



OLYMPUS 593

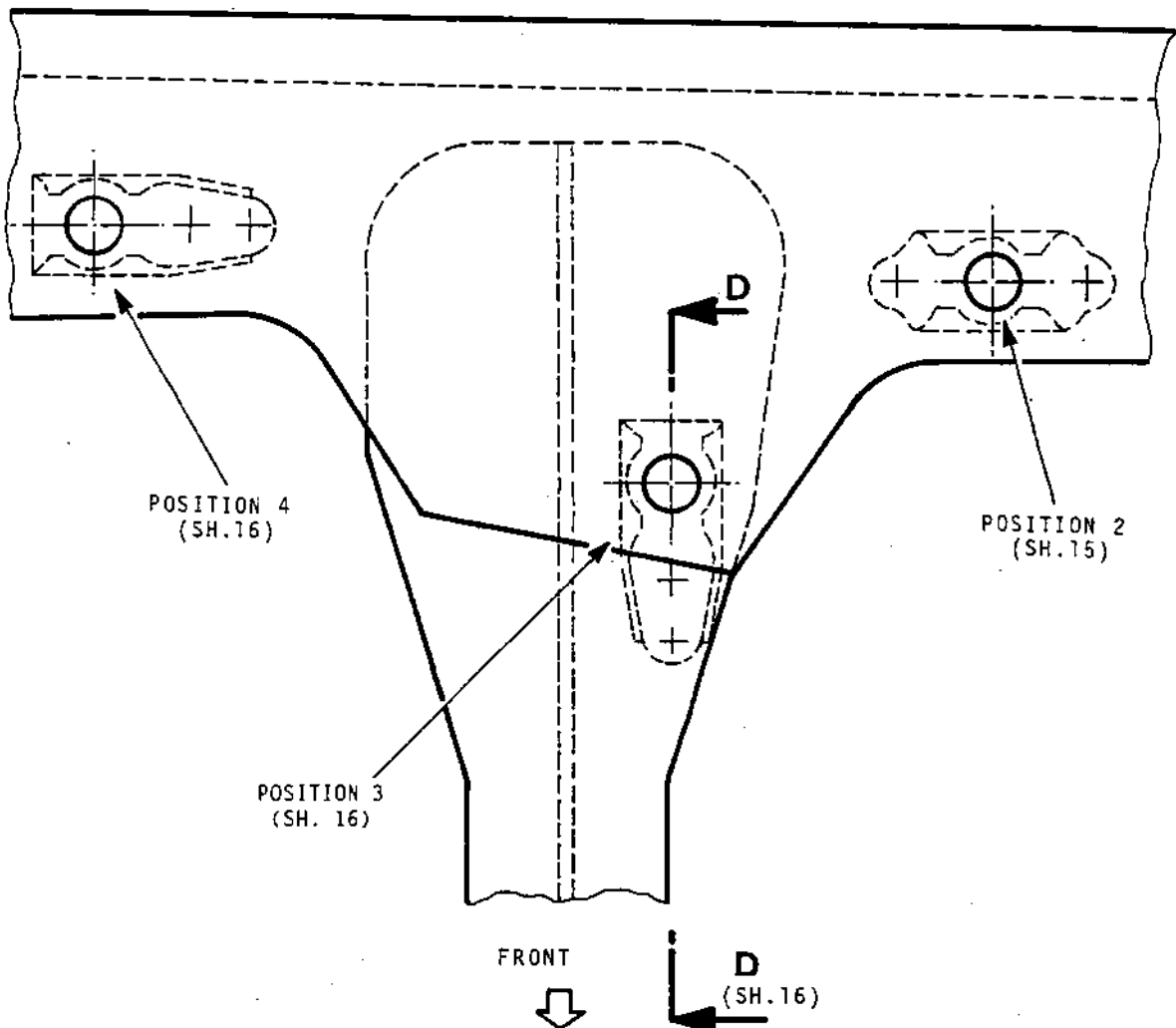
MK.610-14-28
OVERHAUL



F1

FOR NOZZLES
309 TO 313
AND 310 TO 314

XMB 1790.000



Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 2 A of 16)

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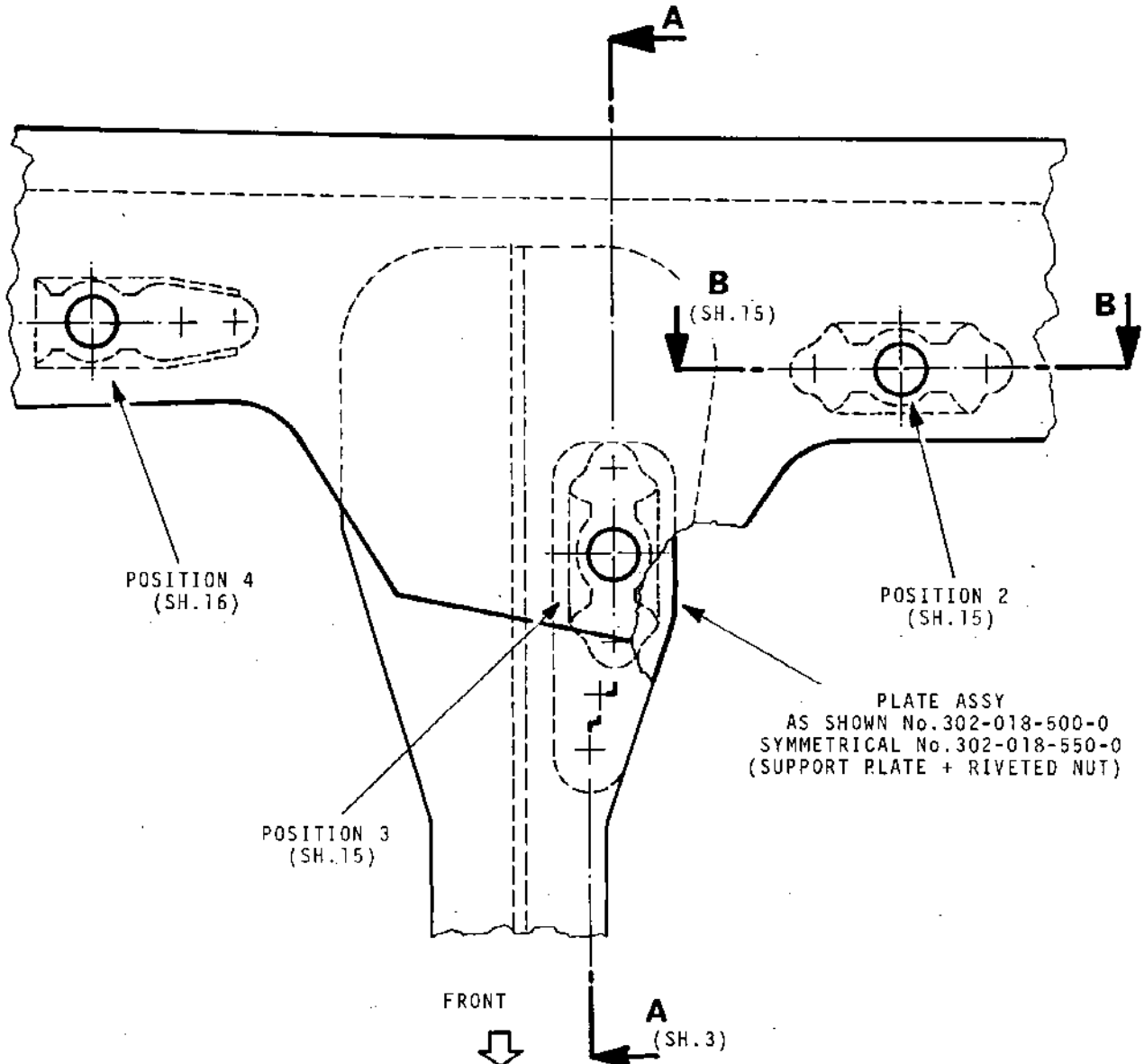
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OVERHAUL



F1

FOR NOZZLES
315 TO ...AND
316 TO ...

XMB 1790.000



Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 2 B of 16)

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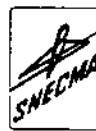
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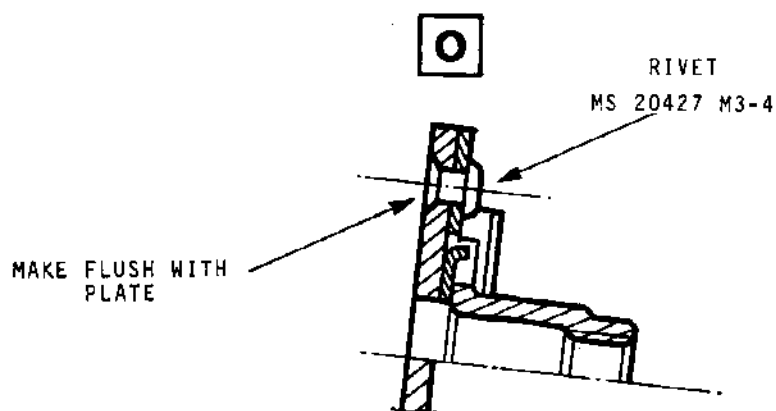
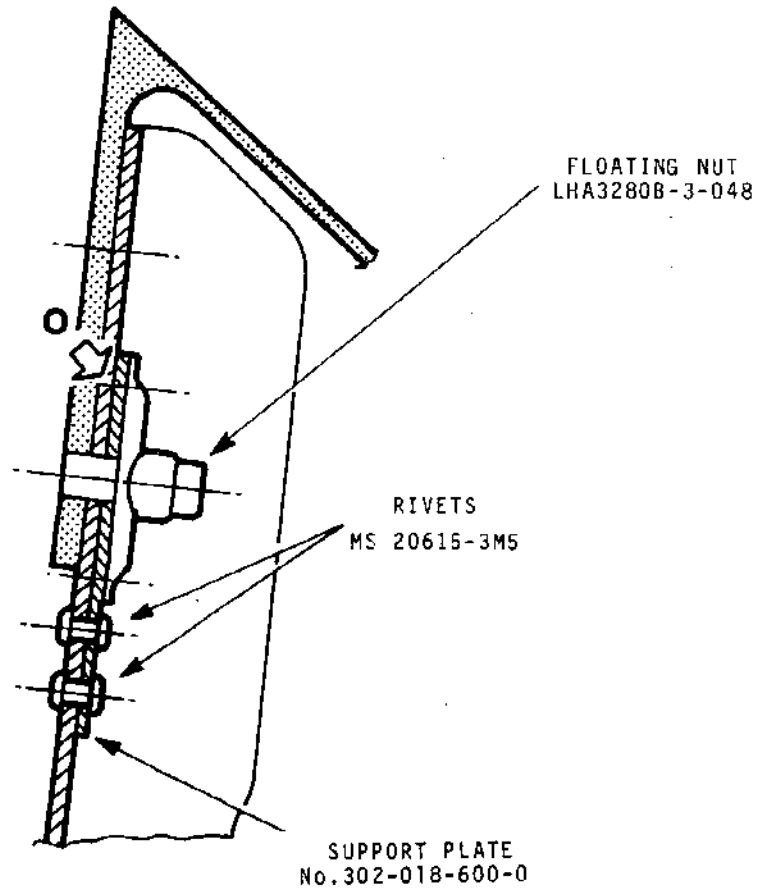


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SECTION A-A



Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 3 of 16)



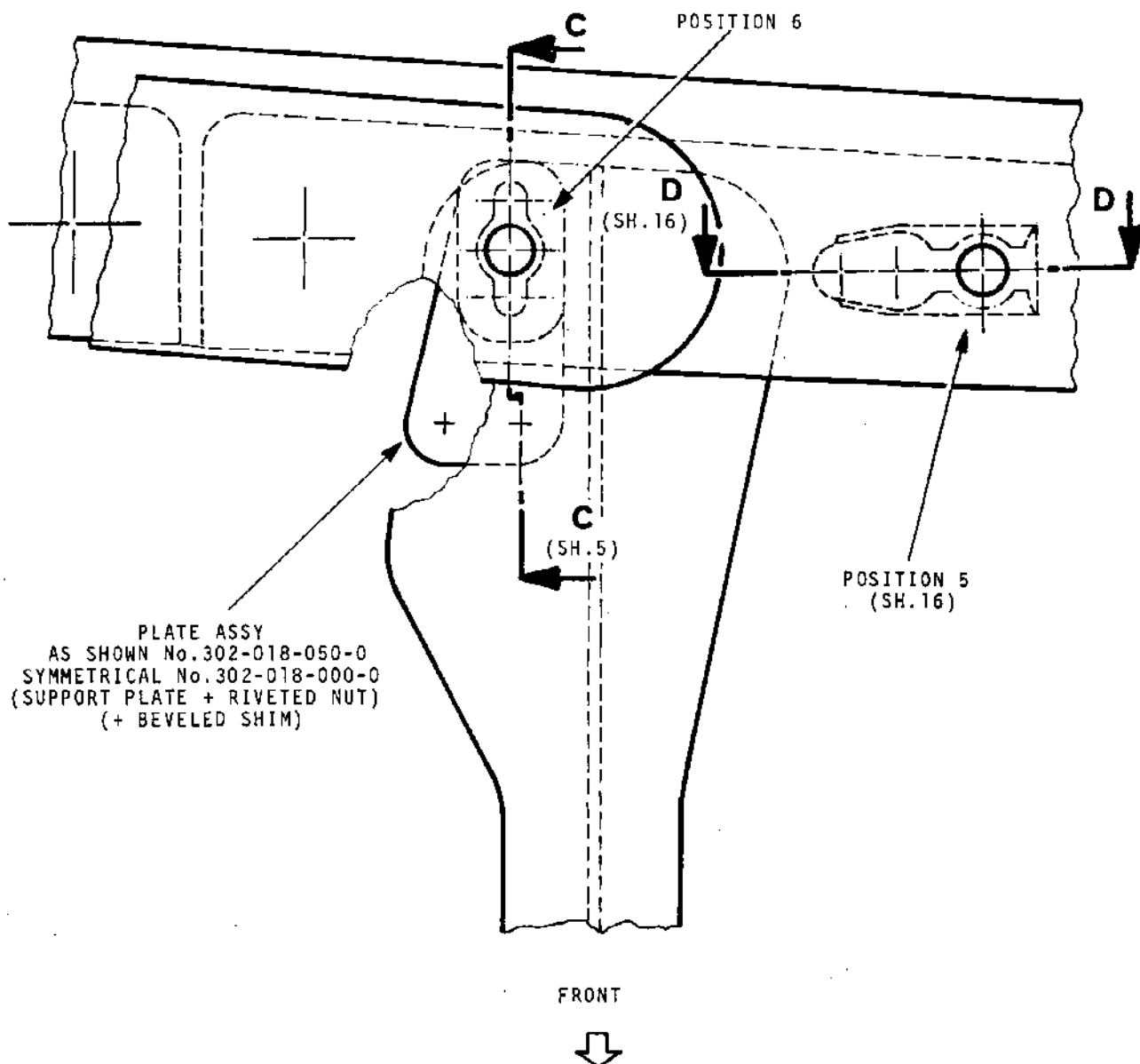
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XMB 1790.000



Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 4 of 16)

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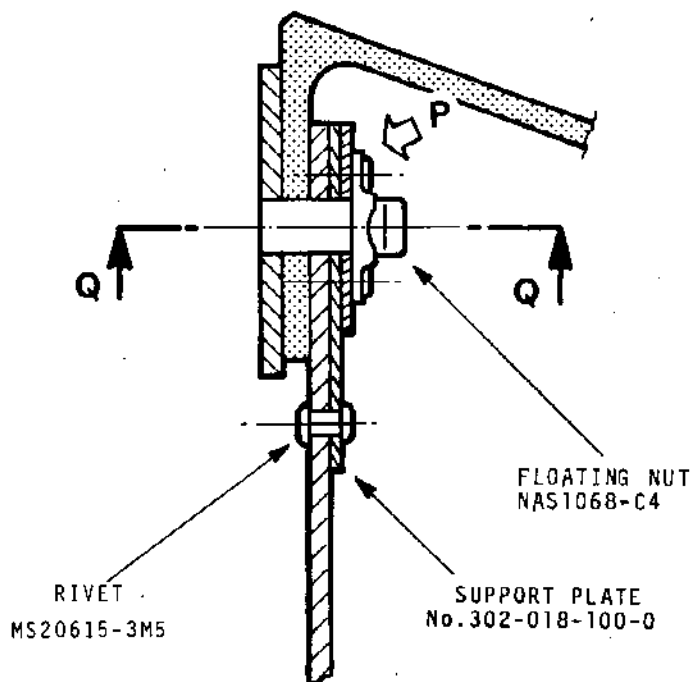


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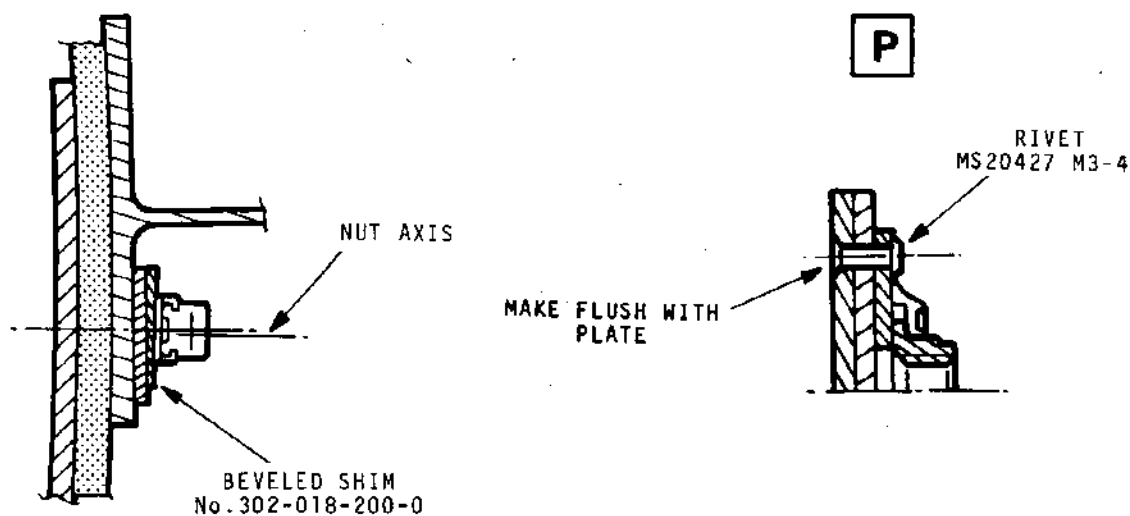


SECTION C-C



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SECTION Q-Q



Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 5 of 16)

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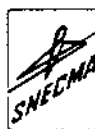
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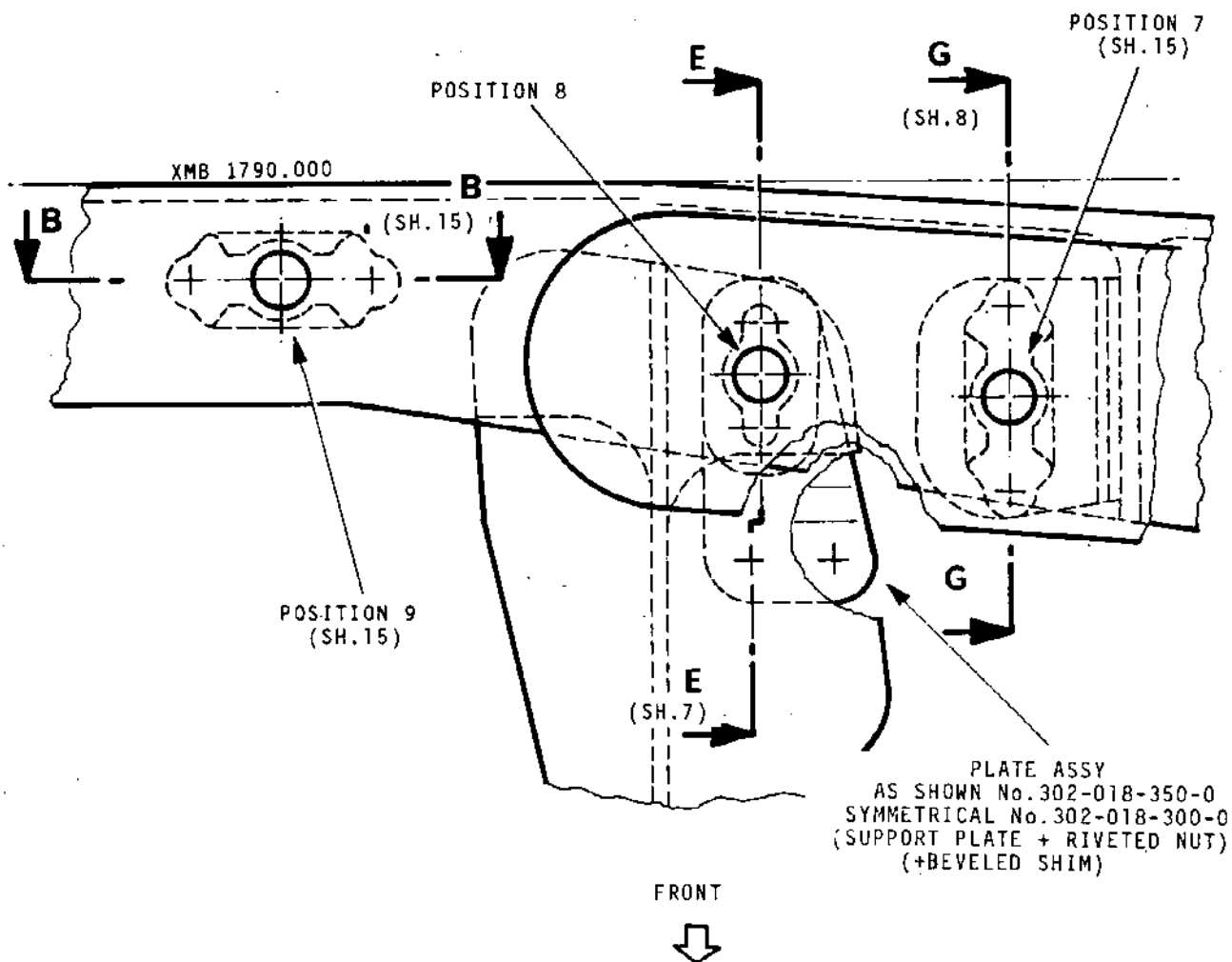
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Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 6 of 16)

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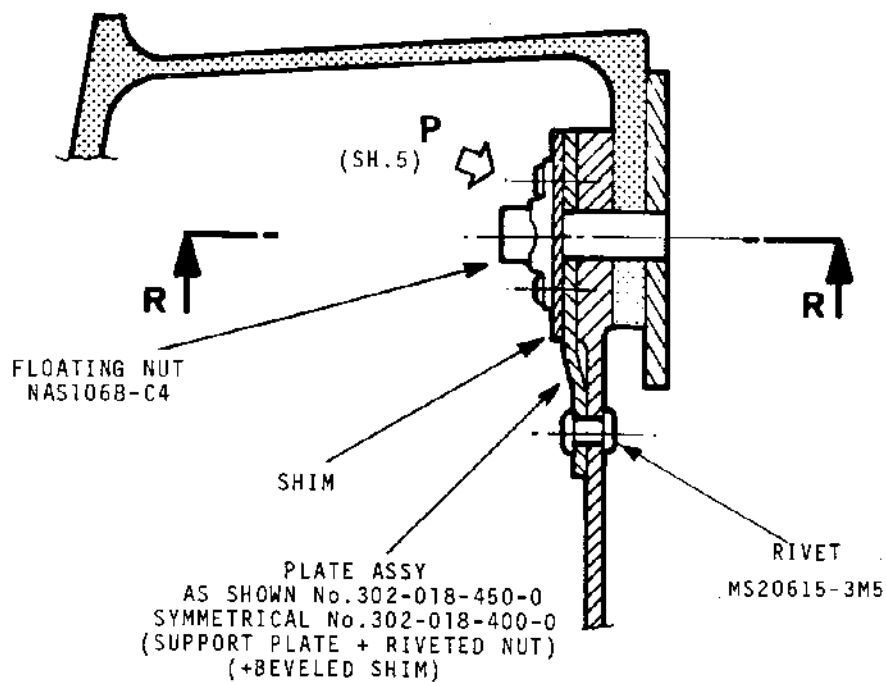
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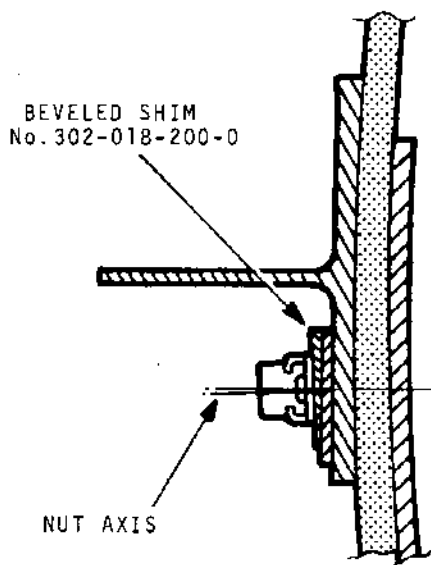
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SECTION E-E



SECTION R-R



Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 7 of 16)

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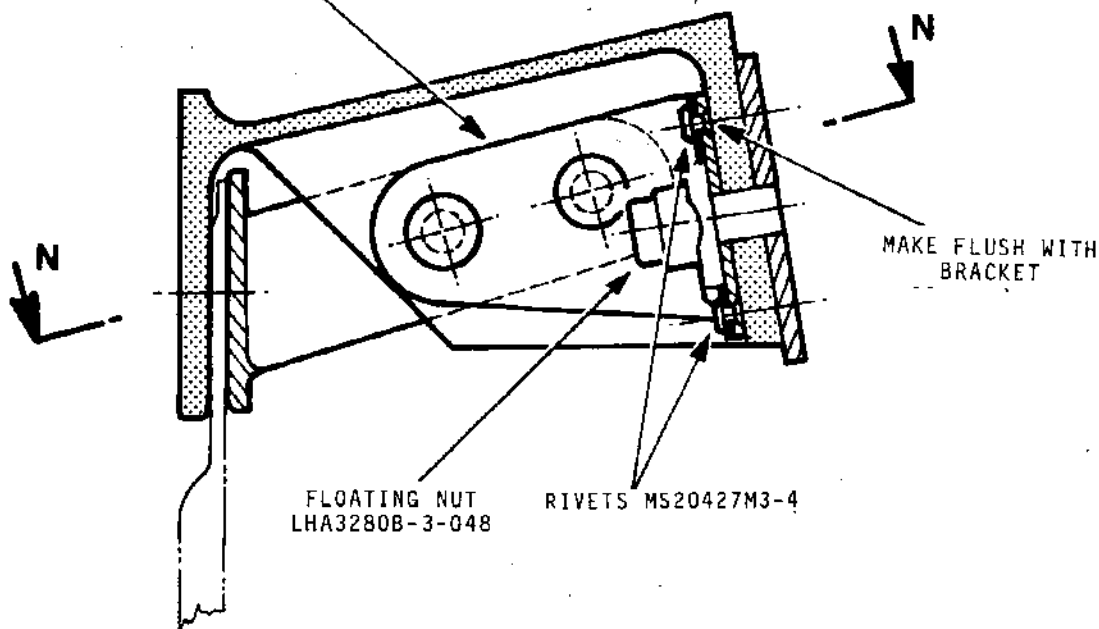
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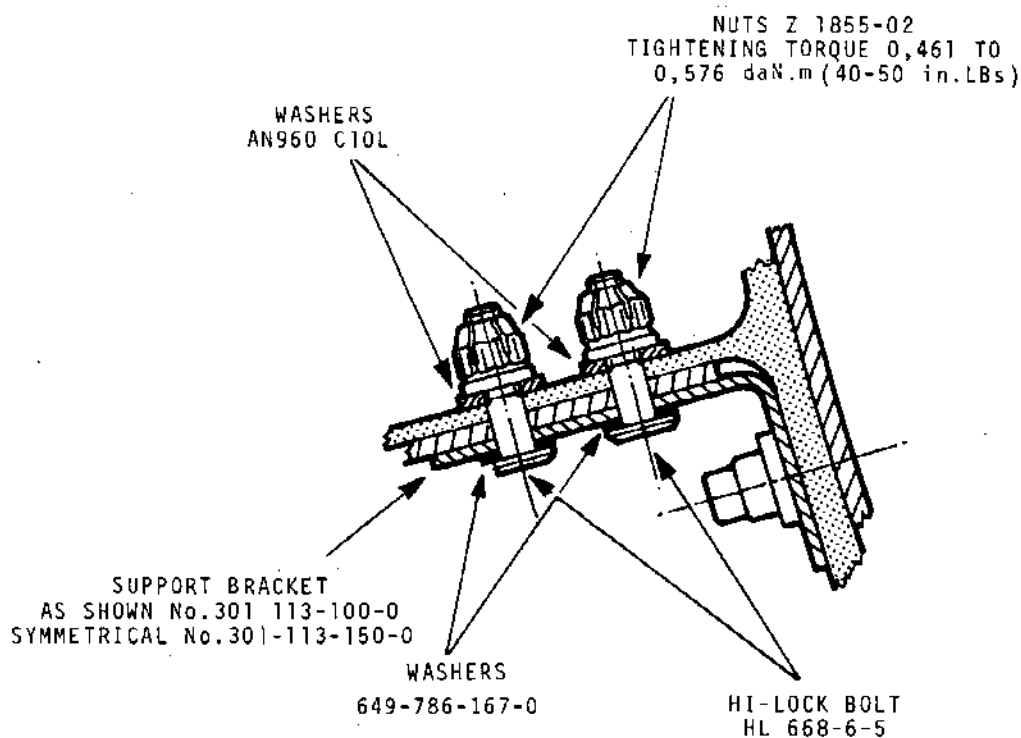
SECTION G-G

SUPPORT BRACKET

XMB 1790.000



SECTION N-N



Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 8 of 16)

N

78-13-01

REP 29-190-2

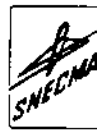
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F4

POSITION 12
(SH.15)



XMB 1790-000

SECTION J-J

FLOATING NUT
LHA3280B-3-048

RIVET MS20427M3-6

SHIM
No.301-059-700-0

MAKE FLUSH WITH
SHIM

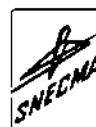
Renewing Attachment Items of Divergent Panels
Next to Rear of Frame
Figure 401 - (Sheet 9 of 16)

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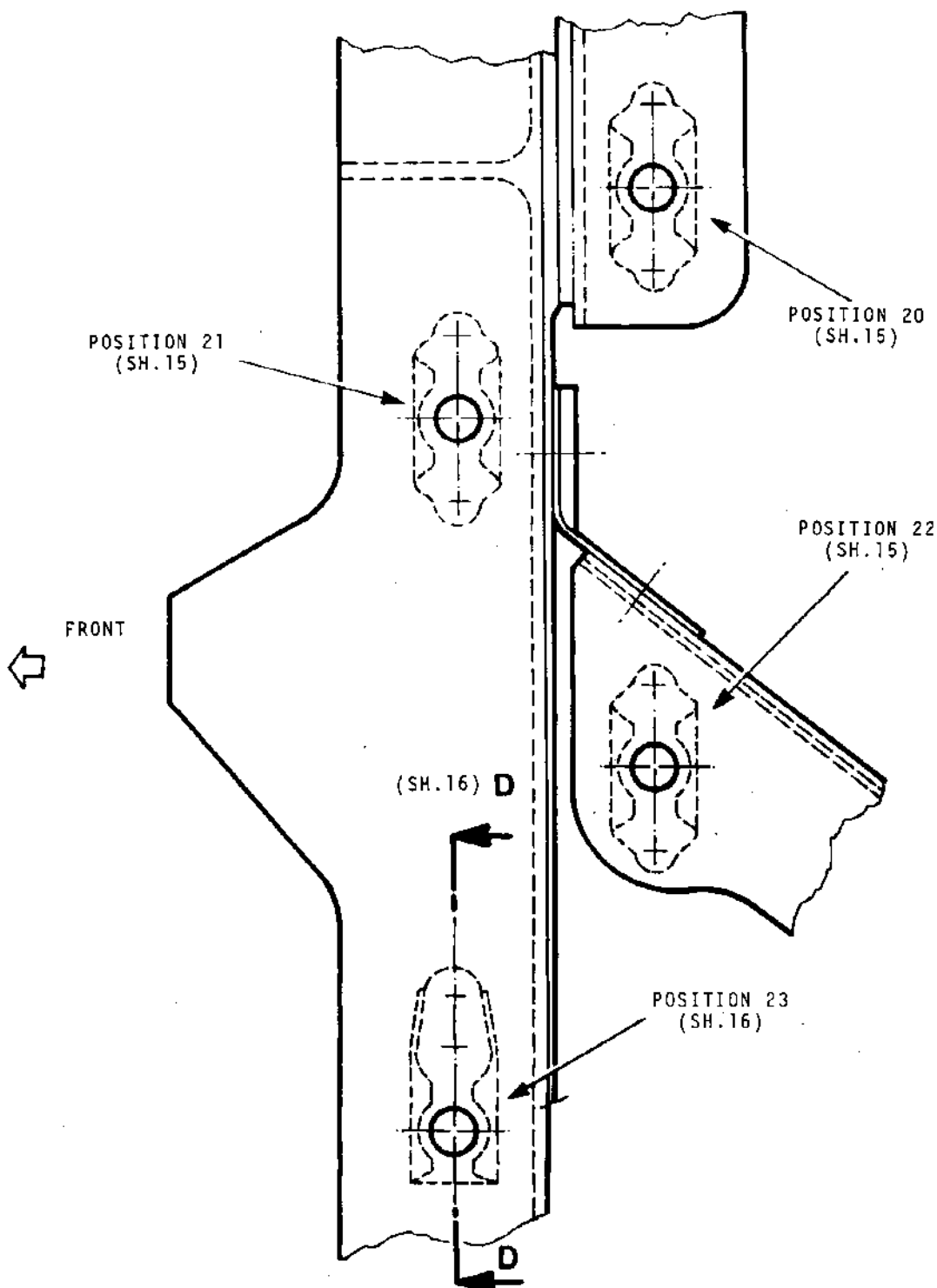


OLYMPUS 593

MK.610-14-28
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Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 10 of 16)

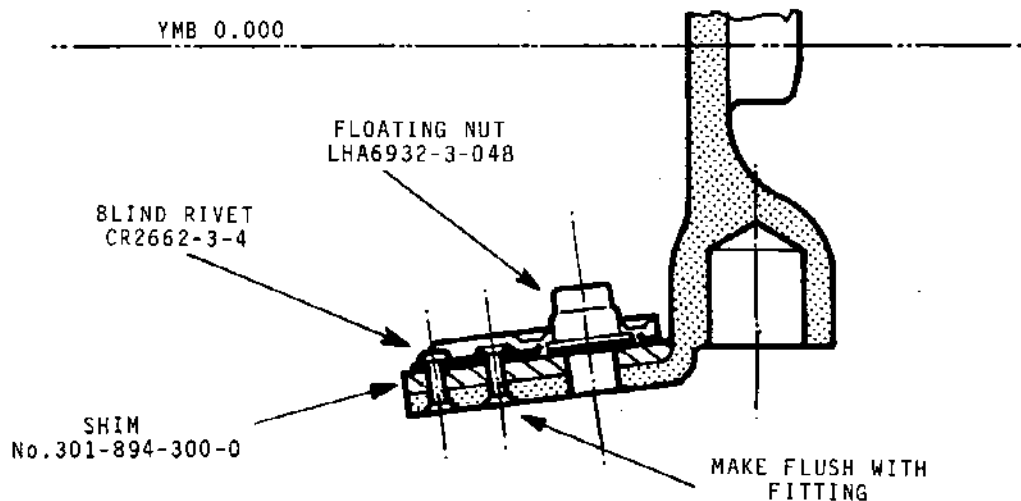
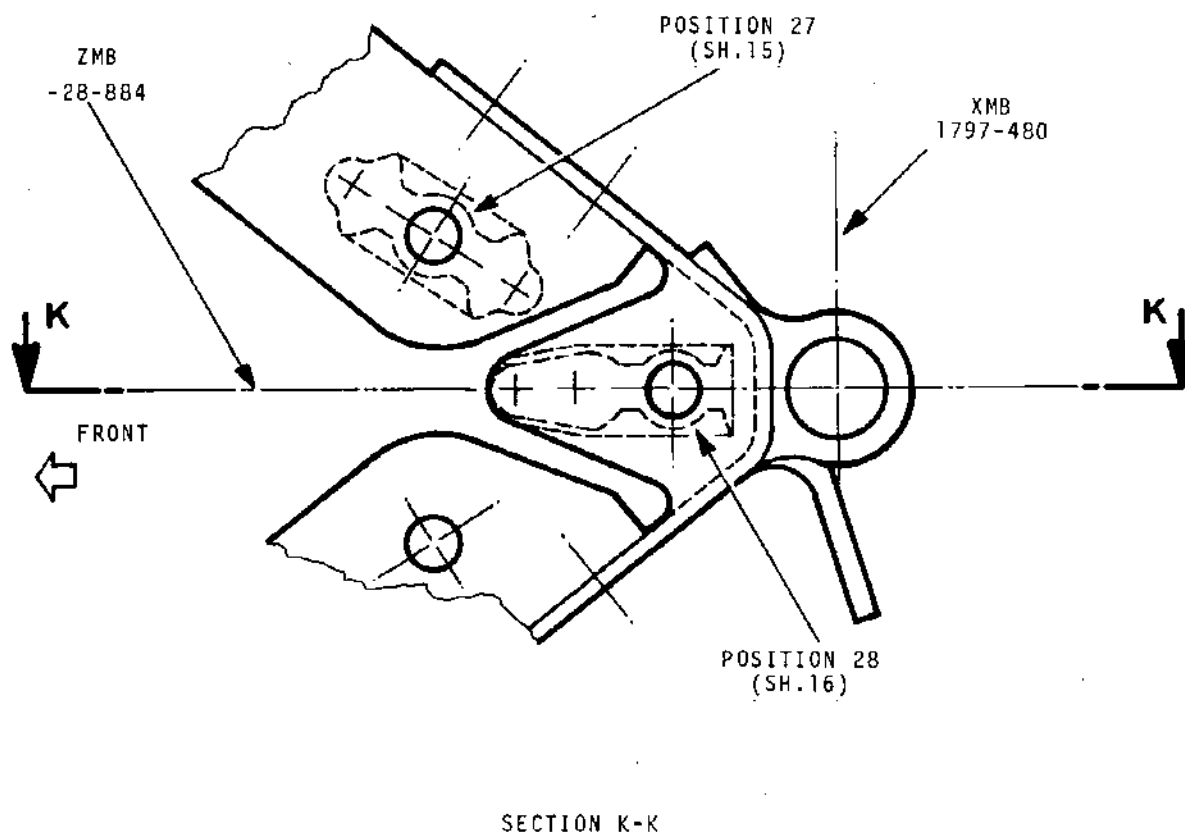


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Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 11 of 16)

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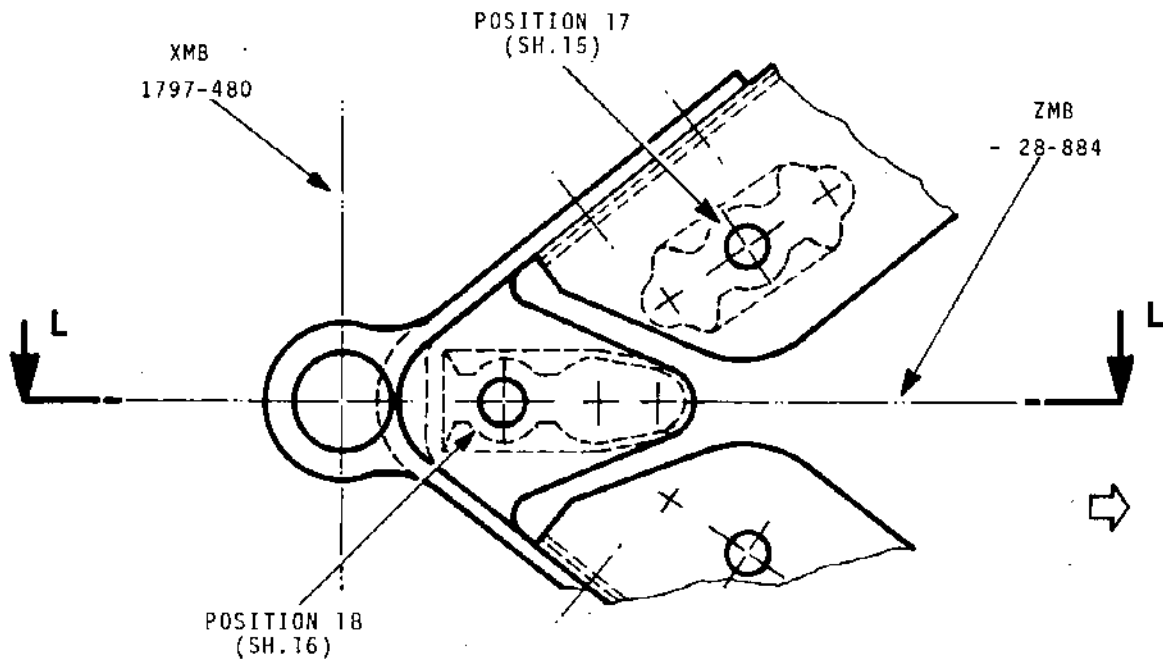


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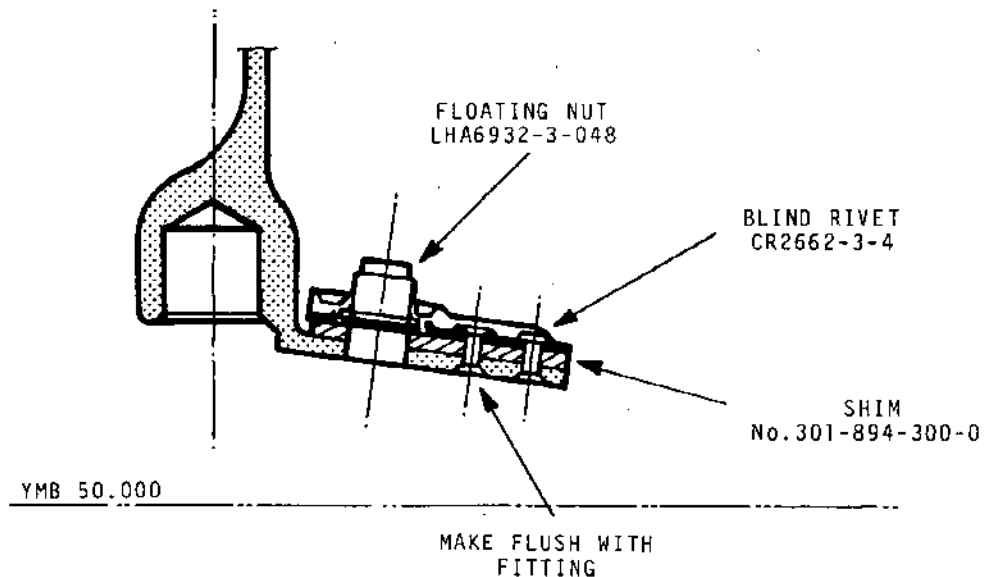
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F7



SECTION L-L



Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 12 of 16)

N

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REP 29-190-2

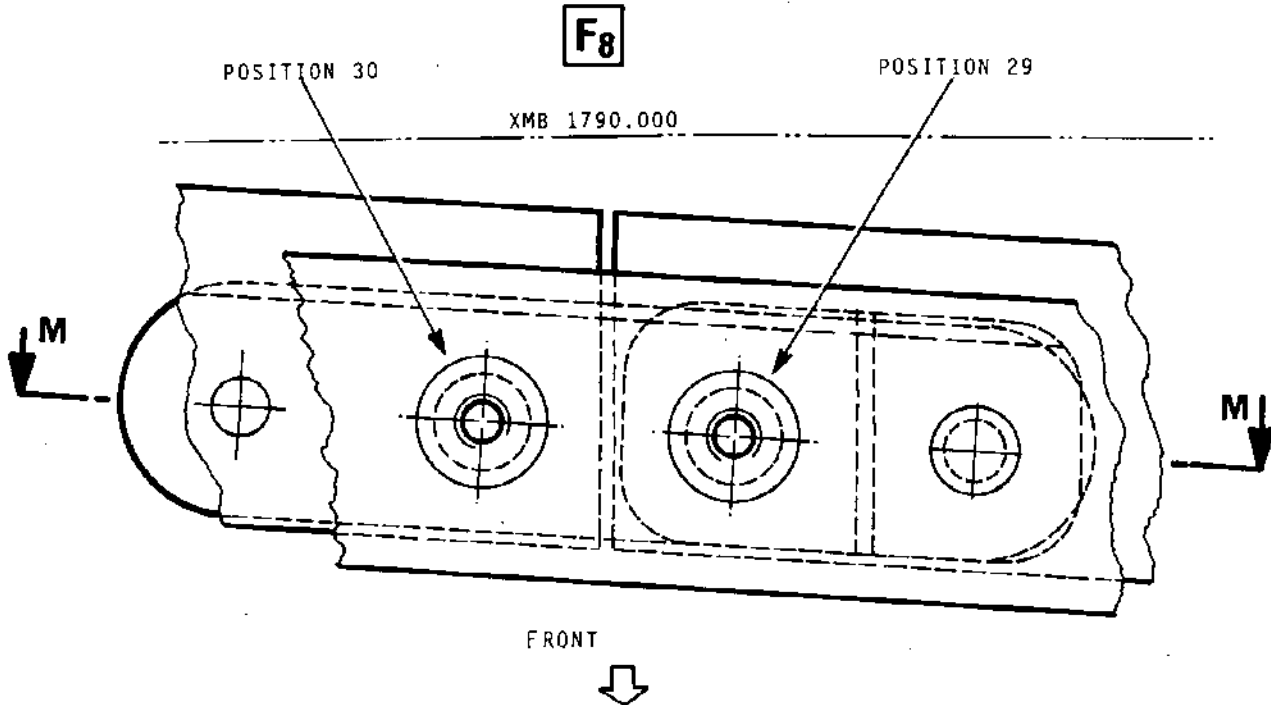
page 417

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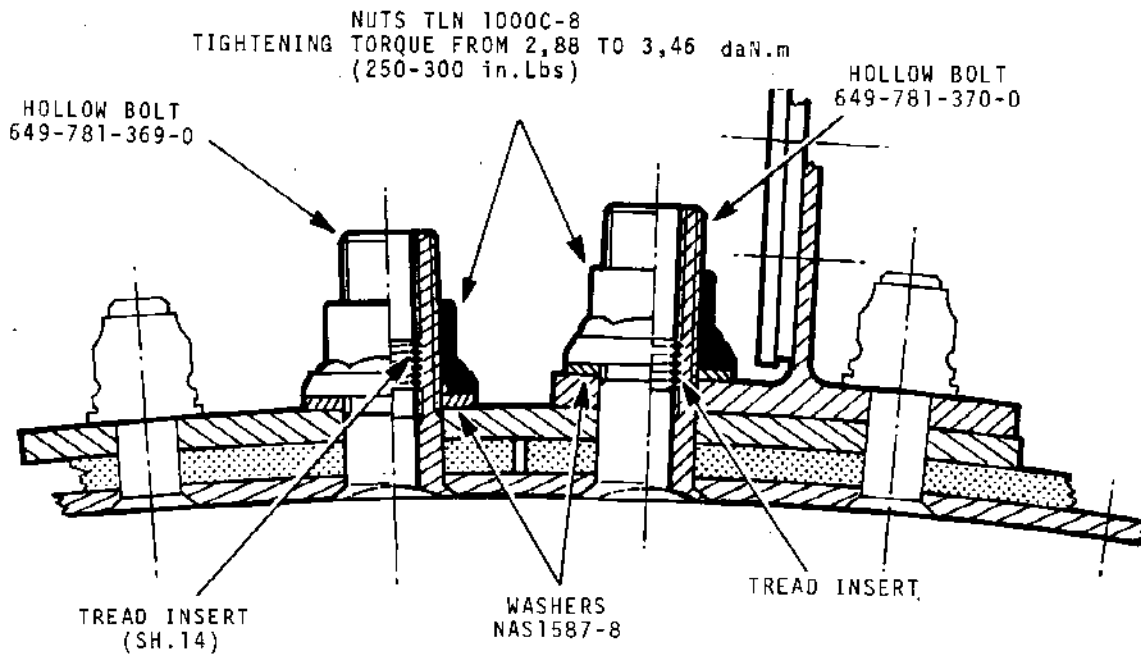


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SECTION M-M

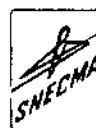


Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 13 of 16)

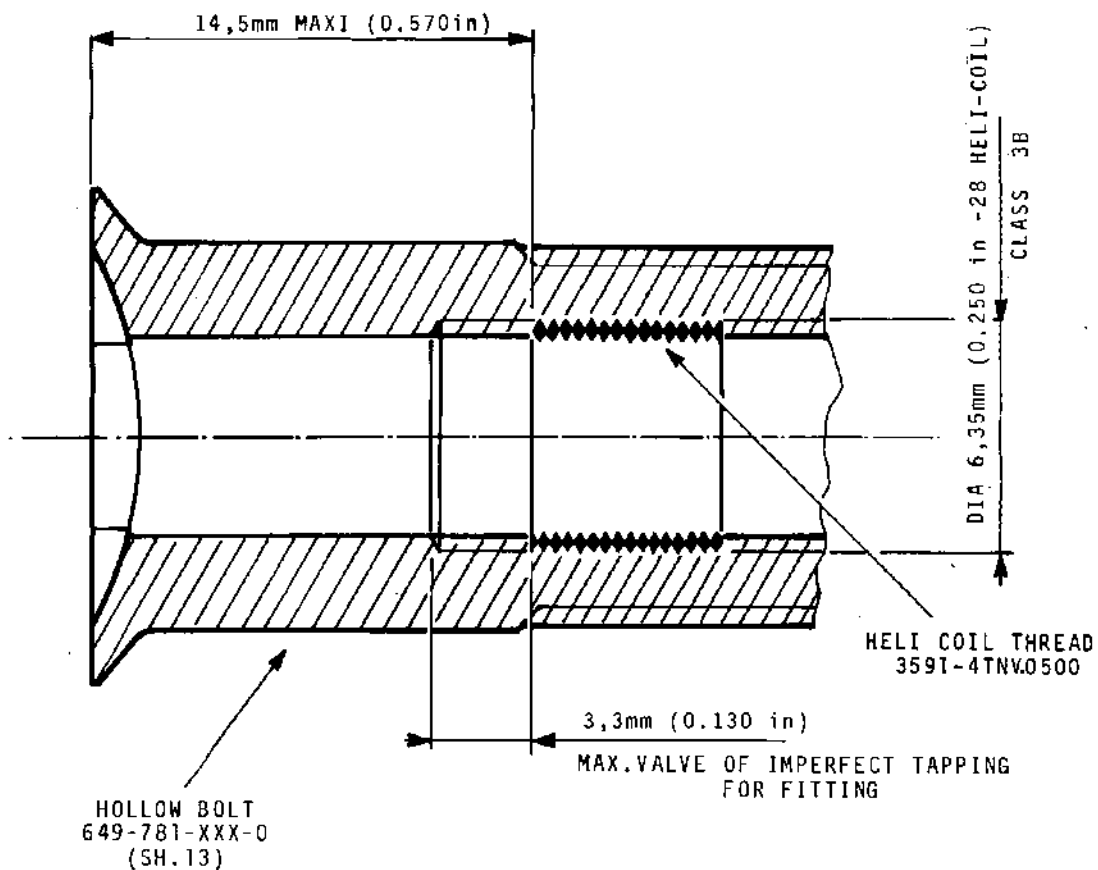


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DETAIL VIEW OF HOW TO FIT IN
TREAD INSERT



Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 14 of 16)

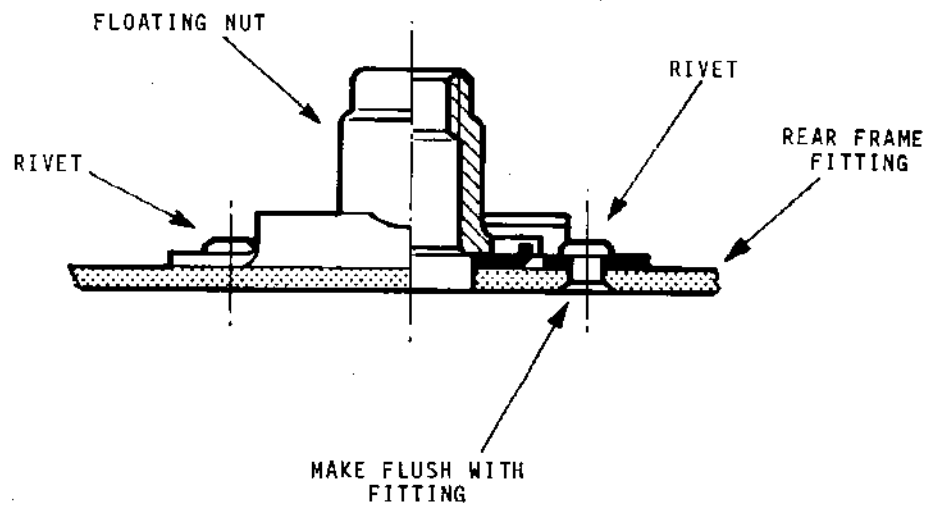


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SECTION B-B



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POSITION	FLOATING NUT	RIVET	REMARKS
1	LHA3280B-6-048	MS20427 M3-6	
2	LHA3280B-6-048	MS20427 M3-6	SEE SH 2/16
3	LHA3280B-3-048	MS20427 M3-4	SEE SH 28/16
7	LHA3280B-3-048	MS20427 M3-4	SEE SH 8/16
9	LHA3280B-6-048	MS20427 M3-7	SEE SH 6/16
10	LHA3280B-2-048	MS20427 M3-6	
11	LHA3280B-3-048	MS20427 M3-7	
12	LHA3280B-3-048	MS20427 M3-6	SEE SH 9/16
13	LHA3280B-6-048	MS20427 M3-4	
14	LHA3280B-6-048	MS20427 M3-4	
15	LHA3280B-4-048	CR2662-3-2	
16	LHA3280B-4-048	CR2662-3-2	
17	LHA3280B-4-048	CR2662-3-2	SEE SH 12/16
19	LHA3280B-6-048	CR2662-3-4	
20	LHA3280B-3-048	MS20427 M3-4	SEE SH 10/16
21	LHA3280B-3-048	CR2662-3-3	SEE SH 10/16
22	LHA3280B-4-048	MS20427 M3-3	SEE SH 10/16
24	LHA3280B-6-048	MS20427 M3-4	
25	LHA3280B-4-048	CR2662-3-2	
26	LHA3280B-4-048	CR2662-3-2	
27	LHA3280B-4-048	CR2662-3-2	SEE SH 11/16

Renewing Attachment Items of Divergent Panels

Next to Rear Frame

Figure 40- - (Sheet 15 of 16)

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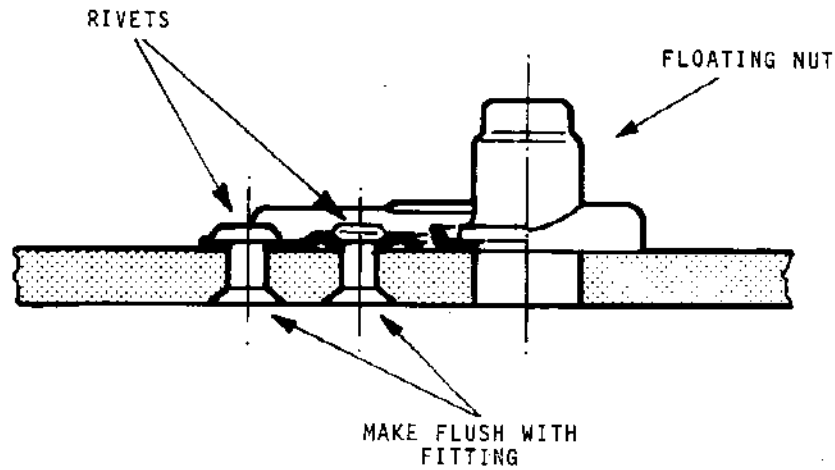
OLYMPUS 593

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SECTION D-D



POSITION	FLOATING NUT	RIVET	REMARKS
3	LHA6932-5-048	MS20427-3-4	SEE SH 2A/16
4	LHA6932-6-048	MS20427-3-6	SEE SH 2/16
5	LHA6932-6-048	MS20427-3-6	SEE SH 4/16
18	LHA6932-3-048	CR2662-3-4	SEE SH 12/16
23	LHA6932-6-048	MS20427-3-4	SEE SH 10/16
28	LHA6932-3-048	CR2662-3-4	SEE SH 11/16

Renewing Attachment Items of Divergent Panels
Next to Rear Frame
Figure 401 - (Sheet 16 of 16)

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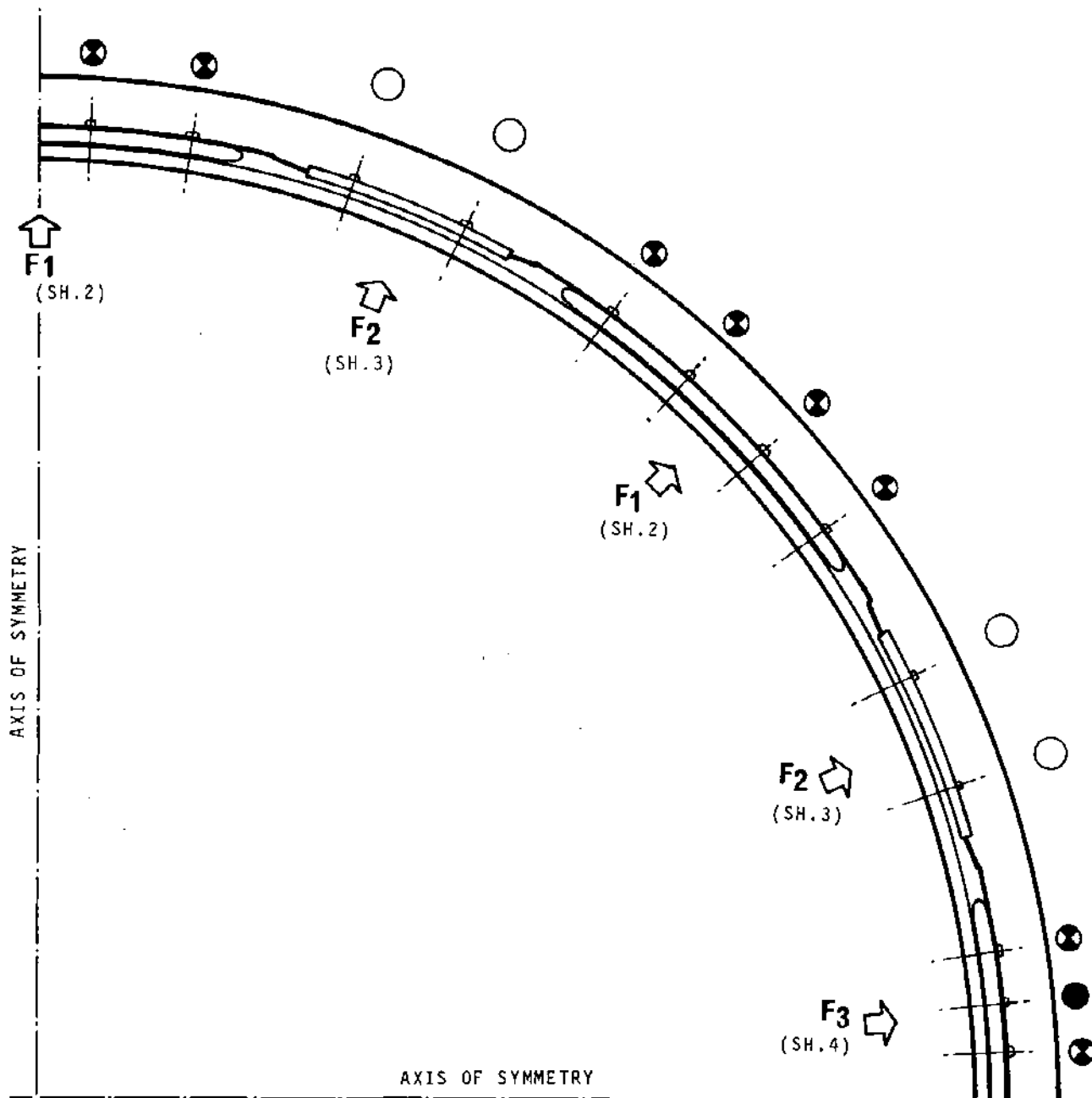


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OVERHAUL



REAR VIEW OF ENGINE AS SEEN AT THROAT SECTION
APPLICABLE TO ENGINES 309 TO 313 AND 310 TO 314
IDENTICAL FOR BAYS 1-2-3 AND 4



Renewing Attachment Items of Divergent Panels
Downstream of Throat Section
Figure 402 - (Sheet 1 of 6)

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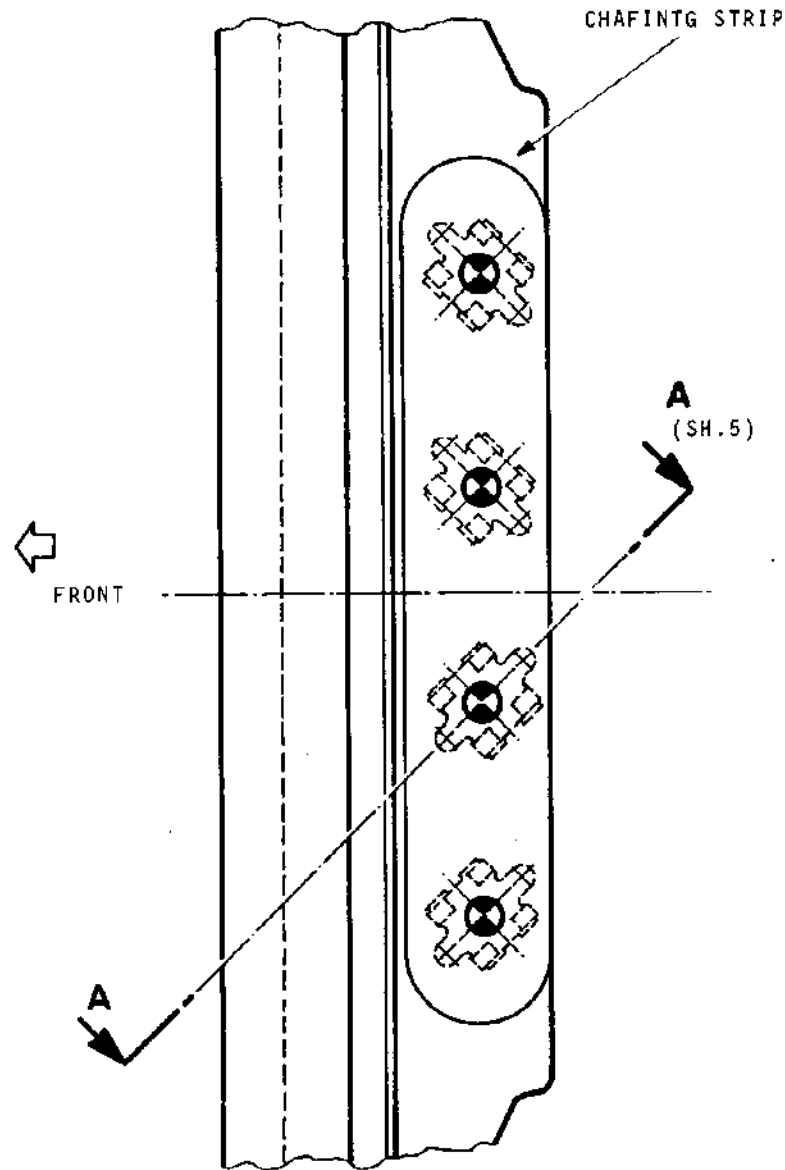


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F₁



Renewing Attachment Items of Divergent Panels
Downstream of Throat Section
Figure 402 - (Sheet 2 of 6)



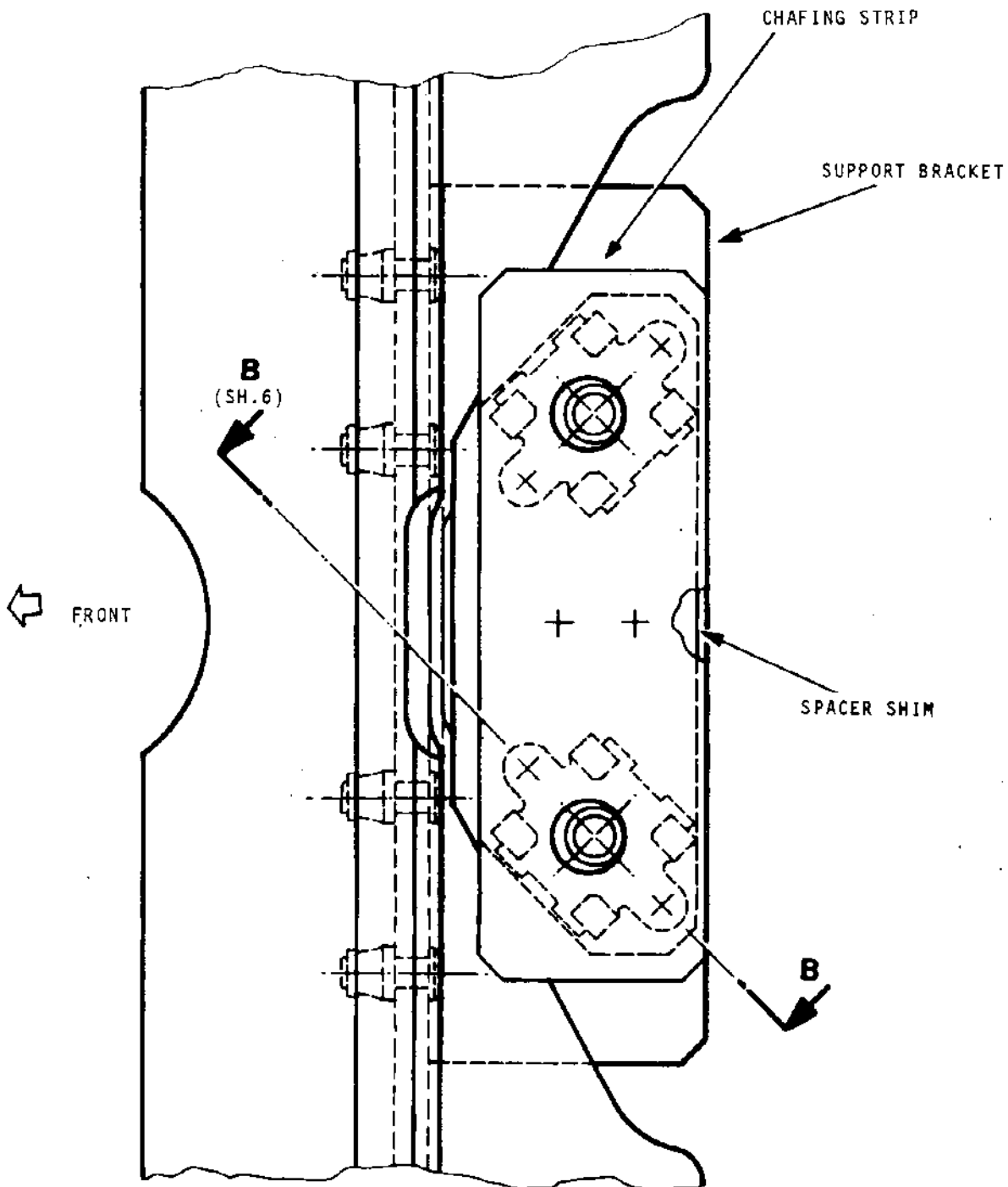
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Renewing Attachment Items of Divergent Panels
Downstream of Throat Section
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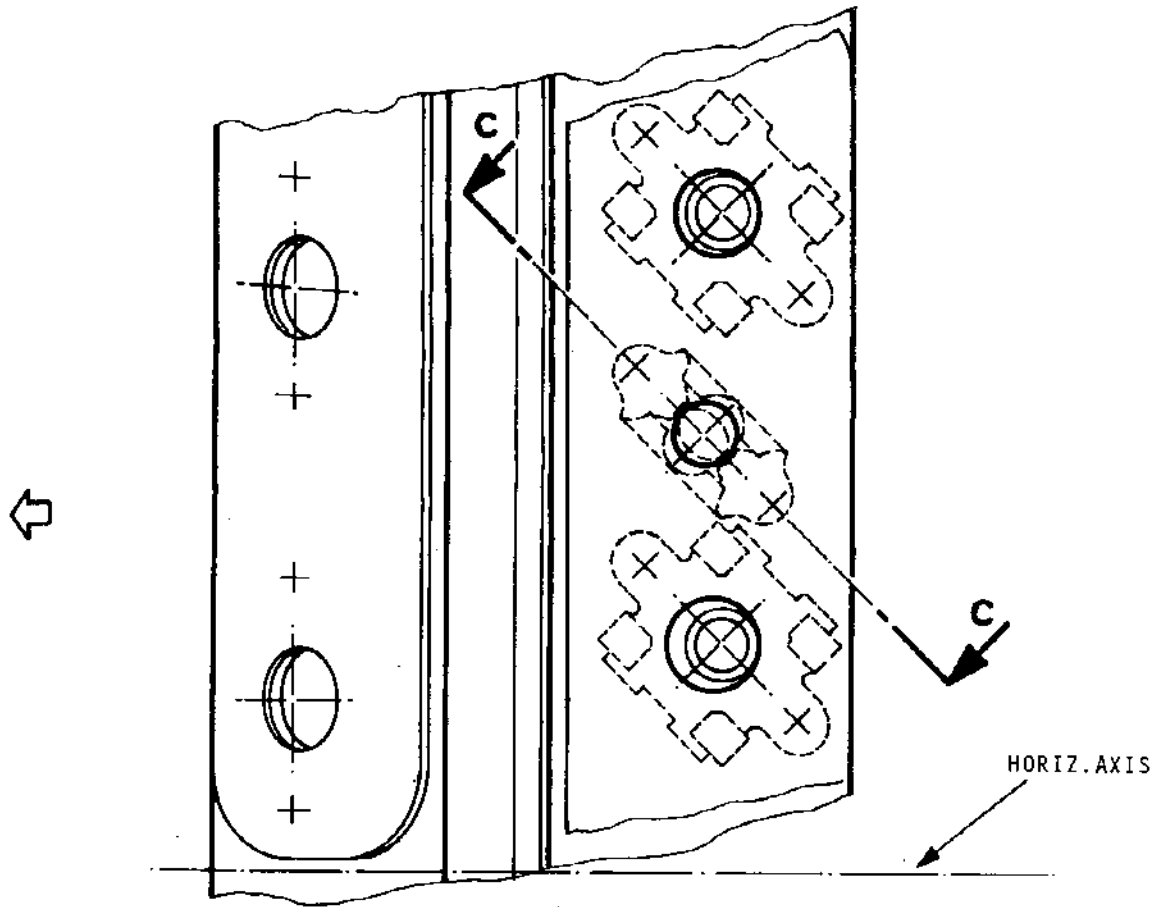
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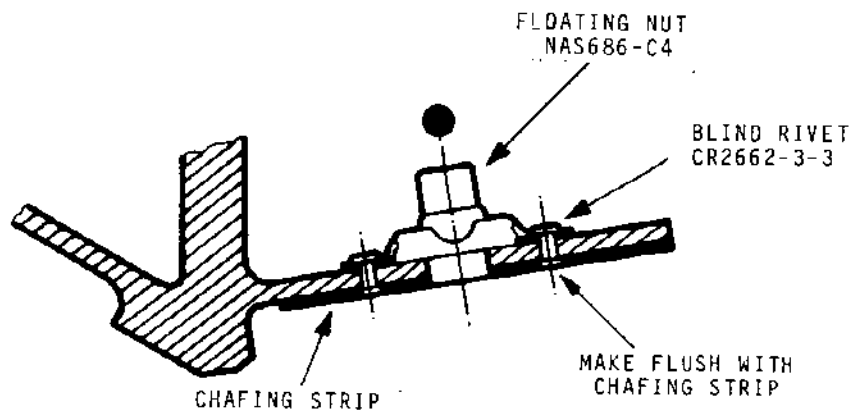
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F3



SECTION C-C

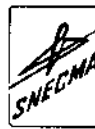


Renewing Attachment Items of Divergent Panels
Downstream of Throat Section
Figure 402 - (Sheet 4 of 6)

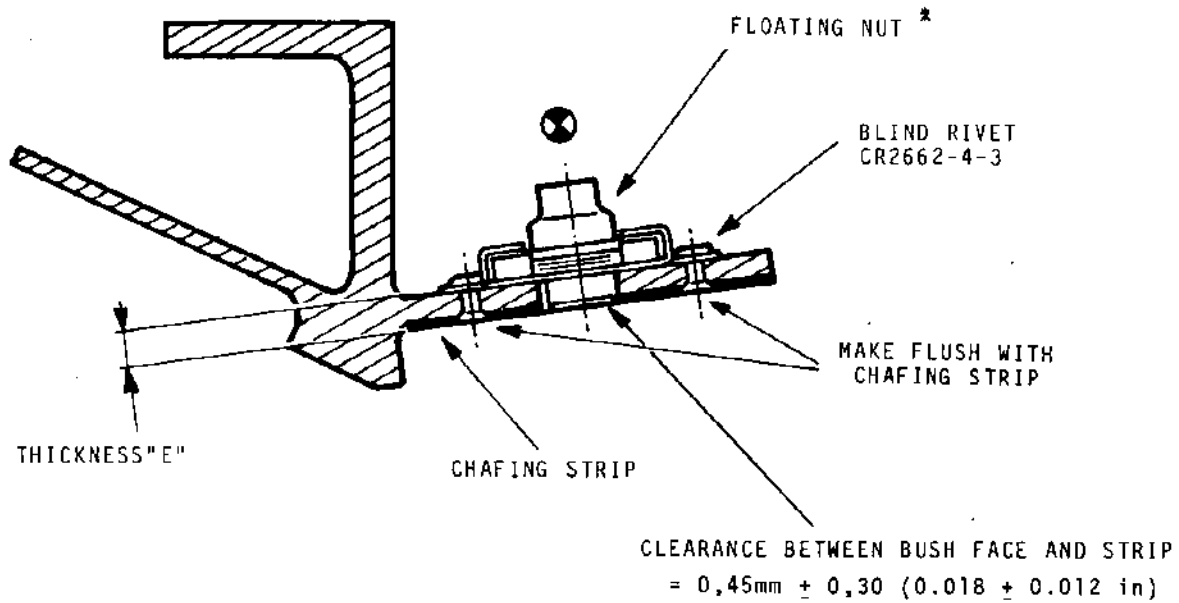


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SECTION A-A



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THICKNESS "E"	FLOATING NUT *
mm (in)	
3,05 mm (0.120 in)	A11471-12-4
3,30 mm (0.130 in)	A11471-13-4
3,56 mm (0.140 in)	A11471-14-4

Renewing Attachment Items of Divergent Panels
Downstream of Throat Section
Figure 402 - (Sheet 5 of 6)

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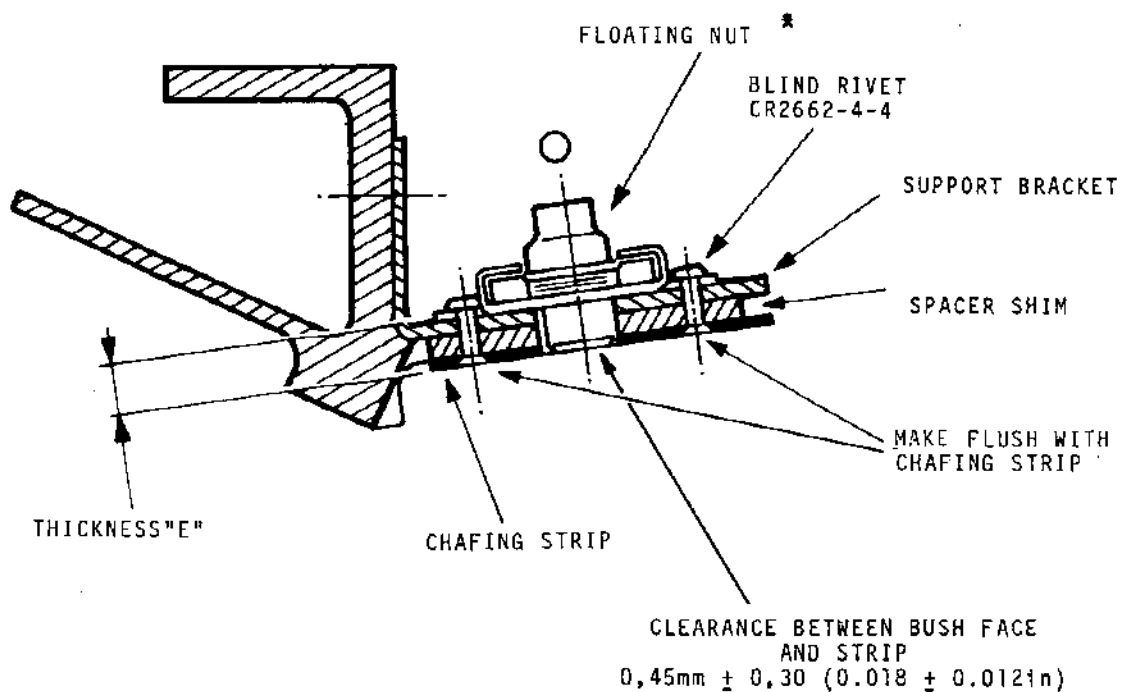


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SECTION B-B



THICKNESS "E"	FLOATING NUT *
mm (in)	
5,08 mm (0.200 in)	A11471-20-4
5,33 mm (0.210 in)	A11471-21-4
5,59 mm (0.220 in)	A11471-22-4

Renewing Attachment Items of Divergent Panels
Downstream of Throat Section
Figure 402 - (Sheet 6 of 6)



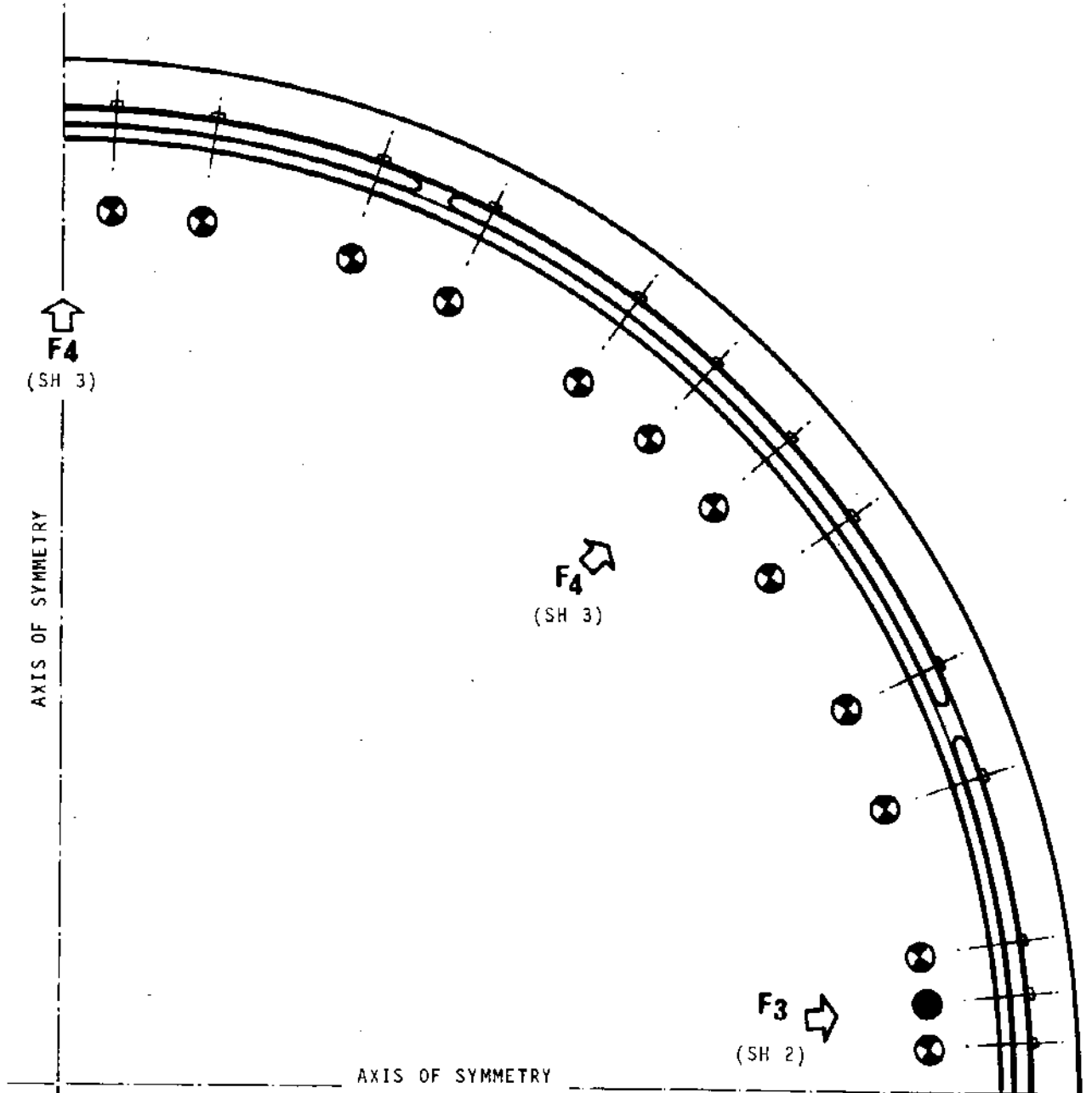
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REAR VIEW ENGINE AS SEEN FROM THROAT SECTION E
APPLICABLE TO ENGINE 315 TO...AND 316 A...
IDENTICAL FOR BAYS 1-2-3 AND 4



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Renewing Attachment Items of Divergent Panels
Downstream of Throat Section
Figure 403 - (Sheet 1 of 4)

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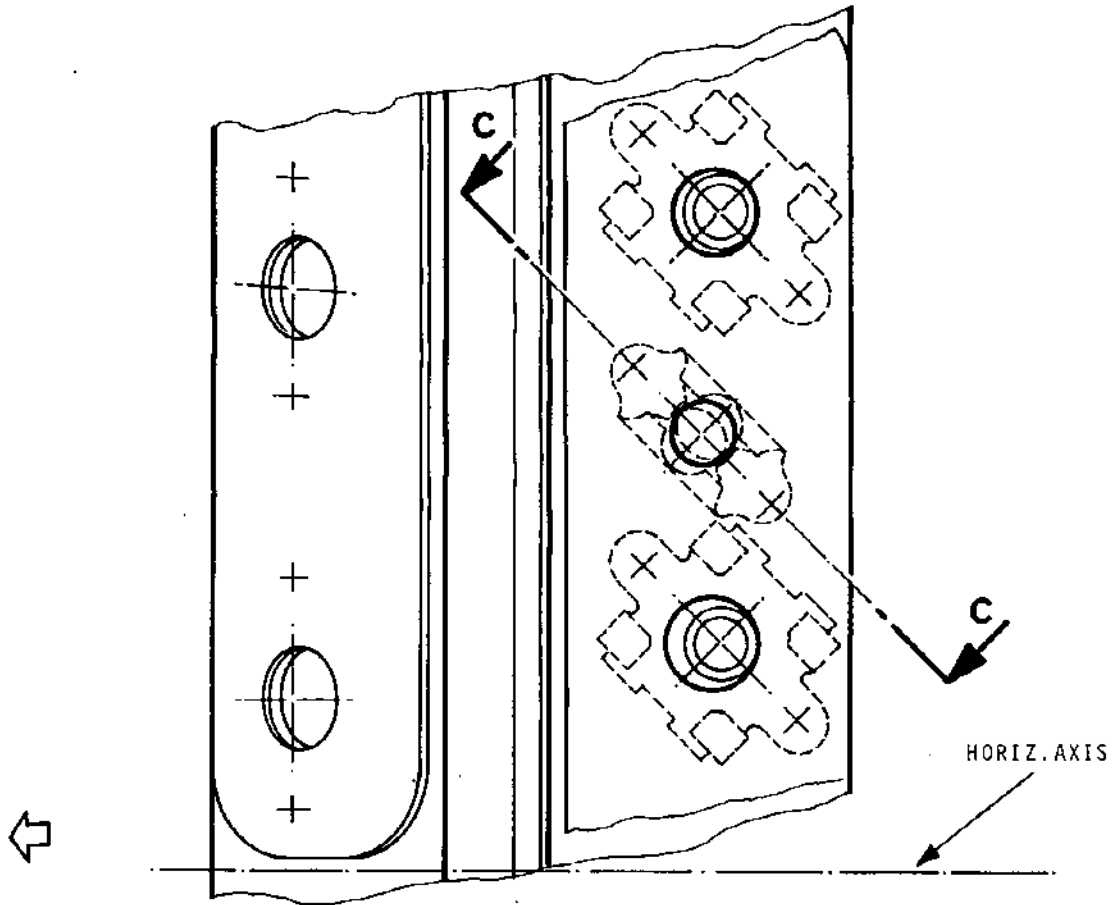


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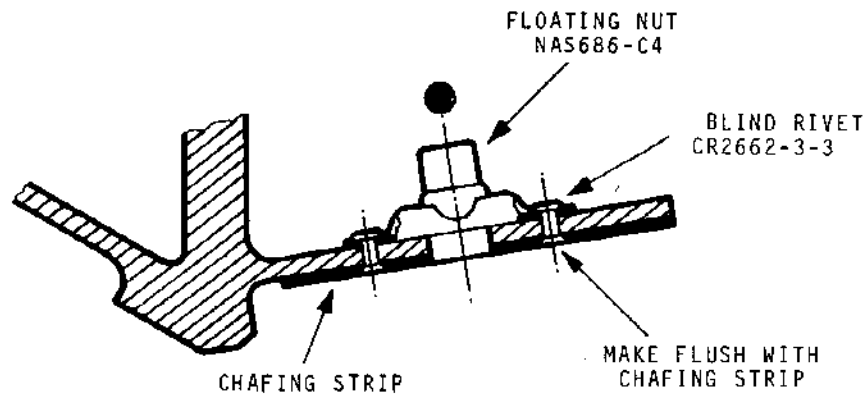
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F3



SECTION C-C



Renewing Attachment Items of Divergent Panels
Downstream of Throat Section
Figure 403 - (Sheet 2 of 4)

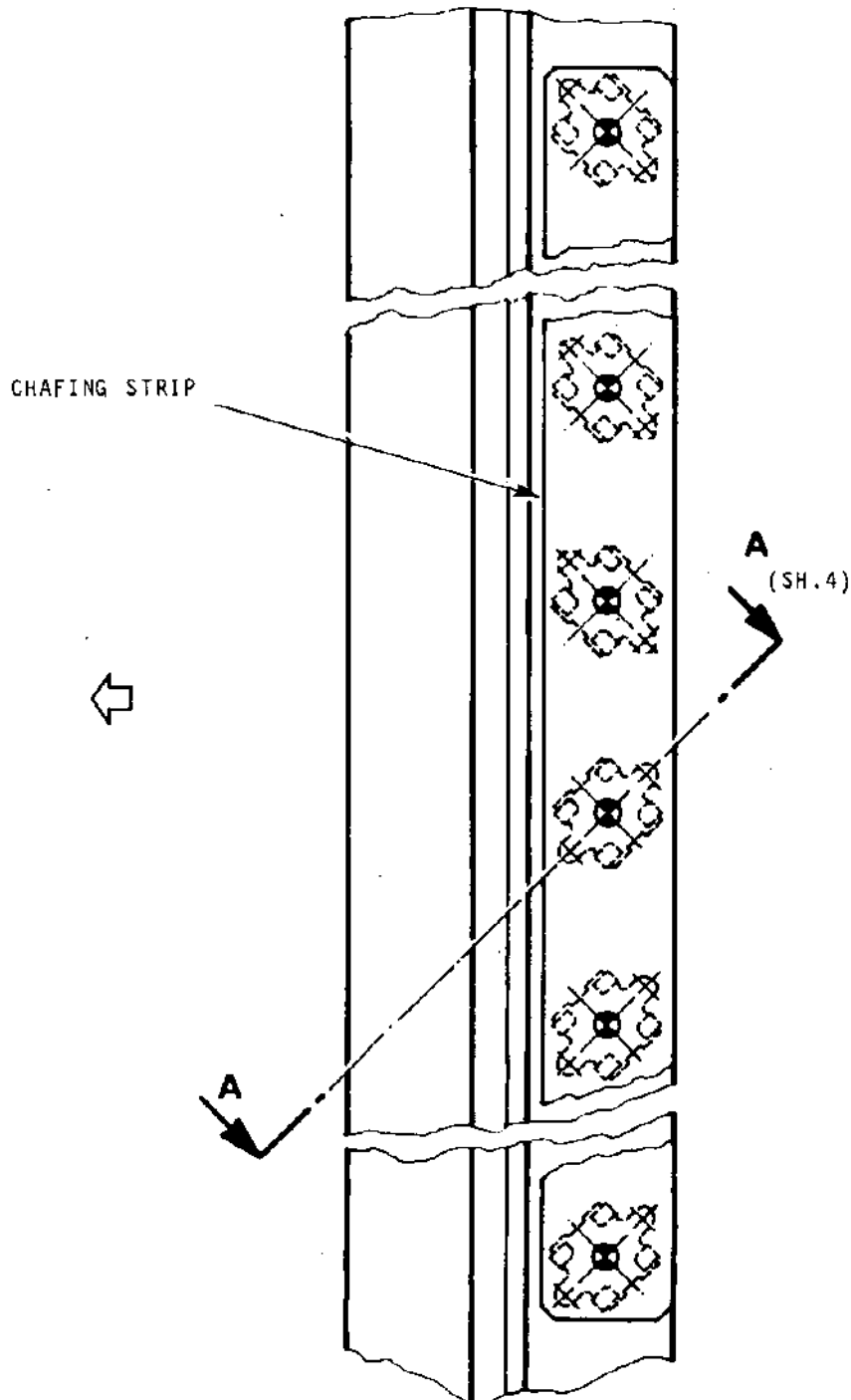


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Renewing Attachment Items of Divergent Panels
Downstream of Throat Section
Figure 403 - (Sheet 3 of 4)

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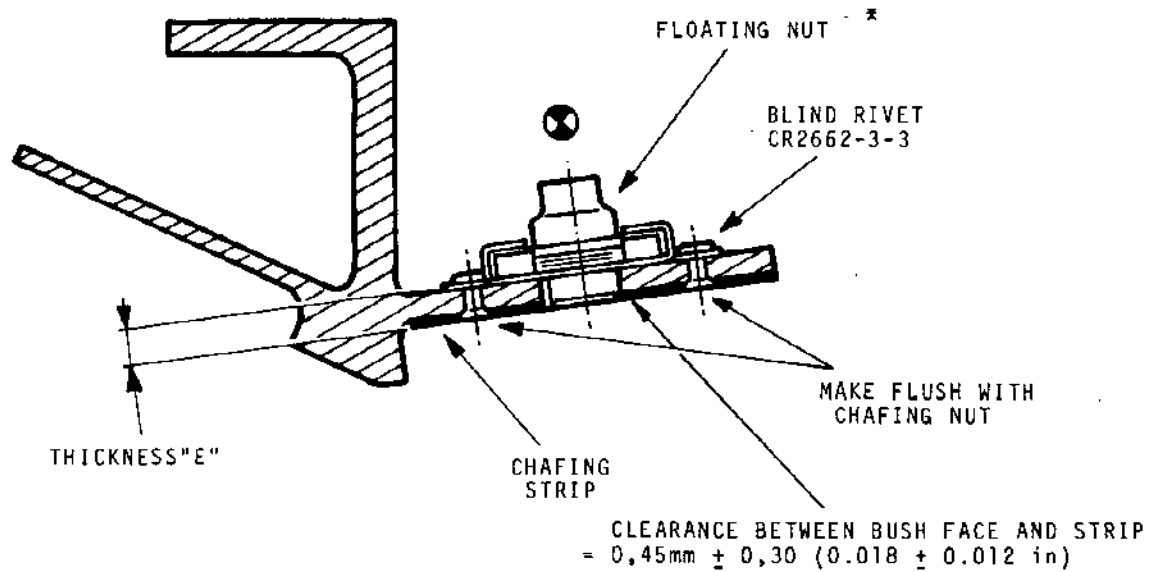


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OVERHAUL



SECTION A-A



THICKNESS "E"	FLOATING NUT *
mm (in)	
3,05 mm (0.120 in)	A11471-T2-4
3,30 mm (0.140 in)	A11471-T3-4
3,56 mm (0.150 in)	A11471-T4-4

Renewing Attachment Items of Divergent Panels
Downstream of Throat Section
Figure 403 - (Sheet 4 of 4)

**OLYMPUS 593****MK. 610-14-28****OVERHAUL**REPAIRTWIN SECONDARY NOZZLE (29-190/191)3. Renewing Attachment Items of Access Doors

PARTS REQUIRED FOR REPAIR

Nut cage	302-063-700-0	
Nut cage	SPC9500-11	(649-785-041-0)
Self-locking nut	SPC9501-1	(649-785-042-0)
Self-locking nut	SPC9501-2	(649-785-043-0)
Self-locking nut	SPC9501-3	(649-785-044-0)
Self-locking nut	SPC9501-4	(649-785-046-0)
Self-locking nut	SPC9501-5	(649-785-047-0)
Self-locking nut	SPC9501-6	(649-785-048-0)
Threaded bush	SPC9103-5	(649-773-130-0)
Threaded bush	SPC9103-6	(649-773-131-0)
Threaded bush	SPC9103-7	(649-773-132-0)
Threaded bush	SPC9103-8	(649-773-133-0)
Threaded bush	SPC9103-9	(649-773-134-0)
Threaded bush	SPC9103-10	(649-773-135-0)
Threaded bush	SPC9103-11	(649-773-136-0)
Threaded bush	SPC9103-12	(649-773-137-0)
Threaded bush	SPC9103-13	(649-773-138-0)
Floating nut	A11471-7-4	(649-785-103-0)
Floating nut	A11471-8-4	(649-785-131-0)
Floating nut	A11471-14-4	(649-785-105-0)
Floating nut	A11471-17-4	(649-785-106-0)
Floating nut	A11471-18-4	(649-785-107-0)
Floating nut	A11471-19-4	(649-785-108-0)
Floating nut	A11471-20-4	(649-785-109-0)
Floating nut	A11471-21-4	(649-785-110-0)
Floating nut	A11471-22-4	(649-785-133-0)
Floating nut	LHA3280B2-048	(649-785-114-0)
Floating nut	LHA3280B3-048	(649-785-115-0)
Floating nut	LHA3280B5-048	(649-785-117-0)
Tab nut	NAS686C4	(649-785-095-0)
Rivet F100	NAS1200-4-5	(649-772-116-0)
Rivet F100	NAS1200-4-6	(649-772-117-0)
Rivet F100	NAS1200-4-7	(649-772-118-0)
Blind rivet F100	CR2662-4-4	(649-772-064-0)
Blind rivet F100	CR2662-4-4	(649-772-064-0)
Rivet F100	21217TC3207	(650-025-073-0)

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PARTS REQUIRED FOR REPAIR (CONT'D)

Rivet	MS20427M3-4	(650-022-042-0)
Rivet	MS20427M3-5	(650-022-044-0)
Rivet	MS20427M3-6	(650-022-046-0)
Rivet	MS20427M3-7	(650-022-047-0)
Rivet	MS20427M3-8	(650-022-049-0)
Shim for nut	NAS463XC416NO	(649-785-125-0)

A. Introduction

Two attachment items for the access doors are required for use in this type or repair.

- (1) Floating type nut (NAS686, LHA3280B and A11471).
Replace them as described in Chapter B.
- (2) Anchor type nut (cage, nut and threaded bush assembly).
Replace them in the way described in Chapter C.

B. Replacing floating nuts

- (1) Remove damaged floating nuts, regrinding the heads of the rivets securing them. The procedure to be followed is described :
 - (a) For nuts LHA3280B and NAS686, in chapter RIVETING Section 70-50-10 : Standard assembly (see figure 401).
 - (b) For nuts A11471, in chapter RIVETING, Sections 70-50-10 : Standard assembly, and 70-50-50 : Assembly with CHERRY LOCK blind rivets (see figure 401, Sheets 4, 5, 10 and 11).
- (2) Fit a new floating nut in the following way :
 - (a) In case of nuts LHA3280B and NAS686, fit them as shown in figure 401 and secure them with rivets, following the instructions given in chapter "RIVETING", Section 70-50-10 : Standard assembly and the indications in figure 401.

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NOTE : In some types of LHA3280B floating nuts, remember to insert a shim between the nut and its support (see figure 401, Sheets 6 and 7).

(b) For floating nuts of the type A11471, proceed as follows :

- 1 Choose a nut suited to the thickness "E" of the unit fully assembled, in conformity with the values tabulated in figure 402.
- 2 Make sure before riveting that the out-of-flush level difference of the bush lies within the tolerance limits specified in figure 402. By this measure it is ensured that the nut is free to slide in its cage after riveting.
- 3 Secure the floating nuts as directed in chapter "RIVETING", Section 70-50-50 : Assembly with CHERRY LOCK blind rivets and in figure 401.

(3) Check the riveting of the floating nuts in compliance with the instructions given in chapter "RIVETING", Sections 70-50-81 : Standard assembly, and 70-50-85 : Assembly with CHERRY LOCK blind rivets.

C. Replacing Anchor Nuts

(1) Remove attachment items from access doors as follows :

- (a) Unscrew threaded bush 649-773-XXX-0, using tool SC 295.
- (b) Remove the nut cage assembly.
- (c) Remove self locking-nut 649-785-XXX-0.

(2) Recondition the attachment items of the access doors as follows :

NOTE : If the self-locking nut alone is damaged within the assembly, replace that item only.

- (a) Place the self-locking nut 649-785-XXX-0 into the nut cage so that the nut hex-head engages the hexagonal recess of the cage (see figures 401 and 403).

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- (b) Place the nut cage thus fitted out on the bracket so that the cage anti-rotation pin engages in its housing (see figures 401 and 403).
- (c) Choose a threaded bush 649-773-XXX-0 suited to thickness "E" of the unit fully assembled (see table in figure 403).
- (d) Pass the threaded bush through the hole provided for the purpose, and screw it into the nut cage assy as indicated in figure 403, using the standard toolkit.
- Tightening torque from 0,403 to 0,576 daN.m (35 to 50 in.lb).
 - Use securing tool SC 295 : figure 403.
- (e) Check the setup as shown in figure 403.

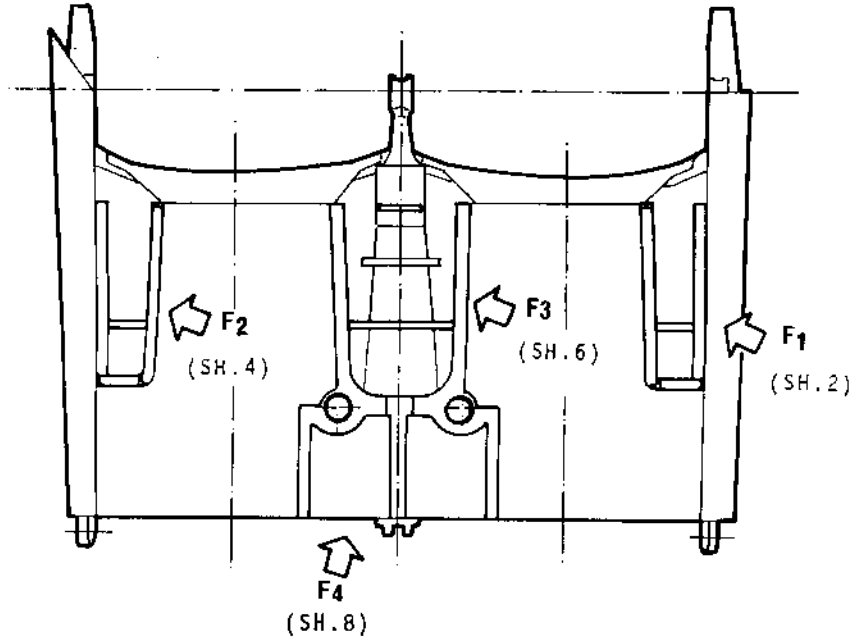
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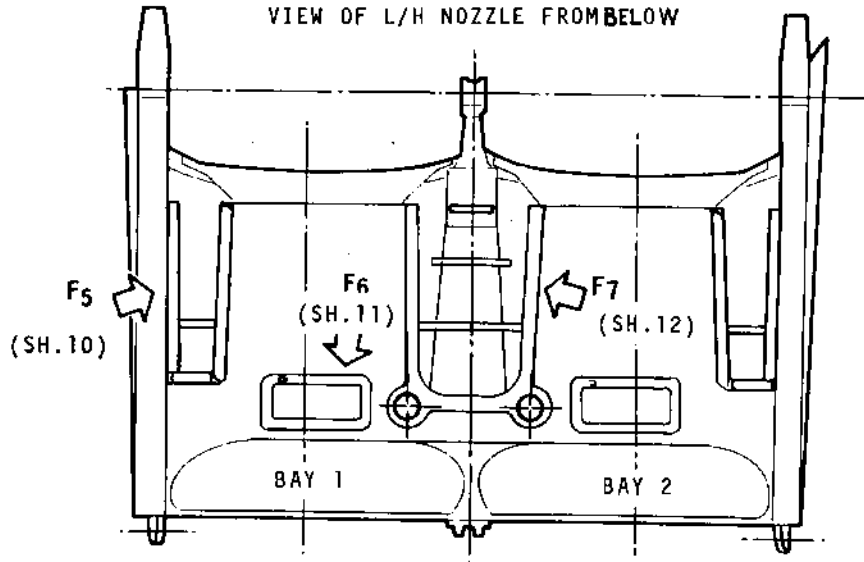
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VIEW OF L/H NOZZLE FROM ABOVE



VIEW OF L/H NOZZLE FROM BELOW



Renewing Attachment Items of Access Doors.
 Figure 401 (Sheet 1 of 13)



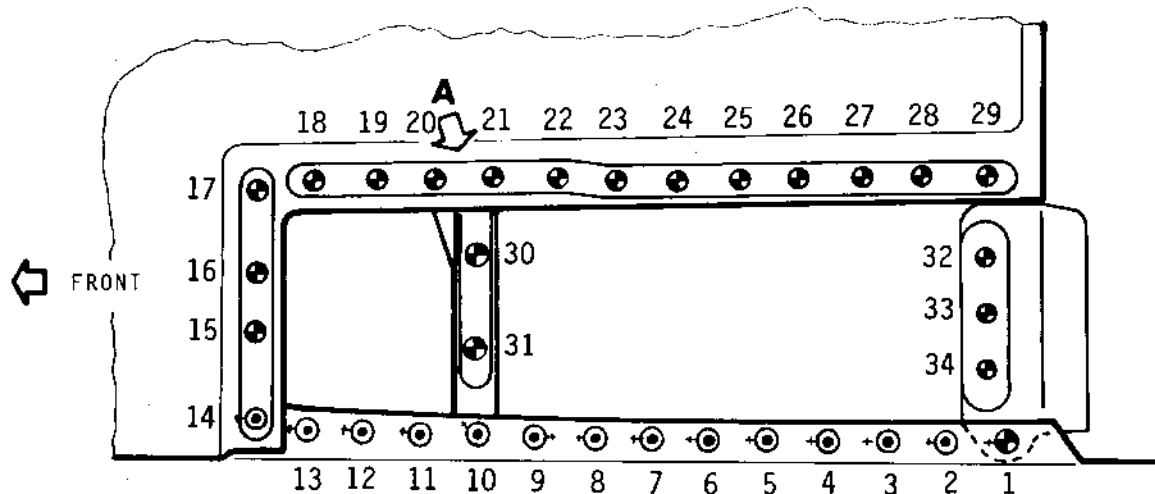
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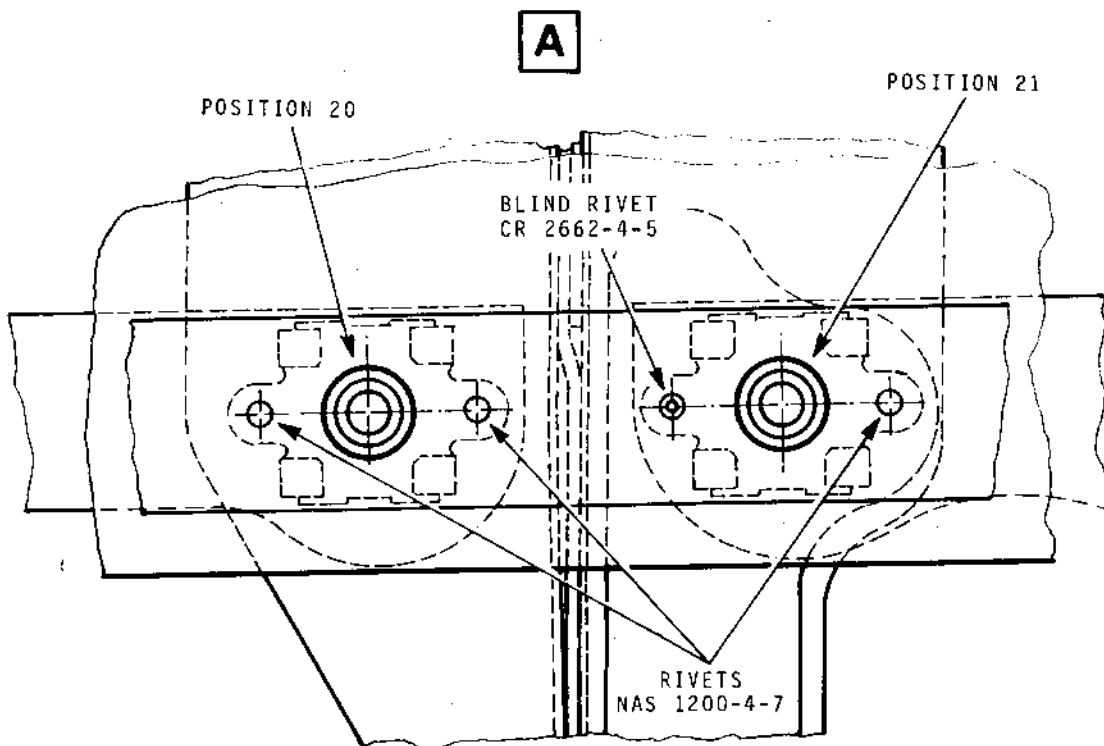


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ON L/H NOZZLE - BAY 1 - AS SHOWN
ON R/H NOZZLE - BAY 4 - SYMMETRICAL



+ POSITION OF ANTI-ROTATION PINS



Renewing Attachment Items of Access Doors
Figure 401 (Sheet 2 of 13)

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SYMBOL	POSITIONS	ATTACHMENT ITEMS			REMARKS
		NUT CAGE	NUT	THREADED BUSH	
⊙	2 TO 9 AND 11 TO 13	302-063-700-0	649-785-146-0	649-773-130-0	SEE FIG.403
	10	302-063-700-0	649-785-146-0	649-773-131-0	
	14	302-063-700-0	649-785-146-0	649-773-132-0	
		FLOATING NUT		RIVETS	
	1	A11471-22-4		650-025-073-0	SEE FIG.402
	15 TO 19 AND 22 TO 28	A11471-14-4		NAS1200-4-6	
	20 AND 21	A11471-21-4		NAS1200-4-7	SEE DETAIL A ON SHEET 2
⊕				AND CR2662-4-5	
	29	A11471-20-4		NAS1200-4-7	SEE FIG.402
	30 AND 31	A11471-7-4		NAS1200-4-5	
	32, 33 AND 34	A11471-8-4		NAS1200-4-5	

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Renewing Attachment Items of Access Doors
Figure 401 (Sheet 3 of 13)

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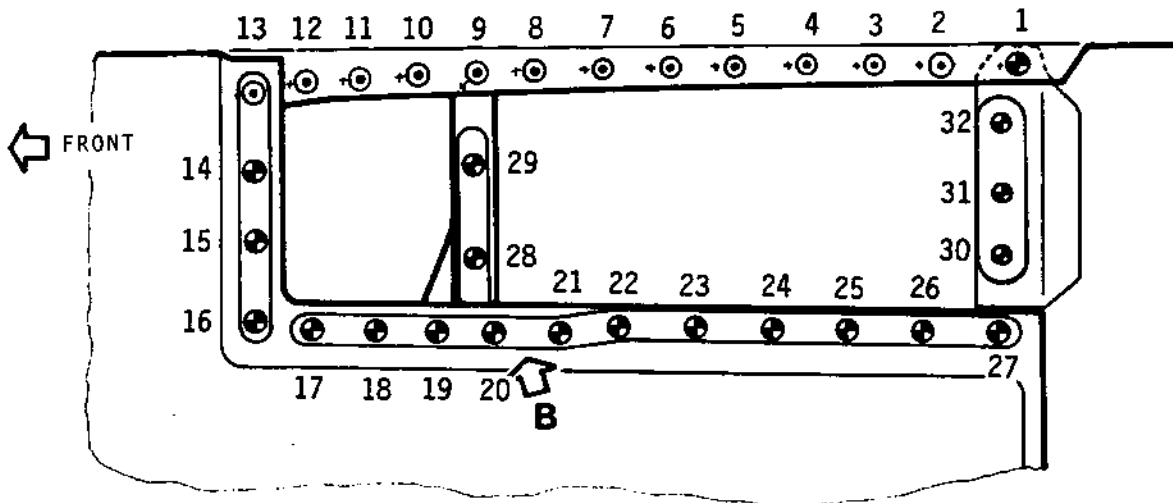
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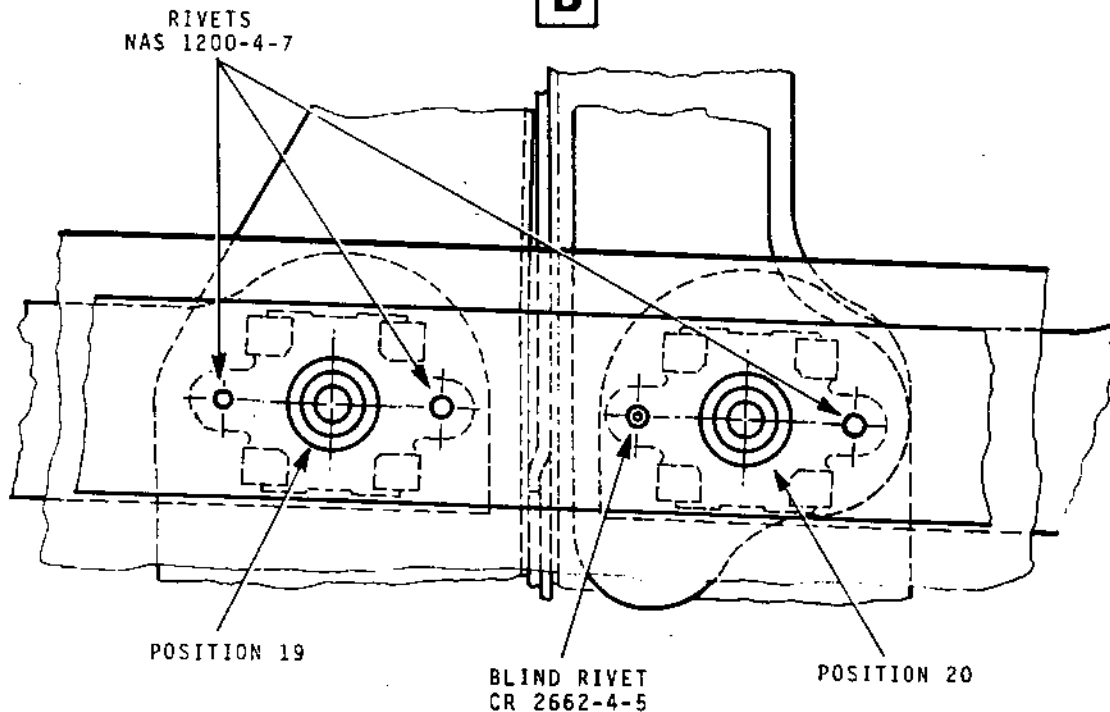
ON L/H NOZZLE - BAY 2 - AS SHOWN

ON R/H NOZZLE - BAY 3 - SYMMETRICAL



+ POSITION OF ANTI-ROTATION PIN

B



Renewing Attachment Items of Access Doors
Figure 401 (Sheet 4 of 13)

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****snecma**

SYMBOL	POSITIONS	ATTACHMENT ITEMS			REMARKS
		NUT CAGE	NUT	THREADED BUSH	
⊙					
	2 TO 8 AND 10 TO 12	302-063-700-0	649-785-146-0	649-773-130-0	SEE FIG.403
	9	302-063-700-0	649-785-146-0	649-773-131-0	
	13	302-063-700-0	649-785-147-0	649-773-132-0	
		FLOATING NUT	RIVETS STANDARD BLIND		
	1	A11471-19-4	650-025-073-0		SEE FIG.402
	14 TO 18 AND 21 TO 26	A11471-14-4	NAS1200-4-6		
	19 AND 20	A11471-21-4	NAS1200-4-7		SEE DETAIL B
			AND CR2662-4-5		
⊙	27	A11471-20-4	NAS1200-4-7		SEE FIG.402
	28 AND 29	A11471-7-4	NAS1200-4-5		
	30, 31 AND 32	A11471-8-4	NAS1200-4-5		

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Renewing Attachment Items of Access Doors
Figure 401 (Sheet 5 of 13)

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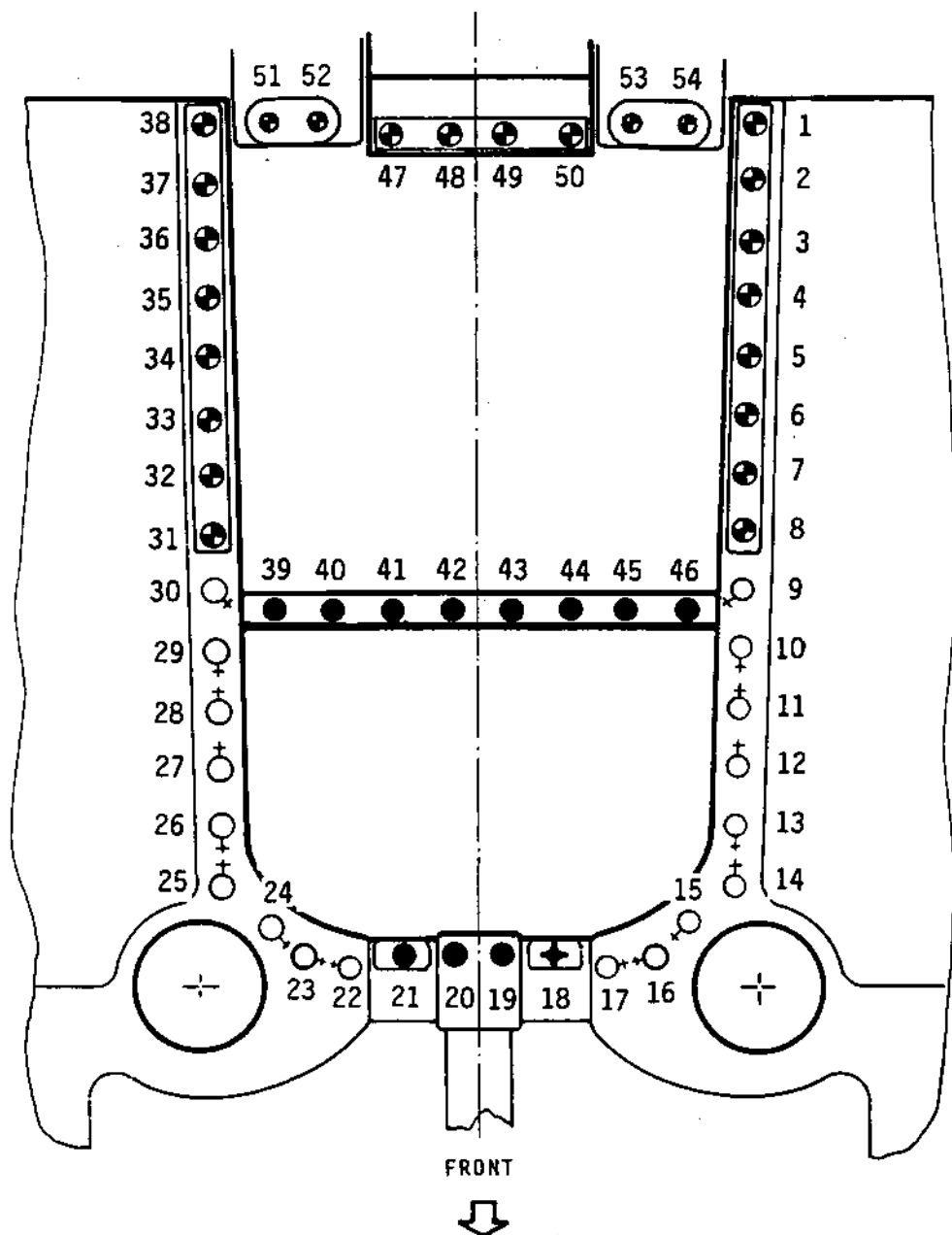


F3

ON L/H NOZZLE AS SHOWN

ON R/H NOZZLE SYMMETRICAL EXCEPT AT POSITIONS

18 - 19 - 20 AND 21



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Renewing Attachment Items of Access Doors
Figure 401 (Sheet 6 of 13)

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OVERHAUL****sneema**

SYMBOL					TABLE APPLICABLE TO NOZZLES 309 TO ... AND 310 TO ...				
POSITIONS			ATTACHMENT ITEMS			REMARKS			
			FLOATING NUT	RIVETS		SEE FIG.402			
⊕	1 AND 38		A11471-18-4	NAS1200-4-7		ASSEMBLY BY MEANS OF BLIND RIVETS			
	2 TO 8 AND 31 TO 37		A11471-14-4	NAS1200-4-6					
	47 TO 50		A11471-17-4	CR2662-4-4					
	51 TO 54		A11471-8-4	NAS1200-4-5					
●	39 TO 46		LHA32808-3-048	MS20427-M3-4					
	19 TO 20		LHA32808-5-048	MS20427-M3-4					
	21		LHA32808-2-048	MS20427-M3-8					
			NUT CAGE	NUT	THREADED BUSH	SEE FIG.403			
○	9 TO 11 AND 28 TO 30		649-785-041-0	649-785-146-0	649-773-132-0				
	13, 14, 25 AND 26		649-785-041-0	649-785-043-0	649-773-136-0				
	15 AND 24		649-785-041-0	649-785-042-0	649-773-133-0				
	16, 17, 22 AND 23		649-785-041-0	649-785-043-0	649-773-135-0				
	12 AND 27		649-785-041-0	649-785-147-0	649-773-136-0				
VARIANTS ON L/H AND R/H NOZZLES									
⊕	18	NUT CAGE			NUT	THREADED BUSH	FOR NOZZLES 309 TO 313 AND 310 TO 314		
		649-785-041-0			649-785-148-0	649-773-137-0			
		FLOATING NUT			RIVETS			FOR NOZZLES 315 TO ... AND 316 TO ...	
LHA32808-2-048			MS20427-M3-8						

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Renewing Attachment Items of Access Doors
Figure 401 (Sheet 7 of 13)**78-13-01**REP 29-190-3
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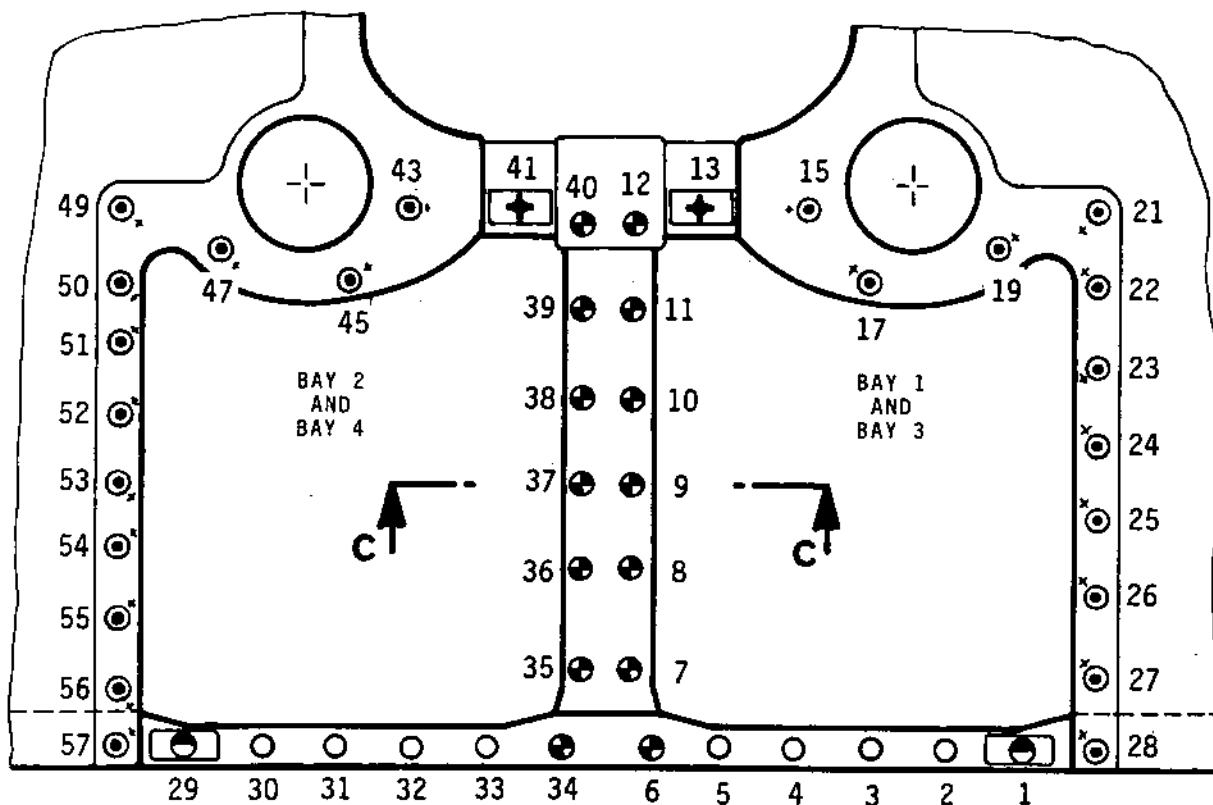
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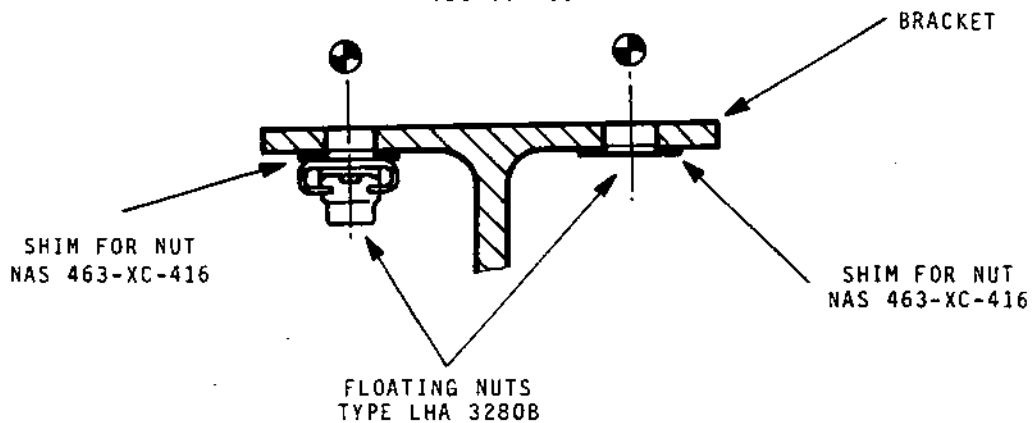
ON L/H NOZZLE - BAY 1 AND 2 - AS SHOWN

ON R/H NOZZLE - BAY 4 AND 3 - IDENTICAL



+ POSITION OF ANTI-ROTATION PIN

SECTION CC



Renewing Attachment Items of Access Doors
Figure 401 (Sheet 8 of 13)

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TABLE APPLICABLE TO NOZZLES 309 TO ... AND 310 TO...
EXCEPT OTHERWISE STATED (SEE REMARKS)

SYMBOL POSITION		ATTACHMENT ITEMS			REMARKS
		FLOATING NUT	RIVETS		
●	1 AND 29 6 AND 34	LHA3280B-2-048 LHA3280B-2-048 + SHIM FOR NUT	MS20427-M3-6 MS20427-M3-6 NAS463XC416		
●	7 TO 11 AND 35 TO 39	LHA3280B-3-048 + SHIM FOR NUT	MS20427-M3-4 NAS463XC416		SEE SECTION CC
●	12 AND 40	LHA3280B-2-048 + SHIM FOR NUT	MS20427-M3-5 NAS463XC416		
+	13 AND 41	NAS686-C4	MS20427-M3-7		
		NUT CAGE, NUT, THREADED BUSH			SEE FIG. 403
	15, 22, 23, 43 52, 53, 55, 56 17, 19, 45 AND 47	302-063-700-0	649-785-043-0	649-773-135-0	
		302-063-700-0	649-785-043-0	649-773-133-0	
●	21 AND 49	302-063-700-0	649-785-044-0	649-773-137-0	
	51 AND 54	302-063-700-0	649-785-044-0	649-773-138-0	
	24, 25, 28 AND 57	302-063-700-0	649-785-043-0	649-773-132-0	
	26, 27, 50	302-063-700-0	649-785-042-0	649-773-130-0	
		FLOATING NUT	RIVETS		
○	2 TO 5 AND 30 TO 33	LHA3280B-3-048 LHA3280B-5-048	MS20427-M3-4 MS20427-M3-4		309 TO 317 AND 321 310 TO 320 319 AND 323 TO ... 322 TO ...

Renewing Attachment Items of Access Doors.
Figure 401 (Sheet 9 of 13)

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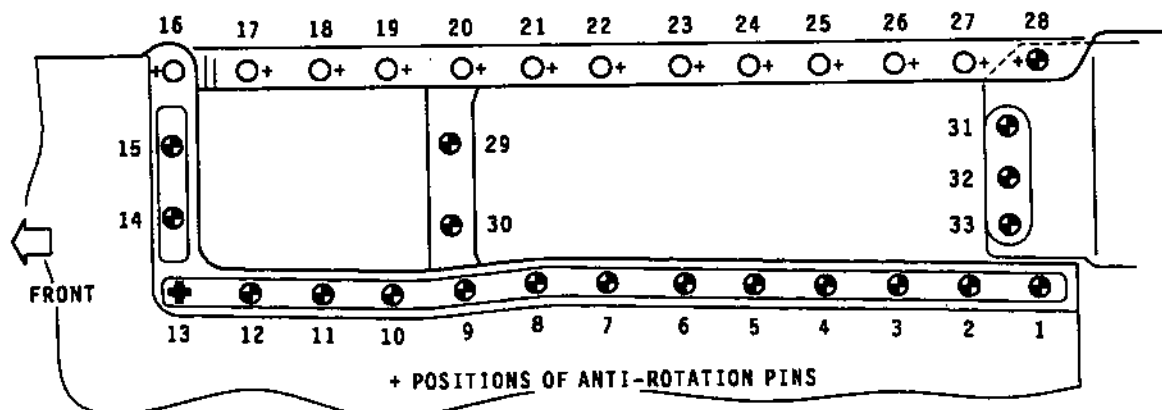
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ON L/H NOZZLE - BAY 1 - AS SHOWN
ON R/H NOZZLE - BAY 3 - IDENTICAL
ON L/H NOZZLE - BAY 2 - SYMETRICAL
ON R/H NOZZLE - BAY 4 - SYMETRICAL



APPLICABLE TO NOZZLES 309 TO ... AND 310 TO ...
EXCEPT WHERE OTHERWISE STATED (SEE REMARKS)

SYMBOL	POSITIONS	ATTACHMENT ITEMS			REMARKS
		FLOATING NUT	RIVETS		SEE FIG.402
+	1	A11471-20-4	NAS1200-4-7		
	2 TO 8 AND 10 TO 12, 14 AND 15	A11471-14-4	NAS1200-4-6		
	9	A11471-22-4	NAS1200-4-7		
	28	A11471-19-4	650-025-073-0		
	29 TO 33	A11471-8-4	NAS1200-4-5		
		NUT CAGE	NUT	THREADED BUSH	SEE FIG.403
○	16	649-785-041-0	649-785-147-0	649-773-132-0	
	17 TO 19 AND 21 TO 27	649-785-041-0	649-785-146-0	649-773-130-0	
	20	649-785-041-0	649-785-147-0	649-773-133-0	
		FLOATING NUT	RIVETS		309 TO 317, 321 AND 325 310 TO 320, 324 AND 326
		A11471-18-4	NAS1200-4-6		
+	13	A11471-18-4	NAS1200-4-6		319, 323 AND 327 TO ... 322 AND 328 TO ...

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Renewing Attachment Items of Access Doors
Figure 401 (Sheet 10 of 13)

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ON L/H NOZZLE - BAYS 1 AND 2 - AS SHOWN

ON R/H NOZZLE - BAYS 3 AND 4 - IDENTICAL

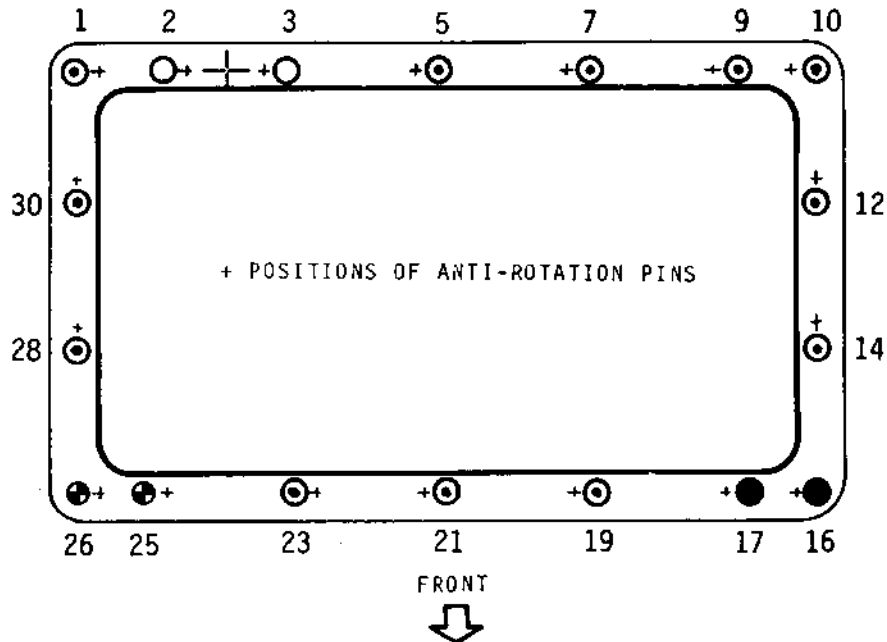


TABLE APPLICABLE TO BAYS 1 AND 3

SYMBOL	POSITION	ATTACHMENT ITEMS			REMARKS
		CAGE NUT, NUT, THREADED BUSH			SEE FIG. 403.
⊙	1, 5, 7, 9, 10, 12 14, 19, 21, 23, 28, 30	302-063-700-0	649-785-146-0	649-773-130-0	
⊕	25 TO 26	302-063-700-0	649-785-146-0	649-773-130-0	
○	2 AND 3	302-063-700-0	649-785-147-0	649-773-133-0	
●	16 AND 17	302-063-700-0	649-785-147-0	649-773-134-0	

TABLE APPLICABLE TO BAYS 2 AND 4

⊙	1, 5, 7, 9, 10, 12 14, 19, 21, 23, 28, 30	302-063-700-0	649-785-146-0	649-773-130-0	
●	16 AND 17	302-063-700-0	649-785-146-0	649-773-130-0	
○	2 AND 3	302-063-700-0	649-785-147-0	649-773-133-0	
⊕	25 AND 26	302-063-700-0	649-785-147-0	649-773-134-0	

Renewing Attachment Items of Access Doors
Figure 401 (Sheet 11 of 13)

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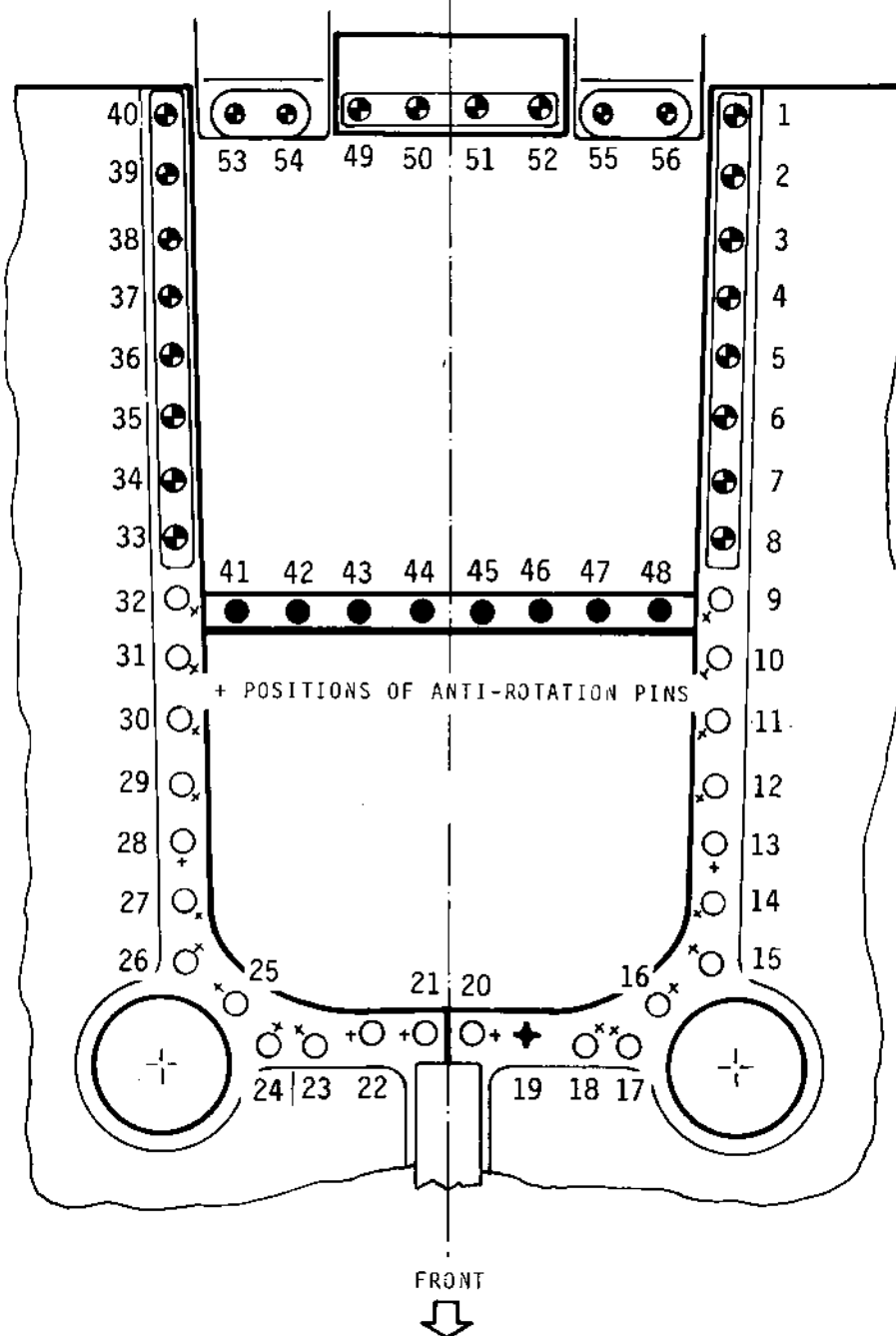
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ON L/H NOZZLE AS SHOWN

ON R/H NOZZLE IDENTICAL



Renewing Attachment Items of Access Doors
Figure 401 (Sheet 12 of 13)

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APPLICABLE TO NOZZLES 309 TO ... AND 310 TO ...
EXCEPT WHERE OTHERWISE STATED (SEE REMARKS)

SYMBOL	POSITIONS	ATTACHMENT ITEMS			REMARKS
		FLOATING NUT	RIVETS		SEE FIG.402
⊕	1 TO 40	A11471-18-4	NAS1200-4-7		
	2 TO 8 AND 33 TO 39	A11471-14-4	NAS1200-4-6		
	49 TO 52	A11471-17-4	CR2662-4-4		BLIND RIVETS
	53 TO 56	A11471-8-4	NAS1200-4-5		
●	41 TO 48	LHA3280B-3-048	MS20427-M3-4		
		NUT CAGE	NUT	THREADED BUSH	SEE FIG.403
○	9 AND 32	649-785-041-0	649-785-146-0	649-773-132-0	
	10 TO 15 AND 26 TO 31	649-785-041-0	649-785-047-0	649-773-135-0	
	16 AND 25	649-785-041-0	649-785-046-0	649-773-133-0	
	17, 18 AND 20 TO 24	649-785-041-0	649-785-047-0	649-773-134-0	
		649-785-041-0	649-785-148-0	649-773-137-0	309 TO 313 AND 310 TO 314
+	19				315 TO ...
		649-785-041-0	649-785-147-0	649-773-134-0	AND 316 TO ...

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Renewing Attachment Items of Access Doors
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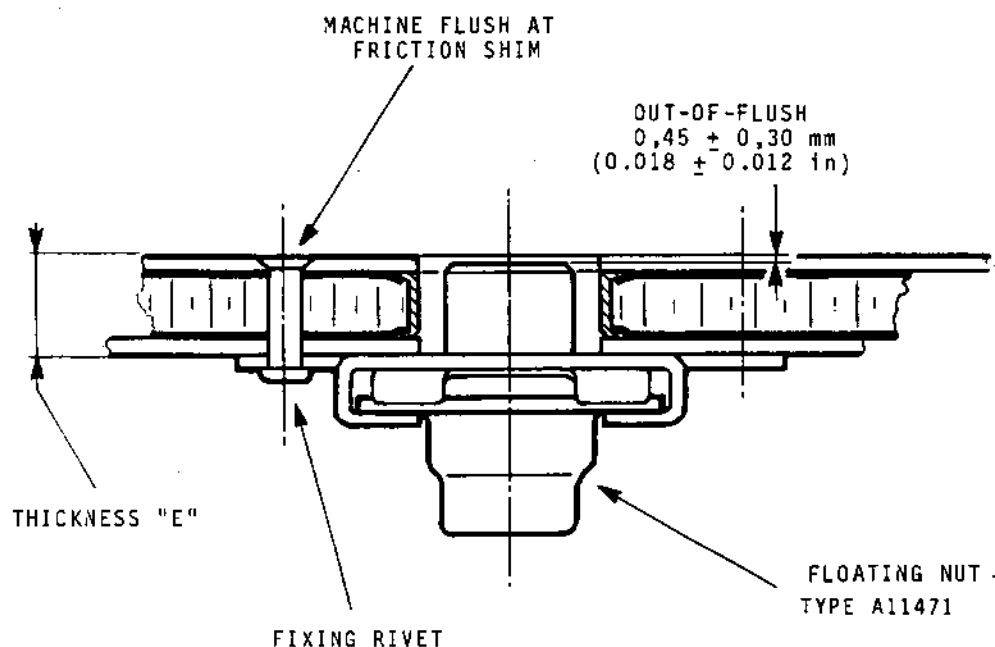
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FLOATING NUT	THICKNESS "E"	
	mm	(in)
A11471-6-4	1,52	(0.060)
A11471-7-4	1,78	(0.070)
A11471-8-4	2,03	(0.080)
A11471-13-4	3,30	(0.130)
A11471-14-4	3,56	(0.140)
A11471-15-4	3,81	(0.150)
A11471-16-4	4,06	(0.160)
A11471-17-4	4,32	(0.170)
A11471-18-4	4,57	(0.180)
A11471-19-4	4,89	(0.190)
A11471-20-4	5,08	(0.200)
A11471-21-4	5,33	(0.210)
A11471-22-4	5,59	(0.220)
A11471-23-4	5,84	(0.230)

Renewing the Floating Nuts Securing the Access Doors
Figure 402

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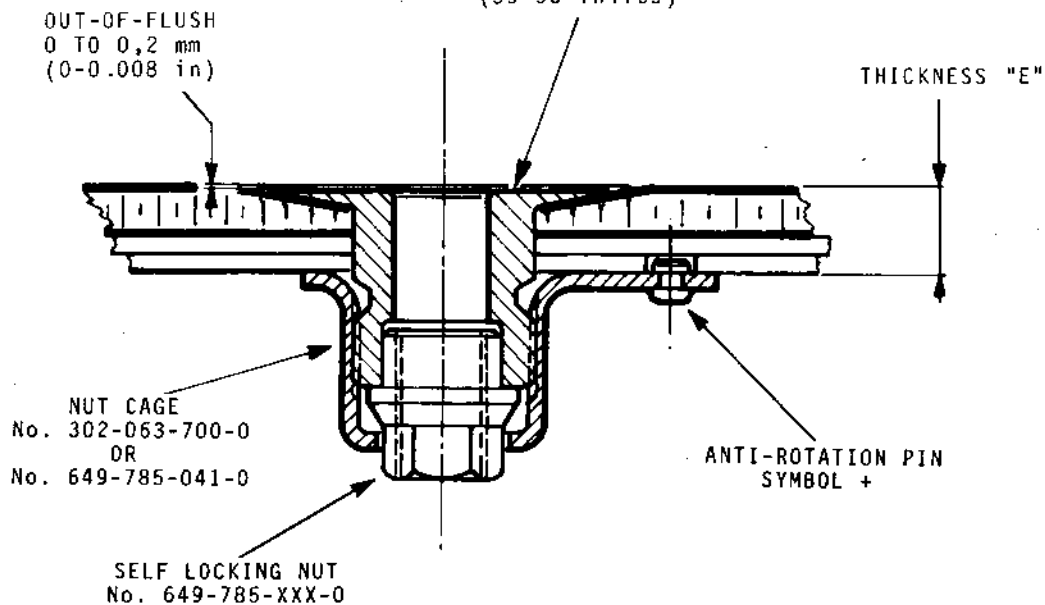
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THREADED BUSH No. 649-773-XXX-0
(SEE TABLE)
TIGHTENING TORQUE 0,403 TO 0,576 daN.m
(35-50 in.lbs)



THREADED BUSH	THICKNESS "E"	
	mm	(in.)
649-773-129-0	3,18	0.125
649-773-130-0	3,96	0.156
649-773-131-0	4,75	0.187
649-773-132-0	5,54	0.218
649-773-133-0	6,35	0.250
649-773-134-0	7,14	0.281
649-773-135-0	7,92	0.312
649-773-136-0	8,71	0.343
649-773-137-0	9,53	0.375
649-773-138-0	10,31	0.406
649-773-139-0	11,10	0.437

Renewing Cage Nuts of Access Doors
Figure 403

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**REPAIRTWIN SECONDARY NOZZLE (29-190)4. Renewing Attachment Items for Heat Shields on Rear Frame.

PARTS REQUIRED FOR REPAIR

Floating captive nut	A11471-5-4	(649-785-209-0)
Floating captive nut	A11471-6-4	(649-785-192-0)
Floating captive nut	A11471-7-4	(649-785-103-0)
Floating captive nut	A11471-9-4	(649-785-207-0)
Floating captive nut	A11471-10-4	(649-785-104-0)
Floating captive nut	A11471-11-4	(649-785-152-0)
Floating captive nut	A11471-13-4	(649-785-132-0)
Floating captive nut	A11471-14-4	(649-785-105-0)
Floating captive nut	A11471-15-4	(649-785-208-0)
Floating captive nut	A11471-18-4	(649-785-107-0)
Floating captive nut	A11471-19-4	(649-785-108-0)
Floating captive nut	A11471-20-4	(649-785-109-0)
Captive nut	LHA 3280 B5-048	(649-785-117-0)
Anchor nut	MS 21062-4	(649-785-092-0)
Rivet	BNAE 21217 TC 3207	(650-025-073-0)
Rivet	MS 20427 M4-6	(650-022-076-0)
Rivet	MS 20427 M4-7	(650-022-077-0)
Blind rivet	CR 2662-3-3	(649-772-060-0)
Blind rivet	CR 2662-4-3	(649-772-063-0)
Blind rivet	CR 2662-3-4	(649-772-061-0)
Riveting washer	649-785-145-0	
Riveting washer	301-146-300-0	
Riveting washer	301-146-400-0	
Shim	301-125-500-0	
Rivet	NAS1199-5-6	(650-024-103-0)

A. Renewing damaged captive nut.

- (1) Remove nut by grinding out retaining-rivet heads.

B. Fitting a new attachment item.

- (1) Fit a new nut and riveting washer, and secure them by riveting as directed in chapter "RIVETING", section 70-50-10, in figure 401, and in following instructions.
- (a) Choose a captive nut suited to thickness "E" of unit fully assembled as directed in figure 401.

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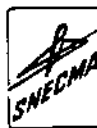
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- (b) Ascertain before riveting nuts type A11471 that the out-of-flush level difference of the bush lies within the tolerances specified in figure 401 (Sheet 5). If it does, the free sliding of the nut in its cage is ensured after installing the heat shield.

- (2) Machine the rivet heads flush with the riveting washer

C. Checking

- (1) Check the application of rivets as per instructions in chapter "RIVETING", section 70-50-80.

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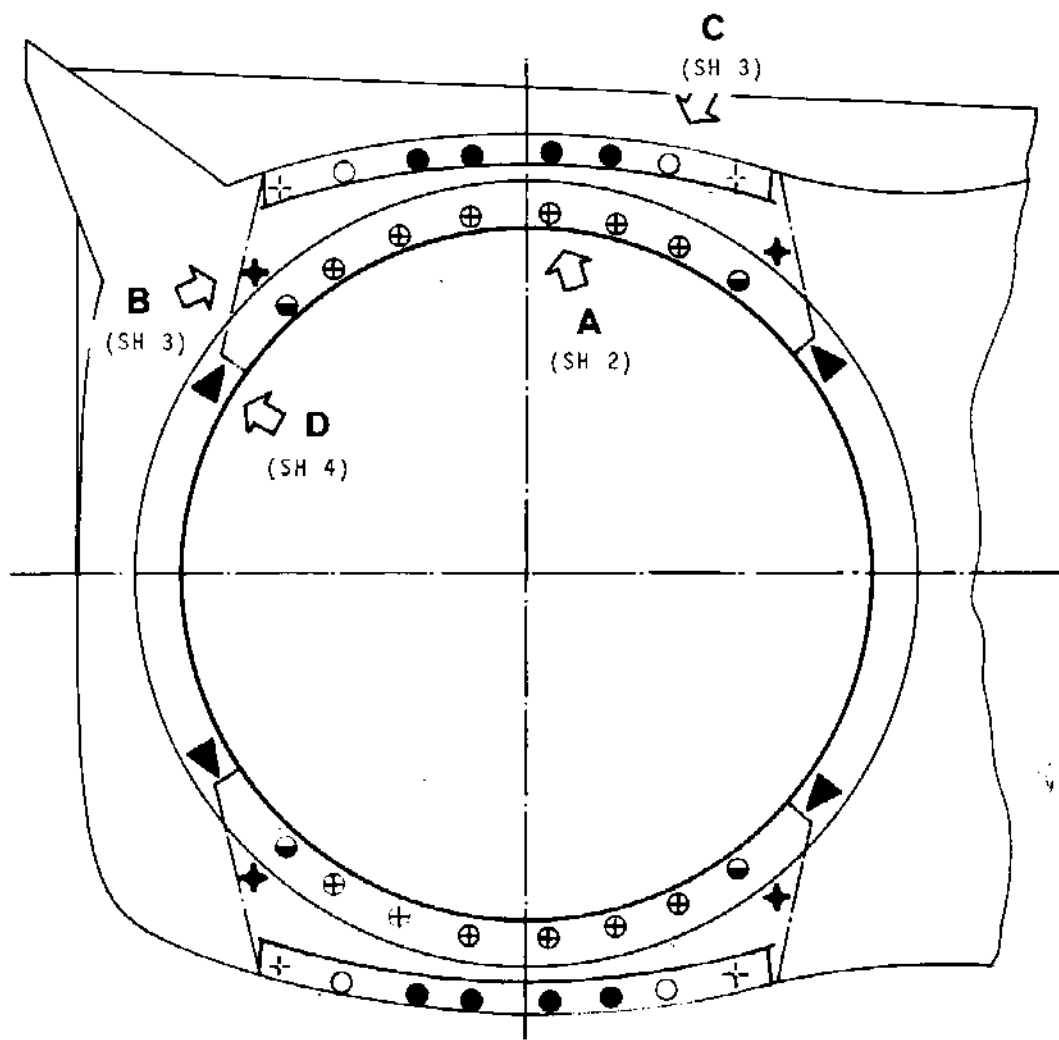


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REAR VIEW OF LH NOZZLE
BAYS 1 AND 3 AS SHOWN
BAYS 2 AND 4 SYMMETRICAL



Renewing Attachment Items
Figure 401 - (Sheet 1 of 5)

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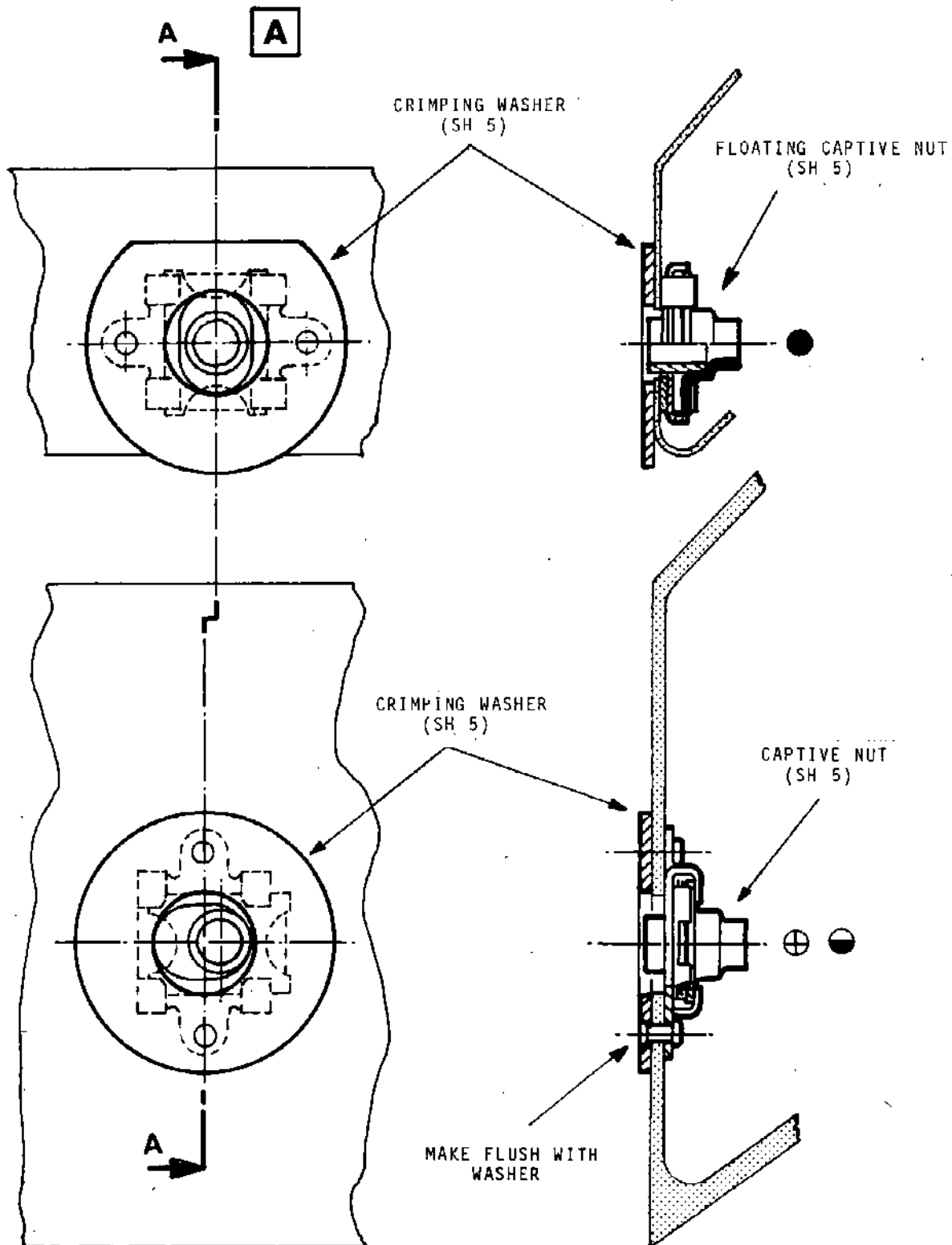


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SECTION AA



Renewing Attachment Items
Figure 401 - (Sheet 2 of 5)

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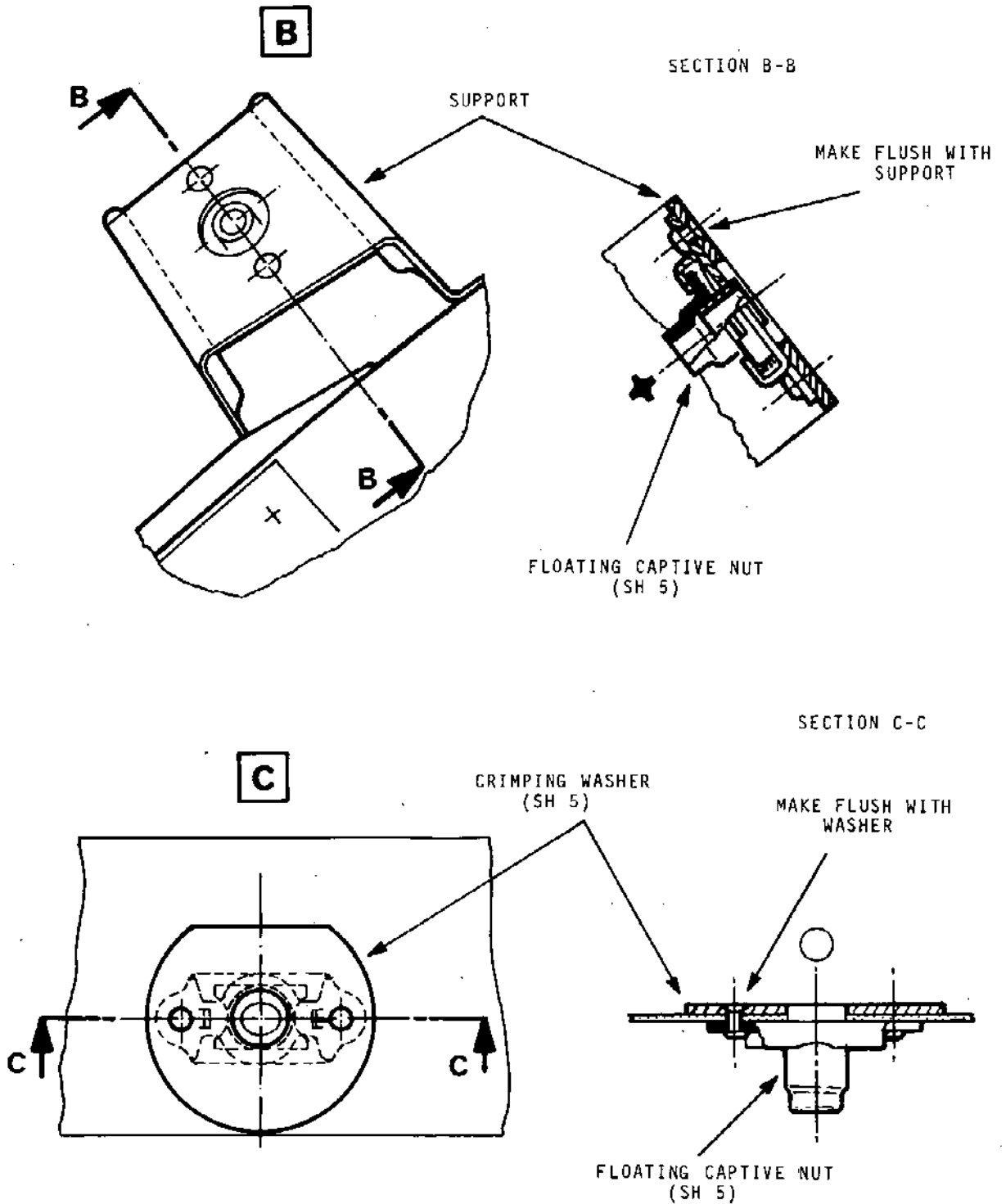


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Renewing Attachment Items
Figure 401 - (Sheet 3 of 5)

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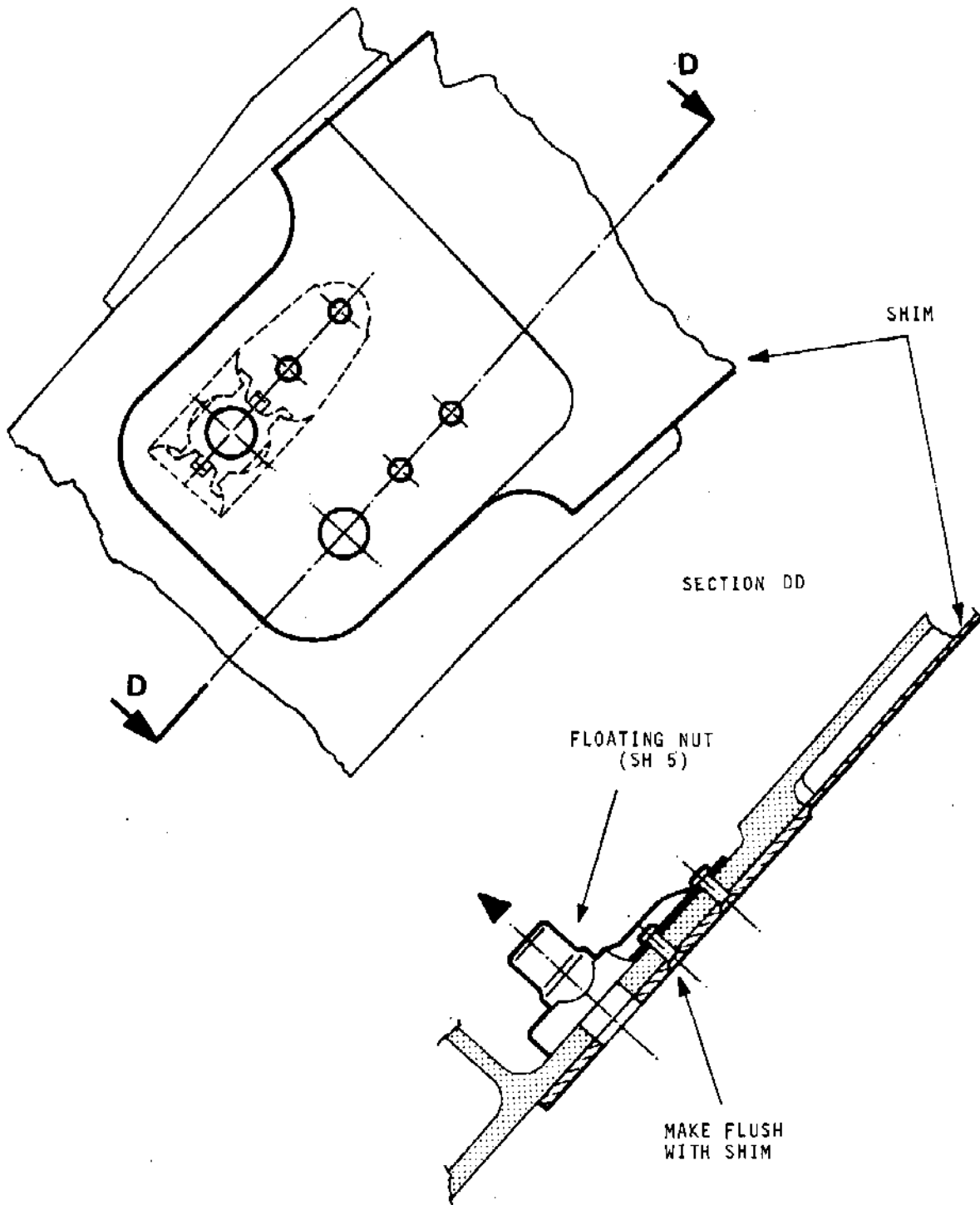


OLYMPUS 593

MK. 610-14-28
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D



Renewing Attachment Items
Figure 401 - (Sheet 4 of 5)

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema****ATTACHMENT ITEMS**

MARKING	FLOATING CAPTIVE NUT	RIVET	RIVETING WASHER
●	A11471-10-4	BLIND CR 2662-4-3	301-146-400-0
⊕	A11471-14-4	MS 20427 M4-6	649-785-145-0
⊖	A11471-19-4	MS 20427 M4-7	649-785-145-0
+	A11471-6-4	BNAE 21217 TC 3207	—
⊙	LHA 3280B 5-048	BLIND CR 2662-3-3	301-146-300-0
▲	MS 21062-4	BLIND CR 2662-3-4	SHIM
+	NO REQUIRED	NAS 1199-5-6	301-125-500-0

FLOATING CAPTIVE NUT No. ESNA

MAX. SIZE NUT ORIG. NUT MIN. SIZE NUT	THICKNESS "E" OF ASSEMBLED UNIT mm (in.)	+ 0,10 + 0.004 - 0,13 - 0.005
-5-4	1,270 (0.050)	
A 11471-6-4	1,524 (0.060)	
-7-4	1,778 (0.070)	
-9-4	2,286 (0.090)	
A 11471-10-4	2,540 (0.100)	
-11-4	2,794 (0.110)	
-13-4	3,302 (0.130)	
A 11471-14-4	3,556 (0.140)	
-15-4	3,810 (0.150)	
-18-4	4,572 (0.180)	
A 11471-19-4	4,826 (0.190)	
-20-4	5,080 (0.200)	

OUT OF FLUSH
 $0,45 \pm 0,30$ mm
 $(0.018 \pm 0.012$ in.)

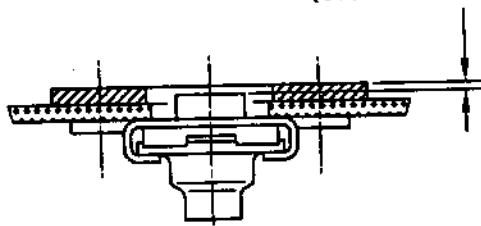
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Figure 401 (Sheet 5/5)

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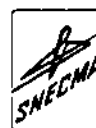
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REPAIR

TWIN SECONDARY NOZZLE (29-190/191)

5. Reconditioning the Airfoil by Use of an Elastomer.

PARTS REQUIRED FOR REPAIR

Primary MB (P 475)
Silicone elastomer CAF 4 (P 474)

A. Introduction

This type of repair is applied to the inner and outer nozzle skin in the event of damage e. g. by impact or scoring exceeding in depth the limit value laid down by Quality Control.

B. Procedure

(1) Tracing the Defect

- (a) Prior to repairing, make sure that the dented area is free from :
 - cracks (use a twin-lens magnifier of x 20 power)
 - separation of layers (sound test by means of a metal part).

The occurrence of either of these defects rules out the use of this type of repair.

(2) Reconditioning the Airfoil

- (a) Recondition the airfoil by the use of silicone elastomer CAF 4 using method M 701 as described in chapter "APPLICATION OF RESINS AND ELASTOMERS" section 70-31, and following the instructions below :
 - the area to be repaired is degreased with a cloth steeped in trichlorethylene (P 76 A).



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- the area under repair is prepared by polishing with emery paper.
- (b) With the elastomer properly cured, polish off surface roughness, if necessary, by the use of emery paper.

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REPAIR

TWIN SECONDARY NOZZLE (29-190/191)

6. Replacement of BAC Seal Fasteners

PARTS REQUIRED FOR REPAIR

Blind bolt VISU LOK PLT 1004-6-4 (650-089-931-0)
Blind bolt VISU LOK PLT 1004-6-5 (650-089-932-0)
Blind bolt VISU LOK PLT 1004-6-6 (650-089-933-0)
Support plate assemblies 002-003-604 to 610-0
Support plate assemblies 002-003-809 to 817-0

Reinforcement plate, complete 002-004-003-0

Cover 002-004-004-0

Screw (649-781-525-0)

NOTE : This repair scheme applies to twin secondary nozzles with no access doors to the BAC-seal fasteners. To nozzles having such doors, points C,D and E are alone applicable.

A. Making access openings

- (1) Mark out the bolt holes, reinforcement plate attachment points and access openings as illustrated in Fig. 401.
- (2) The openings in the stressskin panels are made by means of tangent holes as instructed in chapter section 70-30-10 "PRINCIPLES OF REPAIR" and illustrated in Fig. 401.
- (3) Deburr carefully, using a dental burr.
- (4) Close up any cavities round the borders of the openings, using Araldite resin AV 138 with asbestos fibres for filler, as described under method M 700 in chapter section 70-31-00 "APPLICATION OF RESINS AND ELASTOMERS".

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NOTE : Where necessary, smooth down the edges of the openings with abrasive tape to the dimensions specified in Fig. 401, sheet 3.

- (5) Mount the fully equipped reinforcement plates as follows :
- (a) Drill bolt holes as marked out and shown in Fig. 401.
Deburr carefully.
 - (b) Put the reinforcement plates in position and pin them on through the bolt holes, careful not to damage the nuts.
 - (c) Drill the retaining holes as marked out, described in chapter "RIVETING" section 70-50-60, and shown in Fig. 401.
 - (d) Deburr the holes as instructed under heading D "Deburring" in chapter "RIVETING", section 70-50-60.
 - (e) Dimple the panel as described in chapter "RIVETING", section 70-50-60.
 - (f) Fit the blind bolts serving to secure the complete reinforcement plates, as shown in Fig. 401, sheet 3, and directed in chapter "RIVETING", section 70-50-60.

B. Removing floating anchor nuts

NOTE : Under this repair scheme, the nut adjacent to the defective nut is to be removed if both are on the same support plate.

- (1) Grind out the nut retaining rivet heads with a cutting wheel.
- (2) Remove the floating anchor nuts and use a grinding wheel to flush off the rest of the rivet metal near the angle section (See Fig. 401, sheet 5).

C. Removing blind bolts

- (1) Remove the blind bolts securing the top panel to the angle section at the locations marked out for the support plate assemblies as instructed in chapter "RIVETING", section 70-50-60.

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D. Mounting the fully equipped support plates

- (1) Put the support plates in position on the angle section, and pin them on through the bolt holes, careful not to damage the nut threads.
- (2) Drill mark the retaining holes, and take off the support plates.
- (3) Drill out the blind bolt holes, as described in chapter "RIVETING", section 70-50-60. Carefully deburr the holes.
- (4) Position and mount the support plate fasteners on the angle section, as instructed in chapter "RIVETING", section 70-50-60. Assemble with blind bolts, as shown in Fig. 401.
- (5) Inspect the riveting as described in chapter "RIVETING" section 70-50-86.

E. Mounting the access doors

- (1) Put the cover in position as shown in Fig. 401, Sheet 4
- (2) Fit 649-781-525-0 bolts and locks them fast to a torque of 0,80 to 0,90 daNm (70 to 80 lb. in).



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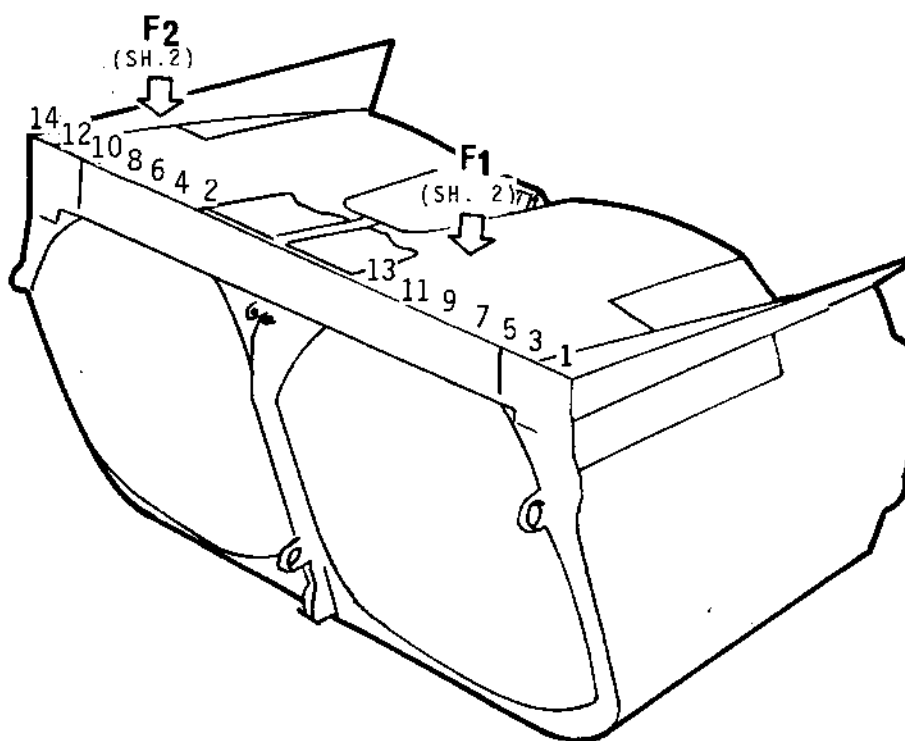
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L/H NOZZLE AS SHOWN

R/H NOZZLE SYMMETRICAL



Replacement of BAC Seal Fasteners
Figure 401 (Sheet 1 of 15)

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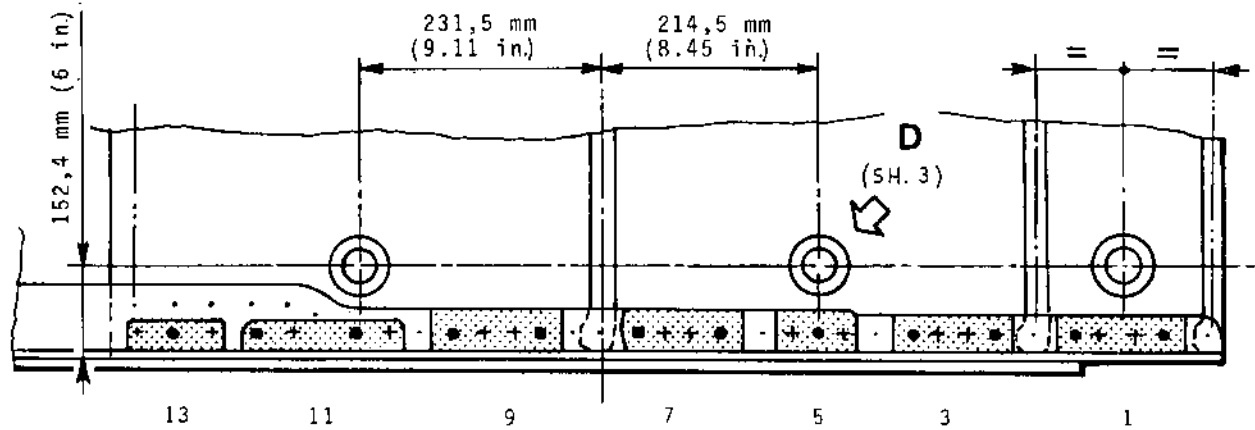
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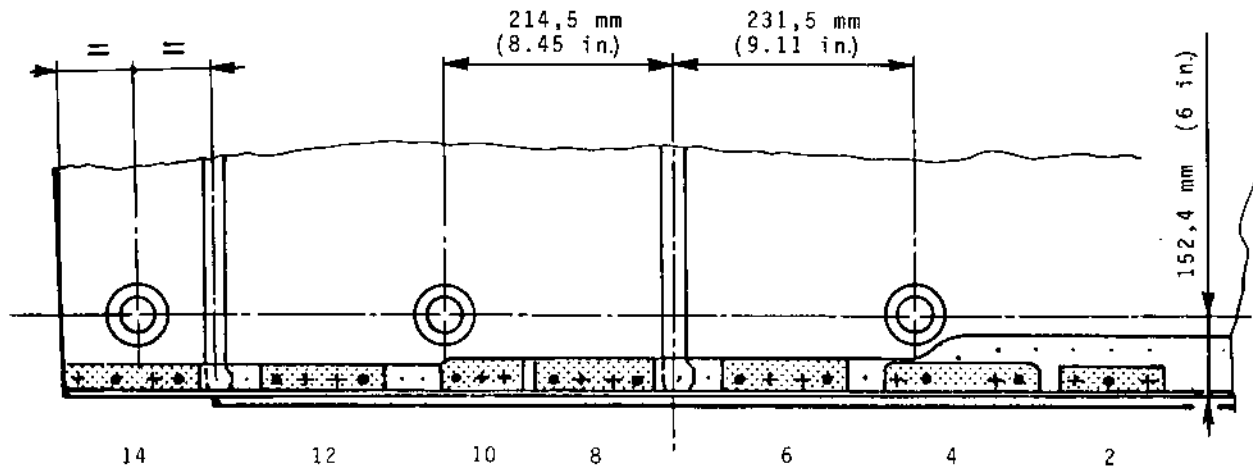
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Replacement of BAC Seal Fasteners
Figure 401 (Sheet 2 of 15)

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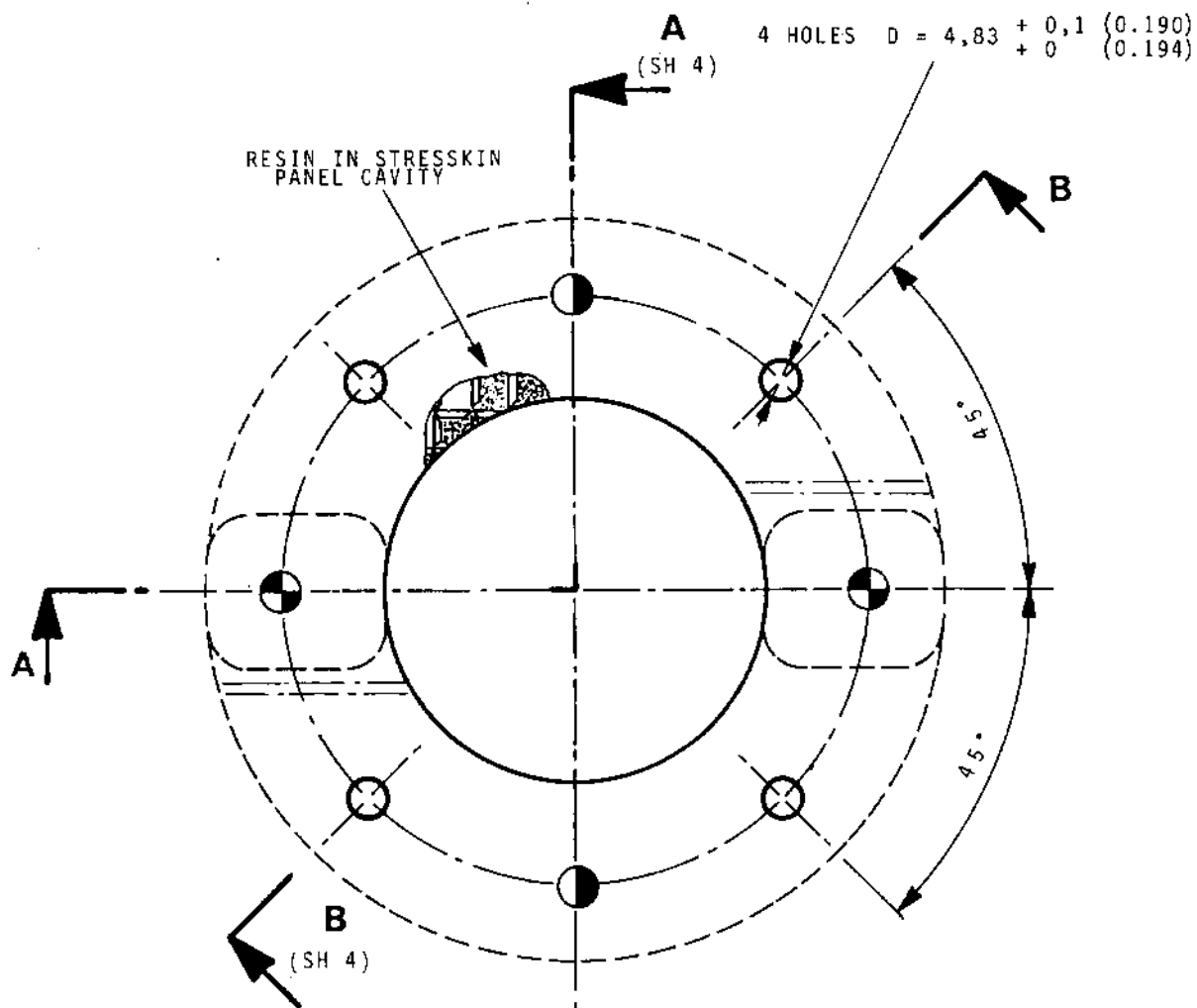
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D



DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES

Replacement of BAC Seal Fasteners
Figure 401 (Sheet 3 of 15)

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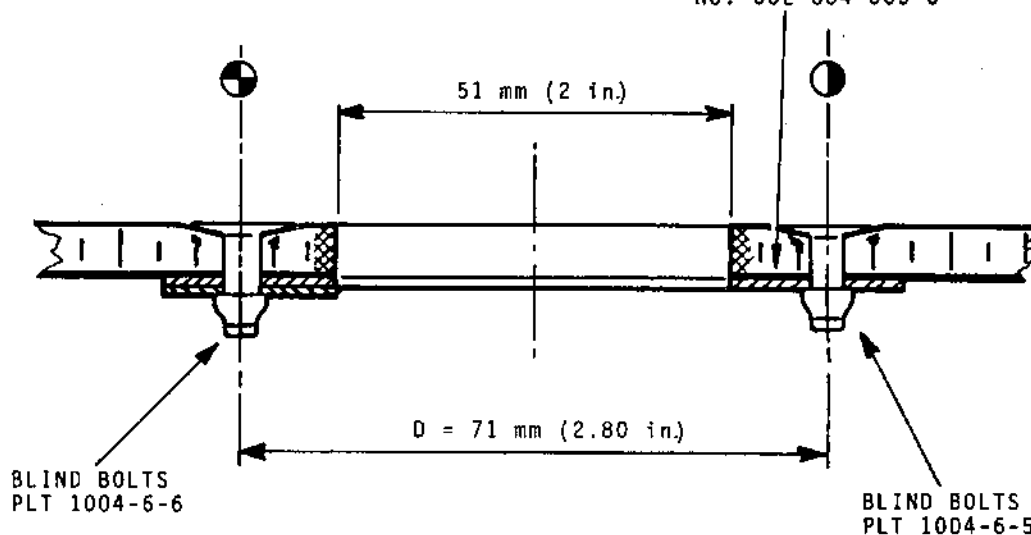
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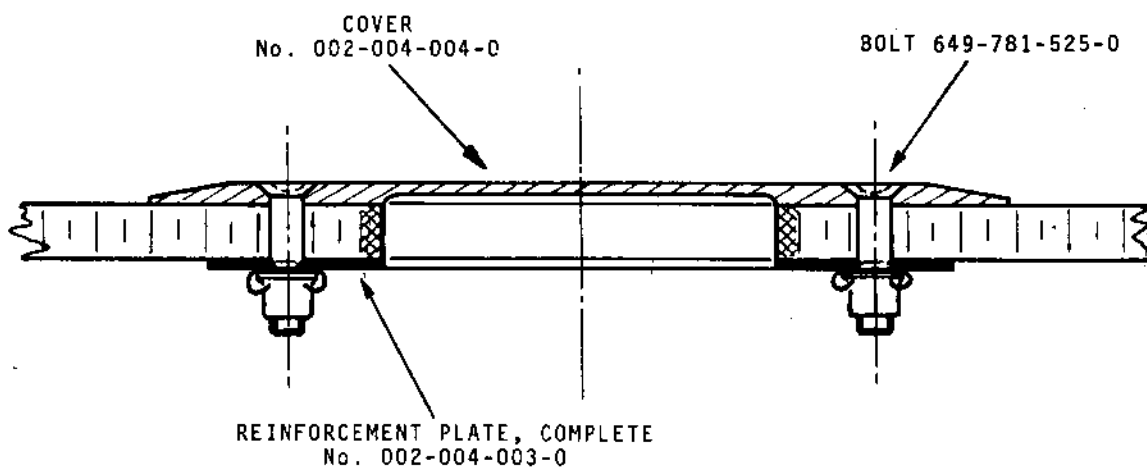


SECTION AA

REINFORCEMENT PLATE, COMPLETE
No. 002-004-003-0



SECTION BB



Replacement of BAC Seal Fasteners
Figure 401 (Sheet 4 of 15)

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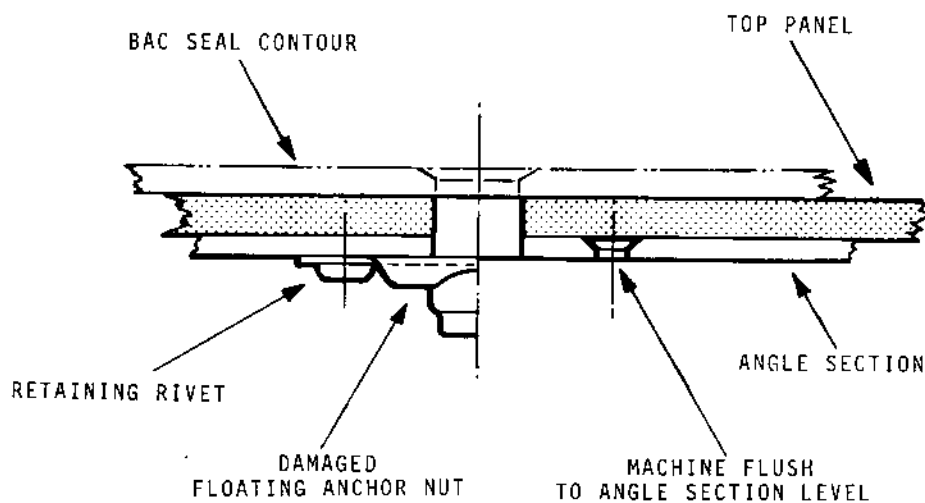


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OVERHAUL



REMOVAL OF ORIGINAL FASTENERS



Replacement of BAC Seal Fasteners
Figure 401 (Sheet 5 of 15)

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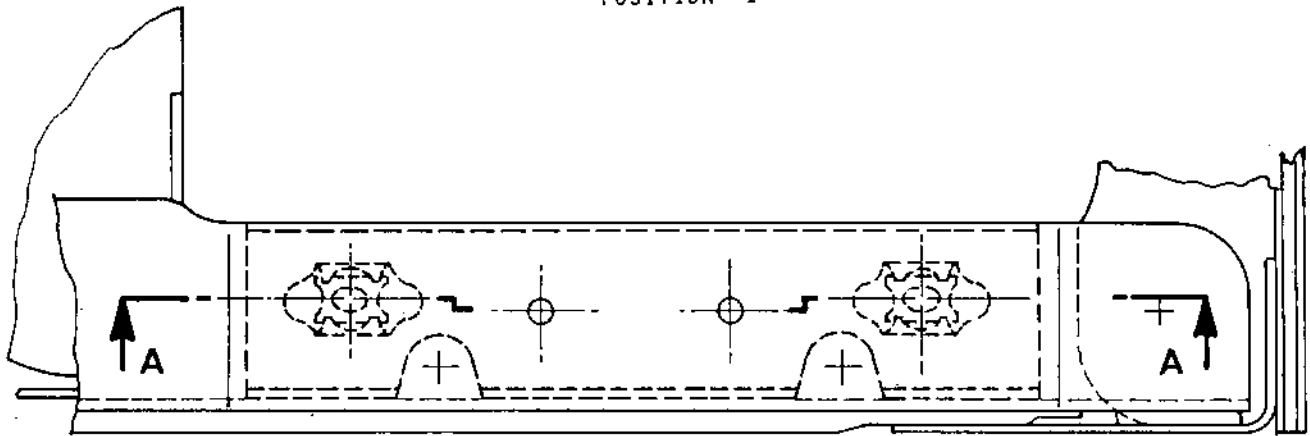
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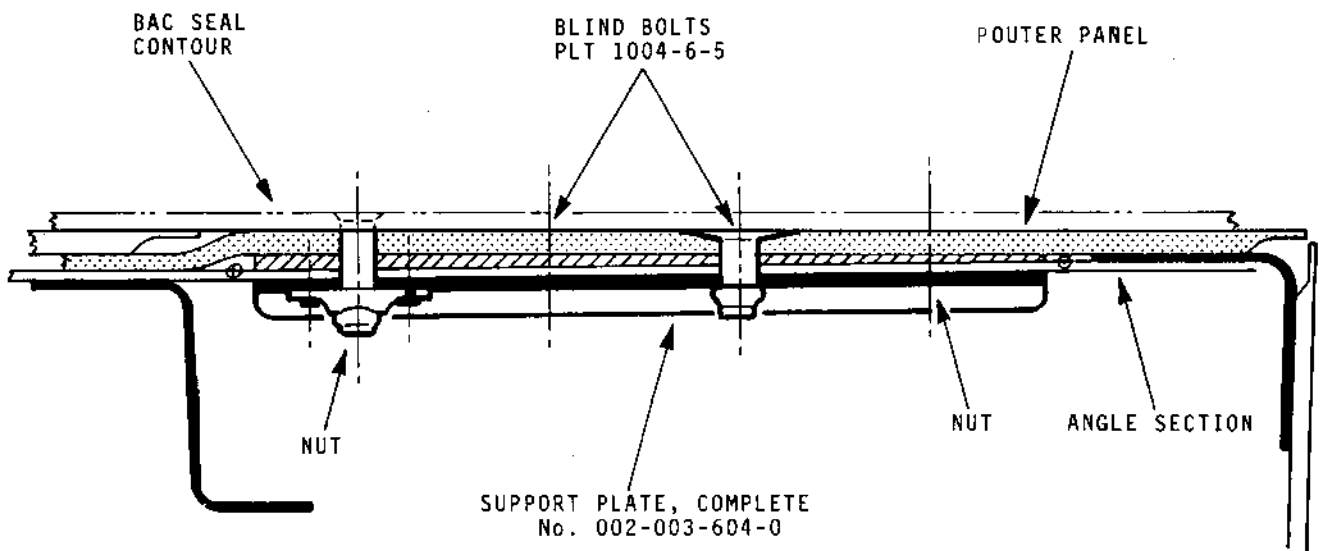


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POSITION "1"



SECTION AA



Replacement of BAC Seal Fasteners
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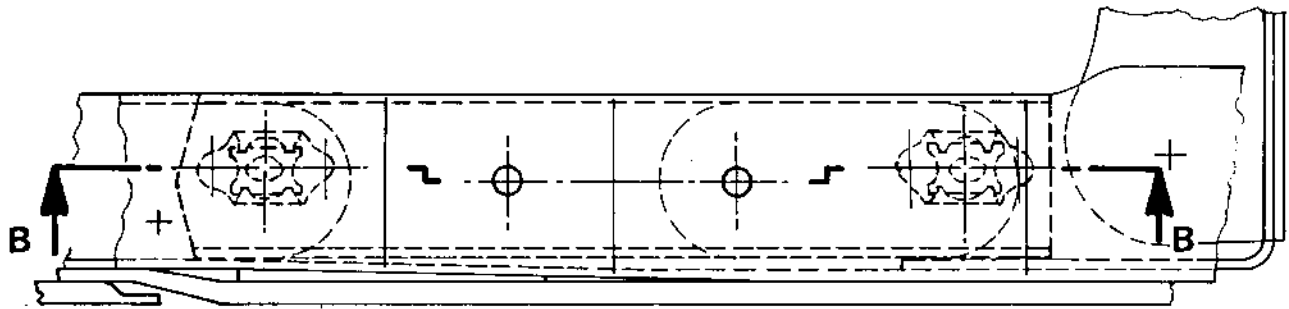


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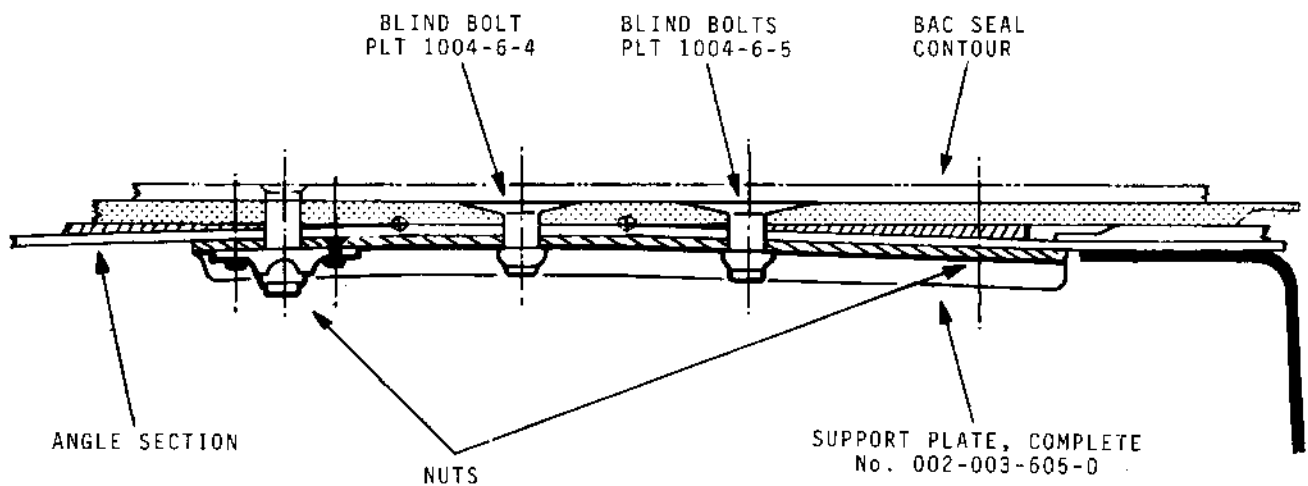
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POSITION "3"



SECTION BB



Replacement of BAC Seal Fasteners
Figure 401 (Sheet 7 of 15)

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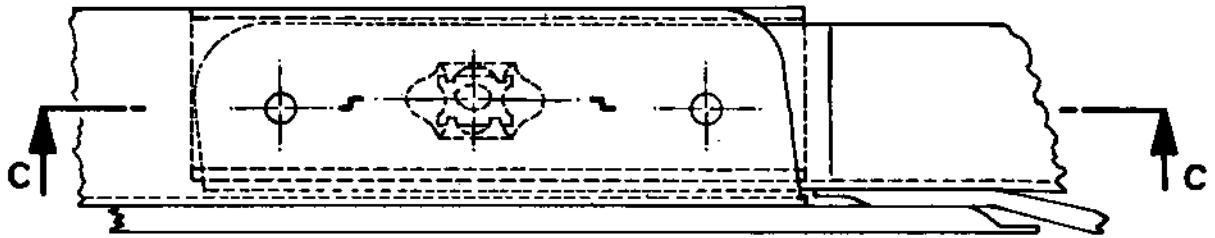
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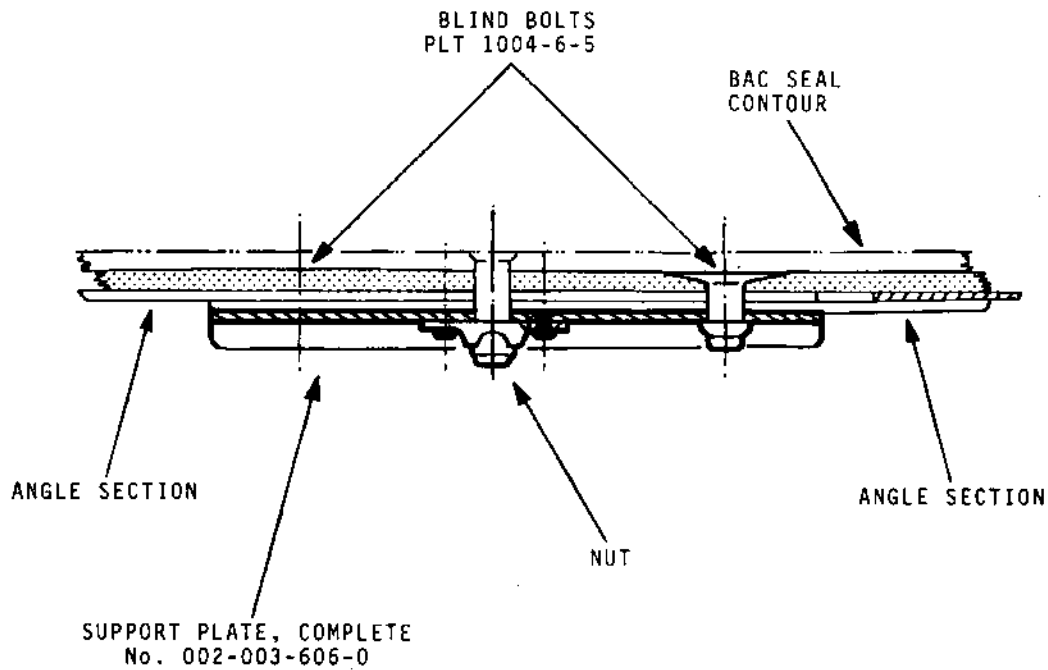


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POSITION "5"



SECTION CC



Replacement of BAC Seal Fasteners
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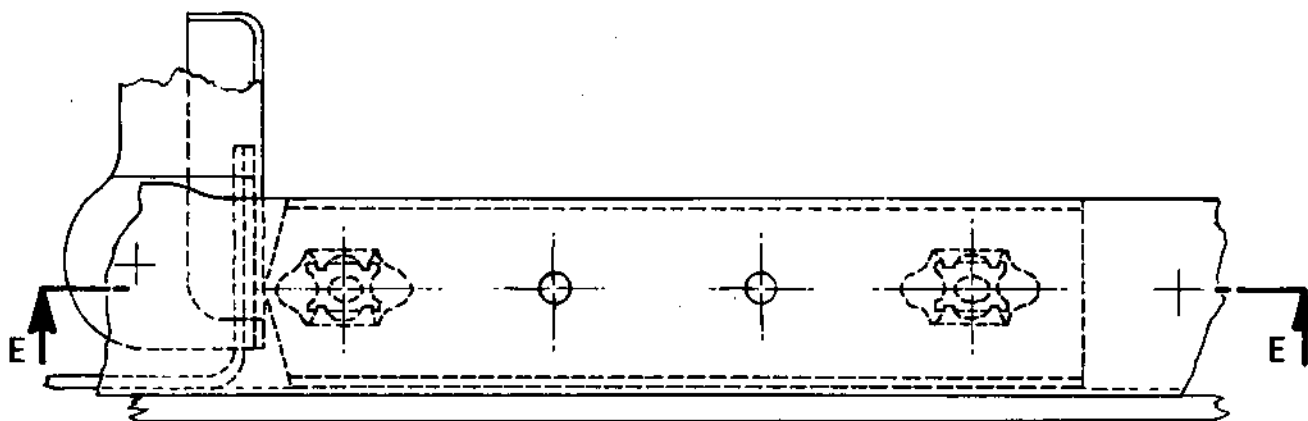


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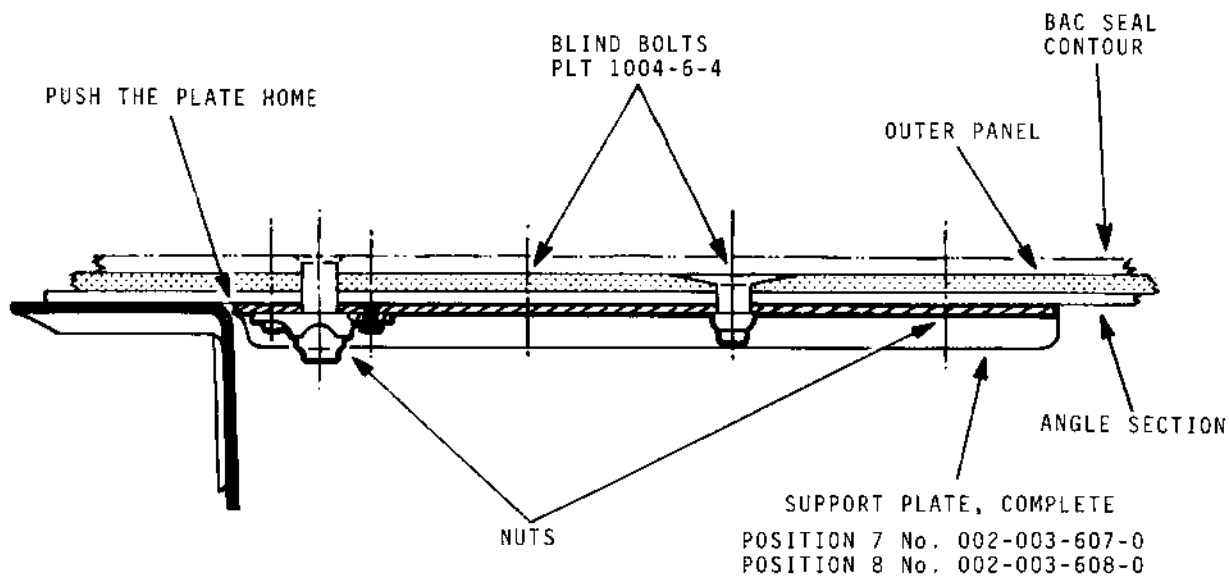
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POSITION "7" AS SHOWN
POSITION "8" OPPOSITE



SECTION EE



Replacement of BAC Seal Fasteners
Figure 401 (Sheet 9 of 15)

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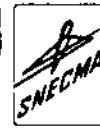
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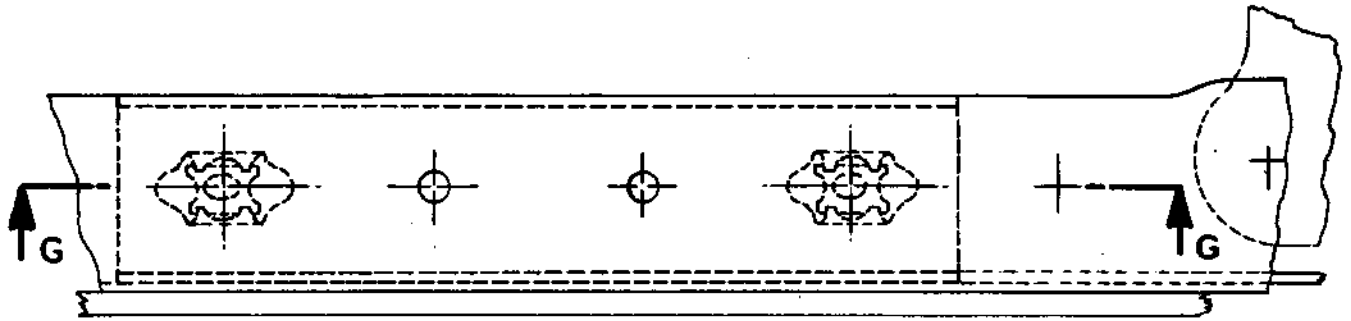
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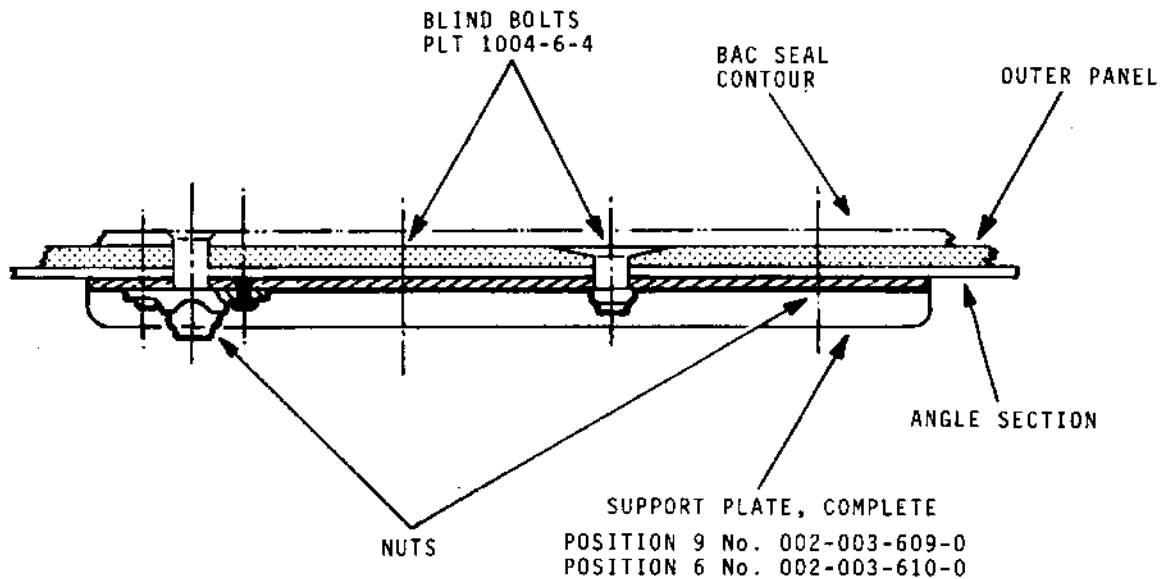
OVERHAUL



POSITION "9" AS SHOWN
POSITION "6" OPPOSITE



SECTION GG



Replacement of BAC Seal Fasteners
Figure 401 (Sheet 10 of 15)

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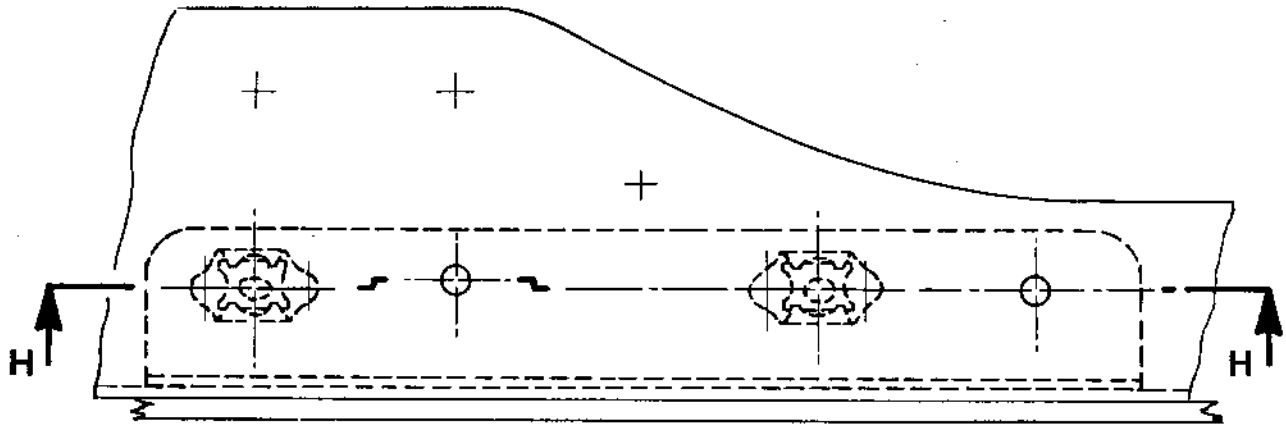
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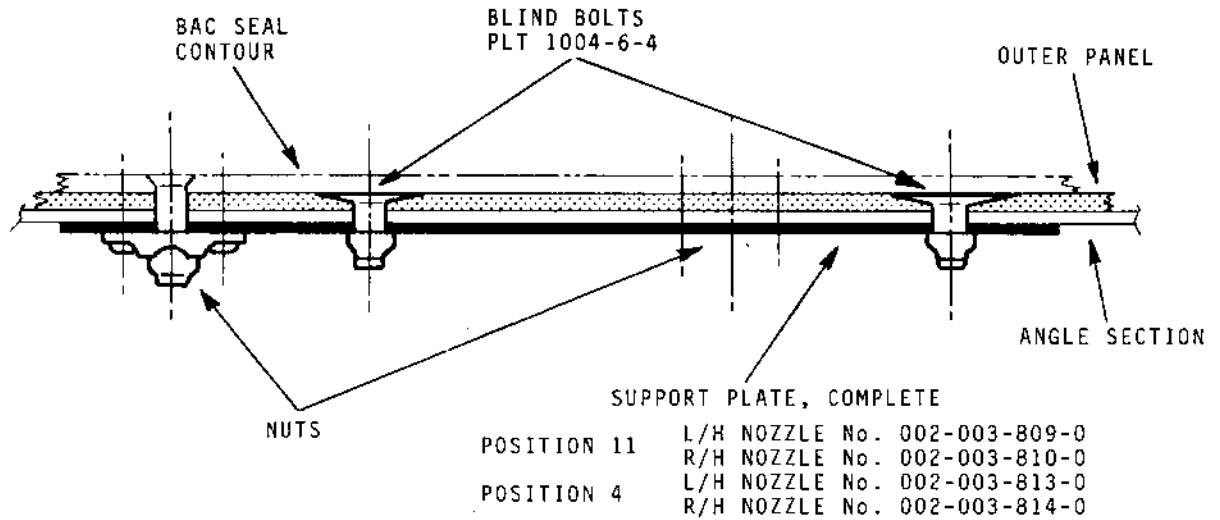
OVERHAUL



POSITION "11" AS SHOWN
POSITION "4" OPPOSITE



SECTION HH



Replacement Of BAC Seal Fasteners
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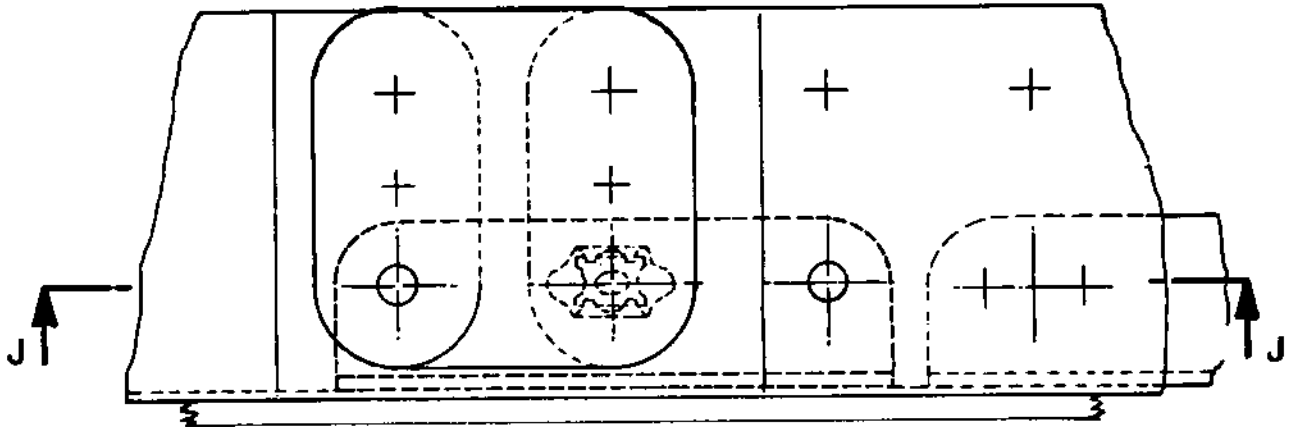
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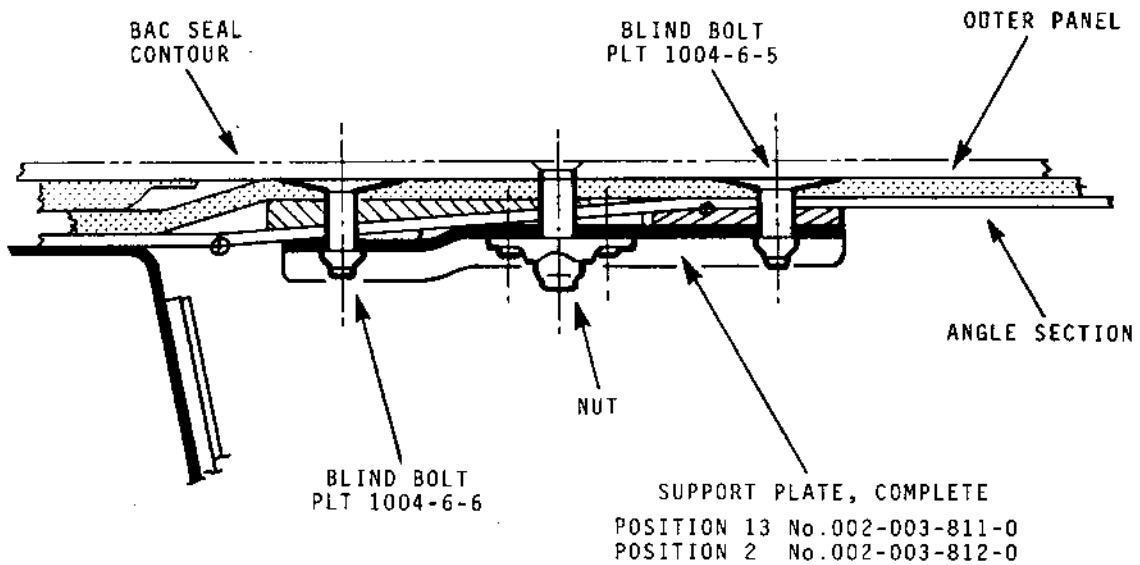


POSITION "13" AS SHOWN
POSITION "2" OPPOSITE

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SECTION JJ



Replacement of BAC Seal Fasteners
Figure 401 (Sheet 12 of 15)

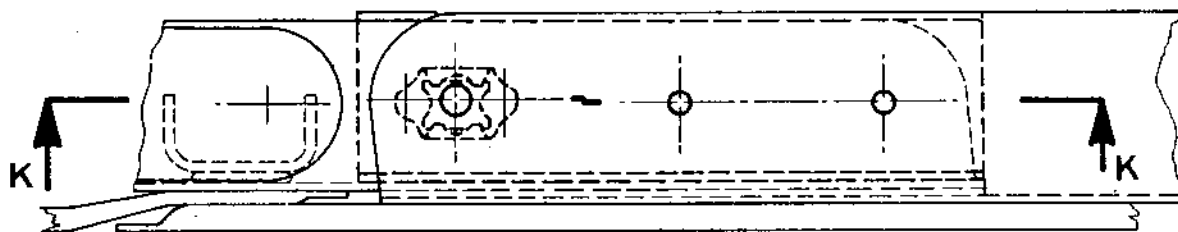


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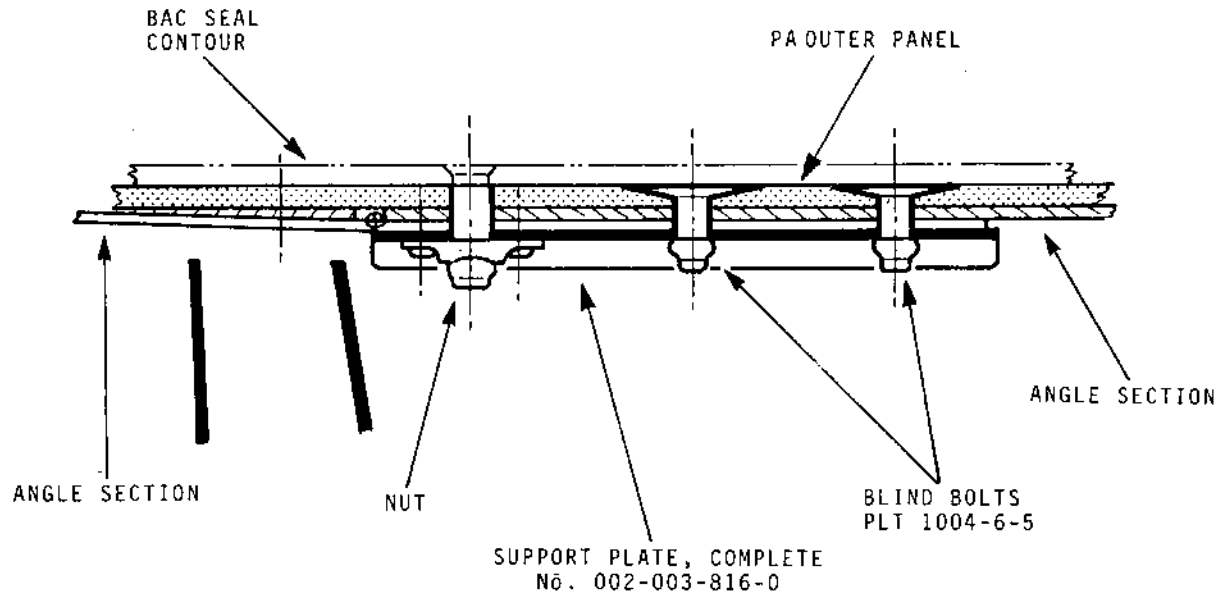
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POSITION "10"



SECTION KK



Replacement of BAC Seal Fasteners
Figure 401 (Sheet 13 of 15)

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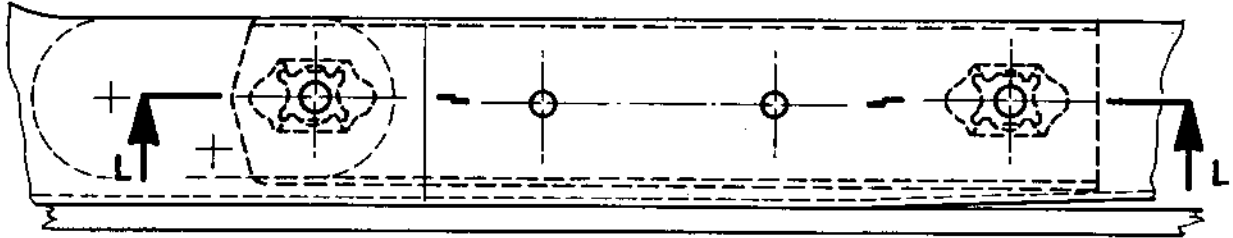


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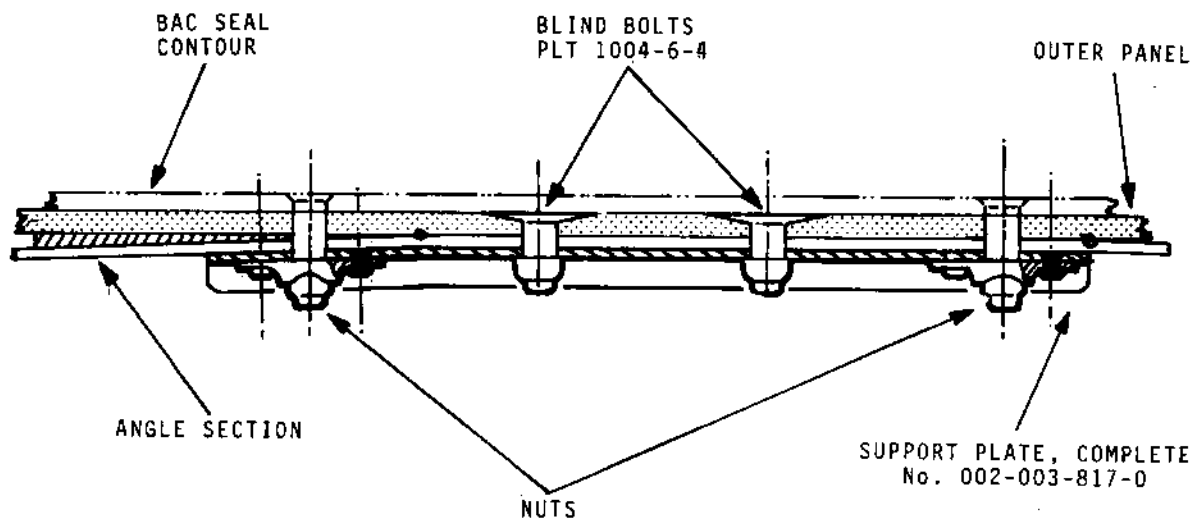
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POSITION "12"



SECTION LL



Replacement of BAC Seal Fasteners
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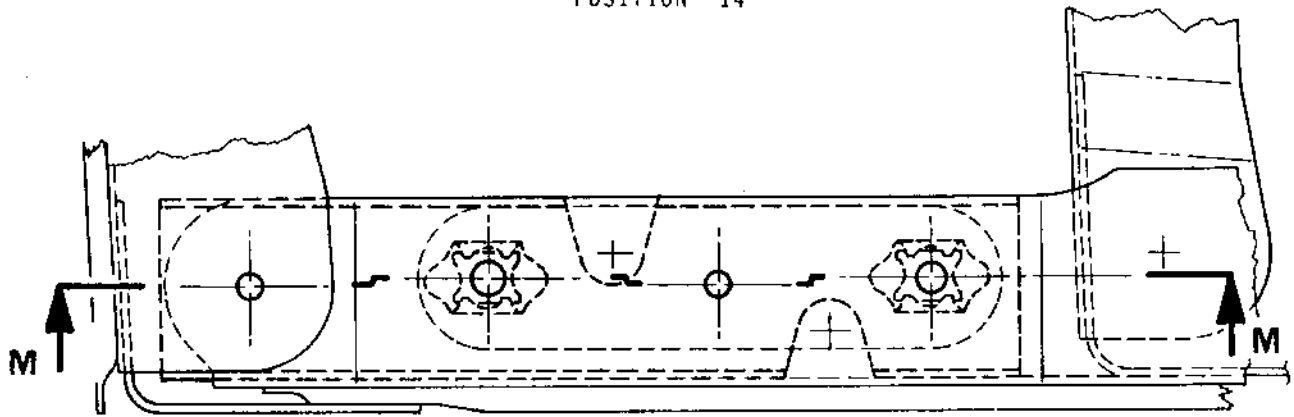
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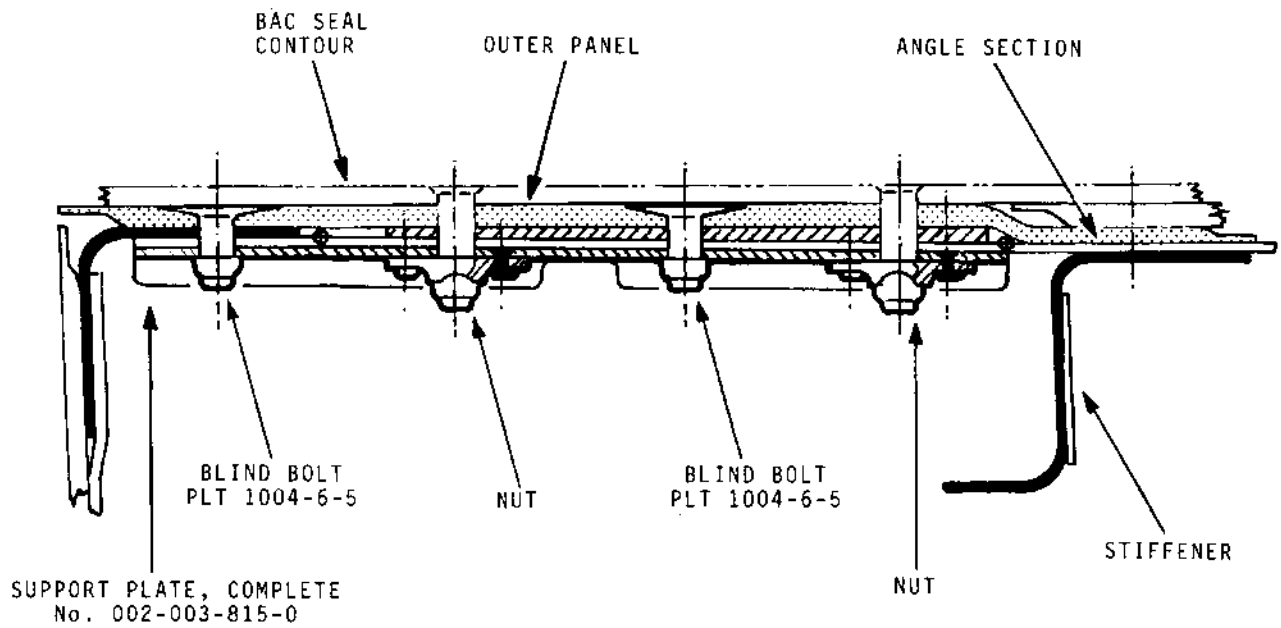


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POSITION "14"



SECTION MM



Replacement of BAC Seal Fasteners
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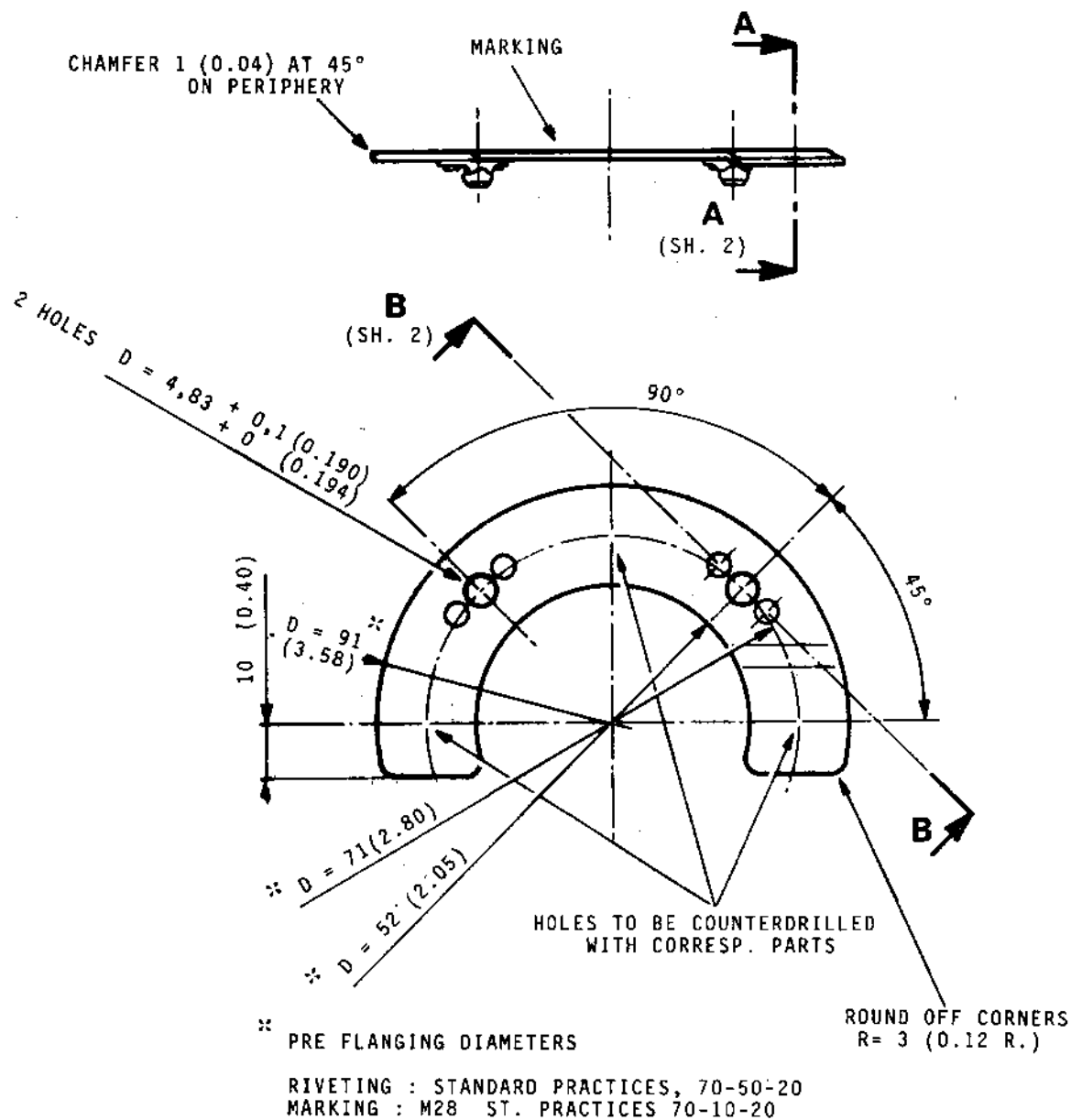
OVERHAUL



REINFORCEMENT PLATE, COMPLETE

No. 002-004-033-0

MATERIAL : P3322 (NC 22 Dnb) - SHEET THICKNESS : 1,3 (0.05)



DIMENSIONS ARE IN MILLIMETRES WITH INCH CONVERSIONS IN PARENTHESES.

Making Up Blanking Pates
Figure 402 (Sheet 1 of 4)

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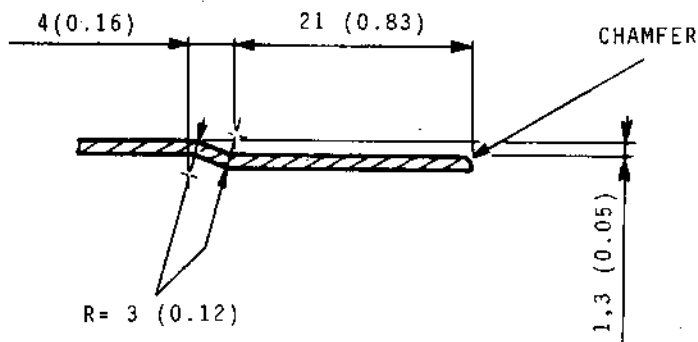


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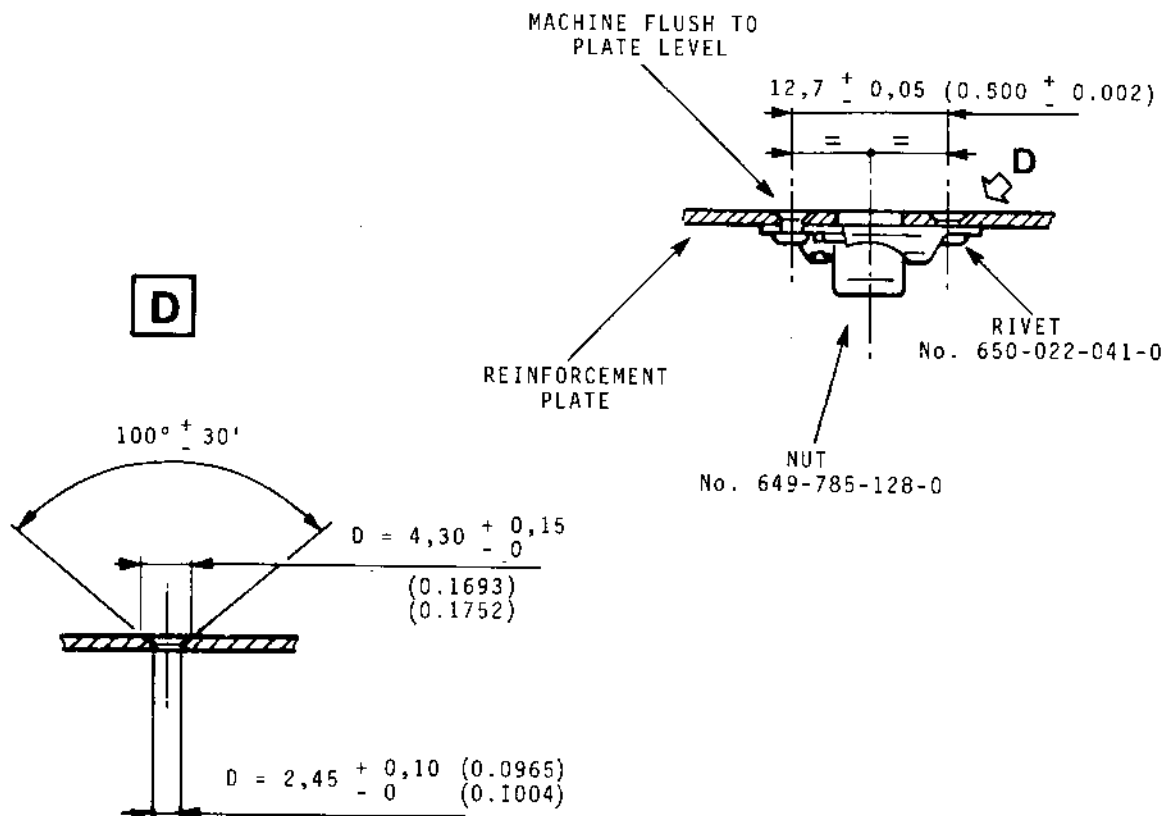
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SECTION AA



SECTION BB



DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Blanking Plates
Figure 402 (Sheet 2 of 4)

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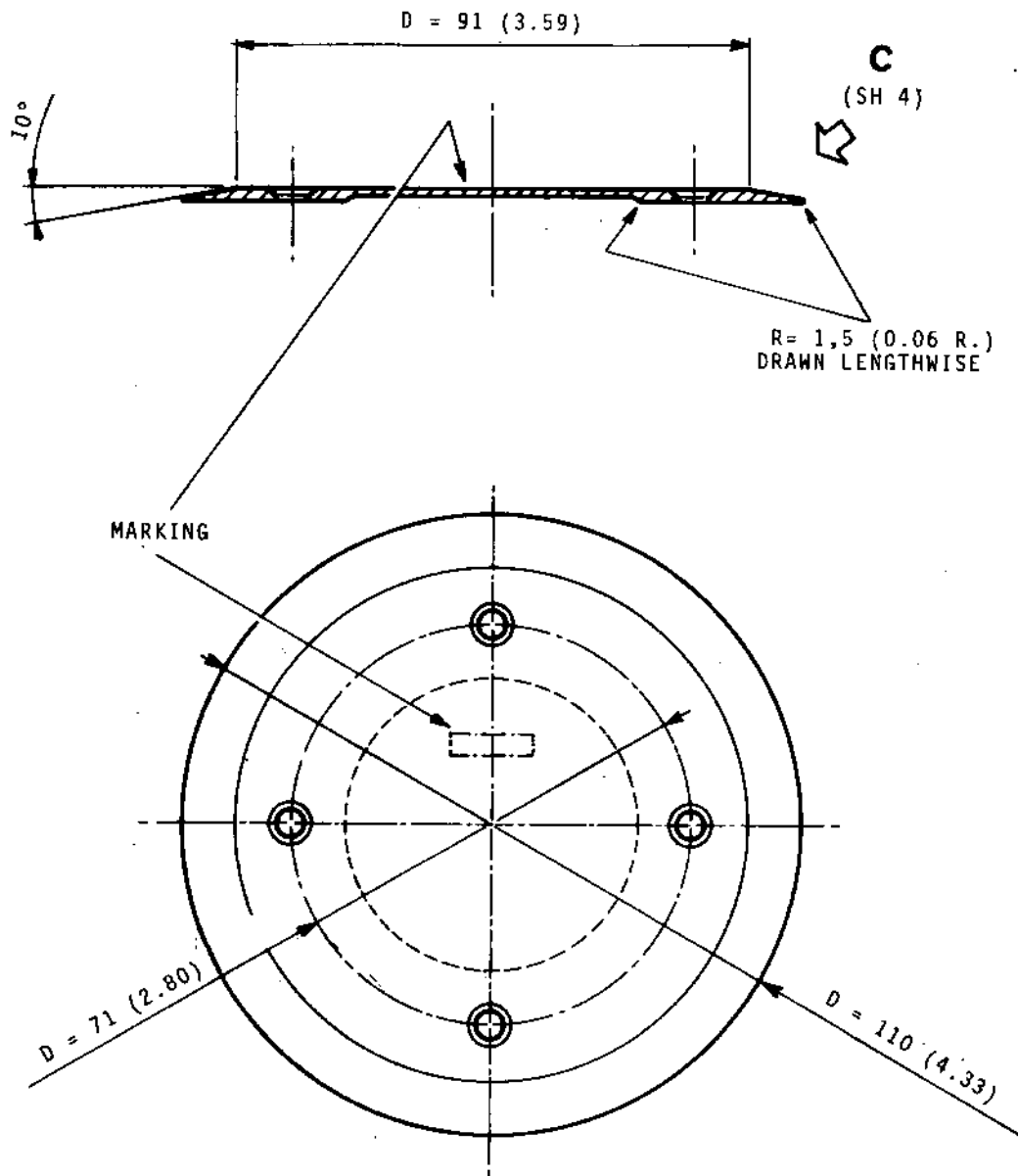
OVERHAUL



COVER

No. 002-004-004-0

MATERIAL: P3322 (NC 22DNb) - SHEET THICKNESS: 2,5 (0.10)



MARKING: M28 STANDARD PRACTICES, 70-10-20

DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Blanking Plates
Figure 402 (Sheet 3 of 4)

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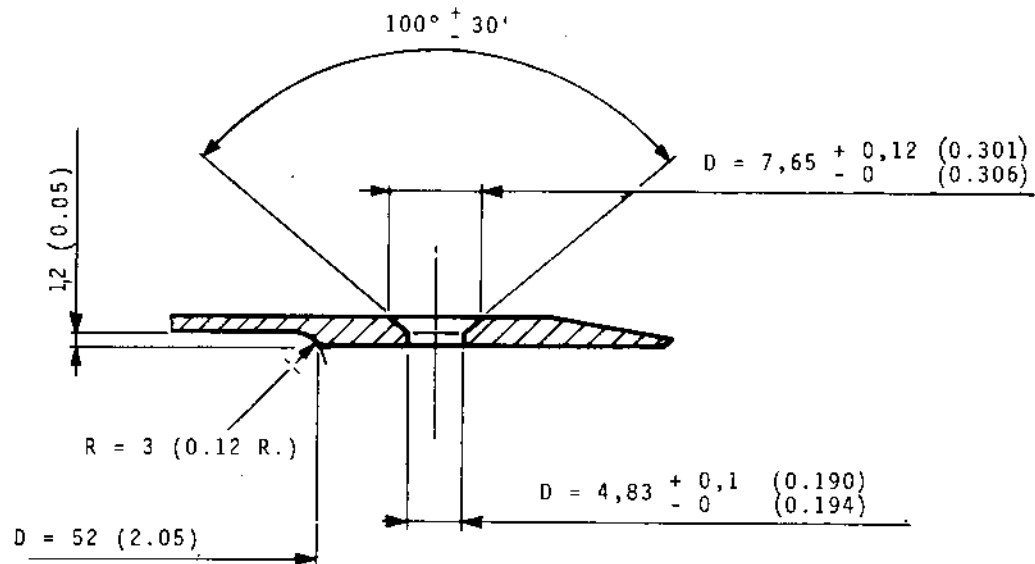


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DIMENSIONS ARE IN MILLIMETRES WITH INCH
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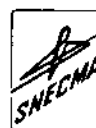
Making Up Blanking Plates
Figure 402 (Sheet 4 of 4)

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**OLYMPUS 593**MK.610-14-28
OVERHAULREPAIRTWIN SECONDARY NOZZLE (29-190/191)7. Renewing Riveted Nuts Securing Heat Insulation on Side Walls.

PARTS REQUIRED FOR REPAIR

Anchor nut No. SIMMONDS LA 579-3	(649-302-008-0)
Anchor nut No. NAS 680-C-3	(649-785-035-0)
Rivet No. BNAE 21217 TC 2406	(650-025-042-0)
or No. BNAE 21217 TC 3207	(650-025-073-0)
Rivet No. BNAE 21217 TC 2407	(650-025-043-0)
or No. BNAE 21217 TC 3208	(650-025-074-0)

- A. Remove nut fixing rivets by grinding out the heads.
- B. Check rivet holes as directed in chapter "RIVETING", section 70-50-10.
- C. If required, rebore rivet holes to a larger diameter as indicated in figure 401 and in chapter "RIVETING", section 70-50-10.
- D. Fit a new nut.

Apply new rivets as directed in chapter "RIVETING", section 70-50-10, and in figure 401.
- E. Check riveting as instructed in chapter "RIVETING", section 70-50-80.

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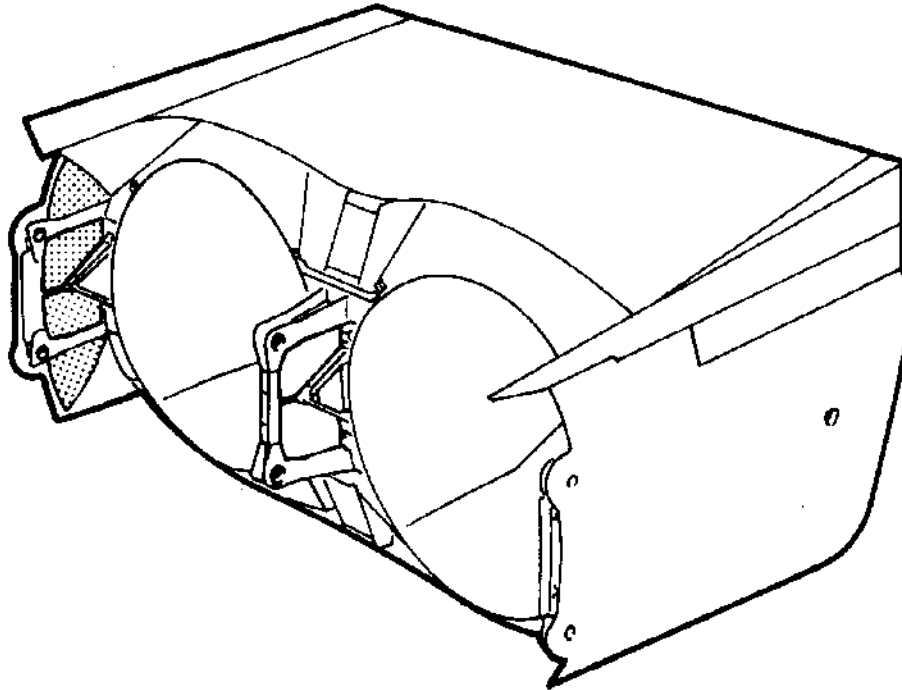


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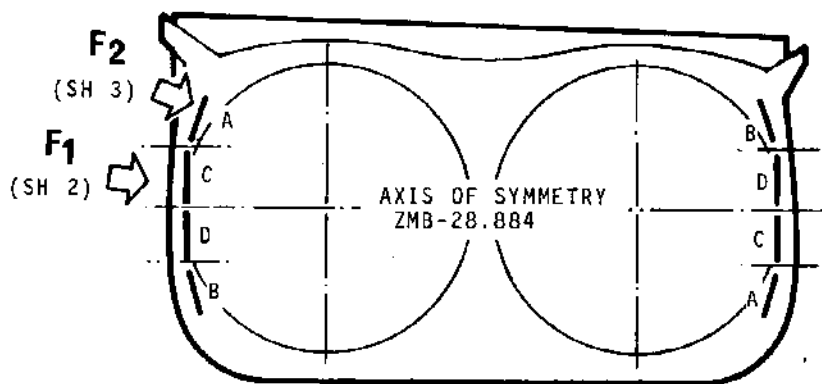
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IDENTICAL POSITION OF HEAT INSULATION
ON "RH" AND "LH" NOZZLES



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Renewing Riveted Nuts
Figure 401 - (Sheet 1 of 5)



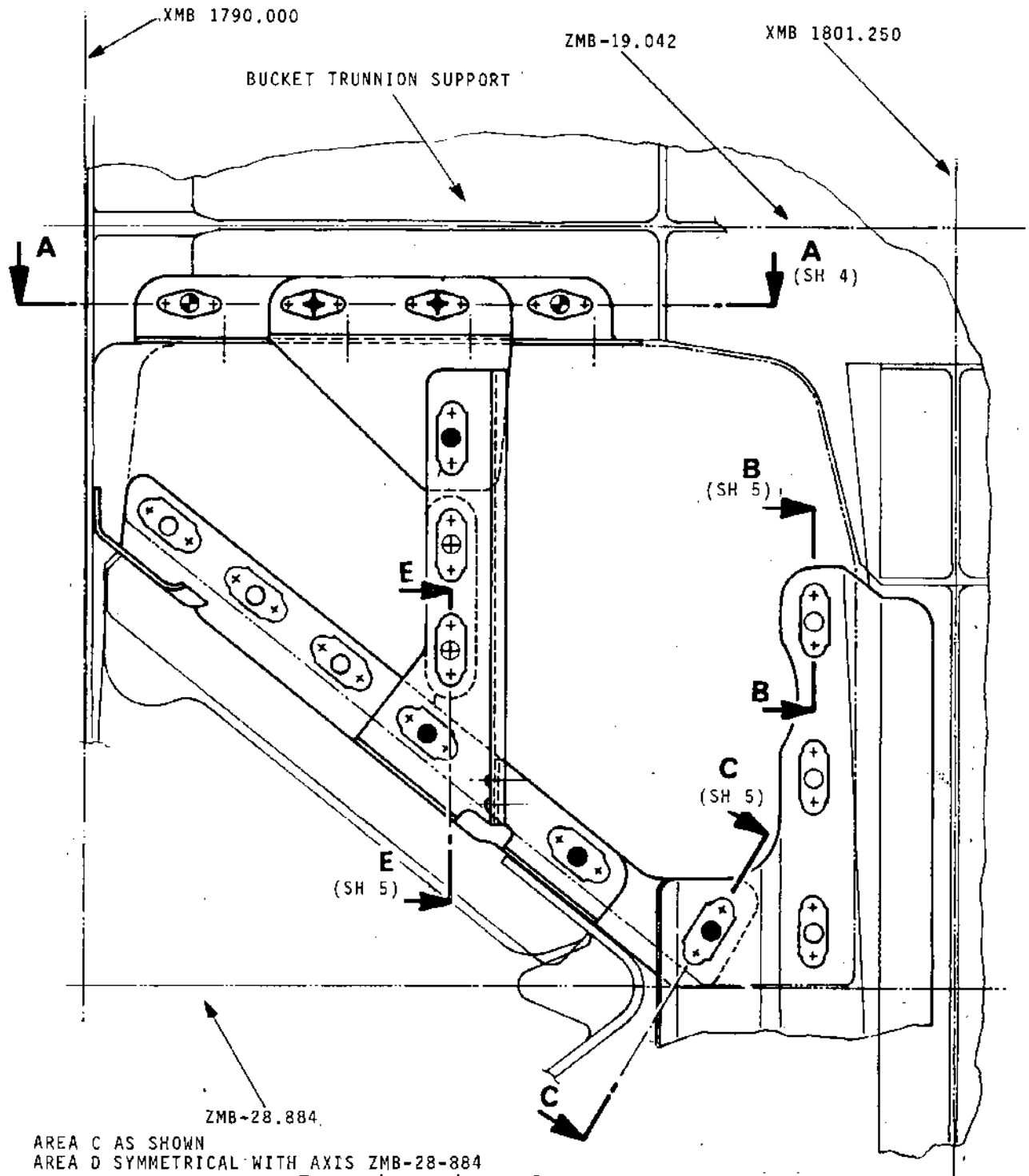
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AREA C AS SHOWN

AREA D SYMMETRICAL WITH AXIS ZMB-28-884

Renewing Riveted Nuts

Figure 401 - (Sheet 2 of 5)

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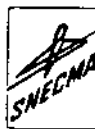
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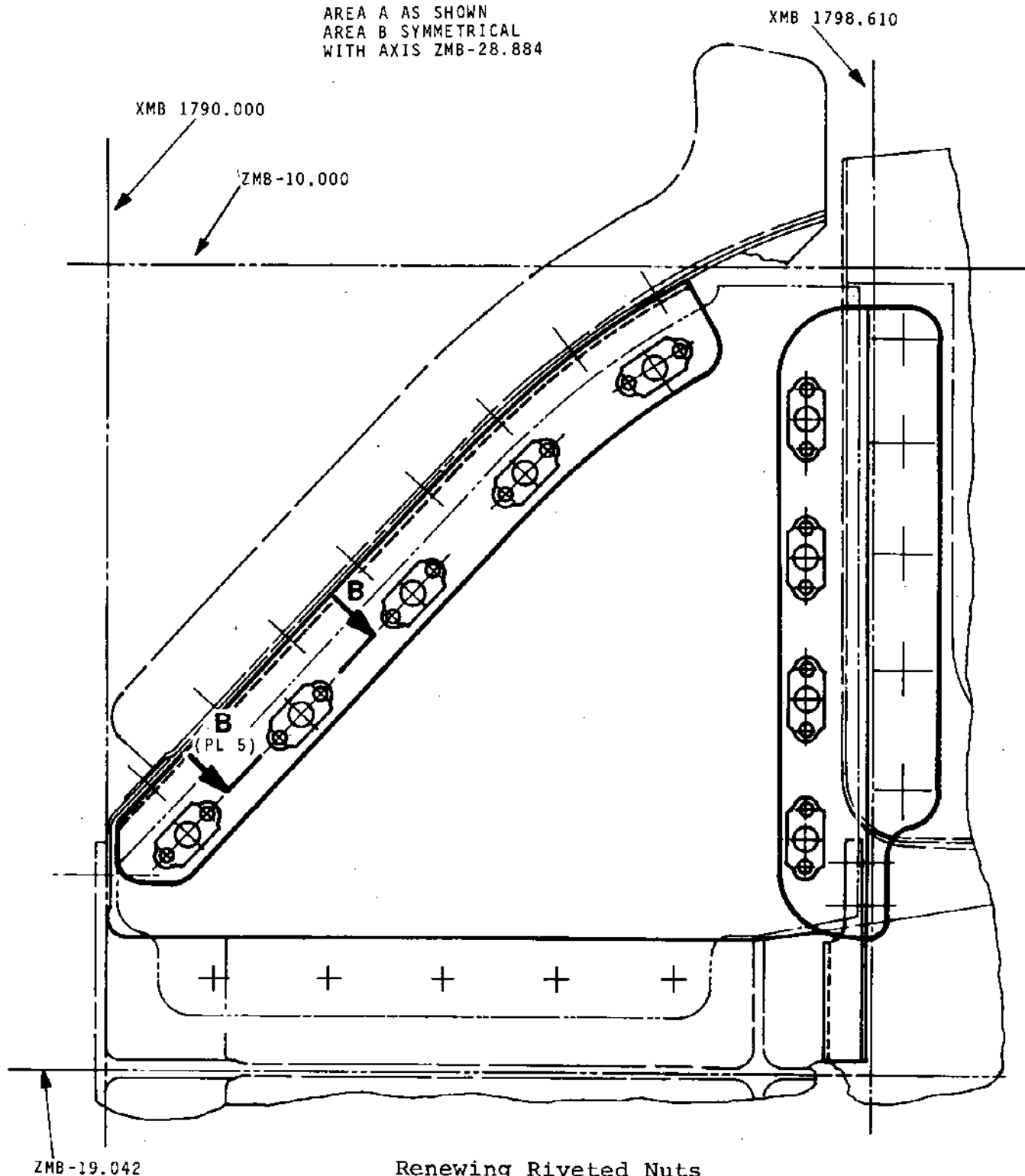
OLYMPUS 593

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AREA A AS SHOWN
AREA B SYMMETRICAL
WITH AXIS ZMB-28.884



Renewing Riveted Nuts
Figure 401 - (Sheet 3 of 5)

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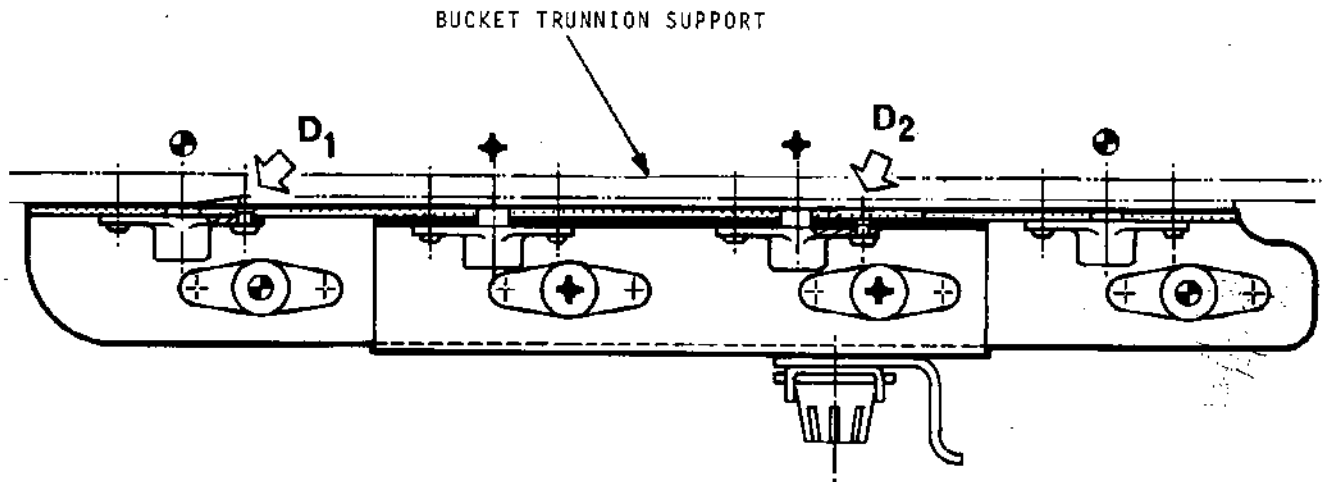
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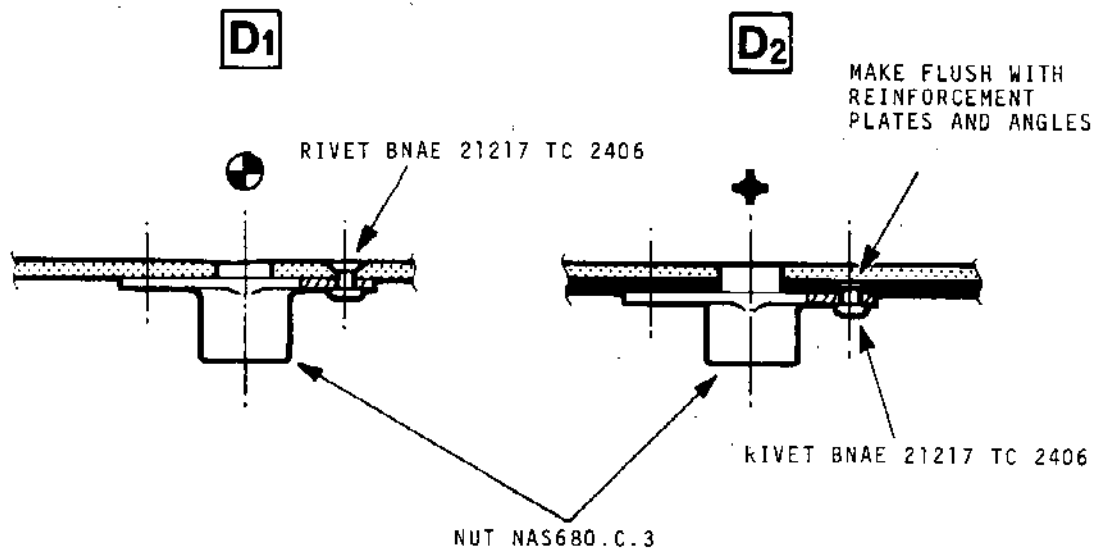
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OUTER THEORETICAL FORM



Renewing Riveted Nuts
Figure 401 - (Sheet 4 of 5)

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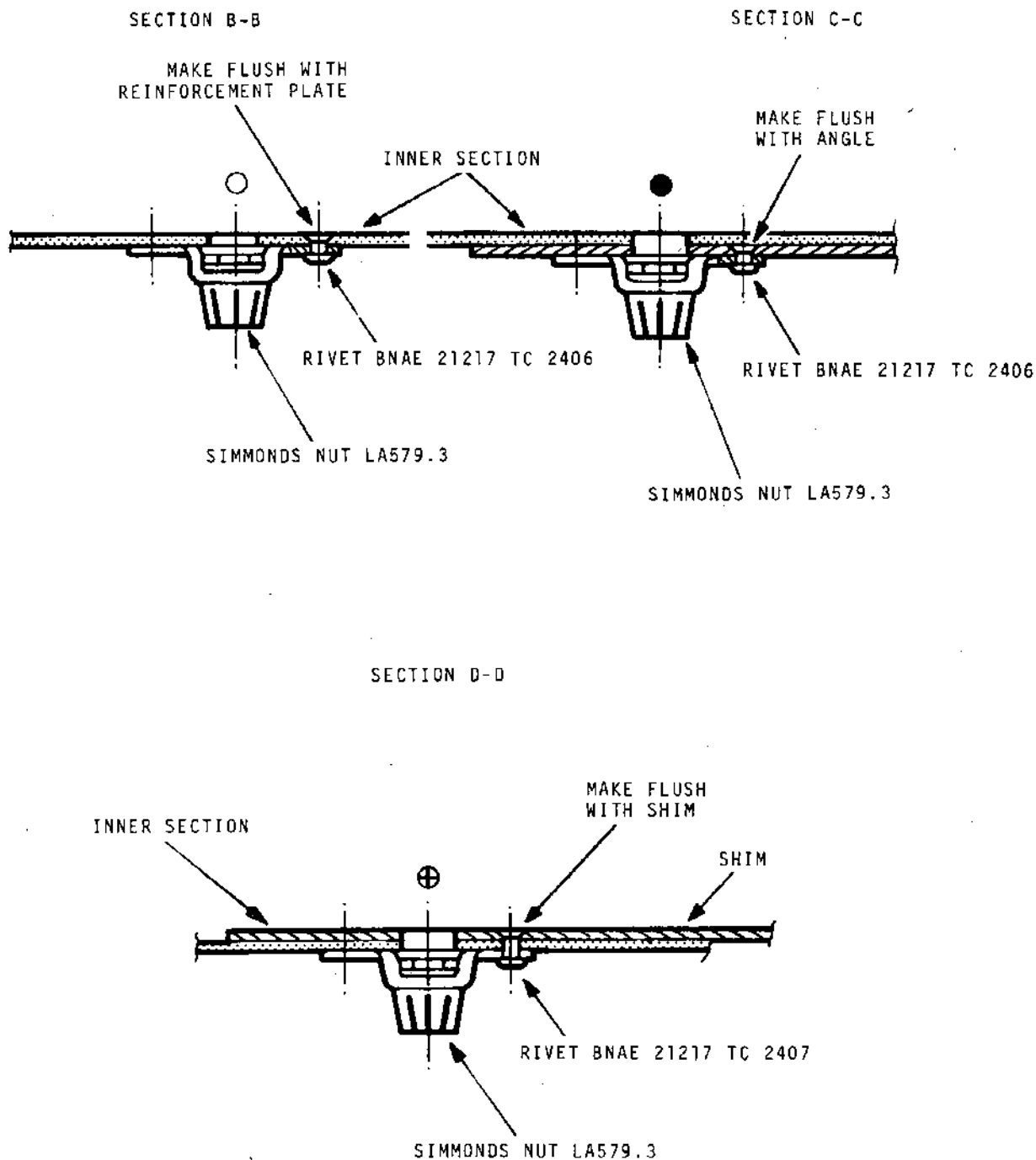
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Renewing Riveted Nuts
Figure 401 - (Sheet 5 of 5)

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REPAIRTWIN SECONDARY NOZZLE (29-190-191)8. Repair of Barrel Suspension Links

PARTS REQUIRED FOR REPAIR

Link assembly	No. 301-073-100-0
Link assembly	No. 301-073-150-0
Link assembly	No. 301-073-400-0
Link assembly	No. 301-073-450-0
Link assembly	No. 301-074-200-0
Link assembly	No. 301-074-250-0
Link assembly	No. 301-074-400-0
Link assembly	No. 301-074-450-0
Link assembly	No. 301-094-900-0
Link assembly	No. 301-094-950-0
Link assembly	No. 301-095-000-0
Link assembly	No. 301-095-050-0

Supporting yoke	No. 301-072-800-0
Supporting Yoke	No. 301-072-850-0
Supporting yoke	No. 301-073-200-0
Supporting yoke	No. 301-073-250-0
Supporting yoke	No. 301-073-500-0
Supporting yoke	No. 301-073-550-0
Supporting yoke	No. 301-073-600-0
Supporting yoke	No. 301-073-900-0
Supporting yoke	No. 301-073-950-0
Supporting yoke	No. 301-074-000-0
Supporting yoke	No. 301-074-050-0
Supporting yoke	No. 301-094-700-0
Supporting yoke	No. 301-094-750-0
Supporting yoke	No. 301-095-100-0
Supporting yoke	No. 301 095-150-0
Supporting yoke	No. 301 095-200-0
Supporting yoke	No. 301 095-250-0

Spacer	No. 301-045-301-0
Spacer	No. 301-045-401-0
Spacer	No. 301-072-702-0
Spacer	No. 301-073-802-0

Washer to be welded	No. 301-046-600-0
---------------------	-------------------

Thin washer	AN960C416	(649-786-070-0)
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Split pin	MS24665-153	(549-528-019-0)
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PARTS REQUIRED FOR REPAIR

(Cont'd from page 401)

Blind bolt	PLT 220-5-2	(650-089-311-0)
Blind bolt	PLT 220-6-2	(650-089-311-0)
Round-headed rivet	NAS1189-5-9	(650-614-108-0)
Cherry-lock rivet	CR2839-5-4	(649-772-085-0)
Cherry-lock rivet	CR2839-6-3	(649-772-089-0)
Hi-lok bolt	HL169-5-13	(649-781-084-0)
Hi-lok bolt	HL169-6-13	(649-781-086-0)
Assembly bolt	NAS6304U8D	(649-774-273-0)
Assembly bolt	NAS6304U"X"8D	
Hi-lok nut	HLN1 G5	(649-785-047-0)
Hi-lok nut	HLN1 G6	(649-785-048-0)
Castellated nut	MS9364-10	(649-783-082-0)
Weld filler wire	P 3008	(Z8CND15)

A. Introduction

Under this repair scheme, the repair of suspension links may be one of two types :

- Type 1 : Using existing items and a "repair" assembly bolt
Type 2 : Using new items and an "original" assembly bolt

B. Disassembly

- (1) Take down the links-and-yokes assembly, removing the blind rivets from the bay/yoke outer panels, as instructed in chapter "Riveting", section 70-50-50 : "Joints made by the Use of Cherry-Lock Blind Rivets", and the barrel/yoke retaining Hi-Lok Bolts as instructed in chapter "Riveting", section 70-50-40 : "Joints Made by the Use of Hi-Lok Fasteners".
- (2) Uncouple the links from the yokes as follows :
 - a) Remove the split pin.

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- (b) Remove the castellated nut with a standard tool.
- (c) Drive out the assembly bolt, careful not to damage the bolt hole.
- (3) Separate the links from the spacer removing the retaining rivets as instructed in chapter "Riveting", section 70-50-50 : "Joints Made by the Use of Cherry-Lock Blind Rivets".

C. Inspection

NOTE : This procedure is intended to determine which of the two forms of repair is to be applied to the links.

- (1) Measure the dimension and the ovality of the assembly bolt holes in the parts concerned.
 - (a) If the measured value is $6,73 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm
 $(0,265 \begin{smallmatrix} + 0.004 \\ + 0 \end{smallmatrix}$ in.) dia., repair the links as instructed under D. in this repair scheme.
 - (b) If the measured value exceeds diameter (a) above, repair the links as instructed under E. in this repair scheme.

D. Repair of suspension links, Type 1

NOTE : In this link repair scheme, the existing yoke and link assemblies are to be used.

- (1) Fit new washers as follows :
 - (a) Using a centring pin, fit new washers on either supporting yoke side, as shown in Fig. 401, sheets 14 and 15.

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- (b) By argon arc welding, make 4 weld spots on each washer, as instructed in chapter "Welding", section 70-35-10 "Fusion Welding", and shown in Fig. 401, sheet 15.
- Weld filler wire : P 3008 (Z8CND15)
 - Weld class : B1
- (2) Perform a class B1 weld inspection as instructed in chapter "Welding", section 70-35-10 : "Fusion welding".
- Carry out a localized water-washable fluorescent penetrant test by method M 503 B as described in chapter section 70-20-10 : "Dye Penetrant Inspection".
- (3) Heat-treat the supporting yokes by method M 822 followed by method M 821 described in chapter section 70-45-10 : "Heat Treatments".
- (4) Make assembly-bolt holes in the following manner :
- (a) Locate the outer bay-side links and yoke and attach them through the existing rivet holes.
 - (b) Counter drill the bolt holes to $6,73 + 0,1$ mm
($0,265 + 0.004$ in.) dia.
- (5) Assemble links and yokes on outer sides of bays as follows :
- (a) Sandwich a thin washer between the assembly bolt head and the link (See Fig. 401, Sheet 14).
 - (b) Mount the assembly bolt into hole as shown in Fig. 401.
 - (c) Fit a castellated nut, with a thin washer sandwiched between it and the link.
- Tighten the nut with a standard tool, taking care to register the pin hole with an undercut in the castellated nut.

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- Torque to 0,023 to 0,046 daN.m (2-4 lb. in.)
- (d) Mount the split pin into the corresponding recess as directed in chapter "Assembly", section 70-70-50 : "Locking".
- (6) Assemble the links with the spacer as follows :
 - (a) Put the corresponding parts in position (See Fig. 401)
 - (b) Counter drill the spacer retaining holes through the existing holes, and make the links -and- spacer joint with the new rivets, as instructed in chapter "Riveting", section 70-50-10 : "Joints Made by the Use of Solid Rivets", as shown in Fig. 401.
 - (c) Check the riveting as directed in chapter "Riveting", section 70-50-81 : "Inspection of Standard Rivets".
- (7) Drill the assembly-bolt hole as follows :
 - (a) Locate and pin the yoke on the inner bay side and the assembly on the outer side through the existing retaining holes.

NOTE : Remember to place shims underneath the inner/yoke (See Fig. 401).

 - (b) Mark out the assembly bolt hole on the yoke with a centre punch.
 - (c) Unpin and remove the yoke and assembly.
 - (d) Make pilot holes of $6,5 \pm 0,1$ mm (0.256 ± 0.04 in.) dia. in the links and the yoke ; deburr.
- (8) Mount yokes and links as follows :
 - (a) Locate and pin the outer supporting yoke on the nacelle.

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- (b) Rebore the yoke/angle-section retaining holes as shown in Fig. 401 as instructed in chapter "Riveting", section 70-50-60 : "Joints Made by the Use of Blind Bolts".
- (c) Put the yokes in position on the nacelle as shown in Fig. 401, and mount the fasteners as instructed in chapter "Riveting", section 70-50-40 : "Joints Made by the Use of Hi-Lok Fasteners", 70-50-50 : "Joints Made by the Use of Cherry-Lock Blind Rivets", and 70-50-60 : "Joints Made by the Use of Blind Bolts".
- (d) Place the links into their relative positions to the inner yoke, and rebore the assembly bolt hole to the diameter specified in the table in Fig. 401, sheet 15.
- (e) Assemble the links with the inner supporting yoke as directed under (5) in this repair scheme (D).

E. Repair of suspension links, Type 2

NOTE : In this repair scheme, new supporting yokes and link assemblies are to be used.

- (1) Fit out the new yokes with washers as described under (1), (2) and (3) in the Type 1 link repair scheme (D).
- (2) Drill out the assembly bolt hole in the outer yoke as follows :
 - (a) Put the yoke in its relative position to one of the links.
 - (b) Mark out the assembly bolt hole with a centre punch.
 - (c) Drill the yoke to the diameter specified in the table in Fig. 401, sheet 15.
- (3) Assemble the links with the outer yoke as instructed under (5) in the Type 1 link repair scheme (D).
- (4) Assemble the links with the spacer as follows :

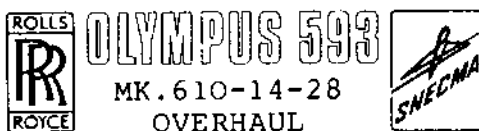
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- (a) Put the spacer in its relative position to the links (See Fig. 401).
 - (b) Counter drill the spacers, and make the joint between links and spacers with new rivets, as instructed in chapter "Riveting", section 70-50-10 : "Joints Made by the Use of Solid Rivets", and as shown in Fig. 401.
 - (c) Check the riveting as instructed in chapter "Riveting", section 70-50-81 : "Inspection of Standard Rivets".
- (5) Drill the yoke retaining holes on the nacelle as follows :
- (a) Put the links-and- outer yoke assy in position on the nacelle.
 - (b) Counter drill the yoke retaining holes as instructed in chapter "Riveting", sections 70-50-50 : "Joints Made by the Use of Blind Rivets", and 70-50-60 : "Joints Made by the Use of Blind Bolts", and as shown in Fig. 401. Pin the assembly on to the nacelle.
 - (c) Put the inner supporting yoke in its relative position to the assembly.
 - (d) Counter drill the Hi-Lok bolt holes as instructed in chapter "Riveting", section 70-50-40 : "Joints Made by the Use of Hi-Lok Fasteners", and shown in Fig. 401.
- (6) Drill out the links-and-inner yoke fixing bolt hole as follows :
- (a) Sandwich a shim between the inner supporting yoke and the barrel, and pin on.
 - (b) Put the links in position on the inner supporting yoke.
 - (c) Mark out the bolt hole on the yoke (See Fig.401, sheet 15).
 - (d) Unpin the inner yoke and the links/outer yoke assy, and remove.

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- (e) Drill the yoke and assembly to $6 \pm 0,1$ mm
0.240
(0.232 in.) dia ; deburr carefully.
- (f) Put assembly and inner yoke in position on the nacelle, and mount the fasteners as instructed in chapter "Riveting", sections 70-50-40 : "Joints Made by the Use of Hi-Lok Bolts", 70-50-50 : "Joints Made by the Use of Cherry-Lock Blind Rivets", and 70-50-60 : "Joints Made by the Use of Blind Bolts", and as shown in Fig. 401.
- NOTE : Do not omit to fit the shim between inner yoke and panel (See Fig. 401).
- (g) Check the riveting as described in chapter "Riveting", section 70-50-80.
- (h) Rebore the bolt hole to the diameter specified in the table in Fig 401, sheet 15.
- (7) Assemble the links with the inner supporting yoke as instructed under (5) in the Type 1 link repair scheme (5).

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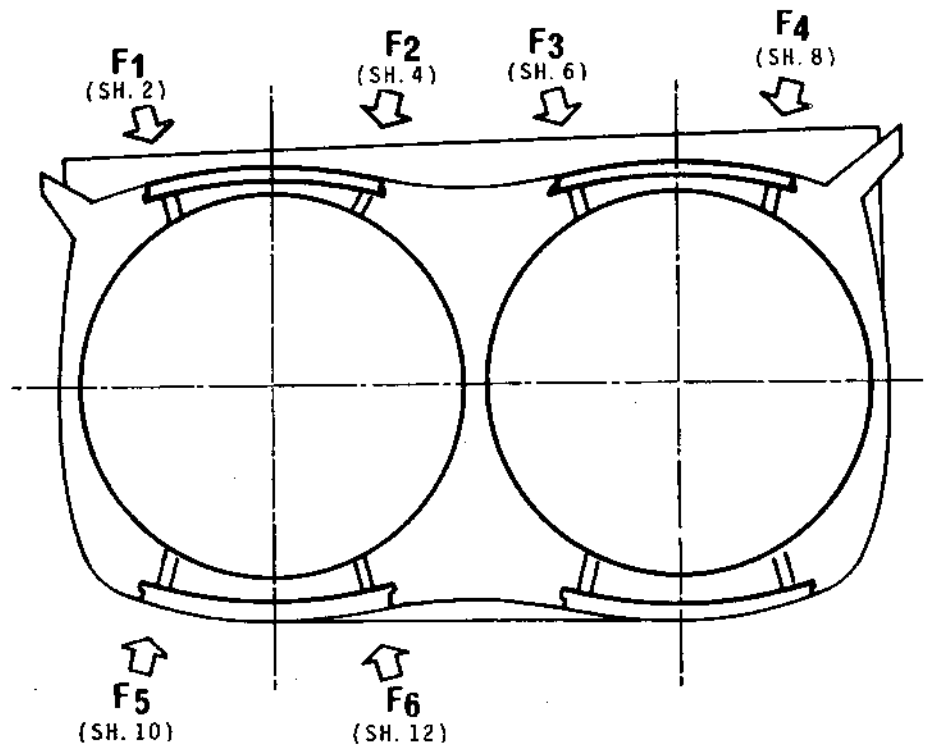


REAR VIEW OF NOZZLE

UPPER PART

BAY 1 - AS DRAWN BAY 4 - SYMMETRICAL

BAY 2 - AS DRAWN BAY 3 - SYMMETRICAL



LOWER PART

BAYS 1 AND 3 - AS DRAWN

BAYS 2 AND 4 - SYMMETRICAL

Repair of Barrel Suspension Links
Figure 401 (Sheet 1 of 16)

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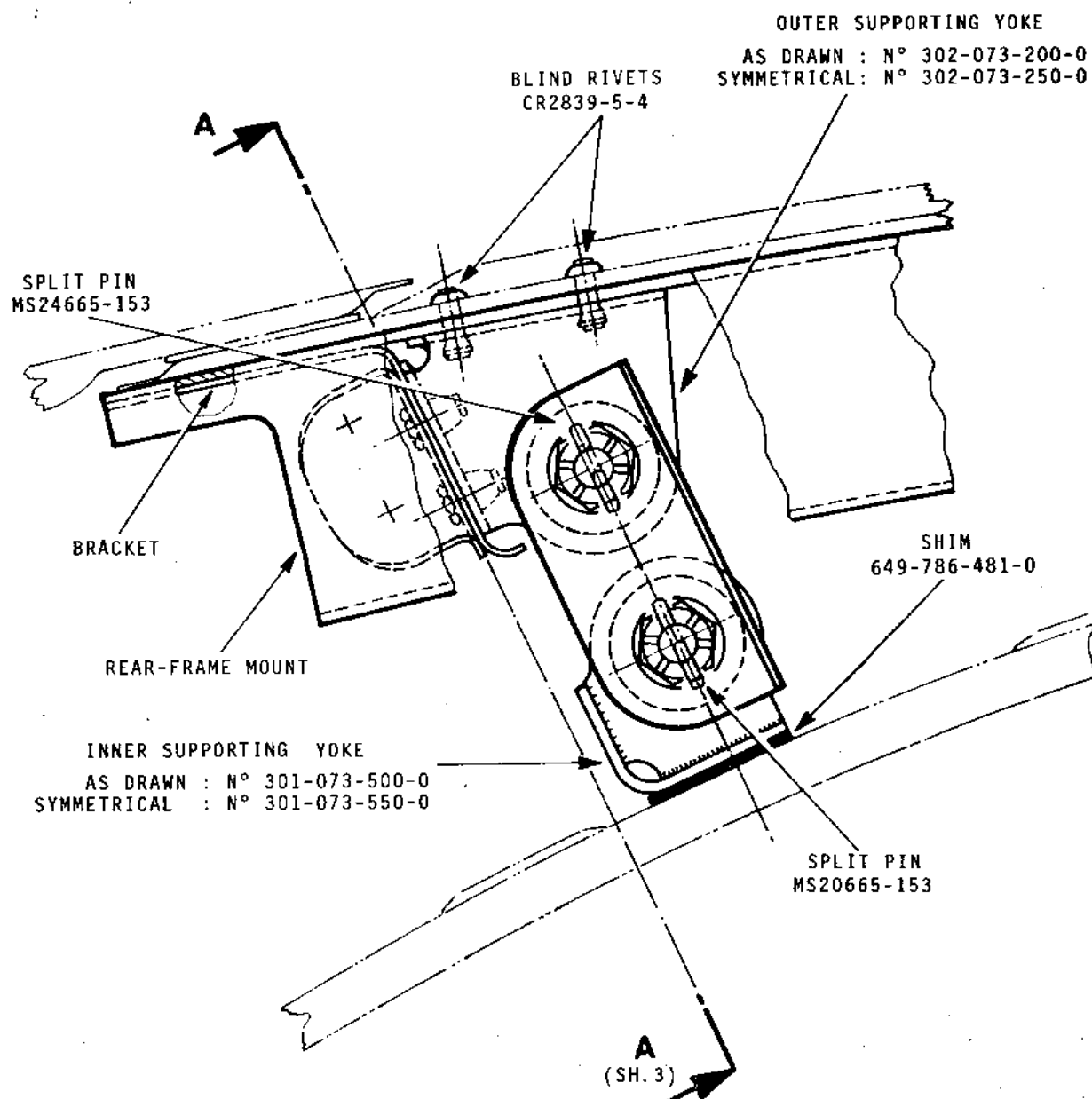
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F₁

IN BAY 1 AS SHOWN
IN BAY 4 SYMMETRICAL

ZMB 0.000



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Repair of Barrel Suspension Links
Figure 401 (Sheet 2 of 16)

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SECTION AA

OUTER SUPPORTING YOKE
AS DRAWN : N° 301-073-200-0
SYMMETRICAL : N° 301-073-250-0

BLIND BOLTS
PLT 220-5-2

REAR-FRAME MOUNT

SUPPORT ANGLE SECTION

LINK ASSY
N° 301-073-400-0

LINK ASSY
N° 301-073-450-0

INNER SUPPORTING YOKE
AS DRAWN : N° 301-073-500-0
SYMMETRICAL : N° 301-073-550-0

SHIM
649-786-481-0

HI-LOK BOLT HL169-5-13

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Repair of Barrel Suspension Links
Figure 401 (Sheet 3 of 16)

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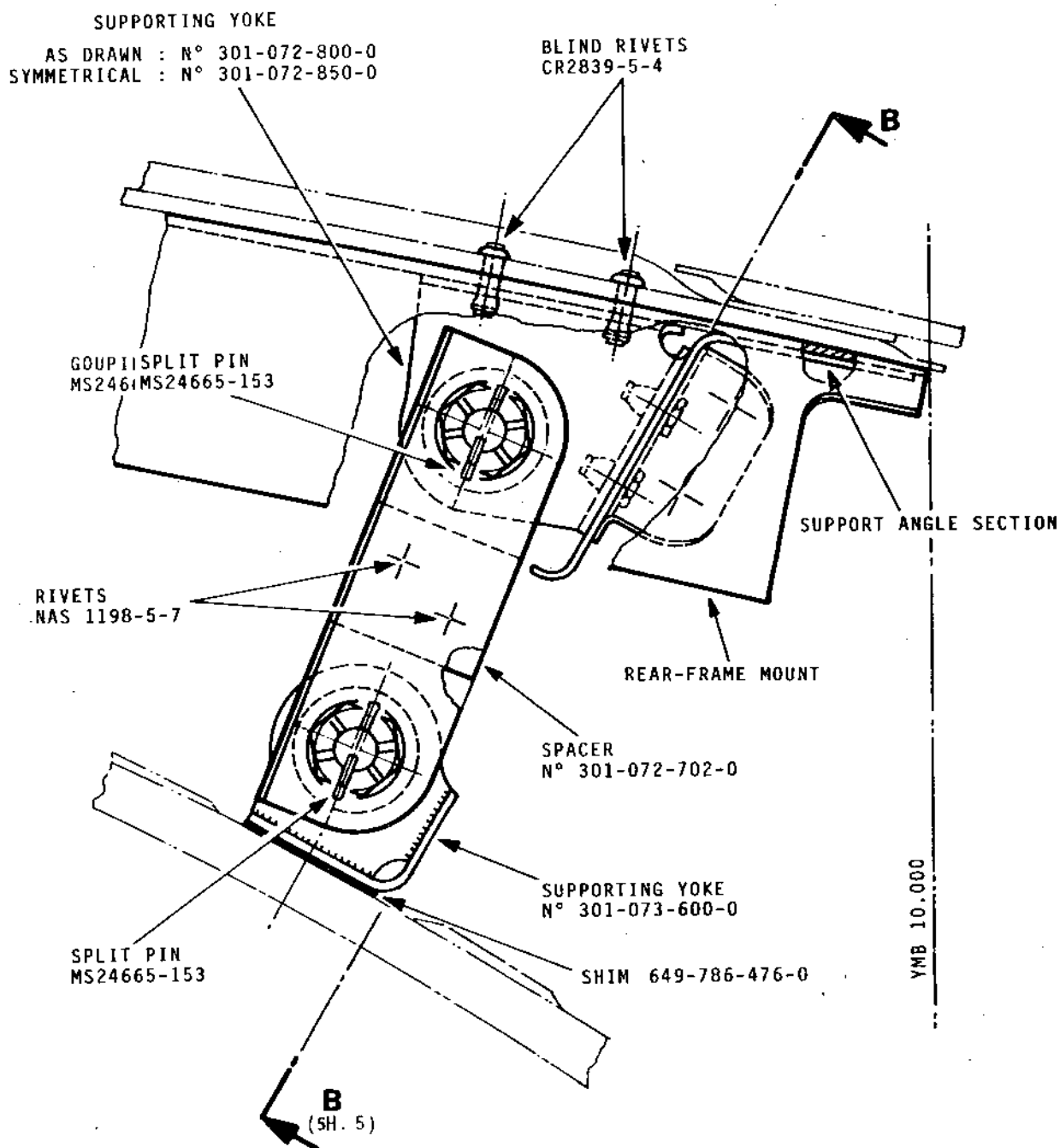


F₂

ZMB 0.000

IN BAY 1 : AS SHOWN

IN BAY 4 : SYMMETRICAL



Repair of Barrel Suspension Links
Figure 401 (Sheet 4 of 16)

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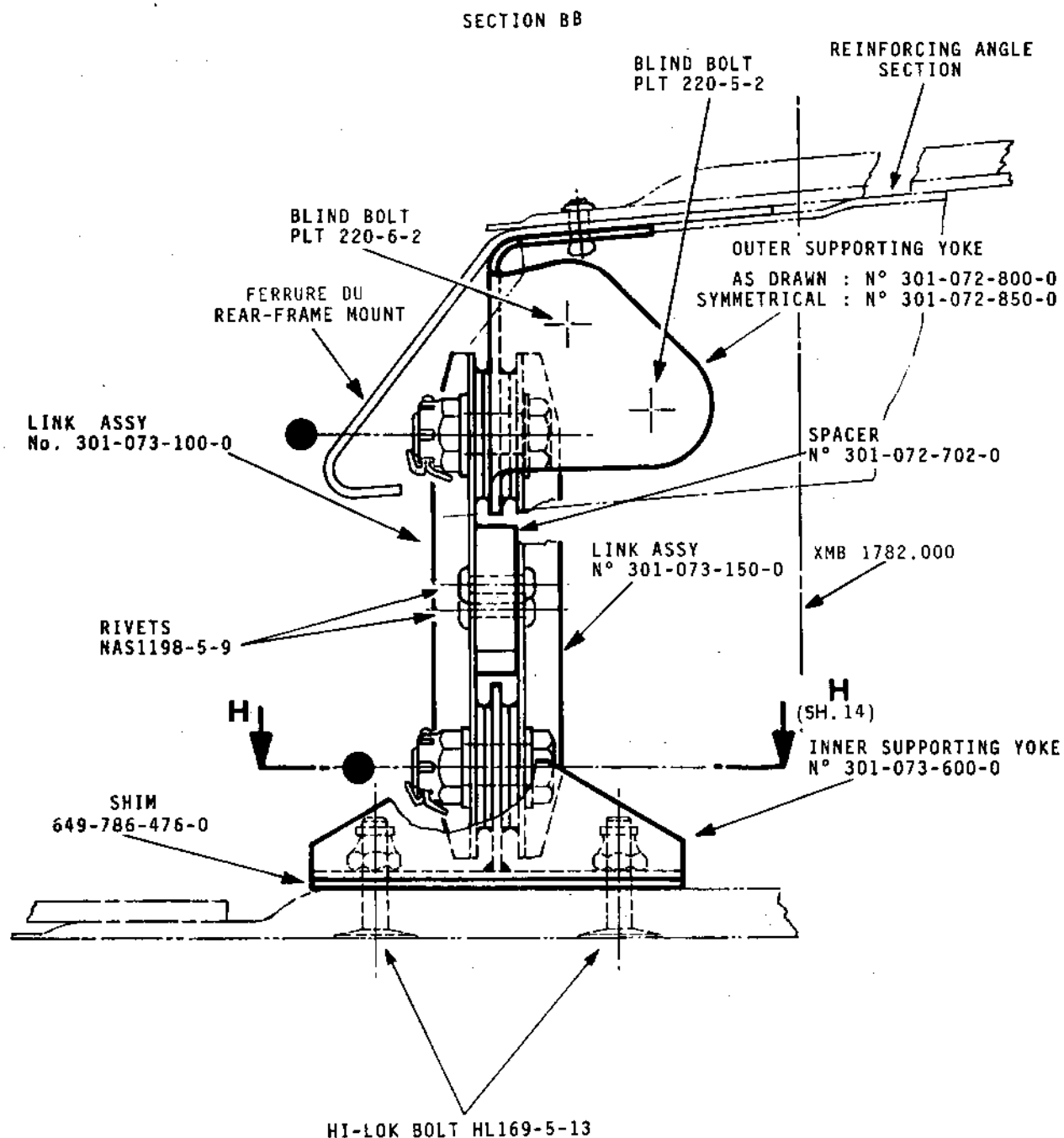
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Repair of Barrel Suspension Links
Figure 401 (Sheet 5 of 16)

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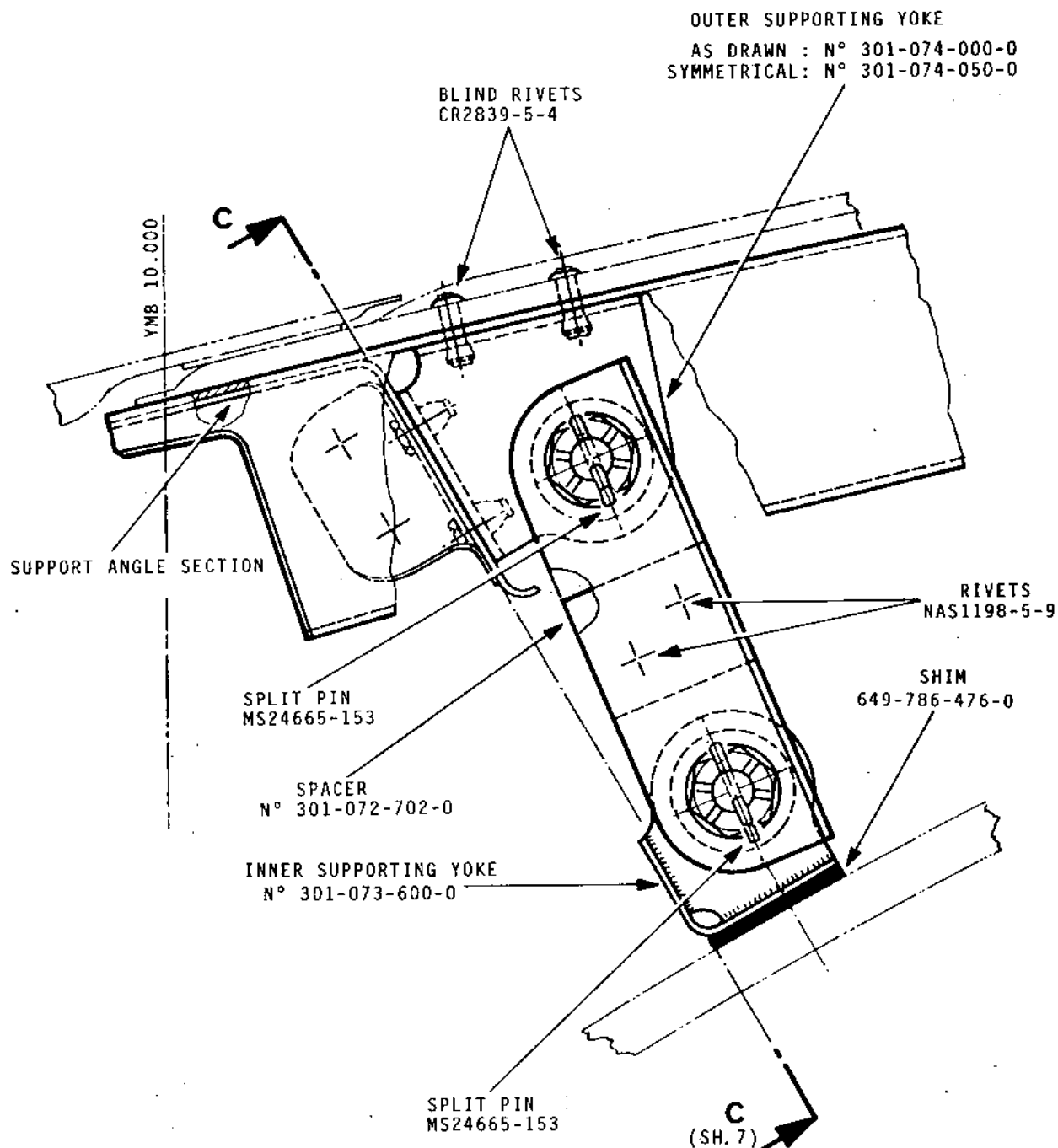
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F₃

IN BAY 2 : AS SHOWN
IN BAY 3 : SYMMETRICAL

ZMB 0.000



Repair of Barrel Suspension Links
Figure 401 (Sheet 6 of 16)

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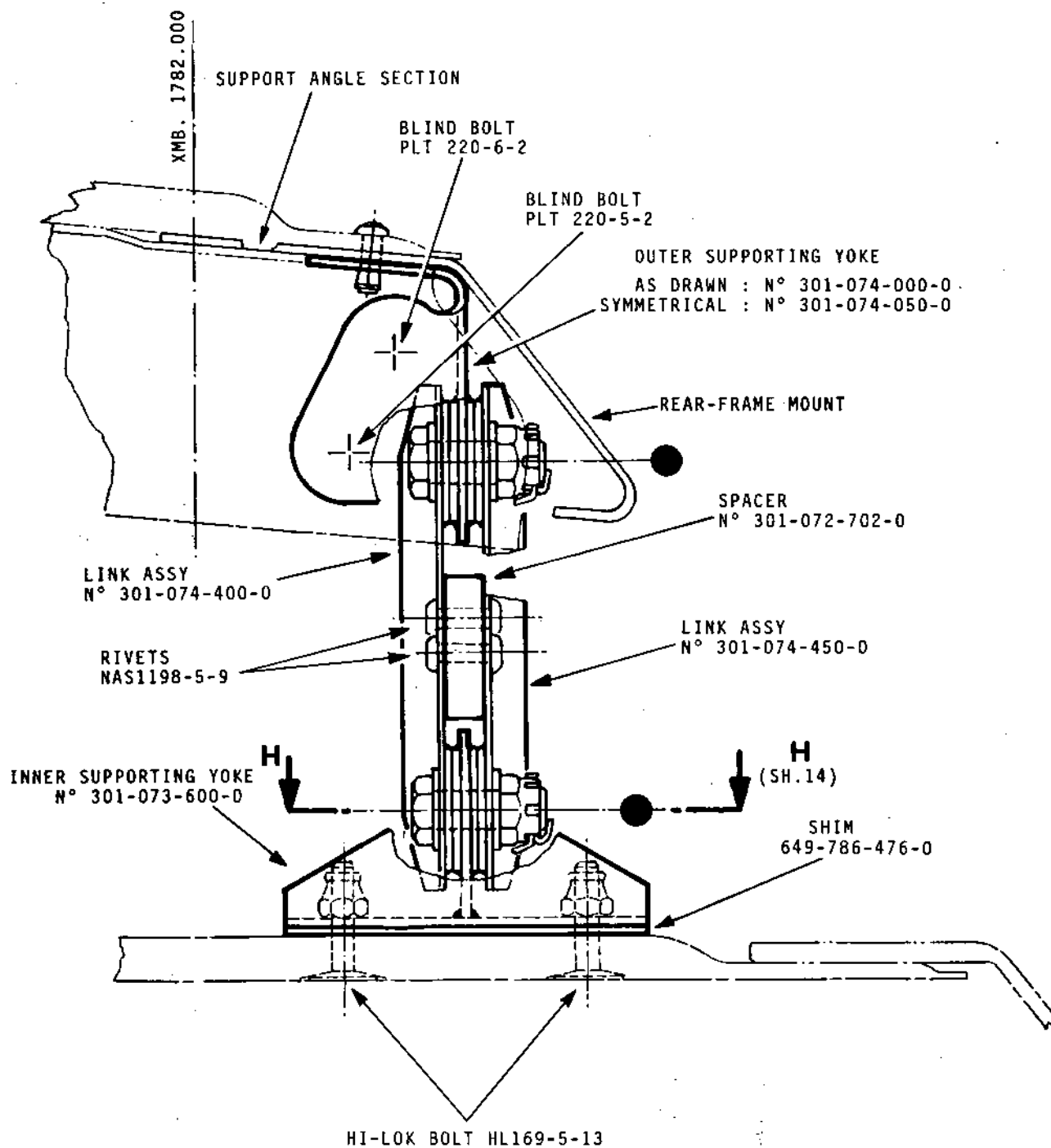
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SECTION CC

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Repair of Barrel Suspension Links
Figure 401 (Sheet 7 of 16)

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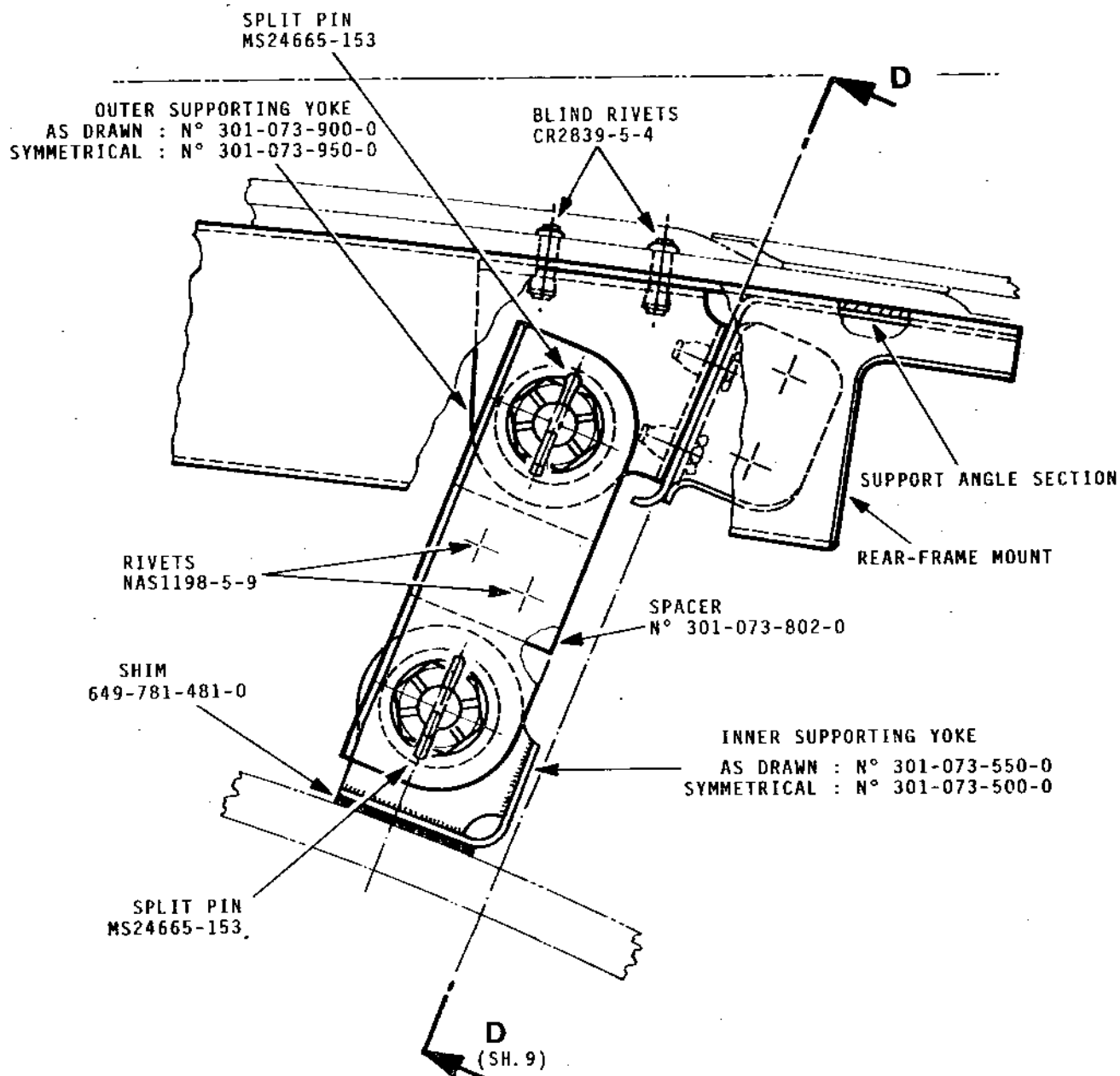
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F₄

IN BAY 2 : AS SHOWN
IN BAY 3 : SYMMETRICAL



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Repair of Barrel Suspension Links
Figure 401 (Sheet 8 of 16)

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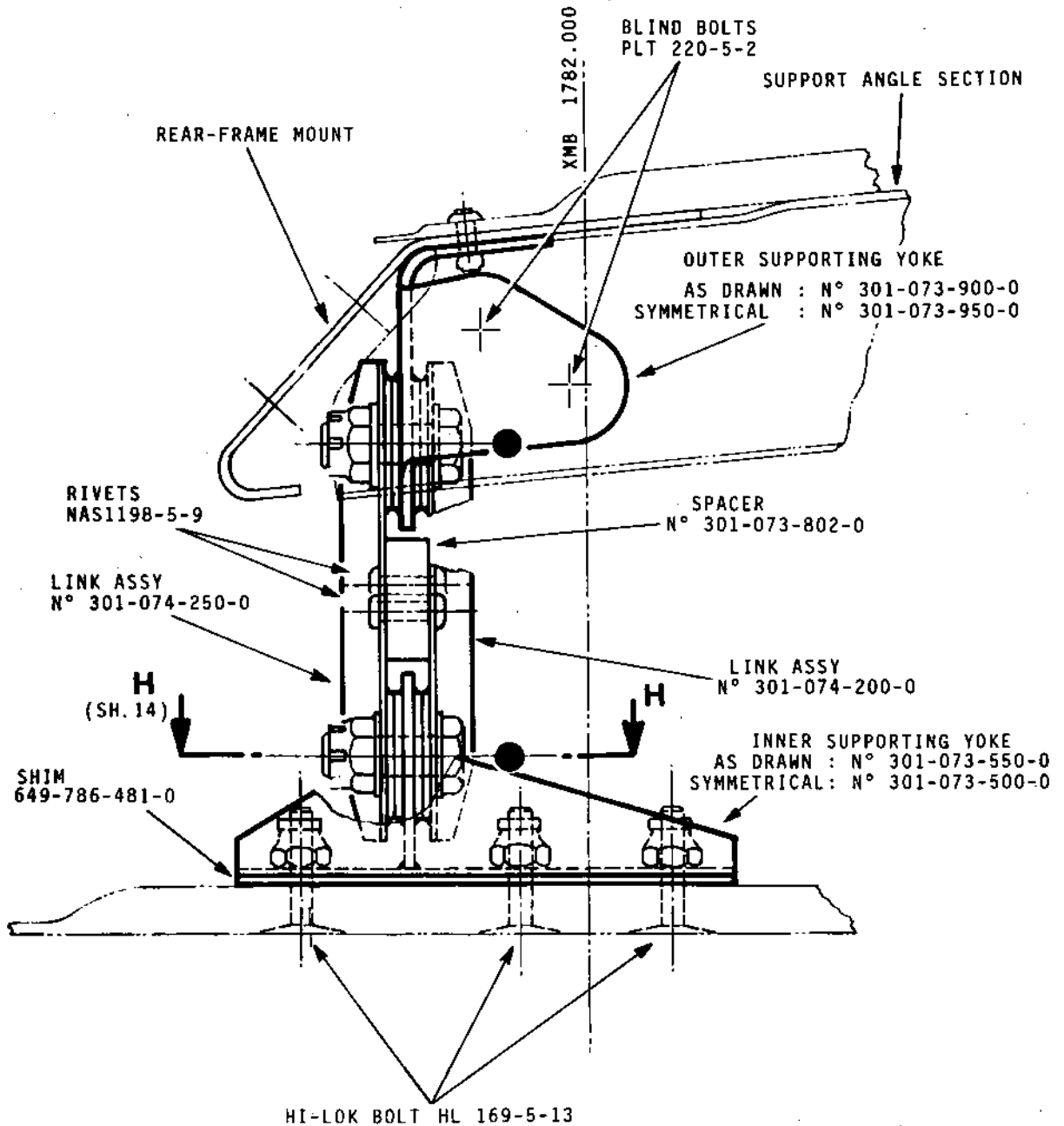


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SECTION D D



Repair of Barrel Suspension Links
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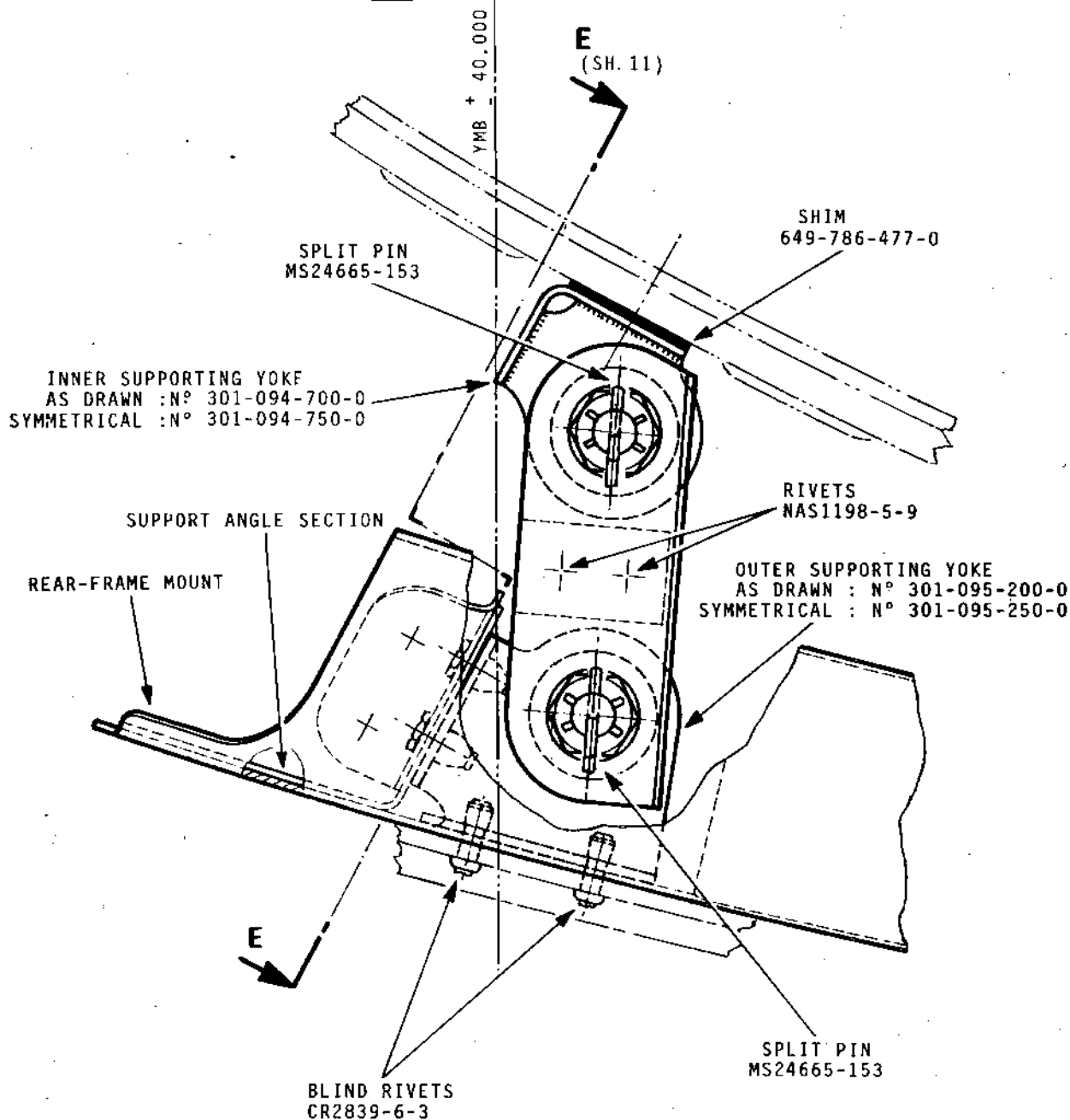
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F₅

IN BAYS 1 AND 3 : AS SHOWN
IN BAYS 2 AND 4 : SYMMETRICAL

ZMB-50.000



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Repair of Barrel Suspension Links
Figure 401 (Sheet 10 of 16)

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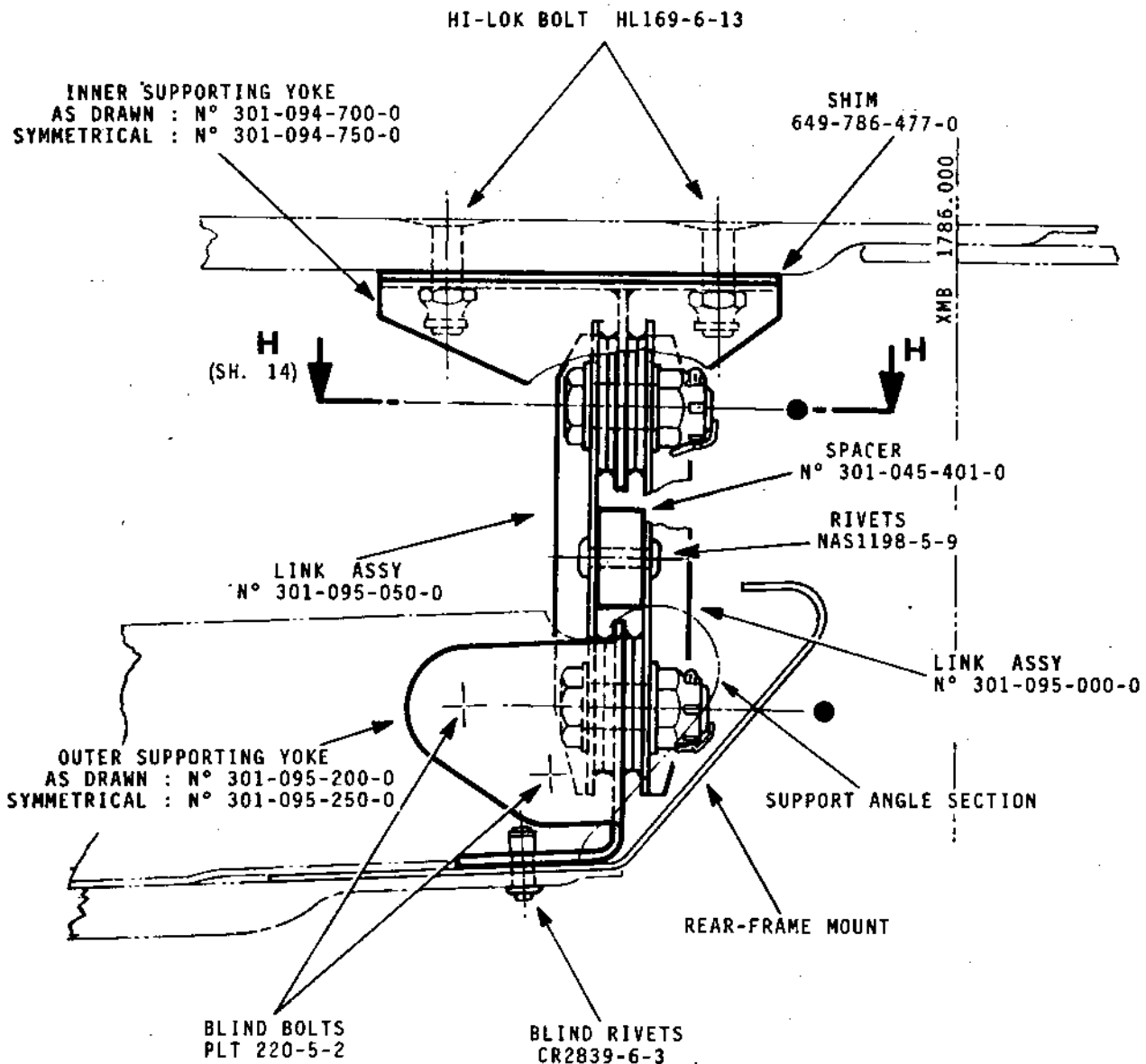


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SECTION EE



Repair of Barrel Suspension Links
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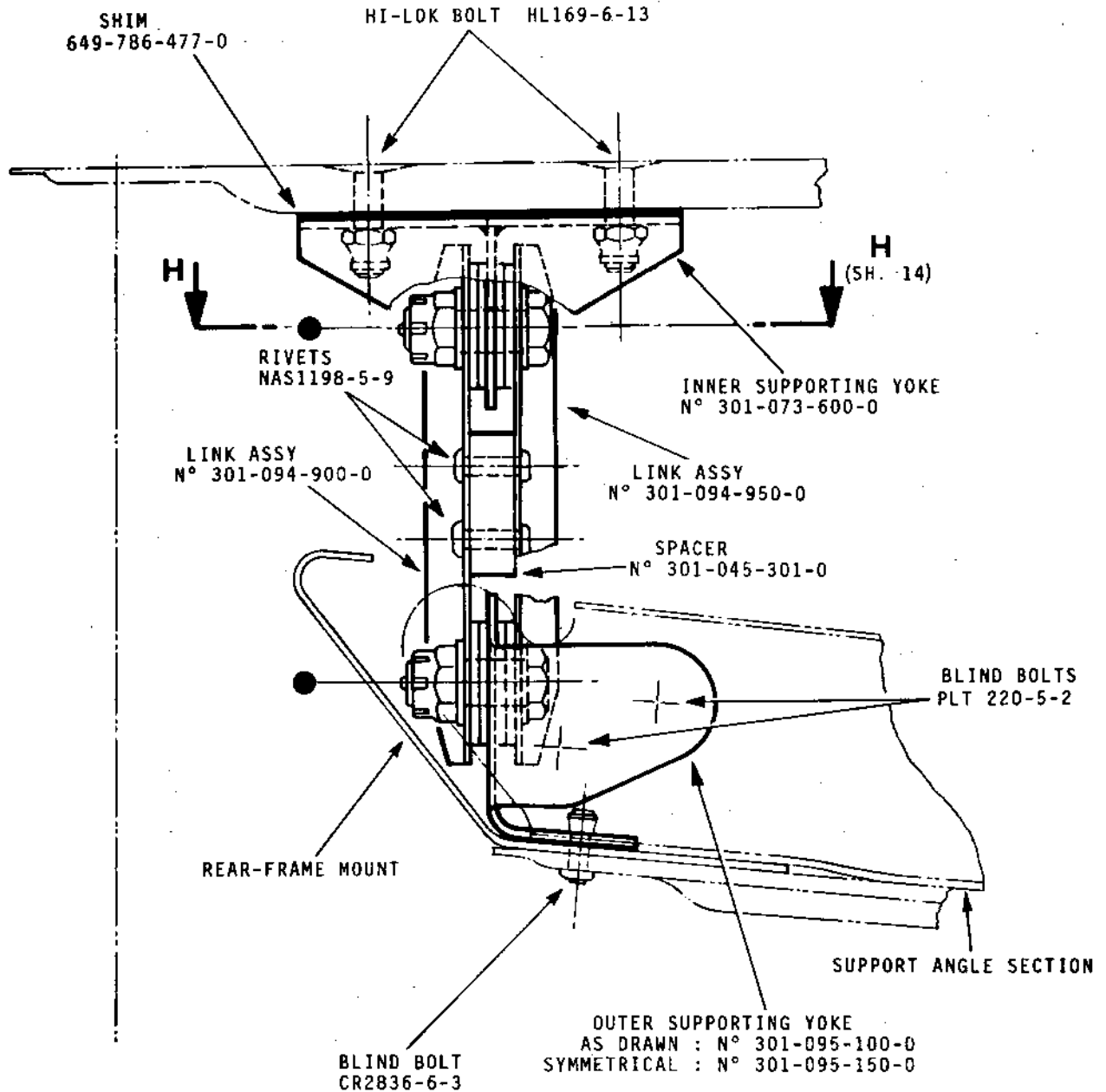


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SECTION GG



Repair of Barrel Suspension Link
Figure 401 (Sheet 13 of 16)

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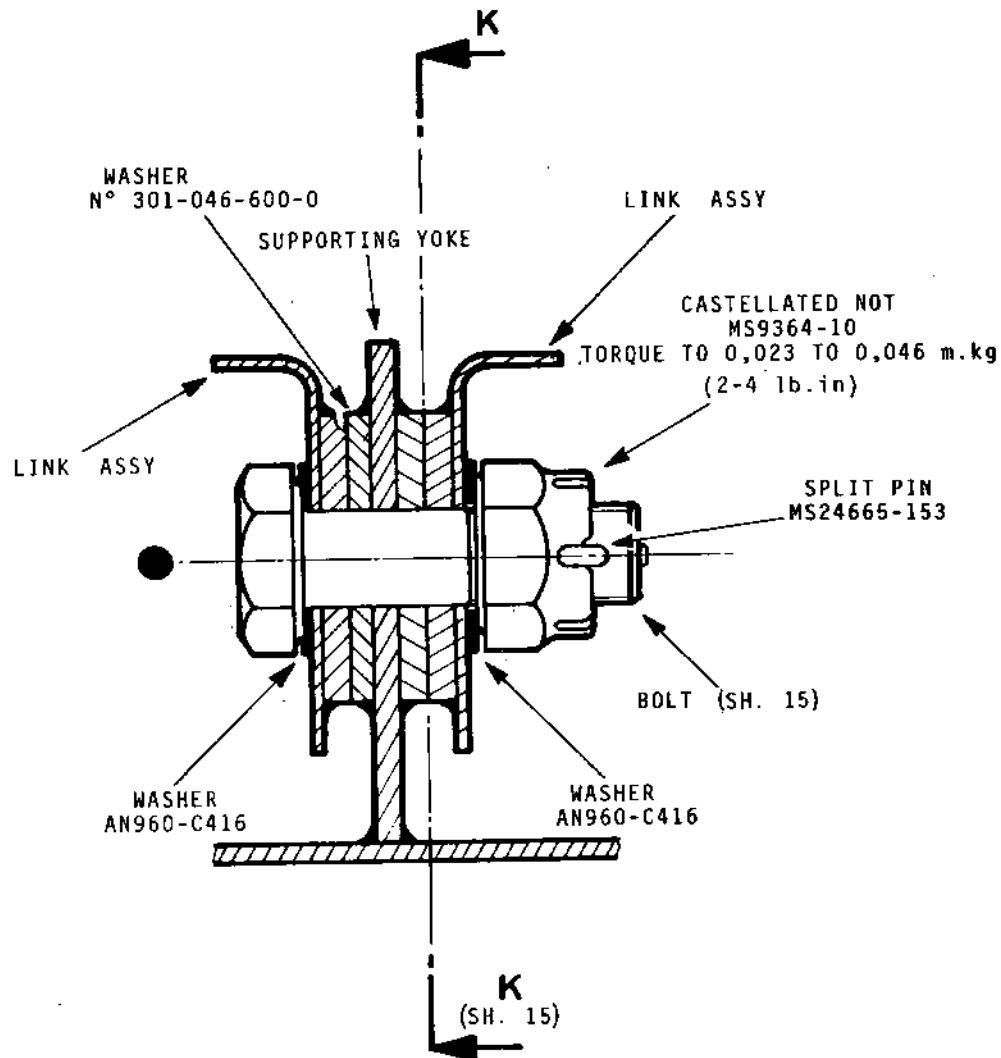


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SECTION H H



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Repair of Barrel Suspension Yoke
Figure 401 (Sheet 14 of 16)

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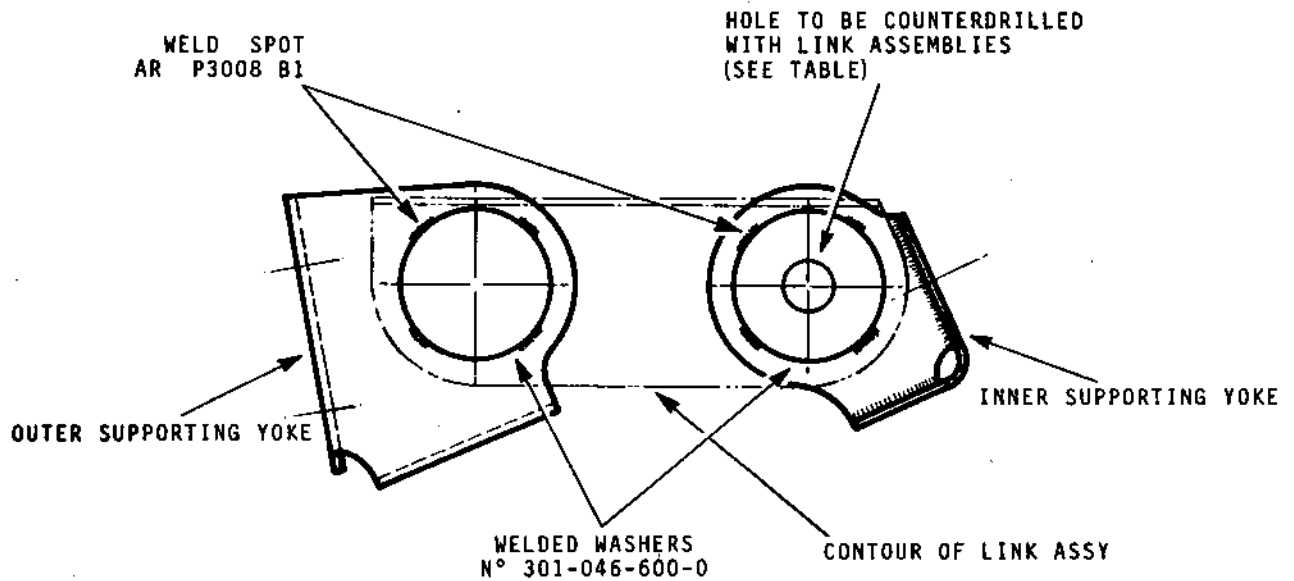


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SECTION KK



DRILLING DIAMETER			
	MM	(IN.)	BOLT
REPAIR TYPE 1	D= 6,73 $\begin{smallmatrix} +0,1 \\ +0 \end{smallmatrix}$	$\left\{ \begin{smallmatrix} 0.265 & +0.004 \\ & +0 \end{smallmatrix} \right\}$	NAS6304U"x"8D
REPAIR TYPE 2	D= 6,35 $\begin{smallmatrix} +0,1 \\ +0 \end{smallmatrix}$	$\left\{ \begin{smallmatrix} 0.250 & +0.004 \\ & +0 \end{smallmatrix} \right\}$	NAS6304U8D

Repair of Barrel Suspension Links
Figure 401 (Sheet 15 of 16)

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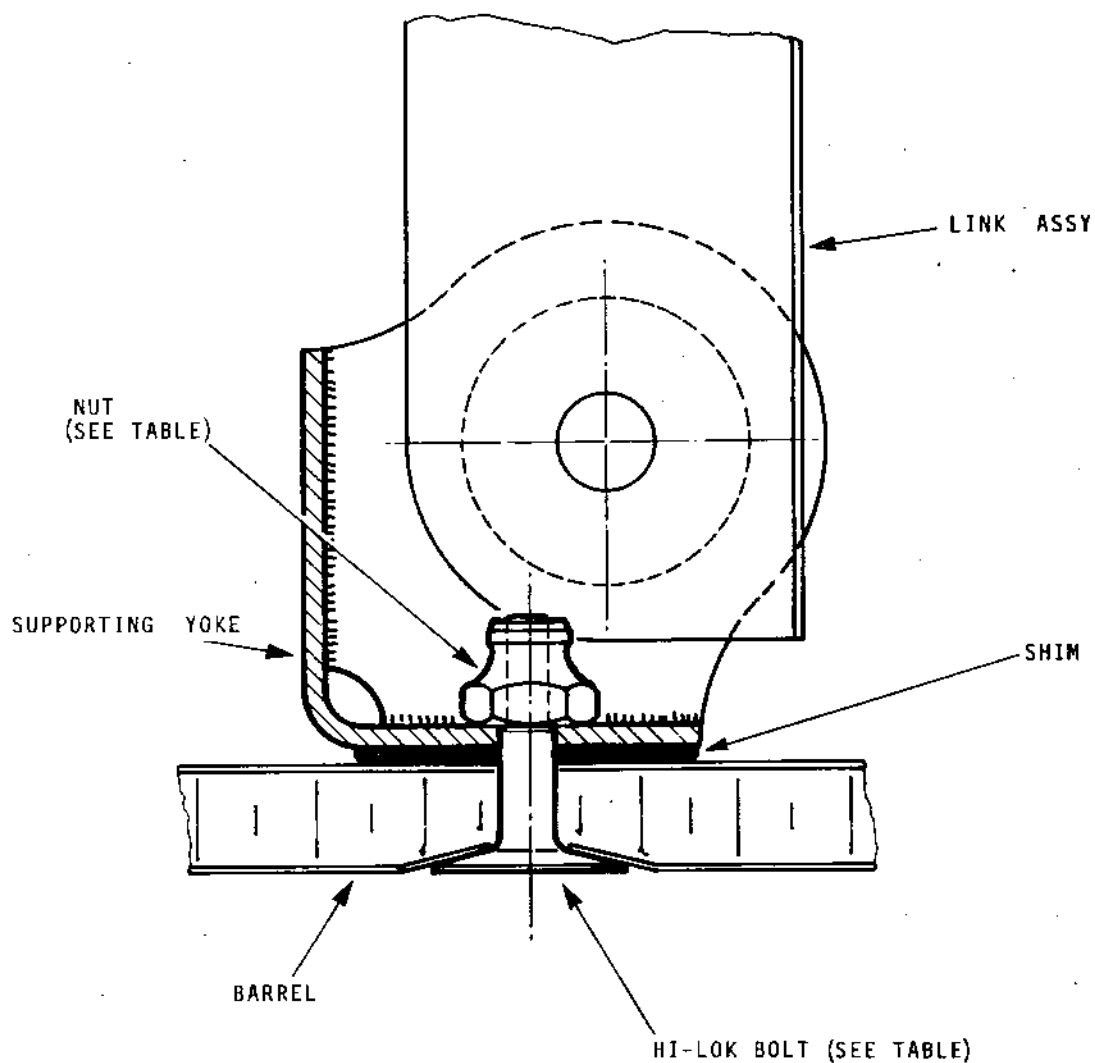


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BOLT	NUT	TIGHTENING TORQUE daN.m (in.lb)
HL169-5-13	HLN 1G-5	0,17 to 0,23 daN.m (15-20 in.lbs)
HL169-6-13	HLN1G-6	0,29 to 0,46 daN.m (25-40 in.lbs)

Repair of Barrel Suspension Links
Figure 401 (Sheet 16 of 16)

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REPAIR



TWIN SECONDARY NOZZLE (29-190/191)

9. Replacement of Defective Fasteners on Inner and Outer
Skin Panels.

PARTS REQUIRED FOR REPAIR

The types and diameters of fasteners used are specified in Fig. 401.

Their lengths are not given, as they cannot be determined before the thickness of the particular assemblies have been ascertained.

- A. Replacement of blind bolts PLT 120, PLT 220 and PLT 1004 (see table, figure 401).
- (1) Replace as described in Standard Practices, chapter 70-50-60.
 - (2) Check the way the bolts have been mounted, as instructed in Standard Practices, chapter 70-50-86.
- B. Replacing HI-LOK bolts HL 869 (See Table in Fig. 401)
- (1) Where the bolts can be got at from both sides :
 - (a) Replace as directed in Standard Practices, chapter 70-50-40.
 - (b) Check the way the bolts have been mounted, as instructed in Standard Practices, chapter 70-50-84.
 - (2) Where the bolts are accessible from one side only :
 - (a) Remove such bolts as described in Standard Practices, chapter 70-50-40.
 - (b) Fit a PLT blind bolt (Standard Practices, 70-50-60).
 - (c) Check the way the bolt has been mounted (Standard Practices, 70-50-86).

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REP 29-190-9

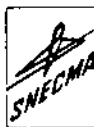
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- C. Replacing HI-LOK bolts HL 667 - HL 169 - HL 167 (see Fig. 401).
- (1) Replace as described in Standard Practices, chapter 70-50-40.
 - (2) Check the way the bolts have been mounted, as instructed in Standard Practices, 70-50-84.
- D. Replacing Lockbolt fasteners (see Fig. 401)
- (1) Replace as described in Standard Practices, 70-50-30.
 - (2) Check the way the fasteners have been mounted, as instructed in Standard Practices, chapter 70-50-83.
- E. Replacing Cherrylock rivets (see Fig. 401).
- (1) Replace as described in Standard Practices, chapter 70-50-50.
 - (2) Check for proper riveting as instructed in Standard Practices, chapter 70-50-85.
- F. Replacing threaded bushes and inserts

The replacement of these items, which serve to secure inspection doors, is covered by REP 29-190-3.

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ITEM No.		ORIGINAL FASTENER	REPAIR FASTENER
1	Bolt	PLT 1004-5-4	PLT 1011-5-4
		PLT 1004-5-5	PLT 1011-5-5
		PLT 1004-5-6	PLT 1011-5-6
		PLT 1004-5-7	PLT 1011-5-7
		PLT 1004-5-8	PLT 1011-5-8
2		PLT 1004-6-2	PLT 1011-6-2
		PLT 1004-6-3	PLT 1011-6-3
		PLT 1004-6-4	PLT 1011-6-4
		PLT 1004-6-5	PLT 1011-6-5
		PLT 1004-6-6	PLT 1011-6-5-5
		PLT 1004-6-7	PLT 1011-6-6
		PLT 1004-6-7-5	PLT 1011-6-6-5
		PLT 1004-6-8	PLT 1011-6-7
		PLT 1004-6-9	PLT 1011-6-7-5
		PLT 1004-6-10	PLT 1011-6-8
3		PLT 1004-8-5	PLT 1011-8-7
		PLT 1004-8-6	PLT 1011-8-8
		PLT 1004-8-7	
		PLT 1004-8-8	
4	Bolt	NAS 1671-3L1	NAS 1753-3L1
		NAS 1671-3L2	NAS 1753-3L2
		NAS 1671-3L3	NAS 1753-3L3
		NAS 1671-3L4	NAS 1753-3L4
		NAS 1671-3L5	NAS 1753-3L5
		NAS 1671-3L6	NAS 1753-3L6
		NAS 1671-3L7	NAS 1753-3L7
		NAS 1671-3L8	NAS 1753-3L8
		NAS 1671-3L9	NAS 1753-3L9
5		NAS 1671-4L4	
		NAS 1671-4L5	
		NAS 1671-4L6	NAS 1753-4L6
		NAS 1671-4L7	NAS 1753-4L7
		NAS 1671-4L8	NAS 1753-4L8
		NAS 1671-4L9	NAS 1753-4L9
		NAS 1671-4L10	NAS 1753-4L10
		NAS 1671-4L11	NAS 1753-4L11
		NAS 1671-4L12	NAS 1753-4L12

Reference Table of Skin Panel Fasteners
Figure 401 (Sheet 1 of 6)

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**OLYMPUS 593**

MK.610-14-28

OVERHAUL



ITEM No.	ORIGINAL FASTENER	REPAIR FASTENER
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6	Bolt	HL 869-5-9	HL 869-6
		HL 869-5-10	HL 869-6-10
		HL 869-5-11	HL 869-6-11
		HL 869-5-12	HL 869-6-12
		HL 869-5-13	HL 869-6-13
		HL 869-5-14	HL 869-6-14
		HL 869-5-15	HL 869-6-15
			HL 869-6-16
			HL 869-6-17
7		HL 869-6	HL 869-6-18
			HL 869-6-20
			HL 959-6-10
			HL 959-6-11
			HL 959-6-12
			HL 959-6-13
			HL 959-6-14
			HL 959-6-15
			HL 959-6-16
8			HL 959-6-17
			HL 959-6-18
			HL 959-8-11
			HL 959-8-12
			HL 959-8-13
			HL 959-8-14
			HL 959-8-15
			HL 959-8-16
			HL 959-8-17
9	Bolt	HL 869-8-18	HL 959-8-18
		HL 668-6-2	HL 868-6-2
		HL 668-6-3	HL 868-6-3
		HL 668-6-4	HL 868-6-4
		HL 668-6-5	HL 868-6-5
		HL 668-6-6	HL 868-6-6
		HL 668-6-7	HL 868-6-7
		HL 668-6-8	HL 868-6-8
		HL 668-6-9	HL 868-6-9
10		HL 668-6-10	HL 868-6-10
		HL 668-8-7	HL 868-8-7
		HL 668-8-8	HL 868-8-8
		HL 668-8-9	HL 868-8-9
		HL 668-8-10	HL 868-8-10
		HL 668-8-12	HL 868-8-12

Reference Table of Skin Panel Fasteners
Figure 401 (Sheet 2 of 6)

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OVERHAUL



ITEM No.		ORIGINAL FASTENER	REPAIR FASTENER
11	Bolt	HL 668-10-8 HL 668-10-9 HL 668-10-10	HL 868-10-8 HL 868-10-9 HL 868-10-10
12		HL 667-6-5 HL 667-6-6 HL 667-6-7 HL 667-6-8 HL 667-6-9	HL 867-6-5 HL 867-6-6 HL 867-6-7 HL 867-6-8 HL 867-6-9
13	Bolt	HL 667-8-8	HL 867-8-8
14	Bolt	HL 169-5-10 HL 169-5-13	HL 169-5-10 or HL 169-6 HL 169-1-13
15		HL 169-6-10 HL 169-6-13	HL 169-6-10 HL 169-6-13
16	Bolt	HL 167-5-4 HL 167-5-5 HL 167-5-6 HL 167-5-7 HL 167-5-9 HL 167-5-10 HL 167-5-11 HL 167-5-14	HL 167-5-4 HL 167-5-5 HL 167-5-6 HL 167-5-7 HL 167-5-9 HL 167-5-10 HL 167-5-11 HL 167-5-14
17	Rivets	2 LPYEU-6-3 2 LPYEU-6-4 2 LPYEU-6-5 2 LPYEU-6-6 2 LPYEU-6-7 2 LPYEU-6-8 2 LPYEU-6-9 2 LPYEU-6-10	2 LPYEU-6 or 8
18	Rivets	CR 2540-5-2 CR 2540-5-3 CR 2540-5-4 CR 2540-5-5 CR 2540-5-6 CR 2540-5-7 CR 2540-5-8	CR 2540-5 or CR 2540-6

Reference Table of Skin Panel Fasteners
Figure 401 (Sheet 3 of 6)

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OVERHAUL



ITEM No.		ORIGINAL FASTENER	REPAIR FASTENER
19	Rivet	CR 2540-6-2 CR 2540-6-3 CR 2540-6-4 CR 2540-6-5 CR 2540-6-6 CR 2540-6-7 CR 2540-6-8	CR 2540-6-2 CR 2540-6-3 CR 2540-6-4 CR 2540-6-5 CR 2540-6-6 CR 2540-6-7 CR 2540-6-8
20	Rivet	CR 2840-4-2 CR 2840-4-3 CR 2840-4-4	CR 2840-4 or CR 2840-5
21	Rivet	CR 2840-5-2 CR 2840-5-3 CR 2840-5-5 CR 2840-5-6 CR 2840-5-7 CR 2840-5-8 CR 2840-5-9	CR 2840-5 or CR 2840-6
22	Rivet	CR 2840-6-3 CR 2840-6-4 CR 2840-6-5 CR 2840-6-6 CR 2840-6-7 CR 2840-6-8 CR 2840-6-9	CR 2840-6
23	Rivet	CR 2838-5-2 CR 2838-5-3 CR 2838-5-4 CR 2838-5-5 CR 2838-5-6	CR 2838-5 CR 2744-6
24	Rivet	CR 2839-5-2 CR 2839-5-3 CR 2839-5-4 CR 2839-5-5	CR 2839-5 or CR 2743-6
25	Rivet	CR 2839-6-1 CR 2839-6-2 CR 2839-6-3 CR 2839-6-4 CR 2839-6-5	CR 2839-6 or CR 2743-8

Reference Table of Skin Panel Fasteners
Figure 401 (Sheet 4 of 6)

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**OLYMPUS 593**

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OVERHAUL



ITEM No.		ORIGINAL FASTENER	REPAIR FASTENER
26	Rivet	CR 2743-6-3 CR 2743-6-4 CR 2743-6-5 CR 2743-6-6	CR 2743-6 or CR 2839-6
27	Rivet	CR 2744-6-3 CR 2744-6-4 CR 2744-6-5 CR 2744-6-6	CR 2744-6 or CR 2838-6
28	Threaded bush	649-773-130-0	
29		649-773-131-0	
30		649-773-132-0	
31		649-773-133-0	
32		649-773-134-0	
33		649-773-135-0	
34		649-773-136-0	
35		649-773-137-0	
36		649-773-138-0	
37	Insert	649-773-147-0 649-773-148-0 649-773-149-0 649-773-150-0 649-773-151-0	
38	Insert	649-773-152-0 649-773-153-0 649-773-154-0	
39	Screw	649-781-022-0 649-781-023-0 649-781-224-0	
40	Screw	649-781-142-0 649-781-024-0 649-781-025-0 649-781-027-0 649-781-028-0 649-781-029-0 649-781-143-0	

Reference Table of Skin Panel Fasteners
Figure 401 (Sheet 5 of 6)

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ITEM No.		ORIGINAL FASTENER	REPAIR FASTENER
41	Blind bolt	PLT 120-5-5	PLT 121-5-5
42	Blind rivet	CR 2838-6-6	CR 2838-6-6 or CR 2744-8
43	Standard rivet	650-022-044-0 650-022-046-0	

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Reference Table of Skin Panel Fasteners
Figure 401 (Sheet 6 of 6)

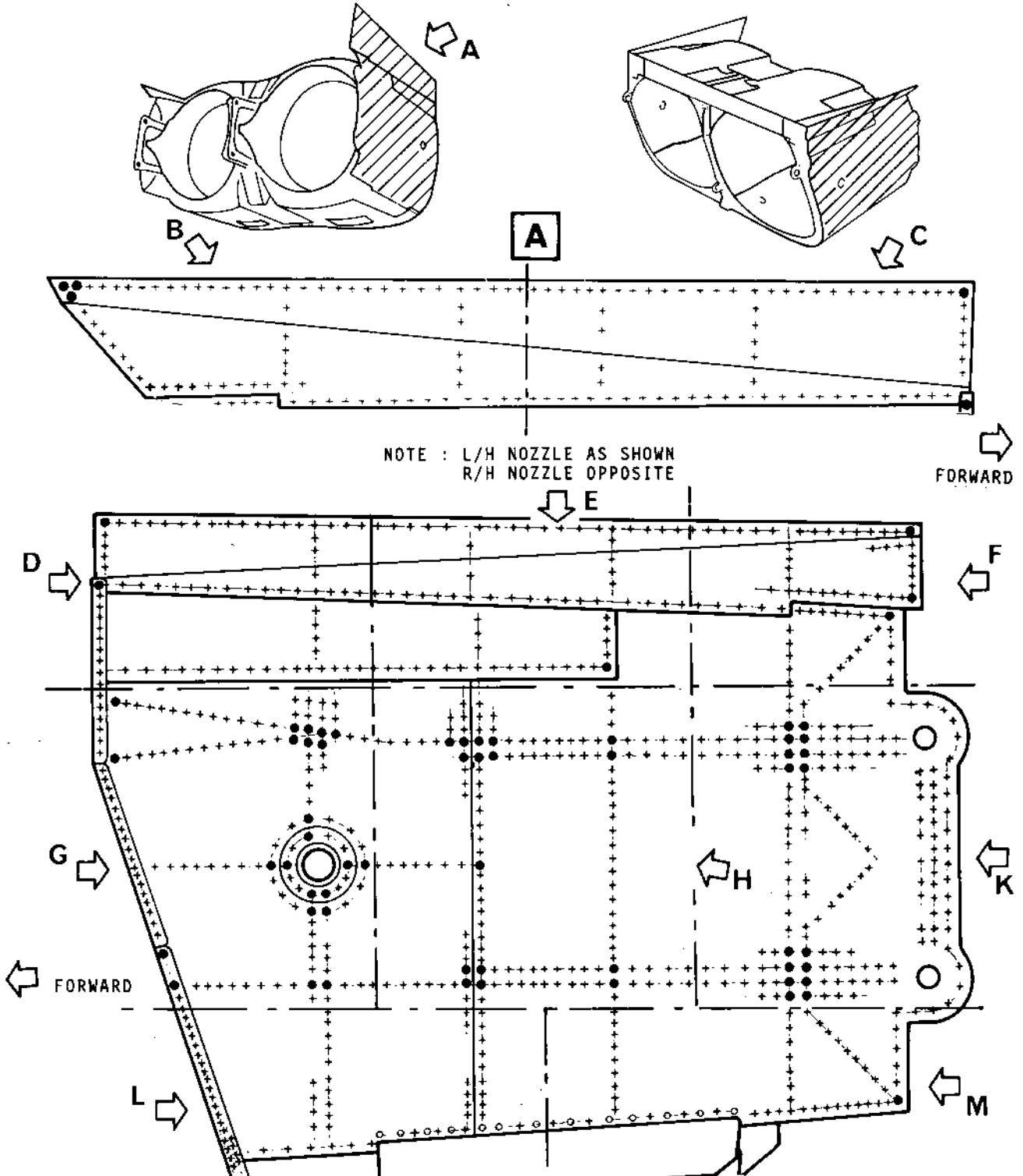
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OVERHAUL



L/H AND R/H SIDE-WALLS, IDENTICAL EXCEPT FOR DETAIL A

Marking of Fasteners on Outer Side-Walls
Figure 402 (Sheet 1 of 8)

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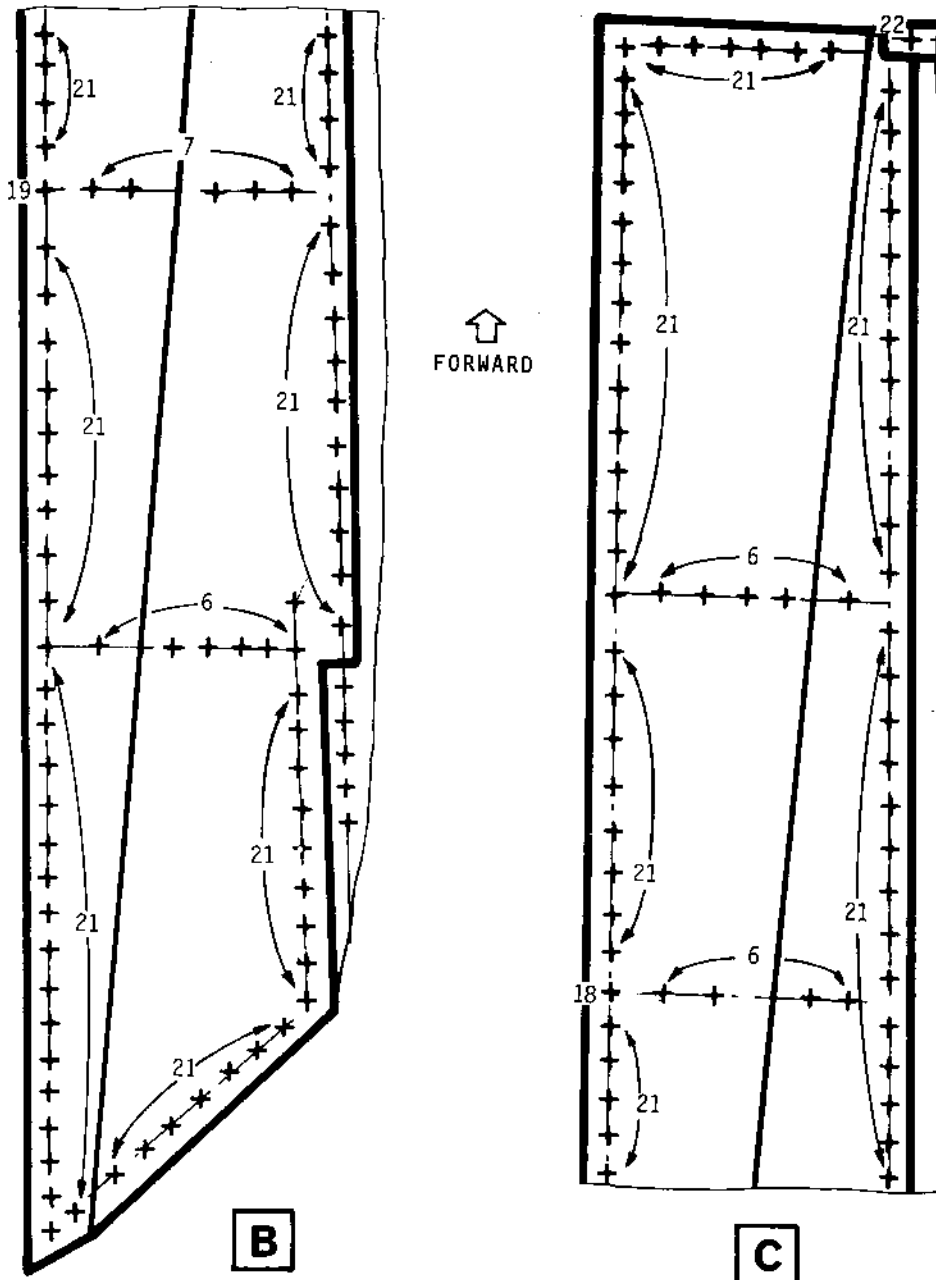
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OVERHAUL



FOR IDENTIFYING FASTENERS, SEE FIG. 401

Marking of Fasteners on Outer Side-Walls
Figure 402 (Sheet 2 of 8)

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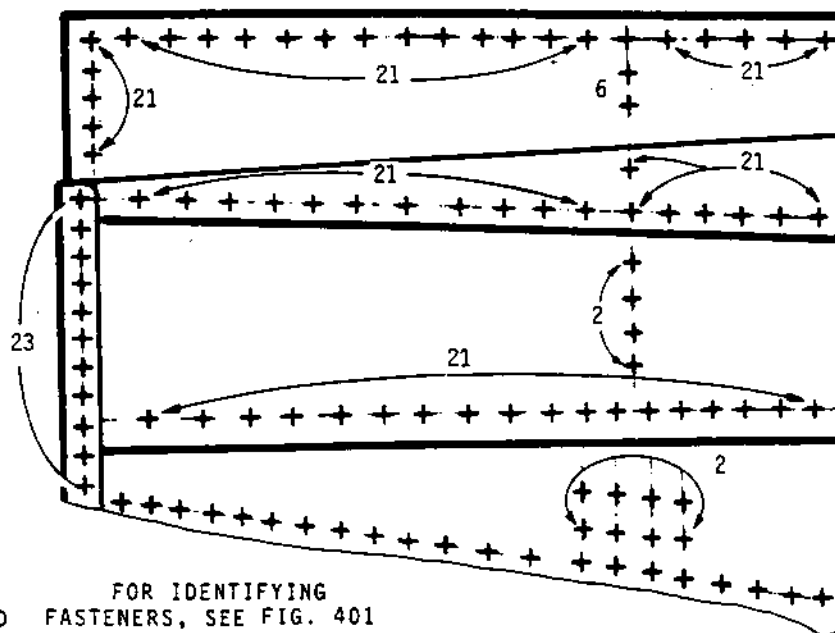
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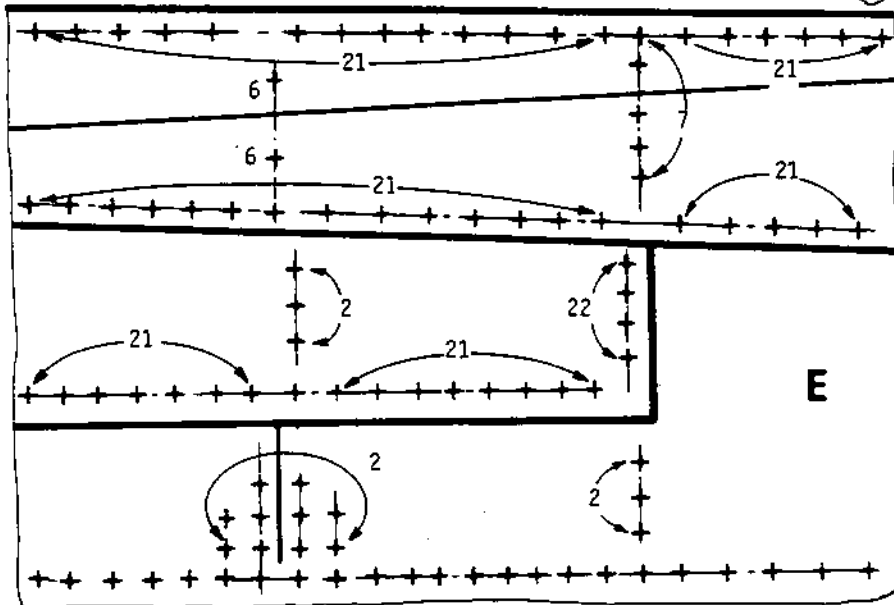
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D



FOR IDENTIFYING
← FORWARD FASTENERS, SEE FIG. 401



Marking of Fasteners on Outer Side-Walls
Figure 402 (Sheet 3 of 8)

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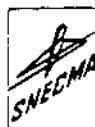
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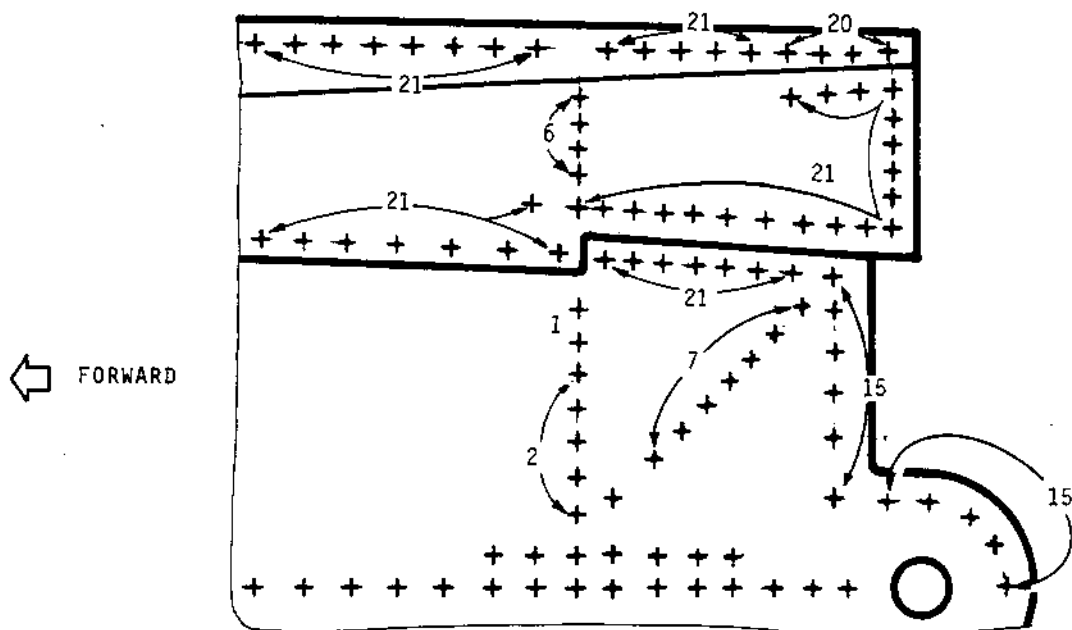
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OVERHAUL



F



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Outer Side-Walls
Figure 402 (Sheet 4 of 8)

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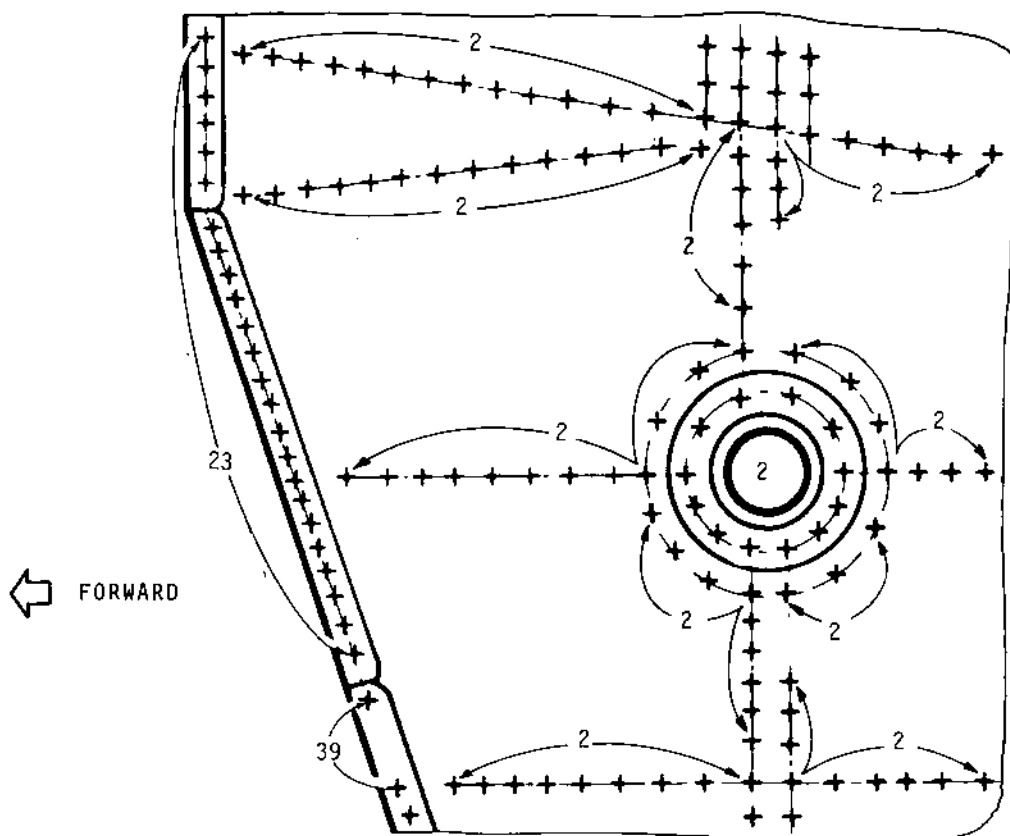
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MK.610-14-28

OVERHAUL



G



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Outer Side-Walls
Figure 402 (Sheet 5 of 8)

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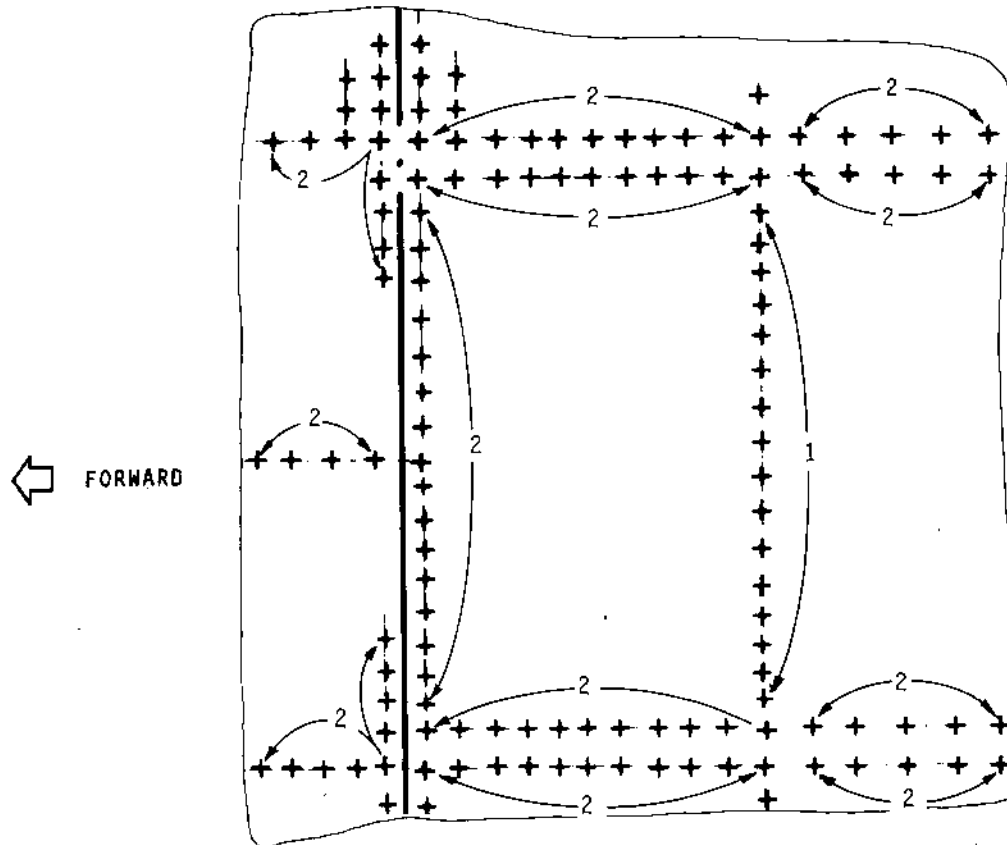


OLYMPUS 593

MK.610-14-28
OVERHAUL



H



FOR IDENTIFYING FASTENERS, SEE FIG. 401

Marking of Fasteners on Outer Side-Walls
Figure 402 (Sheet 6 of 8)

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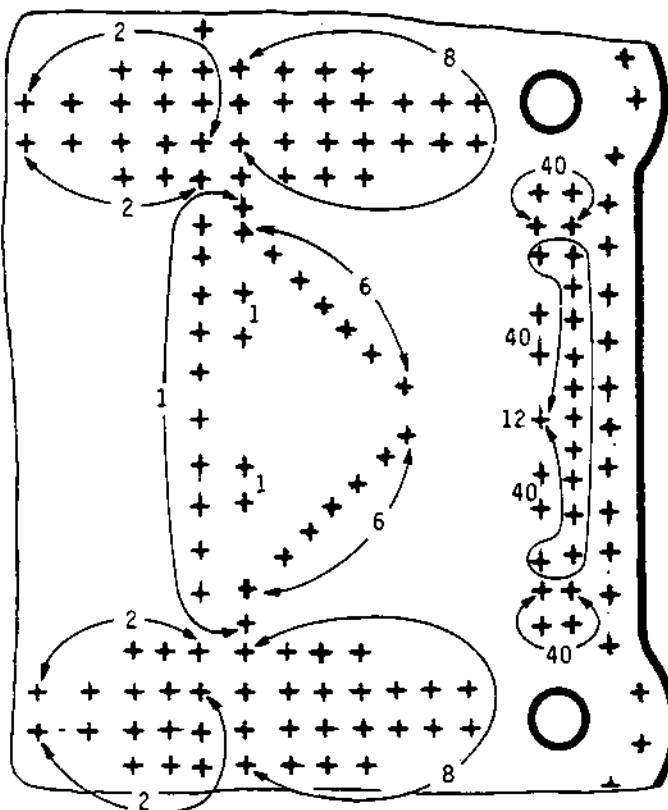
OLYMPUS 593

MK.610-14-28
OVERHAUL



K

← FORWARD



FOR IDENTIFYING FASTENERS SEE FIGURE 401

Marking of Fastners on Outer Side-Walls
Figure 402 (Sheet 7 of 8)

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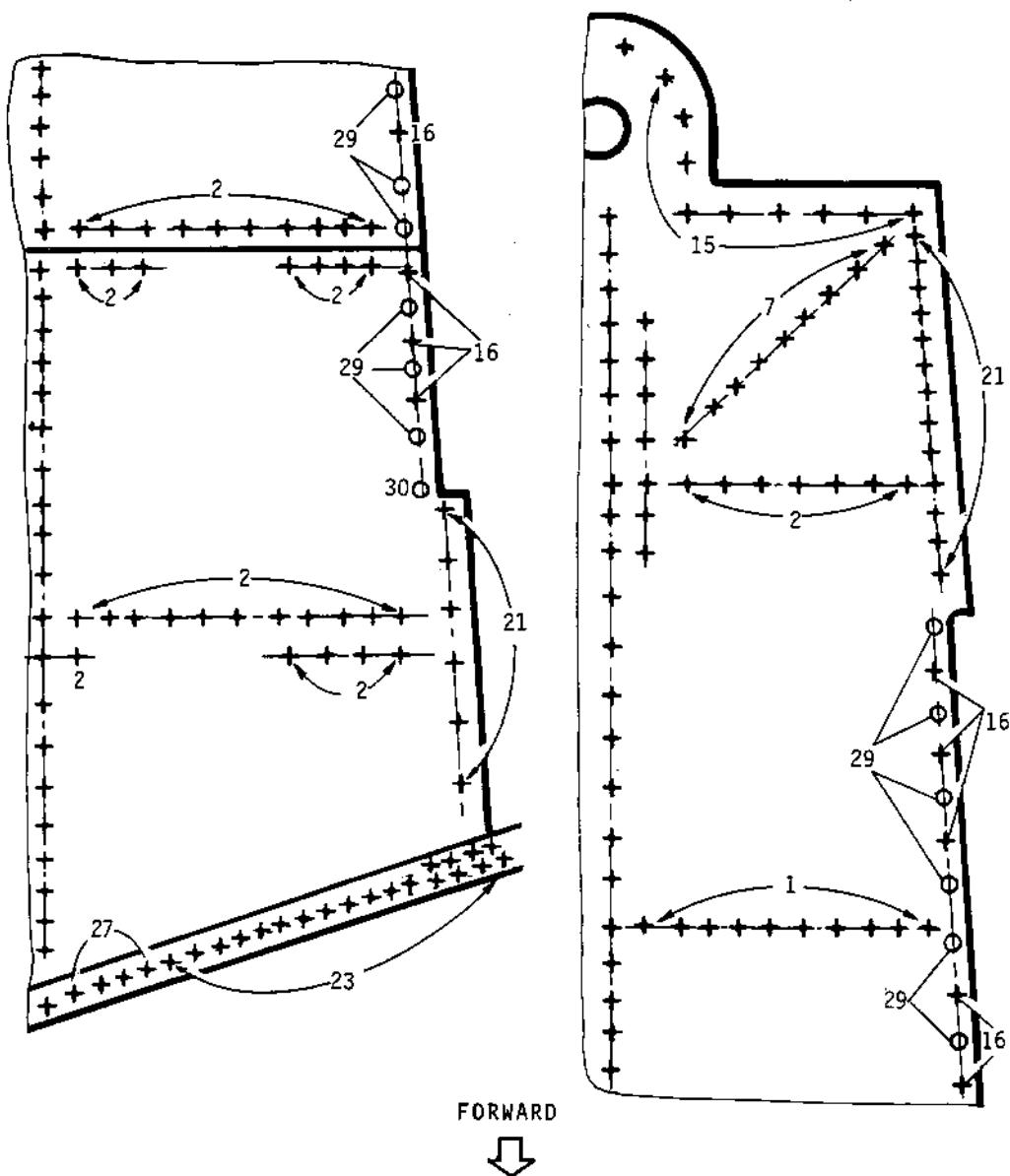
OLYMPUS 593

MK.610-14-28
OVERHAUL



L

M



FOR IDENTIFYING FASTENERS, SEE FIG. 401

Marking of Fasteners on Outer Side-Walls
Figure 402 (Sheet 8 of 8)

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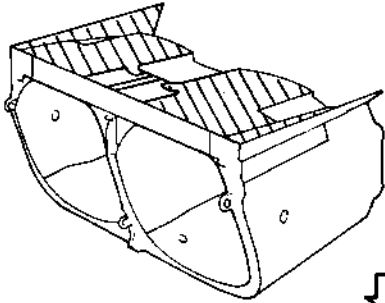
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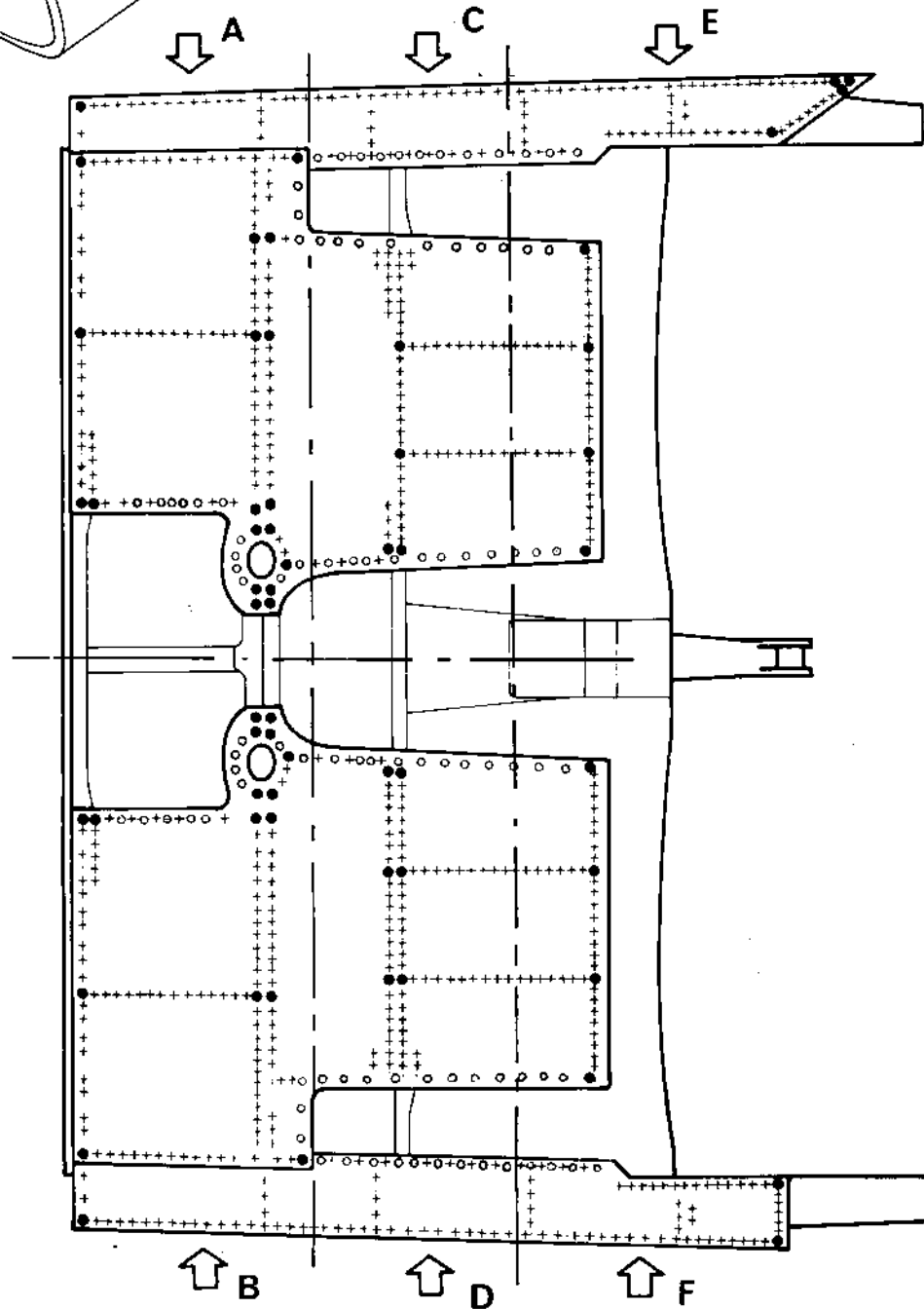


OLYMPUS 593

MK.610-14-28
OVERHAUL



NOTE : L/H NOZZLE AS SHOWN
R/H NOZZLE OPPOSITE



Marking of Fasteners on Top Outer Panels
Figure 403 (Sheet 1 of 5)

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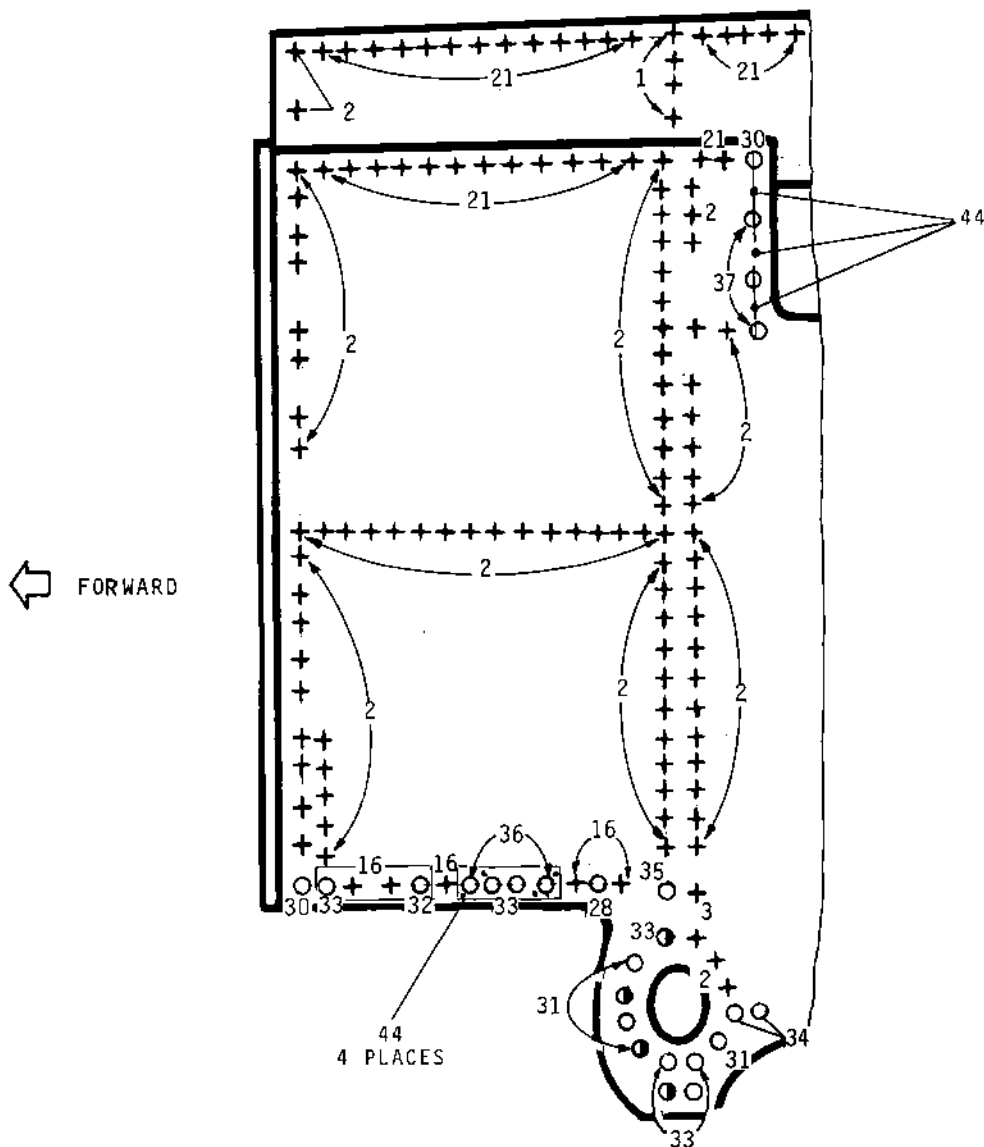


OLYMPUS 593

MK.610-14-28
OVERHAUL



A



FOR IDENTIFYING FASTENERS, SEE FIG. 401

① INSERTS NOT USED FOR SECURING THE INSPECTION DOORS

Marking of Fasteners on Top Outer Panels
Figure 403 (Sheet 2 of 5)

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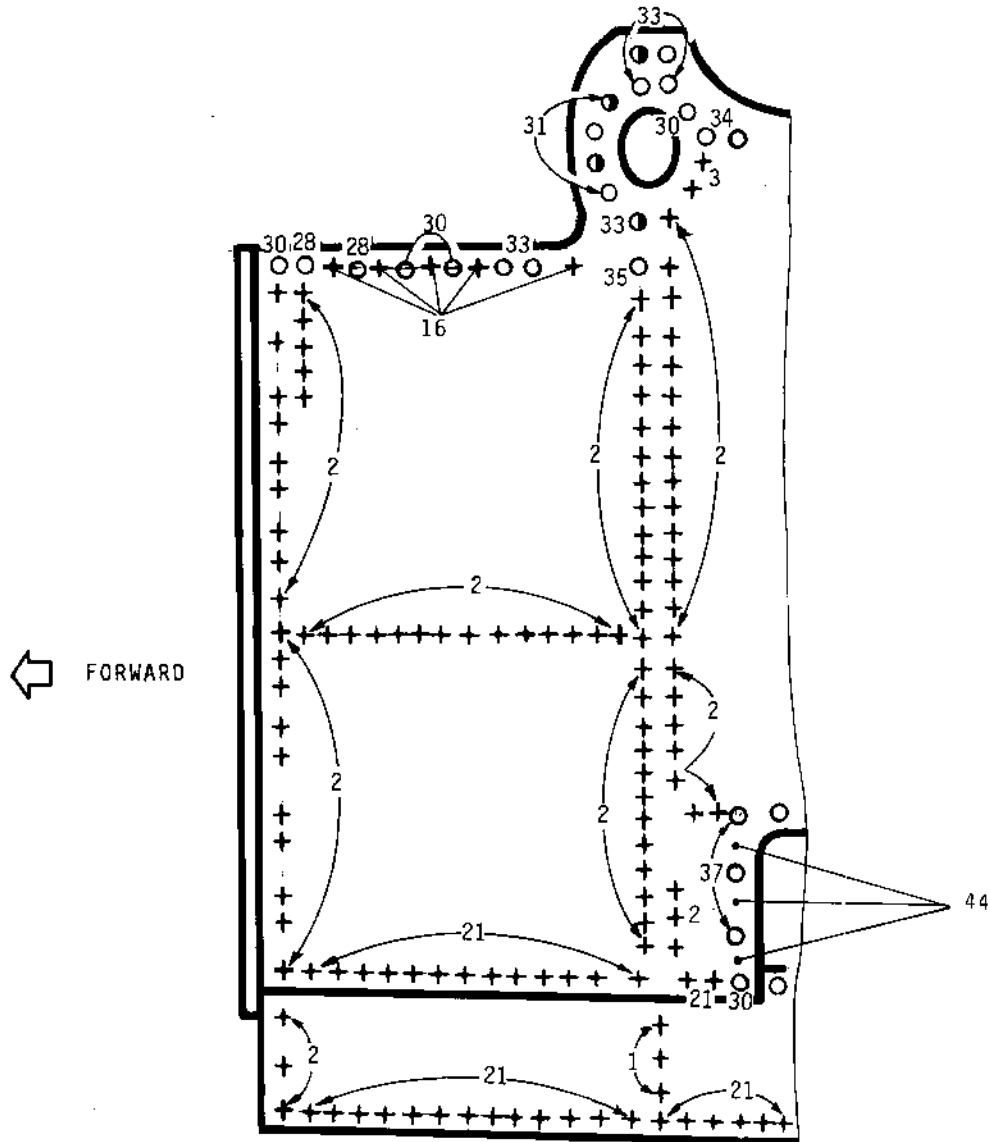


OLYMPUS 593

MK.610-14-28
OVERHAUL



B



FOR IDENTIFYING FASTENERS
SEE FIG. 401

● INSERTS NOT USED FOR SECURING THE INSPECTION DOORS

Marking of Fasteners on Top Outer Panels
Figure 403 (Sheet 3 of 5)

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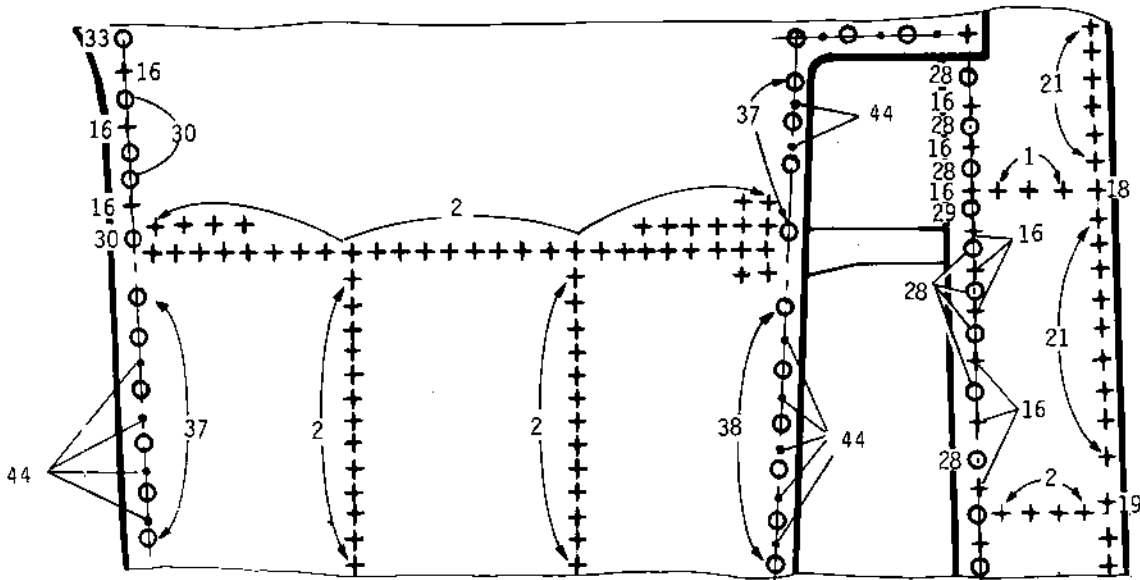
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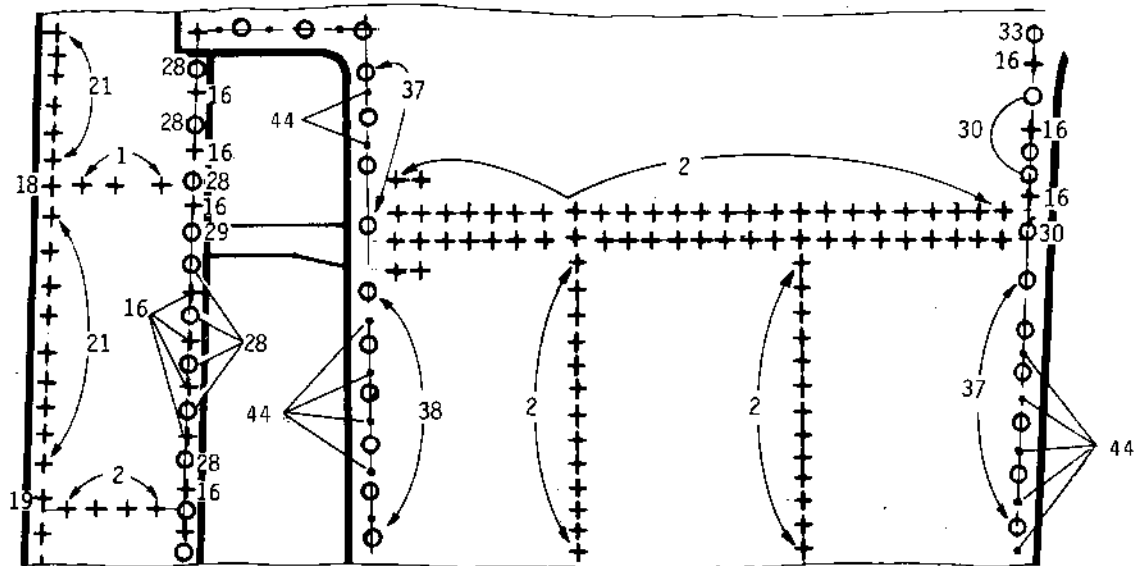
↑
FORWARD

C



FOR IDENTIFYING FASTENERS
SEE FIG. 401

D



Marking of Fasteners on Top Outer Panels
Figure 403 (Sheet 4 of 5)

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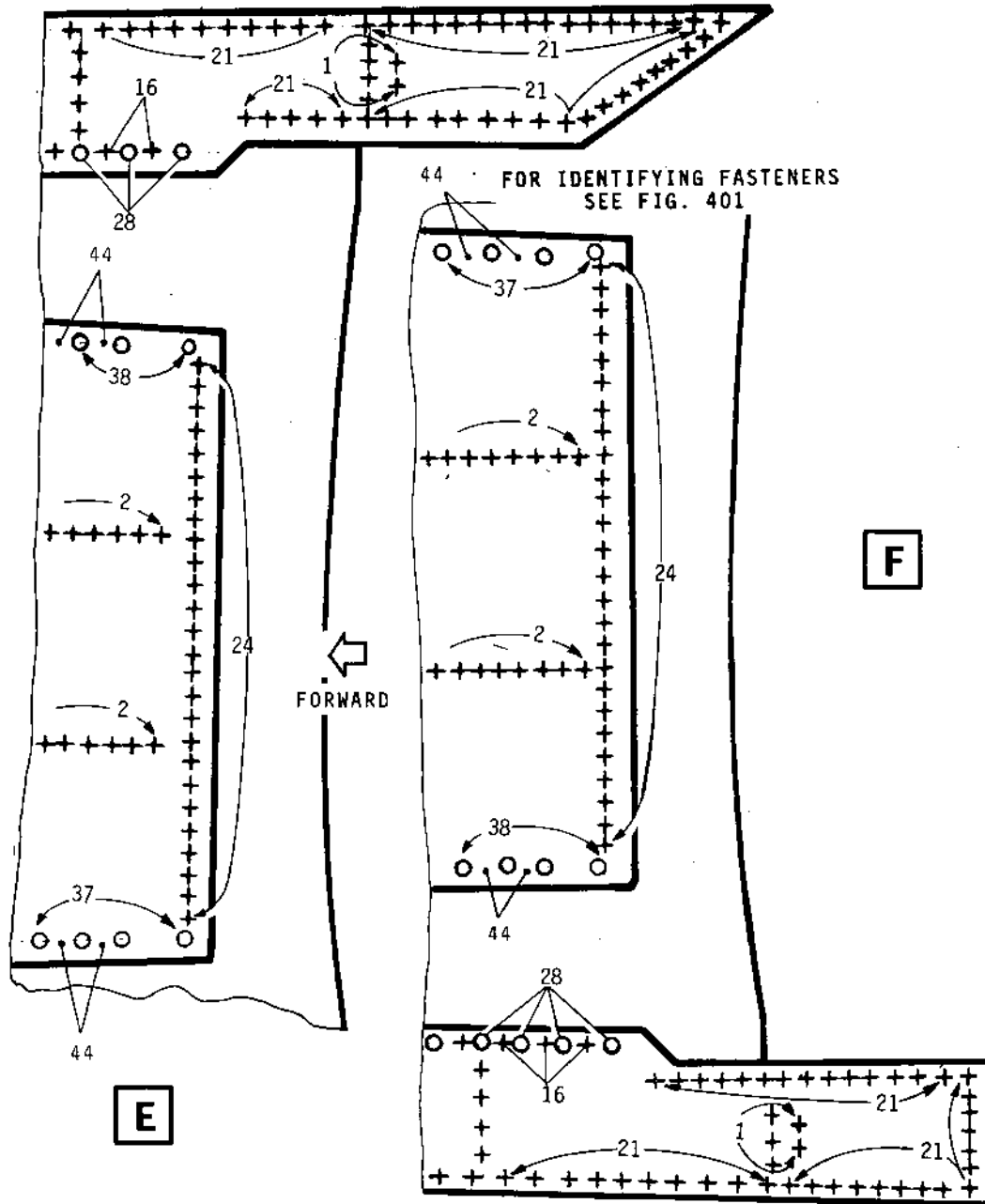
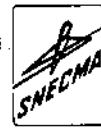
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Marking of Fasteners on Top Outer Panels
Figure 403 (Sheet 5 of 5)

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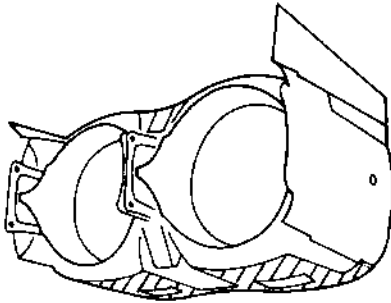
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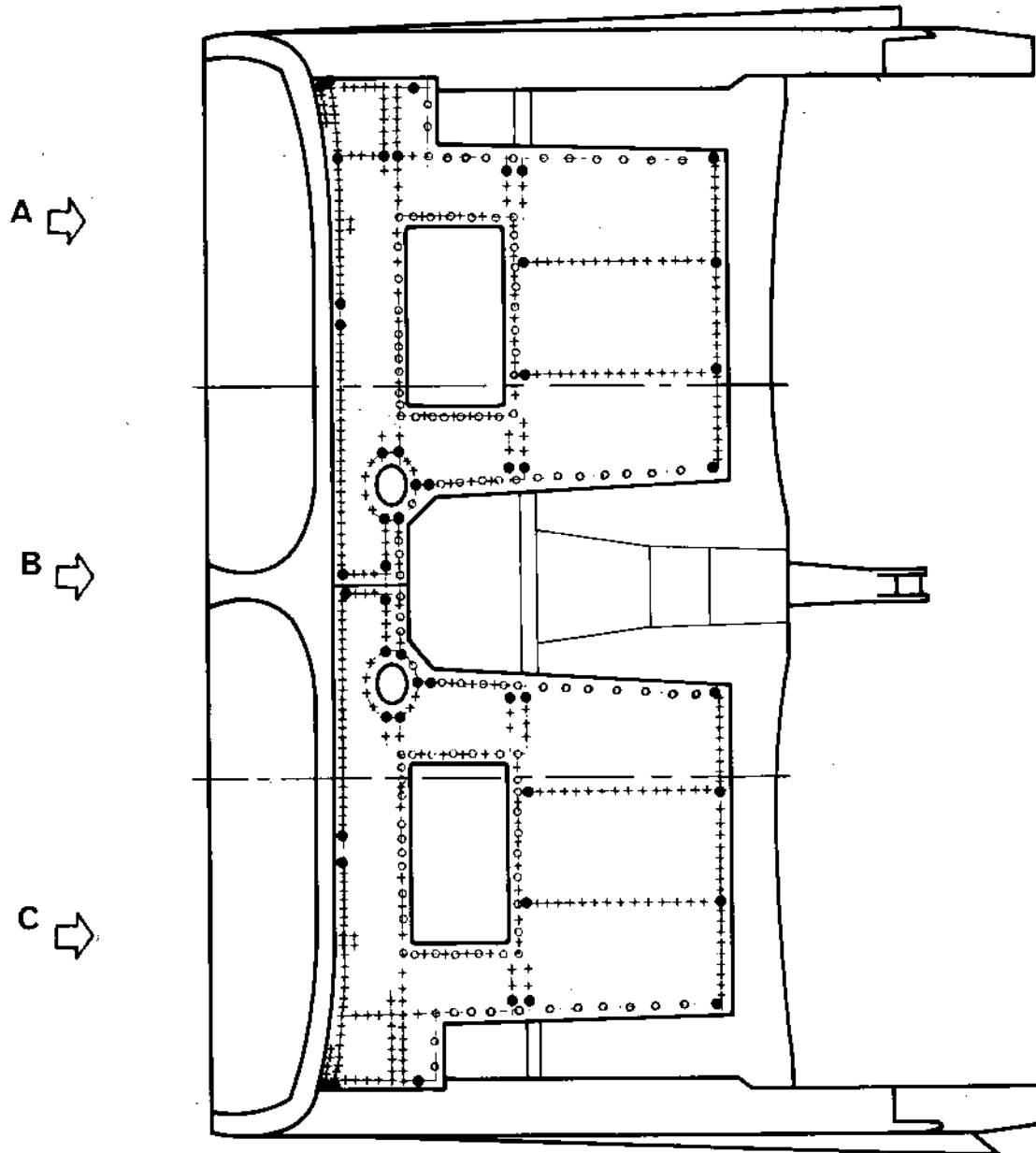


OLYMPUS 593

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OVERHAUL



NOTE : L/H NOZZLE AS SHOWN
R/H NOZZLE OPPOSITE



Marking of Fasteners on Lower Outer Panels
Figure 404 (Sheet 1 of 4)

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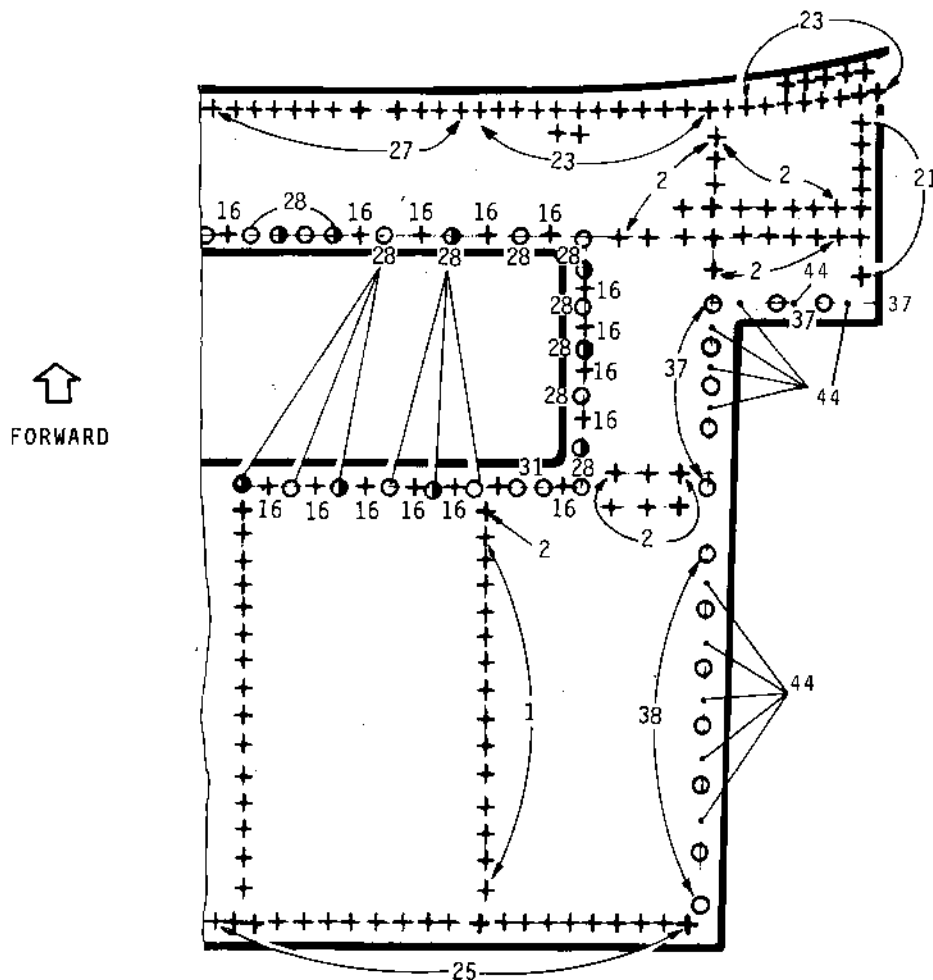
OLYMPUS 593

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OVERHAUL



FOR IDENTIFYING FASTENERS
SEE FIG. 401

A



● INSERTS NOT USED FOR SECURING THE INSPECTION DOORS

Marking of Fasteners on Lower Outer Panels
Figure 404 (Sheet 2 of 4)

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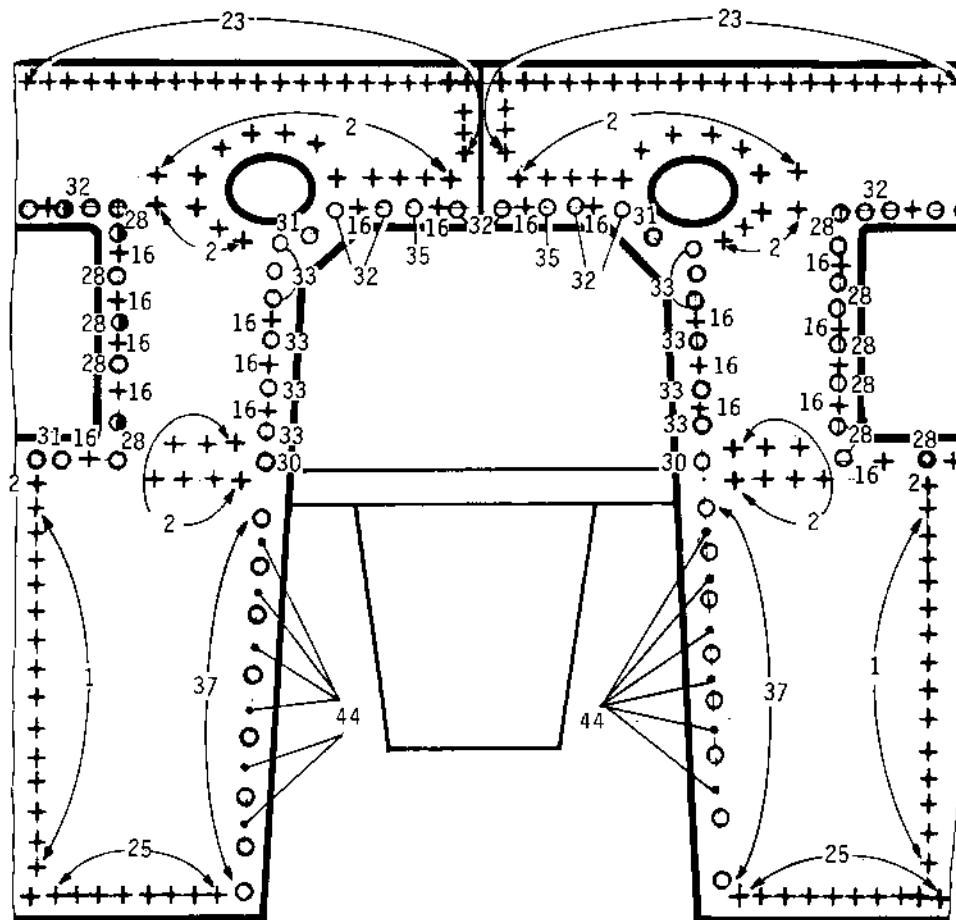
OLYMPUS 593

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OVERHAUL



FORWARD

B



FOR IDENTIFYING FASTENERS
SEE FIG. 401

① INSERTS NOT USED FOR SECURING THE INSPECTION DOORS

Marking of Fasteners on Lower Outer Panels
Figure 404 (Sheet 3 of 4)

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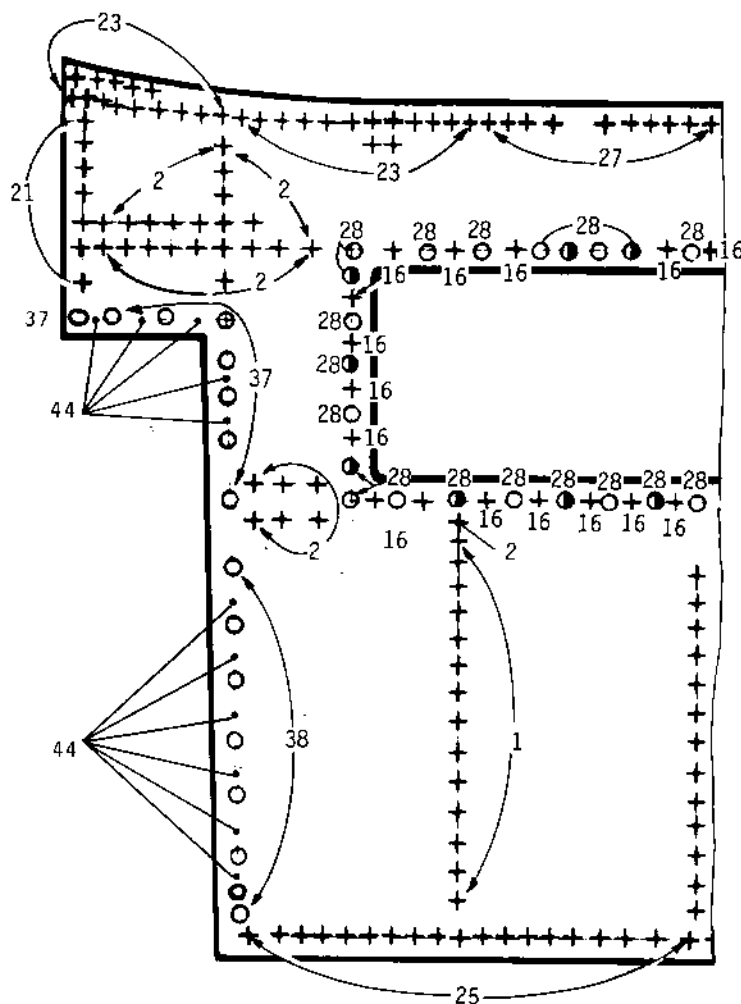
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FORWARD



FOR IDENTIFYING FASTENERS
SEE FIG. 401

① INSERTS NOT USED FOR SECURING THE INSPECTION DOORS

Marking of Fasteners on Lower Outer Panels
Figure 404 (Sheet 4 of 4)

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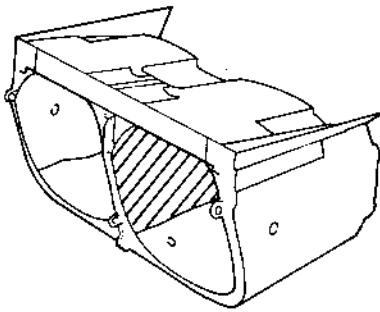
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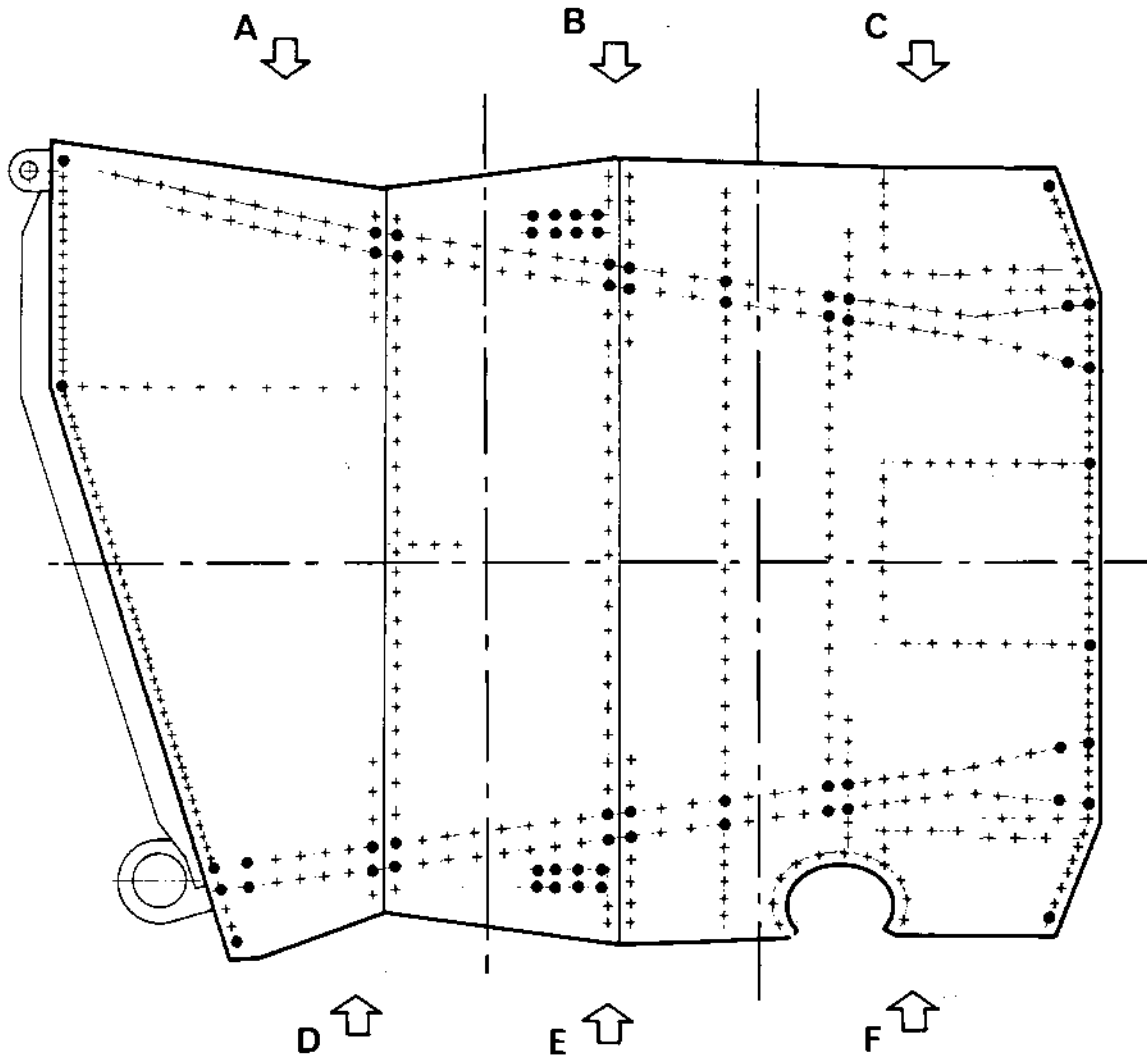


OLYMPUS 593

MK.610-14-28
OVERHAUL



NOTE : L/H NOZZLE AS SHOWN
R/H NOZZLE OPPOSITE



Marking of Centre Wall Fasteners
Figure 405 (Sheet 1 of 7)

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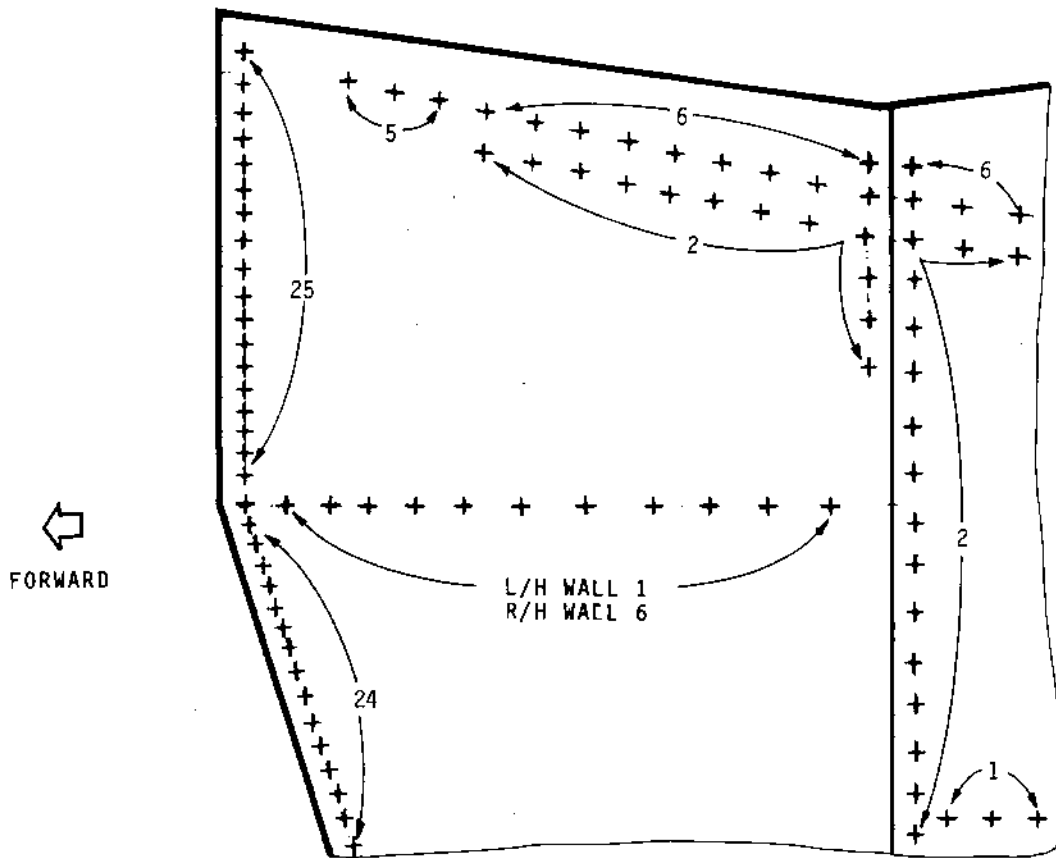
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MK.610-14-28
OVERHAUL



A

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FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Centre Wall Fasteners
Figure 405 (Sheet 2 of 7)

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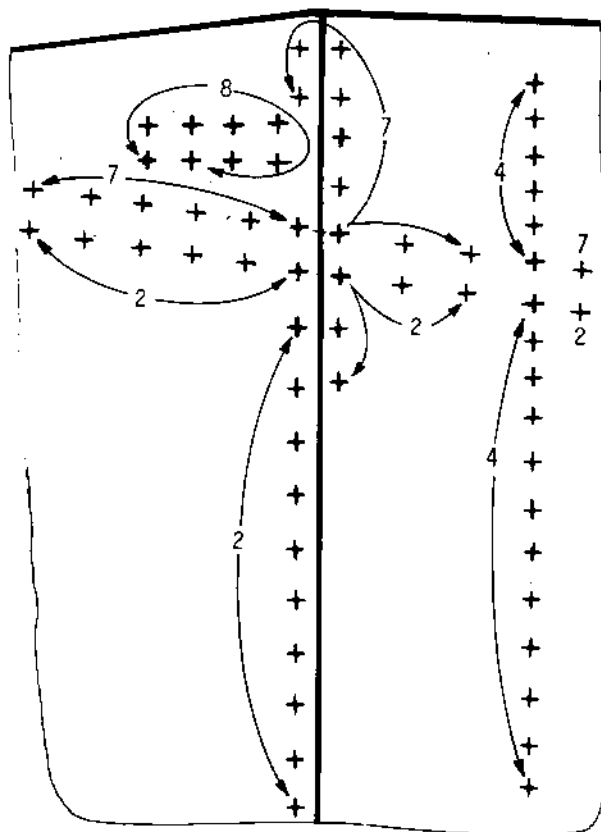
OLYMPUS 593

MK.610-14-28
OVERHAUL



B

←
FORWARD



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking Of Centre Wall Fasteners
Figure 405 (Sheet 3 of 7)

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OLYMPUS 593

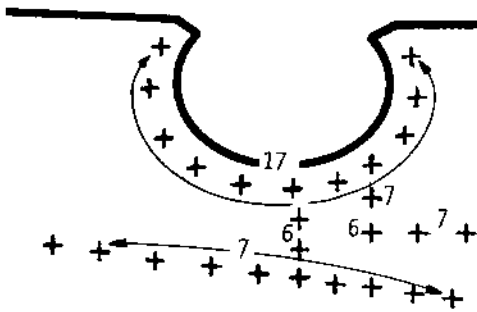
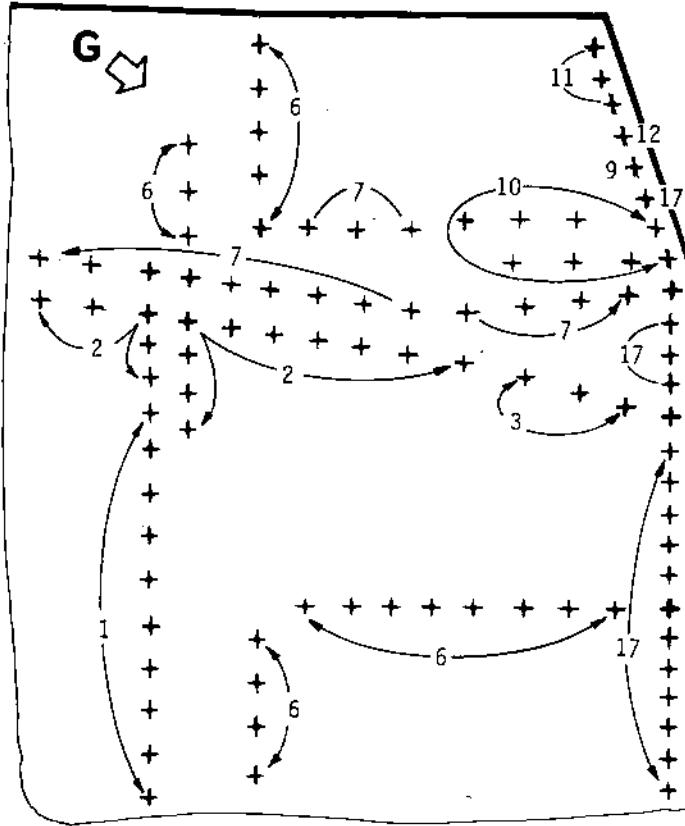
MK.610-14-28
OVERHAUL



C (L/H WALL)

←
FORWARD

G (R/H WALL)



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Centre Wall Fasteners
Figure 405 (Sheet 4 of 7)

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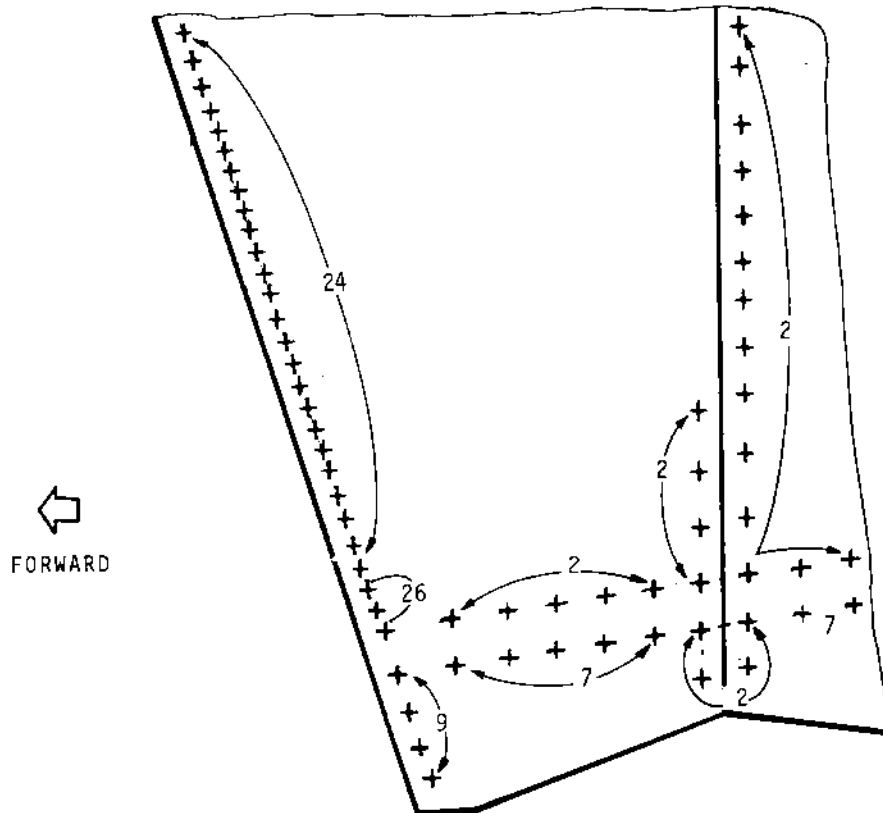


OLYMPUS 593

MK.610-14-28
OVERHAUL



D



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Centre Wall Fasteners
Figure 405 (Sheet 5 of 7)

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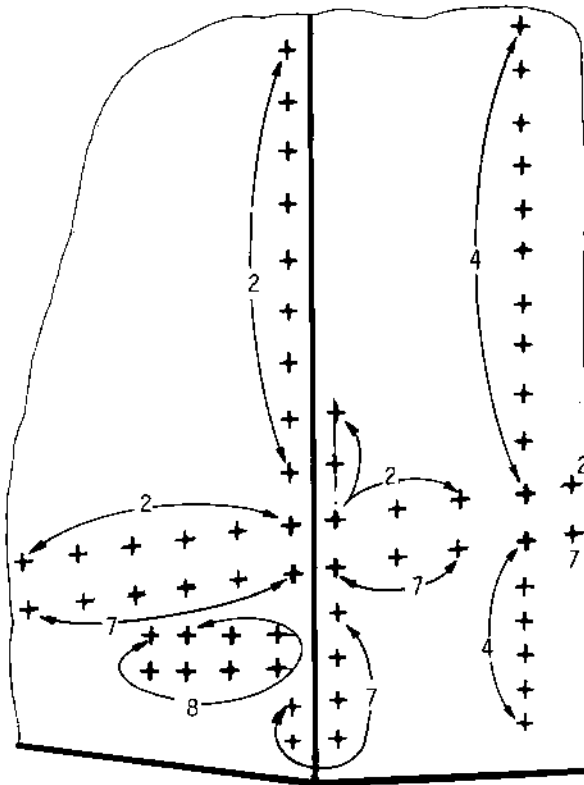
MK.610-14-28
OVERHAUL



E

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←
FORWARD



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Centre Walls Fasteners
Figure 405 (Sheet 6 of 7)

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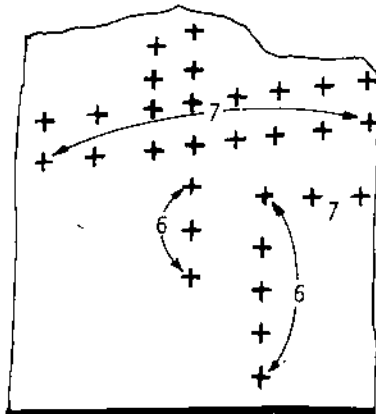
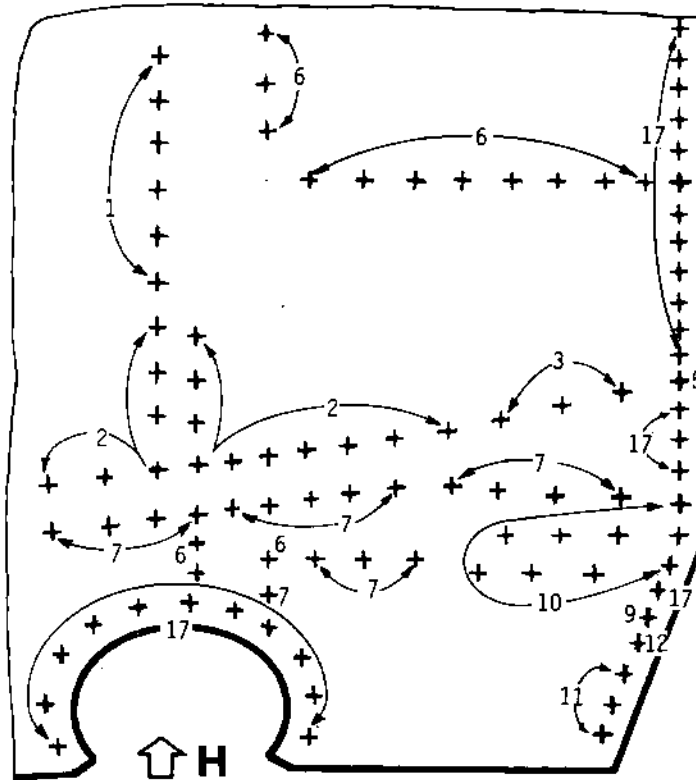
OLYMPUS 593

MK.610-14-28
OVERHAUL



F (L/H WALL)

←
FORWARD



H (R/H WALL)

FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Centre Wall Fasteners
Figure 405 (Sheet 7 of 7)

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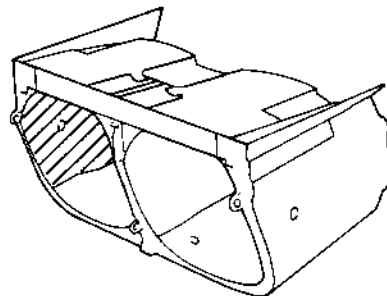
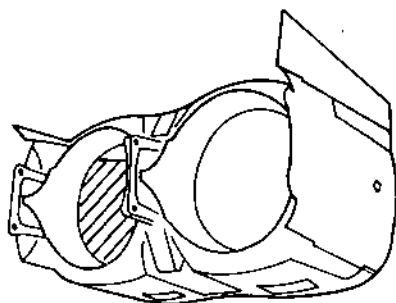
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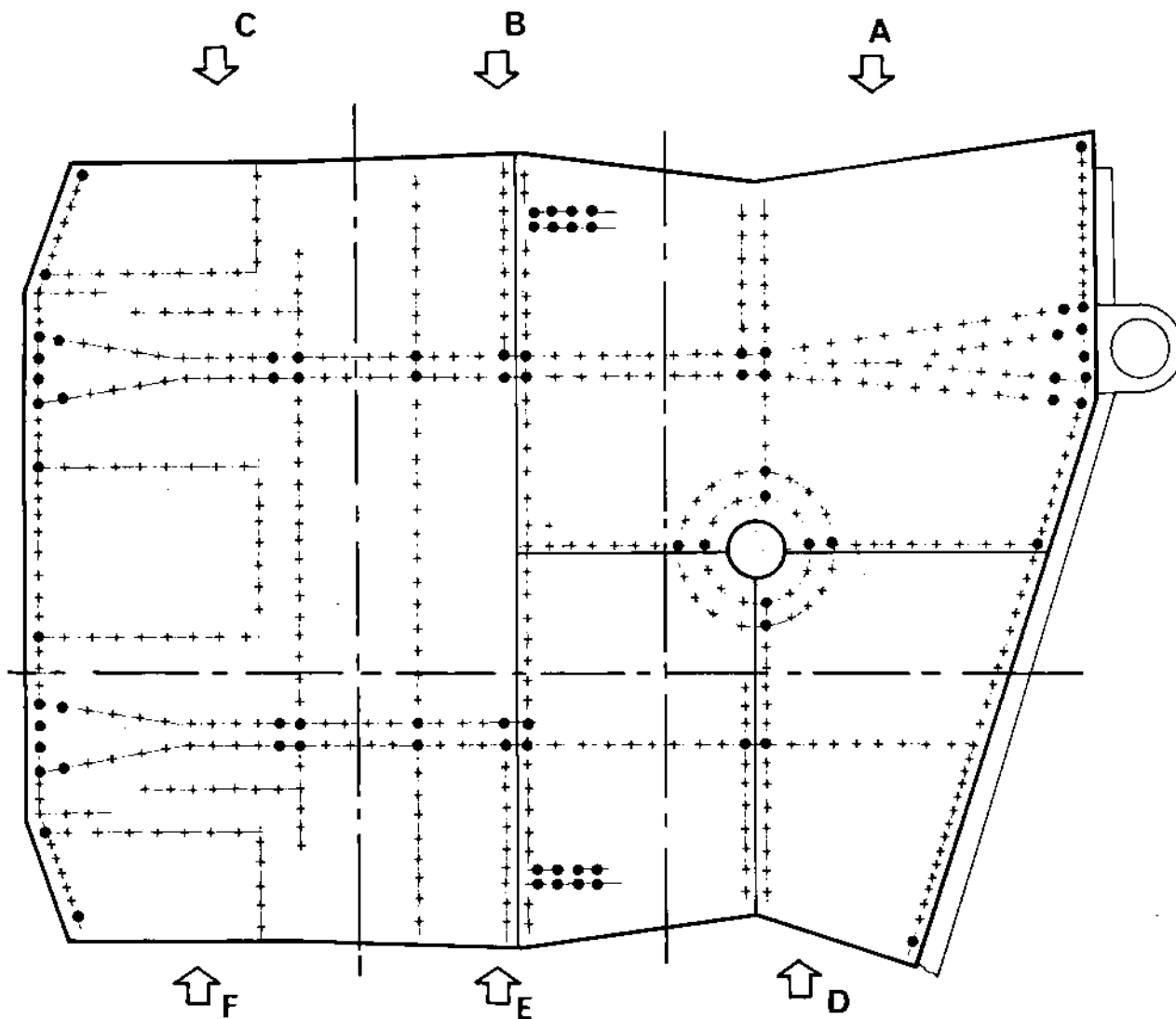
OLYMPUS 593

MK.610-14-28

OVERHAUL



NOTE : L/H NOZZLE AS SHOWN
R/H NOZZLE OPPOSITE



Marking of Fasteners on Inner Side Walls
Figure 406 (Sheet 1 of 6)

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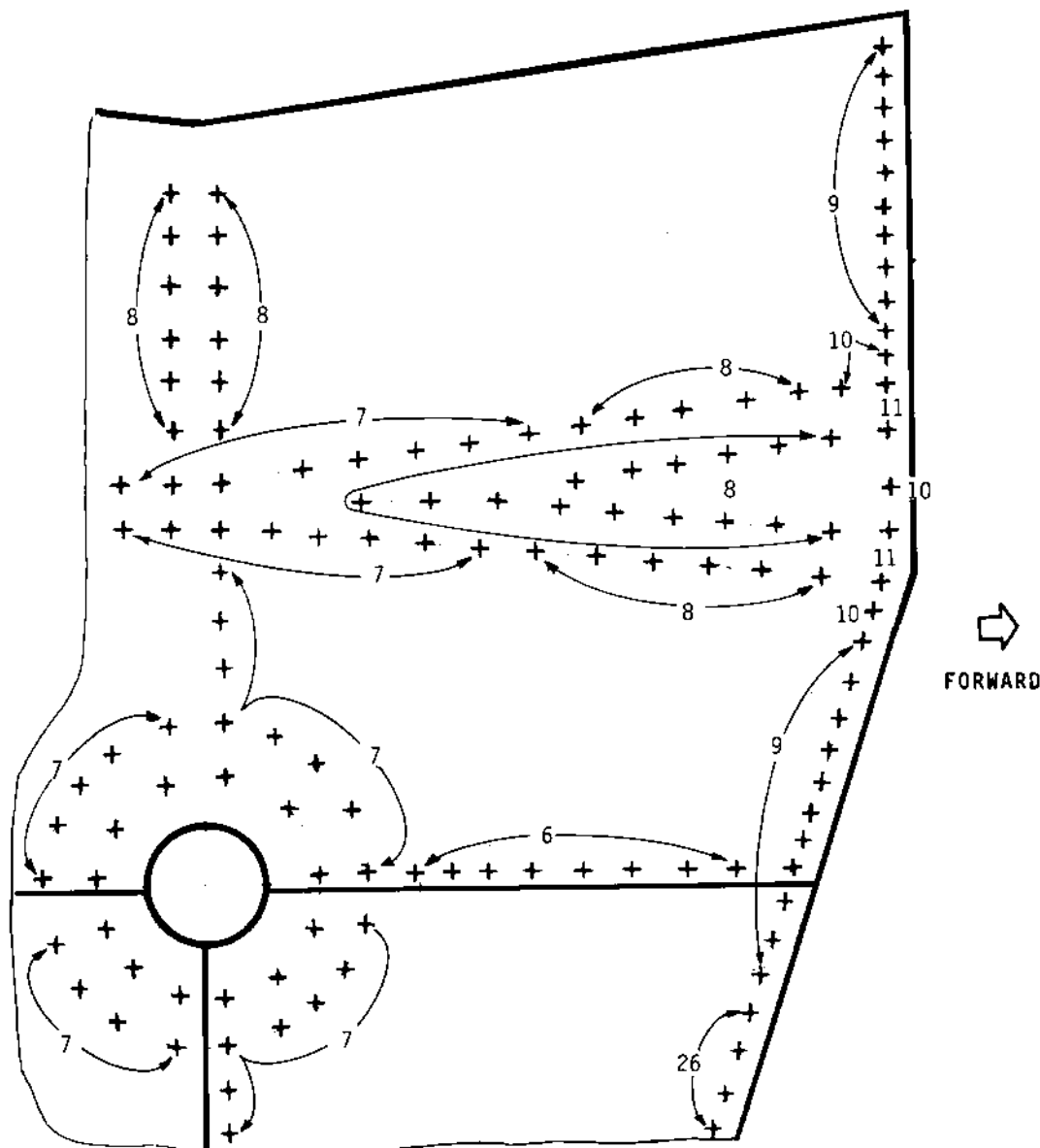


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A



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Inner Side-Walls
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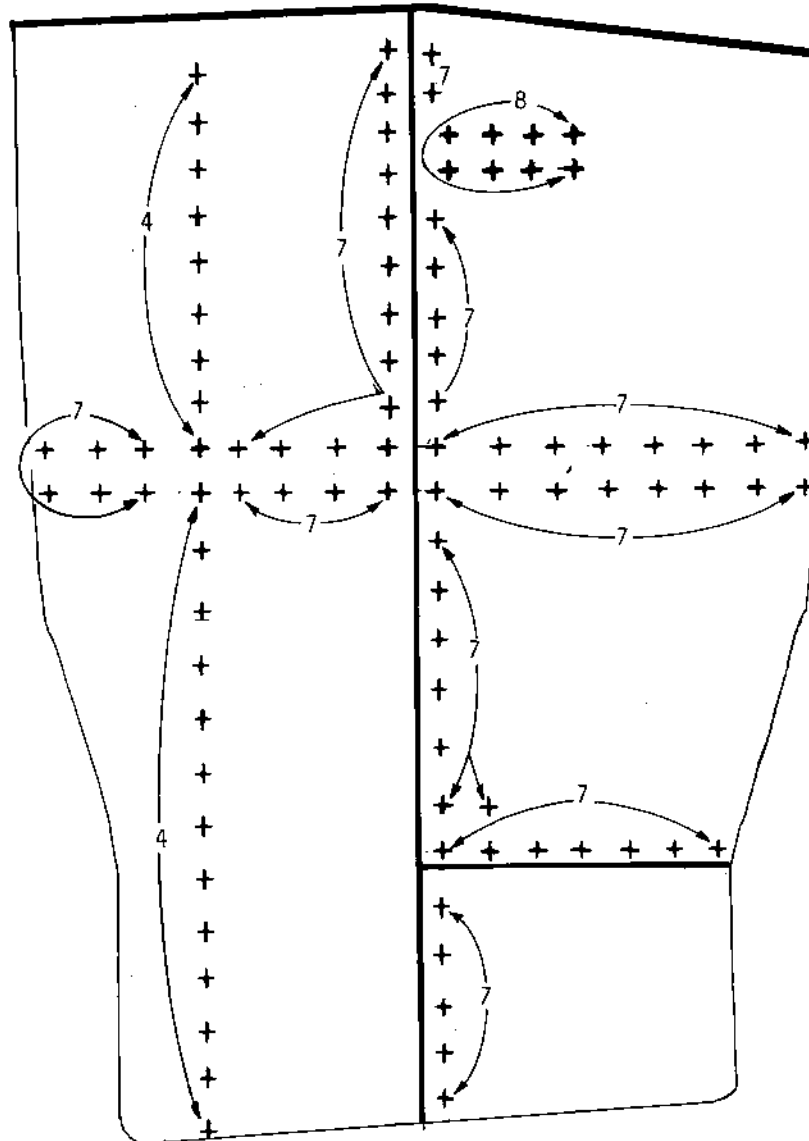


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B



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Inner Side-Walls
Figure 406 (Sheet 3 of 6)

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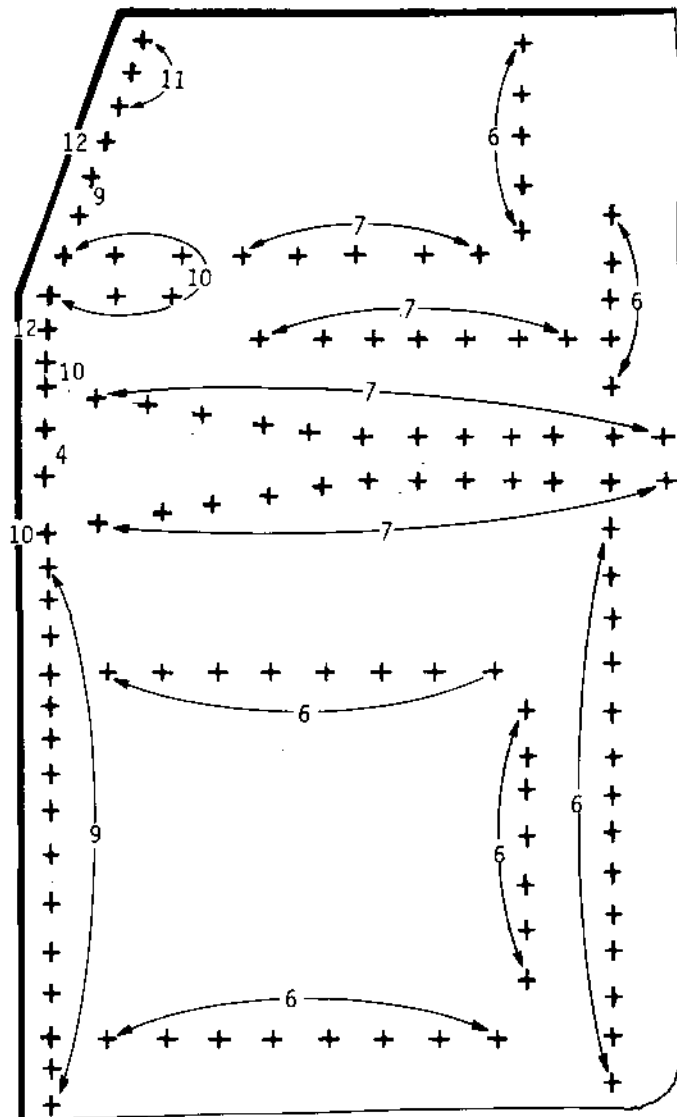


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C



➡
FORWARD

FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Inner Side-Walls
Figure 406 (Sheet 4 of 6)

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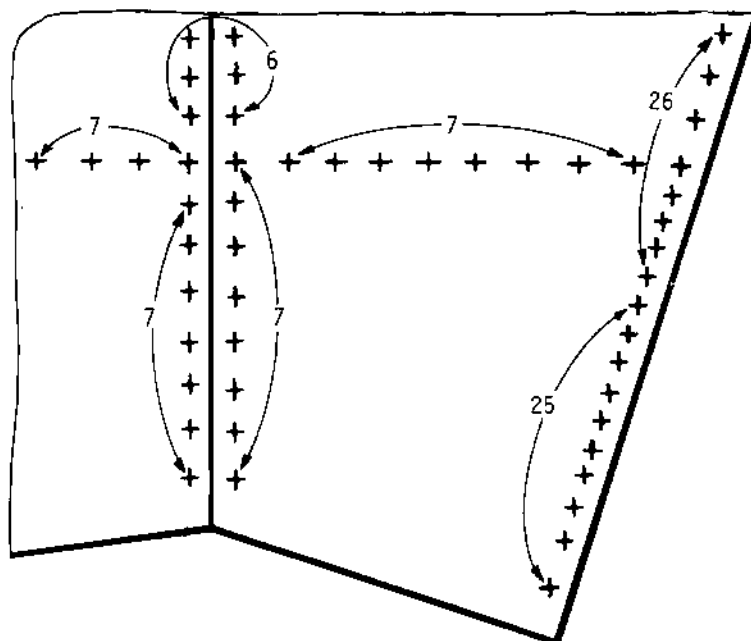
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MK.610-14-28

OVERHAUL

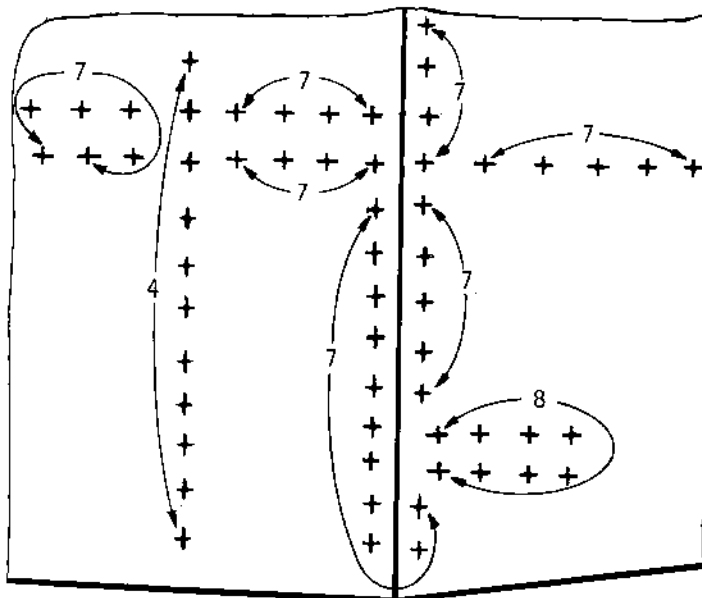


D



FORWARD

FOR IDENTIFYING FASTENERS, SEE FIG. 401



E

Marking of Fasteners on Inner Side Walls
Figure 406 (Sheet 5 of 6)

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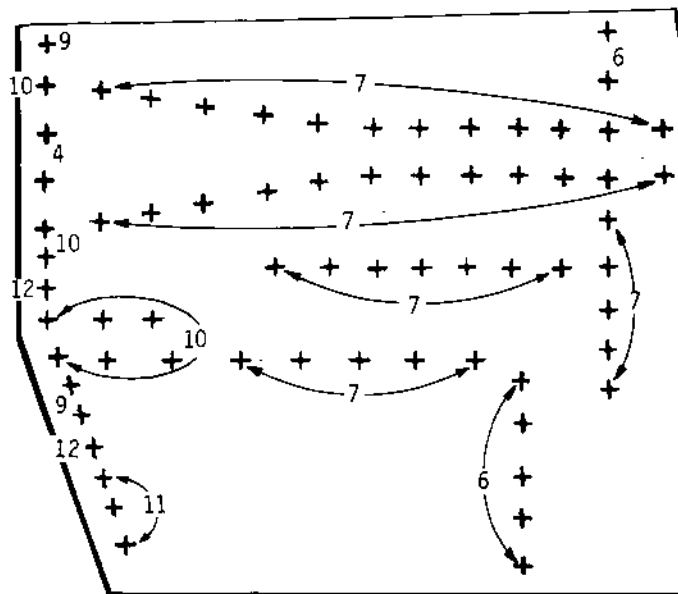


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OVERHAUL



F



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Inner Side-Walls
Figure 406 (Sheet 6 of 6)

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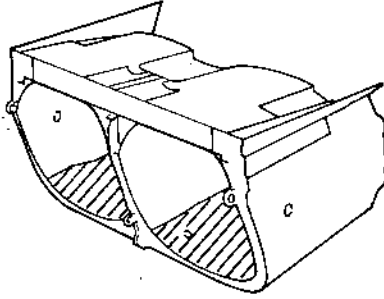
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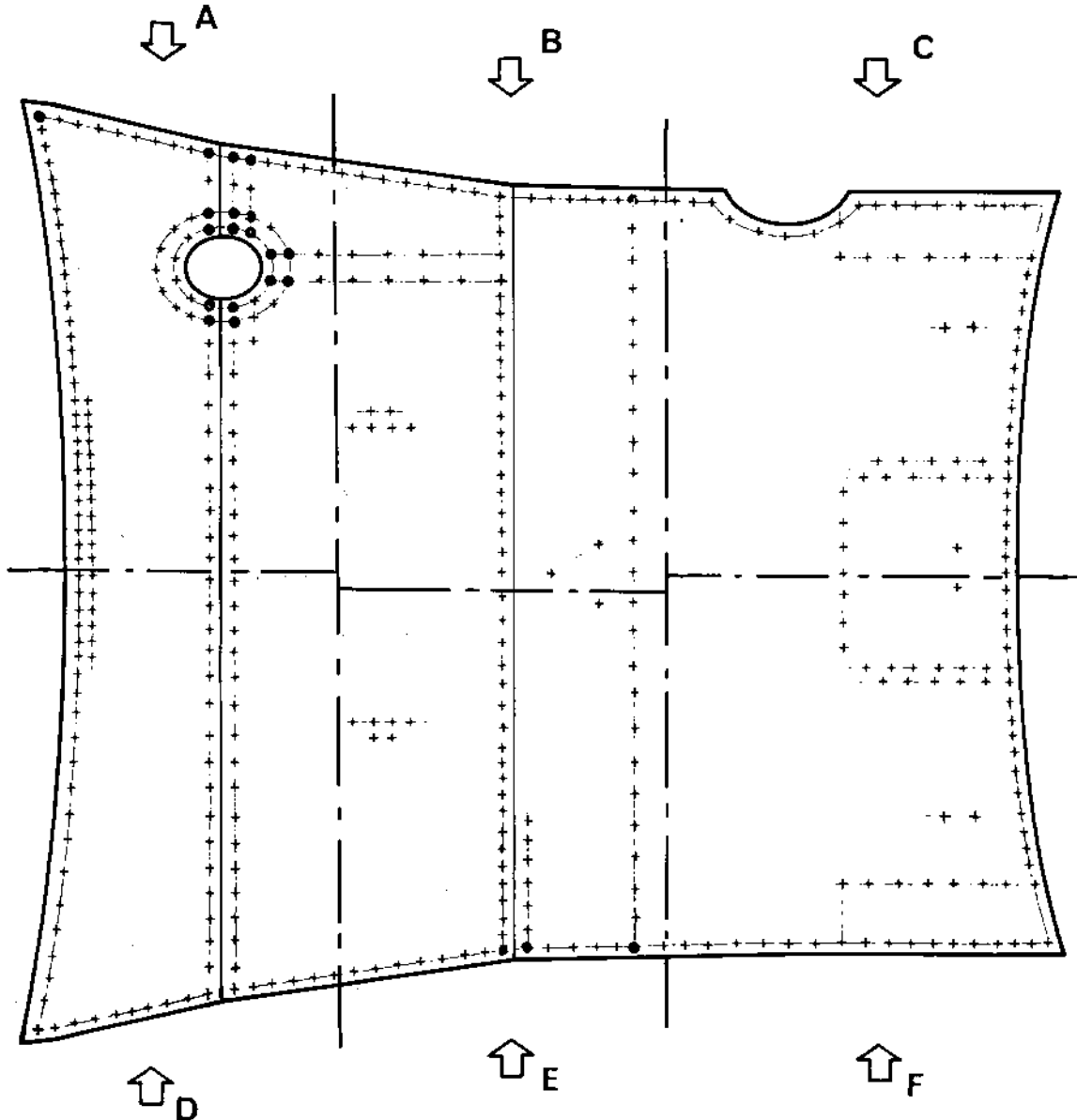


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NOTE : L/H NOZZLE AS SHOWN
R/H NOZZLE OPPOSITE



Marking of Fasteners on Lower Inner Panels
Figure 407 (Sheet 1 of 7)

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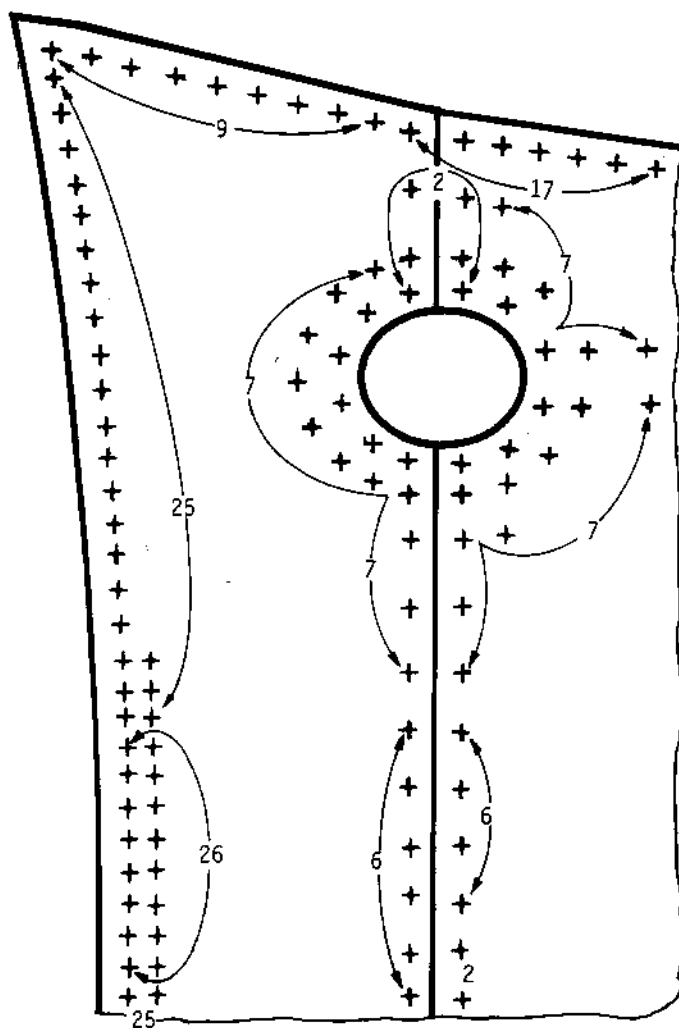
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OVERHAUL



A

←
FORWARD



FOR IDENTIFYING FASTENERS,
SEE FIG. 401

Marking of Fasteners on Lower Inner Panels ,
Figure 407 (Sheet 2 of 7)

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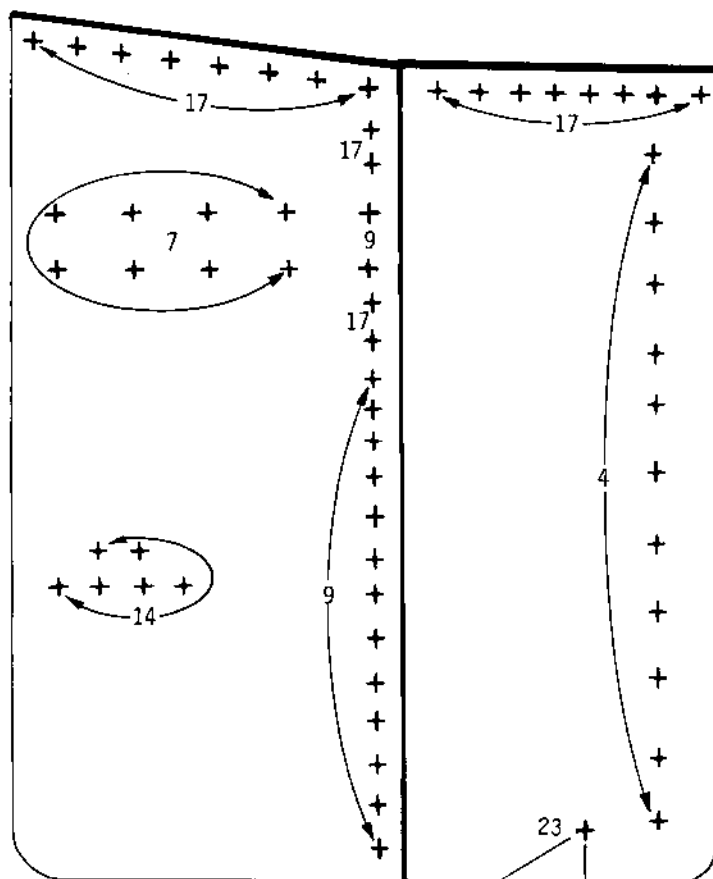
OLYMPUS 593

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OVERHAUL



B



←
FORWARD

FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Lower Inner Panels
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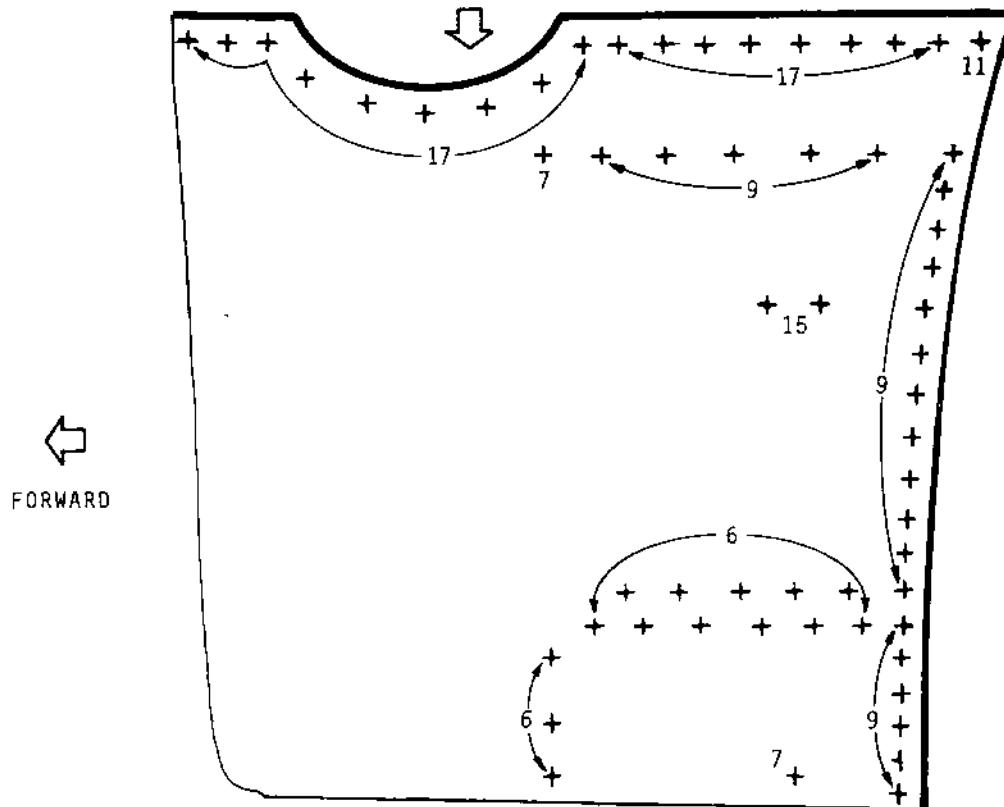


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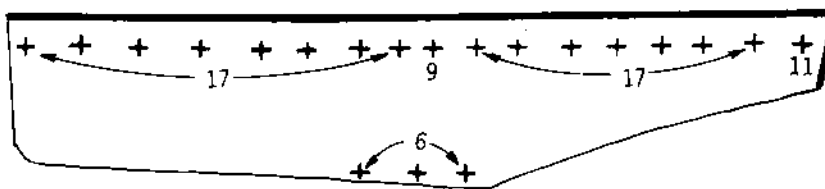
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C (BAY 1)



G (BAY 2)



FOR IDENTIFYING FASTENERS
SEE FIGURE 401

Marking of Fasteners on Lower Inner Panels
Figure 407 (Sheet 4 of 7)

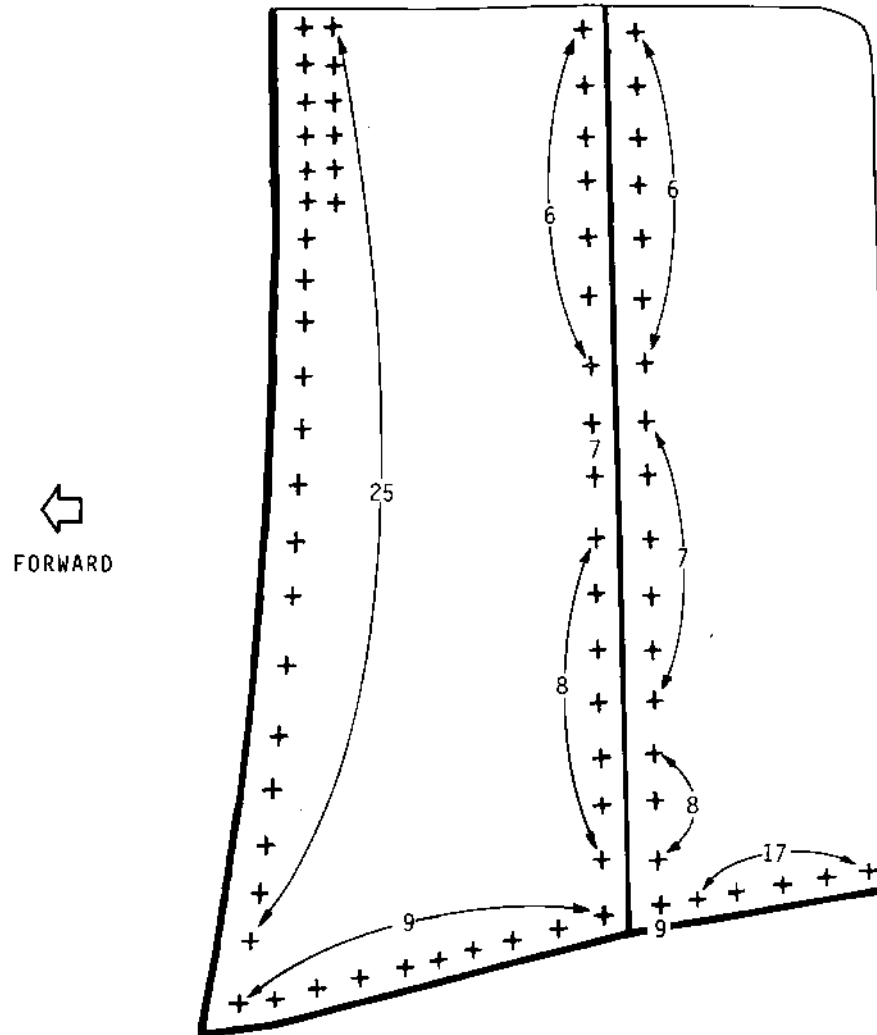
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D



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Lower Inner Panels
Figure 407 (Sheet 5 of 7)



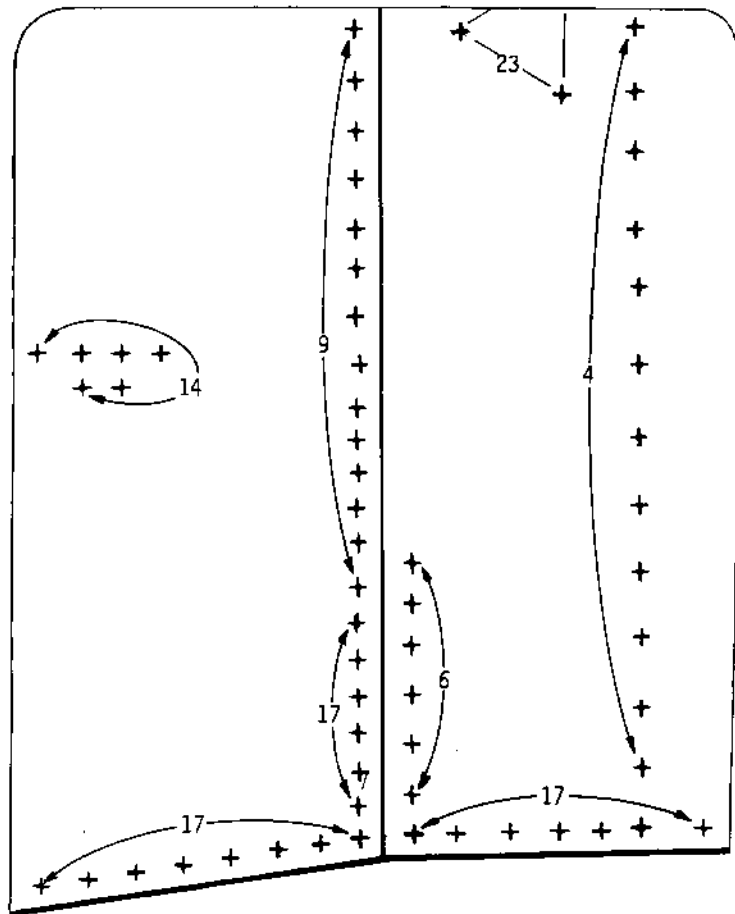
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OVERHAUL



E

←
FORWARD



FOR IDENTIFYING FASTENERS
SEE FIGURE 401

Marking of Fasteners on Lower Inner Panels
Figure 407 (Sheet 6 of 7)

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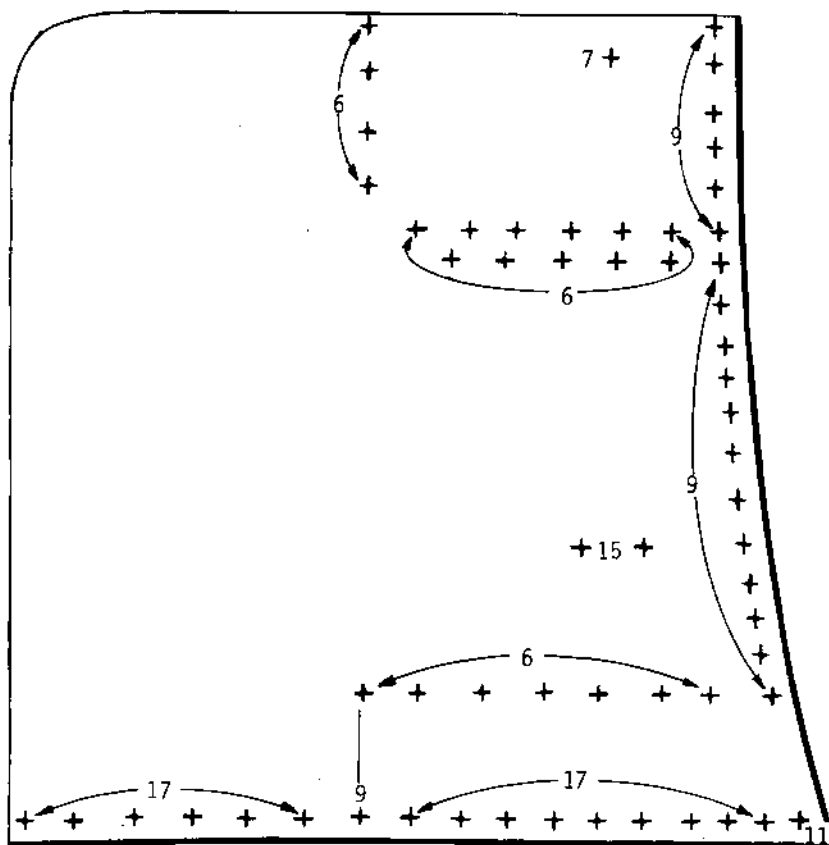
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F

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←
FORWARD



FOR IDENTIFYING FASTENERS
SEE FIGURE 401

Marking of Fasteners on Lower Inner Panels
Figure 407 (Sheet 7 of 7)

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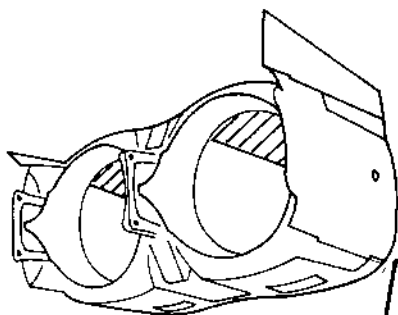
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MK.610-14-28

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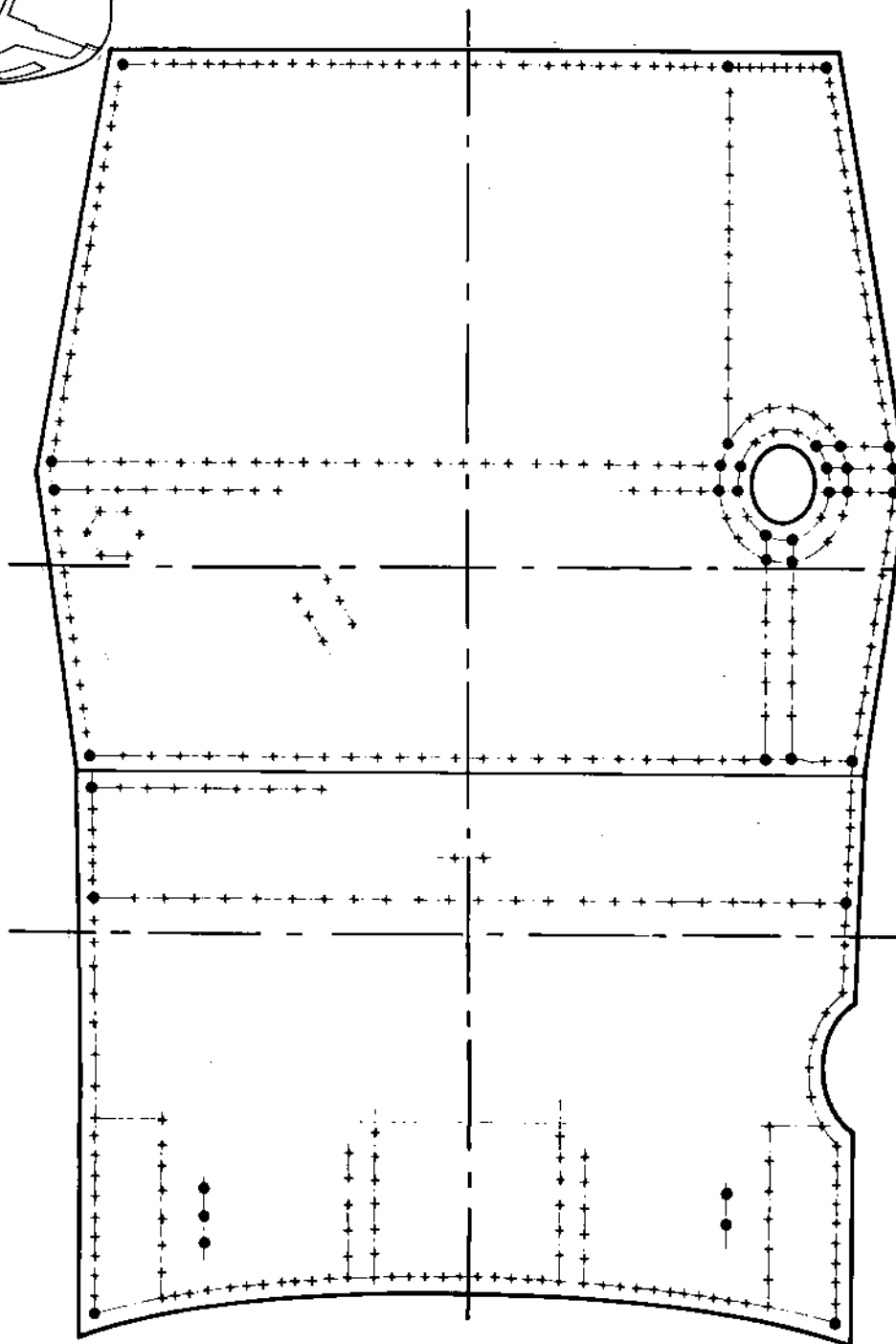
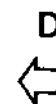


NOTE : L/H NOZZLE AS SHOWN
R/H NOZZLE OPPOSITE

B (BAY 1)



C (BAY 2)



Marking of Fasteners on Top Inner Panels
Figure 408 (Sheet 1 of 8)

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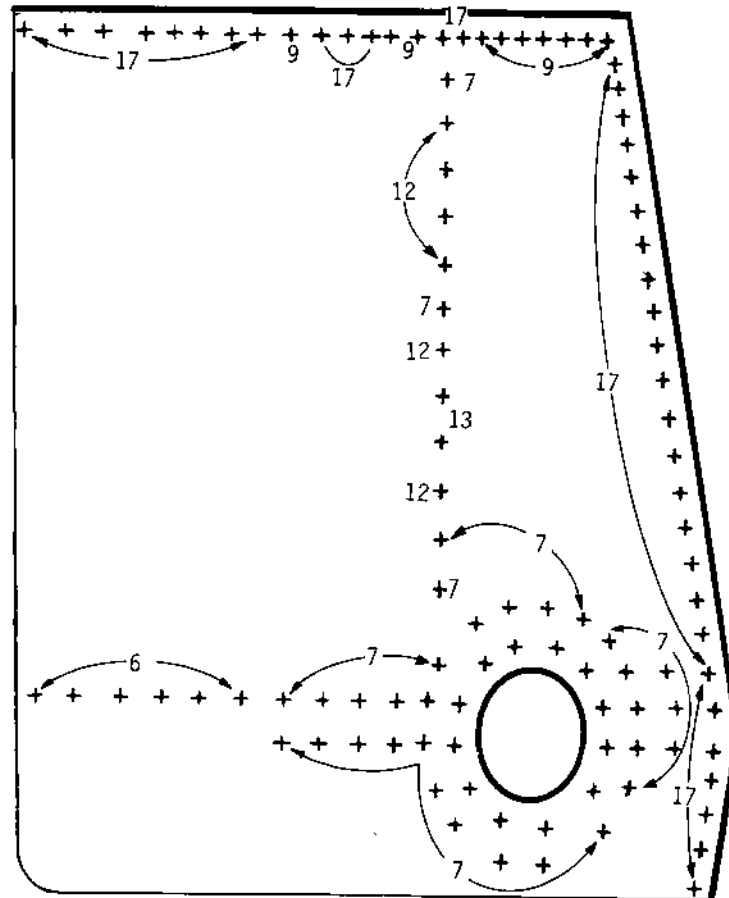


OLYMPUS 593

MK.610-14-28
OVERHAUL



FORWARD



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Top Inner Panels
Figure 408 (Sheet 2 of 8)

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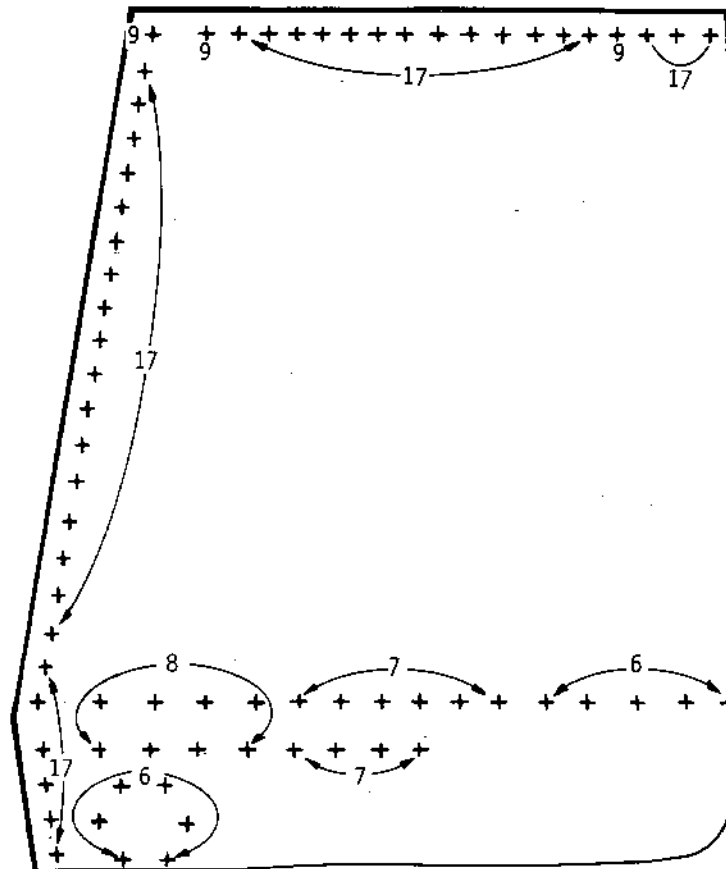
OLYMPUS 593

MK.610-14-28
OVERHAUL



↑
FORWARD

B



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Top Inner Panels
Figure 408 (Sheet 3 of 8)

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OLYMPUS 593

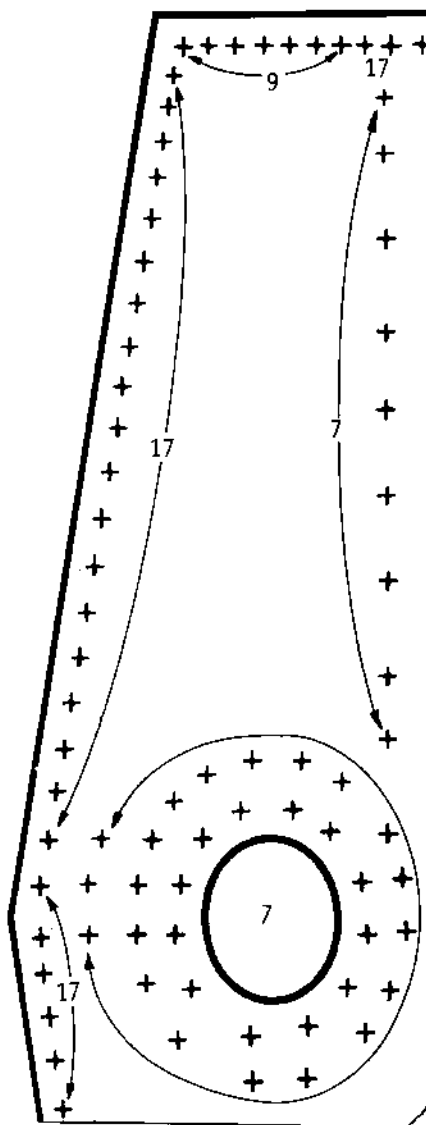
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OVERHAUL



C

↑
FORWARD



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Top Inner Panels
Figure 408 (Sheet 4 of 8)

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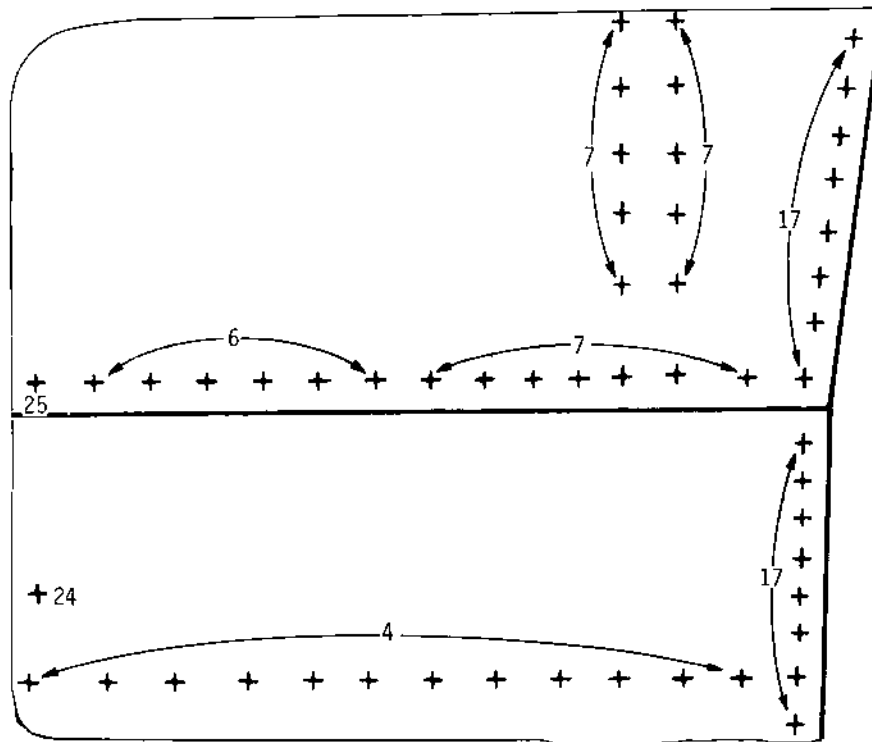
OLYMPUS 593

MK.610-14-28
OVERHAUL



D

↑
FORWARD



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Top Inner Panels
Figure 408 (Sheet 5 of 8)

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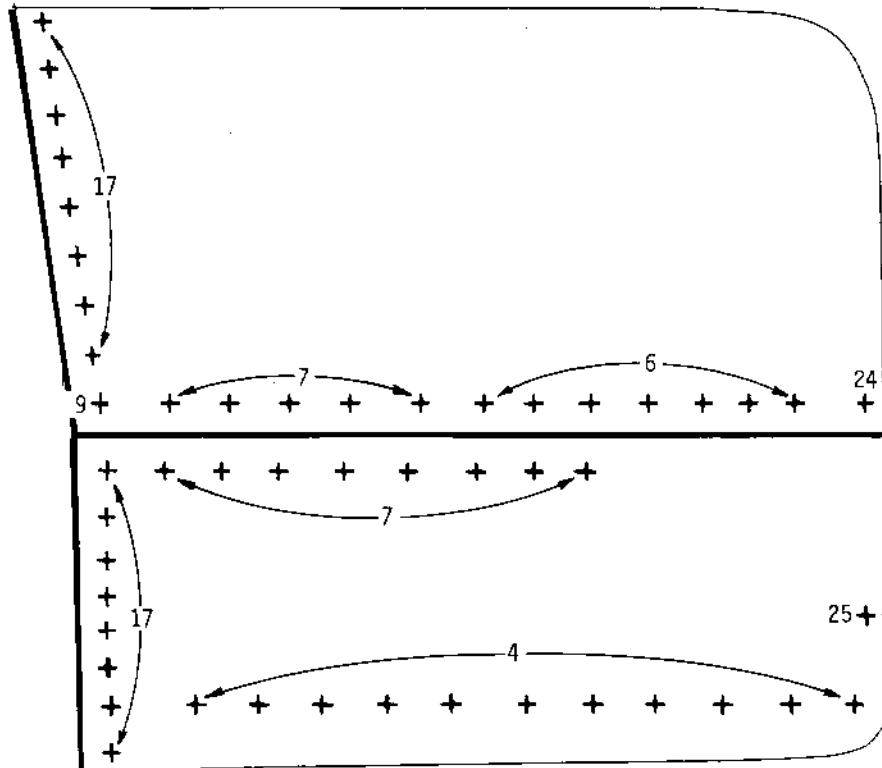
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OVERHAUL



E



FORWARD



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Top Inner Panels
Figure 408 (Sheet 6 of 8)

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MK.610-14-28

OVERHAUL

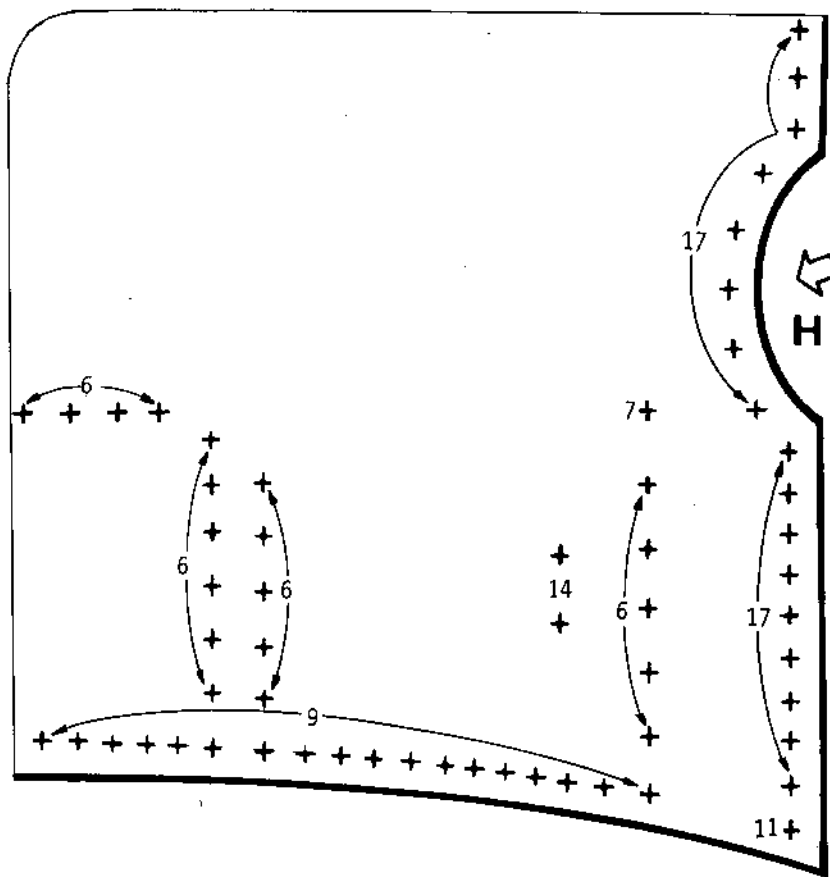


F

BAY 2

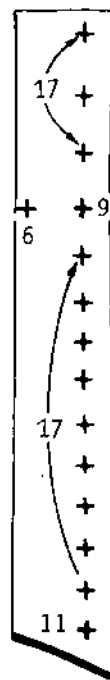


FORWARD



H

BAY 1



FOR IDENTIFYING FASTENERS
SEE FIG.401

Marking of Fasteners on Top Inner Panels
Figure 408 (Sheet 7 of 8)

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MK.610-14-28

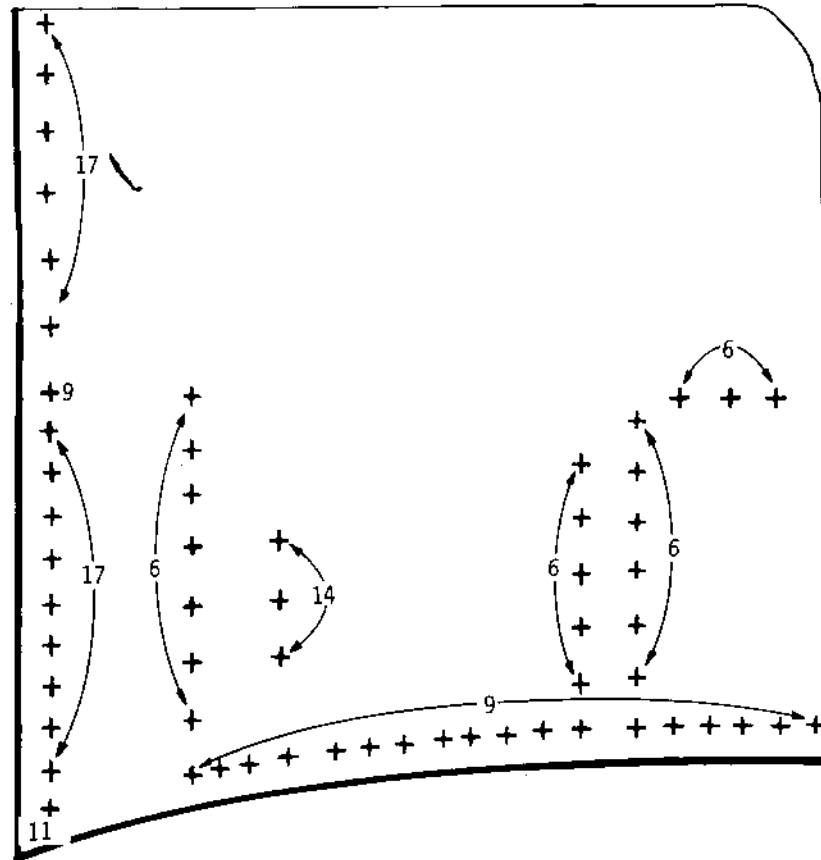
OVERHAUL



G



FORWARD



FOR IDENTIFYING FASTENERS
SEE FIG. 401

Marking of Fasteners on Top Inner Panels
Figure 408 (Sheet 8 of 8)

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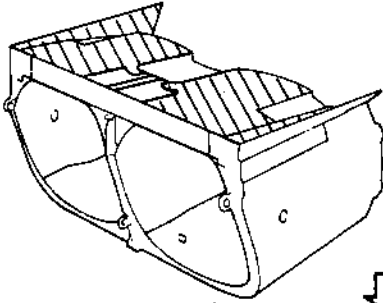
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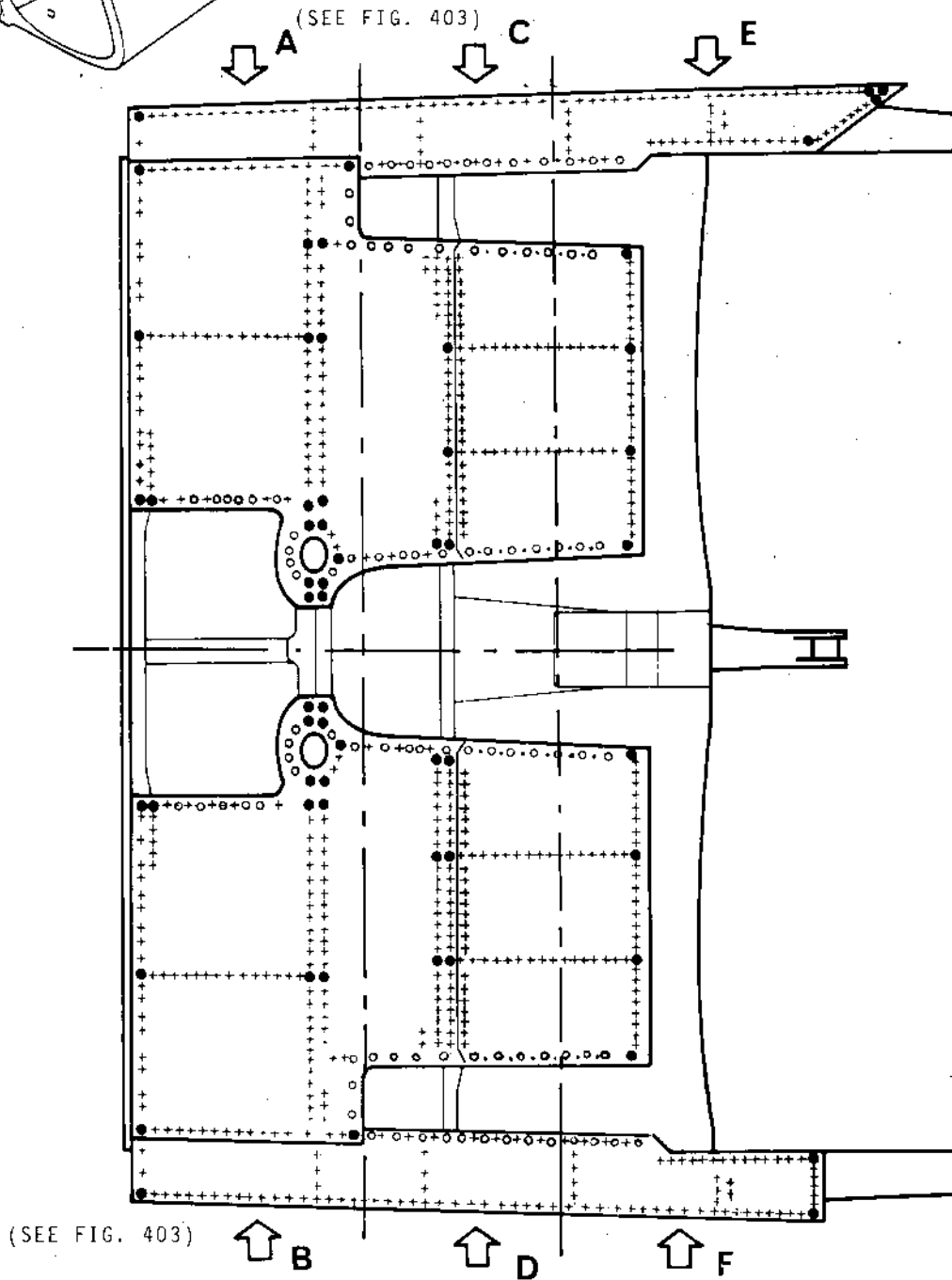


OLYMPUS 593

MK.610-14-28
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NOTE : L/H NOZZLE AS SHOWN
R/H NOZZLE OPPOSITE
SECONDARY NOZZLE VERSION
WITH SHEET METAL REAR
PANEL (SB DL 593-78-28222-39)



Marking of Fasteners on Top Outer Panels
Figure 409 (Sheet 1/3)

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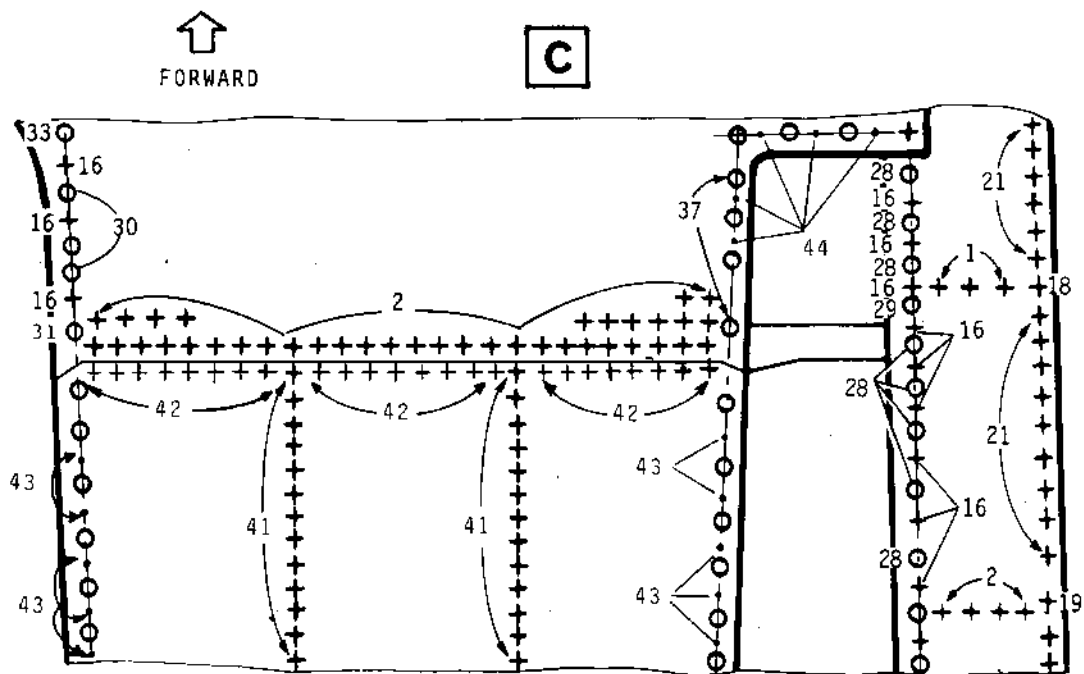
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OLYMPUS 593

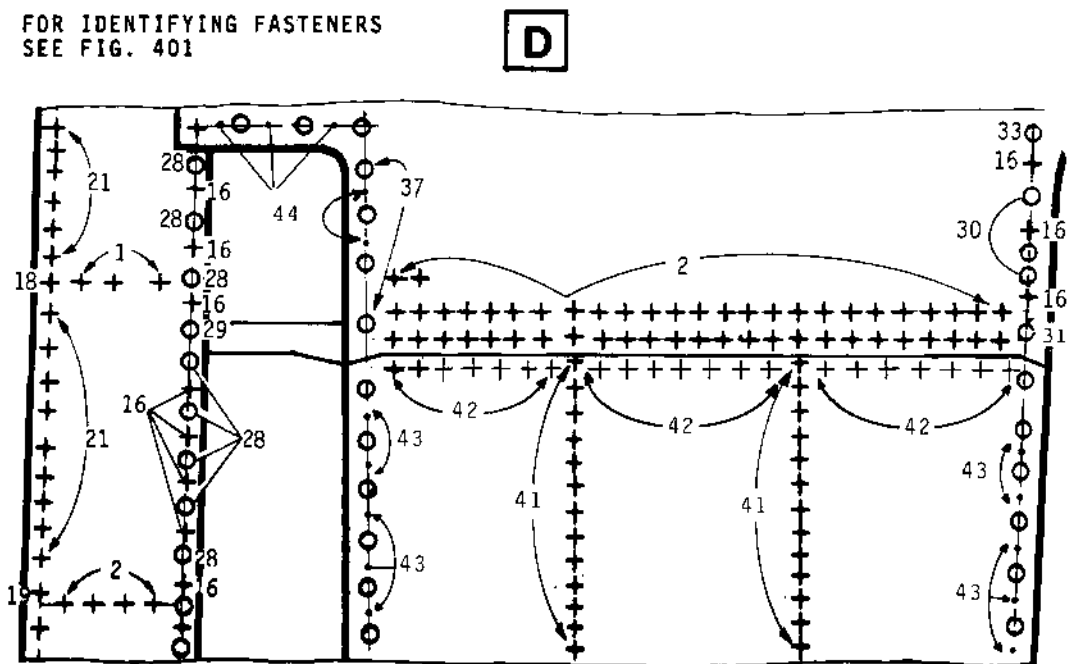
MK.610-14-28

OVERHAUL



SECONDARY NOZZLE VERSION WITH SHEET METAL REAR PANEL

FOR IDENTIFYING FASTENERS
SEE FIG. 401



SECONDARY NOZZLE VERSION WITH SHEET METAL REAR PANEL

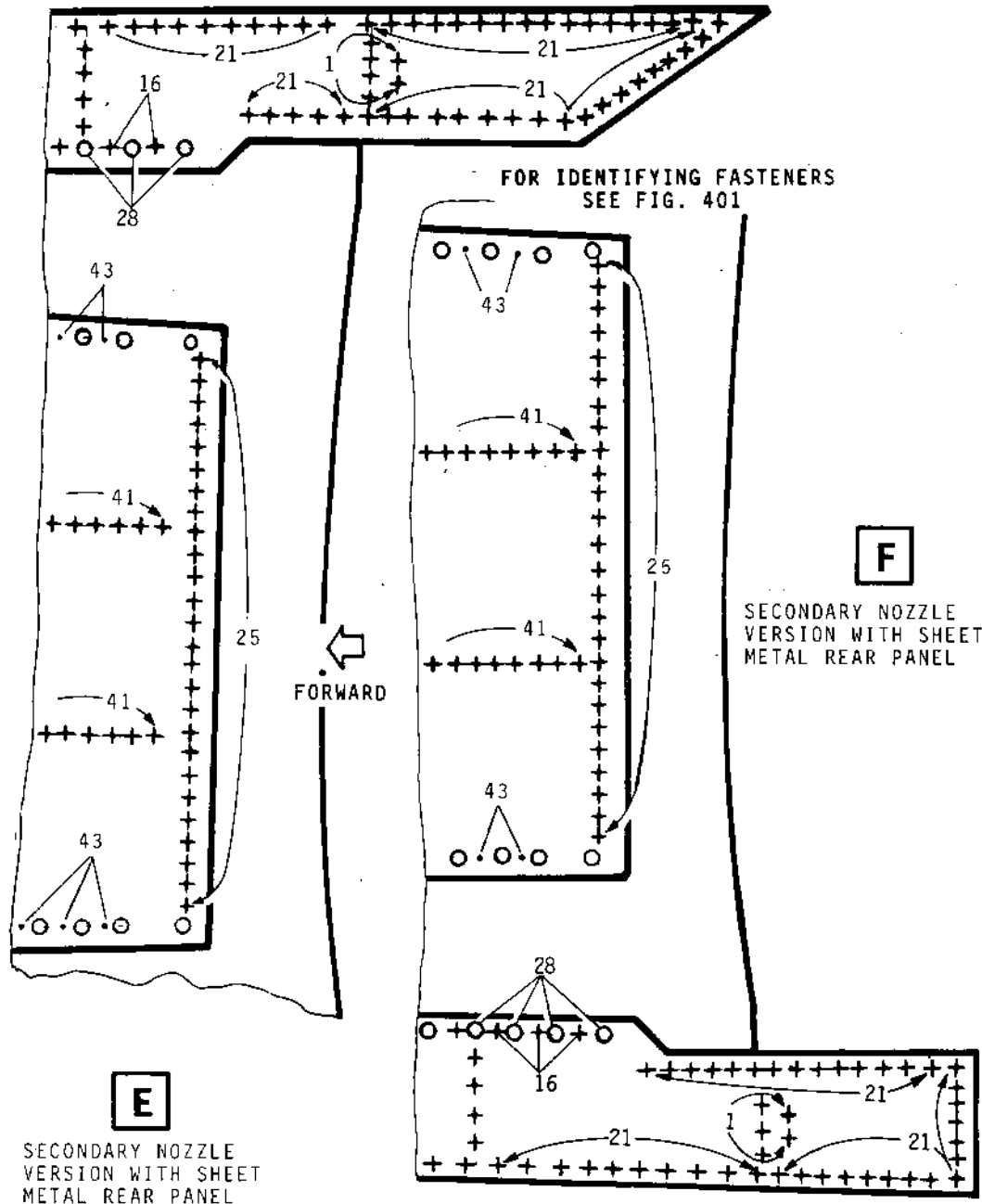
Marking of Fasteners on Top Outer Panels
Figure 409 (Sheet 2/3)

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Marking of Fasteners on Top Outer Panels
Figure 409 (Sheet 3/3)

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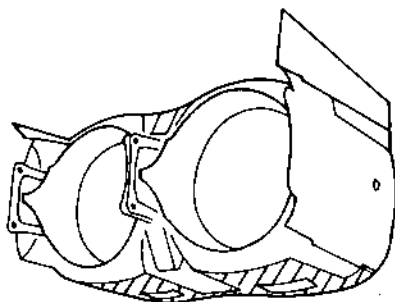
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OLYMPUS 593

MK.610-14-28
OVERHAUL



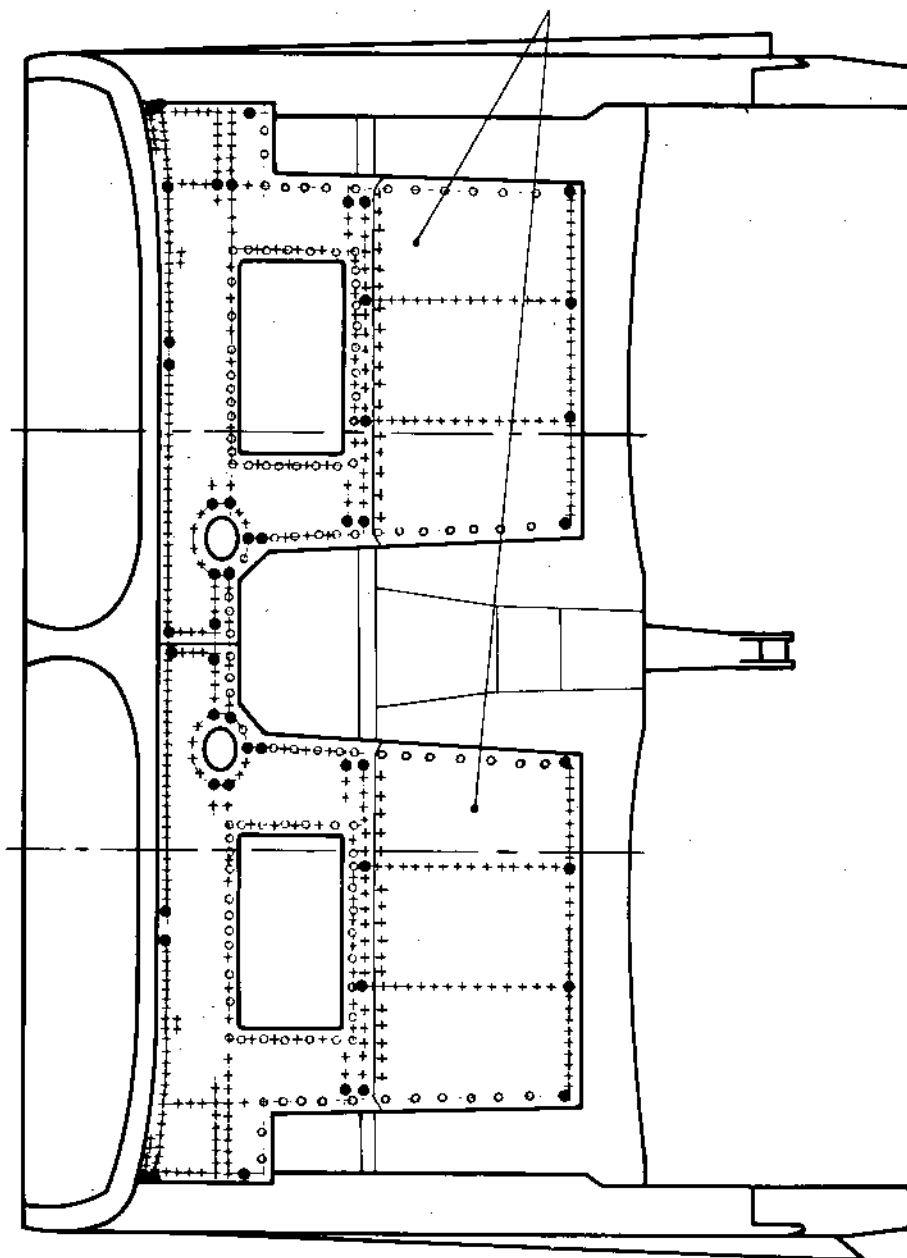
NOTE : L/H NOZZLE AS SHOWN
R/H NOZZLE OPPOSITE
SECONDARY NOZZLE VERSION
WITH SHEET METAL REAR PANEL
(SB OL 593-78-28222-39)

SHEET METAL
REAR PANEL

A →

B →

C →



Marking of Fasteners on Lower Outer Panels
Figure 410 (Sheet 1/4)

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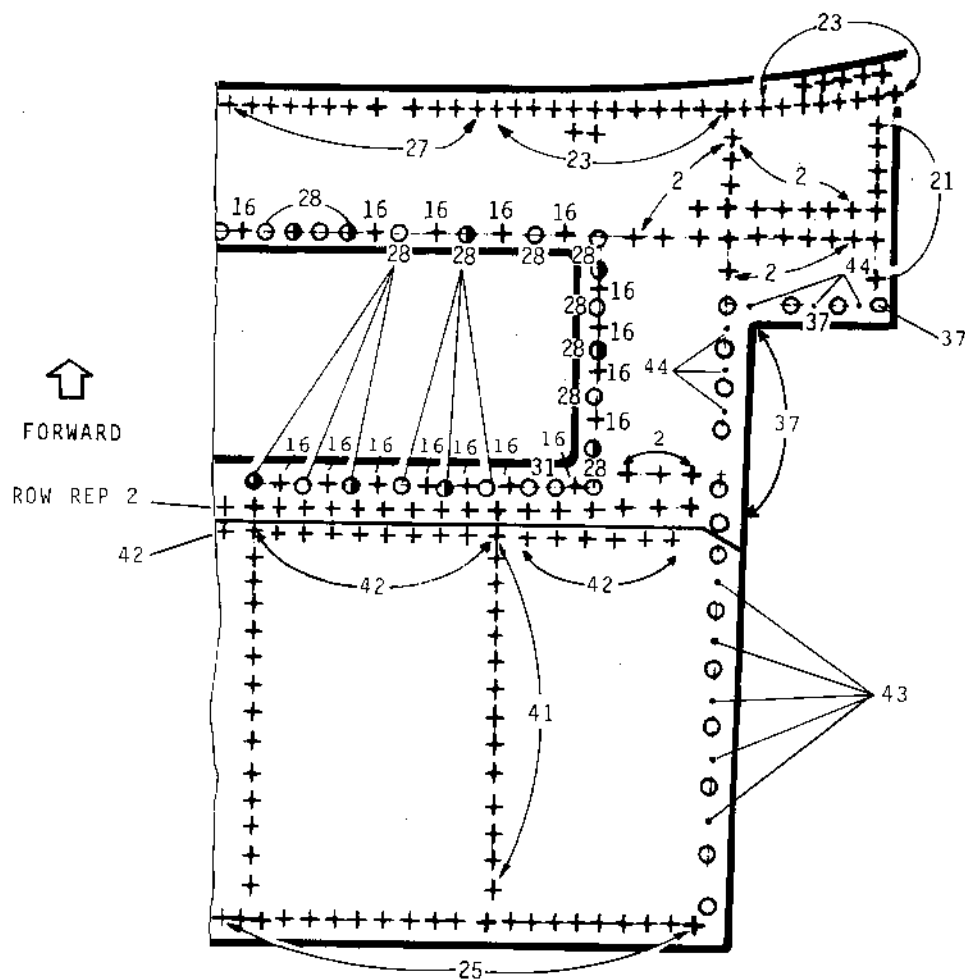
OLYMPUS 593

MK.610-14-28
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FOR IDENTIFYING FASTENERS
SEE FIG. 401

A



● INSERTS NOT USED FOR SECURING THE INSPECTION DOORS

SECONDARY NOZZLE VERSION WITH SHEET METAL REAR PANEL

Marking of Fasteners on Lower Outer Panels
Figure 410 (Sheet 2/4)

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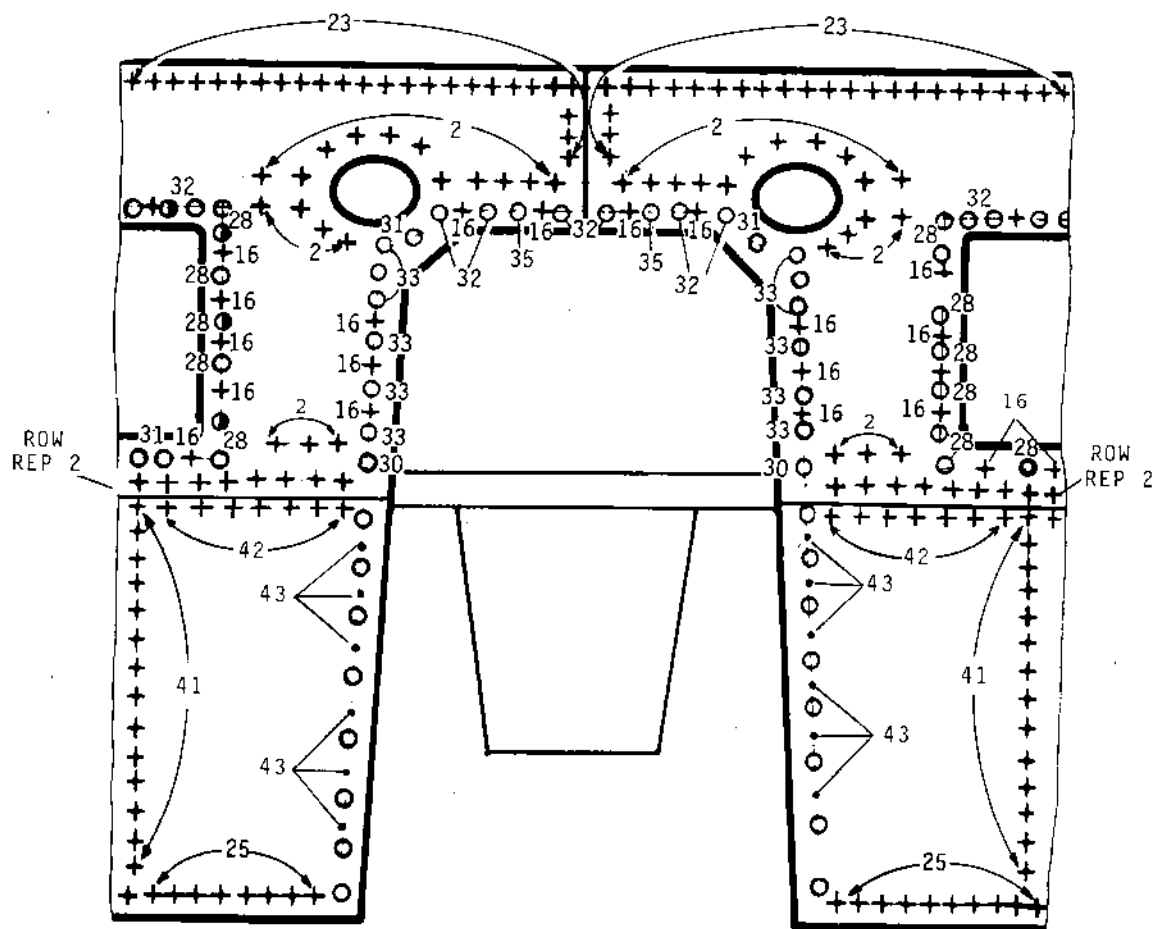
OLYMPUS 593

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OVERHAUL



FORWARD

B



FOR IDENTIFYING FASTENERS
SEE FIG. 401

① INSERTS NOT USED FOR SECURING THE INSPECTION DOORS

SECONDARY NOZZLE VERSION WITH SHEET METAL REAR PANEL

Marking of Fasteners on Lower Outer Panels
Figure 410 (Sheet 3/4)

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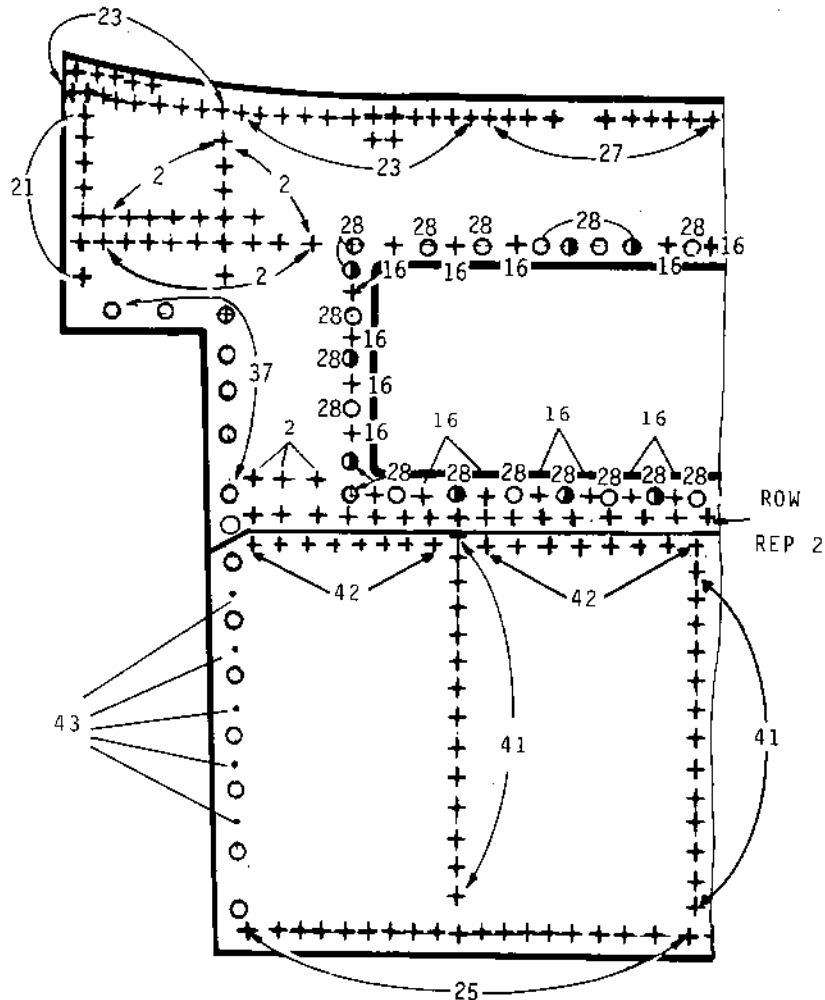
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C

FORWARD



FOR IDENTIFYING FASTENERS
SEE FIG. 401

① INSERTS NOT USED FOR SECURING THE INSPECTION DOORS

SECONDARY NOZZLE VERSION WITH SHEET METAL REAR PANEL

Marking of Fasteners on Lower Outer Panels
Figure 410 (Sheet 4/4)

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REPAIR

TWIN SECONDARY NOZZLE (29-190)

10. Replacement of Bushings at the Bucket Pneumatic Drive Actuator

Mounting Points

PARTS REQUIRED FOR REPAIR

Round bar	P3601 (26NCT25SV)
Bolt	NAS 6704DU14 (649-774-214-0)
Bolt	NAS 6704DU16 (649-774-215-0)

A. Introduction

- (1) This repair scheme only applies when the recess which accommodate the bushings on the mounting yokes are damaged.

B. Machining

- (1) Re-bore the yoke bushing recesses to remove all deteriorations. Deburr.

NOTE : For both yokes (sections C and D) re-bore the recesses as indicated in figure 401.

C. Machining the Bushings.

- (1) Out of round bar P3601, machine the bushings as indicated in figures 402, 403, 404 and 407.
- (2) For pin assemblies (See sections C, D, E and view F), shrink the screw in liquid nitrogen prior to fitting.
- (3) Measure and record the exact bushing recess diameter of the re-bored yokes.
- (4) Select the bushings as indicated in figure 401.
- (5) Rework the bushing dia. "D" to obtain an assembly fit of 0 to 0,02 mm (0 to 0.0008 in.) with the re-bored yoke dia.

D. Installing the bushing.

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- (1) Fit the bushings in their recesses as indicated in figure 401, and secure them with a brass wire, pending installation of bucket pneumatic drive actuator.

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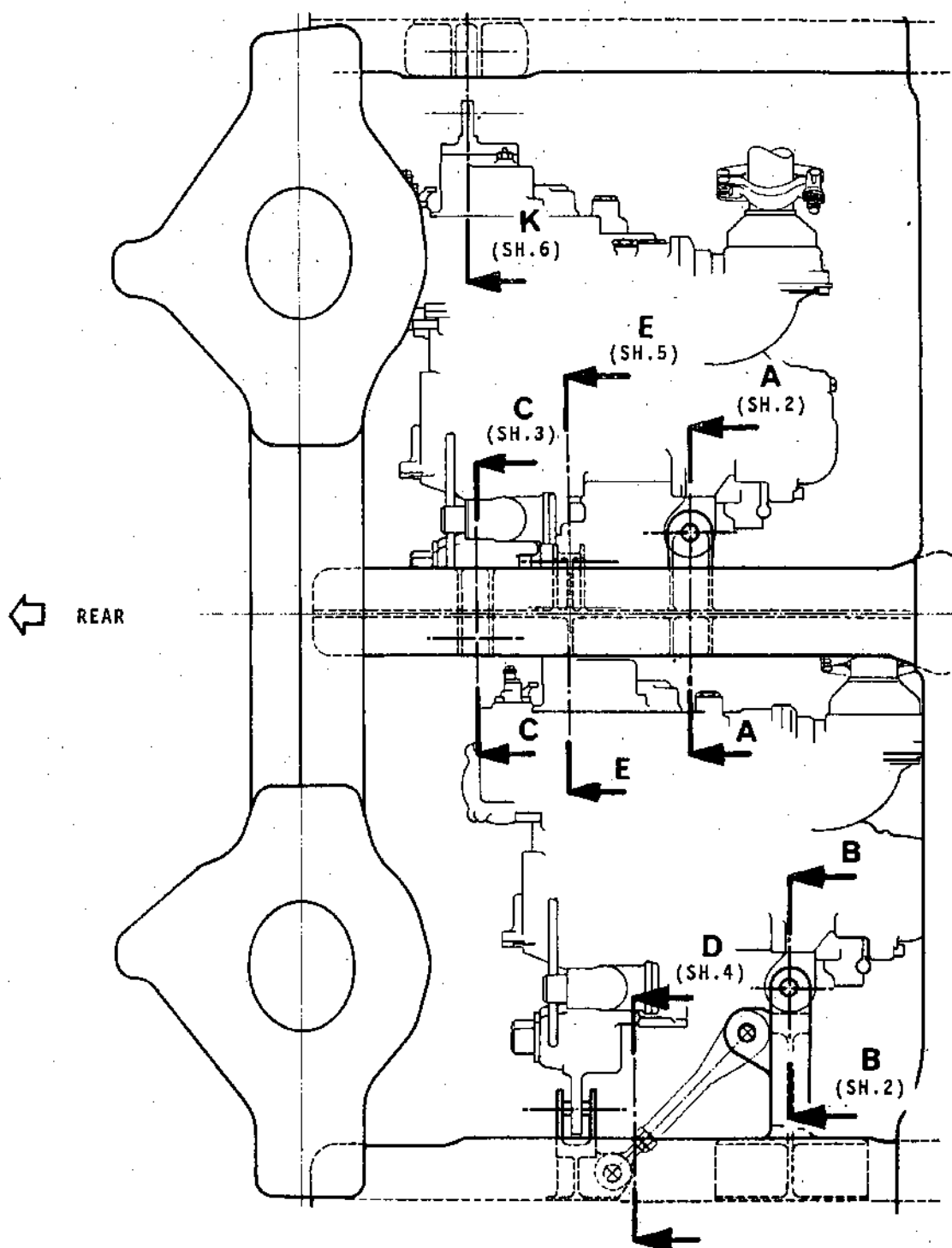
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PLAN VIEW OF FRONT UPPER CENTRE DOORS
VALID FOR BOTH NOZZLE
DOORS REMOVED



Reconditioning the Bucket Pneumatic
Drive Actuator Mounting Points
Figure 401 (Sheet 1 of 6)

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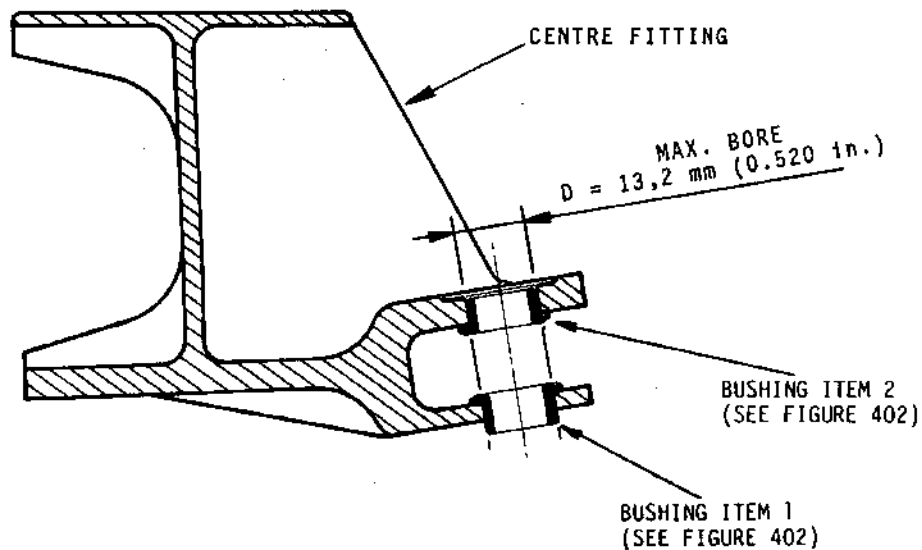


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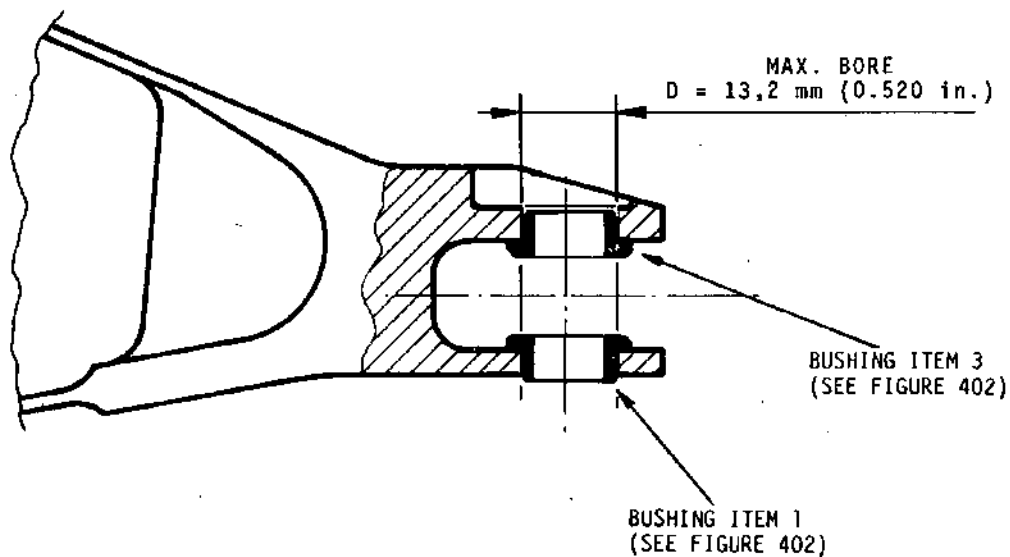
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SECTION AA



SECTION BB



Reconditioning the Bucket Pneumatic
Drive Actuator Mounting Points
Figure 401 (Sheet 2 of 6)

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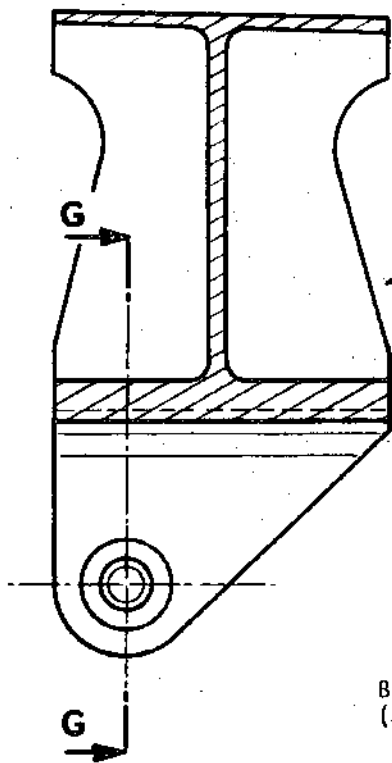
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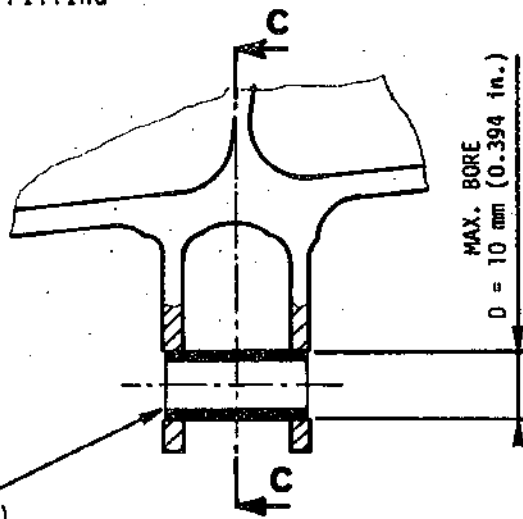
SECTION CC



CENTRE FITTING

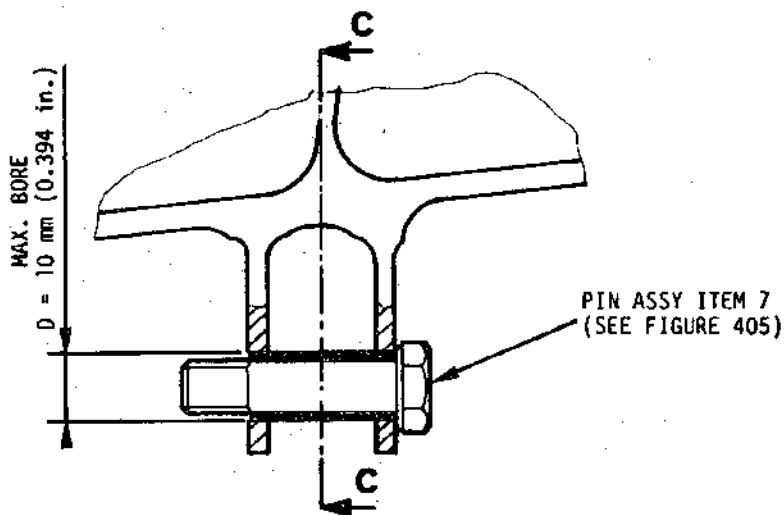
BUSHING ITEM 4
(SEE FIGURE 403)

SECTION GG



MAX. BORE
D = 10 mm (0.394 in.)

FRONT



Reconditioning the Bucket Pneumatic
Drive Actuator Mounting Points
Figure 401 (Sheet 3 of 6)

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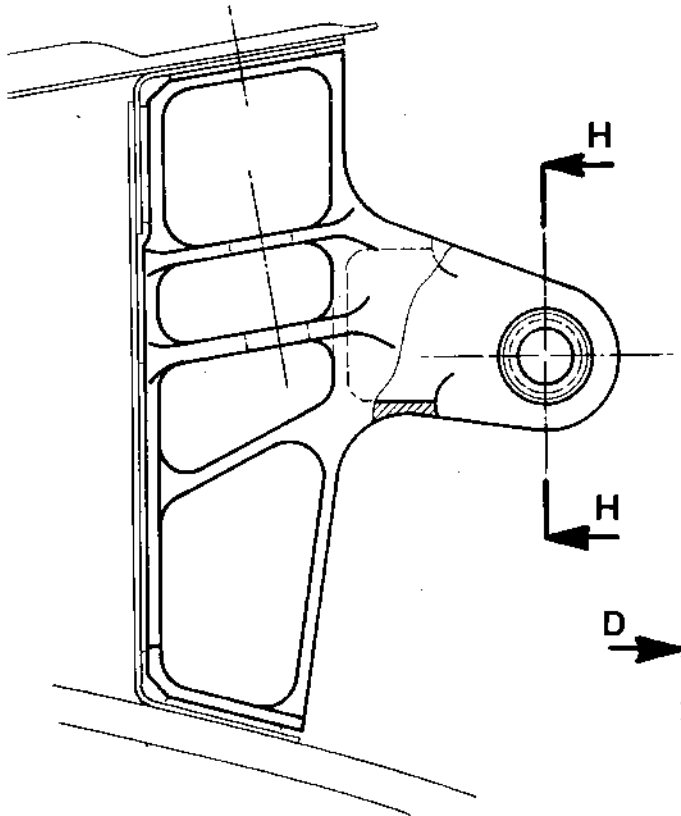


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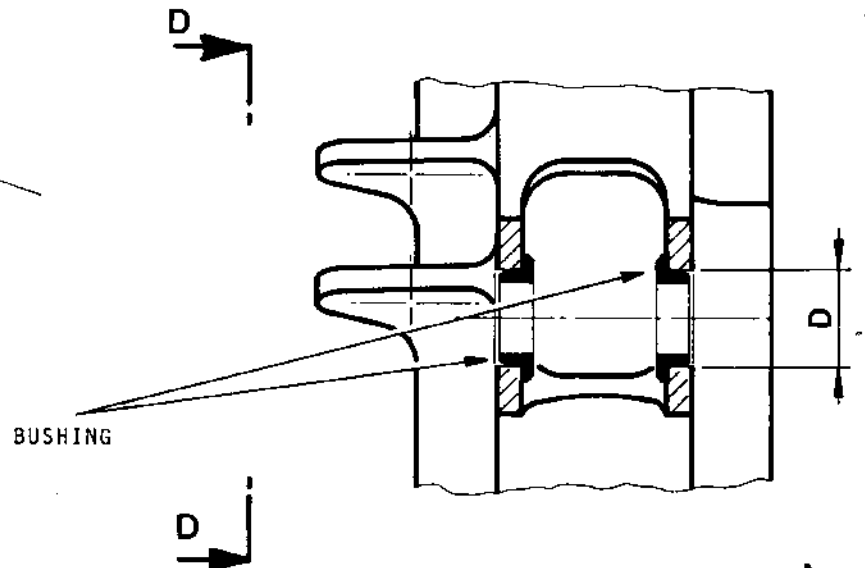
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SECTION DD



SECTION HH



REAR →

BUSHING	RE-BORE DIAMETER		REMARKS
	mm	(in.)	
No. 301-006-300-0	12,7	+ 0,018 + 0	(0.5000) (0.5007)
No. 301-006-300-1	13,2		(0.520) MAX. BORE

Reconditioning the Bucket Pneumatic
Drive Actuator Mounting Points
Figure 401 (Shet 4 of 6)

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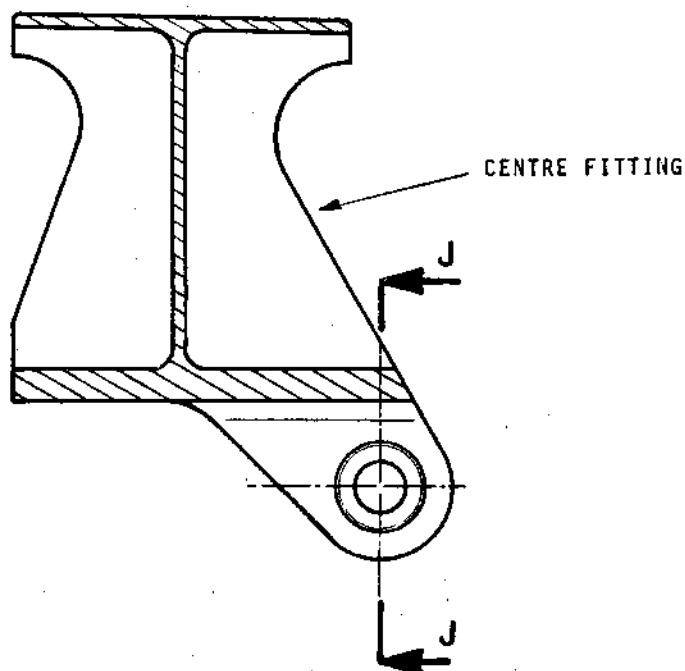


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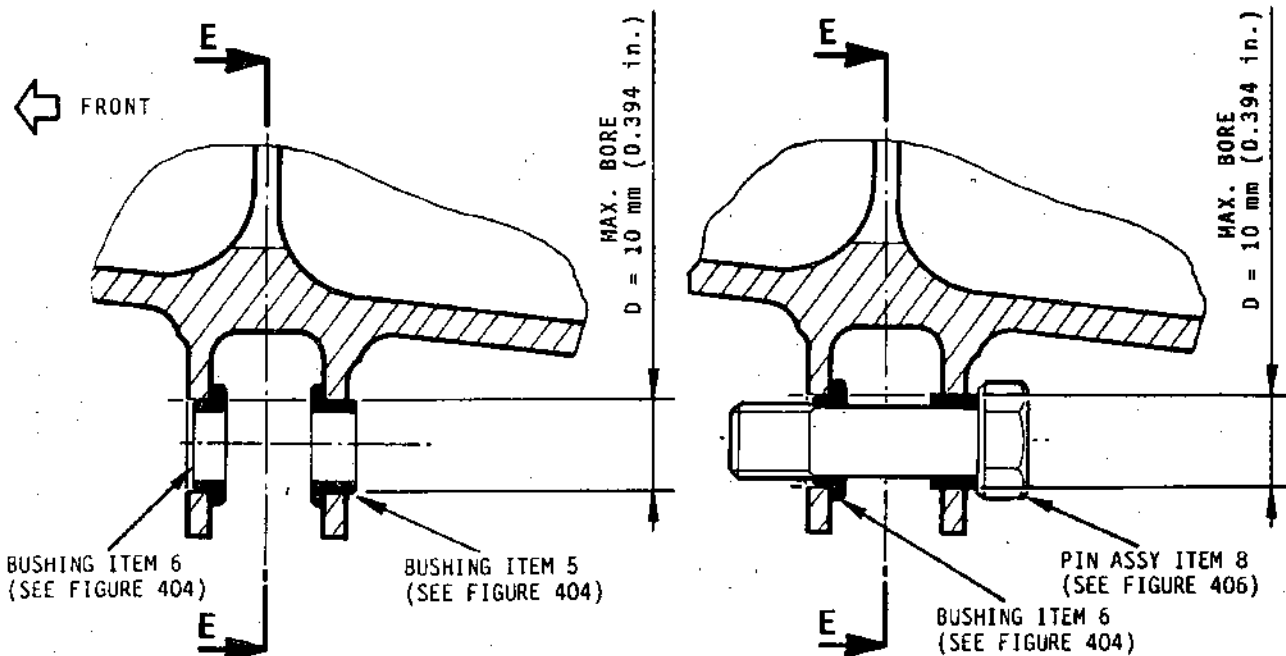
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SECTION EE



SECTION JJ



Reconditioning the Bucket Pneumatic
Drive Actuator Mounting Points
Figure 401 (Sheet 5 of 6)

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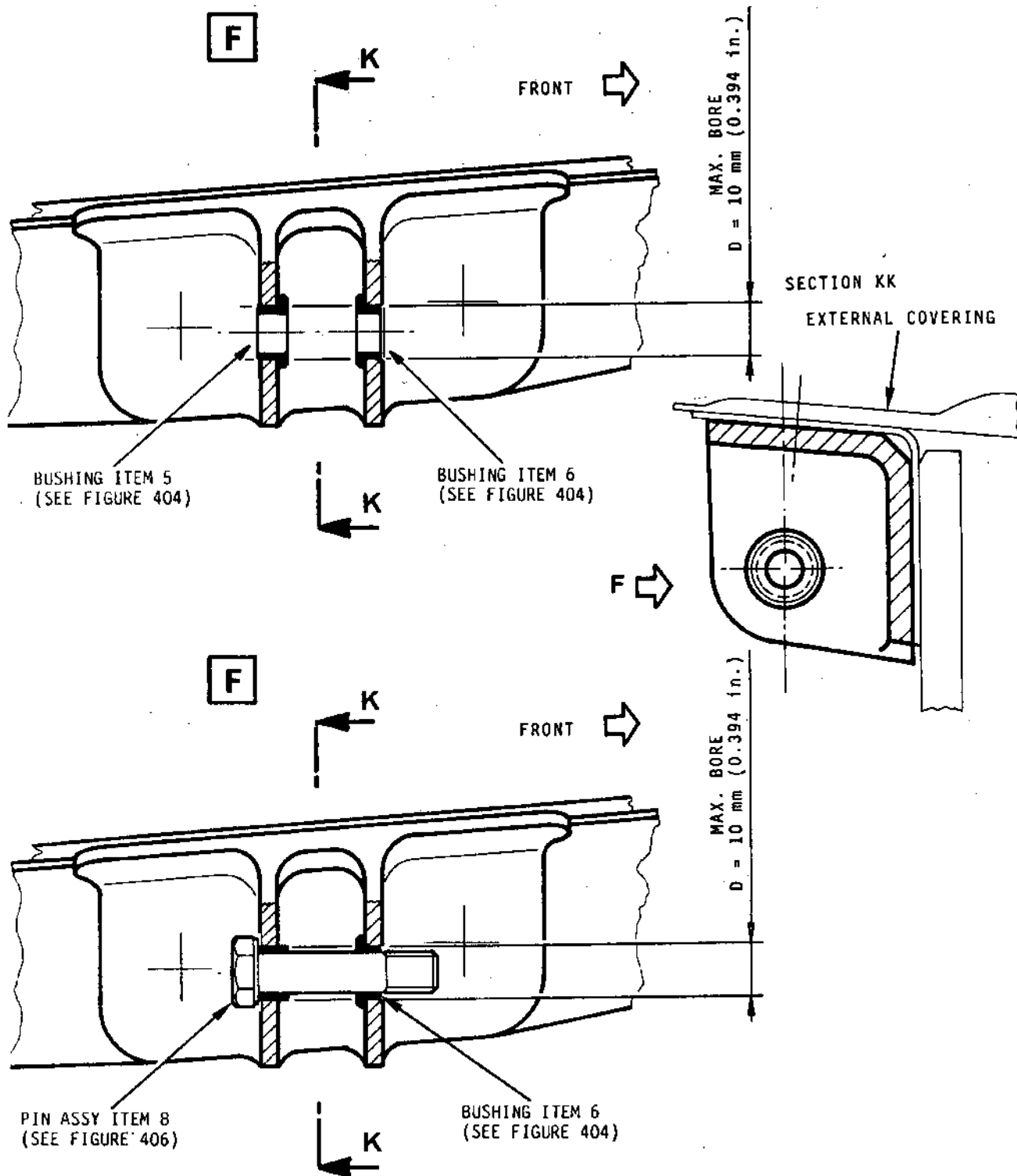
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OVERHAUL



Reconditioning the Bucket Pneumatic
Drive Actuator Mounting Points
Figure 401 (Sheet 6 of 6)

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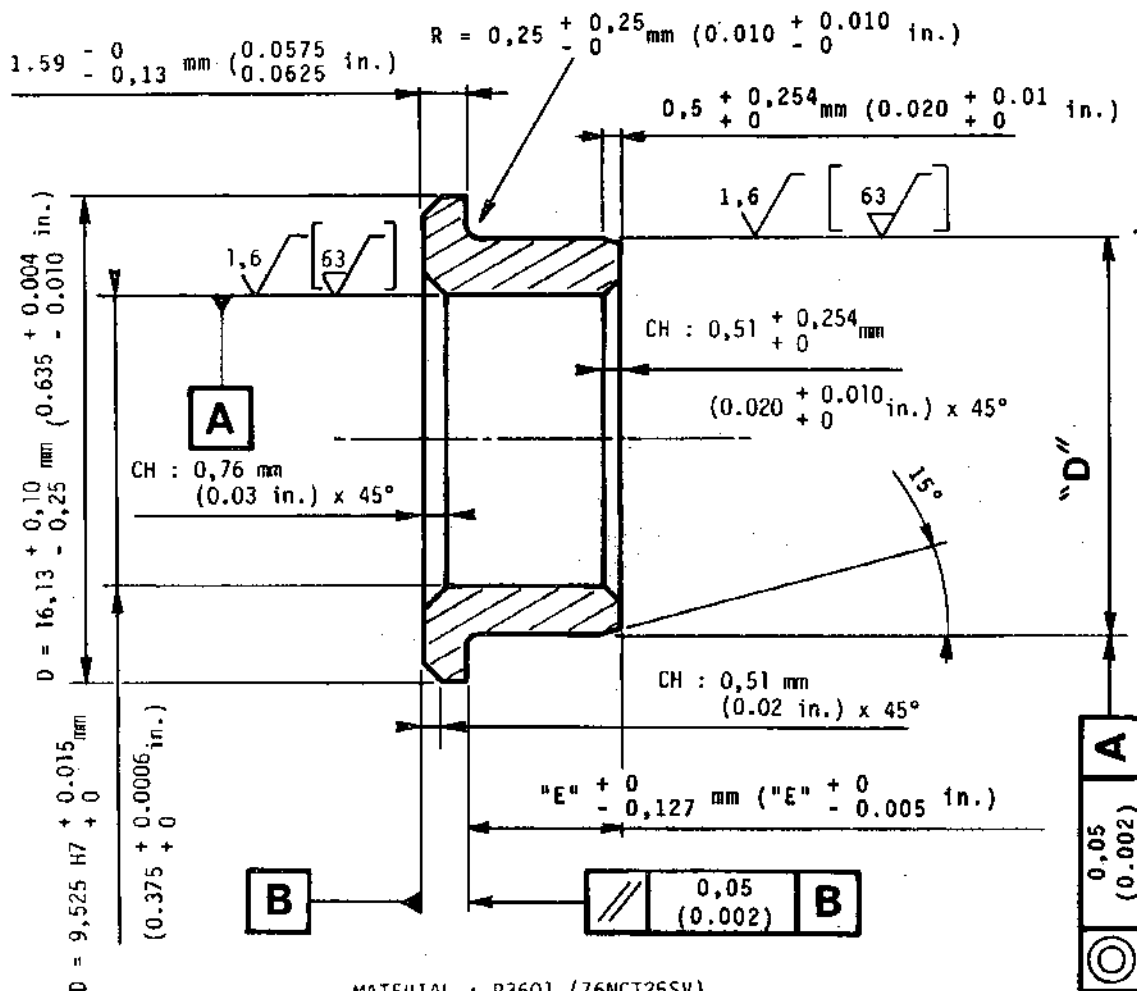
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- MATERIAL : P3601 (Z6NCT25SV)

- REWORK DIA. "D" TO OBTAIN AN ASSEMBLY FIT OF 0 TO 0.02 mm (0.00079 in.) BETWEEN BUSHING AND YOKE

- BREAK EDGES TO $R = 0.13-0.38$ mm ($0.005-0.015$ in.)

BUSHING	DIMENSION "E"		DIA. "D"	
	mm	(in.)	mm	(in.)
ITEM 1	5.08	(0.200)		
ITEM 2	4.45	(0.175)	13.2 ± 0.1	(0.524)
ITEM 3	5.969	(0.235)	± 0	(0.520)

Machining the Bushings before their Installation
Figure 402

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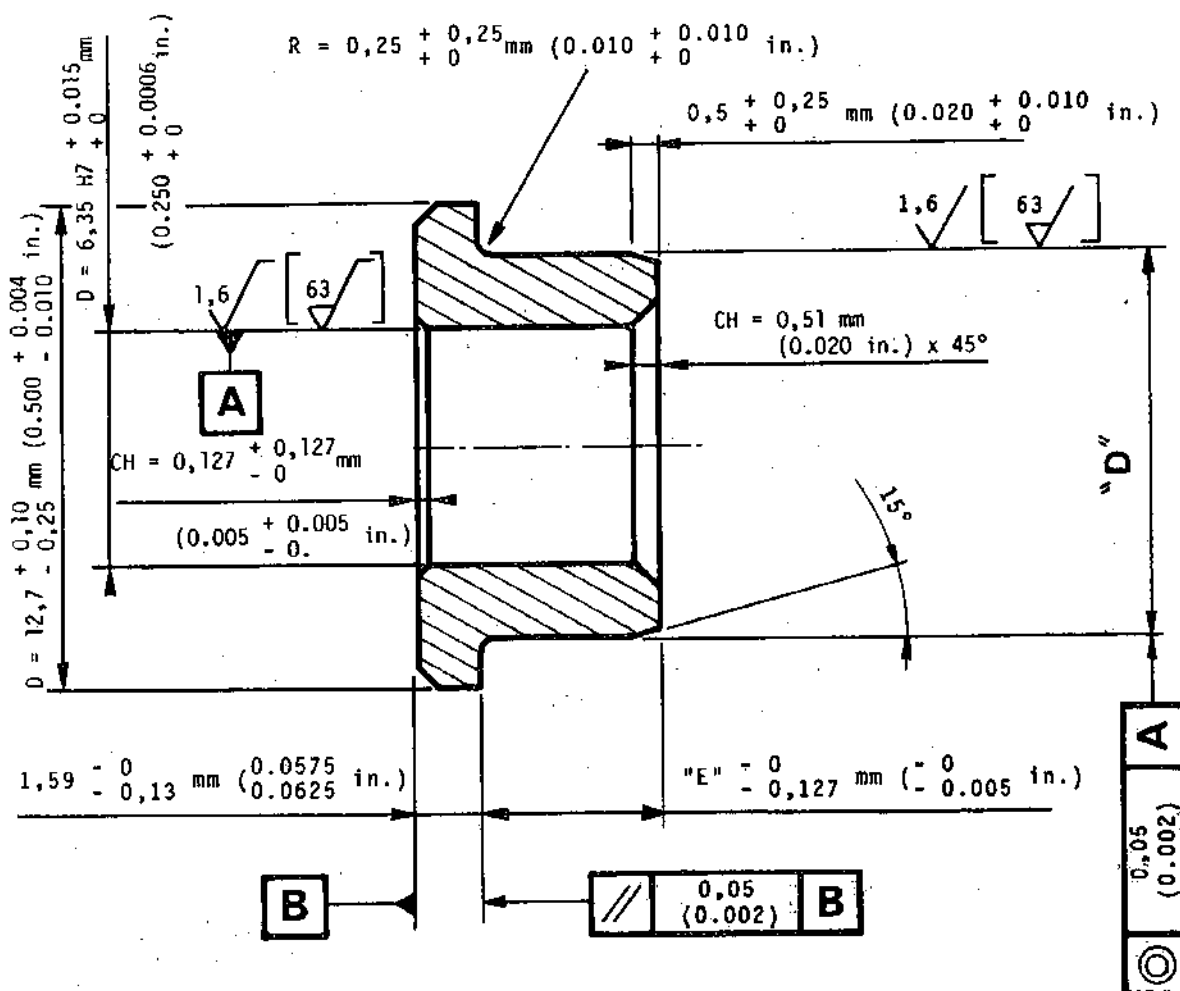
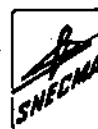
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- MATERIAL : P3601 (Z6NCT25SV)
- BREAK EDGES TO $R = 0,13-0,38 \text{ mm} \begin{pmatrix} 0,005-0,015 \text{ in.} \end{pmatrix}$
- REWORK DIAMETER D TO OBTAIN AN ASSEMBLY FIT OF 0 TO 0,02 mm (0 TO 0,00079 in.) BETWEEN BUSHING AND YOKE

BUSHING	DIMENSION "E" mm (in.)	DIA "D" mm (in.)
ITEM 5	4,699 (0,185)	$10 + 0,1 \begin{pmatrix} 0,398 \end{pmatrix}$
ITEM 6	2,794 (0,110)	$10 + 0 \begin{pmatrix} 0,394 \end{pmatrix}$

Machining the Bushings before their Installation
Figure 404

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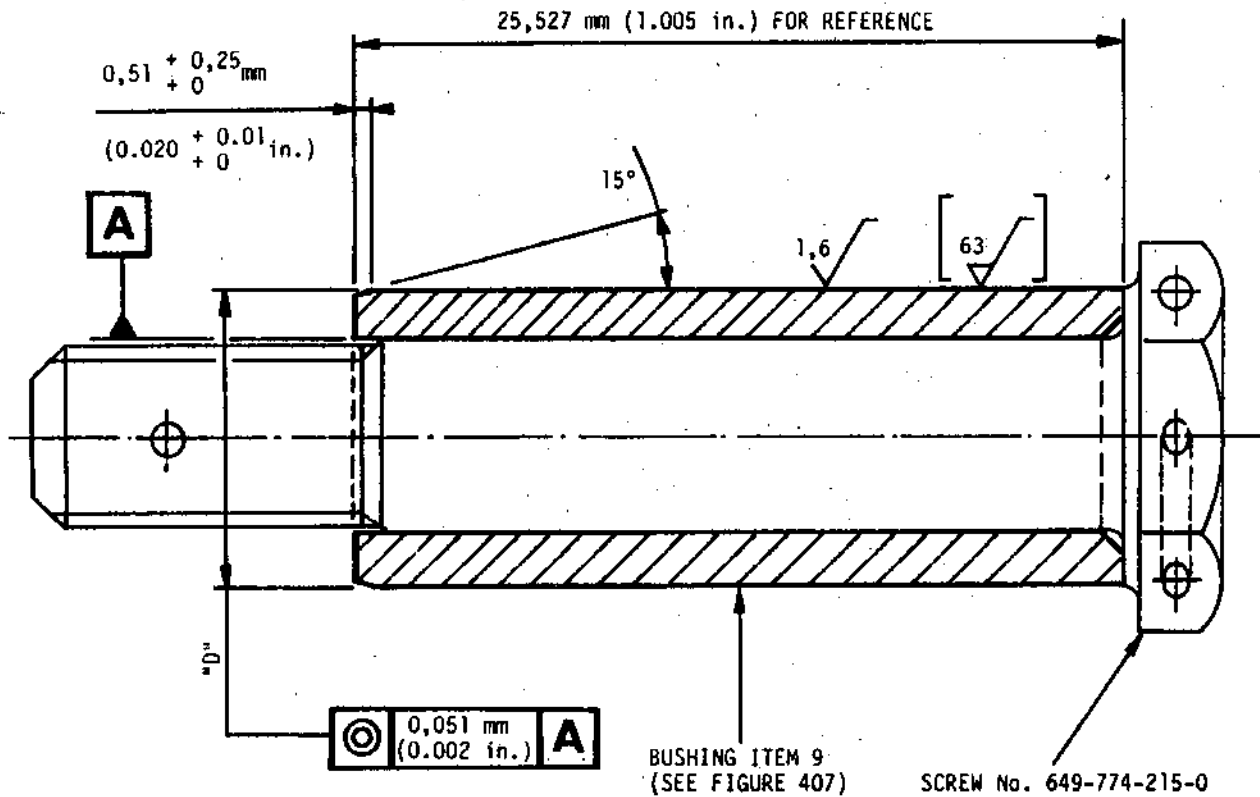


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PIN ASSY ITEM 7



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- REWORK DIAMETER D TO OBTAIN AN ASSEMBLY FIT OF 0 TO 0,02 mm (0 TO 0,00079 in.) BETWEEN PIN ASSY AND YOKE
- DIA D BEFORE REWORK : $10 + 0,1 / + 0$ mm (3,398 in.) (0,394 in.)
- SHRINK THE SCREW IN LIQUID NITROGEN PRIOR TO BUSHING INSTALLATION
- INSTALL THE BUSHING BY ENGAGING THE INNER CHAMFER FIRST

Machining the Pin before Installation
Figure 405

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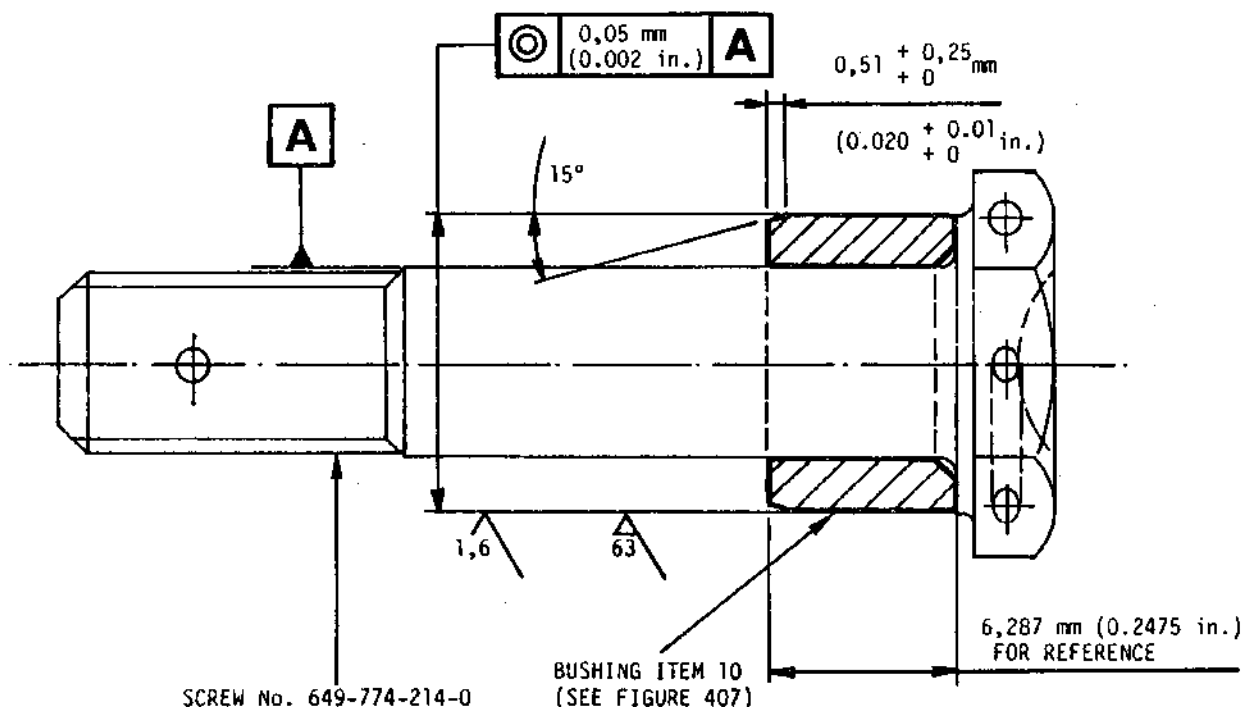
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- SHRINK THE SCREW IN LIQUID NITROGEN PRIOR TO BUSHING INSTALLATION
- INSTALL THE BUSHING BY ENGAGING THE INNER CHAMFER FIRST
- REWORK DIAMETER D TO OBTAIN AN ASSEMBLY FIT OF 0 TO 0,02 mm (0 TO 0.00079 in.) BETWEEN PIN ASSY AND YOKE
- DIA D BEFORE REWORK : $10 + 0,1$ mm (3.398 in.)
+ 0 (0.394 in.)

Machining and Assembly of Pin Assy before Installation

Figure 406

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REP 29-190-10

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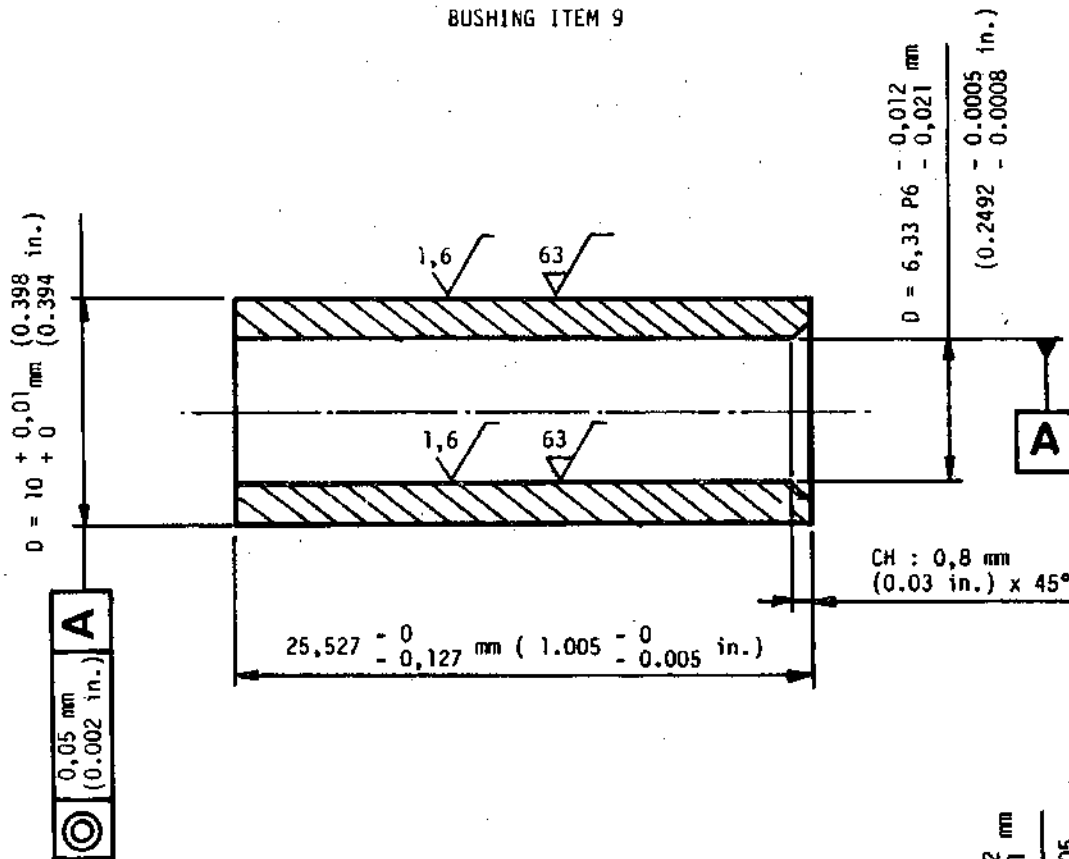


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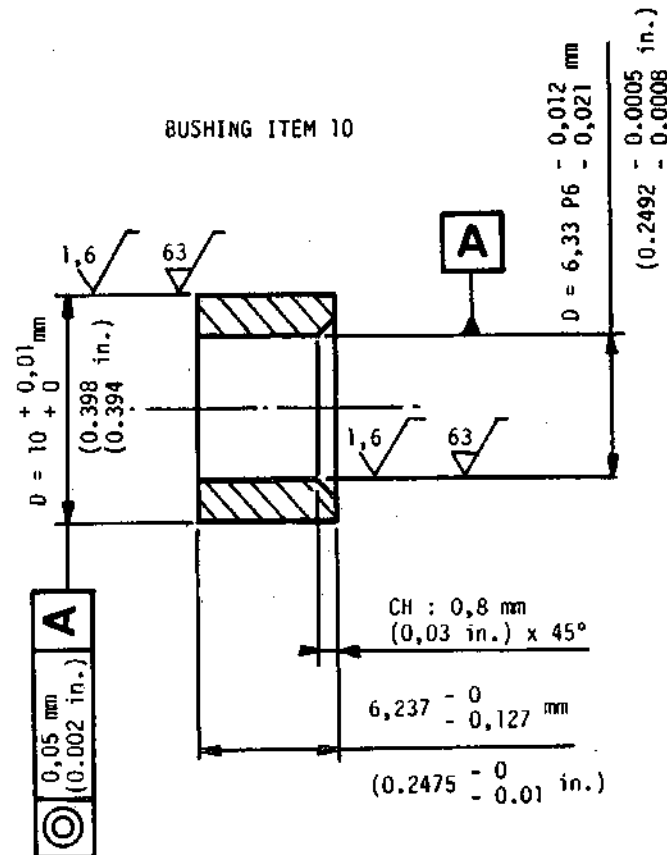
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BUSHING ITEM 9



BUSHING ITEM 10



- MATERIAL : P3601 Z6NCT25SV
- BREAK EDGES TO R = 0,13-0,38 mm (0,005-0,015 in.)
- MACHINE DIA D WITH BUSHING INSTALLED ON PIN (SEE FIGURES 405 AND 406)

Machining the Bushings before Installation on Pin
Figure 407

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REPAIR

TWIN SECONDARY NOZZLE (29-190/191)

11. Repair of cracks on inner and outer skin panels

PARTS REQUIRED FOR REPAIR

Weld filler wire P 3008 or P 3030

Silicone elastomer CAF (P 474)

A. Repair of cracks max. 25 mm (1 in.) in length, redeveloping in mid-sheet.

(1) Restrictions on repairs

The sound area surrounding the side of repair must be 100 mm (3.9 in.)

The crack must not lie in a delaminated area.

(2) Repair instructions

(a) Monitor the condition of the crack surround, ascertaining by a sound test made with a metal object, that there is no delamination. If there is, this repair scheme is unsuitable for use.

(b) Accurately demarcate the crack on careful scrutinizing with a X 20 twin-lens magnifier, then drill a 1 mm (0.039 in.) dia. hole at its either end.

CAUTION : DRILL THE UPPER FACE SHEET OF THE PANEL ONLY.

(c) Weld-fill the crack by the argon arc process adhering to the instructions in Chapter "PRINCIPLE OF REPAIRING COMPONENTS MADE FROM WELDED HONEYCOMB STRUCTURE" Section 70-30-10, and in Chapter "WELDING", Section 70-35-10.

Filler metal : P 3008 or P 3030

Weld Class B1

NOTE : It is essential in welding to apply copper cooling (heat sink) blocks as close to the weld as possible.

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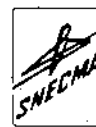
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- (d) Check the Class B1 weld as instructed in Chapter "WELDING", Section 70-35-80, and in the following :

Perform a water-washable dye penetrant test by Method M501B as described in Chapter 70-20-10.

CAUTION : THE PENETRANT IS TO BE CLEARED OUT
USING A CLOTH SOAKED WITH ISOPROPYL
ALCOHOL (P442).

- (e) Ascertain that the segment under repair is free from delamination by a sound test made with a metal object.

B. Repair of cracks developing in the original weld beads.

(1) Restrictions on repairs

The crack must not lie in a delaminated area.
No limitation is set on length.

(2) Repair instructions

The same repair instructions as those under A. apply to cracks of this type.

C. Repair of cracks proceeding from a rivet hole (see figure 402).

(1) Restrictions on repairs

The sound area around the site of repair must be 100 mm (3.9 in.).
The crack must not lie in a delaminated area.
The length of the crack must not exceed 25 mm (1 in.).

(2) Repair instructions

- (a) Prior to repair, ascertain, by a sound test made with a metal object, that the area surrounding the crack is free from delamination.
- (b) Remove the rivet as instructed in Chapter "RIVETING", 70-50-60.
- (c) The instructions for weld-filling the crack are the same as those under A.

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- (d) For outer panels only :

Seal the hole edges with elastomer CAF4 by Method M701 described in Chapter "APPLICATION OF RESINS AND ELASTOMERS", Section 70-31-20.

NOTE : When polymerizing the elastomer insert a tetrafluorethylene-coated rivet so as to hold it in place.

- (e) Apply the rivet as instructed in Chapter "RIVETING", Section 70-50-XX.
- (f) Check the rivet as directed in Chapter "RIVETING", Section 70-50-8X.



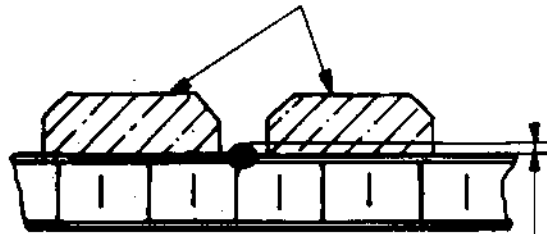
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SECTION AA

COPPER COOLING BLOCK

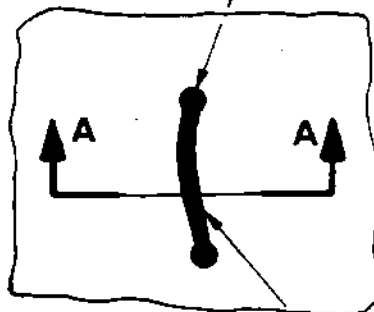


OUT-OF-FLUSHNESS

MAX. 0,5 mm (0.02 in.) OVER 75% OF THE
TOTAL LENGTH

MAX. 1 mm (0.04 in.) ADMISSIBLE LOCALLY

HOLE D = 1 mm (0.039 in.)



WELD-FILLING

Repair of Cracks by Weld-filling
Figure 401

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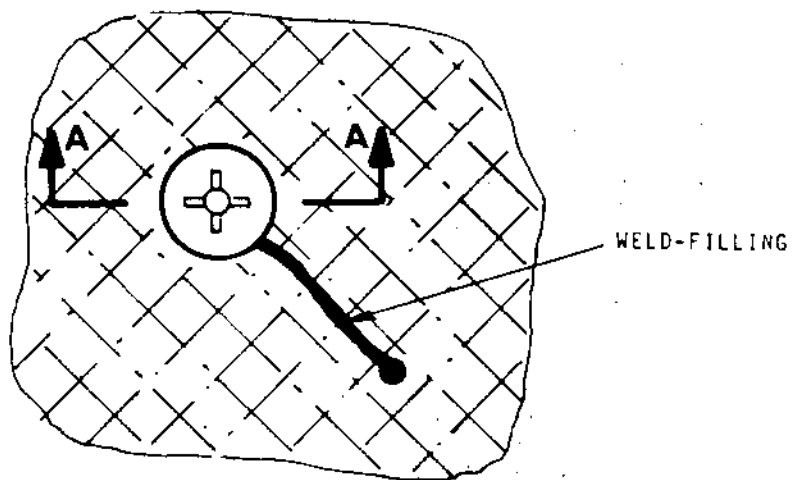
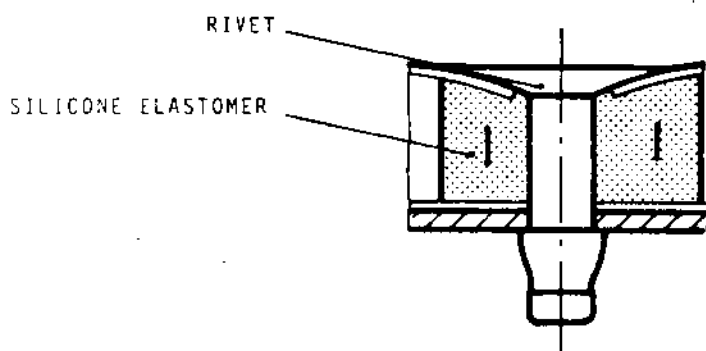


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SECTION AA



Repair of Cracks Originating from a Rivet Hole
by Weld-filling
Figure 402

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REPAIRTWIN SECONDARY NOZZLE (29-190)12. Repair of Delaminations Affecting the Inner and Outer Skin Panels.

PARTS REQUIRED FOR REPAIR

Sheet metal NC 22 DNb (P 3322) ; thickness : 1,2 mm
(0.047 in.)

Epoxy resin Araldite AV 138 (P 472)
 Hardener HV 998 (P 473)
 Asbestos fibre (P 476)

Spacer 002-003-992-1 to 3

Washer AN 960-C8 (649-786-152-0)
Screw HL 144-5-12 (649-781-706-0)
Nut HLN 1G-5 (649-785-047-0)

Rivet CR 2840-5-6 (649-772-099-0)
Rivet CR 2839-6-6 (649-772-092-0)
or Rivet CR 2839-6-7 (649-772-169-0)

A. Introduction

Two cases are considered in this repair scheme :

- Repair of a delamination when the panel is accessible from both sides.
- Repair of a delamination when the panel is accessible from one side only.

B. Repair of delaminations when panel is accessible from both sides.**(1) Restrictions on repair**

- the delamination must not be associated with a crack,

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- the sound area all around the repair must span 150 mm (5.9 in.),
- maximum number of such repairs per mesh : 1.

(2) Repair instructions

- (a) Prior to carry out the repair, check the condition of the zone to be repaired.

- Check for cracks using a X 20 power binocular eye-piece.

Do not apply this kind of repair if cracks are present.

- (b) Using very fine grade abrasive paper, lightly sand the panel until the cell pattern shows up in the area under repair.

- (c) Center punch and drill attachment holes to $4,17 + 0,1$ mm (0.164 in.) dia. Deburr holes.
0 (0.168 in.)

NOTE : The pitch between fixings is 25 mm approx. (1.0 in.) ; each hole to be centered in one cell.

- (d) On the panel, counterbore the passage holes provided for the spacers in accordance with figure 401.

NOTE : Do not rebores through the panel outer skin (face sheet).

- (e) Install the spacers into the holes using Loctite 307 (P 502) bonding agent to hold them in place upon the installation of the HI-LOCK screws (See Table in figure 401).

- (f) Install the fixings as indicated in figure 401 and instructed in chapter 70-50-40 of the Standard Practices manual.

- (g) Inspects the fixings in accordance with chapter 70-50-84.



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C. Repair of delaminations when panel is accessible from one side only.

(1) Restrictions on repairs

- (a) Repair applicable only in the non-restricted zones.
- (b) The sound area all around the repair to span 200 mm (7.9 in.).
- (c) Maximum number of such repairs per mesh : 1.

(2) Repair instructions

- (a) Delineate the damaged zone to be removed taking account of the dimensions of doubler (reinforcing plate) to be blind fitted (See figure 402).
- (b) Cut out and remove the damaged zone using a drilling template featuring tangent holes as indicated in chapter 70-30-10 of the Standard Practices manual.
- (c) Seal the exposed edges of panel using Araldite AV 138 as instructed by method M 700 of chapter 70-31-20, "EMPLOYMENT OF RESINS AND ELASTOMERS".
- (d) Sand lightly the panel with a very fine abrasive paper until the cell pattern shows up.
- (e) Position a sheet of tracing paper on the panel ; transfer the cell pattern on the tracing paper and mark the location of rivets and the external contour of doublers.
- (f) Cut out the doublers (reinforcing plates) and shape them to match the contour of the zone under repair ; machine the edges of doublers as indicated in figure 402. Sheet metal material NC 22 DNB (P 3322), 1,2 mm (0.047 in.) thick.
- (g) Stick the tracing paper on the external doubler, on the side of the latter to be in contact with the panel. Center punch the location of CHERRY LOCK fixings CR 2839-6.
- (h) Drill through the external doublers the holes drill-marked above to 3 mm (0.118 in.) dia. and deburr holes.

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- (i) In a single operation, drill through the doublers the rivet holes for the CHERRY-LOCK rivets CR 2839-6 as instructed in chapter "RIVETING", section 70-50-50.

NOTE : Bring into contact those two faces of the doublers which are to bear on the panel.

- (j) Stick the tracing paper on the side of the internal doubler to be in contact with the panel. Center punch the locations of CHERRY LOCK fixings CR 2840-5-6.
- (k) Carry out the drilling of the internal doubler to a diameter of 3 mm (0.118 in.) (Pre-drilling for the CHERRY LOCK CR 2840-5-6 holes).
- (l) Position the external doubler on the twin secondary nozzle panel and counterdrill the rivet holes for rivets CR 2839-6, see chapter "RIVETING", section 70-50-50.
- (m) Position the internal doubler on the twin secondary nozzle panel and hold it in place using pins inserted through CR 2839-6 rivet holes.
- (n) Counterdrill, through both the doubler and the panel, the CR 2840-5-6 rivets holes as indicated in chapter "RIVETING", section 70-50-50.
- (o) Carefully deburr the edges of holes drilled in the panel and the doubler then, produce the countersinks for the CHERRY LOCK fixings CR 2840-5-6. Refer to chapter "RIVETING", section 70-50-50.
- (p) Rivet the doublers onto the panel as instructed in chapter "RIVETING", section 70-50-50 and per the following instructions :
- Position the internal doubler on the panel and rivet it using rivets CR 2840-5-6.
 - Pin the external doubler onto the panel and joint the whole assembly using rivets CR 2839-6-6 or 6-7.
- (q) Inspect the riveting as instructed in chapter "RIVETING", section 70-50-85.

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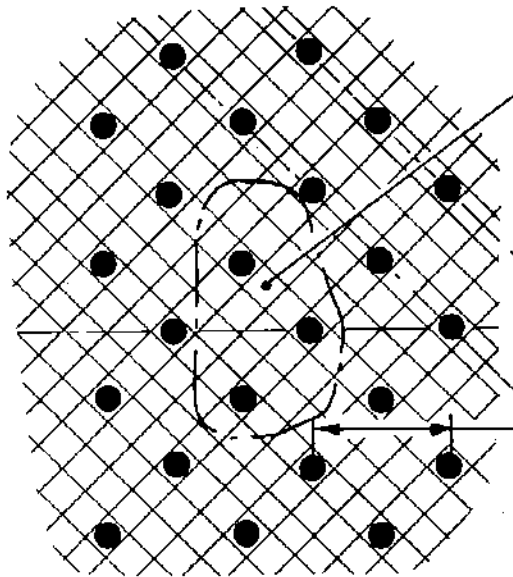
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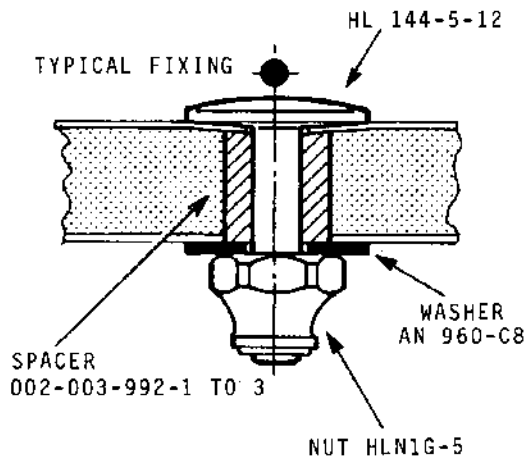


DELAMINATION AREA

2 ROWS OF FIXINGS
SURROUNDING THE DEFECT

PITCH BETWEEN ATTACHMENT POINTS (FIXINGS) :
25 mm (1.0 in.) APPROX.

NOTE : EACH HOLE TO BE CENTERED IN
ONE CELL.



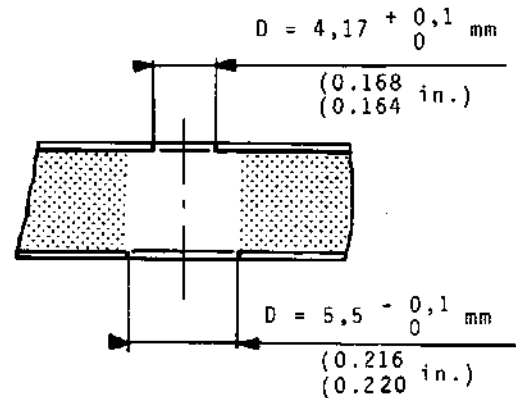
TYPICAL FIXING

HL 144-5-12

SPACER
002-003-992-1 TO 3

WASHER
AN 960-C8

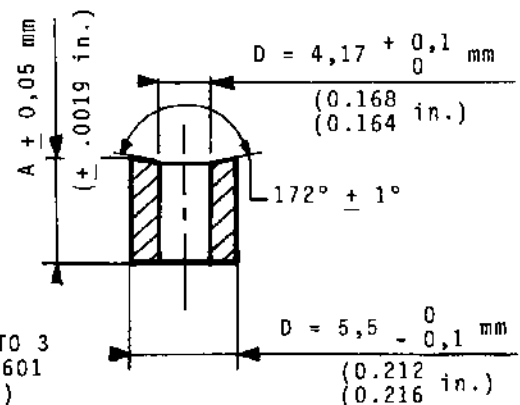
NUT HLN1G-5



DRILLING IN PANEL

SPACER No.	THICKNESS A	
	mm	in.
002-003-992-1	6,45	0.254
002-003-992-2	6,60	0.260
002-003-992-3	6,75	0.266

SPACER
002-003-992-1 TO 3
MATERIAL : P 3601
(Z6 NCT25 sv)



Repairing the Delaminations - Panel Accessible from Both Sides
Figure 401

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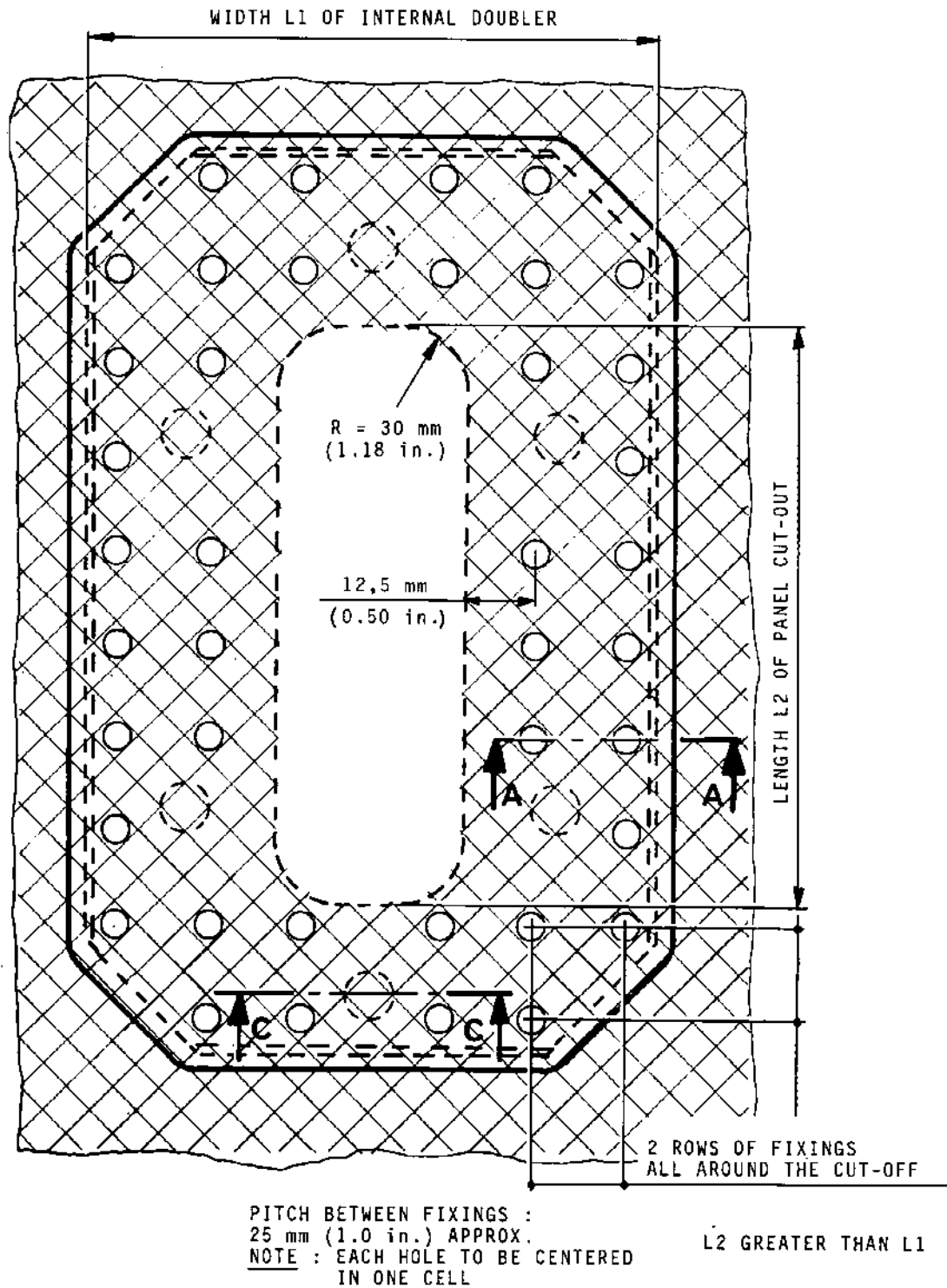
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Repairing the Delaminations - Panel Accessible from one Side only
Figure 402 (Sheet 1 of 2)

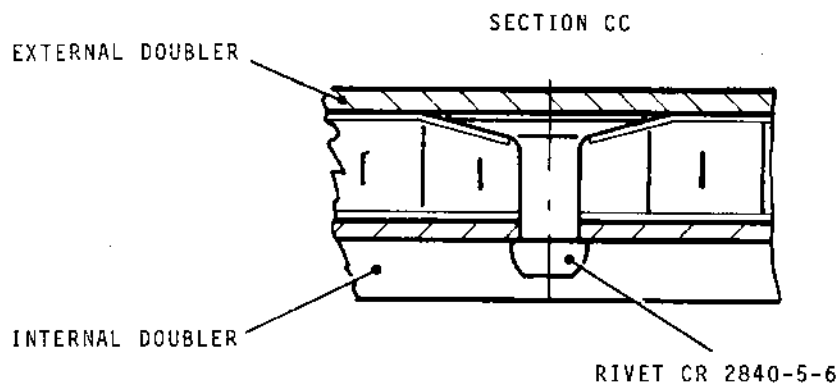
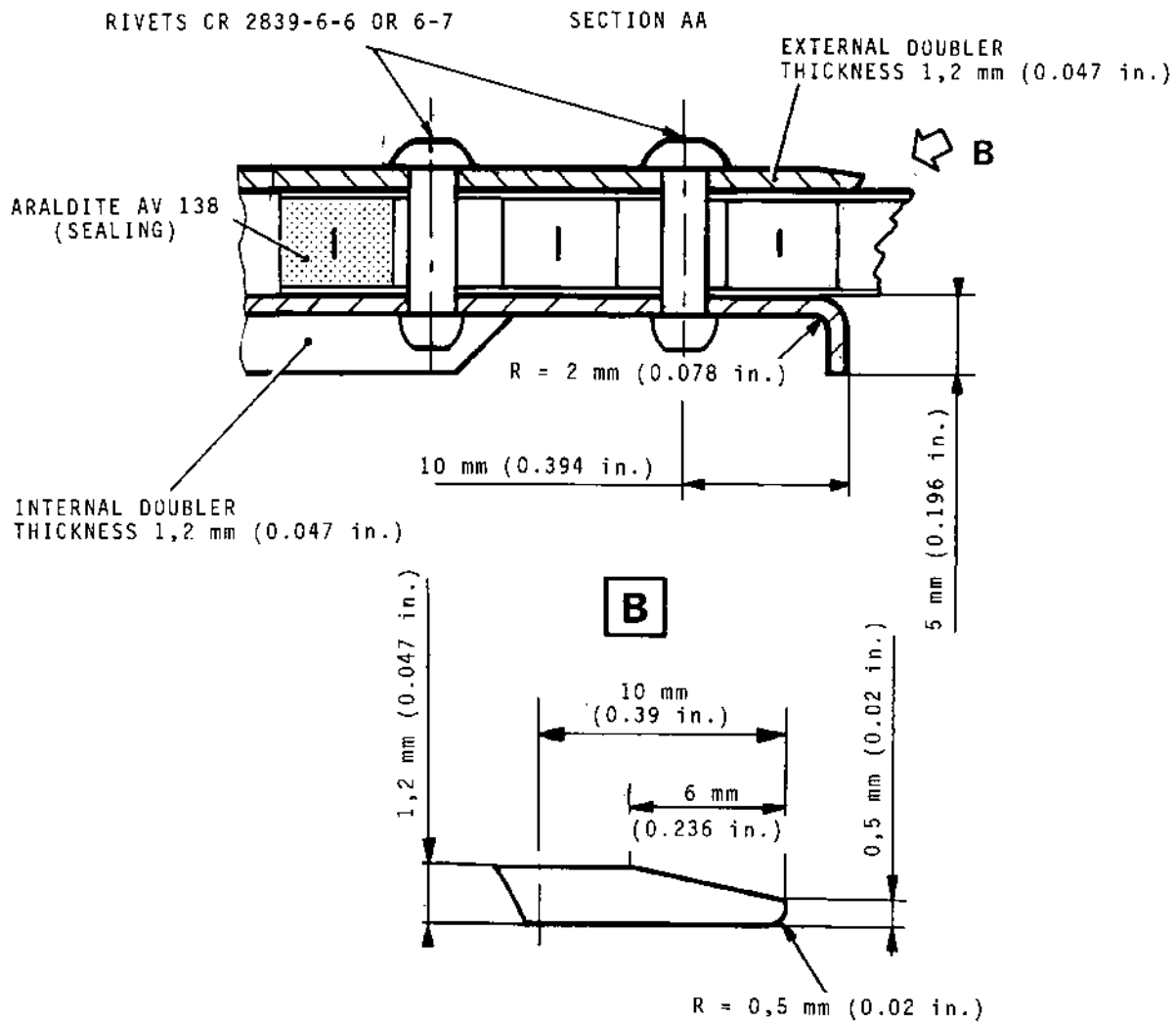


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Repairing the Delaminations - Panel Accessible from one Side only
Figure 402 (Sheet 2 of 2)

**OLYMPUS 593**MK.610-14-28
OVERHAULREPAIRTWIN SECONDARY NOZZLE (29-190/191)13. Repair of the Zone Surrounding the Access Doors to the Bucket Ballscrew Gearbox Attachment Bolts.

PARTS REQUIRED FOR REPAIR

External doubler Sheet metal Z10 CNT 18 (P 3301) ;
thickness 1 mm (0.04 in.)

Internal doubler Sheet metal CNT 18 (P 3301) ;
thickness 0,6 mm (0.023 in.)

Blind rivet CR 2838-4-6

A. Restrictions on repairs

Cracks or delaminations lying in this zone are acceptable once repaired in accordance with REP 29-190-11 or REP 29-190-12.

B. Repair instructions

- (1) Lightly sand the panel using very fine grain abrasive paper so that the cell pattern shows up in the area under repair.
- (2) On a sheet of tracing paper, transfer the cell pattern and mark the locations of rivets and outer contour of doublers (reinforcing plates).
- (3) Shape the doublers to match the contour of the panel and cut out the doublers.
- (4) Stick the tracing paper on the face of the external doubler to come in contact with the panel.
Center punch the rivet locations.
- (5) In a single operation, drill the rivet holes through the doublers, as indicated in chapter "RIVETING", section 70-50-50.
- (6) Drill the rivet holes through the stressskin panel as indicated in chapter "RIVETING", section 70-50-50 and as instructed hereafter :

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- Position the external doubler on the panel.
 - Counterdrill two 3 mm (0.118 in.) dia. holes.
 - By means of these two holes, pin the doubler on the panel.
 - Counterdrill the other holes in the panel to 3 mm (0.118 in.) dia.
 - Using the internal doubler, check for the correct hole locations.
 - Counterbore all the holes in the panel to the final diameter and deburr holes carefully.
- (7) Carry out the countersinks on the external doubler.
- (8) Rivet the internal and external doublers to the panel as instructed in chapter "RIVETING", section 70-50-50.
- (9) Inspect the riveting as per chapter "RIVETING", section 70-50-85.



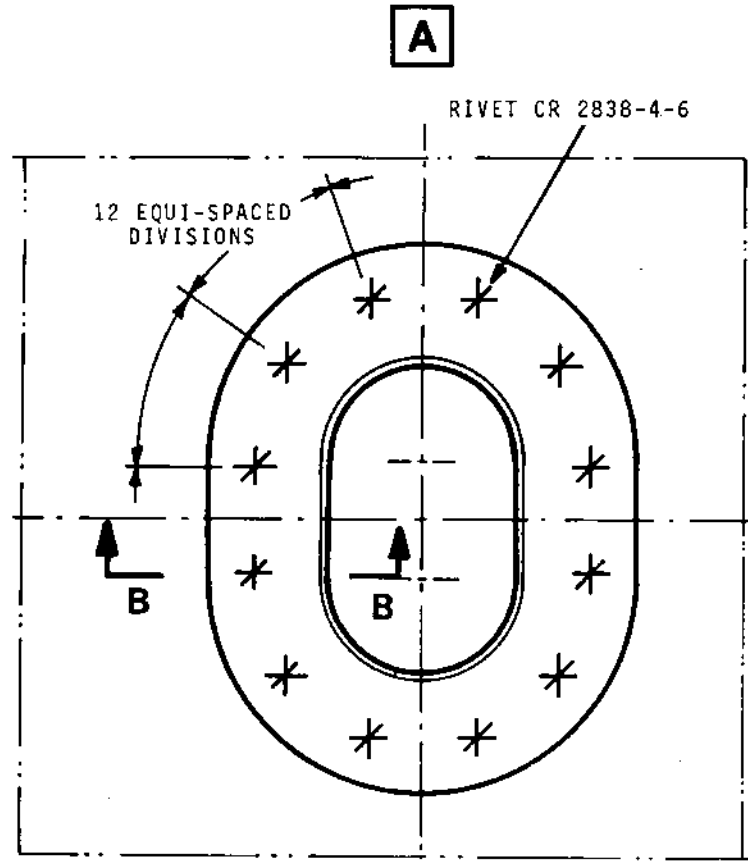
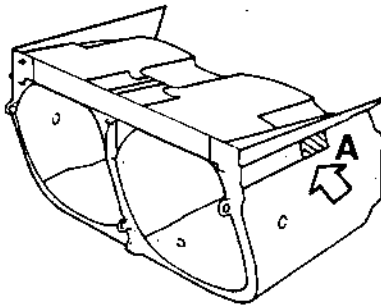
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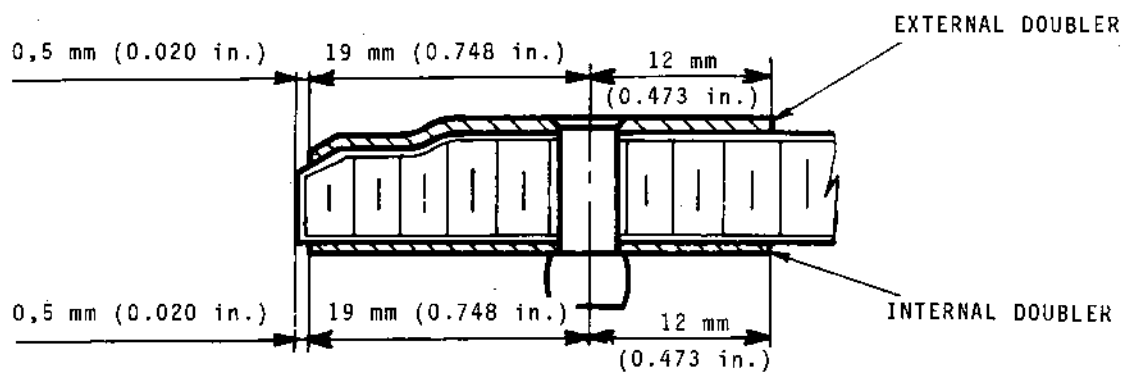
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SECTION BB



Repairing the Zone Surrounding the Access Doors to the Bucket
Ballscrew Gearbox Attachment Bolts

Figure 401

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REPAIR

TWIN SECONDARY NOZZLE (29-190)

14. Repair of the drain-tube

PARTS REQUIRED FOR REPAIR

Elbow	525-003-905-0
Clamp	300-860-500-0
Clamp	300-860-300-0
End fitting	301-045-800-0
Gutter	301-113-700-0
Weld filler wire P 3009	
Rivet CR 2838-4-2 (649-772-197-0)	
Rivet CR 2838-4-4 (649-772-163-0)	
Rivet CR 2838-5-6 (649-772-079-0)	
Rivet CR 2839-6-2 (649-772-088-0)	
Rivet CR 2839-6-3 (649-772-089-0)	
Bolt HL 869-6-10 (649-781-040-0)	
Nut HLN 1G-6 (649-785-048-0)	
Washer SPC 94075-6W (649-786-231-0)	

A. Dismantling the drain-tube

- (1) Remove the angle-piece fasteners as shown in figure 401, Sheet 1 of 4, and instructed in Standard Practices, Chapters :
70-50-10 for rivets marked "A" and "D"
70-50-50 for rivets marked "B" and "C"
- (2) Take the angle-piece off
- (3) Dismount the drain-tube by removing its fasteners as instructed in Standard Practices, Chapters :
70-50-50 for CHERRY-LOCK rivets
70-50-40 for HI-LOCK bolt
in order to detach the support (see figure 401, Section A-A).

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B. Repairing the drain-tube elbow

- (1) Cut off the drain-tube elbow, put the new elbow in place and arc-weld with weld filler wire P3009 as shown in figure 401, Sheet 3 of 4, and instructed in Standard Practices, Chapter 70-35-10.

C. Repairing the drain-tube end fitting

- (1) If the tube end fitting is damaged, cut it off and arc-weld on a new end-piece with weld filler wire P3009 as shown in figure 401, sheet 3 of 4, and instructed in Standard Practices, Chapter 70-35-10, and in the following :
 - (a) Locate and weld the gutter on the end-piece.
 - (b) Locate and weld the end-piece on the drain-tube.

D. Inspection of welds

- (1) Carry out a soundness inspection of the Class B2 welds as instructed in Standard Practices, Chapter 70-35-80, and in the following :
Perform a water-washable dye penetrant test by Method M 501B as described in Chapter 70-20-10.

E. Replacement of the support clamps

- (1) Replace any defective tube support clamp(s) in the way directed in Standard Practices, Chapter 70-50-50, in figure 401, Section B-B, and in the following :
 - (a) Grind out the two CHERRY-LOCK rivets and remove the clamps.
 - (b) Apply a new clamp and secure it on by riveting.
- (2) Check the riveting as instructed in Standard Practices Chapter 70-50-85.

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F. Reinstalling the tube

- (1) Take the flange off the cut-off elbow.
- (2) Place it against that of the drain-tube in such a way as to bring the hole marked ① on sheet 2 of 4 into line with the tube centreline.
- (3) Mark the location of hole ① on the new flange.
- (4) Drill the hole to a dia. of $4,47 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix} \text{ mm}$ $\begin{smallmatrix} 0.176 \\ 0.180 \end{smallmatrix} \text{ in.}$ and deburr.
- (5) Put the drain-tube in position on the structure with the aid of hole ① and the tube support.
- (6) In this position drill-mark the other two hole locations on the drain-tube flange (See figure 401, sheet 2 of 4).
- (7) Remove the tube, drill out the two drill marked holes and deburr.
- (8) Position and secure the drain-tube as instructed in Standard Practices :
 - (a) Chapter 70-50-50 for CHERRY-LOCK rivets
 - (b) Chapter 70-50-40 for the HI-LOCK support fastening bolts (see figure 401, sheet 2 of 4).
- (9) Check the riveting as instructed in Standard Practices :
 - (a) Chapter 70-50-85 for CHERRY-LOCK rivets
 - (b) Chapter 70-50-84 for HI-LOCK bolts.
- (10) Put the angle-piece in position. Rebore the holes market A and D to a dia. of $3,63 \begin{smallmatrix} + 0,08 \\ + 0 \end{smallmatrix} \text{ mm}$ $\begin{smallmatrix} 0.143 \\ 0.146 \end{smallmatrix} \text{ in.}$ See figure 401, sheets 1 and 2.
- (11) Machine the countersinks of these holes to a dia. of $5,72 \pm 0,1 \text{ mm}$ $\begin{smallmatrix} 0.221 \\ 0.229 \end{smallmatrix} \text{ in.}$

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- (12) Remove the angle-piece and thoroughly deburr the different parts.
- (13) Locate and rivet the angle-piece as instructed in Standard Practices, Chapter 70-50-50, and indicated in figure 401, sheets 1 and 2.
- (14) Check the riveting as directed in Standard Practices, Chapter 70-50-85.

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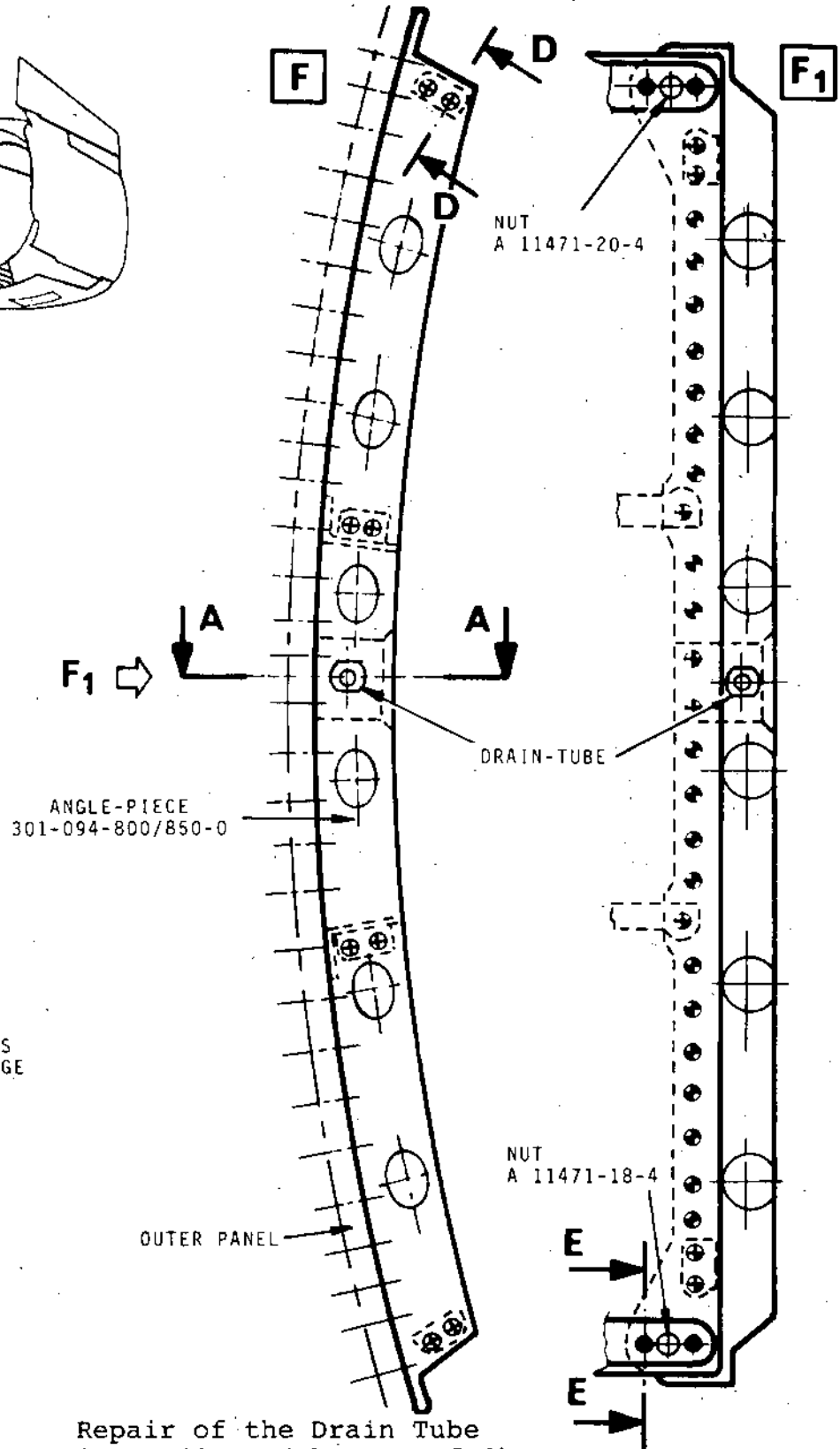
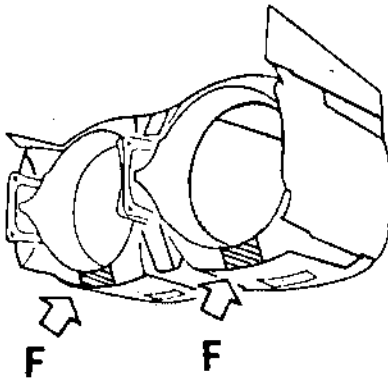
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FOR LIST OF FASTENERS
SEE TABLE ON NEXT PAGE

Repair of the Drain Tube
Figure 401 - (Sheet 1 of 4)

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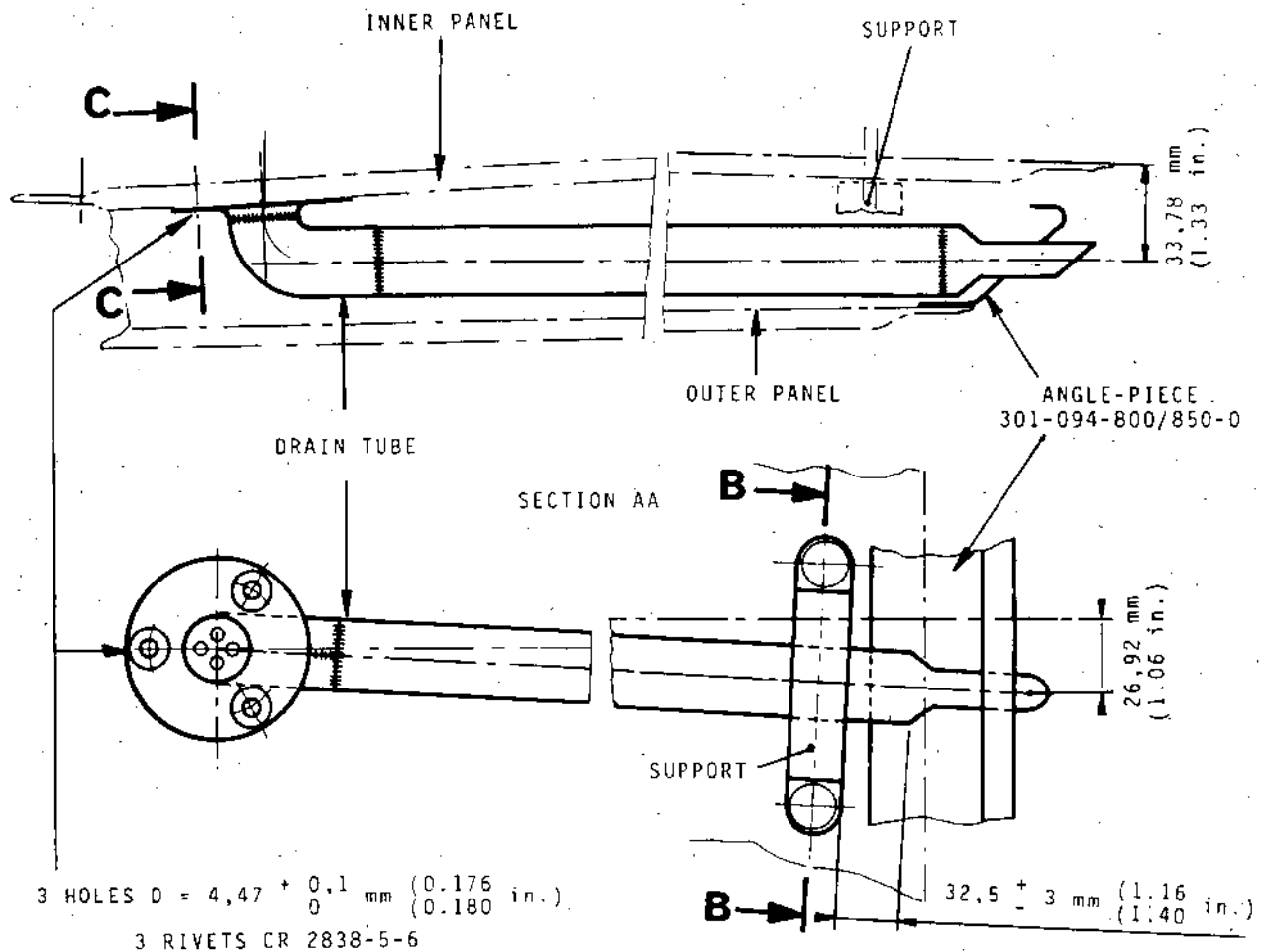
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MARKING TEXT	FIGURE	FASTENER BEFORE REPAIR	FASTENER AFTER REPAIR
"A"	⊕	RIVET NAS 1199-4-4	RIVET CR 2838-4-2
"B"	⊕	RIVET CR 2839-6-3	RIVET CR 2839-6-3
"C"	⊕	RIVET CR 2839-6-2	RIVET CR 2839-6-2
"D"	●	RIVET NAS 1200-4-7	RIVET CR 2838-4-4



Repair of Drain Tube
Figure 401 - (Sheet 2 of 4)

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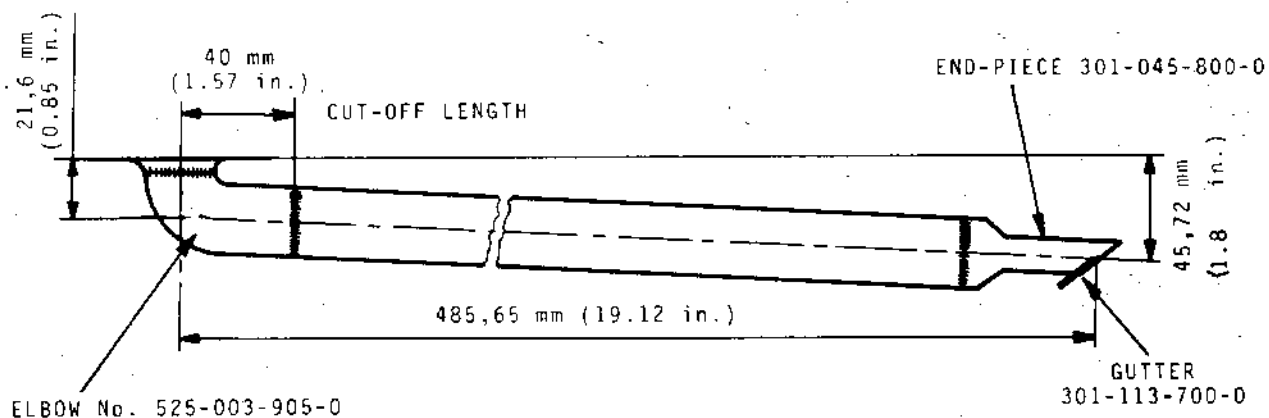
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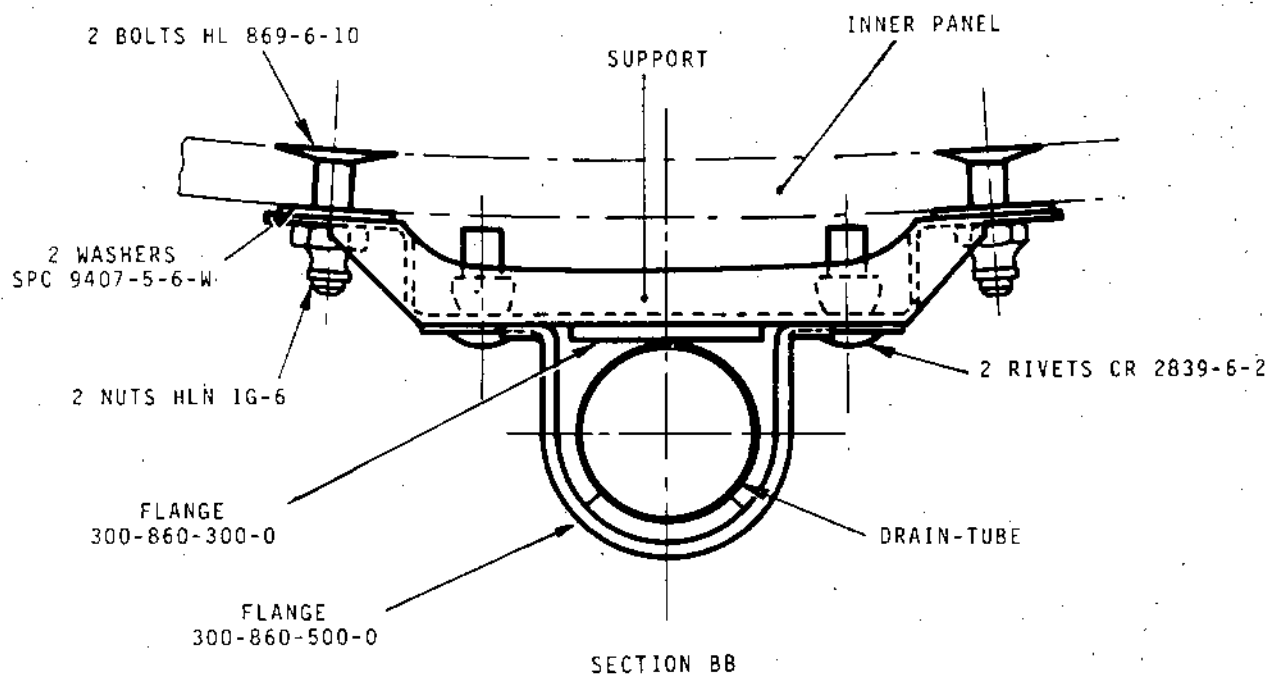
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DETAILED VIEW OF DRAIN-TUBE AFTER REPAIR



Repair of Drain Tube
Figure 401 - (Sheet 3 of 4)

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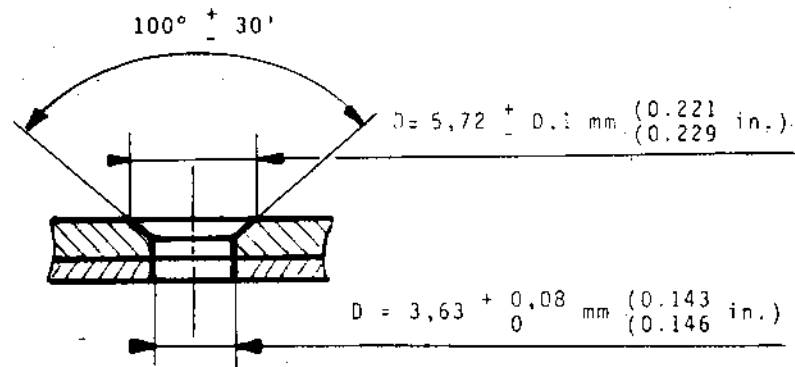
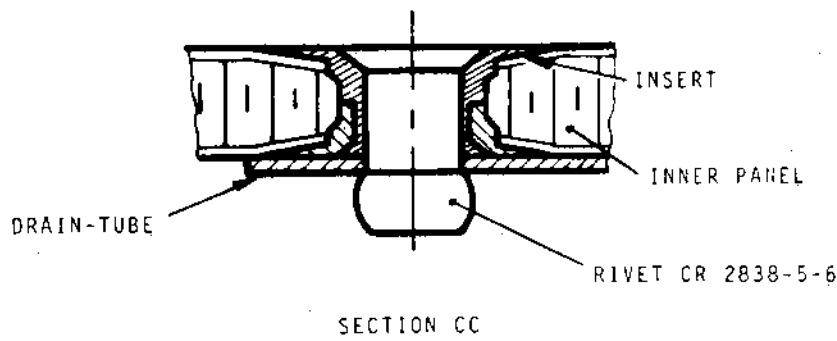
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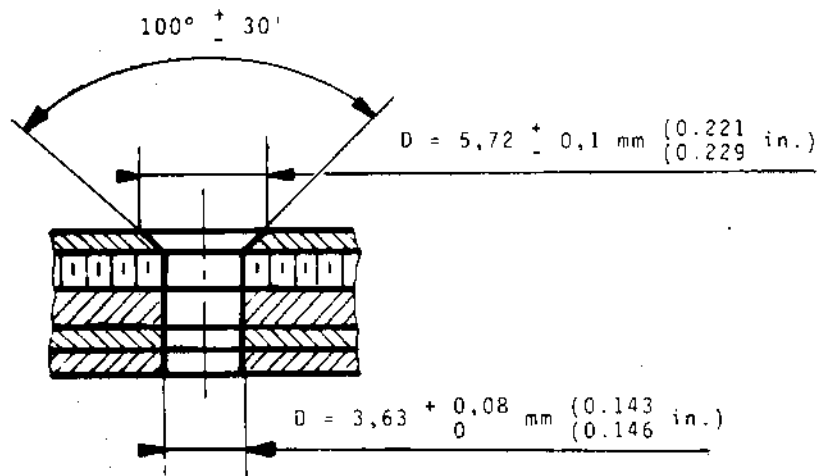
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SECTION DD APPLICABLE TO THE 8 HOLES MARKED ⊕
COUPE DD VALABLE



SECTION EE APPLICABLE TO THE 4 HOLES MARKED ●

Repair of the Drain Tube
Figure 401 - (Sheet 4 of 4)

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REPAIRTWIN SECONDARY NOZZLE (29-190)16. Applying doublers to tops elevon panels

PARTS REQUIRED FOR REPAIR

Doubler plates	: Sheeting P3344 (T60)	
	Thickness : 1 mm (0.039 in.)	
Reinforcement plates	: Sheeting P3344 (T60)	
	Thickness : 1,2 mm (0.047 in.)	
Angle section assy	: 002-004-008-0	
Cover assy	: 002-004-009-0	
Screw, head 100° countersink	: NAS 1102-E3-16	
	(649-781-140-0)	
Blind rivet	: CR 2839-5-3	(649-772-084-0)
Blind rivet	: CR 2839-5-4	(649-772-085-0)
Blind rivet	: CR 2839-5-6	(649-772-086-0)
Blind rivet	: CR 2839-5-8	(649-772-087-0)
Blind rivet	: CR 2839-6-6	(649-772-092-0)
Spacer washer	: 002-004-010-0	
Spacer washer	: 002-004-048-0	

Under this repair scheme, doublers of areas suited to the extent of damage are applied to the upper elevon panels, notably :

- 1 or 2 doublers per elevon ; or
- 1 doubler plate covering the surface area of 3 doublers (see Fig. 402, sheets 1 and 2).

A. Making up doublers

- (1) Cut doubler plates out of P3344 sheeting (T60) of 1 mm (0.039 in.) thickness, in sizes specified in Fig. 402.

NOTE : If required, cut doublers out of doubler plates as indicated in Fig. 402.

- (2) Shape the doublers to the elevon contours and the positions shown in Fig. 401.

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- (3) Round off angles coming into contact with the elevon Stressskin panels as shown in Fig. 402.

B. Making up reinforcement plates

- (1) Cut reinforcement plates out of P3344 sheeting (T60) of 1,2 mm (0.047 in.) thickness, as shown in Fig. 403 and, where applicable, in Fig. 401.
- (2) Round off sharp edges coming into contact with the Stressskin panel as shown in Fig. 403, sheet 1.

C. Making access openings

- (1) Make openings in the panel as directed in Chapter "Principle of Repair", Section 70-30-10, 4 : "Machining", and as shown in Fig. 401.
- (2) Close up cavities round the borders of the openings, using Araldite resin P472 (AV38), with asbestos fibres P476 added as a filler, in the way described under Method 700 in Chapter Section 70-31-00 "Application of Resins and Elastomers".

D. Removal of fasteners

- (1) Remove existing blind rivets from the locations set out for the doubler fasteners in the way instructed in Chapter "Riveting", Sections 70-50-50 : "Joints Made by the Use of Cherry-Lok Blind Rivets", and 70-50-60 : "Joints Made by the Use of Blind Bolts".

E. Drilling the doublers

- (1) Trace out the existing holes on the doubler(s) as follows :
 - (a) Stick strips of Stabilene tracing-paper on the upper elevon panel.
 - (b) Mark the locations of the retaining holes.
 - (c) Put the doubler(s) in position on the elevon, as shown in Fig 401.

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(d) Stick the Stabilene strips on the doublers, and take them down.

- (2) Make rivet holes of the following diameters in the doublers :
- | | | | | |
|-----------|----|---------|------|-------------------------|
| 5 + 0,1 | mm | (0.197 | in.) | for fasteners marked A, |
| 5 + 0 | | (0.201 | | B, C and D ; |
| 5,7 + 0,1 | mm | (0.224 | in.) | for fasteners marked E. |
| + 0 | | (0.228 | | |
- (3) Rebore the retaining holes in the elevon panel as instructed in Chapter "Riveting", Section 70-50-50 : "Joints Made by the Use of Cherry-Lock Blind Rivets", and as shown in Fig. 401.
- (4) Place the doublers on the elevons as follows :
- (a) Fit the spacer washers coated with Loctite 307 (P502) into the existing recesses.
- (b) Locate and pin the doubler(s) on the elevons as illustrated in Fig. 401.

F. Drilling the reinforcement plates

- (1) Put the reinforcement plates in position on the outer surface of the doublers as shown in Fig. 401.
- (2) Counterdrill the holes for CR 2839-5-6 rivets as instructed in Chapter "Riveting", Section 70-50-50 : "Joints Made by the Use of Cherry-Lock Blind Rivets", and as illustrated in Fig. 401.

G. Deburring

Unpin the doublers, and deburr the rivet holes in the doublers, reinforcement plates and Stressskin panel as directed in Chapter "Riveting", Section 70-50-50.

H. Mounting doublers and reinforcement plates

- (1) Pin the doublers on to the elevon top.

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- (2) Position the reinforcement plates in the inner part of the elevon.
- (3) Mount the reinforcement-plate fasteners as shown in Fig. 401, and instructed in Chapter "Riveting", Section 70-50-50 : "Joints Made by Cherry-Lock Blind Rivets".
- (4) Rivet the doublers on round their circumferences as instructed in Chapter "Riveting", Section 70-50-50, and illustrated in Fig. 401.
- (5) Check the riveting on doublers and reinforcement plates as instructed in Chapter "Riveting", Section 70-50-85 : "Joints Made by the Use of Cherry-Lock Blind Rivets".

I. Blanking access openings

Mount the blanking plates as shown in Fig. 401, sheet 8, and as described hereunder :

- (1) Join the angle-section assy and the cover together by means of a bolt.
- (2) Bring the leading edges into contact by screwing in the bolt.
- (3) Mount the blanking plates and lock the bolt. Torque bolt to 0,90 m. Kg (78 in. lbs).

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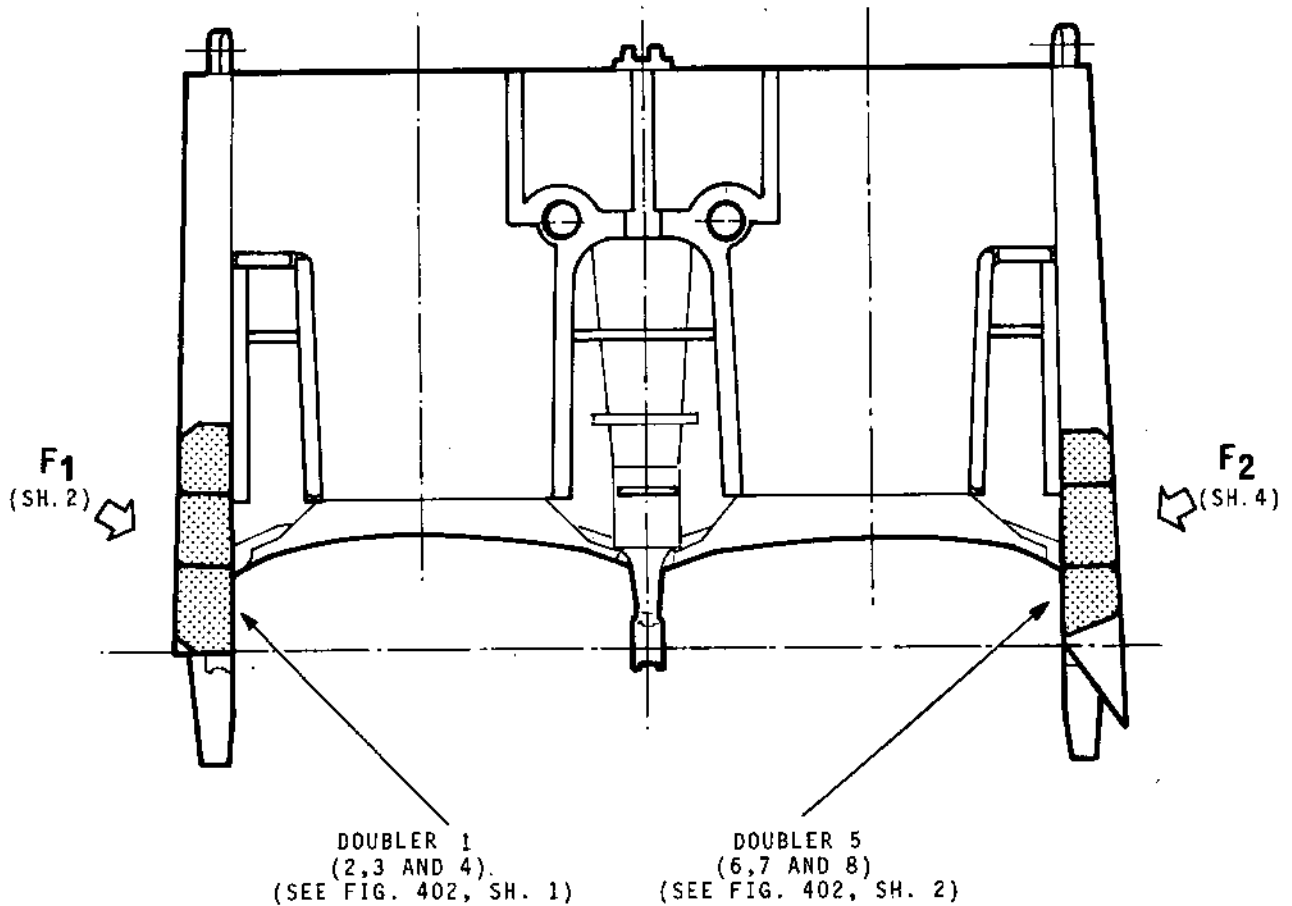


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VIEW FROM ABOVE
L/H NOZZLE : AS SHOWN
R/H NOZZLE : SYMMETRICAL



Applying Doublers to Top Elevon Panels
Figure 401 (Sheet 1 of 8)

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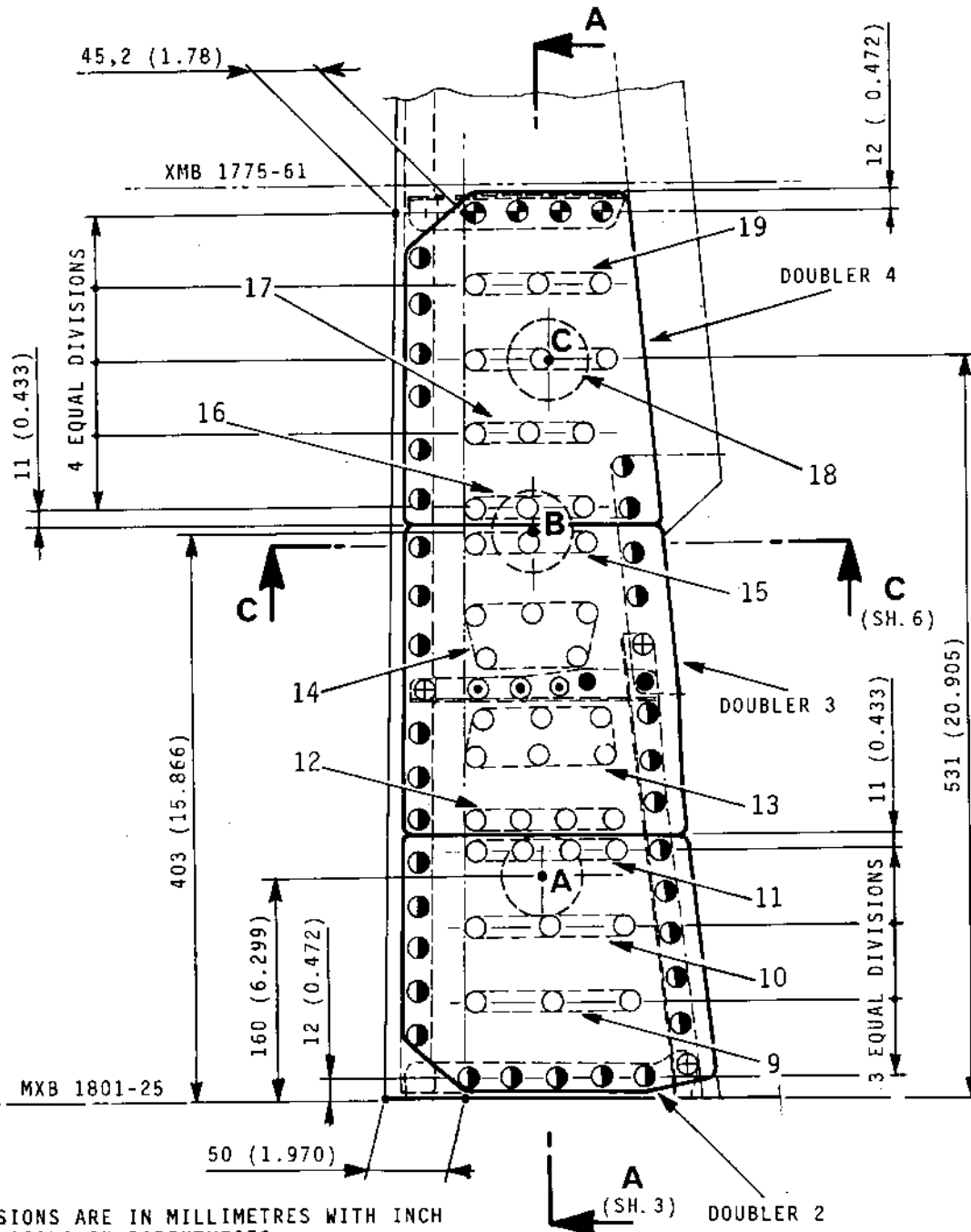
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F₁

IN BAY 1 : AS DRAWN
IN BAY 4 : SYMMETRICAL



DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Applying Doublers to Top Elevon Panels
Figure 401 (Sheet 2 of 8)

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REINFORCEMENT PLATE 15

SECTION AA

BLANKING PLATE
SEE SH. 8

XMB 1786

REINFORCEMENT PLATE 14

XMB 1790

REINFORCEMENT PLATE 13

REINFORCEMENT PLATE 12

XMB 1794

E
(SH.7)

2 EQUAL DIVISIONS

2 EQUAL DIVISIONS

MIN. 1
(0.039)

11 (0.433)

96,3 (3.79)

11 (0.433)

MIN. 1 (0.039)

DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Applying Doublers to Top Elevon Panels
Figure 401 (Sheet 3 of 8)

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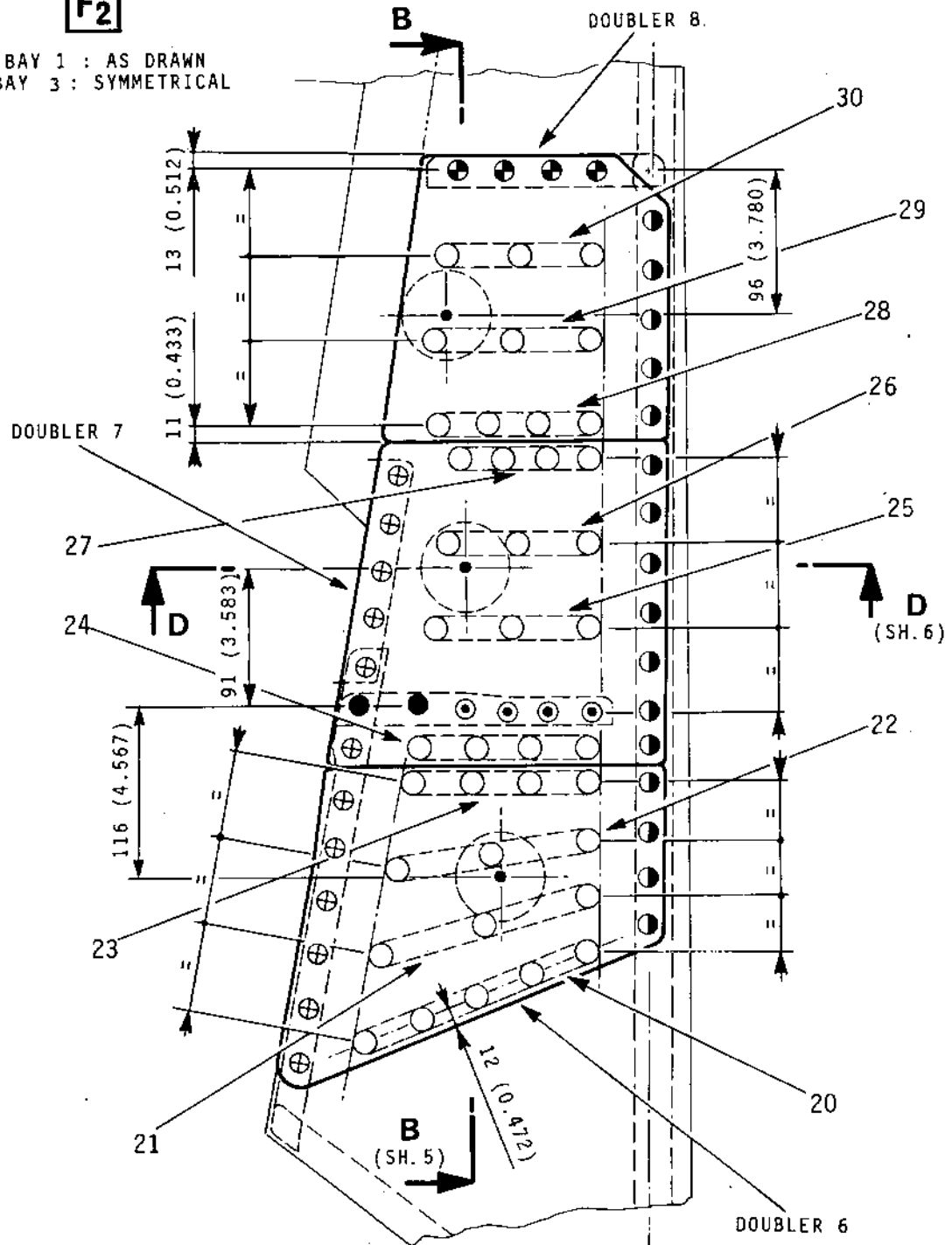
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OVERHAUL



F₂

IN BAY 1 : AS DRAWN
IN BAY 3 : SYMMETRICAL



DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Applying Doublers to Top Elevon Panels
Figure 401 (Sheet 4 of 8)

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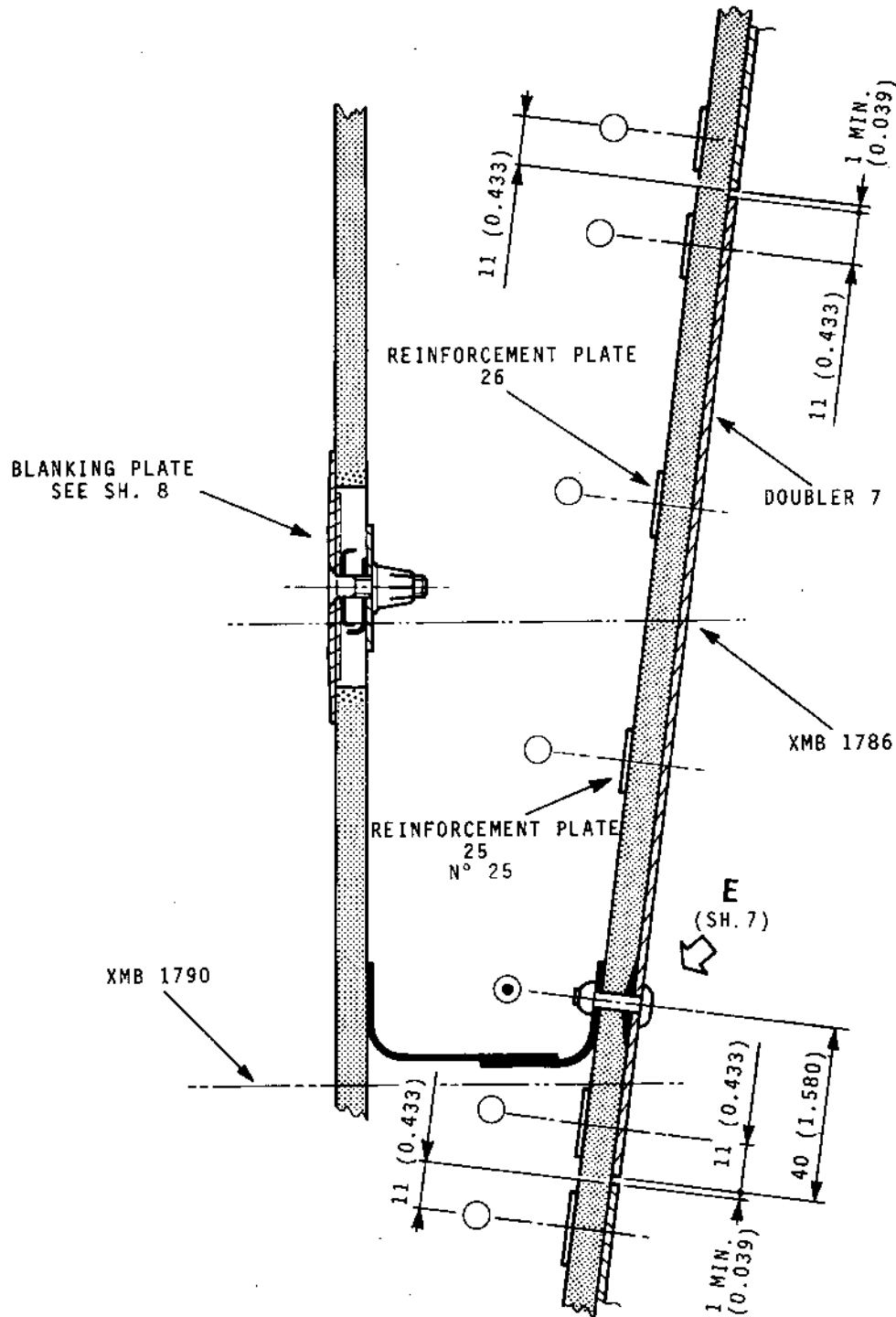
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SECTION BB



DIMENSIONS ARE IN MILLIMETRES WITH INCH CONVERSIONS IN PARENTHESES.

Application of Doublers to Top Elevon Panels
Figure 401 (Sheet 5 of 8)

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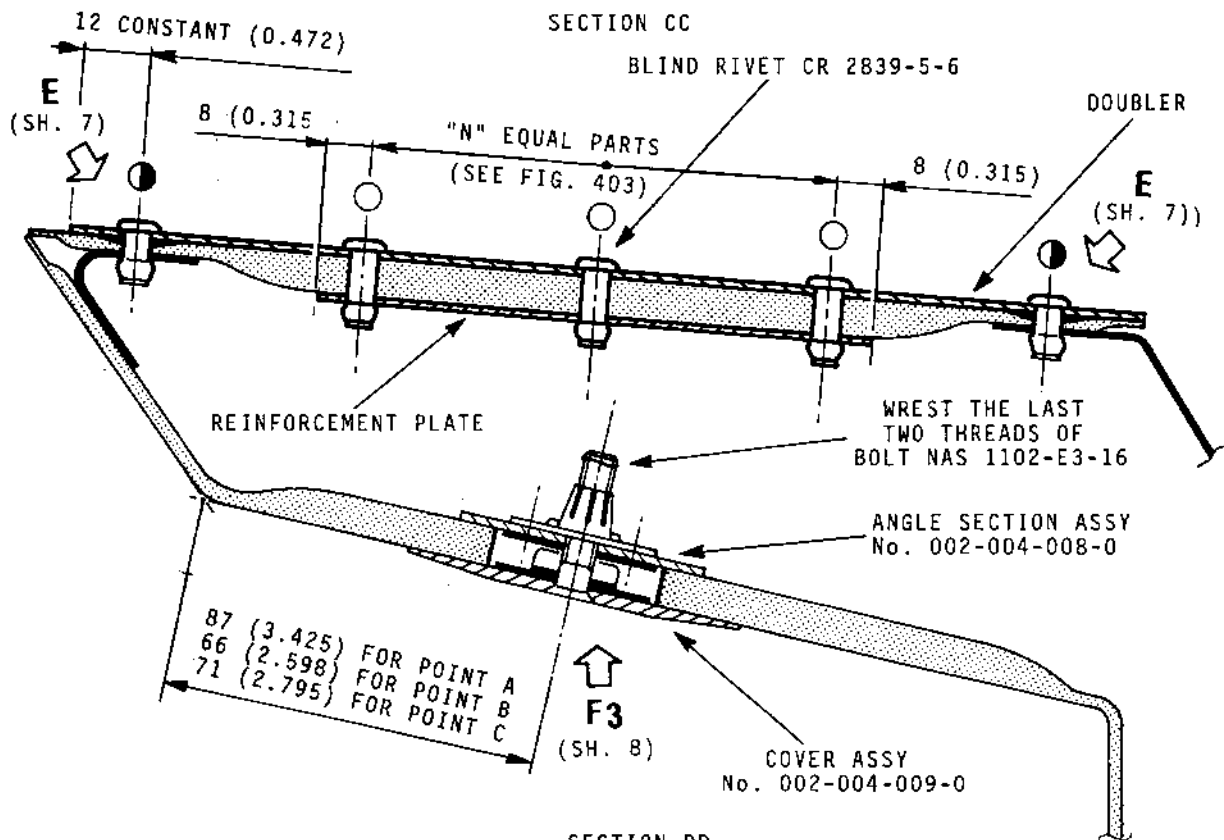
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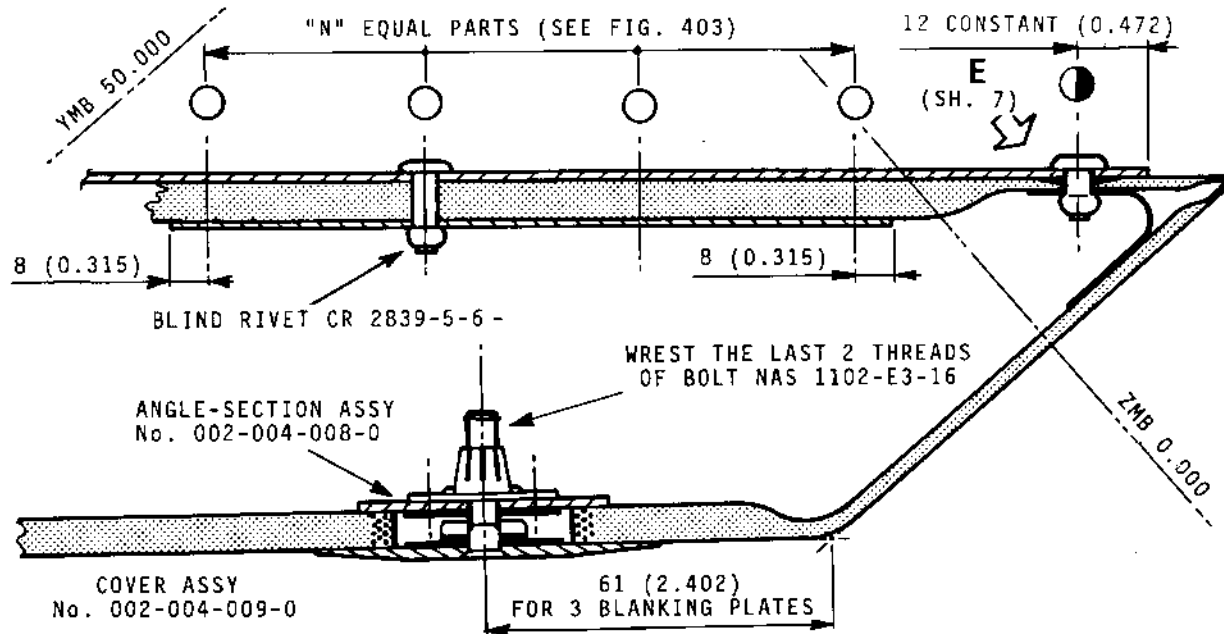
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SECTION CC



SECTION DD



DIMENSIONS ARE IN MILLIMETRES WITH INCH CONVERSIONS IN PARENTHESES.

Application of Doublers to Top Elevon Panels
Figure 401 (Sheet 6 of 8)

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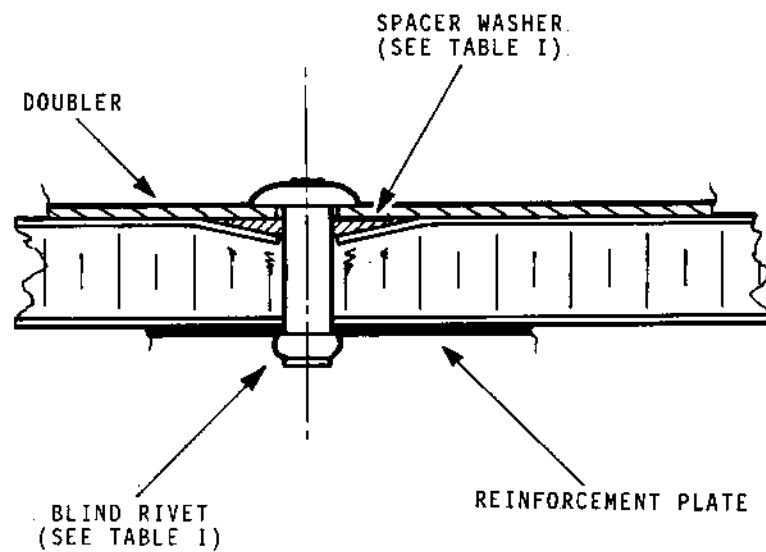


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E



SYMBOL ON TEXT	ON FIG.	BLIND RIVET	SPACER WASHER
"A"	⊙	CR 2839-5-3	No. 002-004-048-0
"B"	⊕	CR 2839-5-4	"
"C"	⊗	CR 2839-5-6	"
"D"	●	CR 2839-5-8	No. 002-004-048-0
"E"	⊗	CR 2839-6-6	No. 002-004-010-0

Application of Doublers to Top Elevon Panels
Figure 401 (Sheet 7 of 8)

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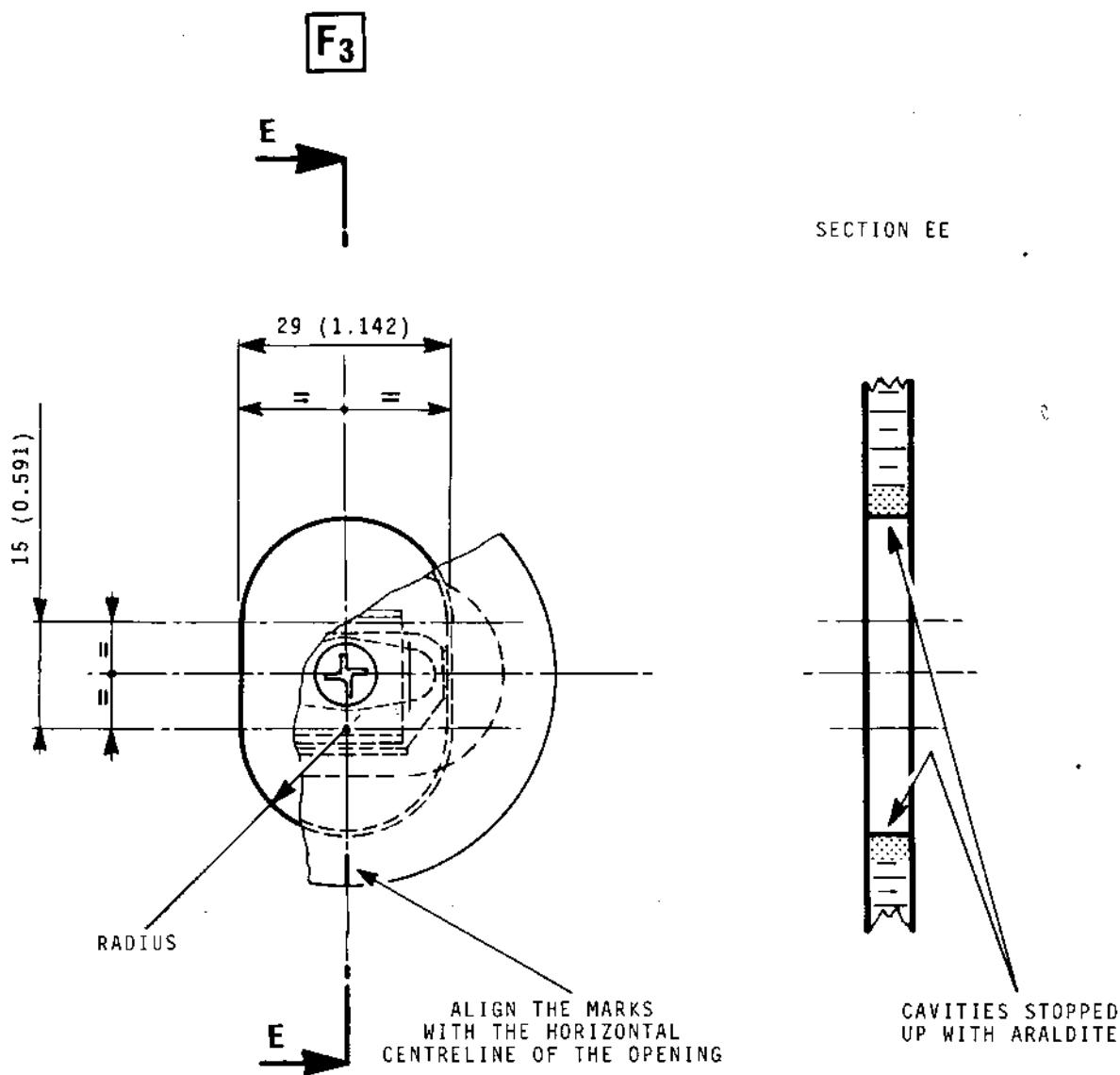
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CONVERSIONS IN PARENTHESES.

Application of Doublers to Top Elevon Panels
Figure 401 (Sheet 8 of 8)

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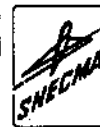
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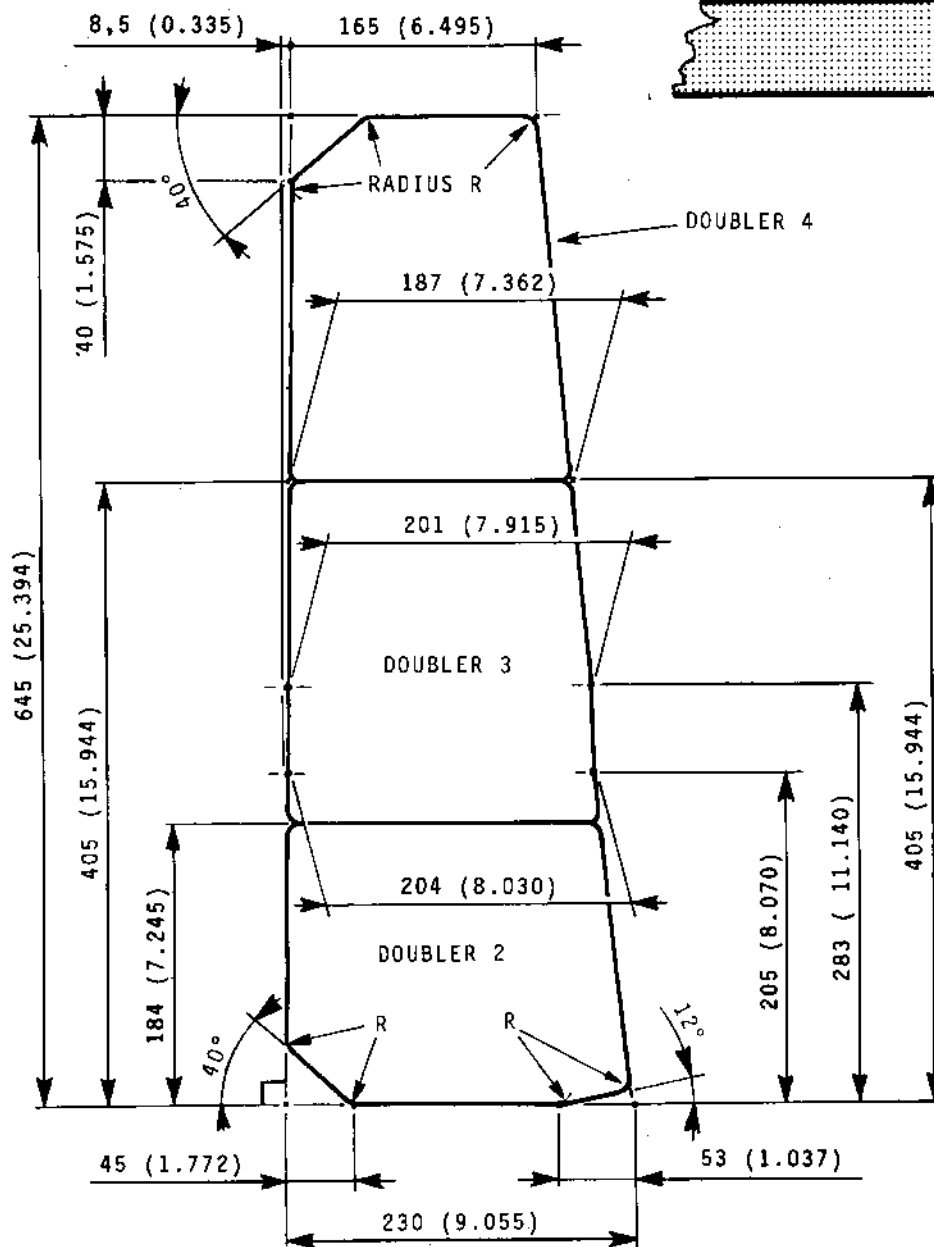


ROUND OFF CORNERS
OF CUT-OUT DOUBLER TO :
R = 6 mm (0.236 in.)

DOUBLER 1
(2,3 AND 4)

ROUND OFF SHARP EDGE IN
CONTACT WITH STRESSKIN PANEL
TO R = MIN. 0,6 mm (0.024 in.)

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DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Doublers
Figure 402 (Sheet 1 of 2)

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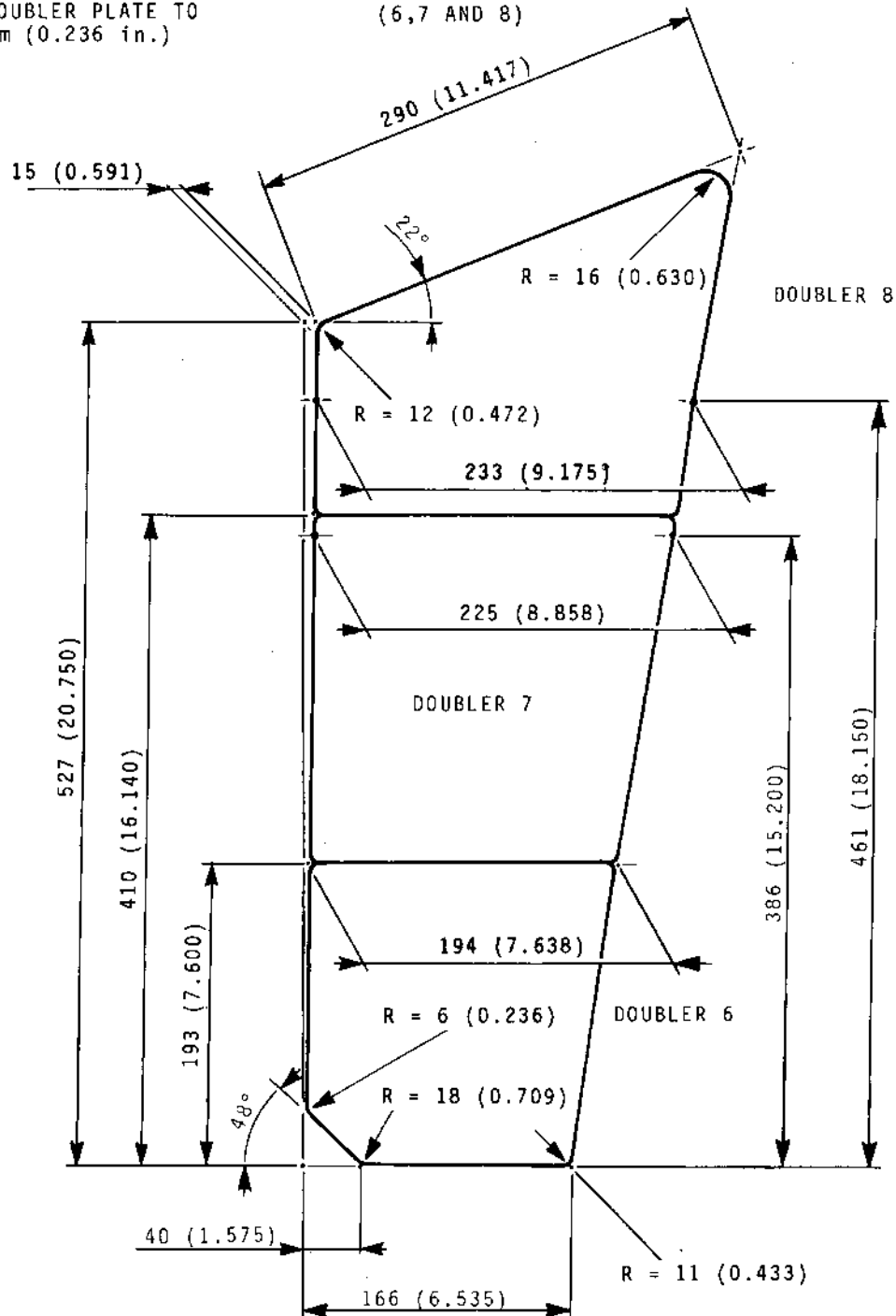
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ROUND OFF CORNERS OF
CUT-OUT DOUBLER PLATE TO
R = 6 mm (0.236 in.)

DOUBLER 5
(6,7 AND 8)



DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Doublers
Figure 402 (Sheet 2 of 2)

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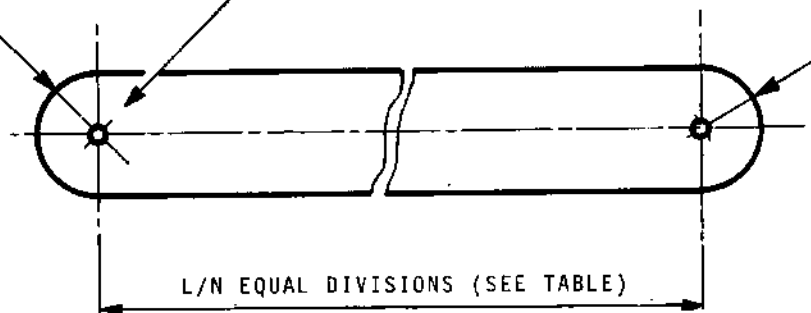
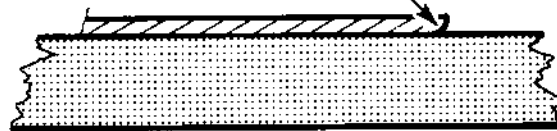
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N + 1 PILOT HOLES D = 2 (0.079)

R = 8 (0.315)

R = 8 (0.315)

ROUND OFF SHARP EDGE IN CONTACT WITH
STRESSKIN PANEL TO : R = MIN. 0,6 mm (0.024 in.)

ITEM No.	MM	LENGTH "L" (IN.)	NUMBER OF EQUAL DIV.(S) "N"
9	112	4.41	2
10	108	4.25	2
11	102	4.01	3
12	99	3.90	3
15	82	3.23	2
16	80	3.15	2
17	81	3.19	2
18	96	3.78	2
19	91	3.58	2
20	98	3.86	4
21	106	4.17	2
22	102	4.01	2
23	90	3.54	3
24	96	3.78	3
25	104	4.10	2
26	114	4.50	2
27	120	4.72	3
28	133	5.24	3
29	147	5.79	2
30	164	6.46	2

DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.Making Up Reinforcement Plates
Figure 403 (Sheet 1 of 2)**78-13-01**

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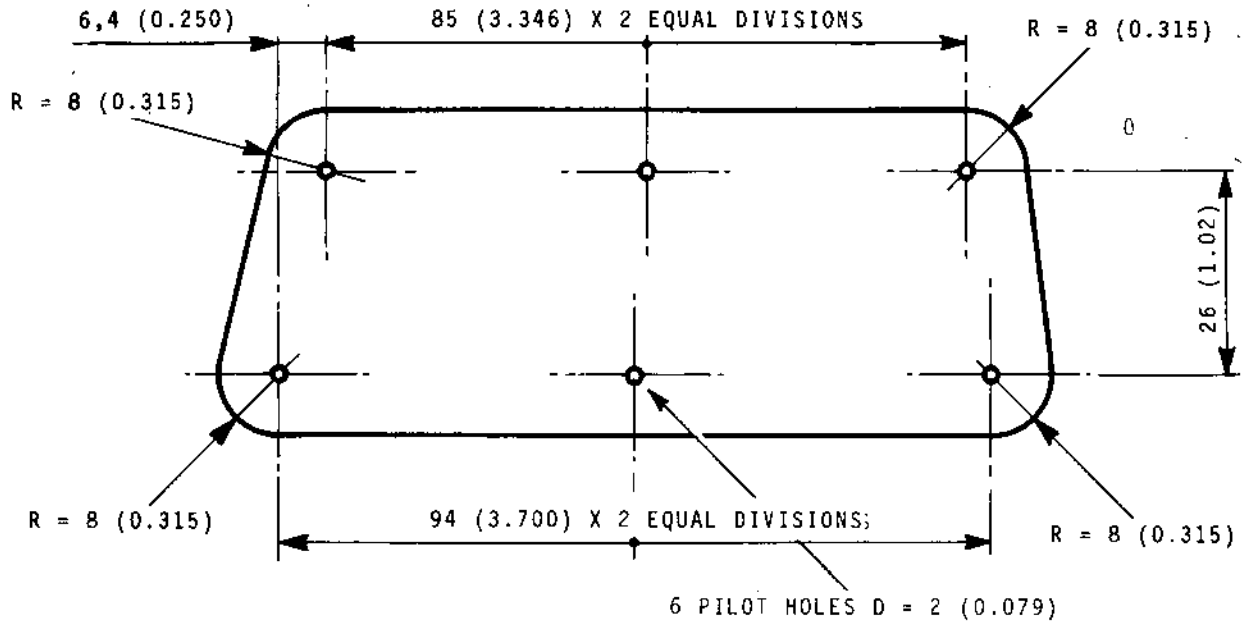


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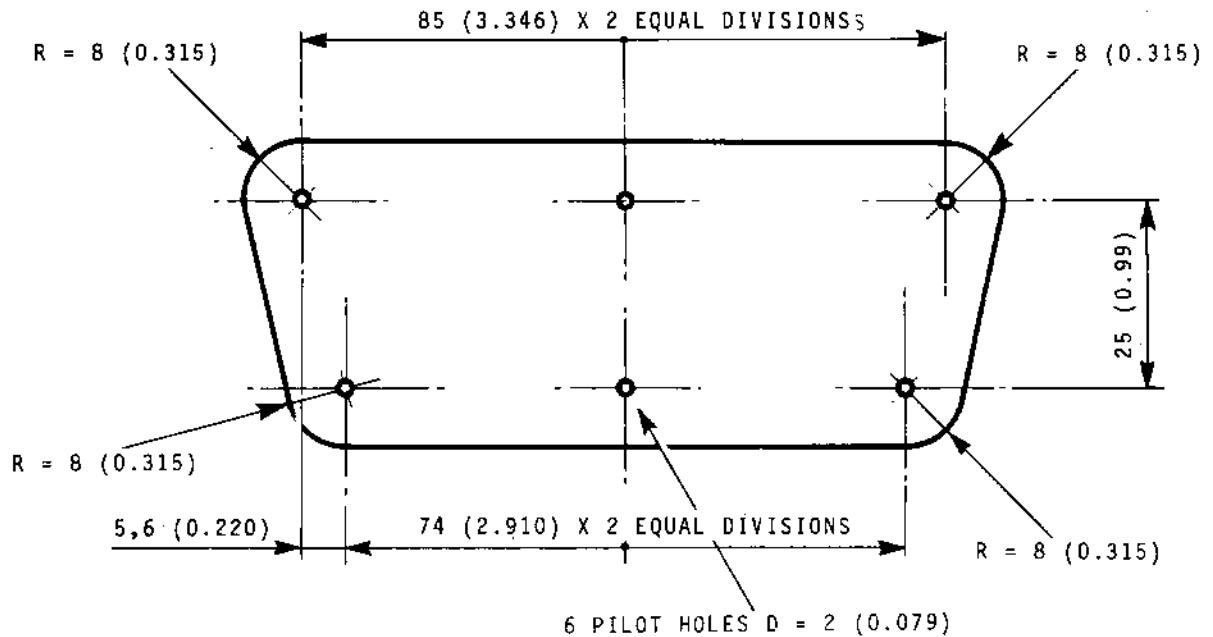
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REINFORCEMENT PLATE 13



REINFORCEMENT PLATE 14



DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Reinforcement Plates
Figure 403 (Sheet 2 of 2)

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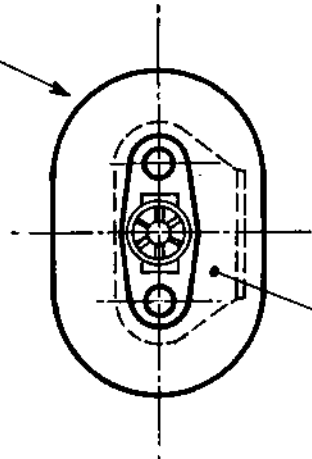
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ANGLE SECTION ASSY
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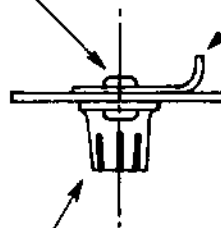
PLATE
No. 002-004-051-0
(SH.5)



MARKING

RIVET
No. 650-014-043-0

ANGLE SECTION
No. 002-004-050-0
(SH.4)



SELF-LOCKING NUT
No. 649-295-020-0

RIVETING : STANDARD PRACTICES
CHAPTER SECTION 70-50-20

MARKING : M 28 STANDARD PRACTICES
CHAPTER SECTION 70-10-20

Making Up Blanking Plates
Figure 404 (Sheet 1 of 7)

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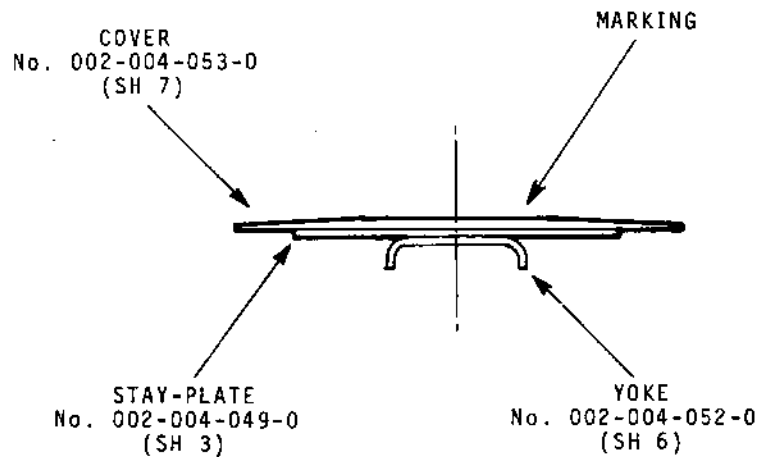
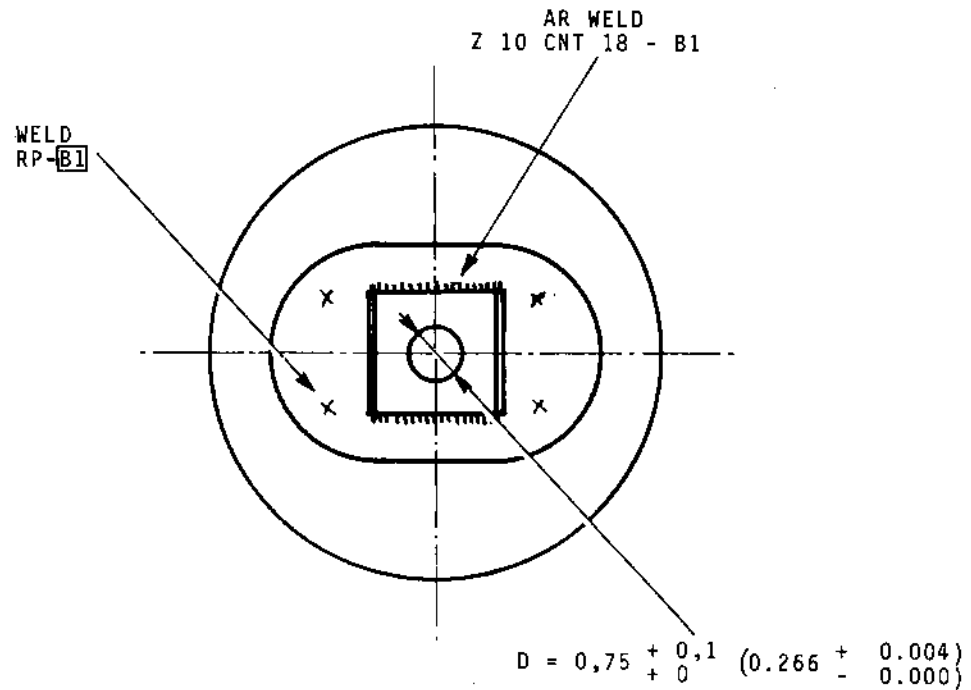
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ANGLE-SECTION ASSY
No. 002-004-009-0



WELDING : STANDARD PRACTICES CHAP.
SECTION 70-35-20

MARKING : M 28 STANDARD PRACTICES,
CHAP. SECTION 70-10-20

DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Blanking Plates
Figure 404 (Sheet 2 of 7)

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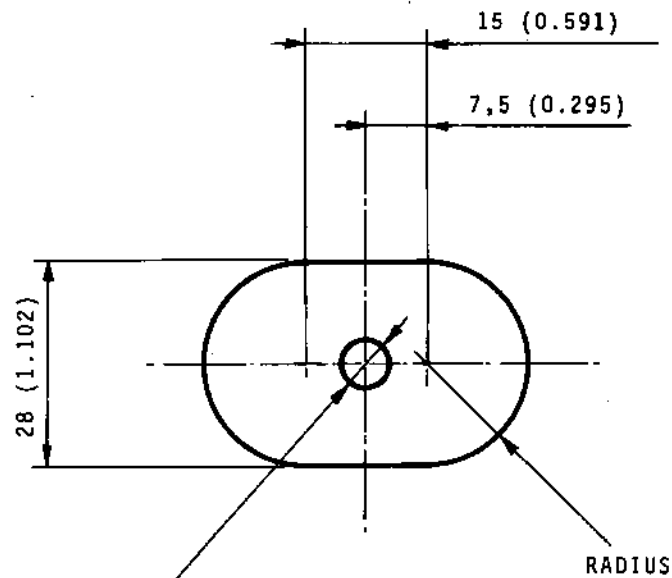
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STAY PLATE
No. 002-004-049-0

MATERIAL : P3301 (Z 10 CNT 18) - SHEET THICKNESS : 1 (0.04)



$$D = 6,75 + \frac{0,1}{0} \quad (0.266 + \frac{0.004}{0.000})$$

DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Blanking Plates
Figure 404 (Sheet 3 of 7)

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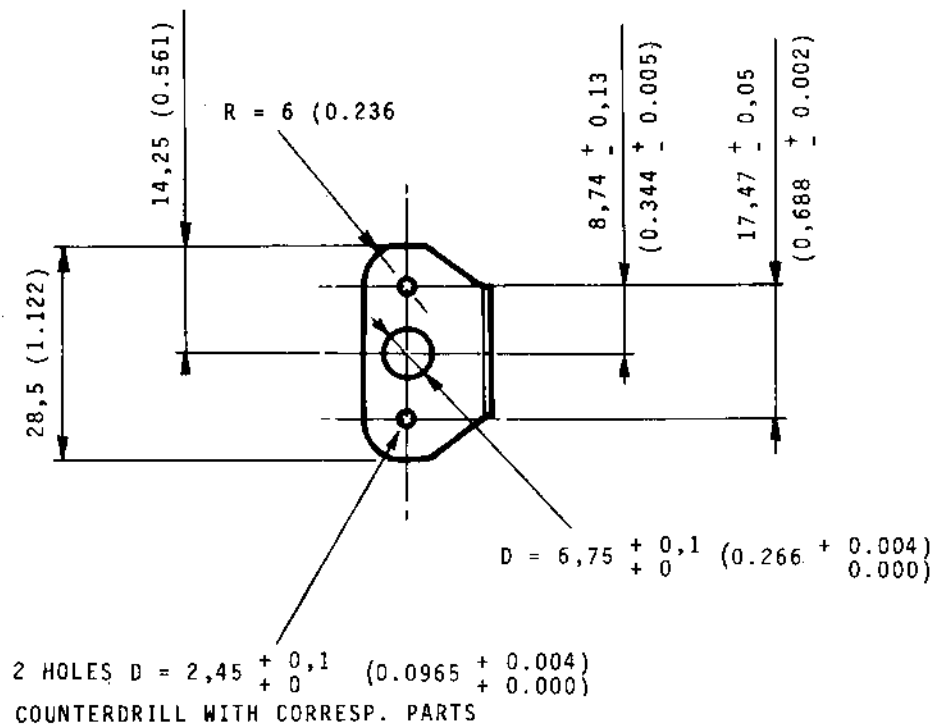
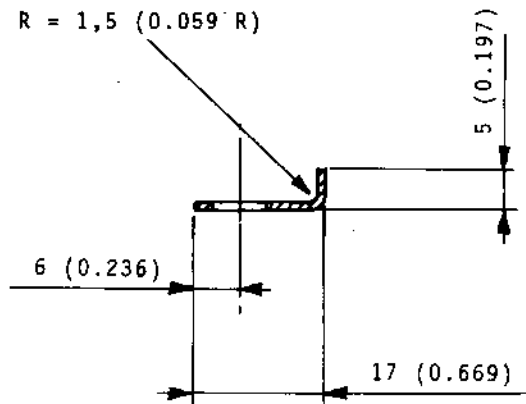
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ANGLE SECTION
No. 002-004-050-0

MATERIAL : P3301 (Z 10 CNT 18)-SHEET THICKNESS : 1 (0.04)



DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Blanking Plates
Figure 404 (Sheet 4 of 7)

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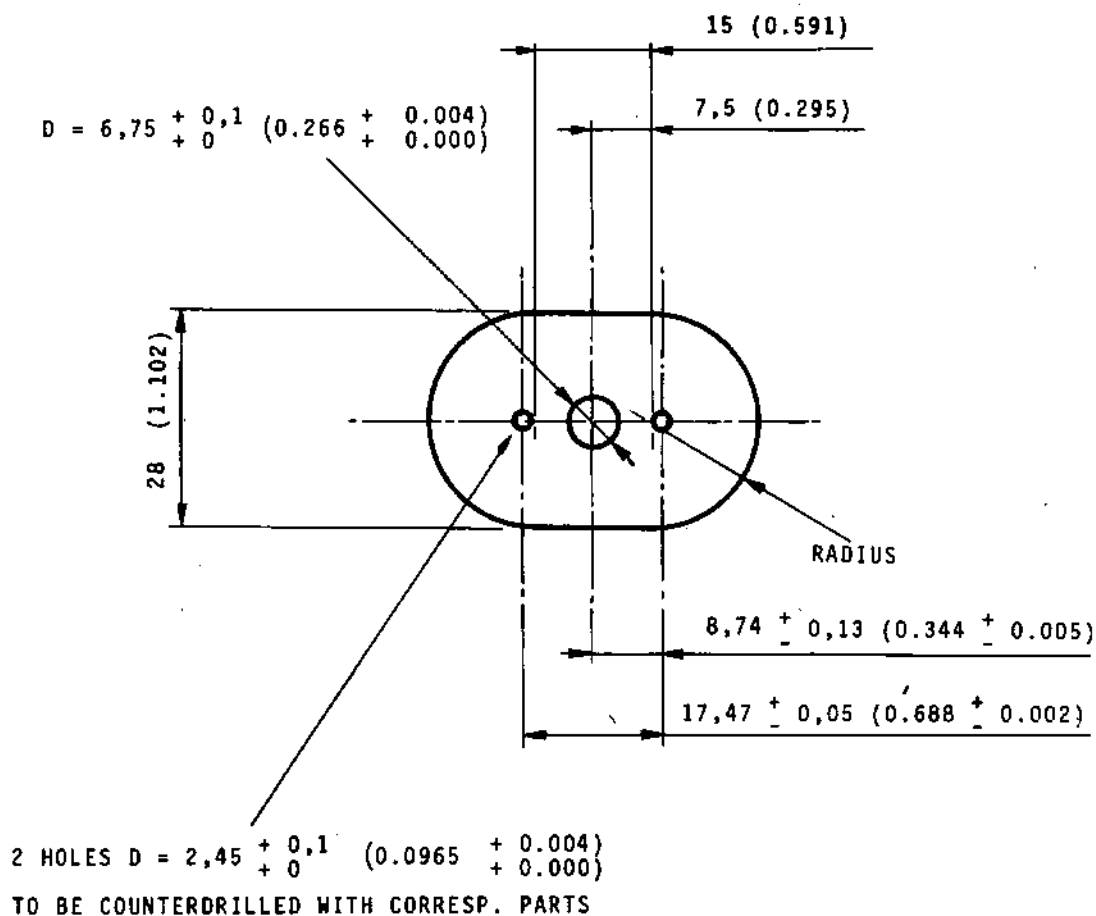
OLYMPUS 593

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OVERHAUL



PLATE
No. 002-004-051-0

MATERIAL : P3301 (Z 10 CNT 18) - SHEET THICKNESS : 1 (0.04)



DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Blanking Plates
Figure 404 (Sheet 5 of 7)

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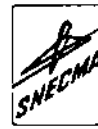
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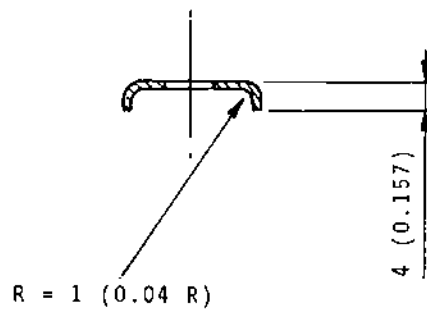
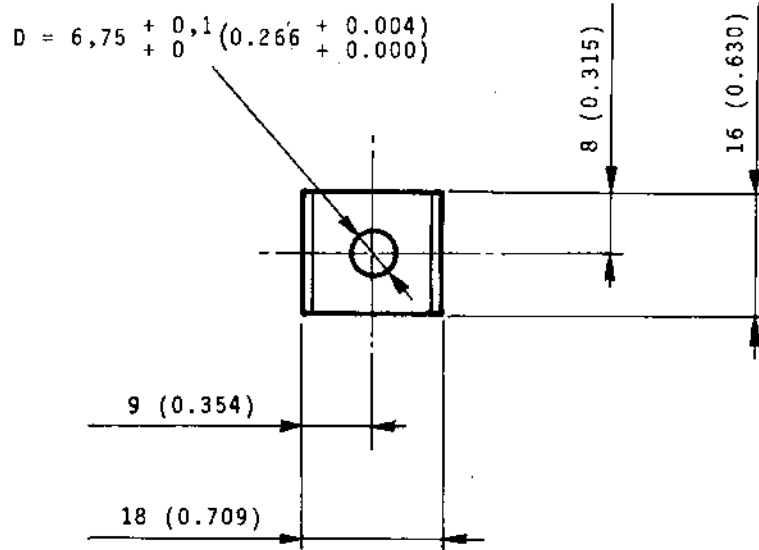
OVERHAUL



YOKE

No. 002-004-052-0

MATERIAL : P3301 (Z 10 CNT 18) - SHEET THICKNESS : 1 (0.04)



DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Blanking Plates
Figure 404 (Sheet 6 of 7)

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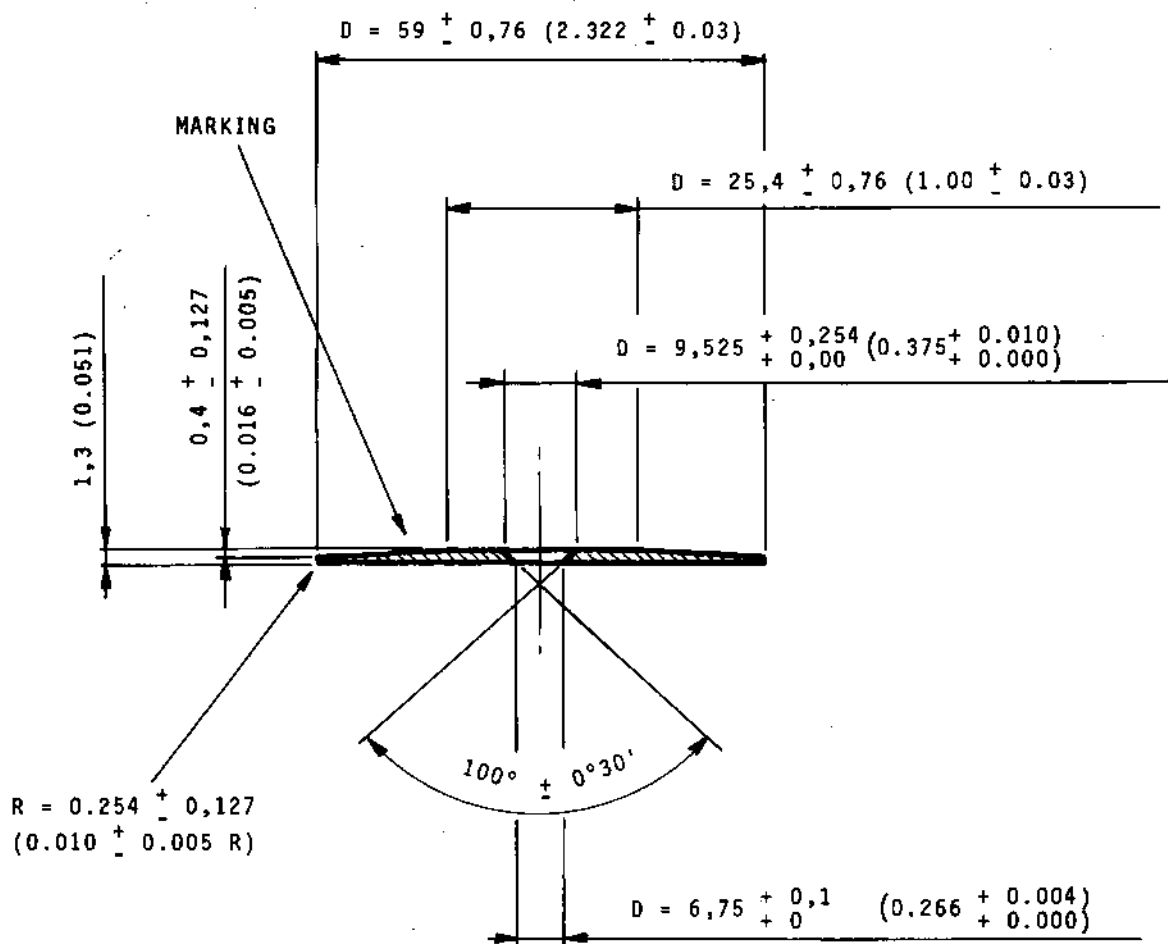
OVERHAUL



COVER

No. 002-004-053-0

MATERIAL : P3301 (Z 10 CNT 18) - SHEET THICKNESS : 1 (0.04)



DIMENSIONS ARE IN MILLIMETRES WITH INCH CONVERSIONS IN PARENTHESES.

Making Up Blanking Plates
Figure 404 (Sheet 7 of 7)

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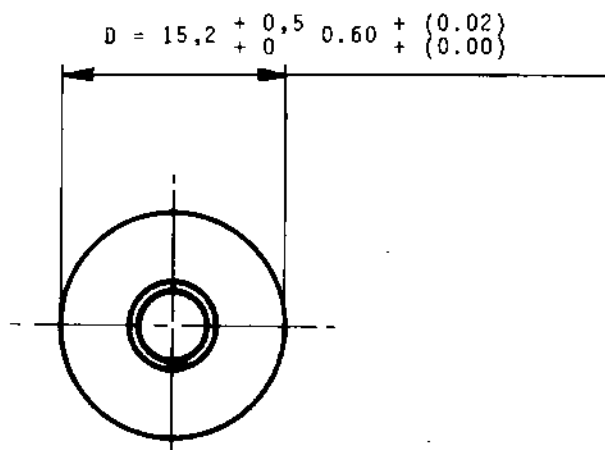
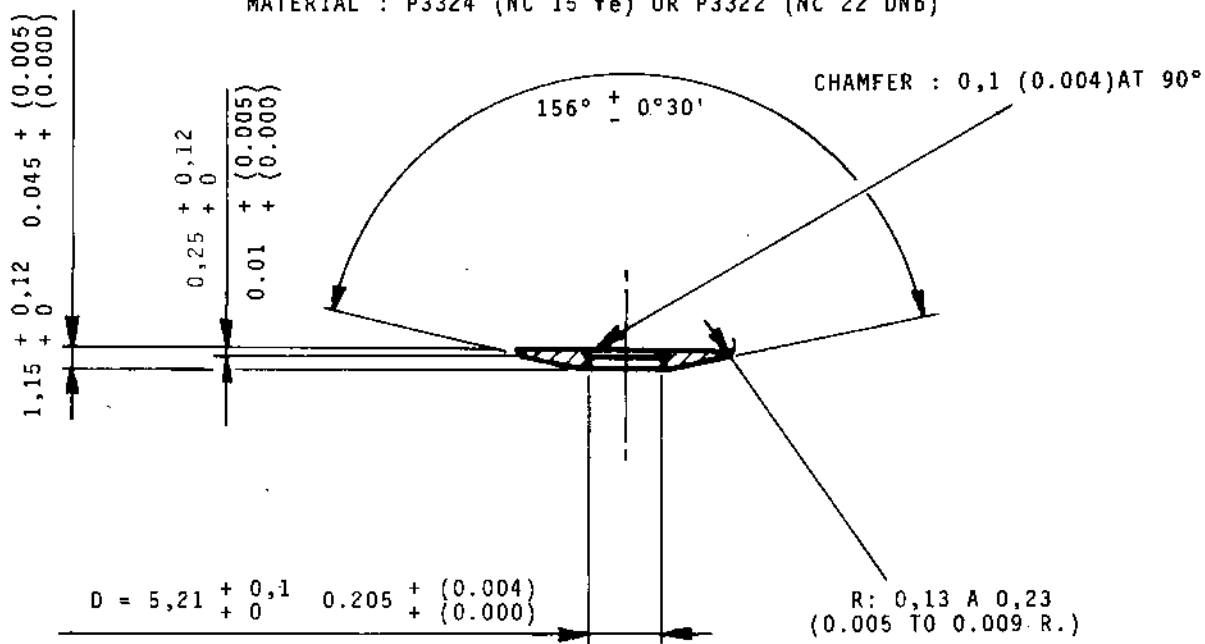
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SPACING WASHER
No. 002-004-010-0

MATERIAL : P3324 (NC 15 fe) OR P3322 (NC 22 DNb)



DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Spacer Washers
Figure 405 (Sheet 1 of 2)

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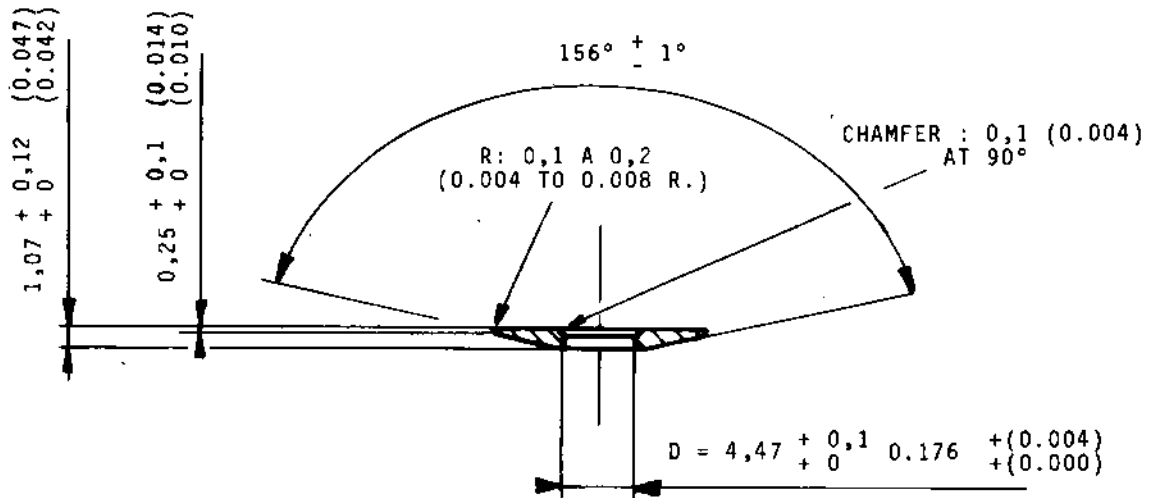
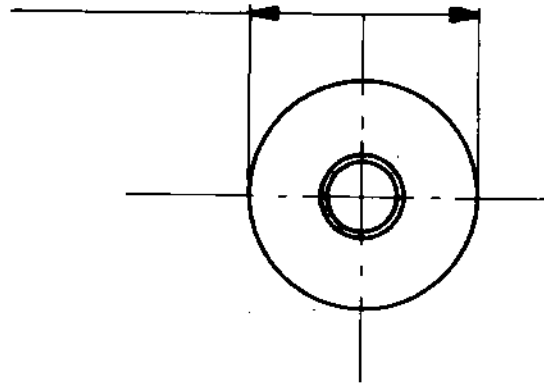
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OVERHAUL



SPACING WASHER
No. 002-004-048-0

MATERIAL : P3324 (NC 15 Fe) DR 3322 (NC 22 Dnb)

$D = 13,2 \begin{smallmatrix} + \\ - \end{smallmatrix} 0,5 \quad (0.520 \begin{smallmatrix} + \\ - \end{smallmatrix} 0.002)$



DIMENSIONS ARE IN MILLIMETRES WITH INCH
CONVERSIONS IN PARENTHESES.

Making Up Spacer Washers
Figure 405 (Sheet 2 of 2)

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OVERHAULREPAIRTWIN SECONDARY NOZZLE (29-190-191)17. Repair of Delaminations Lying in the Barrel Suspension Link Attachment Zones

PARTS REQUIRED FOR REPAIR

Sheet metal Z8 CND 15 (P 3305)	Thickness 1,2 mm (0.047 in.)
Sheet metal T 40 (P 3340)	Thickness 0,8 mm (0.031 in.)
Sheet metal T 40 (P 3340)	Thickness 1,6 mm (0.062 in.)
Sheet metal T 40 (P 3340)	Thickness 3,0 mm (0.118 in.)
Sheet metal T 40 (P 3340)	Thickness 4,0 mm (0.157 in.)
Bracket (supporting yoke)	No. 301-073-500-0
Bracket (supporting yoke)	No. 301-073-550-0
Bracket (supporting yoke)	No. 301-073-600-0
Bracket (supporting yoke)	No. 301-094-700-0
Bracket (supporting yoke)	No. 301-094-750-0
Spacer	No. 002-003-992-3
Thrust washer	No. 002-003-995-0
Washer AN 960C8	No. 649-786-152-0
Washer AN 960C10	No. 699-786-068-0
HI-LOCK nut 97-5	No. 649-782-257-0
HI-LOCK nut 97-6	No. 649-782-258-0
HI-LOCK screw 40-5-2	No. 649-781-290-0
HI-LOCK screw 40-5-3	No. 649-781-291-0
HI-LOCK screw 40-5-4	No. 649-781-292-0
HI-LOCK screw 40-5-6	No. 649-781-294-0
HI-LOCK screw 40-5-7	No. 649-781-295-0
HI-LOCK screw 40-5-8	No. 649-781-336-0
HI-LOCK screw 40-5-9	No. 649-781-390-0
HI-LOCK screw 40-5-10	No. 649-781-447-0
HI-LOCK screw 40-6-4	No. 649-781-298-0
HI-LOCK screw 40-6-5	No. 649-781-299-0
HI-LOCK screw 40-6-6	No. 649-781-300-0
HI-LOCK screw 40-6-8	No. 649-781-302-0
HI-LOCK screw 40-6-10	No. 649-781-448-0
Anchor nut NAS 687C3	No. 649-785-201-0
Rivet MS 20427M3-4	No. 650-022-042-0
Rivet CR 2839-5-4	No. 649-772-085-0
Rivet CR 2839-6-3	No. 649-772-089-0

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PARTS REQUIRED FOR REPAIR

Blind bolt PLT 220-5	Length as required
Blind bolt PLT 220-5-2	No. 650-089-311-0
Blind bolt PLT 220-6-2	No. 650-089-311-0
Blind bolt PLT 220-6-6	No. 650-089-335-0
Blind bolt PLT 220-6-7	No. 650-089-336-0
HI-LOCK screw HL 169-5-13	No. 649-781-084-0
HI-LOCK screw HL 169-6-13	No. 649-781-086-0
HI-LOCK screw HLN1G5	No. 649-785-047-0
HI-LOCK screw HLN1G6	No. 649-785-048-0

Loctite 307 bonding agent (P 502)

A. Removing the existing fixings

Take down the existing attachment items located in the area to be repaired as indicated in figure 402 and instructed in the following chapters of the Standard Practices manual :

- 70-50-10 For rivets fixing the NAS anchor nuts
- 70-50-40 For HI-LOCK screws
- 70-50-60 For blind bolts

B. Removing the barrel suspension link

Take down the link and its brackets (supporting yokes) as indicated in REP 29-190-8 "Repair of Barrel Suspension Links".

C. Repairing the doublers

- (1) From sheet metal Z8 CND 15 (P 3305), thickness 1,2 mm (0.047 in.), pre-cut the doublers "2", "3" and "4" to the following dimensions :

- . "2" = 320 mm (12.6 in.) X 180 mm (7.08 in.) approx.
- . "3" = 320 mm (12.6 in.) X 65 mm (2.56 in.) approx.
- . "4" = 320 mm (12.6 in.) X 300 mm (11.8 in.) approx.

- (2) Shape the doubler to match the panel contour.

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- (3) Position the doublers "2" and "4" on the panel. On these doublers, center punch the location of holes located at both ends and the location of all the holes in the rear edge.
- (4) Fit the doublers to the dimensions shown on figure 404.
- (5) Heat treat the three doublers per methods M 822 and M 821 in chapter 70-45-10 of the Standard Practices manual.
- (6) Re-shape the doublers, if required.
- (7) Position the doublers "2" and "4" and counterdrill the holes identified in figure 404 as follows :
 - (a) Holes for HI-LOCK screws HL 40-5 : to $4,17 \begin{smallmatrix} +0,1 \\ -0 \end{smallmatrix}$ mm
(0.164 - 0.168 in.) dia.
 - (b) Holes for HI-LOCK screws HL 40-6 : to $4,83 \begin{smallmatrix} +0,1 \\ -0 \end{smallmatrix}$ mm
(0.190 - 0.194 in.) dia.
 - (c) Holes for blind bolts PLT 220-6 : to $5,05 \begin{smallmatrix} +0,08 \\ -0 \end{smallmatrix}$ mm
(0.199 - 0.202 in.) dia. Take down the doublers and deburr holes.
- (8) Position and pin the doublers on to the panel.

D. Drilling the holes accommodating the delamination restraining screws

- (1) On the panel, center punch the location of holes a and b (see figure 405, sheets 1 and 2).

NOTE : The dimensions are given for guidance only as each hole is to be centered in one cell.

- (2) Drill through both the panel and the doublers "2" and "4" the holes a and b and deburr.
- (3) Position doubler "3" on to the two others. Center punch the location of holes marked b on this same doubler.
- (4) Take down the doubler, drill the above center punched holes and deburr.

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(5) Pin doubler "3" on to the two others.

E. Preparing the parts in view of installation of the frames

- (1) From sheet metal Z8 CND 15 (P 3305), thickness 1,2 mm (0.047 in.) cut out and put to shape and dimensions the following parts :
 - (a) the web 1 as per figure 406 (sheet 1).
 - (b) the two ribs 5 and rib 16 as per figure 406 (sheet 2).
 - (c) the two angle sections 6 and angle section 17 as per figure 406 (sheet 2).
 - (d) the two stringers 7 and stringer 18 as per figure 406 (sheet 3).
 - (e) the stringers 10 and 11 as per figure 406 (sheet 4).
 - (f) the two ribs 12 as per figure 406 (sheet 6).
 - (g) the stringers 14 and 20 as per figure 406 (sheet 5).
- (2) From sheet metal T 40 (P 3340), of thickness given for each part, cut out and machine the shims as instructed below :
 - (a) from a 4 mm (0.157 in.) thick sheet metal, cut out the three skew shims 8 as per figure 406 (sheet 7).
 - (b) from a 4 mm (0.157 in.) thick sheet metal, cut out the three skew shims 9 as per figure 405 (sheet 4).
 - (c) from a 1,6 mm (0.063 in.) thick sheet metal, cut out a shim 13 for each attachment within the rear edge of the repaired zone, as per figure 406 (sheet 7).

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- (d) from a 1,6 mm (0.063 in.) thick sheet metal, cut out the shim 15, as per figure 406 (sheet 5).
- (e) from a 0,8 mm (0.031 in.) thick sheet metal, cut out the shim 19, as per figure 406 (sheet 7).

- (3) Subject all parts cut out and shaped under paragraph E (1) to heat treatment per methods M 822 and M 821 in chapter 70-45-10 of the Standard Practices manual.
- (4) After heat treatment, re-shape the parts if necessary.

F. Drilling the front section of the frames.

- (1) Position web 1 on both the nozzle throat section and the panel as indicated in figure 405 (sheets 3 and 4).
- (2) Counterdrill the holes marked C through web 1, the panel and doubler 4 (figure 405, sheet 1 and figure 406, sheet 1). Deburr holes.
- (3) Pin web 1 on to the panel.
- (4) Counterdrill web 1 together with the throat section, the holes marked s but the two providing for attachment of stringers 10 and 11 (figure 405, sheet 3). Deburr holes.
- (5) Between web 1 and throat section, sandwich the shims 19 (figure 405, sheets 6 and 7) then, pin the web on to the nozzle throat section.
- (6) Locate the NAS anchor nuts on angle sections 6 and 17 (figure 406, sheet 2).
- (7) Install the rivets as indicated in chapter 70-50-10 of the Standard Practices manual.
- (8) Inspect the riveting as instructed in chapter 70-50-81 of the Standard Practices manual.
- (9) On the webs 5 and 16 drill the holes through the face in contact with the panel (see figure 406, sheet 3). Deburr holes.



- (10) Position angle sections 6 and 17 and secure them to the convergent channel section using the NAS anchor nut (figure 405, sheet 4).
- (11) Position ribs 5 and 16 on the panel together with the corresponding angle sections (figure 405, sheets 4 and 6).
- (12) Drill, through the panel and the doublers, the ribs-to-panel attachment holes, identified c and d on figure 405 (sheet 1). Deburr holes.
- (13) Pins the ribs 5 and 17 on to the panel while sandwiching skew shims 8 and 9. Counterdrill holes identified e and f. Deburr, then pin the ribs and the shims.
- (14) Using angle sections 6 and 17, counterdrill holes identified h and i through the ribs 5 and 16 (figure 405, sheet 4 and figure 406, sheets 2 and 3). Deburr holes.
- (15) Position stringer 7 and stringer 18 on the assembly. Using the ribs and the corresponding angle sections, counterdrill the stringers (see figure 405, sheets 4 and 6). Deburr holes then, pin the stringers.

G. Drilling the rear sections of the frames

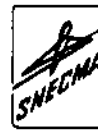
- (1) Position ribs 12 on the rear-frame mount (fitting) and on the panel then counterdrill the holes identified m through the ribs (figure 405, sheet 5). Deburr holes and pin ribs.
- (2) Using the panel and doubler 4, counterdrill holes identified c through the ribs (figure 405, sheet 2). Deburr holes.
- (3) Pin ribs 12 on to the panel.
- (4) Position the stringers 10 and 11 on web 1 and ribs 12 (figure 405, sheets 3 and 5).
- (5) In a single operation, counterdrill holes identified H through both the stringers and the ribs 12 (figure 405, sheet 5). Deburr, then pin the stringers.



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- (6) In a single operation, counterdrill holes identified i through both the stringers 10 and 7, using the web 1 ; then, both the stringers 11 and 7, using the web 1 (figure 406, sheets 3, 4, 5). Deburr holes and pin the stringers.
- (7) Position the stringer 14 on the web 1 with the shim 15 and counterdrill the stringer and the shim altogether using the existing frame then, pin on.
- (8) Counterdrill the holes identified i through the stringers 14 and 18 (figure 405, sheet 3). Deburr holes and pin the stringers.
- (9) Position the stringer 20 on the web 1 and, using the frame, counterdrill holes identified l and m through the stringer (figure 405, sheet 7). Deburr and pin the stringer.
- (10) Counterdrill the holes identified i (figure 405, sheet 3) through the stringer 20 and the web 1. Deburr and pin on.
- (11) Counterdrill the holes identified s through the stringers 10, 11, 14 using web 1 and nozzle throat section (figure 405, sheet 3). Deburr holes.
- (12) Take down the parts. On the panel, counterbore the holes identified a-b-c-d-e-f-g to the following diameter :

$$5,5 \begin{smallmatrix} + \\ 0 \end{smallmatrix} \begin{smallmatrix} 0,1 \\ \end{smallmatrix} \text{ mm (0.212 - 0.216 in.)}$$

CAUTION : DO NOT REBORE THROUGH THE OUTER SKIN (FACE SHEET) OF PANEL (SEE FIG. 405, SHEET 8).

- (13) Locate the spacers into these holes using Loctite 307 bonding agent (P 502) to hold them fast upon installation of the attaching hardware (fixings).

H. Fixing the doublers and frames

- (1) Again, pin all the parts making up the repair altogether.
- (2) Unpin the pins, one-by-one, each time replacing it by the fixing required at the subject location. Refer to figures 404 and 405 for the location and identification of each fixing.
These fixings are to be installed as instructed in chapters 70-50-40 and 70-50-60 of the Standard Practices manual.

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- (3) Re-install the link and its brackets as indicated in REP 29-190-8.

NOTE : For the re-insertion of the SPC shim between the panel and the supporting yoke, allow for the doubler thickness : 1,2 mm (0.047 in.) which will have to be machined out from the shim.

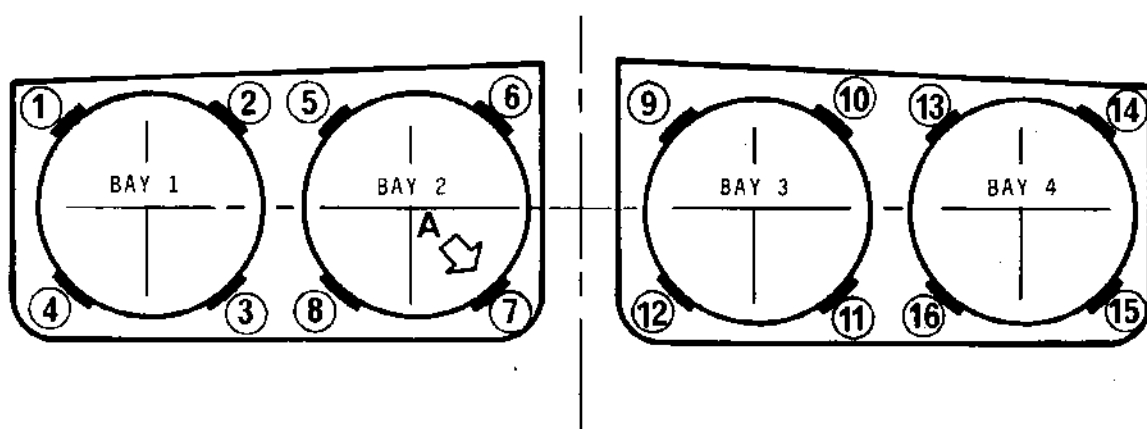
- (4) Inspect the installed fixings as indicated in chapters 70-50-84 and 70-50-86 of the Standard Practices manual.



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REAR VIEW OF NOZZLES

Identifying the Various Locations for the Repair Purposes
Figure 401

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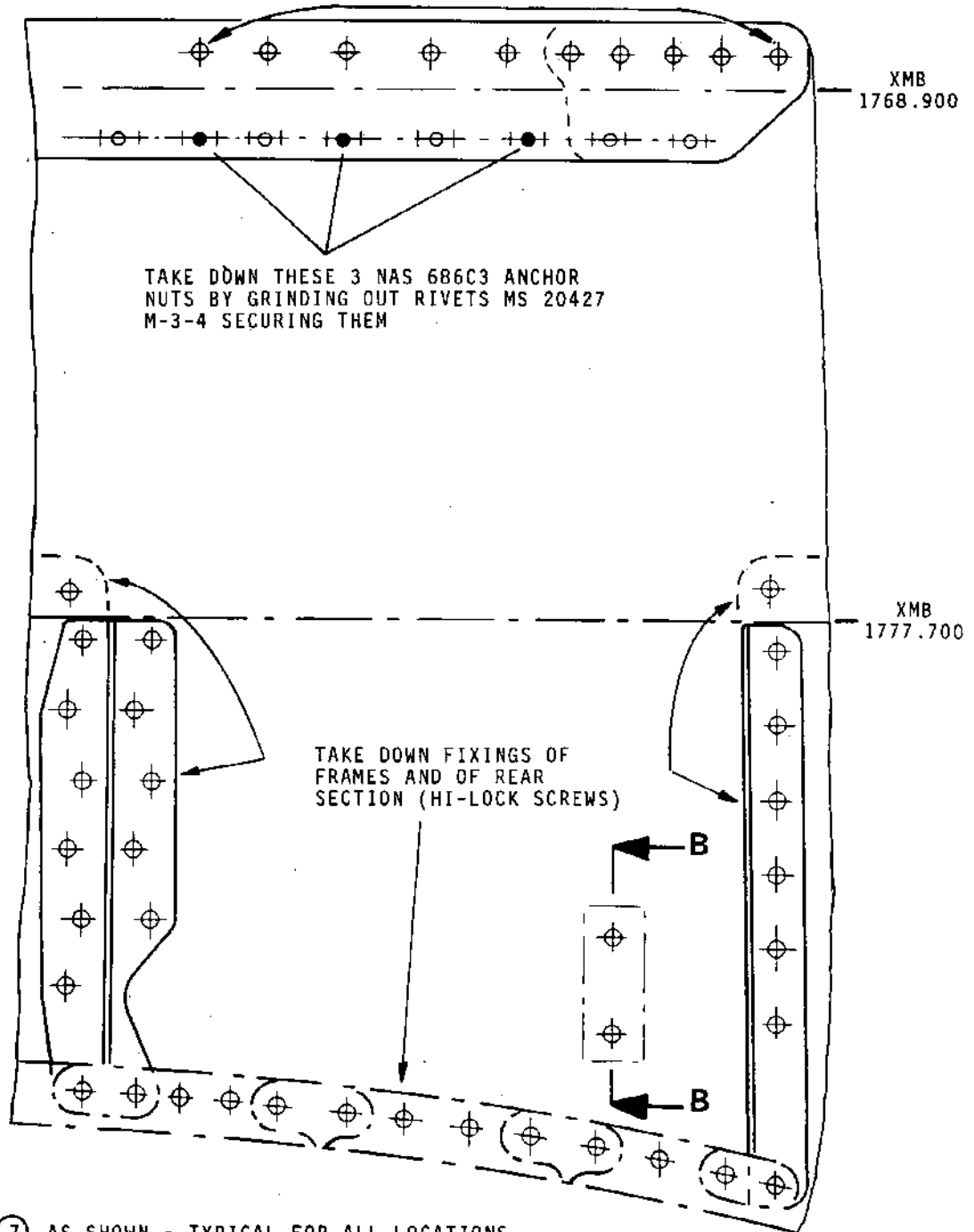
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↑
FRONT

A

TAKE DOWN THE CHANNEL
FIXINGS
BLIND BOLTS



Taking down the Fixings whose Accommodating Holes are Useful
to Carry out the Repair
Figure 402

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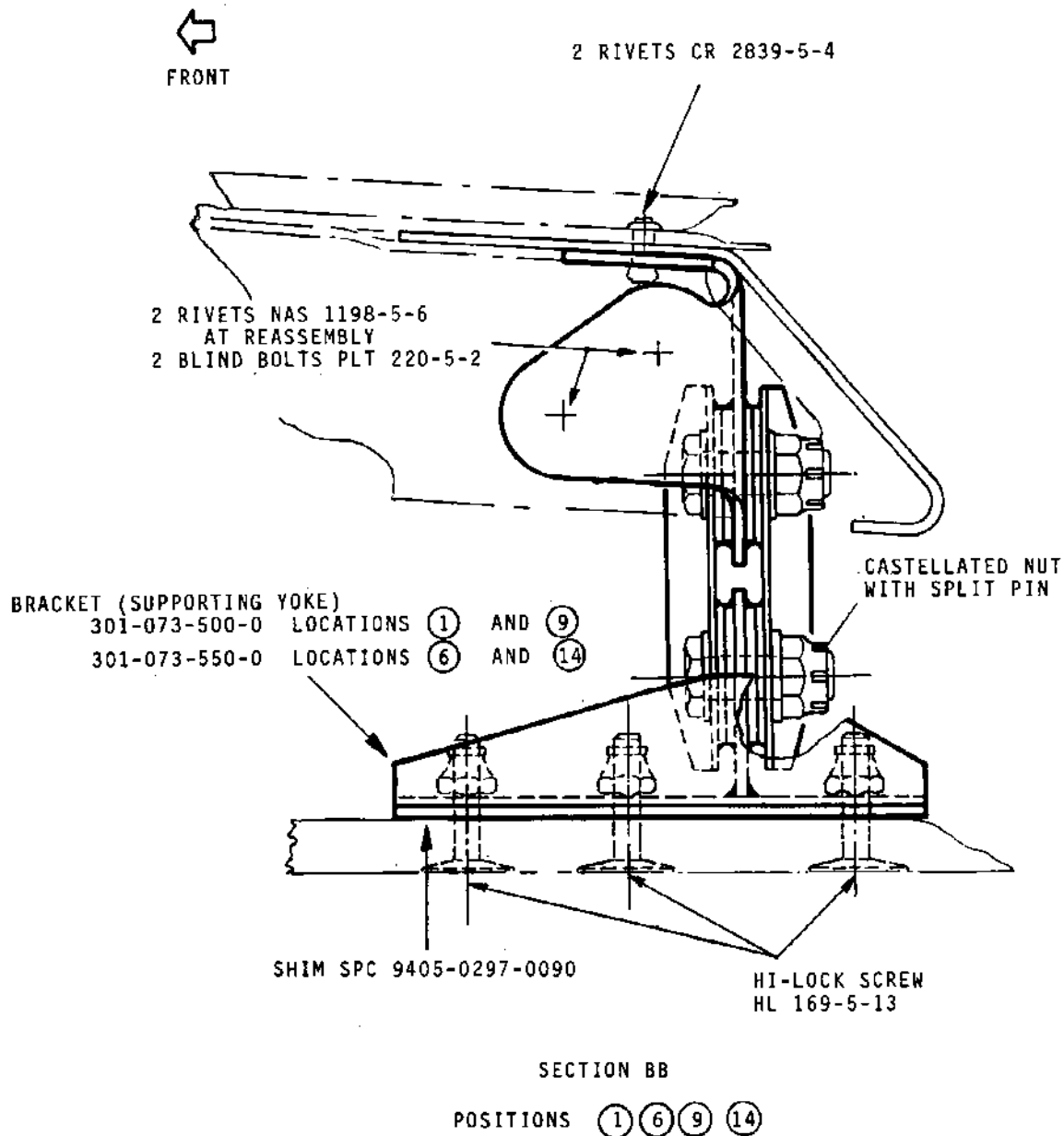


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THE INSTALLATION OF DOUBLER MAY
RESULT IN A THICKNESS CHANGE OR
IN THE ELIMINATION OF SHIM SPC

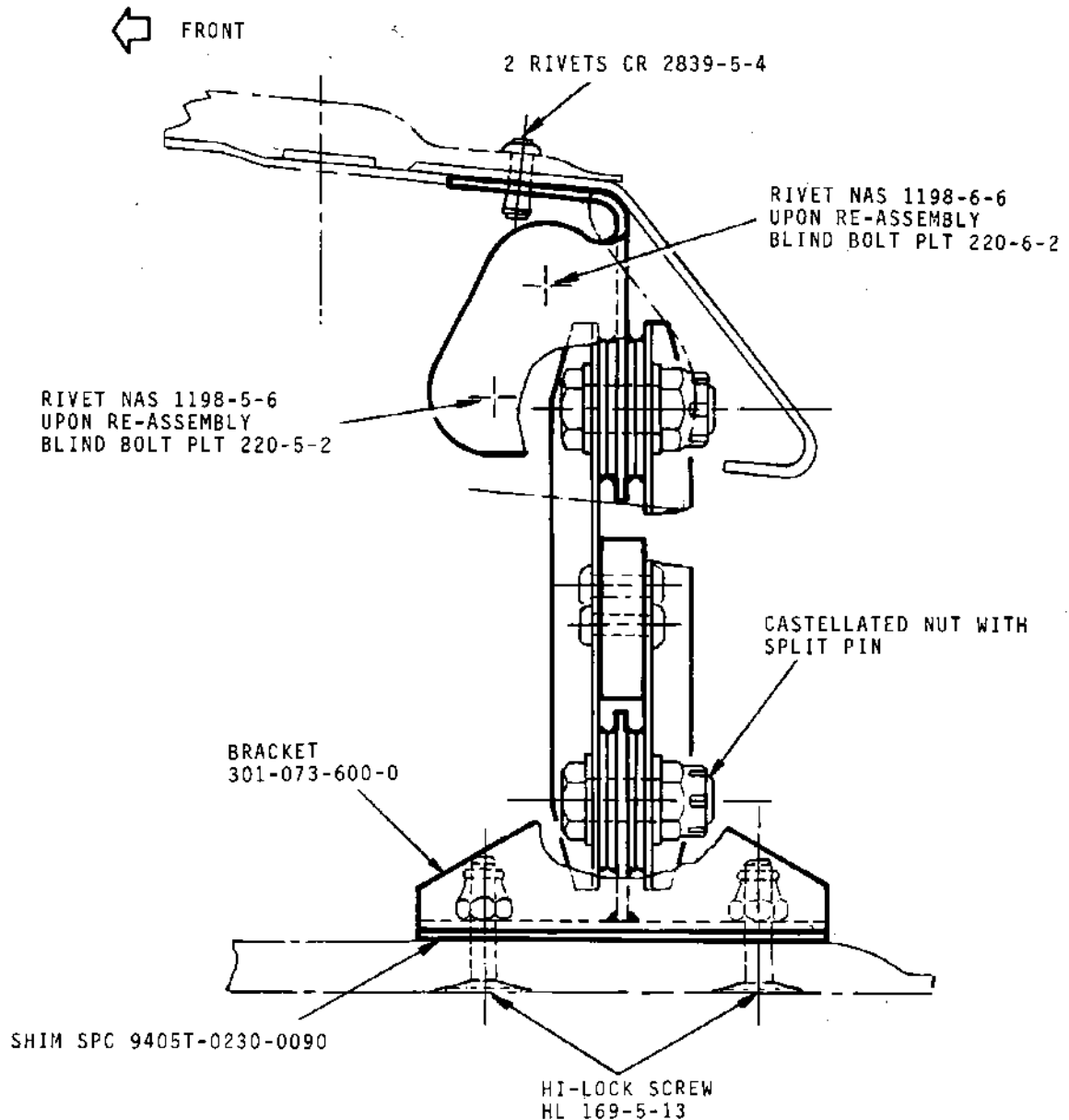
Identifying the Suspension Link Brackets (Supporting Yokes)
Figure 403 (Sheet 1 of 3)



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SECTION BB

TYPICAL FOR LOCATIONS (2) (5) (10) (13)

THE INSTALLATION OF DOUBLER MAY
RESULT IN A THICKNESS CHANGE OR
IN THE ELIMINATION OF SHIM SPC

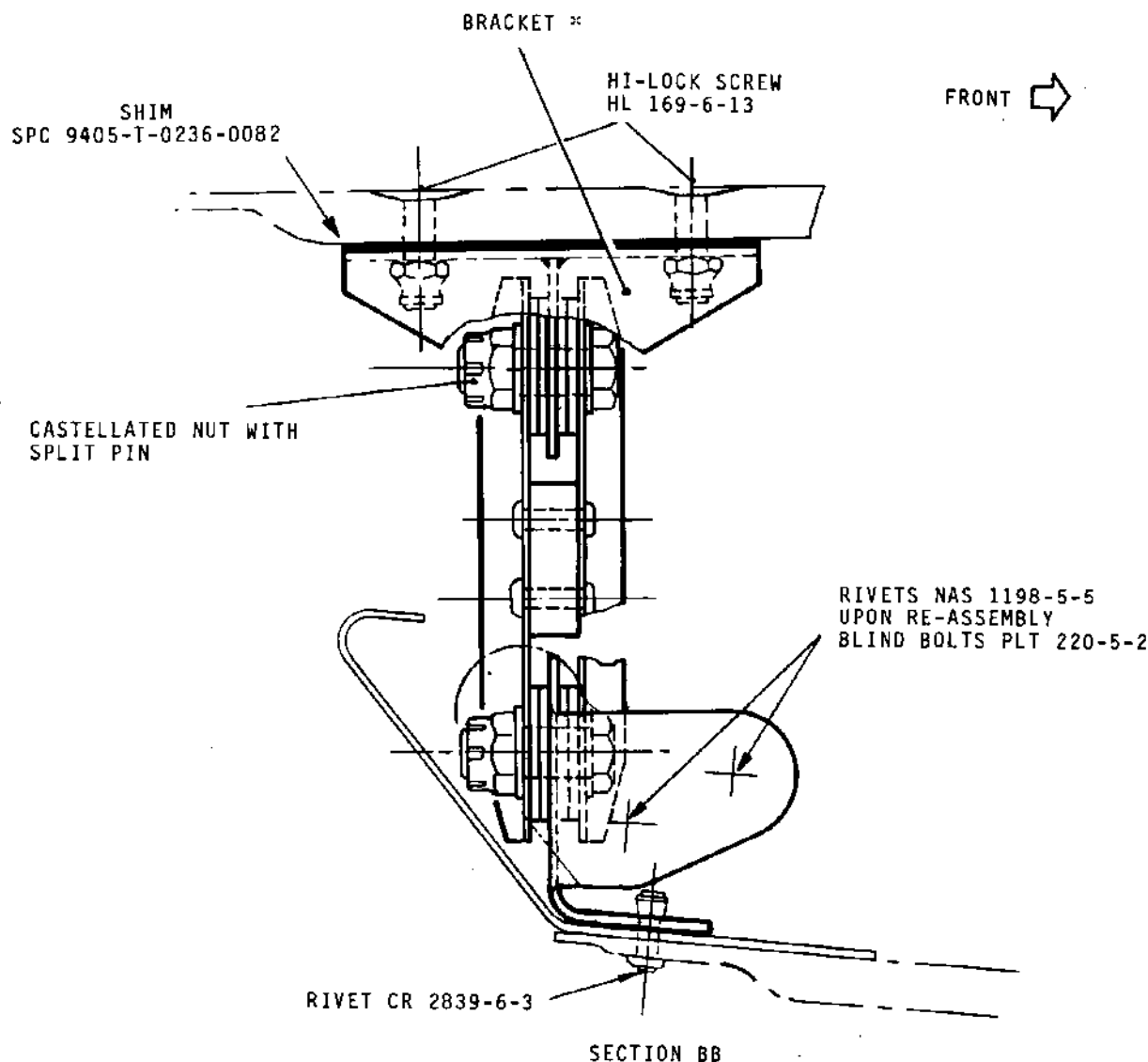
Identifying the Suspension Link Brackets (Supporting Yokes)
Figure 403 (Sheet 2 of 3)



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TYPICAL FOR LOCATIONS (3) (4) (7) (8) (11) (12) (15) (16)

* BRACKET 301-073-600-0 LOCATIONS (3) (8) (11) (16)

BRACKET 301-094-700-0 LOCATIONS (4) (12)

BRACKET 301-094-750-0 LOCATIONS (7) (15)

AT RE-ASSEMBLY, INSTALL A NEW BRACKET.
INSTALLATION OF DOUBLER MAY RESULT IN A THICK-
NESS CHANGE OR IN THE ELIMINATION OF SHIM SPC.

Identifying the Suspension Link Brackets (Supporting Yokes)
Figure 403 (Sheet 3 of 3)

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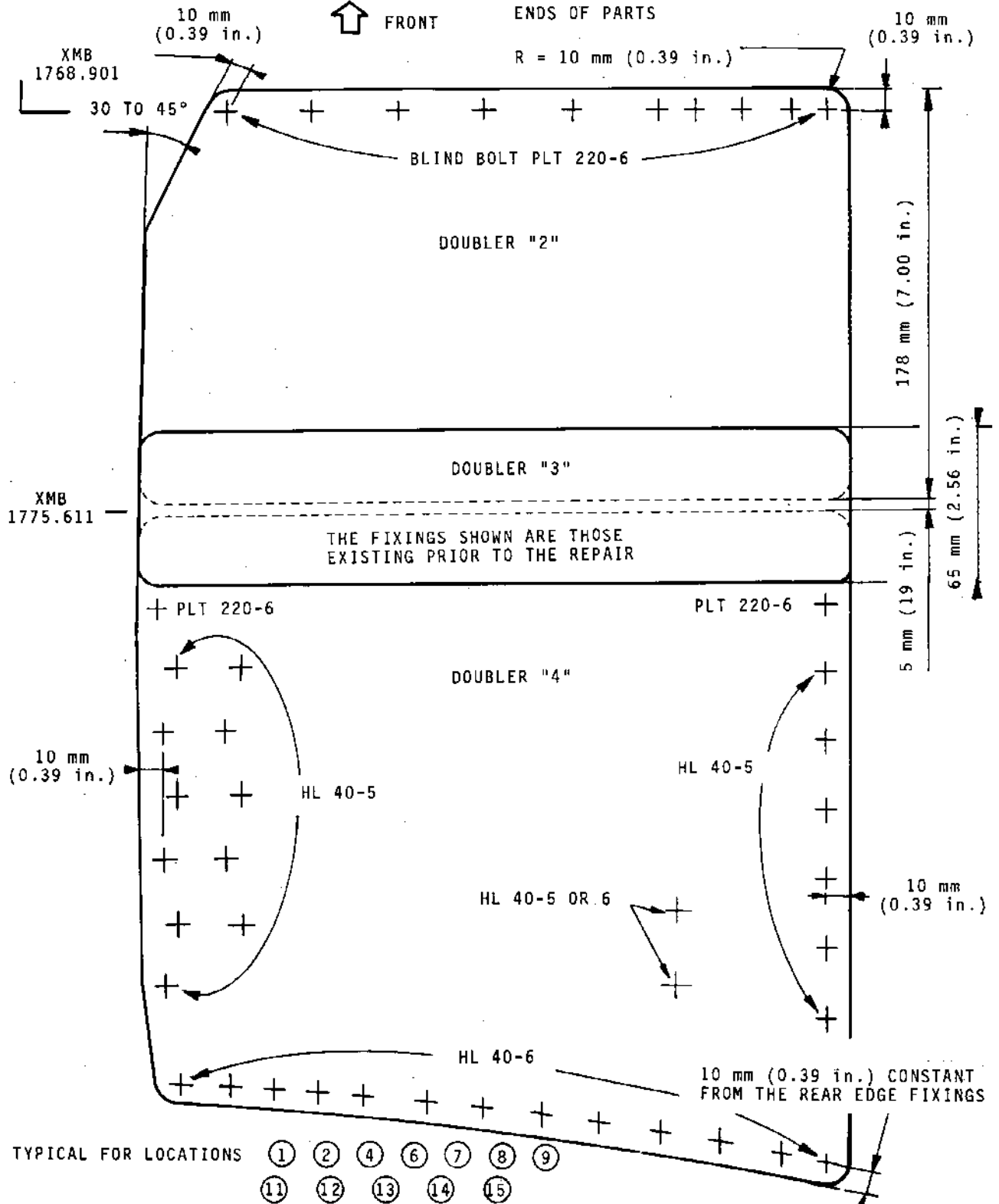
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Installing the Doublers
Figure 404 (Sheet 1 of 2)

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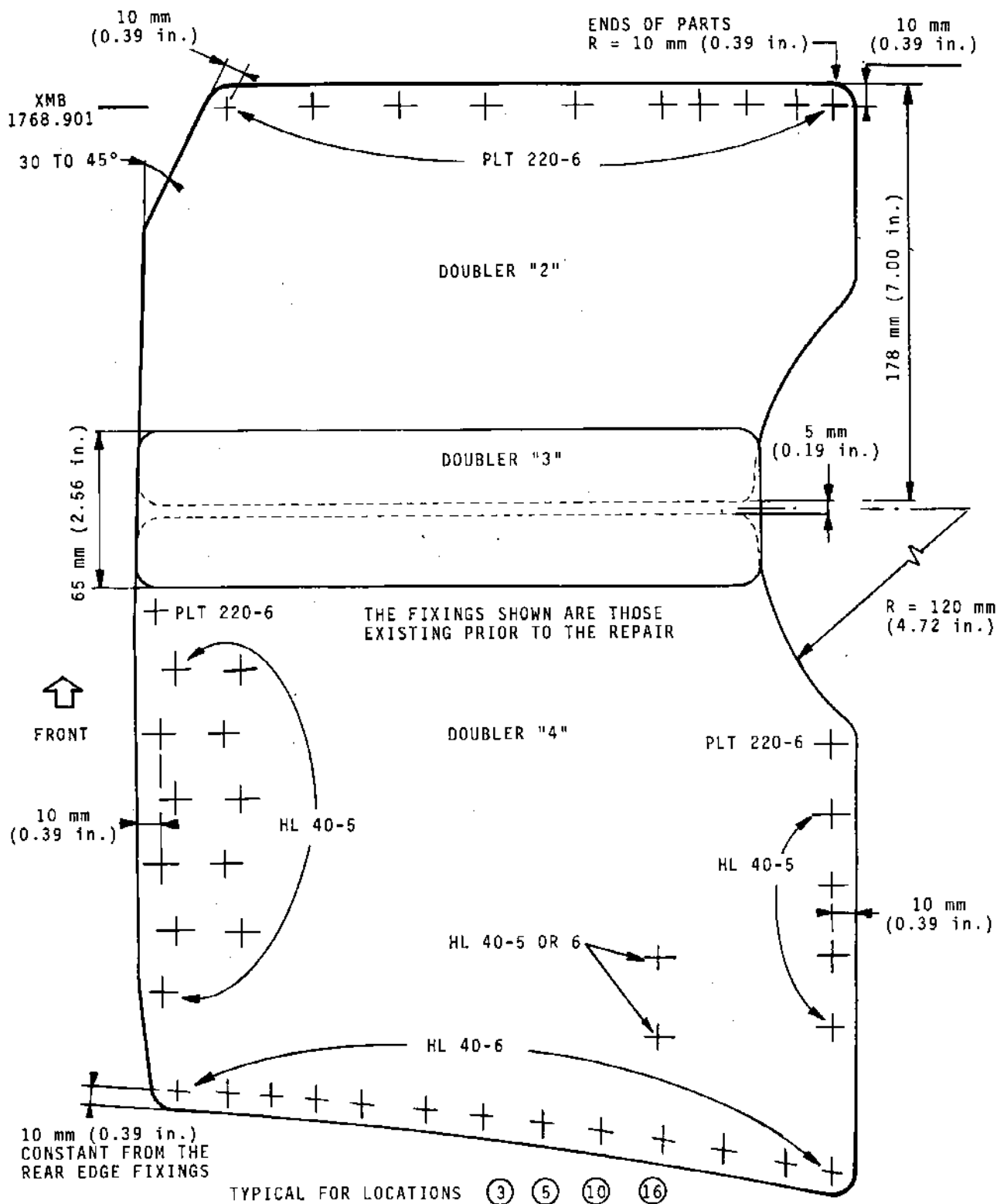


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Installing the Doublers
Figure 404 (Sheet 2 of 2)

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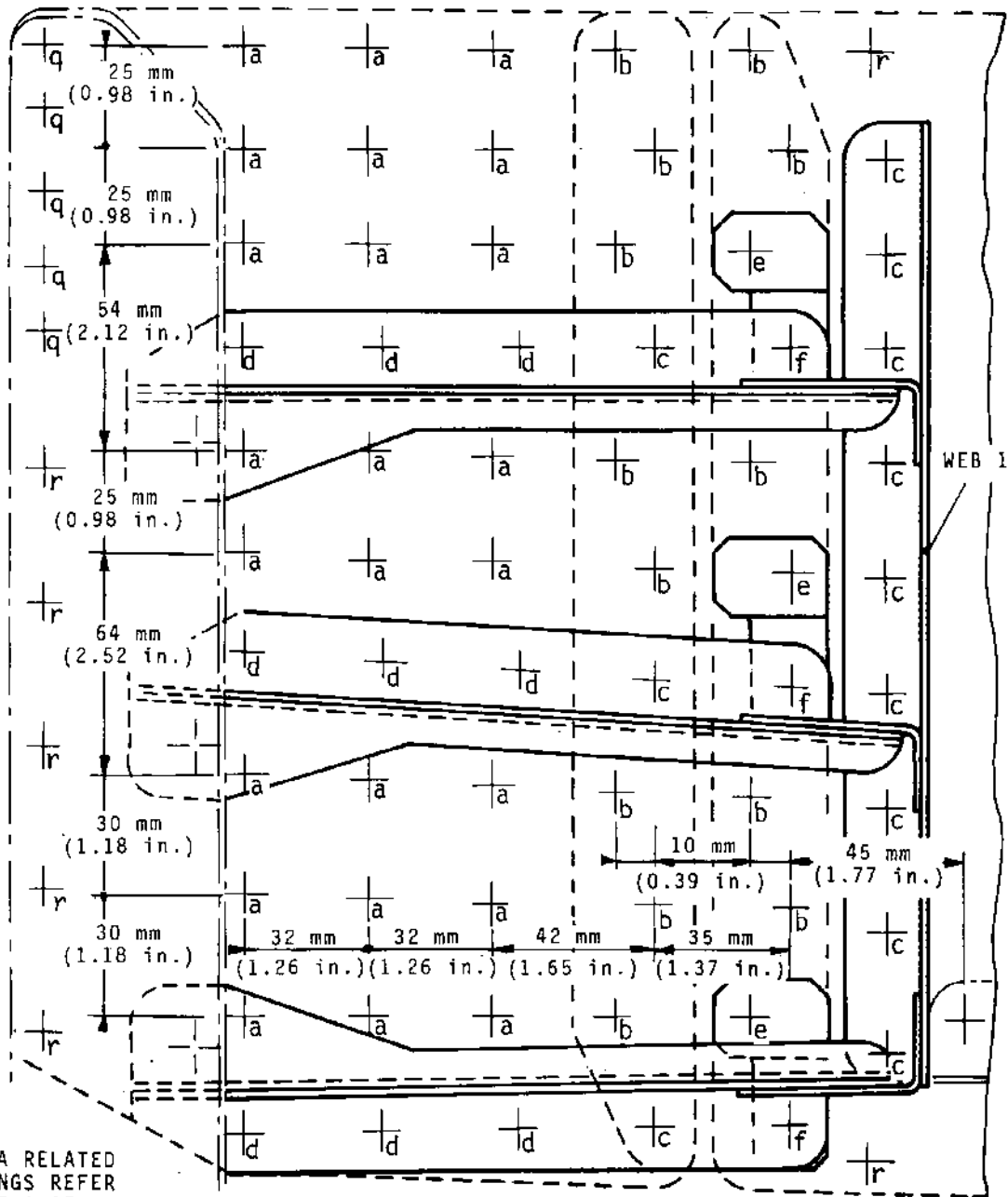
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XMB
1768-900

XMB
1777-700

NOTE : THE DRILLING DIMENSIONS ARE
FOR GUIDANCE ONLY, EACH HOLE TO BE
CENTERED IN ONE CELL.



FOR DATA RELATED
TO FIXINGS REFER
TO SHEET 9 OF 9

INNER SIDE VIEW (FRONT SECTION)

← FRONT

Repair through Installation of Doublers and Frames
Figure 405 (Sheet 1 of 9)

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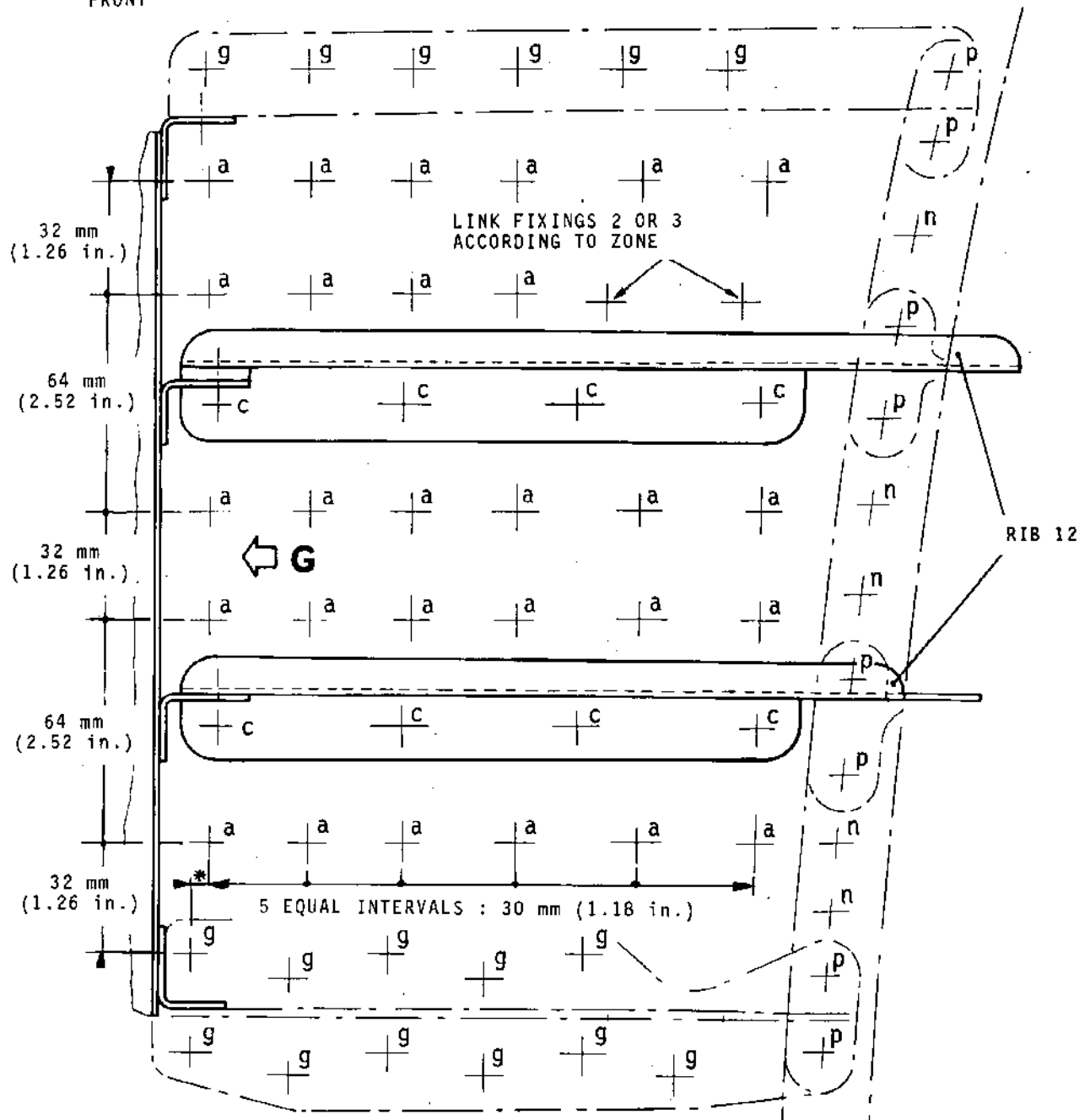
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FRONT

INNER SIDE VIEW (REAR SECTION)

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* 5 mm (0.196 in.)

FOR DATA RELATED TO FIXINGS
REFER TO SHEET 9 OF 9

NOTE : THE DRILLING DIMENSIONS
(HOLES IDENTIFIED a) ARE FOR
GUIDANCE ONLY : EACH HOLE TO BE
CENTERED IN ONE CELL.

Repair through Installation of Doublers and Frames
Figure 405 (Sheet 2 of 9)

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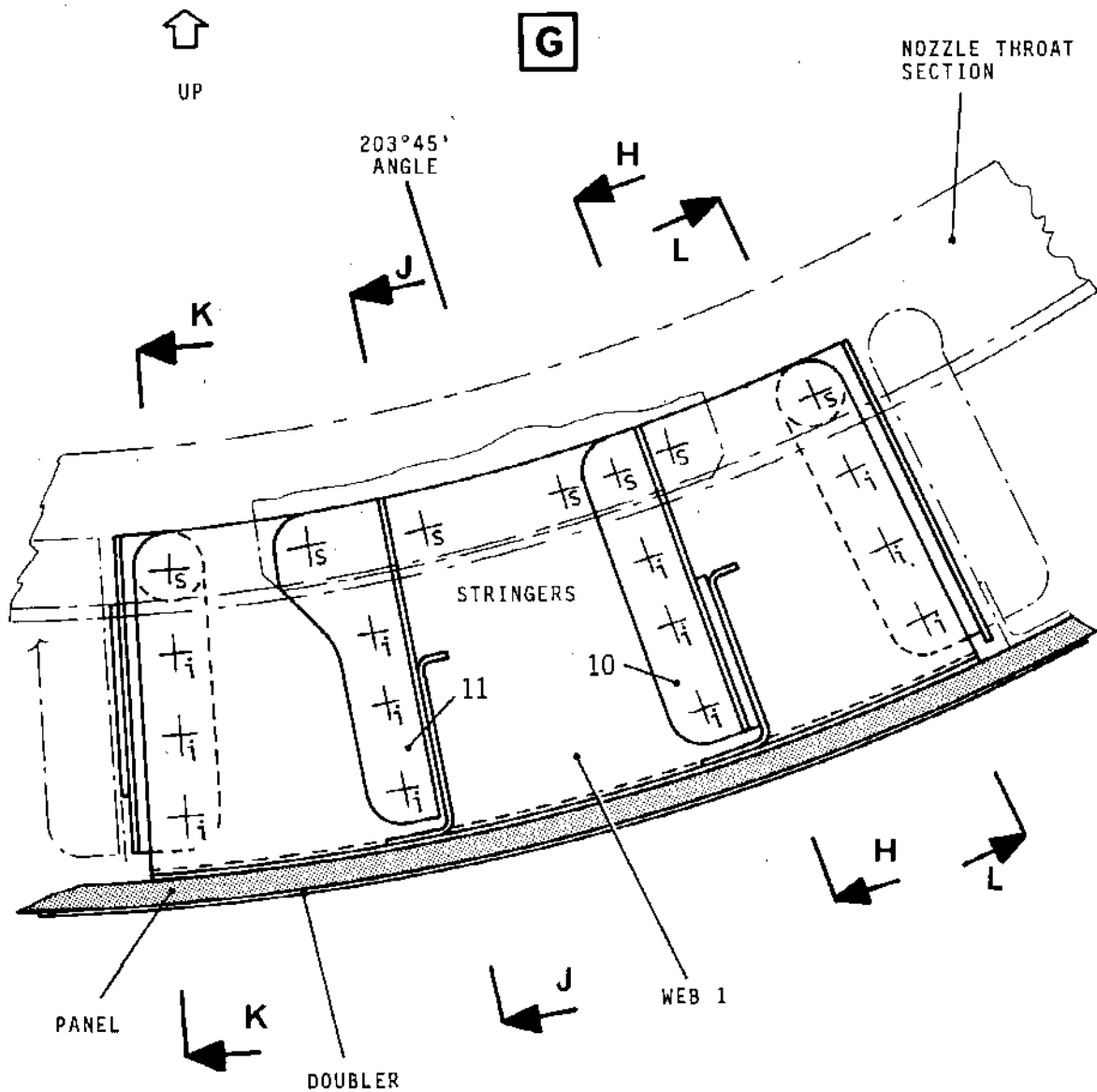
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FOR DATA PERTAINING TO
FIXINGS REFER TO SHEET 9 OF 9

Repair through Installation of Doublers and Frames
Figure 405 (Sheet 3 of 9)

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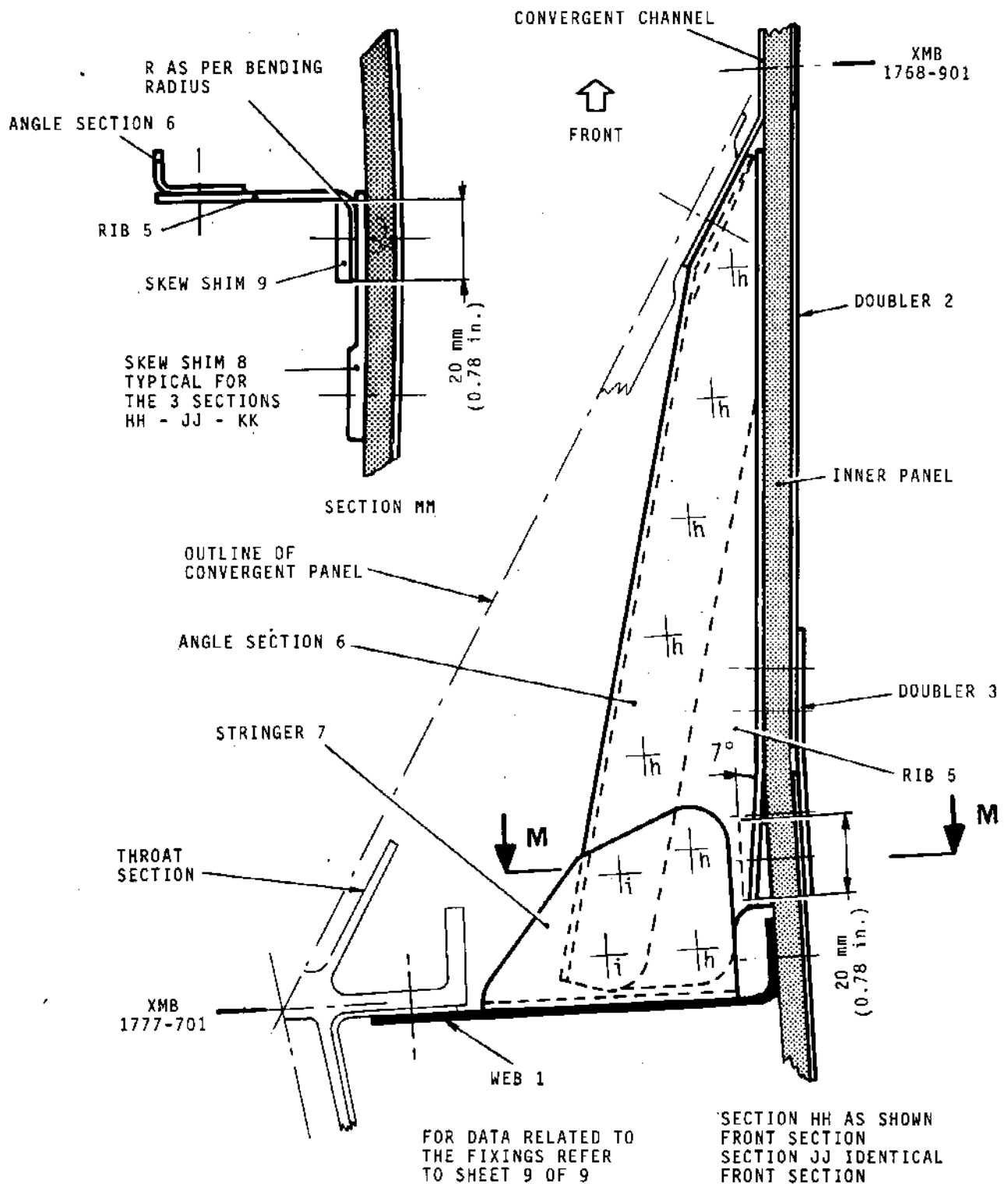


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Repair through Installation of Doublers and Frames
Figure 405 (Sheet 4 of 9)

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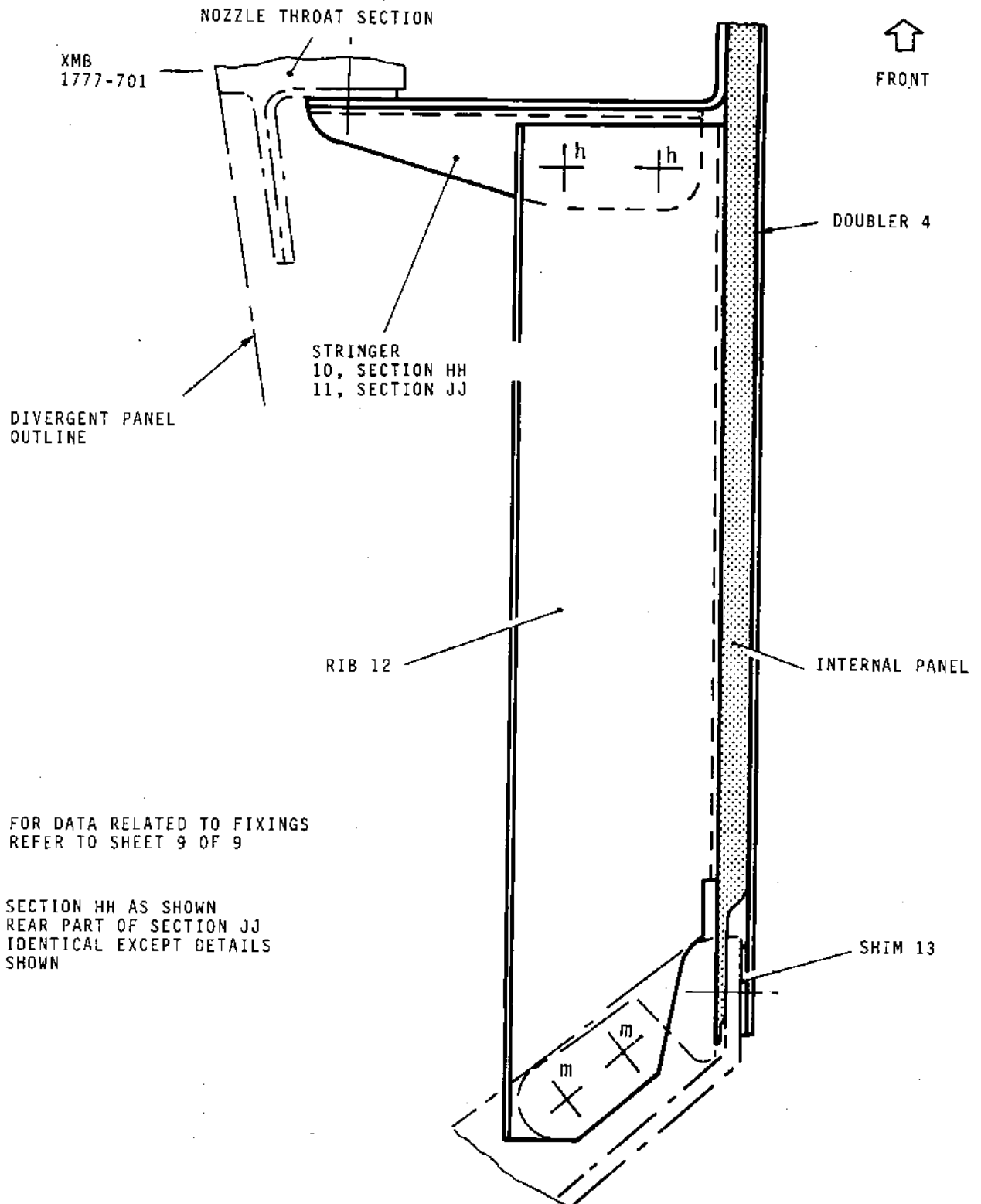
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FOR DATA RELATED TO FIXINGS
REFER TO SHEET 9 OF 9

SECTION HH AS SHOWN
REAR PART OF SECTION JJ
IDENTICAL EXCEPT DETAILS
SHOWN

Repair through Installation of Doublers and Frames
Figure 405 (Sheet 5 of 9)

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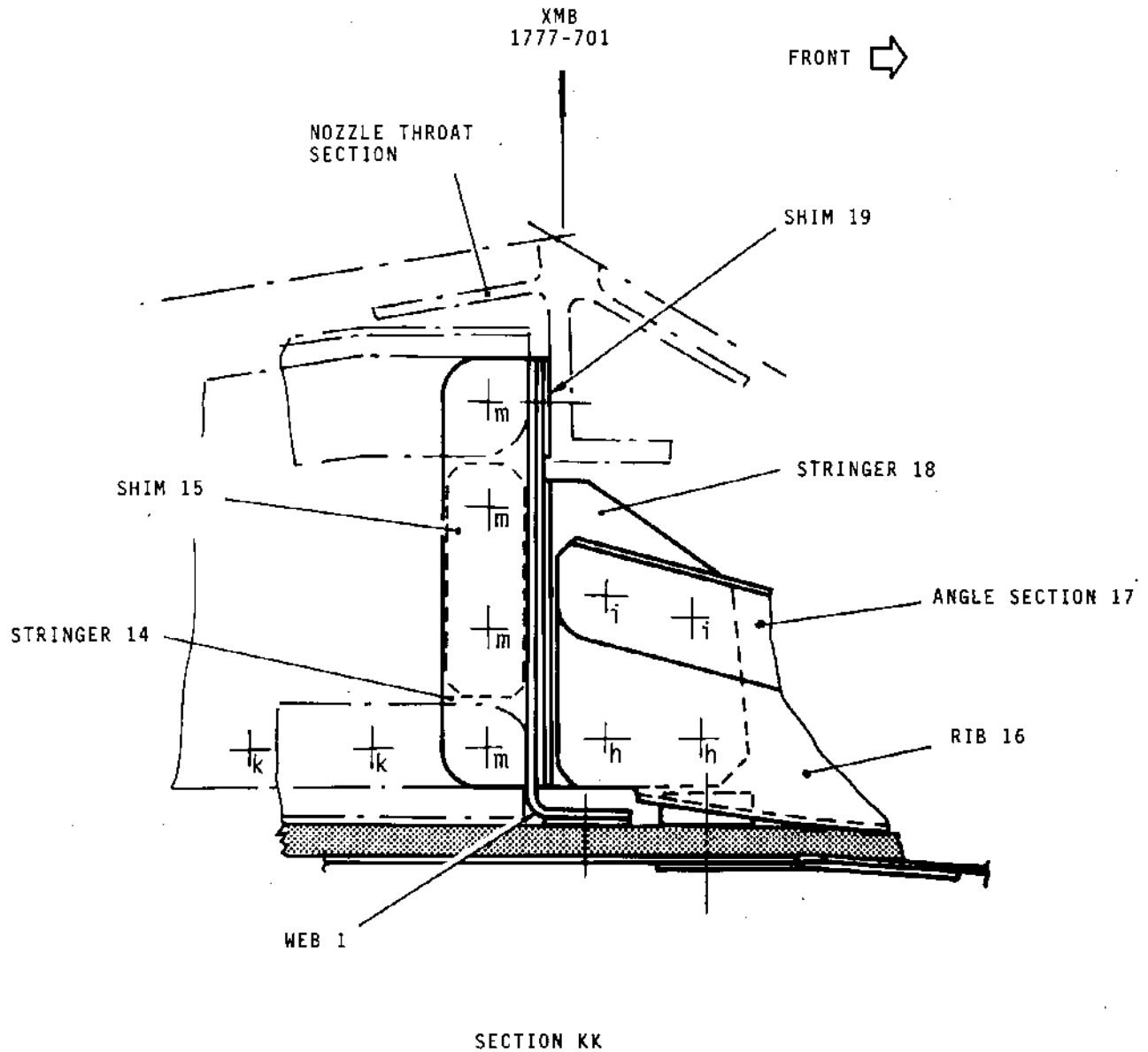
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FOR DATA RELATED TO FIXINGS REFER TO SHEET 9 OF 9

Repair through Installation of Doublers and Frames
Figure 405 (Sheet 6 of 9)

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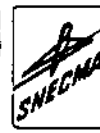
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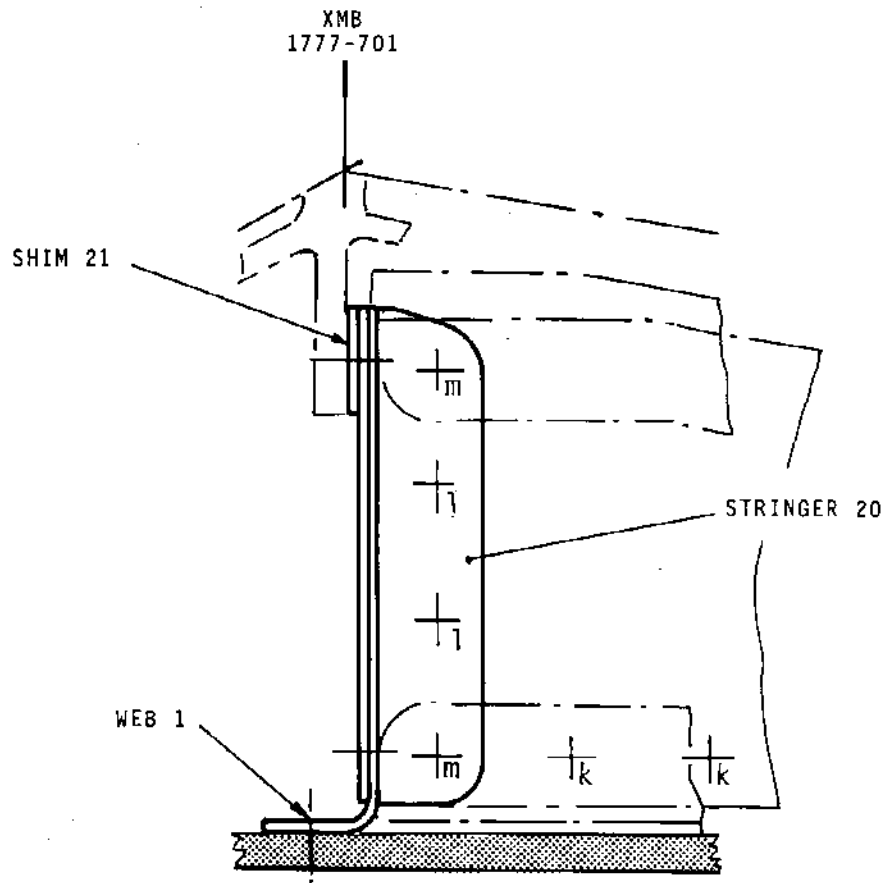


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OVERHAUL



FRONT



FOR DATA RELATED TO FIXINGS REFER TO SHEET 9 OF 9

SECTION LL - REAR PART

Repair through Installation of Doublers and Frame
Figure 405 (Sheet 7 of 9)

N

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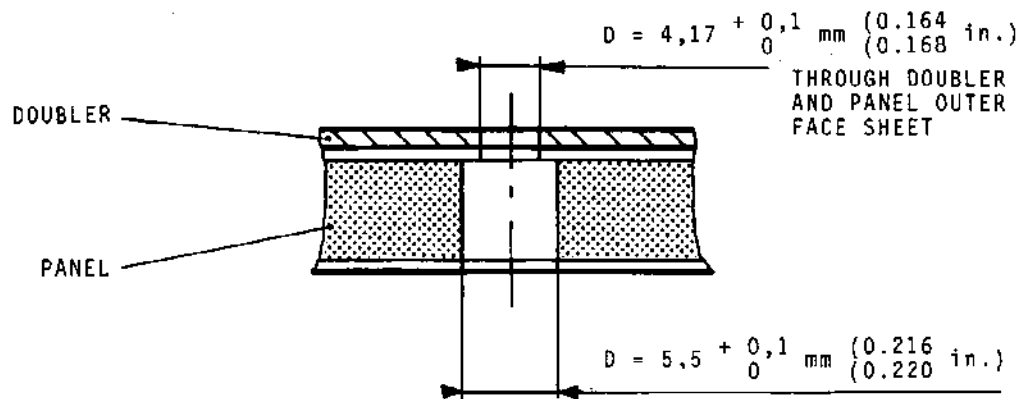
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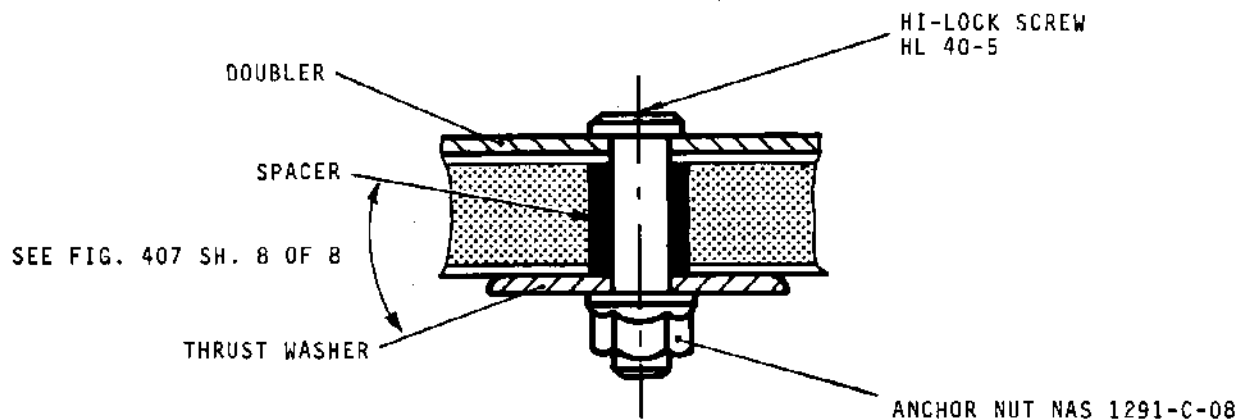


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DRILLING OF PANEL AND DOUBLERS
FOR FIXINGS IDENTIFIED a-b-c-d-e-f-g



INSTALLATION OF FIXINGS ON DOUBLER AND PANEL - TYPICAL

Repair through Installation of Doublers and Frames
Figure 405 (Sheet 8 of 9)

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IDENT. SYMBOL	FIXING	DRILL DIA. D =		NUT	THRUST WASHER	SPACER	NUT WASHER
		mm	in.				
a	SCREW HL-40-5-6 OR HL 40-5-7	4,17 ^{+0,1} ₀ (0.164) (0.168)		HL 97-5	002-003-995-0	002-003-992-5	
b	SCREW HL 40-5-7				002-003-995-0	002-003-992-5	
c	SCREW HL 40-5-7					002-003-992-5	AN 960-C8
d	SCREW HL 40-5-6 OR HL 40-5-7					002-003-992-5	AN 960-C8
e	SCREW HL 40-5-9					002-003-992-5	AN 960-C8
f	SCREW HL 40-5-10					002-003-992-5	AN 960-C8
g	SCREW HL 40-5-2					002-003-992-5	AN 960-C8
h	SCREW HL 40-5-2						AN 960-C8
i	SCREW HL 40-5-3						AN 960-C8
j	SCREW HL 40-5-4						AN 960-C8
k	SCREW HL 40-6-4	4,83 ^{+0,1} ₀ (0.190) (0.194)		HL 97-6			AN 960-C10
l	SCREW HL 40-6-5						AN 960-C10
m	SCREW HL 40-6-6						AN 960-C10
n	SCREW HL 40-6-8						AN 960-C10
p	SCREW HL 40-6-10						AN 960-C10
q	BLIND BOLT PLT220-6-7	5,05 ^{+0,08} ₊₀ (0.199) (0.202)					
r	BLIND BOLT PLT220-6-6	4,19 ^{+0,08} ₊₀ (0.165) (0.168)					
s	BLIND BOLT PLT220-5						

Repair through Installation of Doublers and Frames
Figure 405 (Sheet 9 of 9)

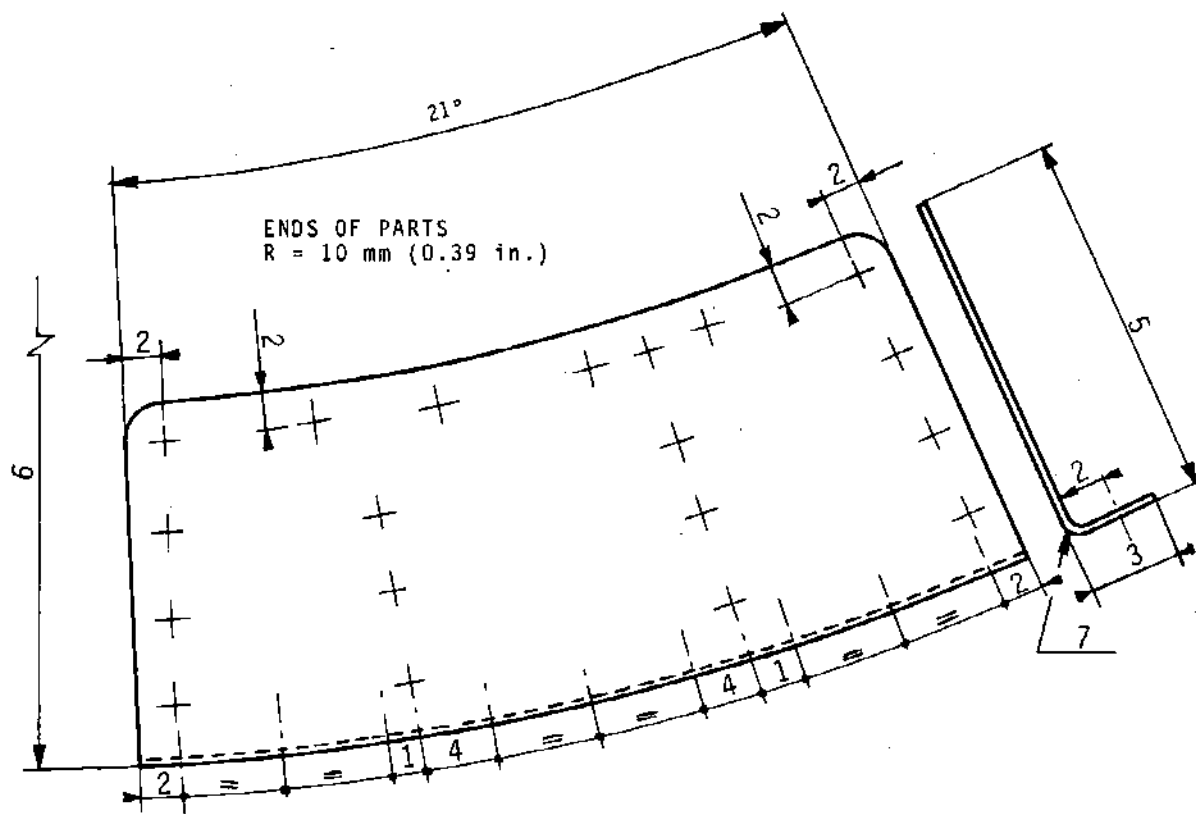
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HOLES TO BE COUNTERDRILLED UPON INSTALLATION
TOGETHER WITH THE CORRESPONDING STRINGERS



WEB 1 ; THICKNESS 1,2 mm (0.047 in.)
MATERIAL Z8 CND 15 (P 3305) CONDITION T1R3R2

IDENT. SYMBOL	DIMENSIONS	
	mm	in.
1	8	0.31
2	10	0.39
3	20	0.78
4	22	0.86
5	97	3.82
6	R=660	26.00
7	R=2	0.078

Sheet Metal Parts Manufacturing Details
Figure 406 (Sheet 1 of 8)

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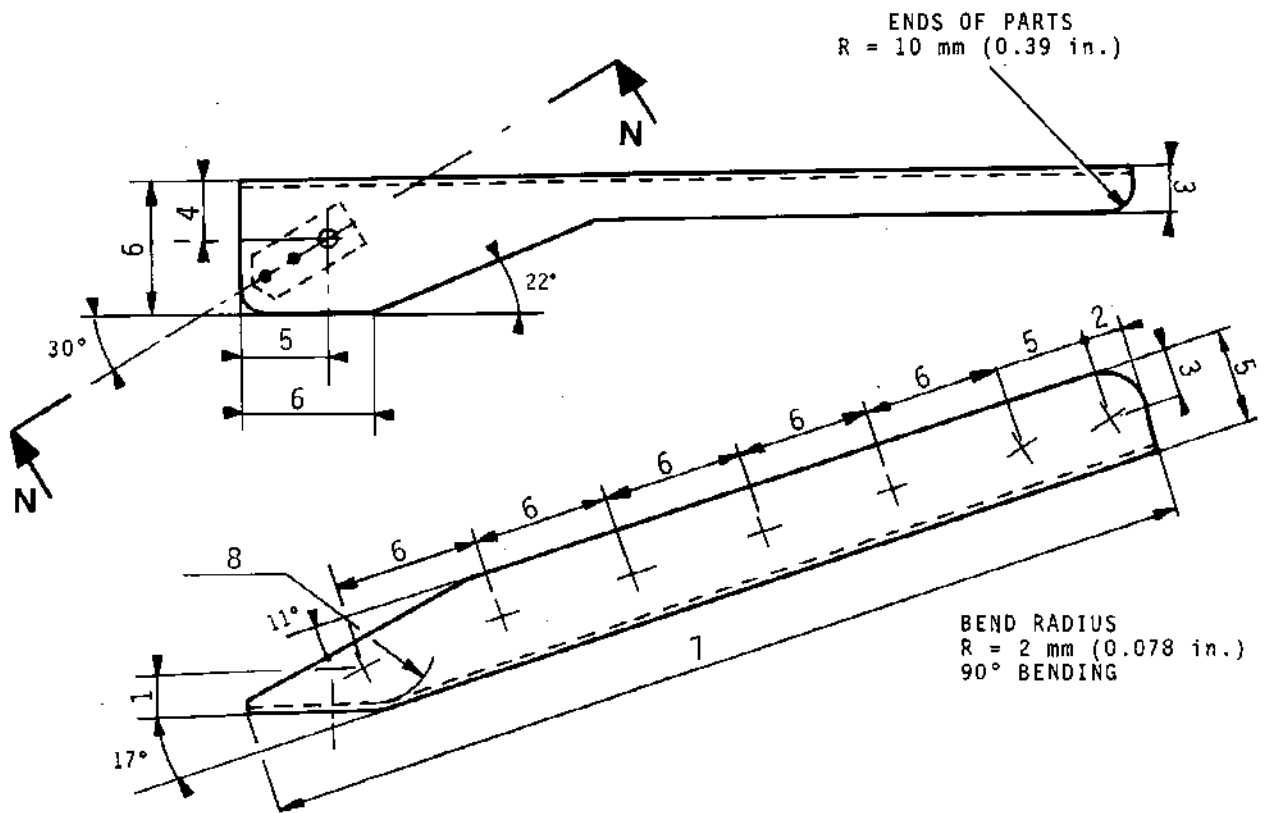
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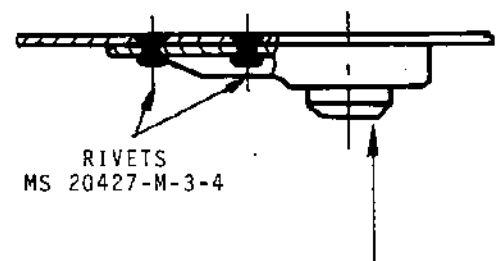
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IDENT. SYMBOL	DIMENSIONS	
	mm	in.
1	6	0.23
2	8	0.31
3	10	0.39
4	13	0.51
5	20	0.78
6	30	1.18
7	208	8.19
8	R=15	0.59

SECTION NN



ANGLE SECTION 6 AS SHOWN
ANGLE SECTION 17 SYMMETRICAL
HOLES TO BE COUNTERDRILLED
UPON INSTALLATION WITH RIBS :
5 FOR ANGLE SECTION 6
16 FOR ANGLE SECTION 17
THICKNESS 1,2 mm (0.047 in.)
MATERIAL Z8 CND 15 (P 3305)
CONDITION T₁R₃R₂

Sheet Metal Parts Manufacturing Details
Figure 406 (Sheet 2 of 8)

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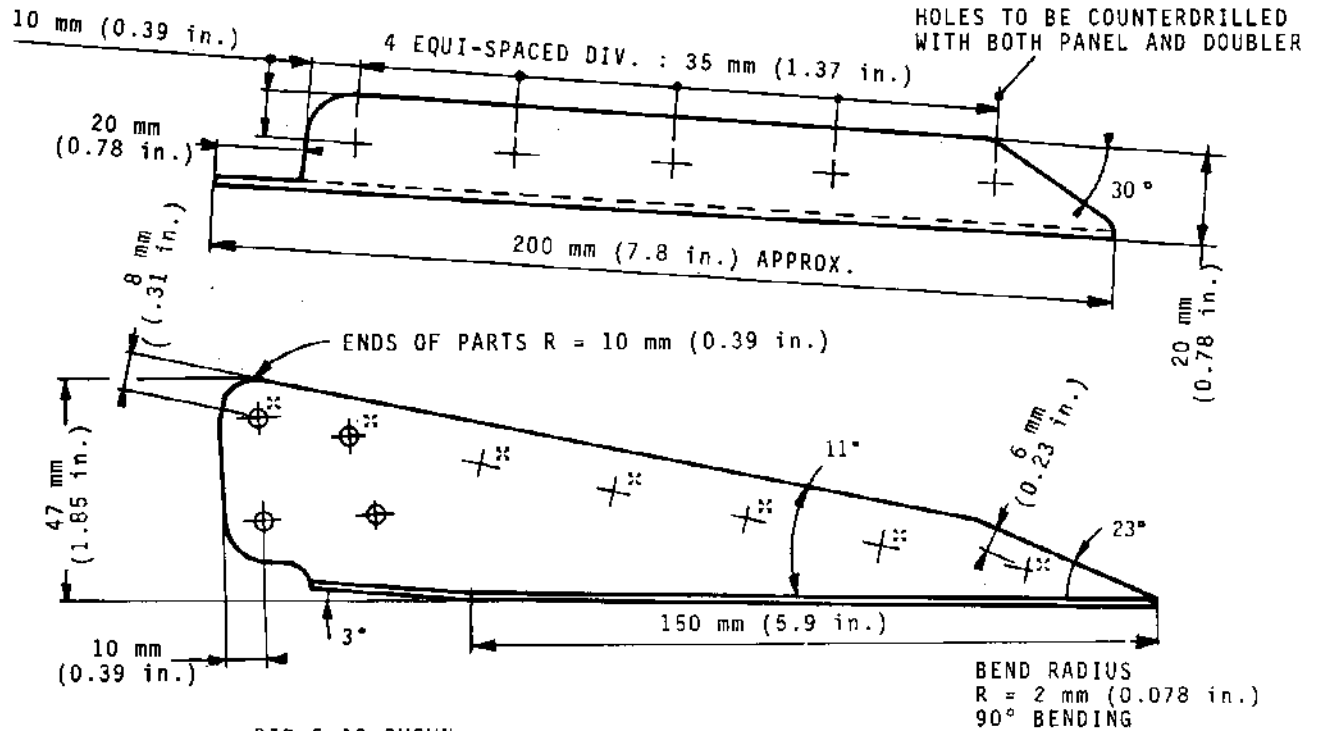


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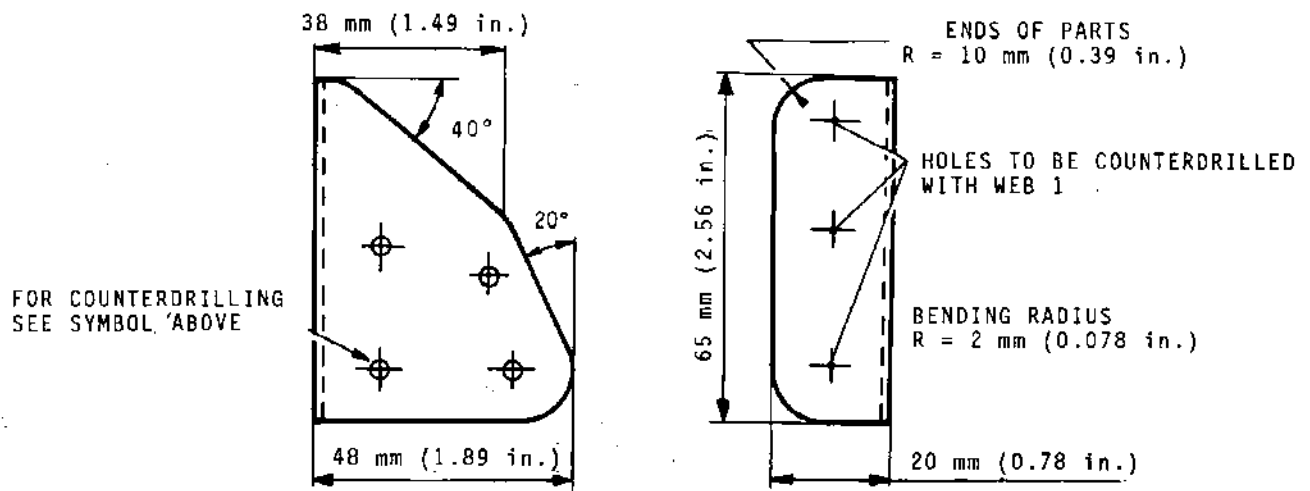


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RIB 5 AS SHOWN
RIB 16 SYMMETRICAL
HOLES TO BE COUNTER-
* DRILLED UPON INSTALLATION
WITH :
ANGLE SECTION 6 FOR RIB 5
ANGLE SECTION 17 FOR RIB 16
HOLES TO BE COUNTERDRILLED
UPON INSTALLATION WITH :
STRINGER 18 FOR RIB 16
STRINGER 7 FOR RIB 5

THICKNESS 1,2 mm (0.047 in.)
MATERIAL 28 CND 15 (P 3305)
CONDITION T₁R₃R₂



STRINGER 7 AS SHOWN THICKNESS 1,2 mm (0.047 in.)
STRINGER 18 SYMMETRICAL MATERIAL 28 CND 15 (P 3305) CONDITION T₁R₃R₂

Sheet Metal Parts Manufacturing Details
Figure 406 (Sheet 3 of 8)

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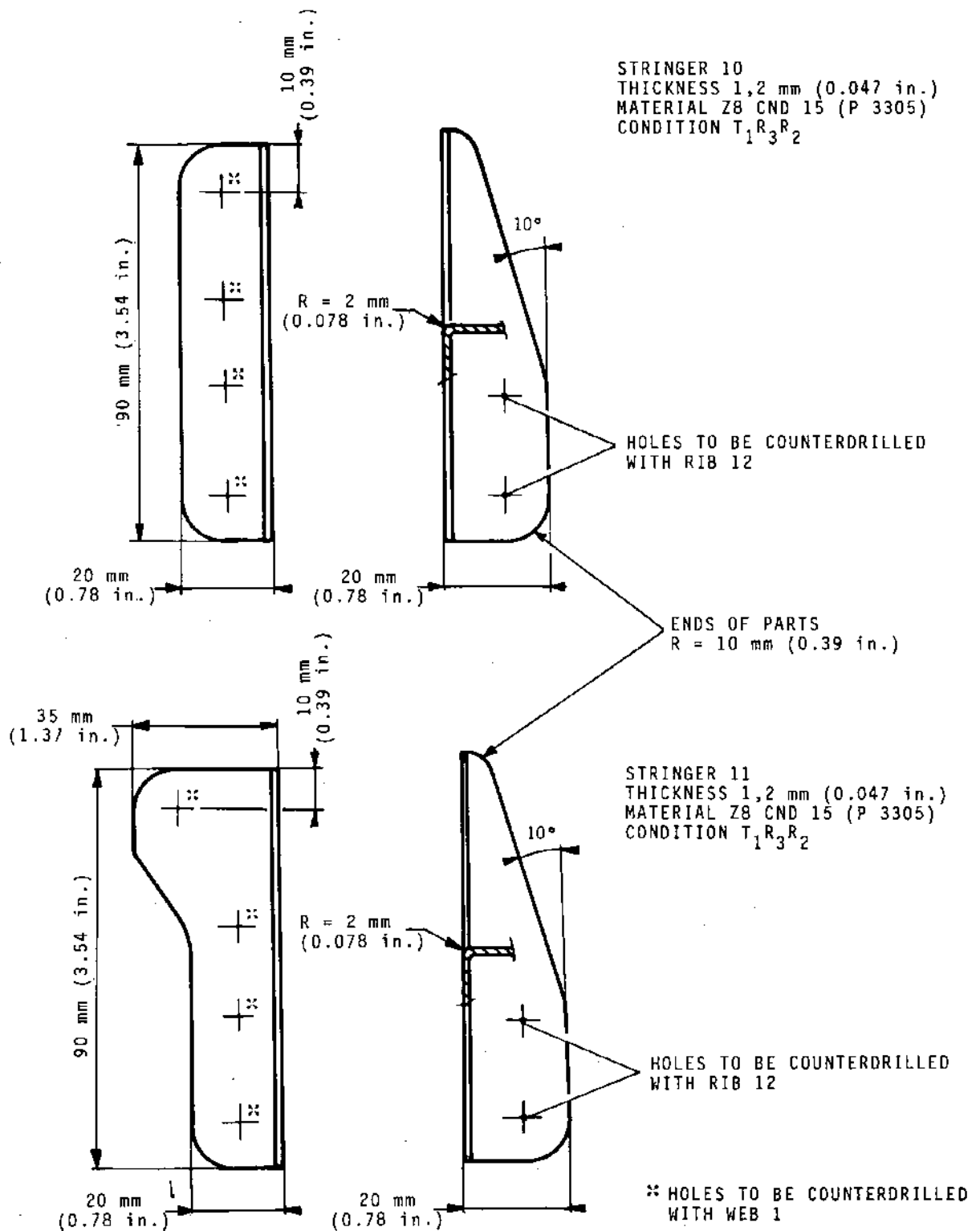
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Sheet Metal Parts Manufacturing Details
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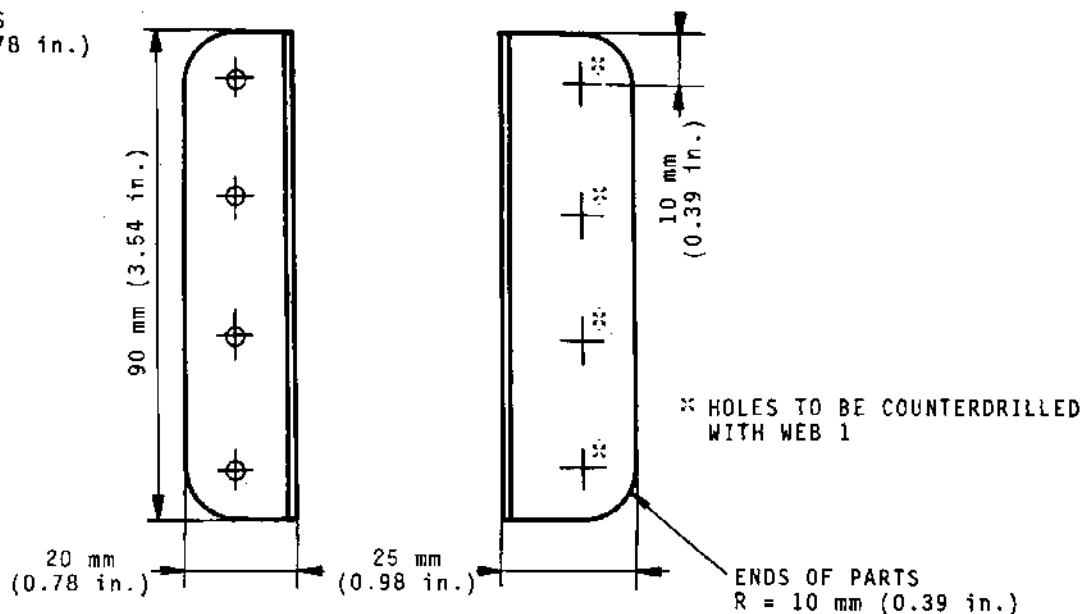
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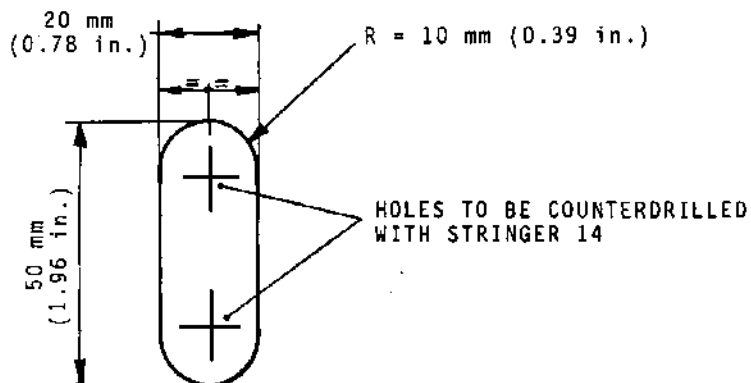


BENDING RADIUS
R = 2 mm (0.078 in.)



⊕ HOLES TO BE TRANSFER-DRILLED
WITH EXISTING PARTS .
SEE : SECTION KK
SECTION LL

STRINGER 14 AS SHOWN
STRINGER 20 SYMMETRIC
THICKNESS 1,2 mm (0.047 in.)
MATERIAL Z8 CND 15 (P 3305)
CONDITION T₁R₃R₂



SHIM 15 MATERIAL T 40 (P 3340)
THICKNESS 1,6 mm (0.063 in.)

Sheet Metal Parts Manufacturing Details
Figure 406 (Sheet 5 of 8)

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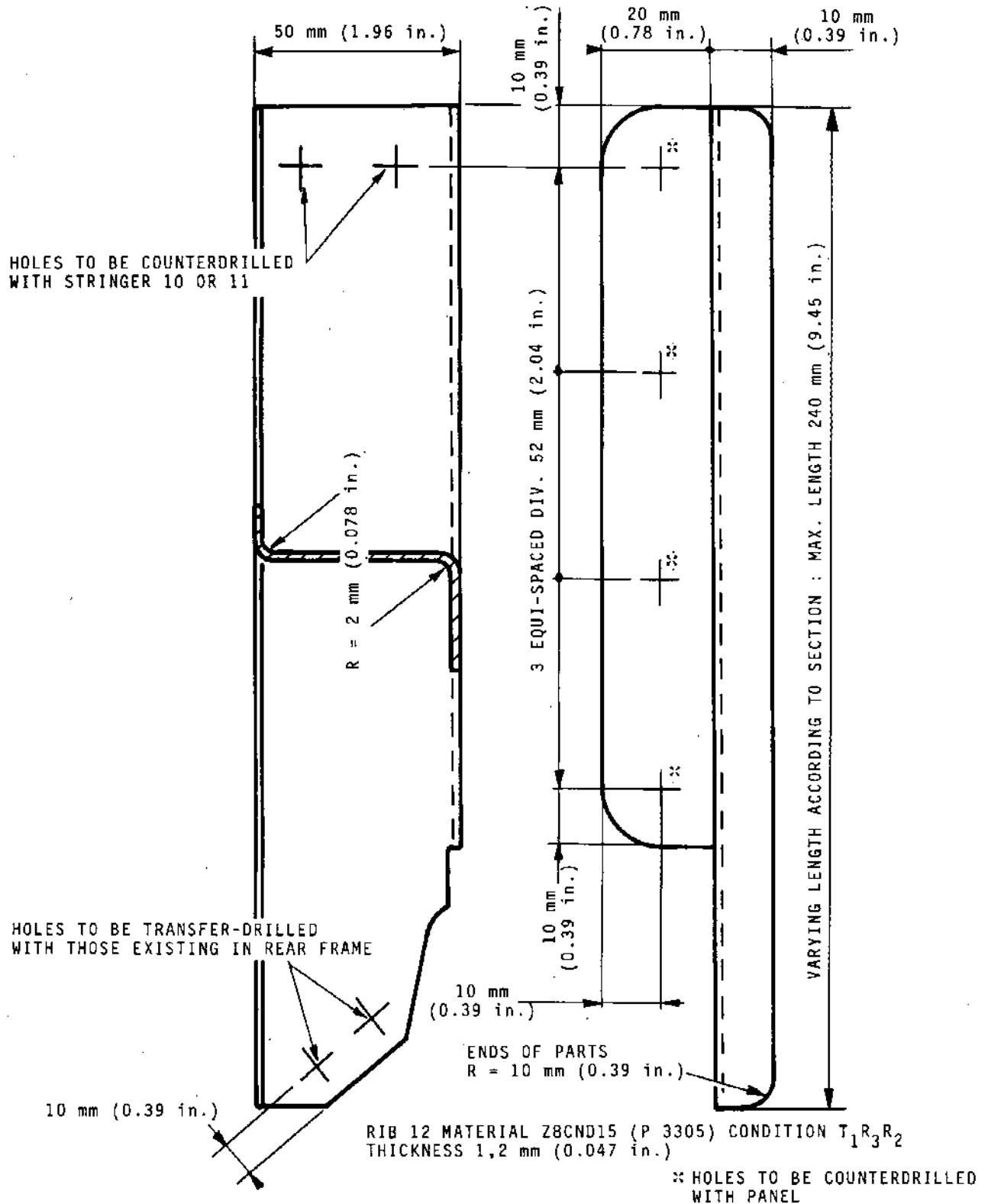
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Sheet Metal Parts Manufacturing Details
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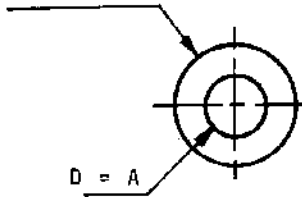
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D = 16 mm (0.63 in.)



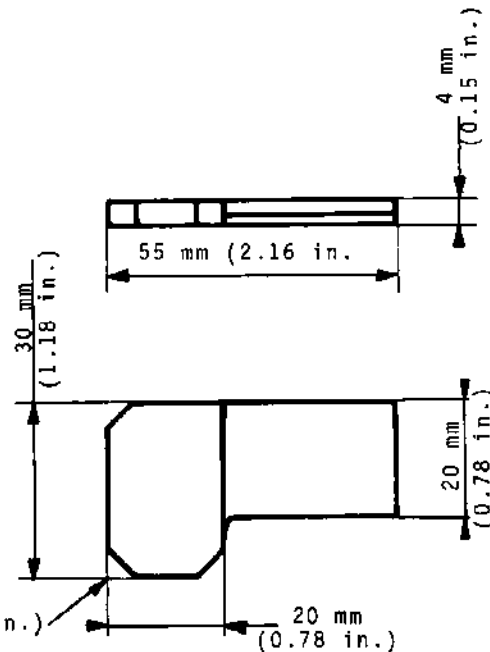
MATERIAL T40 (P 3340)

SHIM INDEX No.	THICKNESS		D = A	
	mm	in.	mm	in.
15	1,6	0.063	4,83 + 0,1 0	0.190 0.194
21 23	0,8	0.031	4,19 + 0,1 0	0.165 0.169



SKEW SHIM 8
MATERIAL T40 (P 3340)

5 X 5 mm (0.19 X 0.19 in.)



Sheet Metal Parts Manufacturing Details
Figure 406 (Sheet 7 of 8)

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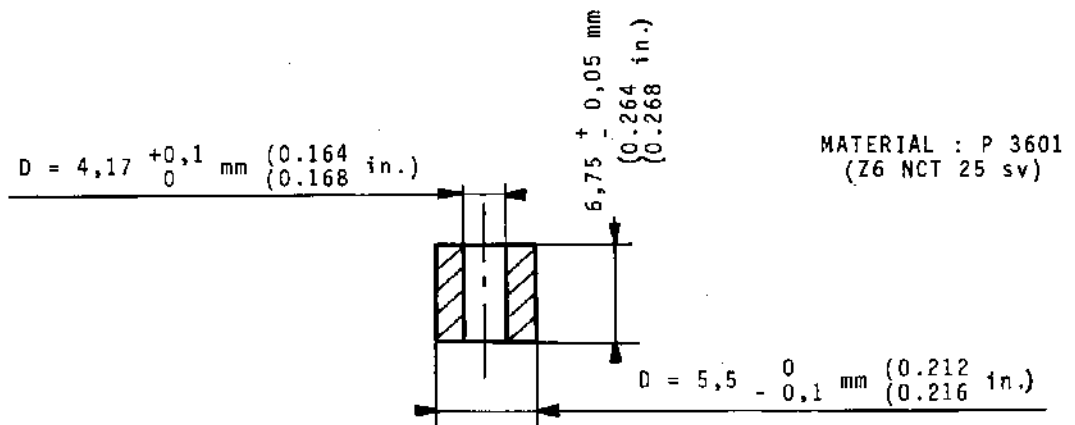
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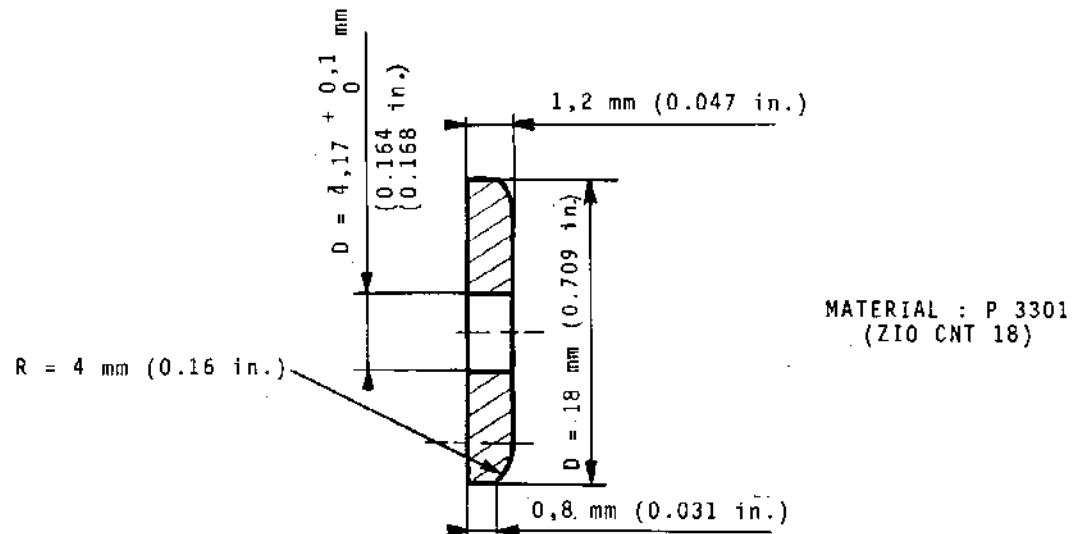


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SPACER 002-003-992-3



THRUST WASHER 002-003-995-0

Sheet Metal Parts Manufacturing Details
Figure 406 (Sheet 8 of 8)

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REPAIRTWIN SECONDARY NOZZLE (29-190)18. Repair of wrinkling or core-to-face sheet separations on rear side-panelPARTS REQUIRED FOR REPAIR

Sheeting P3305 (Z8 CND 15), 1,2 mm (0.047 in.) in thickness		
Spacer	002-003-992-3	
Washer	002-003-995-0	
Washer	002-004-005-0	
Washer AN 960 C 8		(649-786-152-0)
Bolt HL 40-5-8		(649-781-336-0)
HL 40-5-6		(649-781-294-0)
HL 40-5-7		(649-781-295-0)
HL 40-6-6		(649-781-300-0)
HL 40-6-7		(649-781-301-0)
HL 40-6-8		(649-781-302-0)
HL 40-8-7		(649-781-305-0)
HL 40-8-8		(649-781-306-0)
HL 48-8-9		(649-781-307-0)
Bolt HL 144-5-12		(649-781-706-0)
Nut HL 97-5		(649-782-257-0)
HL 97-6		(649-782-258-0)
HL 97-8		(649-782-252-0)
Nut HLN1 G 5		(649-785-047-0)
HLN1 G 8		(649-785-049-0)
Bolt		(649-781-527-0)
or Bolt NAS 1578 C 4T 10		(649-781-440-0)
Bolt		(649-781-027-0)
or Bolt NAS 1578 C 4T 7		(649-781-441-0)

A. Checking the extent of damage

- (1) Perform a coin tapping test to ascertain the extent of the core-to-face sheet separation.
- (2) Carry out a radiographic inspection, using an X-ray unit complete with a long anode, as instructed in the Standard Practices Manual, Chapter section 70-20-30, as shown in Fig. 401, with the following remarks

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taken into account :

- (a) Make a straight shot of each area (see example of point B in area 2 - Fig. 402).
 - (b) Make two shots at 15° of each area to expose the delaminated segment (see example of points C and D in area 2 - Fig. 402).
- (3) Depending on the extent of damage, there are two possible forms of repair applicable to each area.
- (a) A minor extent of separation with wrinkling, limited to the inner panel face and not involving destruction of the ribbon, or else (separation alone : Repair by application of an internal doubler).
 - (b) Extensive separation on both faces, with the ribbon not destroyed, with or without wrinkling on the inner face : Repair by applying two doublers.

NOTE : Heavy damage occurring concurrently in areas 1 and 2 (see Fig. 401) is to be dealt with by the use of one outer doubler in both types of repair. The same applies to areas 2 and 3, 3 and 4, 5 and 6, 6 and 7, and 7 and 8.

B. Repair by application of one doubler to the inner panel face (appropriate to areas 1 through 8).

(1) Making a doubler

- (a) Lightly rub the panel with a fine emery cloth . until the honeycomb pattern shows through.
- (b) Stick a sheet of tracing paper on the panel and trace out the honeycomb cell outlines, the outer contours of the doubler and the locations of the retaining holes. Drill-mark these hole locations on the panel.

NOTE : Each hole must invariably lie at the centre of a cell.

- (c) Stick the tracing paper on a plate made from Z 8 CND 15 sheet metal P3305 of 1,2 mm (0.047 in.) thickness, previously shaped to the contours of the panel : next trace out the doubler outline.

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- (d) Cut out the doubler, and mark out the area around the wrinkled surface as shown in Fig. 403, Sheet 1 or 2 depending on the area concerned).

(2) Drilling the panel and doubler

- (a) Drill out the holes in the panel to a dia. of $4,17 + 0,1 \text{ mm}$ (0.164 in.), and deburr.
 $+ 0$ (0.168 in.)
- (b) Put the doubler in position on the panel and drill-mark the retaining-hole locations.
- (c) Take off the doubler and drill its marked-out holes to a dia of $4,17 + 0,1 \text{ mm}$ (0.164 in.),
 $+ 0$ (0.168 in.), deburr.
- (d) Bore out the spacer holes in the panel to a dia. of $5,5 + 0,1 \text{ mm}$ (0.216 in.)
 $+ 0$ (0.220 in.) as shown in Fig. 403, Sheet 3 of 6.

NOTE : Do not pierce the outer skin of the panel.

(3) Mounting on the doubler

- (a) Fix the spacers in the panel holes with Loctite 307 (P502) to hold them fast while fitting the Hi-Lok bolts.
- (b) Locate and pin the doubler on the panel.
- (c) Fasten the doubler on with Hi-Lok bolts (See Fig. 403) as instructed in the Standard Practices Manual, Chapter Section 70-50-40, and below :
- 1 Use HL 144-5-12 or, exceptionally, HL 40-5-7 bolts, with a thrust washer placed underneath the bolt head.
- 2 Remove the pins one by one, putting a Hi-Lok bolt in the place of each.
- (d) Check the way the Hi-Lok bolts have been applied, as instructed in the Standard Practices Manual, Chapter Section 70-50-84.

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C. Repair by application of two doublers (as appropriate to areas 2-3-6-7, Fig. 401)

(1) Making up the doublers

- (a) Lightly rub the panel with a fine emery cloth so as to make the honeycomb pattern show through.
- (b) Stick a sheet of tracing paper on the outer skin of the panel and trace out the cell outlines, the locations of the existing fastenings, the outer contours of the doublers, and the locations of the new retaining holes (see Fig. 404).

NOTE : Each hole must invariably lie at the centre of a cell.

- (c) Remove the existing fasteners from the panel, as shown in Fig. 404 and directed in the Standard Practices Manual, Chapter Sections
 - 70-50-40 for fasteners marked B, C and H
 - 70-50-60 for those marked D.

Also remove the screws marked E (cross-slotted screws of the "Torq Set" type).

- (d) Cut out the outer doubler to measure approx. 285 mm (11.22 in.) by 310 mm (12.2 in.) Shape it to fit the panel contours.
- (e) Stick the tracing paper on that outer-doubler side coming into contact with the panel. Drill-mark the locations of the existing fasteners, and trace out the outline of the doubler.
- (f) Stick the tracing paper on a plate made from Z 8 CND 15 sheet metal (P3305) 1,2 mm (0.047 in.) in thickness. Trace out the outline of the inner doubler.
- (g) Cut out the doublers, and mark out the area around the wrinkled segment on the inner doubler in the way shown in Fig. 404.
- (h) Using Z8 CND 15 sheeting (P3305) 1,2 mm (0.047 in.) in thickness, machine a thrust shim as shown in Fig. 404, Sheet 5.



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(2) Drilling the panel and doublers.

- (a) Pre-drill the panel holes marked A, F and G to a dia. of $3 \pm 0,1$ mm $\begin{matrix} (0.114 \\ (0.122 \text{ in.}) \end{matrix}$, and deburr.
- (b) Put the inner doubler in position on the panel. Drill-mark the locations of A holes on the doubler.
- (c) Take off the doubler, and drill out the A holes so marked to a dia. of $4,17 \begin{matrix} + 0,1 \\ + 0 \end{matrix}$ mm $\begin{matrix} (0.164 \\ (0.168 \text{ in.}) \end{matrix}$.
- (d) Drill out the following holes in the outer doubler :
 - 1 B and E holes to $6,35 \begin{matrix} + 0,1 \\ 0 \end{matrix}$ mm $\begin{matrix} (0.250 \\ (0.254 \text{ in.}) \end{matrix}$ dia.
 - 2 C and D holes to $4,83 \begin{matrix} + 0,1 \\ 0 \end{matrix}$ mm $\begin{matrix} (0.190 \\ (0.194 \text{ in.}) \end{matrix}$ dia.
 - 3 H holes to $4,17 \begin{matrix} + 0,1 \\ 0 \end{matrix}$ mm $\begin{matrix} (0.164 \\ (0.168 \text{ in.}) \end{matrix}$ dia.
 Deburr.
- (e) Pin the outer doubler onto the panel through the existing holes, and counterdrill the D holes on the panel to a dia. of $4,83 \begin{matrix} + 0,1 \\ 0 \end{matrix}$ mm $\begin{matrix} (0.190 \\ (0.194 \text{ in.}) \end{matrix}$. Drill-mark the locations of A, F and G holes on the doubler.
- (f) Remove the doubler, drill out its A, F and G holes to a dia. of $4,17 \begin{matrix} + 0,1 \\ 0 \end{matrix}$ mm $\begin{matrix} (0.164 \\ (0.168 \text{ in.}) \end{matrix}$, and deburr.
- (g) Place the thrust shim on the panel. Drill-mark the locations of F holes on it.
- (h) Remove the shim and drill out the F holes so marked. Deburr.
- (i) Bore out the A, F and G holes in the panel to a dia. of $4,17 \begin{matrix} + 0,1 \\ 0 \end{matrix}$ mm $\begin{matrix} (0.164 \\ (0.168 \text{ in.}) \end{matrix}$.

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Next bore out the "A" and "G" holes to the diameters of the spacer holes, as indicated in Fig. 404, Sheet 3.

NOTE : Do not pierce the outer panel skin.

(3) Mounting on the doublers

- (a) Fix the spacers into the panel holes with Loctite 307 (P502) to hold them fast while mounting the Hi-Lok bolts.
- (b) Fit tapered washers or heads of discarded fasteners into the panel recesses or countersinks. Fix them fast with Loctite 307 (P502).
- (c) Locate and pin the doublers on the panel.
- (d) Secure the doublers onto the panel as shown in Fig. 404 and instructed in the Standard Practices Manual, Chapter Section 70-50-40.
- (e) For the holes marked E, there are two alternative modes of fastening, namely (a) by 649-781-XXX-0 100° flush-head screws, cross-slotted, Type "Torq Set", together with 002-004-005 washers, or (b) by NAS 1578 C-4T screws with cross-slotted round heads, Type "Torq Set".
For mounting, coat the screws with C 200 anti-seizing lubricant (P209) ; tightening torque to applied : 0,34 to 0,46 DaN.m (30 to 40 lb. in.).
- (f) Check the way the Hi-Lok bolts have been mounted, as instructed in the Standard Practices Manual, Chapter Section 70-50-84.

D. Repair by application of two doublers (as appropriate to areas 1, 4, 5 and 8, Fig. 401).

(1) Making up the doublers

- (a) Lightly rub the panel with a fine emery cloth so as to make the honeycomb pattern show through.
- (b) Stick a sheet of tracing-paper on the outer skin of the panel, and trace out the panel cell contours, the locations of the existing fastenings, the outlines of the doublers, and the locations of the new retaining holes (See Fig. 405).

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NOTE : Each hole must invariably lie at the centre of a cell.

- (c) Remove the existing fasteners from the panel as illustrated in Fig. 405 and instructed in the Standard Practices Manual, Chapter section 70-50-40, for fasteners marked "B".
 - (d) Using Z 8 CND 15 sheet metal (P3305) of 1,2 mm (0.047 in.) thickness, shape the doublers to the panel contours and cut them out as shown in Fig. 405.
 - (e) Stick the tracing paper on that outer-doubler side coming into contact with the panel. Drill-mark the fastener locations.
- (2) Drilling the panel and doublers
- (a) Pre-drill the C holes in the panel to a dia. of $3 \pm 0,1 \text{ mm}$ (0.114 in.), and deburr.
 - (b) Put the inner doubler in position on the panel. Drill-mark the locations of the "C" holes on the doubler.
 - (c) Take off the doubler, and drill out the "C" holes so marked to a dia. of $4,17 \pm 0,1 \text{ mm}$ (0.164 in.).
 - (d) Drill the following holes in the outer doubler :
 - 1 A holes to $6,35 \pm 0,1 \text{ mm}$ (0.250 in.) dia.
 - 2 B holes to $4,83 \pm 0,1 \text{ mm}$ (0.190 in.) dia.
 Deburr.
 - (e) Pin the outer doubler onto the panel. Drill-mark the "C"-hole locations on the doubler.
 - (f) Remove the doubler. Drill out the "C" holes so marked to a dia. of $4,17 \pm 0,1 \text{ mm}$ (0.164 in.). Deburr.
 - (g) Bore out first the panel "C" holes to a dia. of $4,17 \pm 0,1 \text{ mm}$ (0.164 in.), then the spacer holes as shown in Fig. 405, sheet 2. Deburr.

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NOTE : Do not pierce the outer panel skin.

(3) Mounting on the doublers

- (a) Fix the spacers into the panel holes with Loctite 307 (P502) so as to hold them fast while fitting in the Hi-Lok bolts.
- (b) Fit tapered washers or heads of discarded fasteners into the panel recesses. Fix them fast with Loctite 307 (P502).
- (c) Locate and pin the doublers on the panel.
- (d) Secure the doublers onto the panel as directed in Fig. 405 and in the Standard Practices Manual, Chapter section 70-50-40.
- (e) Check the way the fasteners have been mounted as instructed in the Standard Practices Manual, Chapter section 70-50-84.

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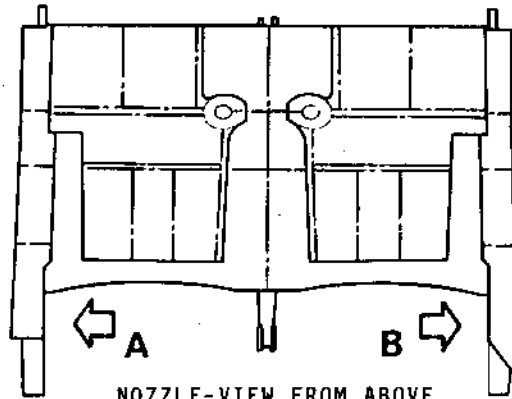
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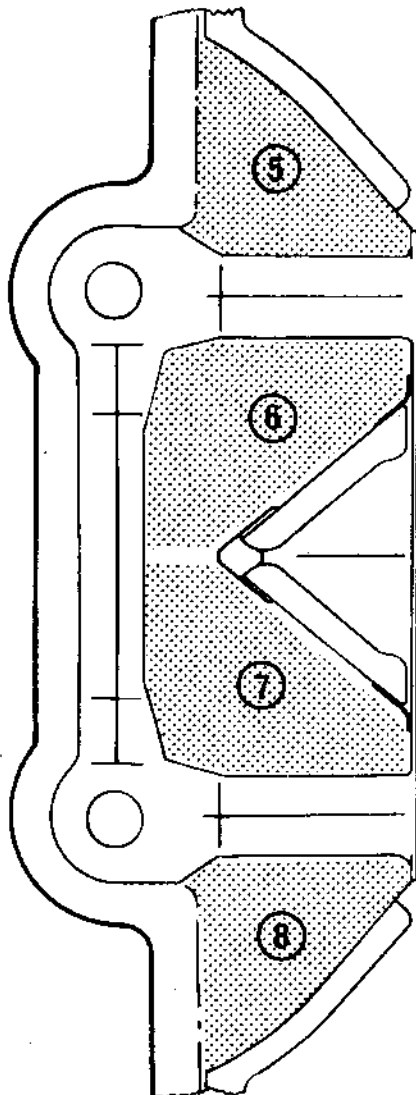


A

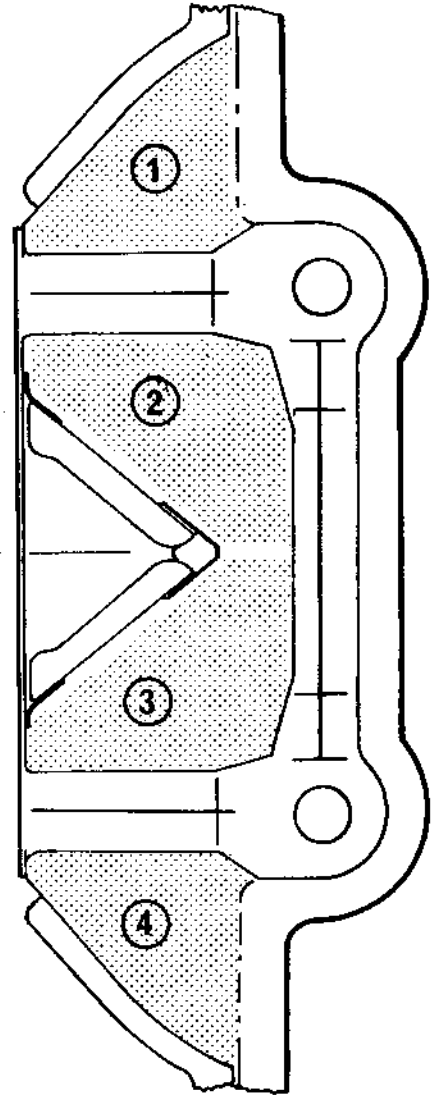


B

NOZZLE-VIEW FROM ABOVE



ZMB
-28.884



Marking Out Repair Areas
Figure 401

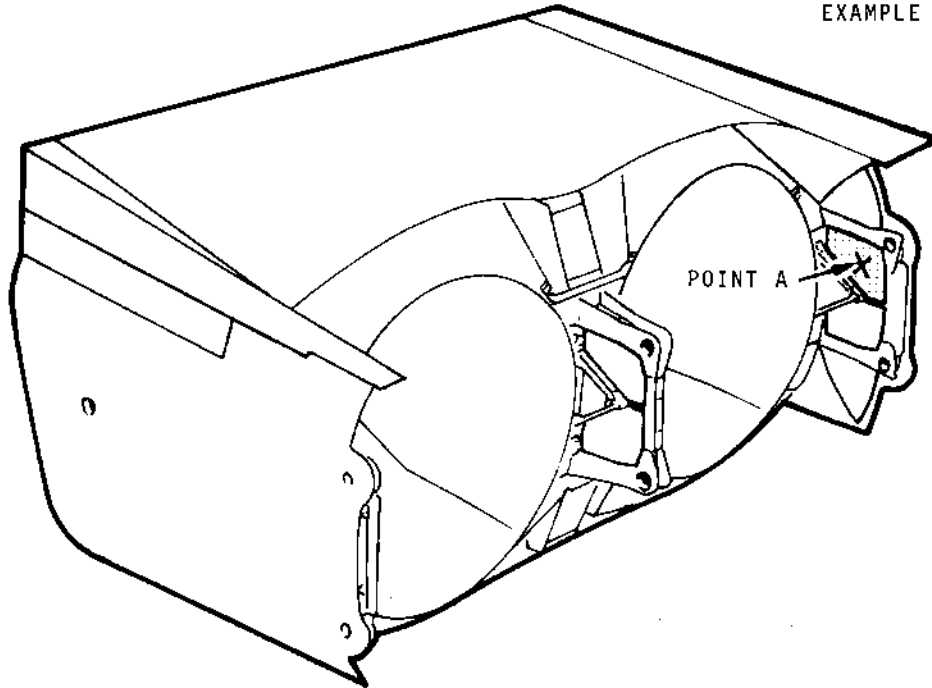


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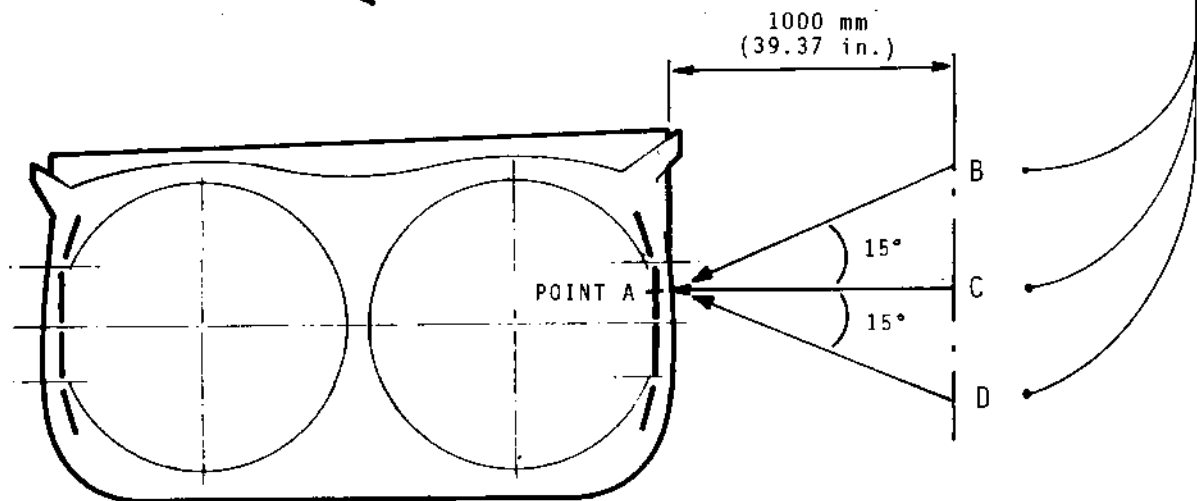
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EXAMPLE OF INSPECTION
AREA 2



SUCCESSIVE POSITIONS OF
X-RAY SOURCE



SOURCE LOCATION	ITEMS UNDER INSPECTION	FILM	PHOTOGRAPHIC DENSITY	IQI
B C D	CHECKING A DE-LAMINATED SEGMENT	FILM ●	2,2	WIRE OF 0.015 mm (0.006 in.) DIA.

KODAK FILM, TYPE M, WITHOUT SCREEN, OR EQUI-
VALENT FILMSTOCK
● FILM MEASUREMENTS : 300 X 400 mm (11.8 X 15.75 in.)

Checking the Extent of Damage
Figure 402

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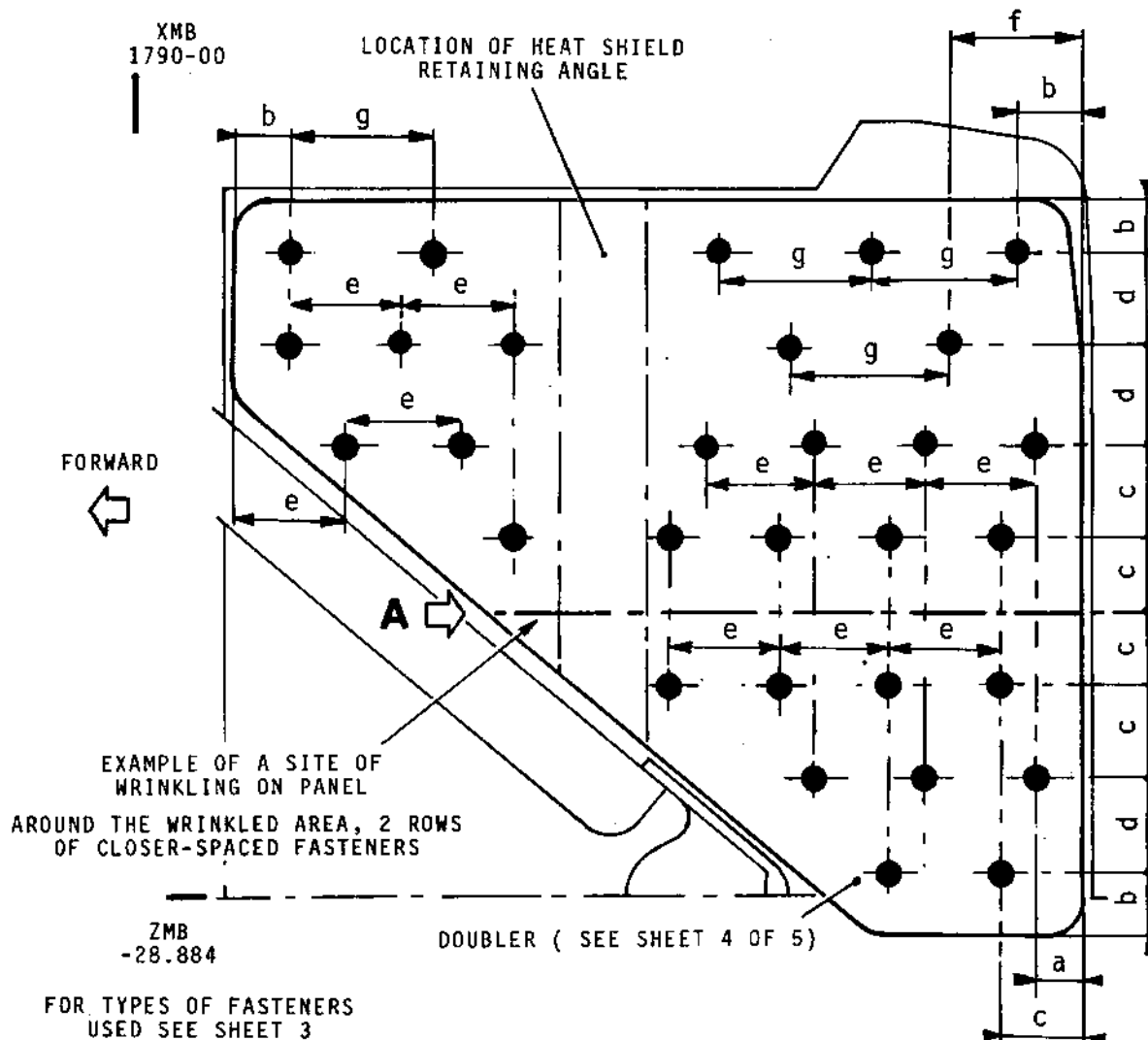
OLYMPUS 593

MK.610-14-28

OVERHAUL



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DIMENSION	MM	INCH
a	10	0.394
b	15	0.590
c	20	0.787
d	25	0.984
e	30	1.181
f	35	1.378
g	40	1.574

EXAMPLE OF THE REPAIR OF A MINOR-EXTENT
CORE-TO-FACE SHEET SEPARATION
AREA 2 AS SHOWN
AREA 3 SYMMETRICAL AS FROM THE ZMB-28884 AXIS
AREA 6 OPPOSITE
AREA 7 SYMMETRICAL WITH AREA 6 AS FROM
THE ZMB-28884 AXIS

THE DIMENSIONS ARE GIVEN BY WAY OF
GUIDANCE ONLY AS EACH HOLE MUST LIE
AT A CELL CENTRE

INSIDE VIEW

Application of Doubler to the Inner
Face of Rear Side-Panel
Figure 403 (Sheet 1 of 6)

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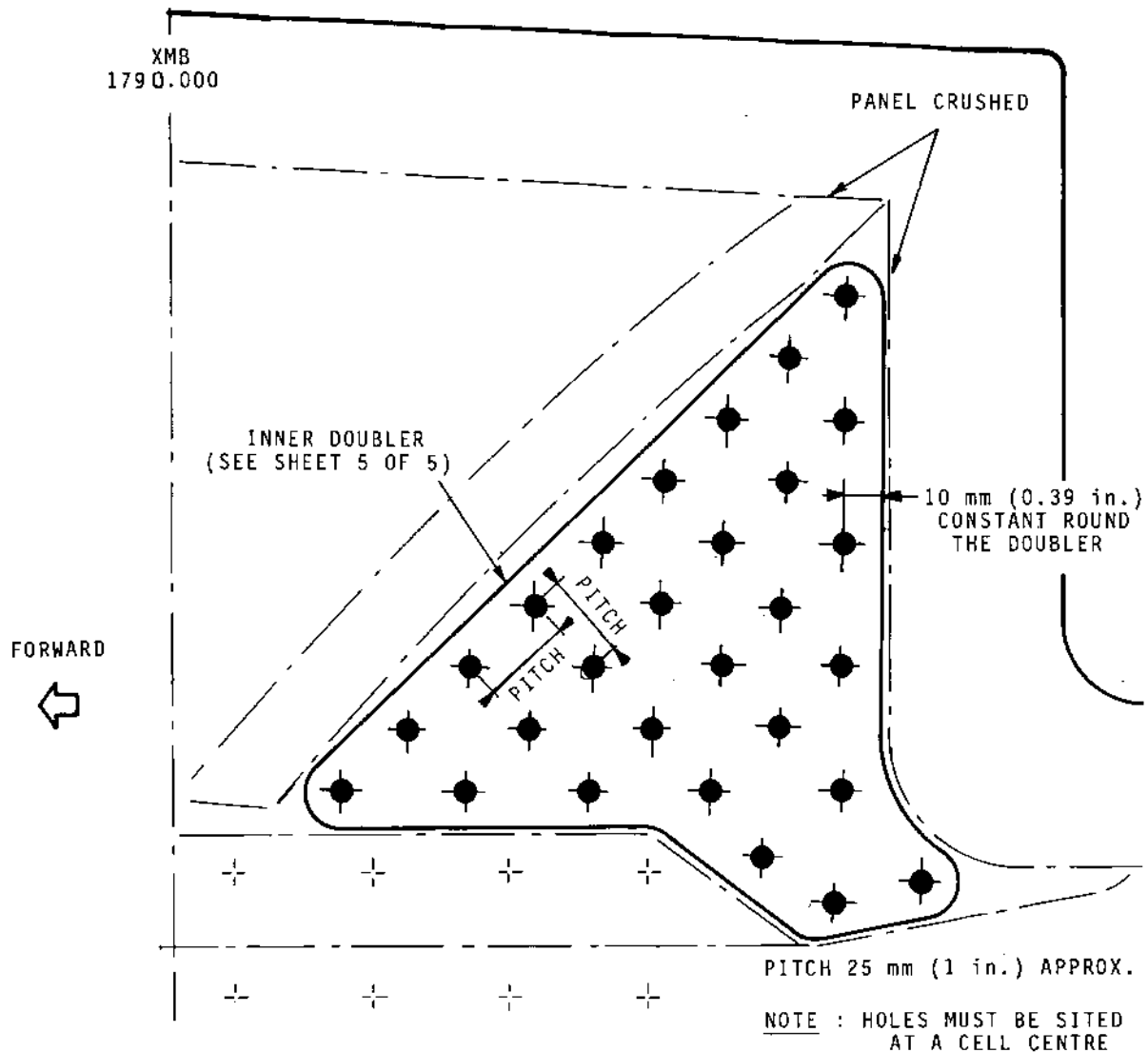


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FOR TYPES OF FASTENERS USED SEE SHEET 3 OF 5

EXAMPLE OF THE REPAIR OF A DELAMINATED AREA ON THE INNER SKIN

AREA 1 AS SHOWN
AREA 4 SYMMETRICAL AS FROM ZMB-28.884 AXIS
AREA 5 OPPOSITE
AREA 8 SYMMETRICAL WITH AREA 5 FROM THE ZMB-28.884 AXIS

IF THE AREA COMPRISES A WRINKLED SURFACE AS WELL, SHAPE THE DOUBLER
AS SHOWN ON SHEET 3

Application of Doubler to the Inner Face of
Rear Side Panel
Figure 403 (Sheet 2 of 6)

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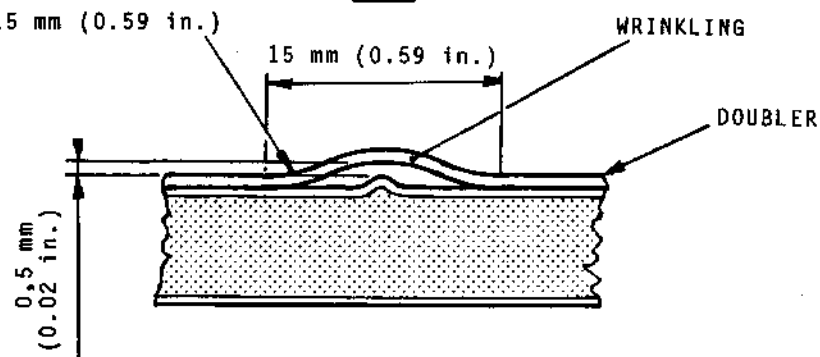
OLYMPUS 593

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A

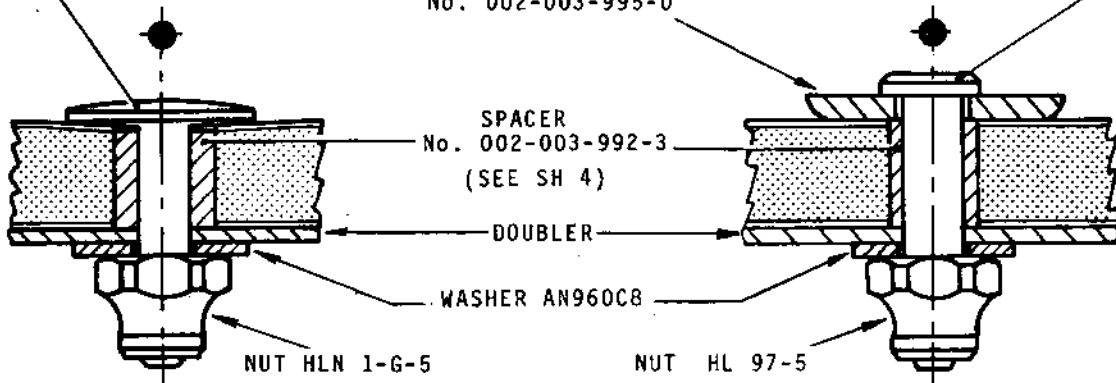
R = 15 mm (0.59 in.)



BOLT HL 144-5-12

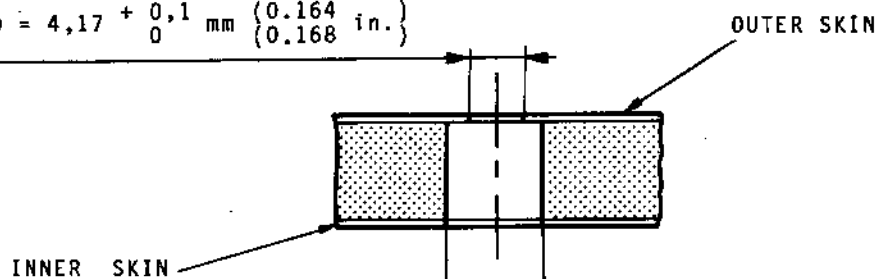
THRUST WASHER
No. 002-003-995-0

BOLT HL 40-5-7



FASTENER FOR EXCEPTIONAL
USE ONLY

$D = 4,17 + \begin{matrix} 0,1 \\ 0 \end{matrix} \text{ mm } \left\{ \begin{matrix} 0.164 \\ 0.168 \end{matrix} \text{ in.} \right\}$



$D = 5,5 + \begin{matrix} 0,1 \\ 0 \end{matrix} \text{ mm } \left\{ \begin{matrix} 0.216 \\ 0.220 \end{matrix} \text{ in.} \right\}$

DRILLING THE PANEL

Application of Doubler to Inner Face of
Rear Side Panel
Figure 403 (Sheet 3 of 6)

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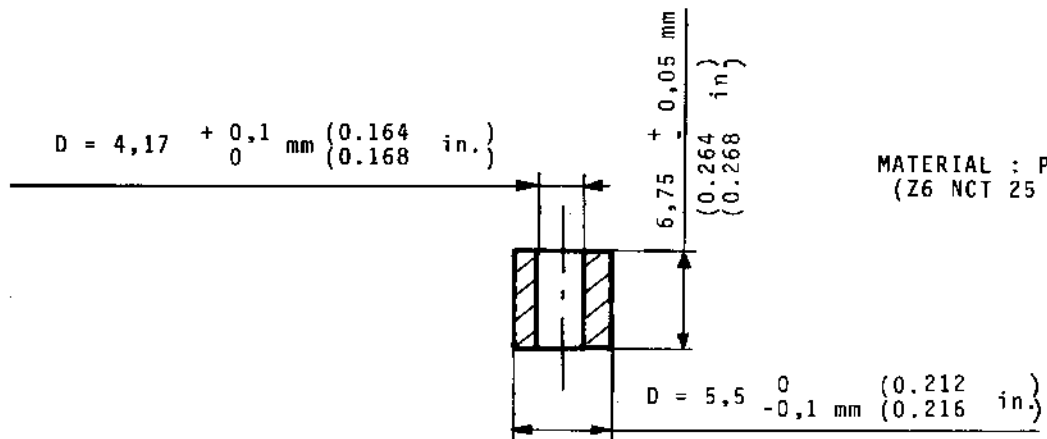
OLYMPUS 593

MK.610-14-28

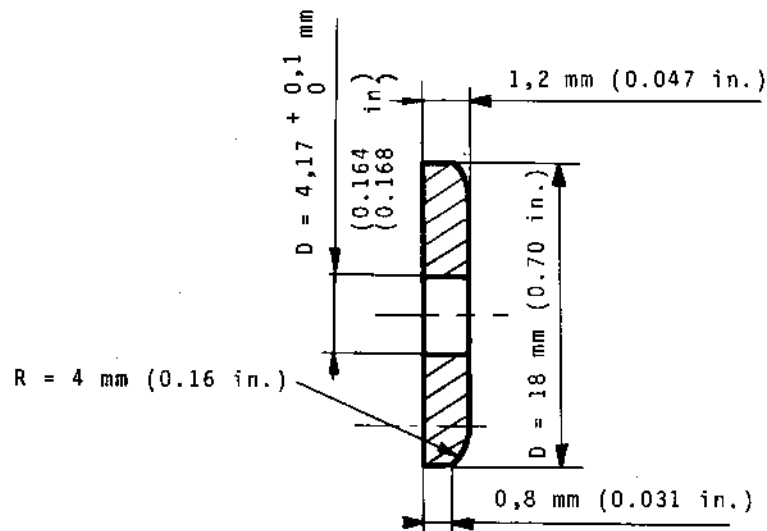
OVERHAUL



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SPACER 002-003-992-3



THRUST WASHER 002-003-995-0

Application of Doubler to Inner Face of
Rear Side Panel
Figure 403 (Sheet 4 of 6)

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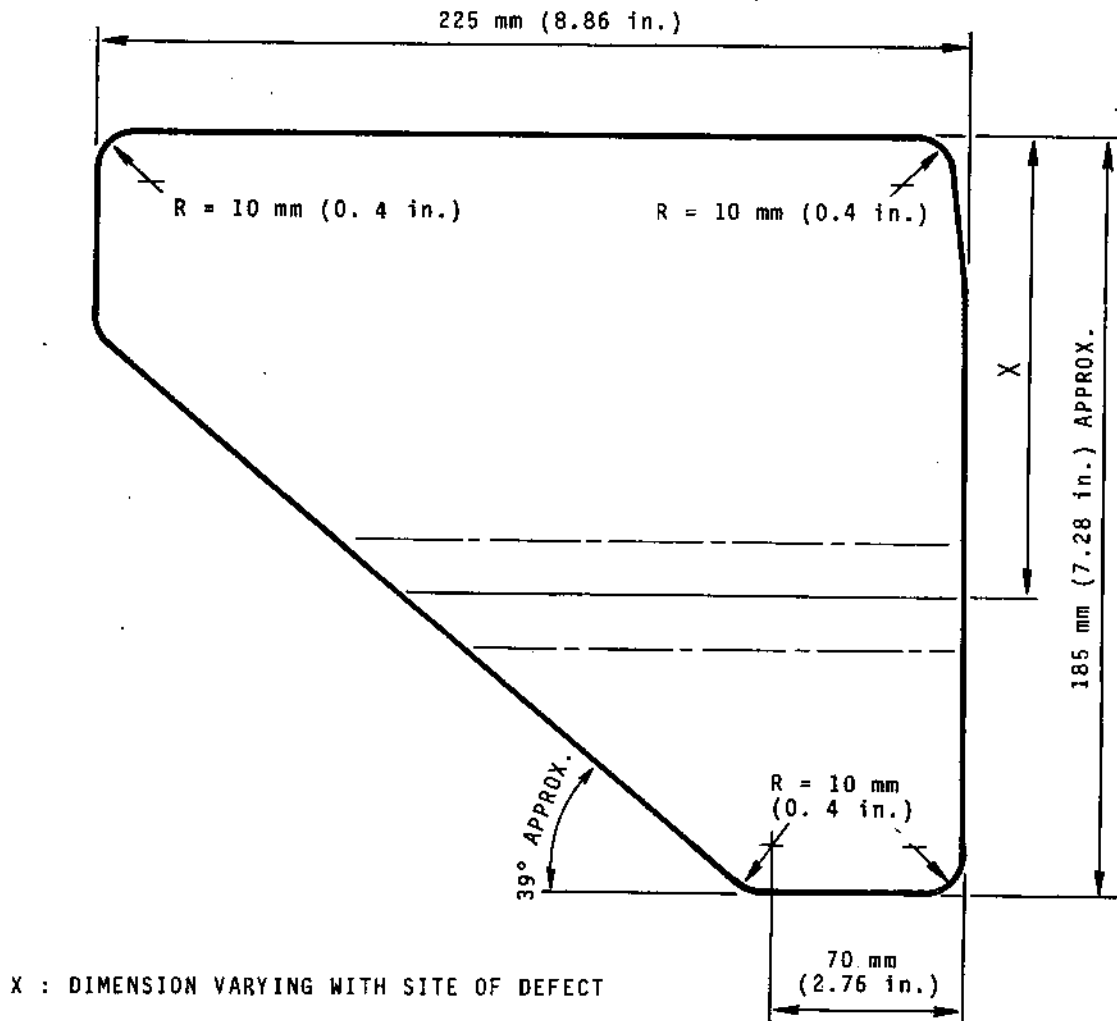


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INNER-DOUBLER DESIGN, AREA 2

AREA 3 : SYMMETRICAL AS FROM ZMB - 28.884 AXIS

AREA 6 : OPPOSITE

AREA 7 : SYMMETRICAL WITH AREA 6 AS FROM ZMB - 28.884 AXIS

MATERIAL : P3305 (Z8 CND 15) THICKNESS = 1,2 mm (0.047 in.)

Application of Doubler to Inner Face of
Rear Side Panel
Figure 403 (Sheet 5 of 6)

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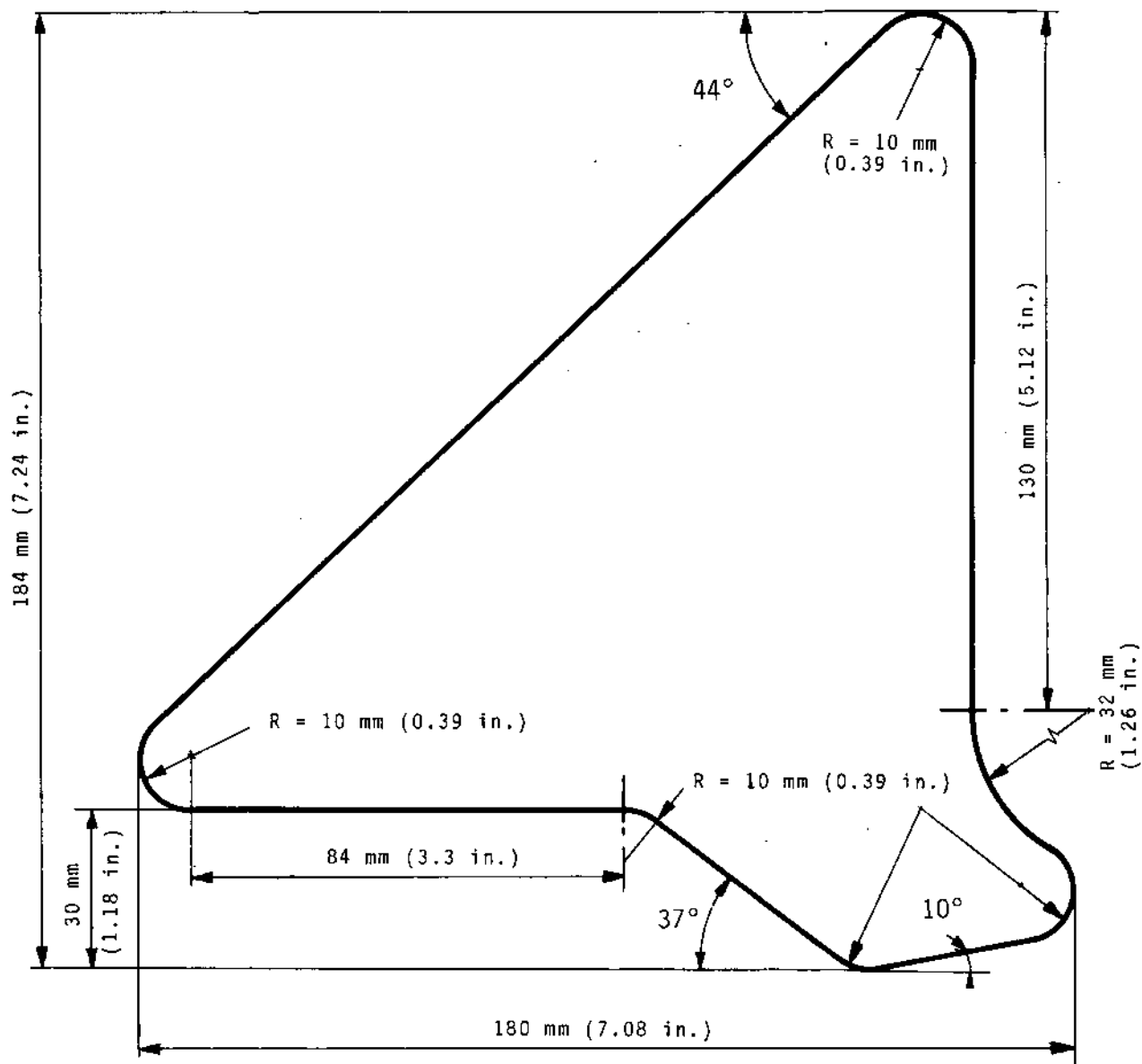


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INNER-DOUBLER DESIGN, AREA 1

AREA 4 : SYMMETRICAL AS FROM ZMB - 28.884 AXIS

AREA 5 : OPPOSITE

AREA 8 : SYMMETRICAL WITH AREA 5 AS FROM ZMB - 28.884 AXIS

MATERIAL : P3305 (Z8 CND 15) THICKNESS = 1,2 mm (0.047 in.)

Application of Doubler to Inner Face of
Rear Side Panel
Figure 403 (Sheet 6 of 6)

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XMB
1801-250

BUCKET
JOINTING

LOCATION OF HEAT-SHIELD RETAINING
ANGLE (PANEL INNER FACE)

OUTER DOUBLER
(SEE SHEET 8)

FORWARD →

INNER DOUBLER
(SEE SHEET 9)

THRUST SHIM

10 mm (0.39 in.) CONSTANT
AROUND DOUBLER

28 mm (1.1 in.)

EXAMPLE OF THE REPAIR OF
A DELAMINATED SEGMENT
ON THE OUTER AND INNER SKIN

REPAIR VIEW FROM OUTSIDE

AREA 2 : AS SHOWN
AREA 3 : SYMMETRICAL AS FROM ZMB-28.884 AXIS
AREA 6 : OPPOSITE
AREA 7 : SYMMETRICAL WITH AREA 6 AS FROM
ZMB-28.884 AXIS

Application of Doublers to Rear Side Panel/Central Section
Figure 404 (Sheet 1 of 9)

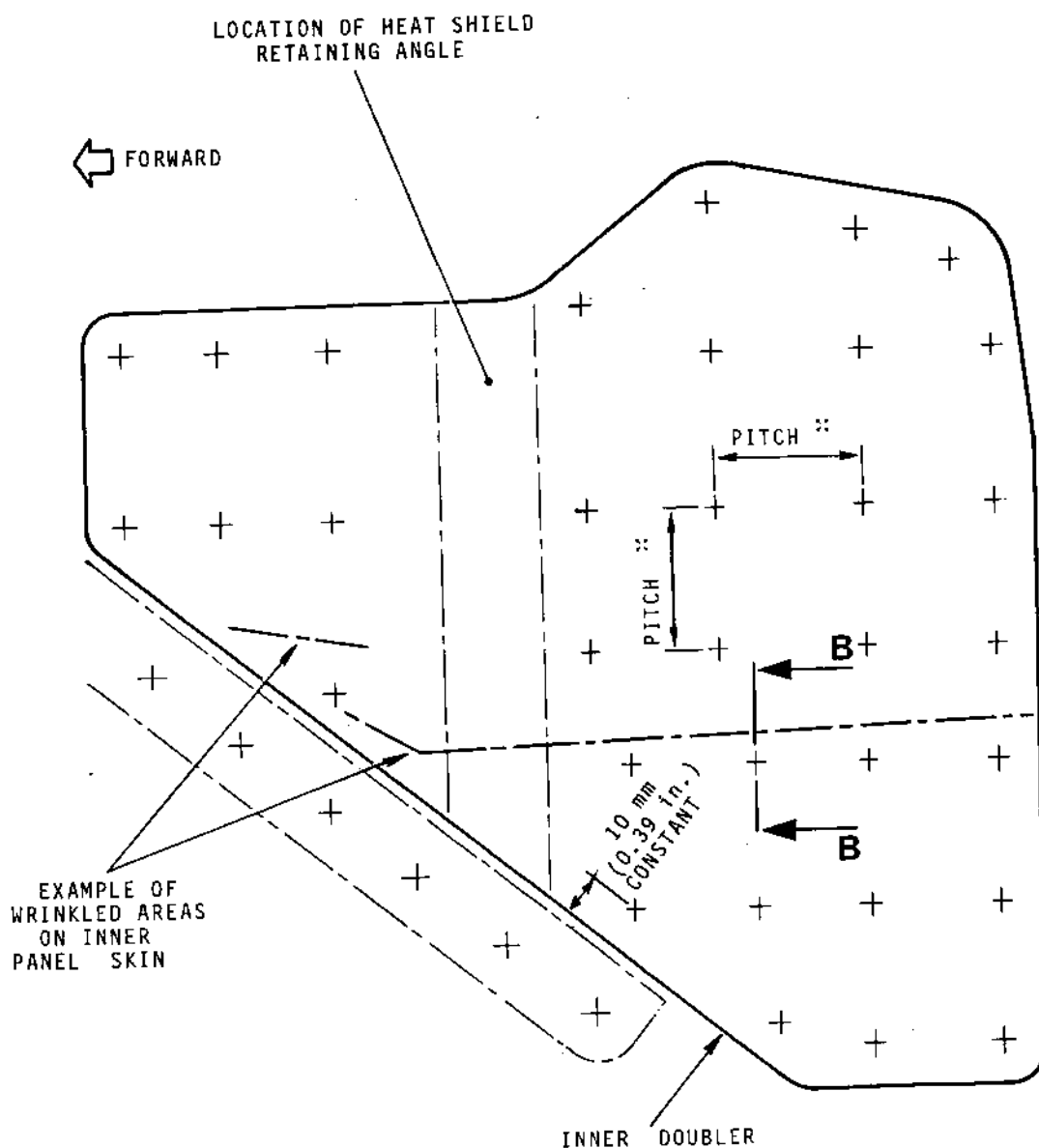
78-13-01

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** PITCHES OF FASTENERS
30 mm (1.18 in.) IN WRINKLED AREAS
40 mm (1.57 in.) ELSEWHERE

REPAIR-INSIDE VIEW

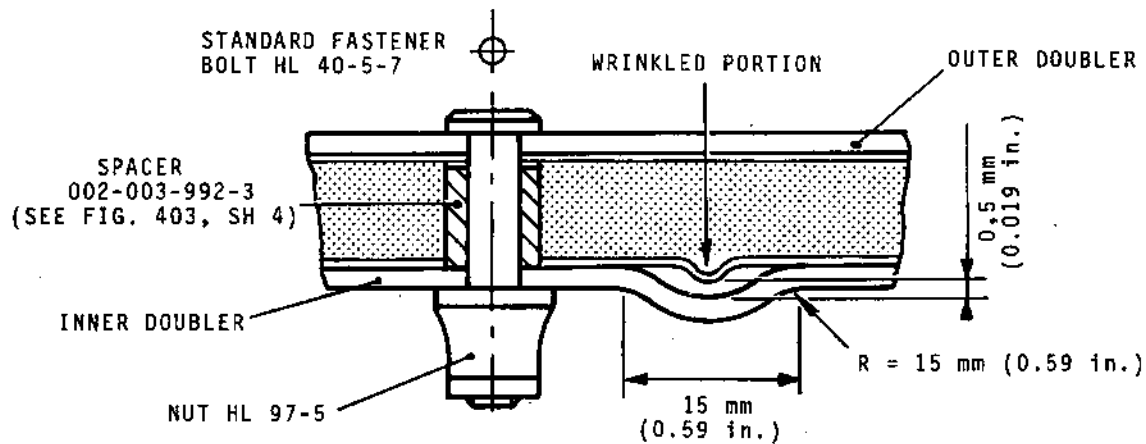
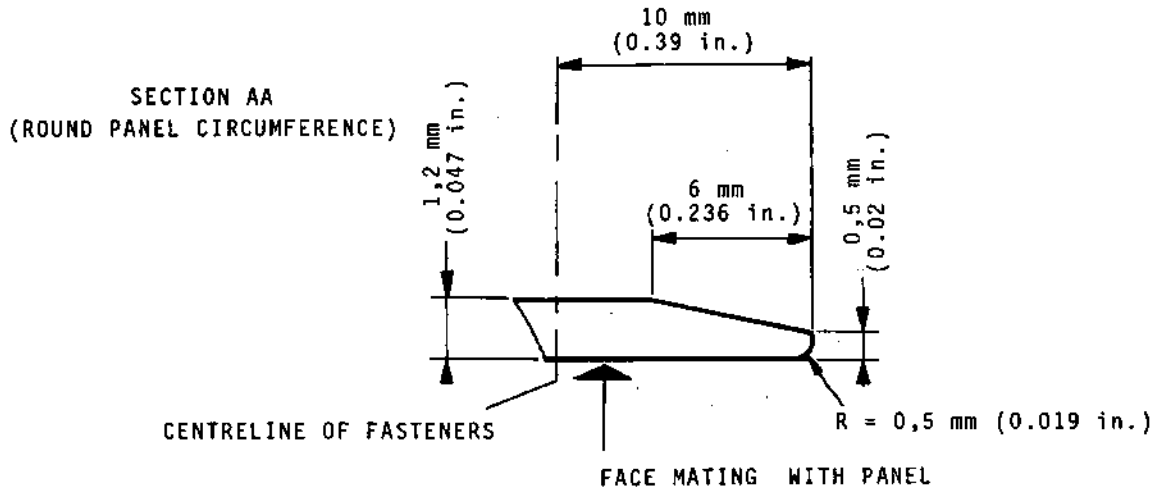
Application of Doublers to Rear Side-Panel/Central Section
Figure 404 (Sheet 2 of 9)

78-13-01

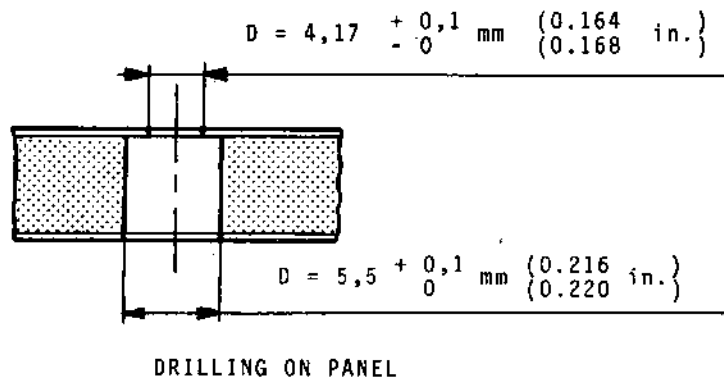
REP 29-190-18

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SECTION BB.

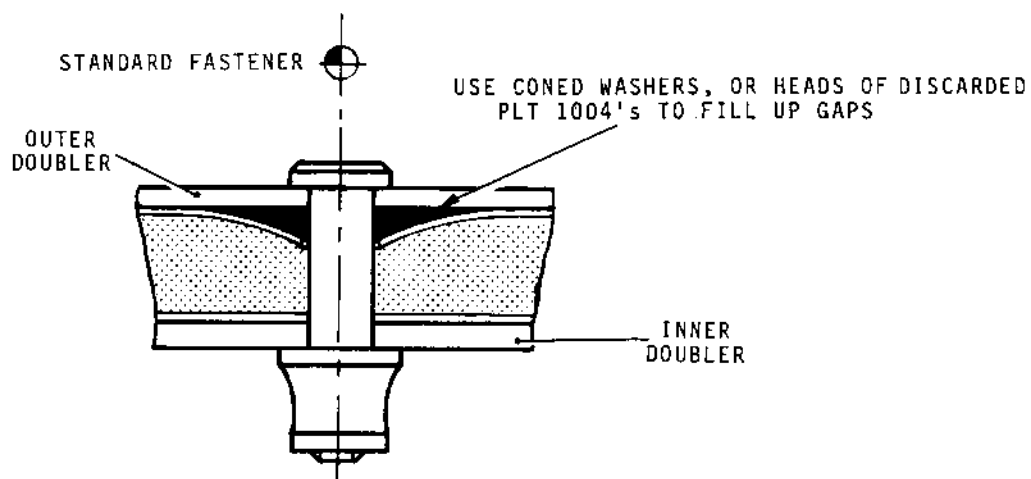
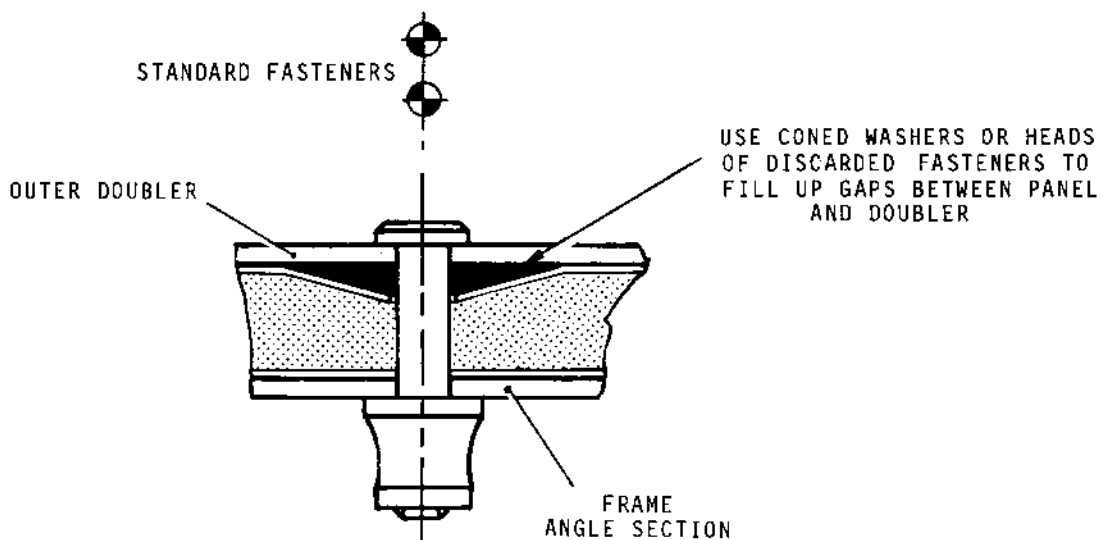


Application of Doublers to Rear Side-Panel/Central Section
Figure 404 (Sheet 3 of 9)



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FOR IDENTIFYING FASTENERS, SEE SHEET 7

Application of Doublers to Rear Side-Panel/Central Section
Figure 404 (Sheet 4 of 9)

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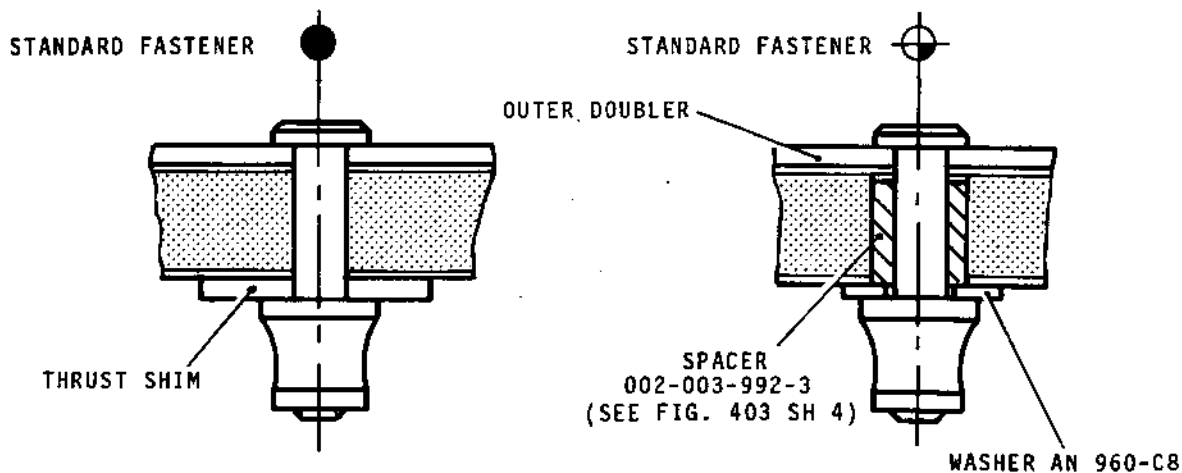
OLYMPUS 593

MK.610-14-28

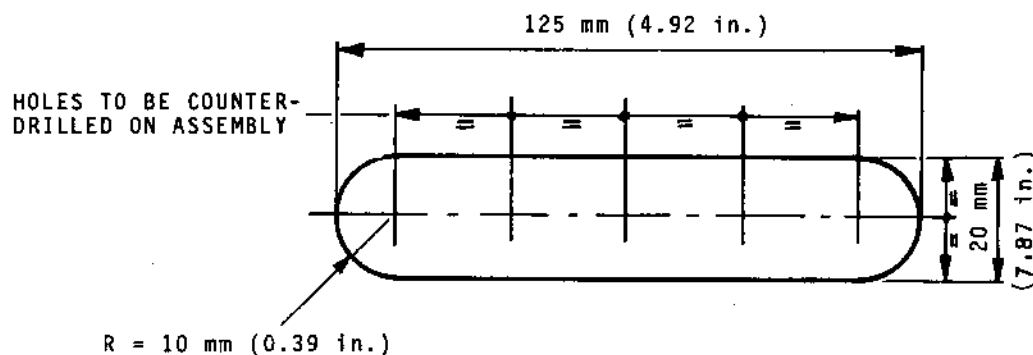
OVERHAUL



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FOR TYPES OF FASTENERS USED
SEE SHEET 7



MATERIAL : P3305 (Z8 CND 15)
THICKNESS : 1,2 mm (0.047 in.)

THRUST SHIM SEPARATELY SHOWN
(SEE SHEET 1)

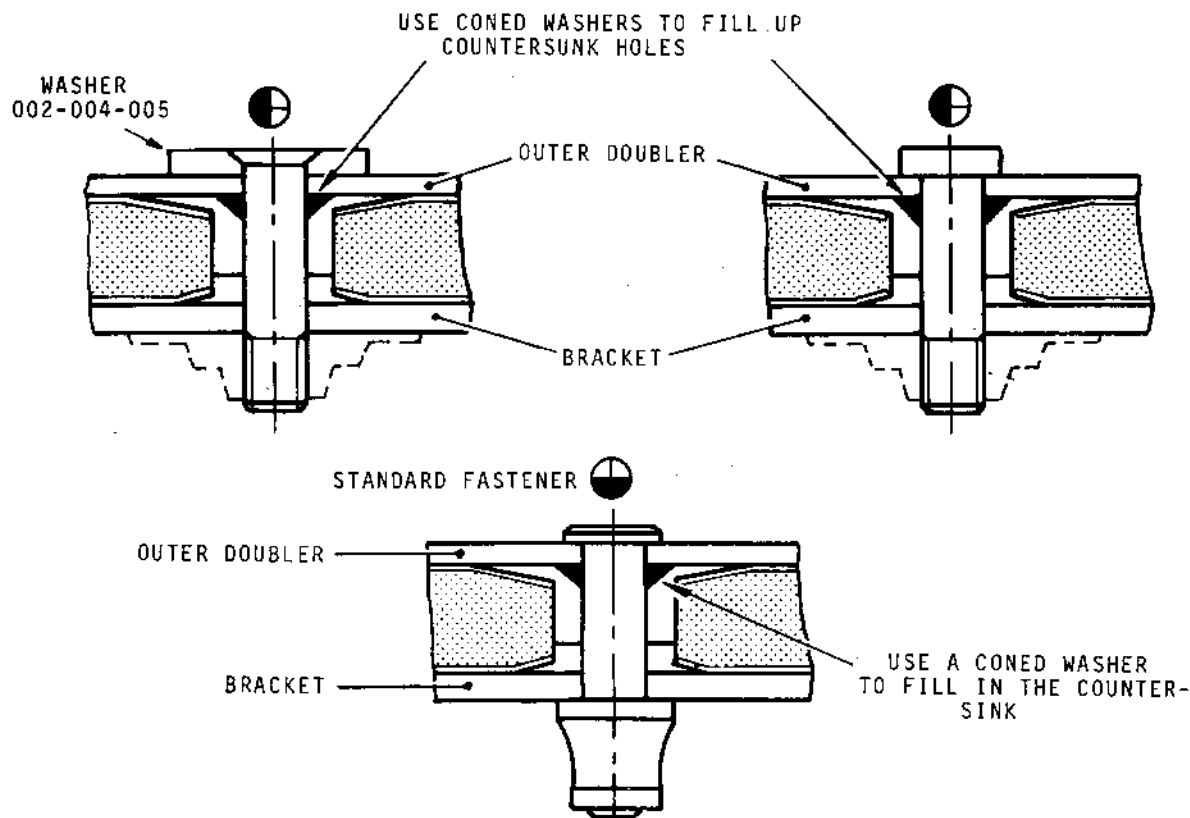
Application of Doublers to Rear Side-Panel/Central Section
Figure 404 (Sheet 5 of 9)

78-13-01

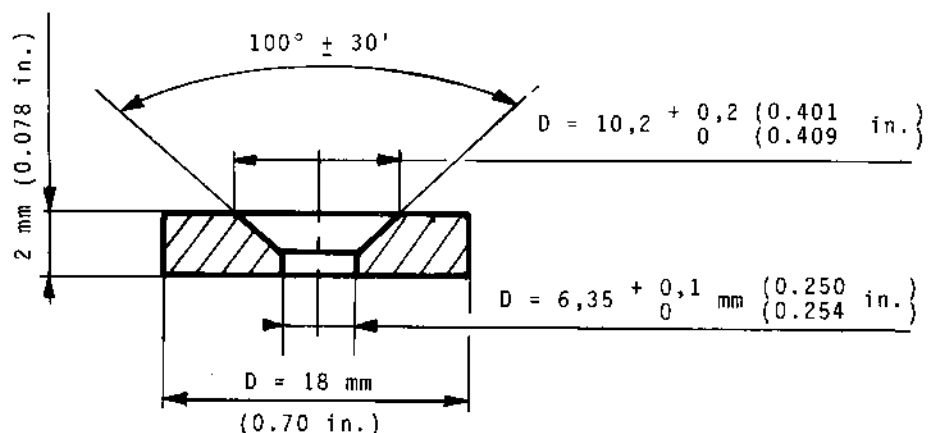
REP 29-190-18

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FOR TYPES OF FASTENERS USED, SEE SHEET 7



WASHER 002-004-005-0
MATERIAL : P 3301 (Z10 CNT 18)

Application of Doublers to Rear Side-Panel/Central Section
Figure 404 (Sheet 6 of 9)

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**OLYMPUS 593**

MK.610-14-28

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CORRESPONDENCES BETWEEN THE SYMBOLS IN THE TEXT AND IN THE FIGURES,
IN REPAIR BY 2 DOUBLERS IN AREAS 2-3-6-7

SYMBOL IN FIGURE	SYMBOL IN TEXT	FASTENER USED BOLT	NUT
⊕	"A"	HL 40-5-7	HL 97-5
⊕ 1	"B"	HL 40-8-8	HL 97-8
⊕ 2	"B"	HL 40-8-9	HL 97-8
⊕ 3	"B"	HL 40-8-7	HL 97-8
⊕	"C"	HL 40-6-7	HL 97-6
⊕	"D"	HL 40-6-7 OR 6-8	HL 97-6
⊕ 1	"E"	649-781-527-0 OR NAS 1578-C4T-10	HLNIG-8
⊕ 2	"E"	SPC 9000-4-8 OR NAS 1578C4T-7	FLOATING ANCHOR NUT FITTED IN THE BRACKET
●	"F"	HL 40-5-7	HL 97-5
⊕	"G"	HL 40-5-6	HL 07-5
⊕ 1	"H"	HL 40-5-8	HL 97-5
⊕ 2	"H"	HL 40-5-6 OR 5-7	HL 97-5

Application of Doublers to Rear Side-Panel-Central Section
Figure 404 (Sheet 7 of 9)

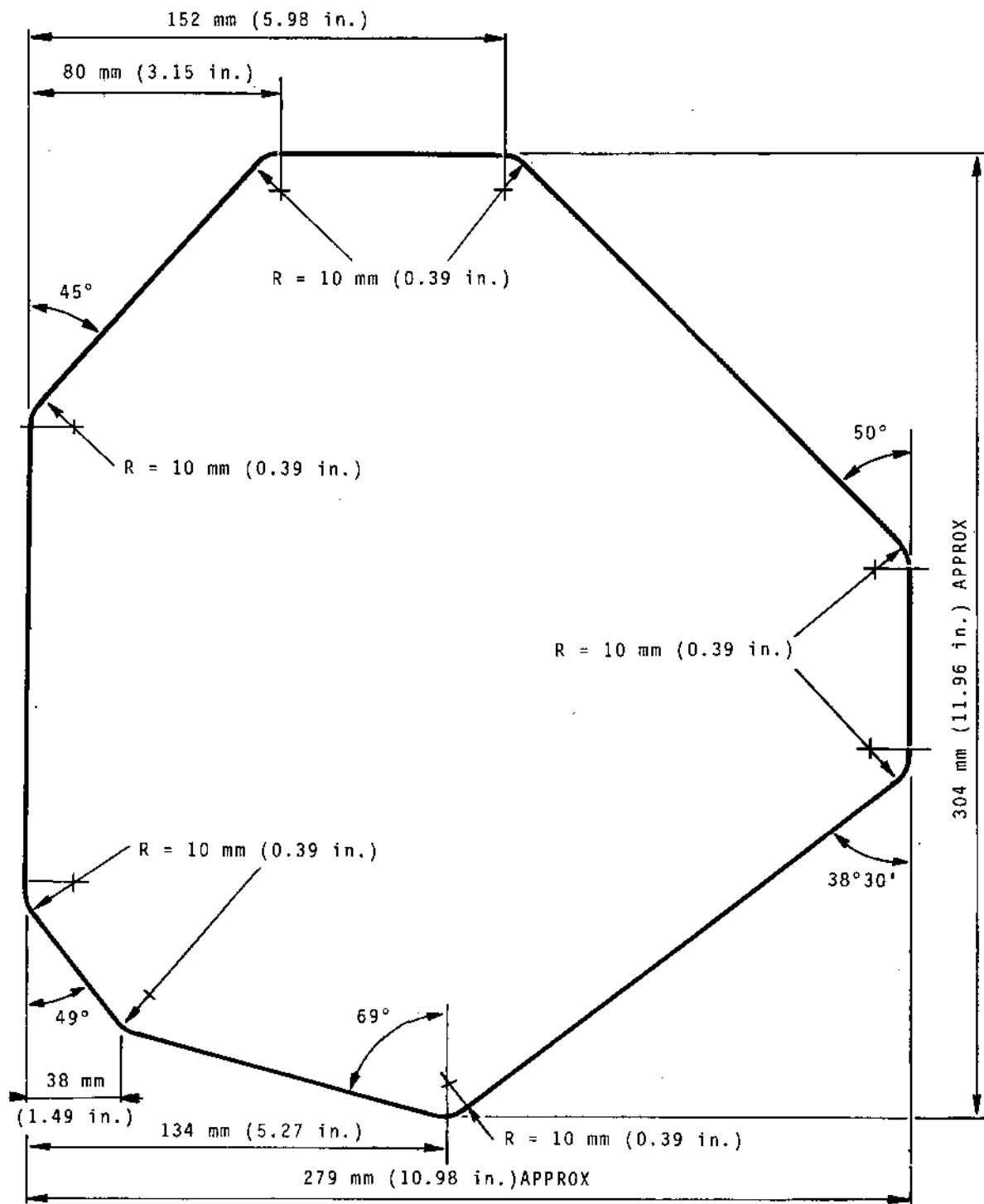
78-13-01

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DETAILS OF OUTER DOUBLER

MATERIAL : P 3305 (Z8 CND 15) THICKNESS 1,2 mm (0.047 in.)

Application of Doublers to Rear Side-Panel/Central Section
Figure 404 (Sheet 8 of 9)

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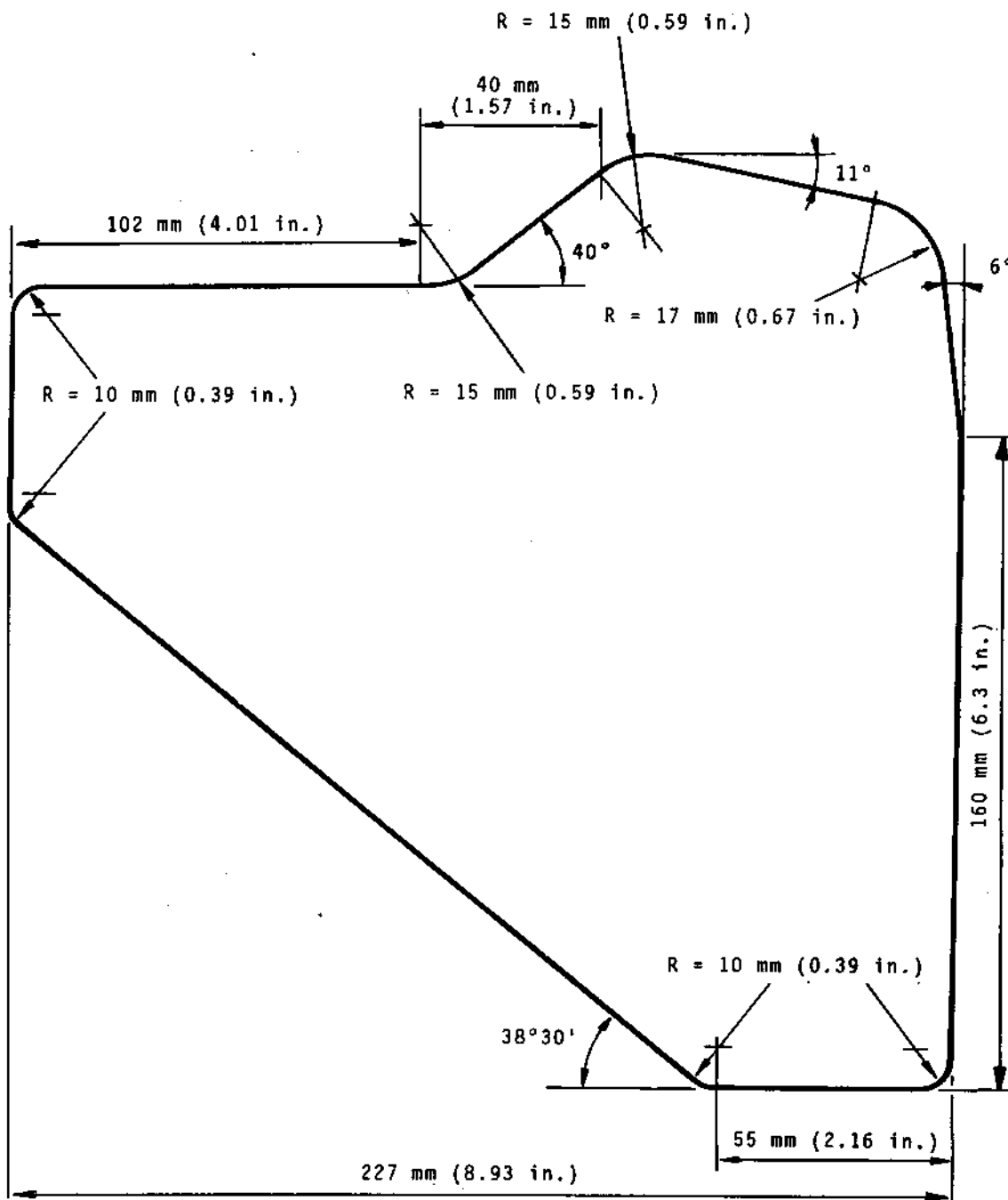
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DETAILS OF INNER DOUBLER
MATERIAL : P3305 (Z8 CND 15)
THICKNESS : 1,2 mm (0.047 in.)

Application of Doublers to Rear-Side-Panel/Central Section
Figure 404 (Sheet 9 of 9)

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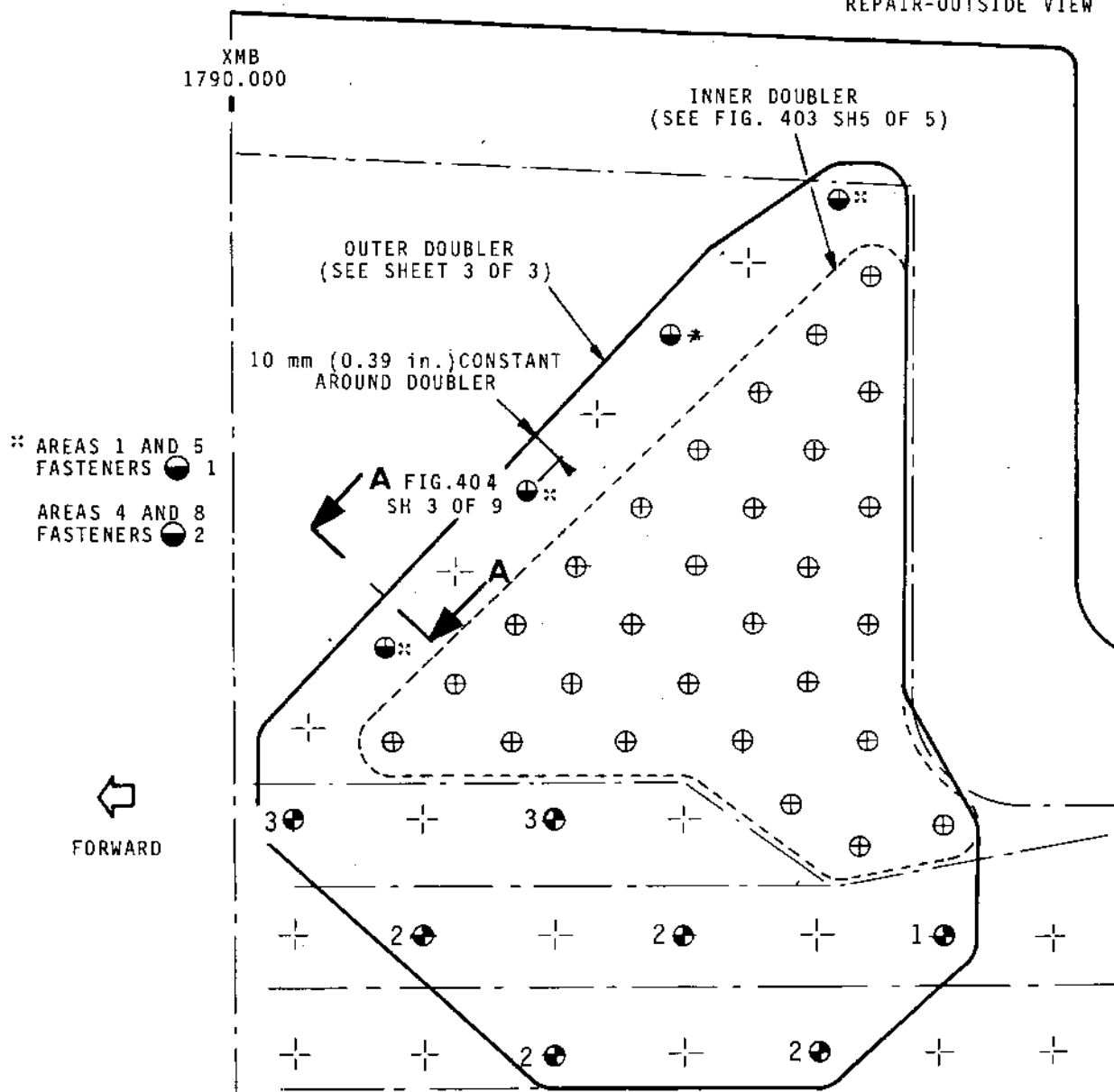
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OVERHAUL



REPAIR-OUTSIDE VIEW

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IN THE DELAMINATED AREA, THE INNER DOUBLER AND THE PITCH BETWEEN FASTENERS ARE THE SAME AS IN A STRAIGHTFORWARD REPAIR OF THE TYPE SHOWN IN FIG. 403, SHEET 2 OF 5

EXAMPLE OF THE REPAIR OF A CORE-TO-FACE SHEET SEPARATION ON INNER AND OUTER SKINS

AREA A : AS SHOWN AREA 5 : OPPOSITE
AREA 4 : SYMMETRICAL AREA 8 : SYMMETRICAL WITH AREA 5
(EXCEPT FOR DETAILS INDICATED)

Application of Doublers to Rear Side-Panel/Upper and Lower Sections
Figure 405 (Sheet 1 of 3)

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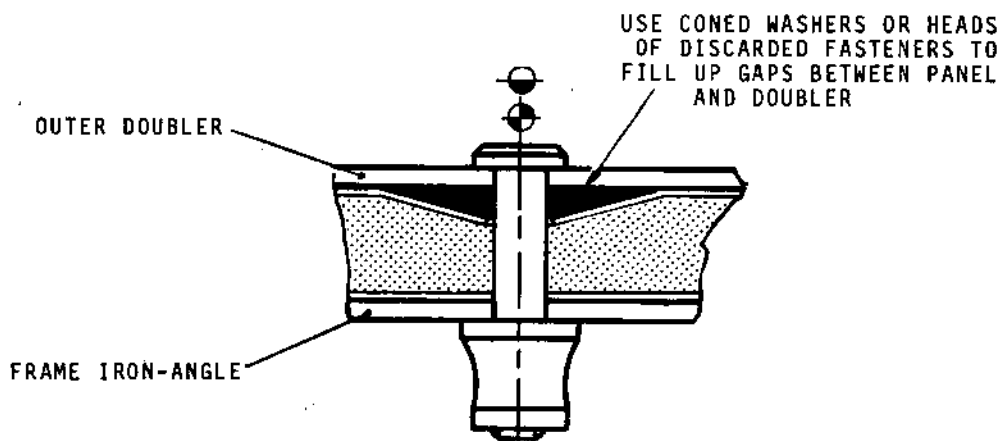
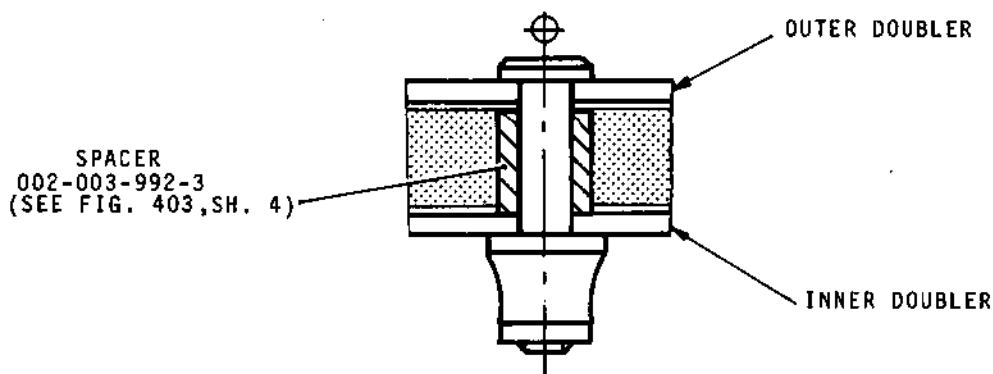
OLYMPUS 593

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SYMBOL IN FIGURE	SYMBOL TEXT	FASTENER USED	
⊕ 1	"A"	BOLT HL 40-8-8	NUT HL 97-8
⊕ 2	"A"	BOLT HL 40-8-9	NUT HL 97-8
⊕ 3	"A"	BOLT HL 40-8-7	NUT HL 97-8
⊕ 1	"B"	BOLT HL 40-6-7	NUT HL 97-6
⊕ 2	"B"	BOLT HL 40-6-6	NUT HL 97-6
		OR	BOLT HL 40-6-7
⊕	"C"	BOLT HL 40-5-7	NUT HL 97-5

Application of Doublers to Rear Side-Panel/Upper and Lower Sections
Figure 405 (Sheet 2 of 3)

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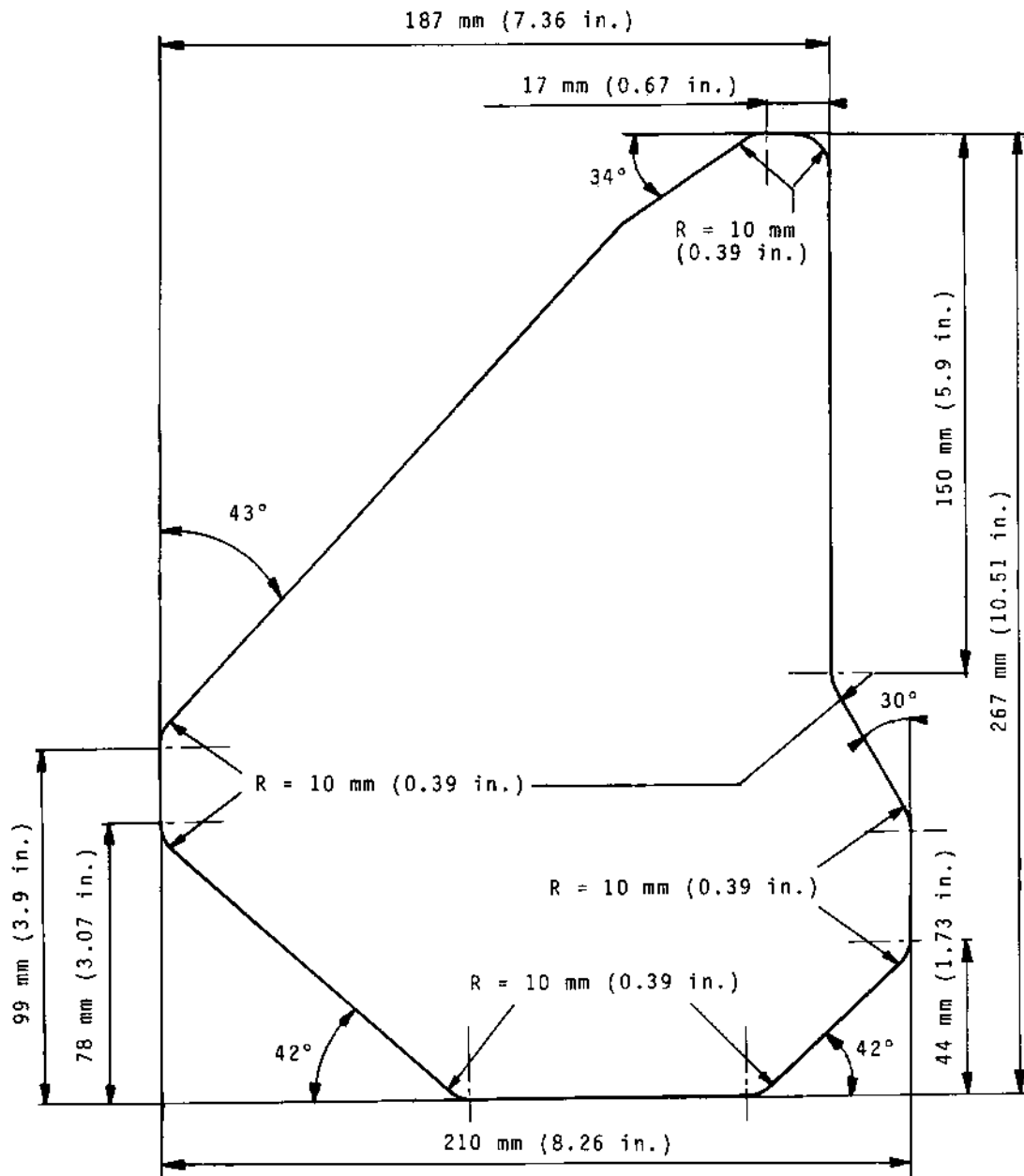


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DETAILS OF OUTER DOUBLER

MATERIAL : P3305 (Z8 CND 15)

THICKNESS : 1,2 mm (0.047 in.)

Application of Doublers to Rear Side-Panel/Upper and Lower Sections
Figure 405 (Sheet 3 of 3)

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**OLYMPUS 593**MK.610-14-28
OVERHAULREPAIRTWIN SECONDARY NOZZLE (29-190)19. Repair of Delaminations (Core-to-face Sheet Separations) Affecting the Aft Zone of the Upper and Lower Panels.

PARTS REQUIRED FOR REPAIR

Sheet metal T 60 (P 3344) ; thickenss 1 mm (0.039 in.)
Sheet metal T 60 (P 3344) ; thickness 1,2 mm (0.047 in.)
Sheet metal T 60 (P 3344) ; thickness 1,5 mm (0.059 in.)
Sheet metal T 60 (P 3344) ; thickness 5,2 mm (0.204 in.)

Rivet CR 2838-5-6 (649-772-079-0)
Rivet CR 2839-5-6 (649-772-086-0)
Rivet CR 2839-6-2 (649-772-088-0)
Rivet CR 2839-6-3 (649-772-089-0)
Rivet CR 2839-6-7 (649-772-169-0)
Rivet CR 2839-6-8 (649-772-170-0)

Spacer No. 002-004-073-1
Spacer No. 002-004-113-1

A. Assessing the extent of the defect

Determine the extent of the delamination through a tap coin test.

Depending on the extent of the defect, two repair modes are possible :

- (1) Local repair through the installation of a doubler covering the defect only.
- (2) Repair using a doubler covering the panel aft zone in totality.

B. Repair mode 1 : Local repair through installation of a doubler covering the defect only.

- (1) Preparing the doubler
 - (a) Using a fine grain emery cloth, sand lightly the panel so that the mesh (cell) patterns show up.
 - (b) Mark the location of doubler attachment (fixing) holes on the panel and center punch the hole locations.

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NOTE : Each hole to be centered within one cell.

- (c) Drill 2,5 mm (0.10 in.) dia. pilot holes through the panel.
- (d) Transfer the hole locations on a stabilene tracing paper.
- (e) From sheet metal material T60 (P3344), pre-cut the doublers in the thicknesses appropriate to the type of fixing to be used ; then curve these doublers to match the panel contour. External doubler : thickness 1,2 mm (0.047 in.) or 1,5 mm (0.059 in.) ; internal doubler : thickness 1,2 mm (0.047 in.) or 1 mm (0.039 in.). Refer to figure 402.

NOTE : For repair involving the lower panels, shape the doublers immediately above the panel weld line so as to avoid any doubler/panel weld line interference. (Refer to figure 402, sheet 7).

- (f) Stick the tracing paper on the external doubler. Center punch the hole locations and trace the outline of the external doubler.
- (g) Clip together the external and internal doublers and drill 2,5 mm (0.010 in.) dia. pilot holes through them.
- (h) Cut the internal and external doublers to dimensions and, working lengthwise, machine their edges as indicated in figure 402.

NOTE : The internal doubler may be made in several strips to ease its installation. Fit the doubler until proper contact is obtained with the angle section.

- (i) Offer up the internal and external doublers on the panel and check for alignment of holes. If required, rework holes in the doublers until good alignment is obtained.

(2) Drilling the doublers and panel

- (a) Pin the doublers on to the panel then drill 4 mm (0.157 in.) dia. holes through the assembly.
- (b) Take down the doublers and deburr holes in doublers and panel.

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- (c) Offer up the doublers on the panel and check again for hole alignment.
If required, rework holes in doublers until proper alignment is obtained.
- (d) Re-position the doublers, pin them on to the panel and ream holes to $D = 4,47 + 0,1 \text{ mm}$ ($0.176 - 0.180 \text{ in.}$).
- (e) Take down the doublers and deburr all the mating parts carefully.
- (f) Within the delaminated zone, drill $6 + 0,1 \text{ mm}$ dia. holes ($0.236 - 0.240 \text{ in.}$) through the panel outer face-sheet to provide for passage of spacers. Deburr carefully.

CAUTION : DO NOT DRILL THROUGH THE PANEL INNER FACE-SHEET.

(3) Installing the doublers

- (a) Locate the spacer and hold them fast using Loctite 307 bonding agent (P 502).
- (b) Position the doublers and pin them on to the panel.
- (c) Secure the doublers using blind rivets as instructed in chapter 70-50-50 of the Standard Practices manual and as indicated in figure 402.
- (d) Inspect the installed rivets as instructed in chapter 70-50-85 of the Standard Practices manual.

C. Repair mode 2 : Repair using a one-piece doubler covering the panel aft zone in totality.

(1) Preparing the doubler

- (a) Grind out the rivets identified on figure 403 and 404 providing for attachment of external doublers on to the nozzle framework.

NOTE : Ascertain that the rivet holes are not out-of-round. Otherwise, provide for installation of oversize dia. rivets.

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- (b) Using a fine grain emery cloth, sand lightly the panel so that the mesh (cell) patterns show up.
- (c) Mark on the panel, the location of doubler attachment holes (fixings) and center punch the hole locations. (Refer to figures 403 and 404).

NOTE : Each hole to be centered in one cell.

- (d) Drill 2,5 mm (0.10 in.) dia. pilot holes through the panel.
- (e) On a Stabilene tracing paper, transfer the location of holes providing for attachment of the doublers to the Stresskin panel.
- (f) From sheet metal material T60 (P 3344), 1,5 mm (0.060 in.) thick, pre-cut the external doubler and then curve it to match the panel contour.
- (g) Offer up the external doubler on the panel and, using a scribe, transfer mark on the doubler the locations of rivet holes (rivets machined out in step C.(a)) existing in one frame and in the two angle sections located on the frame side.
- (h) Remove the doubler from the panel and drill 2,5 mm (0.10 in.) dia. holes through the hole locations marked in the above step.
- (i) Position the doubler on the panel and check for hole alignment.
If required, rework holes in the doubler until proper alignment is obtained.
- (j) Drill the holes to 4 mm (0.157 in.) dia.
- (k) Pin the doubler on to the frame and the two angle sections and press it correctly against the panel.
Again, carry out steps (g) through (j) to drill the holes in line with the second frame and the two other angle sections.
- (l) Stick the Stabilene tracing paper on the external doubler and center punch the location of all the holes providing for attachment of doublers to the Stresskin panel.

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NOTE : Position the Stabilene tracing paper relative to the holes located in line with the two frames and angle sections and which have been previously drilled in the doubler.

- (m) From sheet metal material T60 (P 3344) 1 mm (0.040 in.) thick, pre-cut the whole set of internal doublers and curve them to match the panel contour.
- (n) Clip together the internal and external doublers and, through them, drill pilot holes to the following diameters :
 - 1. 2,5 mm (0.100 in.) in the lateral zones
 - 2. 4 mm (0.157 in.) in the central zones.
- (o) Trace the outline of internal and external doublers relative to the hole locations and as indicated in figures 403 and 404.
Cut the doublers to dimensions and, working lengthwise, machine their edges as indicated in figures 403 (Sheet 14) and 404 (Sheet 15).
- (p) Position the internal and external doublers on the panel and check for hole alignments.
If required, rework holes in doublers until proper alignment is obtained.

(2) Drilling the doublers and panel

NOTE : For repair involving the lower panels, it may be necessary to partially disassemble the panel and the rear frame to obtain passage clearance for the central zone internal doublers at the location of the drain-tube support clamp.

- (a) Pin the doublers on to the panel and drill the assembly to 4 mm (0.157 in.) dia.
- (b) Take down the external doubler and the lateral internal doublers and deburr both these and the panel.

NOTE : The central internal doublers are to be deburred in their "as-installed" position as indicated in chapter 70-50-50.

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- (c) Pin the doublers on to the panel and ream the assembly to the following dia. :
 $4,47 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.176 - 0.180 in.)
- (d) Take down the doublers and deburr all the part carefully.
- (e) Within the delaminated zone as well as directly in line with the attachment holes previously accommodating the PLT screws, drill the panel outer face-sheet to the following diameters :
 - 1. $6 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.236 - 0.240 in.) for the spacers
No. 002-004-073-1 (Refer to figure 405).
 - 2. $8 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.315 - 0.319 in.) for the spacers
No. 002-004-113-1 (Refer to figure 405).

CAUTION : DO NOT DRILL THROUGH THE PANEL INNER FACE-SHEET.

(3) Installing the doublers

- (a) From sheet metal material T60 (P 3344) 5,2 mm (0.204 in.) thick, or from two 2,6 mm (0.102 in.) sheet metal plates, machine two shims as indicated in figure 403 (Sheet 12) and in figure 406.
- (b) Offer up the external doubler on the panel and fit the shim so as to ensure proper contact of doubler in the rear frame zone.
- (c) Locate the spacers maintaining them with Loctite 307 bonding agent (P 502).
- (d) Re-position the doublers and pin them on to the panel.
- (e) Secure the doublers using blind rivets, as instructed in chapter 70-50-50 of the Standard Practices manual and as indicated in figures 403 and 404.

NOTE : Secure the external doubler first to the nozzle framework.

- (f) Inspect the installed rivets as instructed in chapter 70-50-85 of the Standard Practices manual.

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OVERHAUL

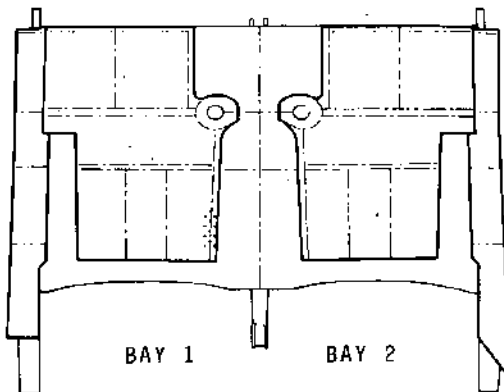


PRINTED IN FRANCE



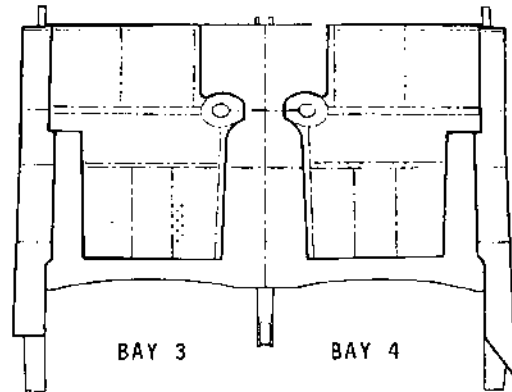
FRONT

TOP VIEW



BAY 1

BAY 2



BAY 3

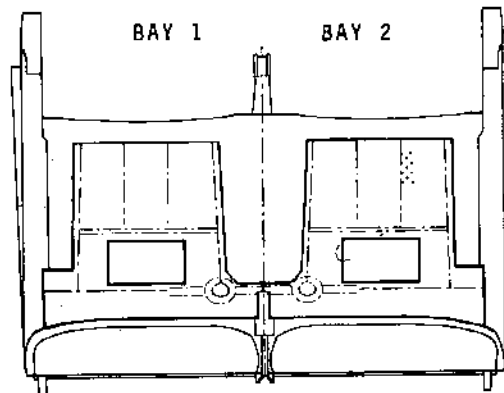
BAY 4

L.H. NOZZLE

R.H. NOZZLE

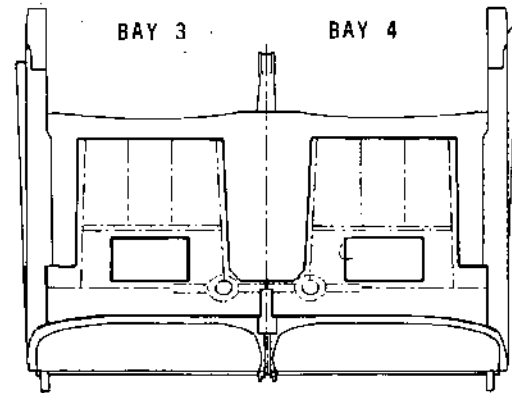
AIRCRAFT CENTERLINE

BOTTOM VIEW



BAY 1

BAY 2



BAY 3

BAY 4

FRONT



Typical Locations of Defects on the Nozzle to be Locally Repaired
Figure 401

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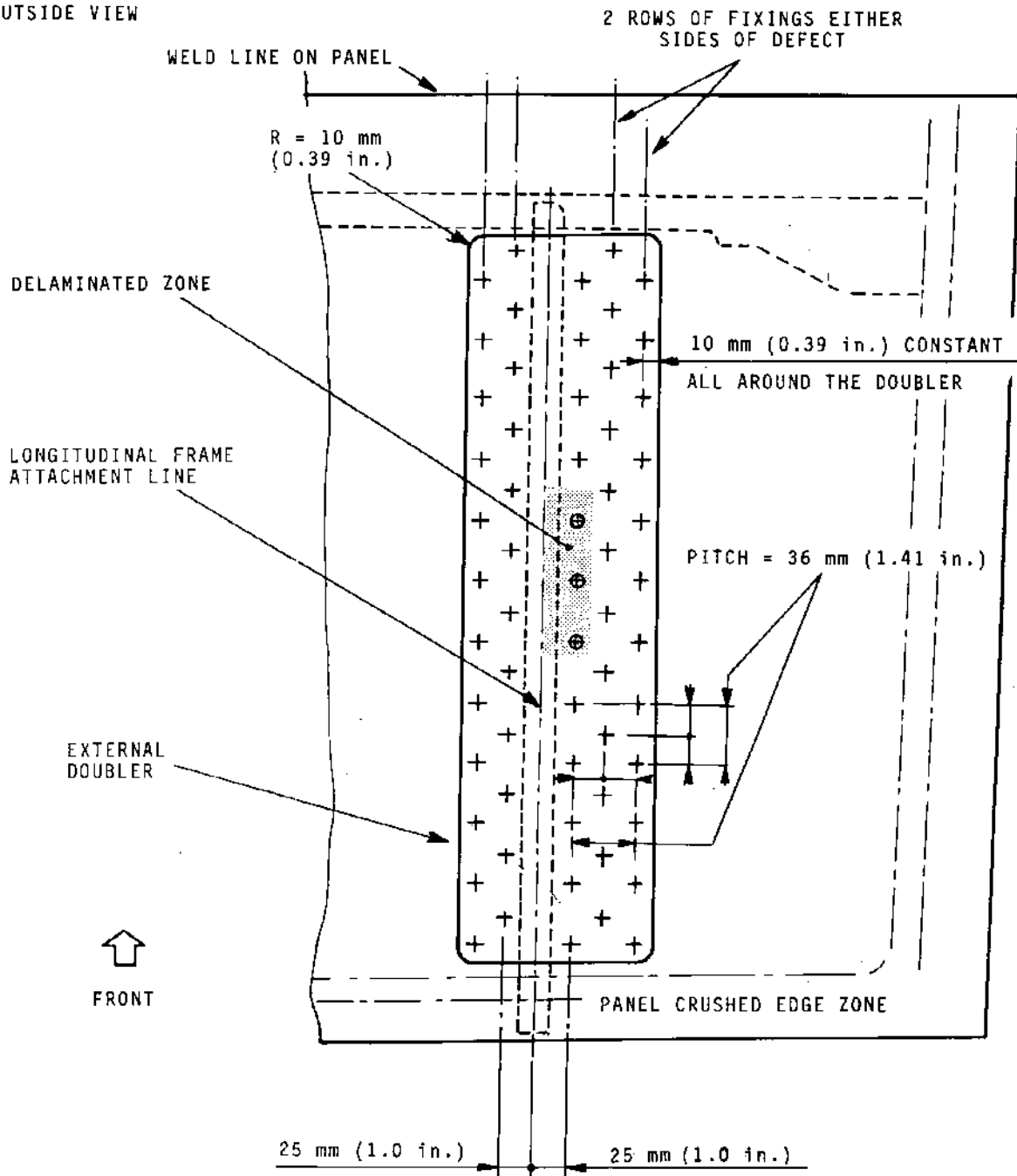
OLYMPUS 593

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TYPICAL REPAIR ON UPPER PANEL, BAY 3
REPAIR VALID FOR THE OTHER BAYS -
OUTSIDE VIEW



FOR DATA RELATED TO FIXINGS
AND MACHINING OF DOUBLER
EDGE REFER TO SHEET 6 OF 7

Local Repair through Doubler Installation
Figure 402 (Sheet 1 of 7)

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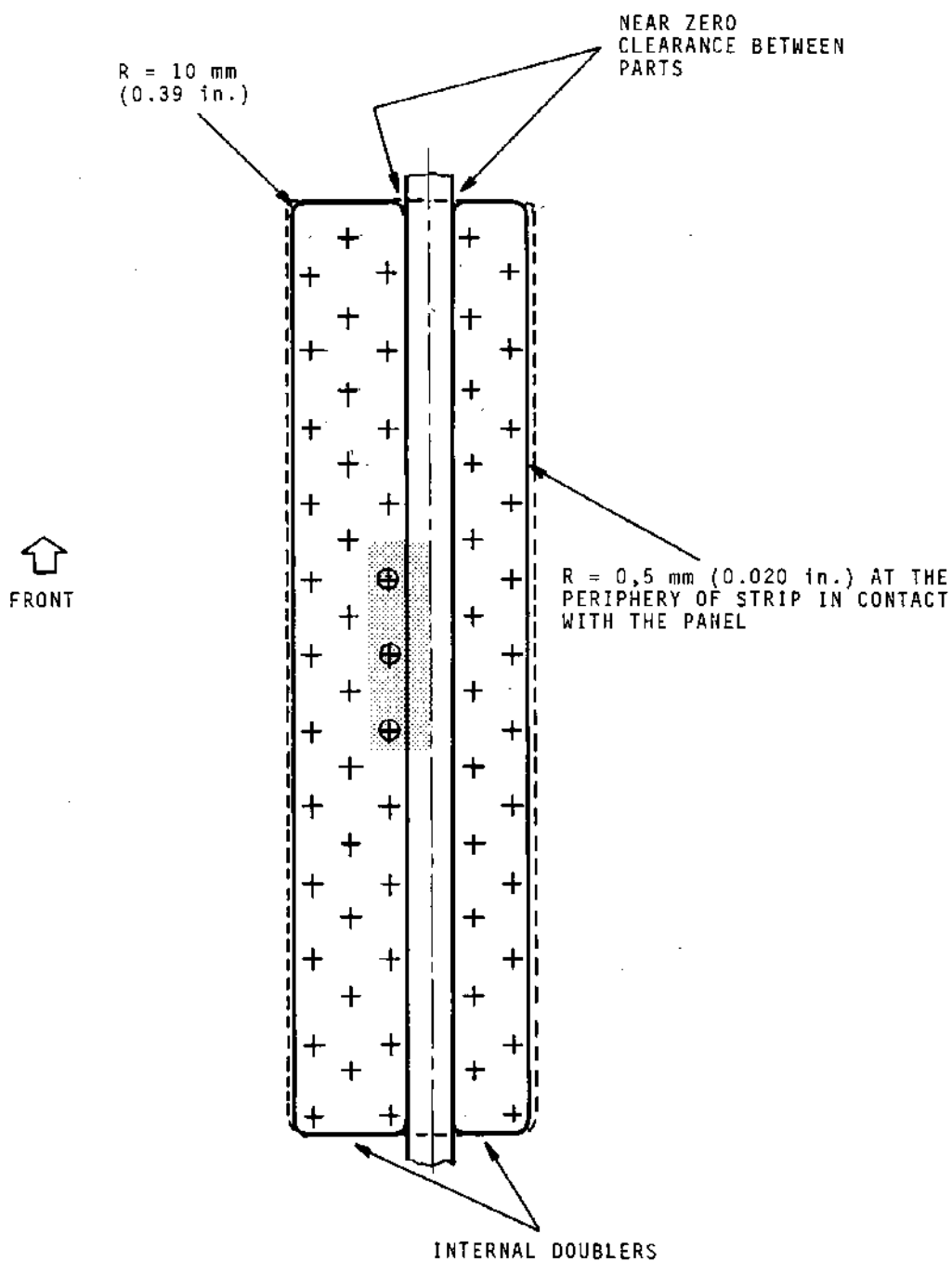
OLYMPUS 593

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TYPICAL REPAIR ON UPPER PANEL, BAY 3
REPAIR VALID FOR THE OTHER BAYS -
INSIDE VIEW



Local Repair through Doubler Installation
Figure 402 (Sheet 2 of 7)

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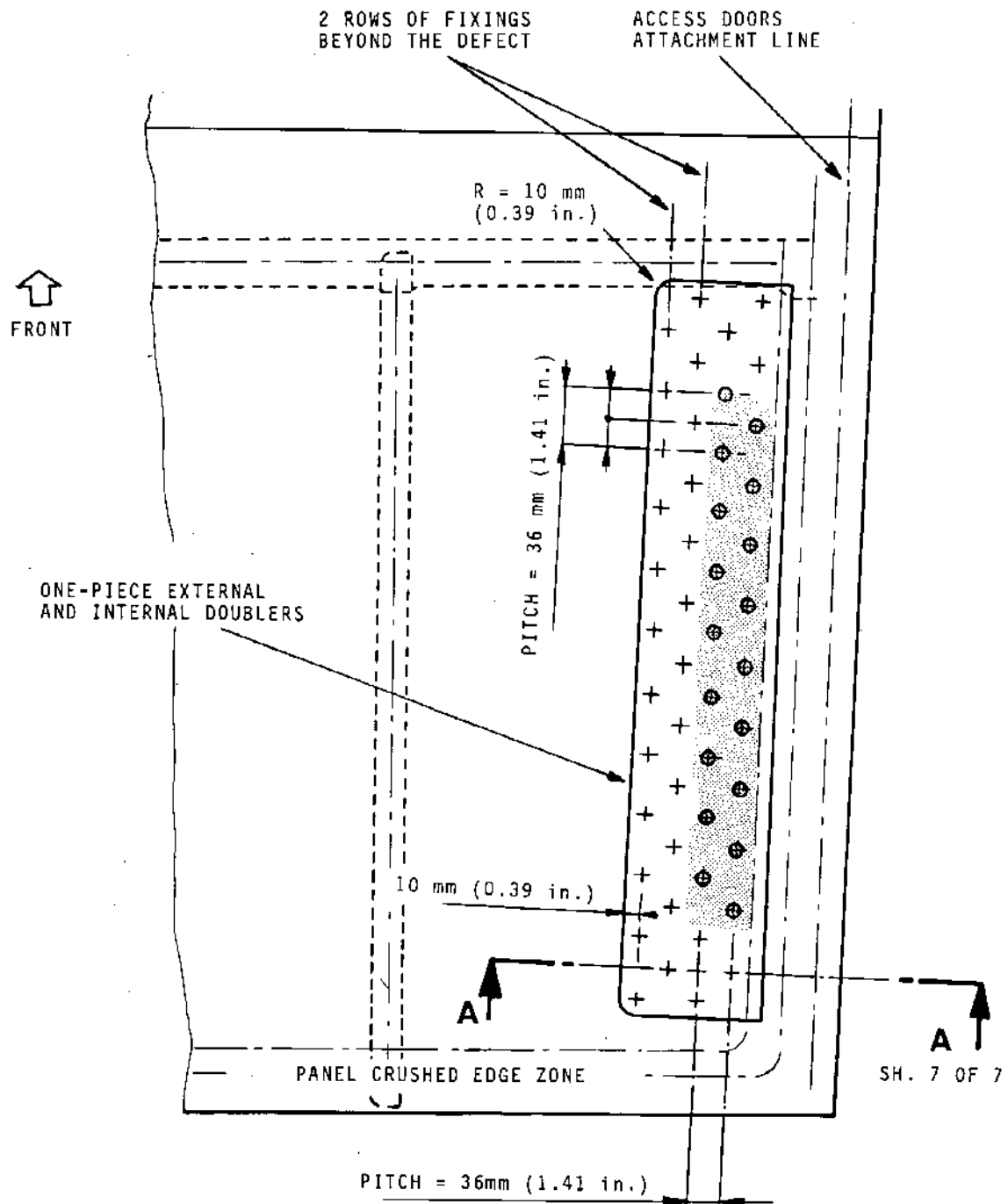
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OVERHAUL



TYPICAL REPAIR AT THE EDGE OF UPPER PANEL, BAY 1
REPAIR VALID FOR THE OTHER BAYS -
OUTSIDE VIEW



Local Repair through Doubler Installation
Figure 402 (Sheet 3 of 7)

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TYPICAL REPAIR ON LOWER PANEL, BAY 2
REPAIR VALID FOR THE OTHER BAYS -
OUTSIDE VIEW

2 ROWS OF FIXINGS
EITHER SIDES OF DEFECT

EXTERNAL
DOUBLER

R = 10 mm
(0.39 in.)

WELD LINE
ON PANEL

B (SH. 7)

10 mm (0.39 in.)
CONSTANT ALL
AROUND THE DOUBLER

DELAMINATED ZONE

LONGITUDINAL FRAME
ATTACHMENT LINE

PITCH = 36 mm (1.41 in.)

10 mm (0.39 in.) CONSTANT
ALL AROUND THE PANEL

- PANEL CRUSHED EDGE ZONE

25 mm
(1.0 in.)

25 mm
(1.0 in.)

FOR DATA RELATED TO FIXINGS AND
MACHINING OF DOUBLER EDGE
REFER TO SHEET 6 OF 7

Local Repair through Doubler Installation
Figure 402 (Sheet 4 of 7)

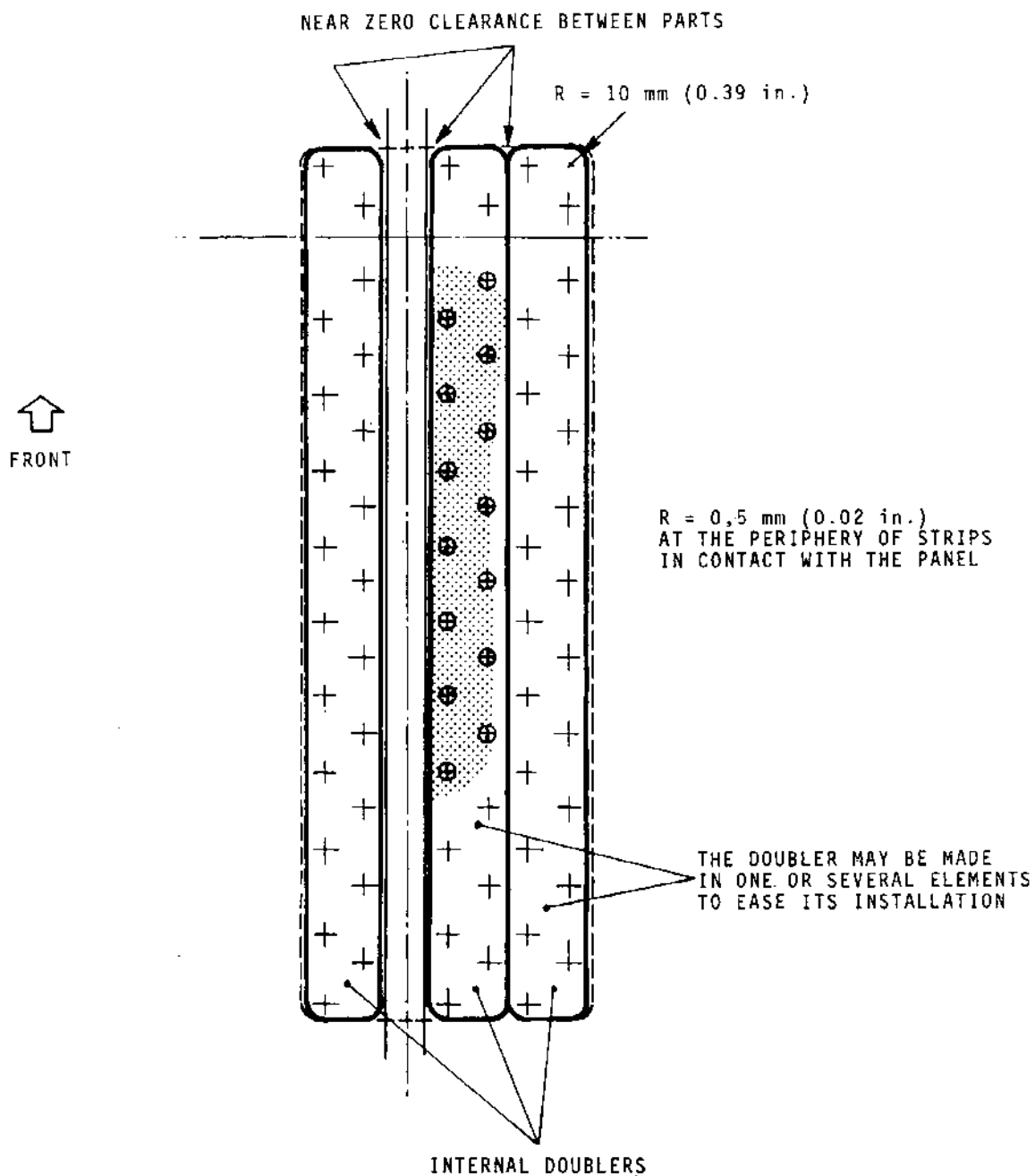
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TYPICAL REPAIR ON LOWER PANEL, BAY 2
REPAIR VALID FOR THE OTHER BAYS -
INSIDE VIEW



Local Repair through Doubler Installation
Figure 402 (Sheet 5 of 7)

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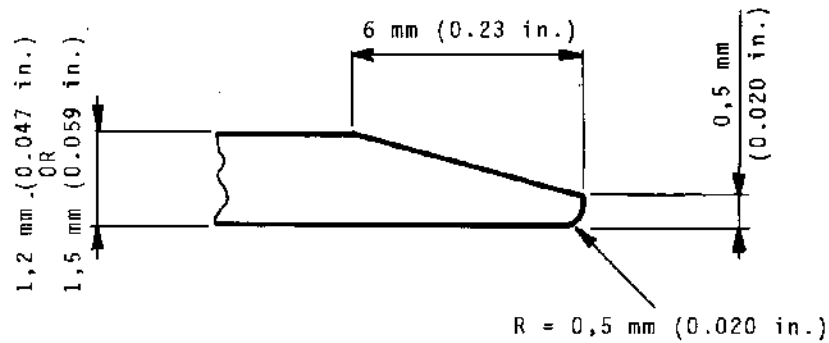
OLYMPUS 593

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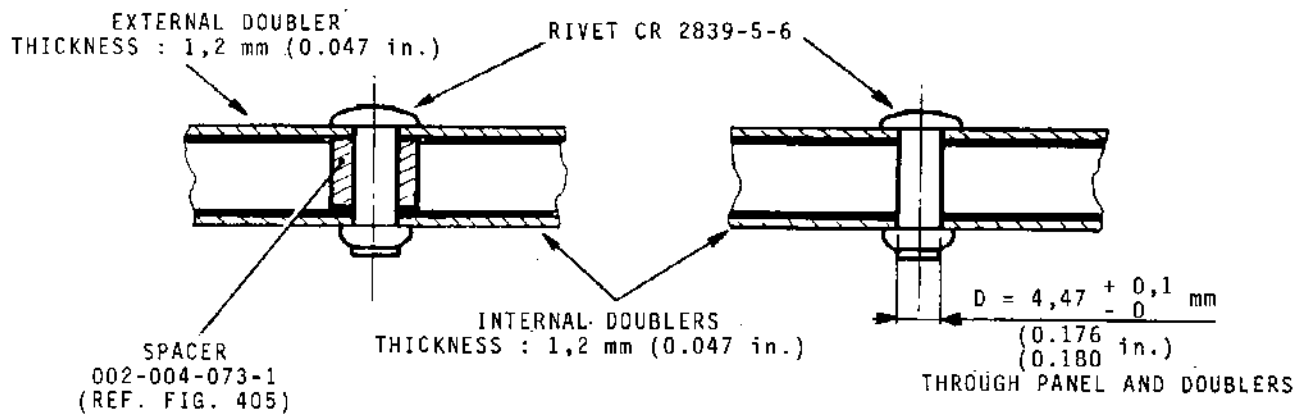
CUT OUT ALL AROUND THE EXTERNAL DOUBLERS



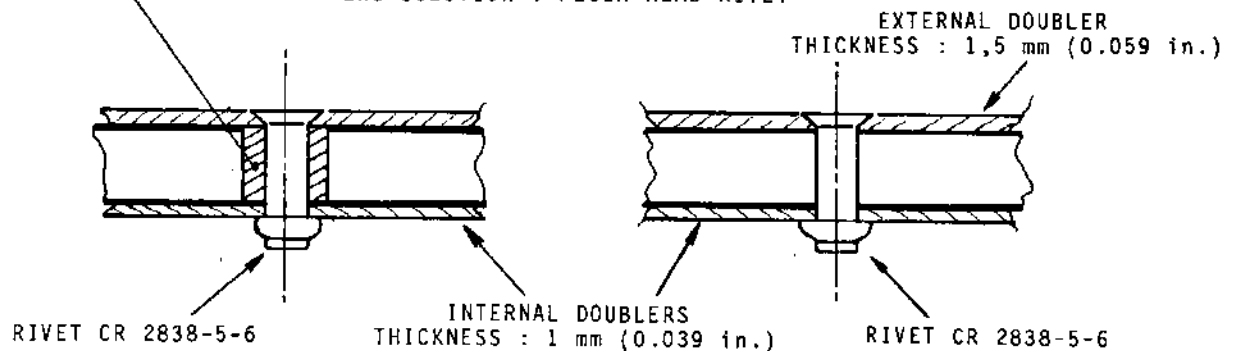
FIXING ARRANGEMENT IN DELAMINATED ZONE

FIXING ARRANGEMENT IN THE SOUND AREA

1st SOLUTION : ROUND HEAD RIVET



2nd SOLUTION : FLUSH HEAD RIVET



Local Repair through Doubler Installation
Figure 402 (Sheet 6 of 7)

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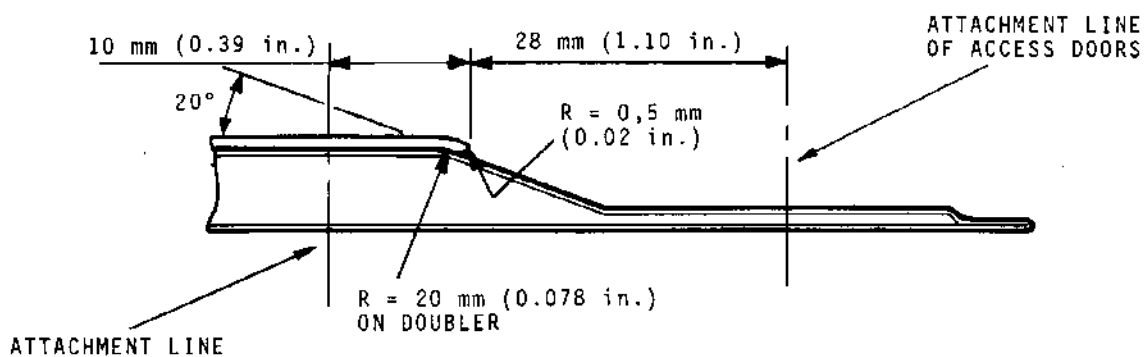
OLYMPUS 593

MK.610-14-28

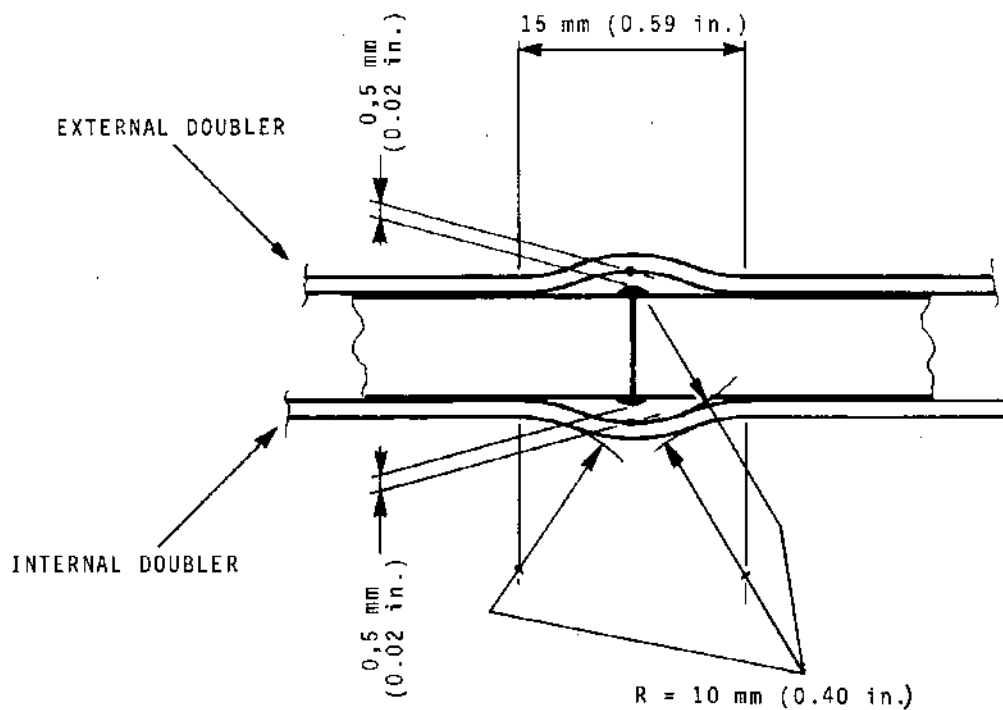
OVERHAUL



SECTION AA
(FOLDING OF DOUBLER OVER ALL ITS LENGTH)



SECTION BB
SHAPING OF DOUBLERS IMMEDIATELY
ABOVE THE PANEL WELD LINE



Local Repair through Doubler Installation
Figure 402 (Sheet 7 of 7)

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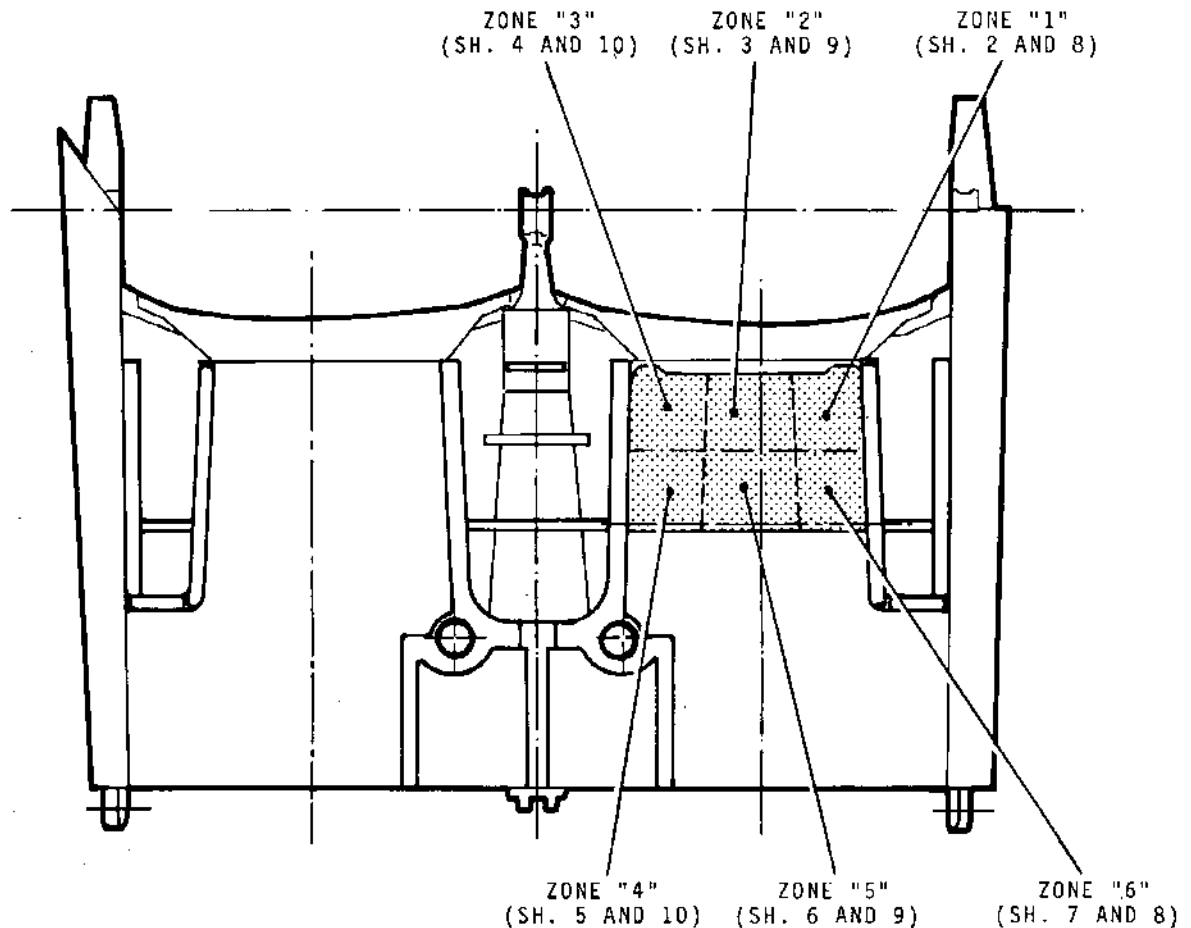
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OVERHAUL



TOP VIEW

REPAIR ON BAYS 1 AND 3 AS SHOWN
REPAIR ON BAYS 2 AND 4 SYMMETRICAL



LOCATIONS OF DOUBLER FIXINGS :

- AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES, SEE SHEETS 2 THRU 7
- WITHIN A SOUND AREA, SEE SHEETS 8 THRU 10
- WITHIN THE DELAMINATED ZONE AND NEXT TO IT, SEE SHEETS 11 AND 12

EXTERNAL DOUBLER CUT OUT FROM SHEET METAL T60 (P 3344) :
THICKNESS : 1,5 mm (0.059 in.)

INTERNAL DOUBLER CUT OUT FROM SHEET METAL T60 (P 3344) :
THICKNESS 1 mm (0.039 in.)

SPACER BUSHES (SEE FIG. 405)

SHIMS (SEE FIG. 406)

Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 1 of 18)

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OVERHAUL



ZONE "1"

LOCATIONS OF FIXINGS AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES.

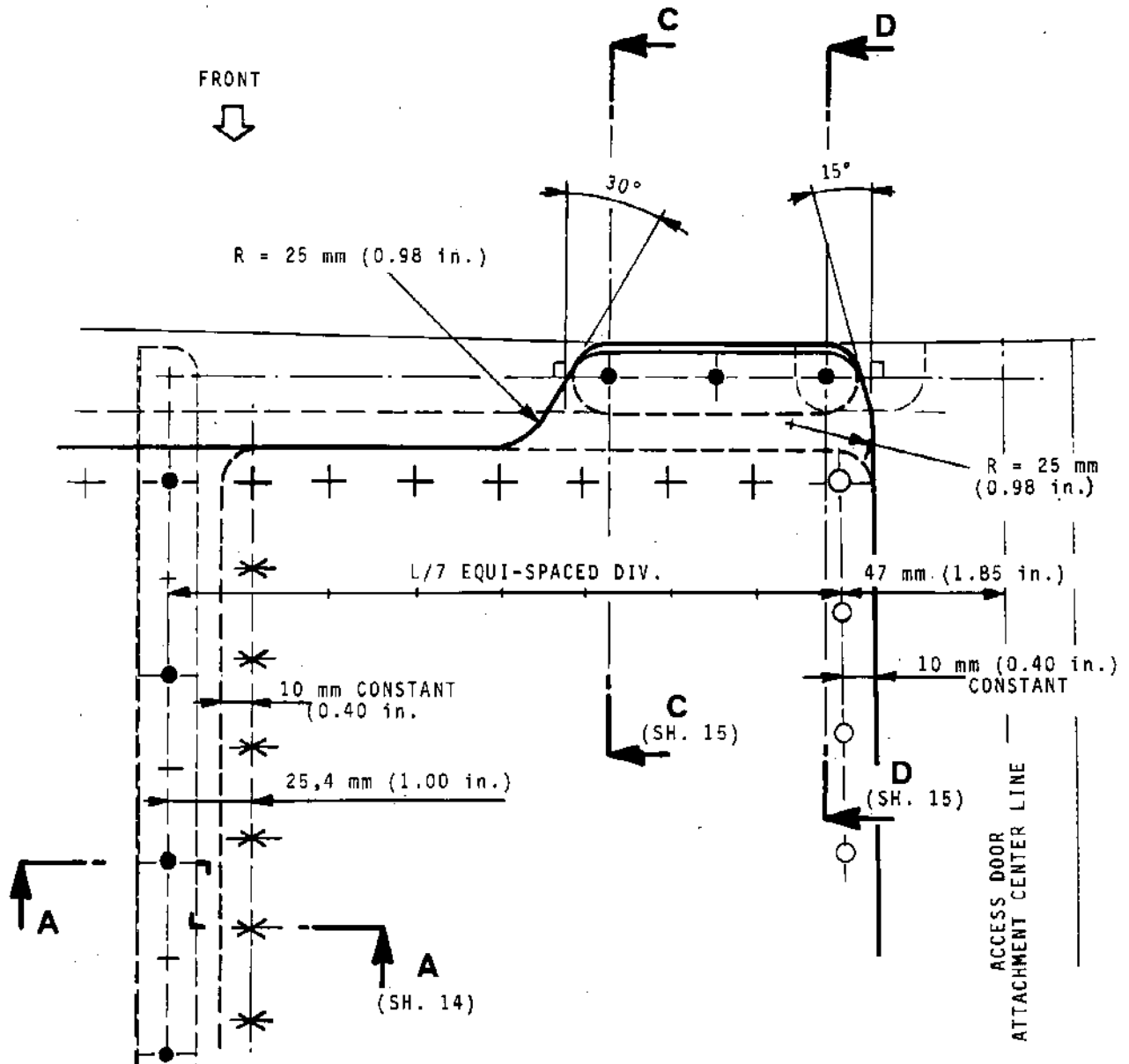
RIVETING PITCH

27 mm (1.06 in.)

36 mm (1.42 in.)

EXISTING ATTACHMENT POINTS RE-USED

NON-DIMENSIONED RADII = 10 mm (0.040 in.)



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 2 of 18)

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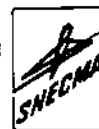
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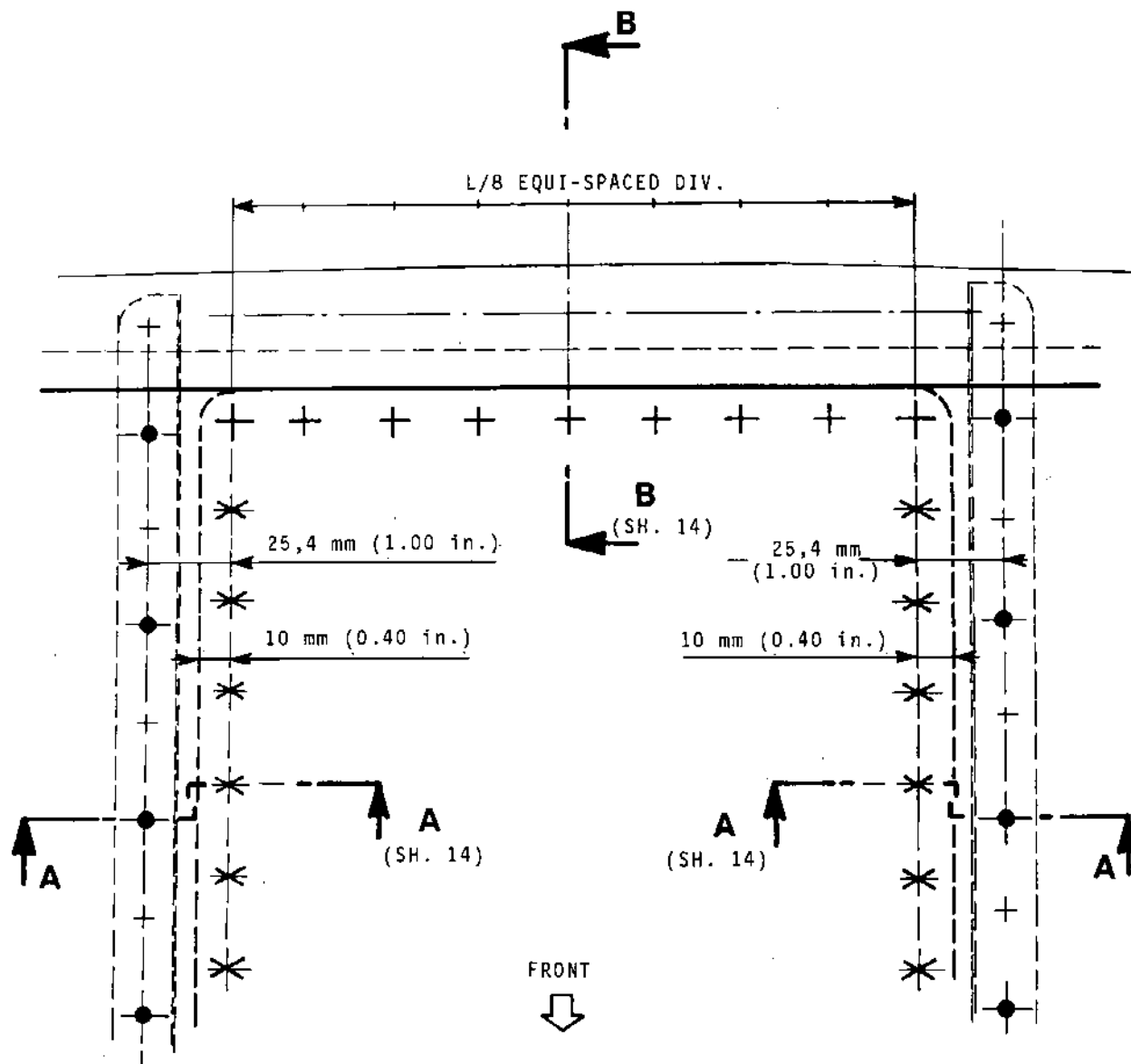
ZONE "2"

LOCATIONS OF FIXINGS AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES

RIVETING PITCH ≤ 27 mm (1.06 in.)

EXISTING ATTACHMENT POINTS RE-USED

NON-DIMENSIONED RADII = 10 mm (0.040 in.)



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 3 of 18)

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ZONE "3"

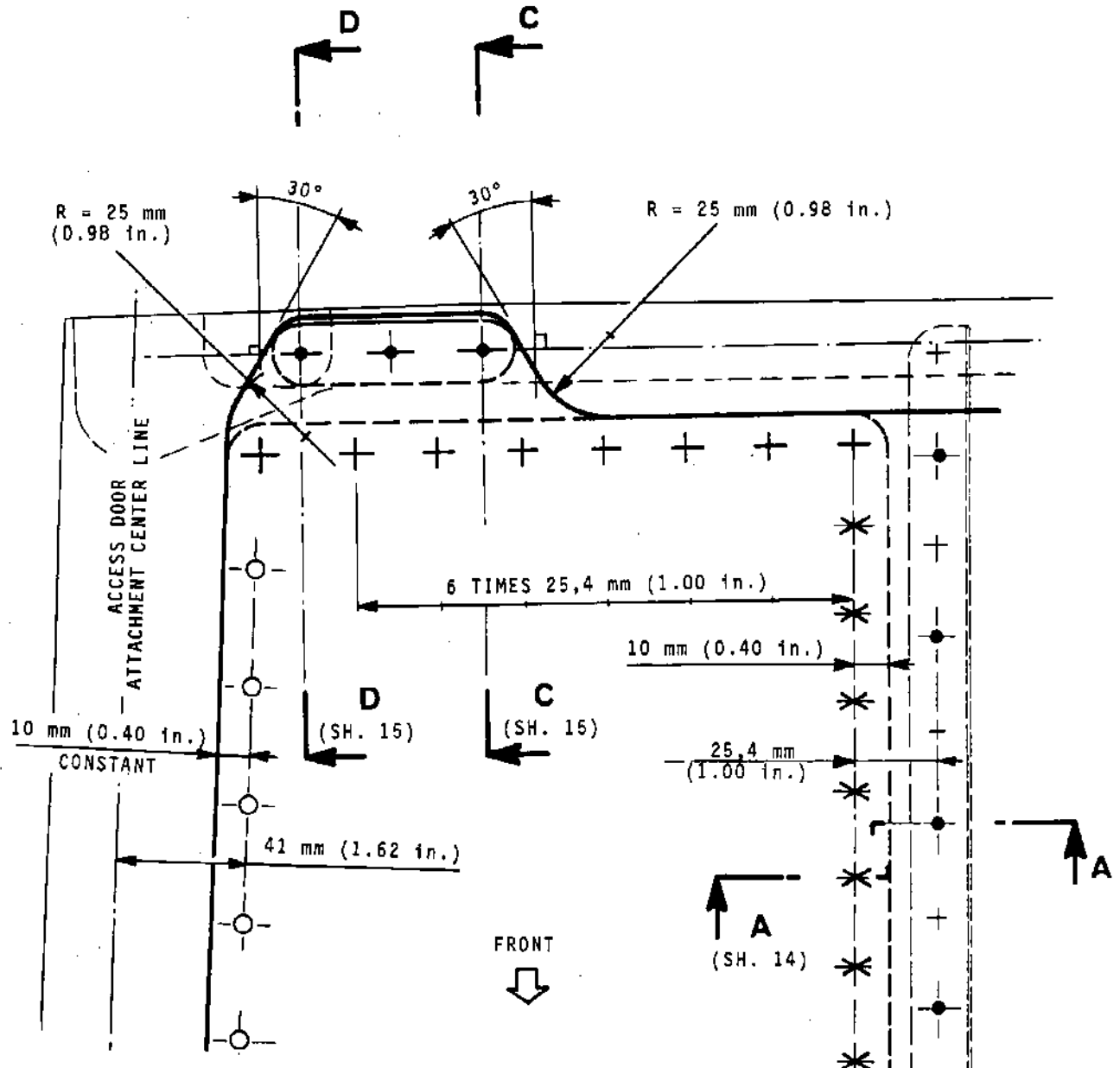
LOCATIONS OF FIXINGS AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES

RIVETING PITCH \times = 27 mm (1.06 in.)

\bigcirc = 36 mm (1.42 in.)

\oplus = EXISTING ATTACHMENT POINTS RE-USED

NON-DIMENSIONED RADII = 10 mm (0.42 in.)



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 4 of 18)

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ZONE "4"

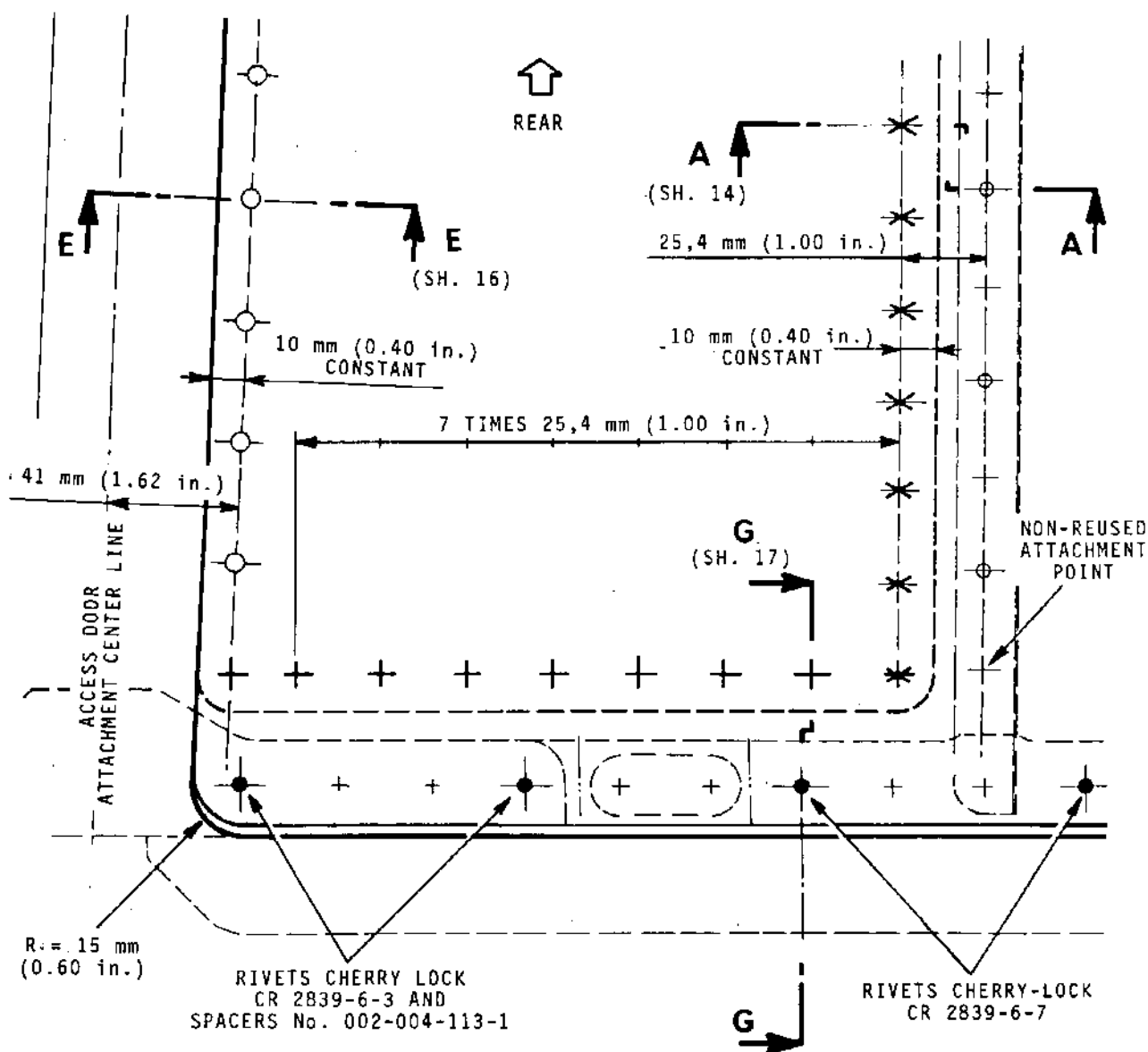
LOCATIONS OF FIXINGS AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES

RIVETING PITCH * = 27 mm (1.06 in.)

-○ = 36 mm (1.42 in.)

+ = EXISTING ATTACHMENT POINTS RE-USED

NON-DIMENSIONED RADII = 10 mm (0.40 in.)



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 5 of 18)

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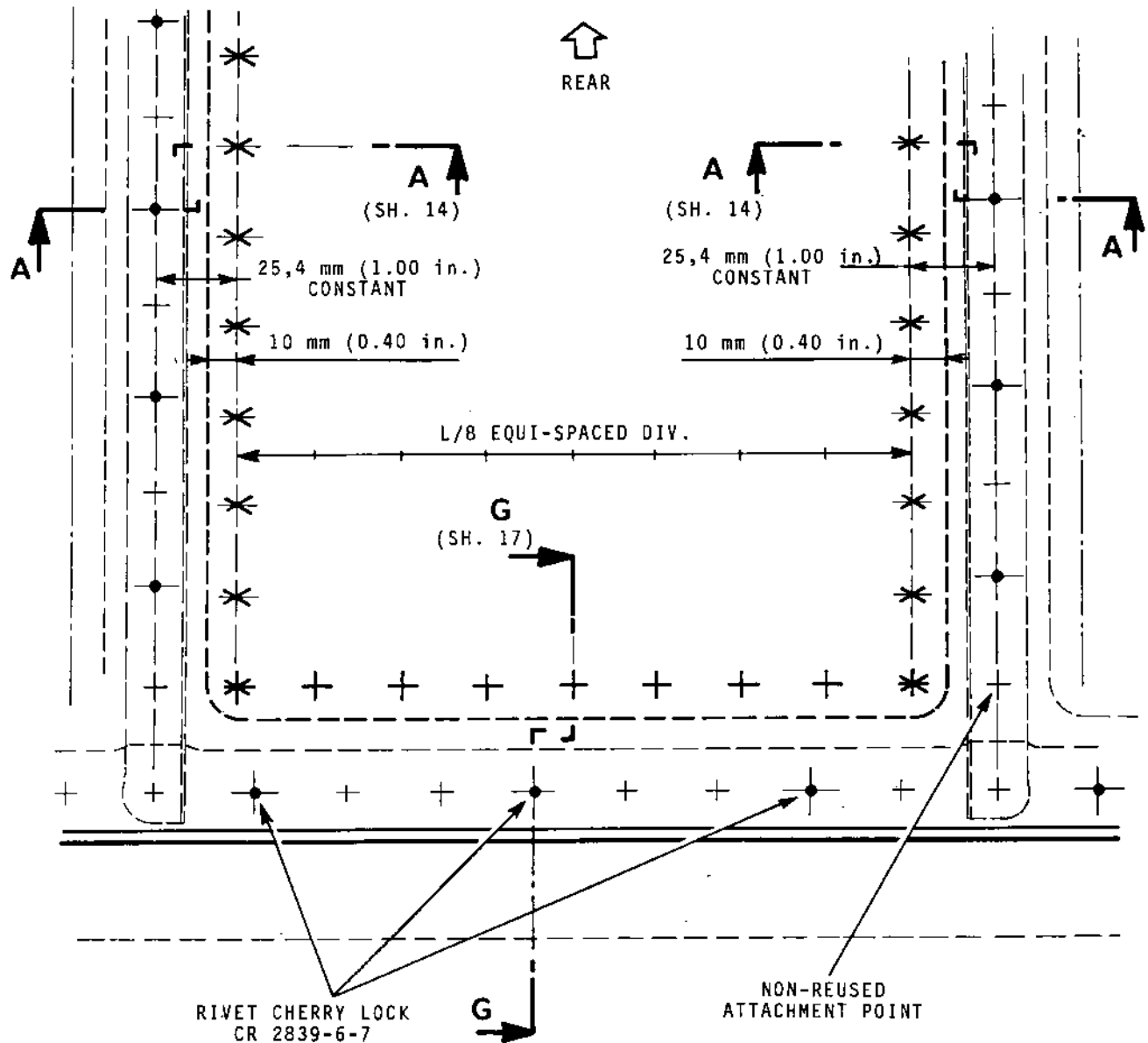
MK.610-14-28
OVERHAUL



ZONE "5"

LOCATIONS OF FIXINGS AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES

RIVETING PITCH = 27 mm (1.06 in.)
 = EXISTING ATTACHMENT POINTS RE-USED
NON-DIMENSIONED RADII = 10 mm (0.40 in.)



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 6 of 18)

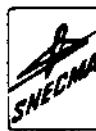
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ZONE "6"

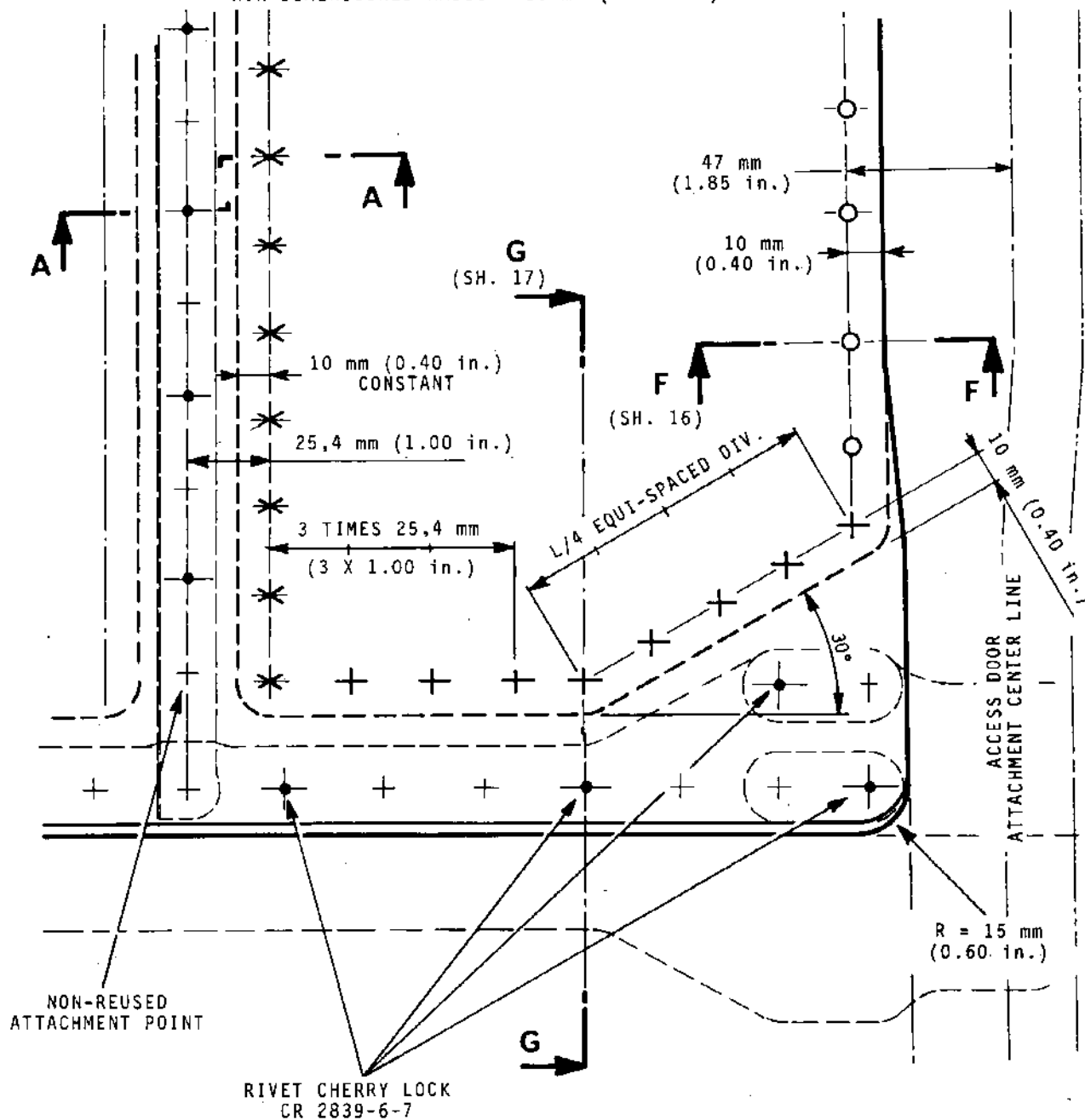
LOCATIONS OF FIXINGS AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES

RIVETING PITCH \times = 27 mm (1.06 in.)

-O- = 36 mm (1.42 in.)

+ = EXISTING ATTACHMENT POINTS RE-USED

NON-DIMENSIONED RADII = 10 mm (0.40 in.)



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 7 of 18)

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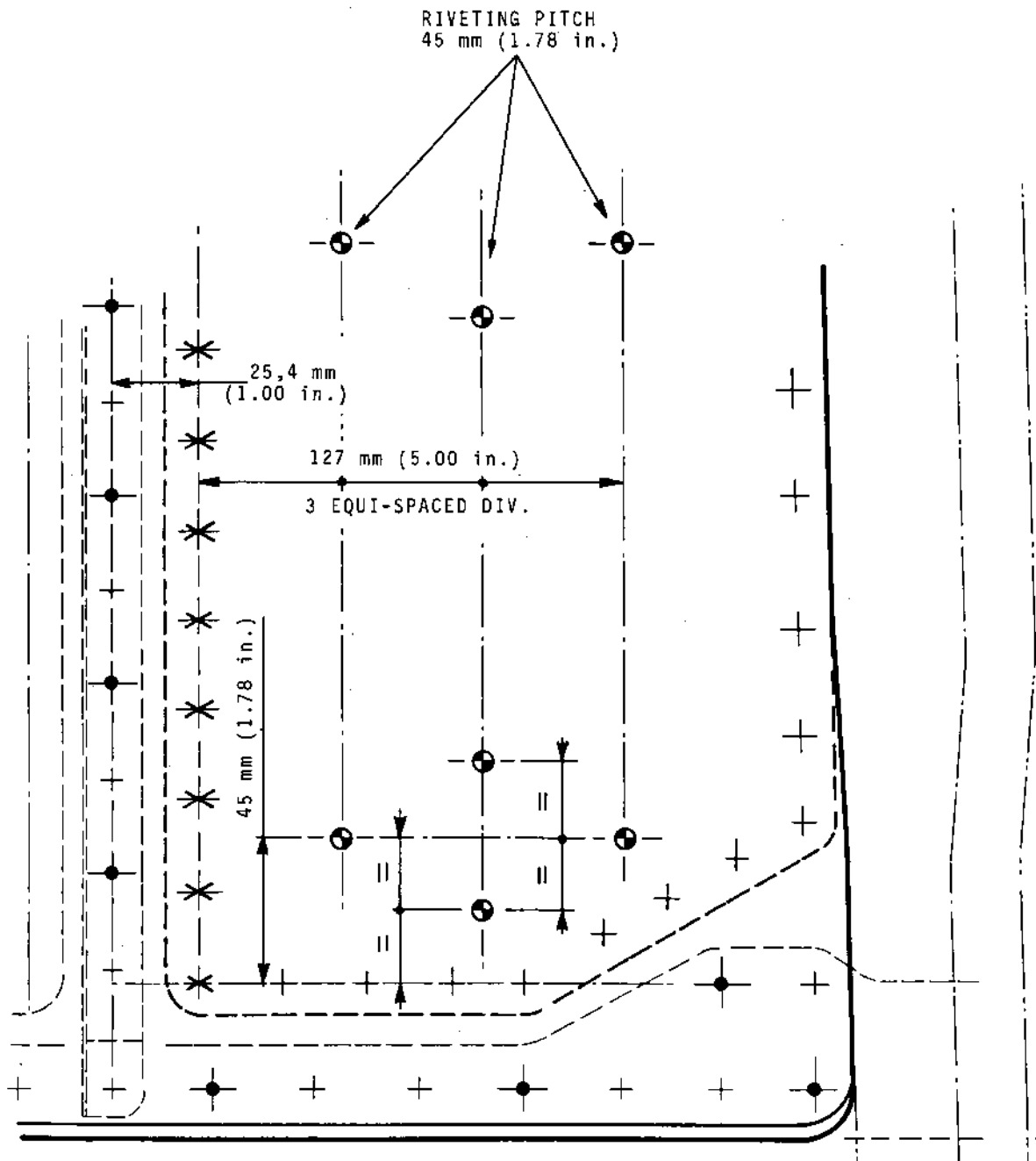
OLYMPUS 593

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OVERHAUL



ZONES "1" AND "6"

LOCATIONS OF THE DOUBLER FIXINGS WITHIN A SOUND AREA

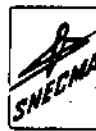


Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 8 of 18)



OLYMPUS 593

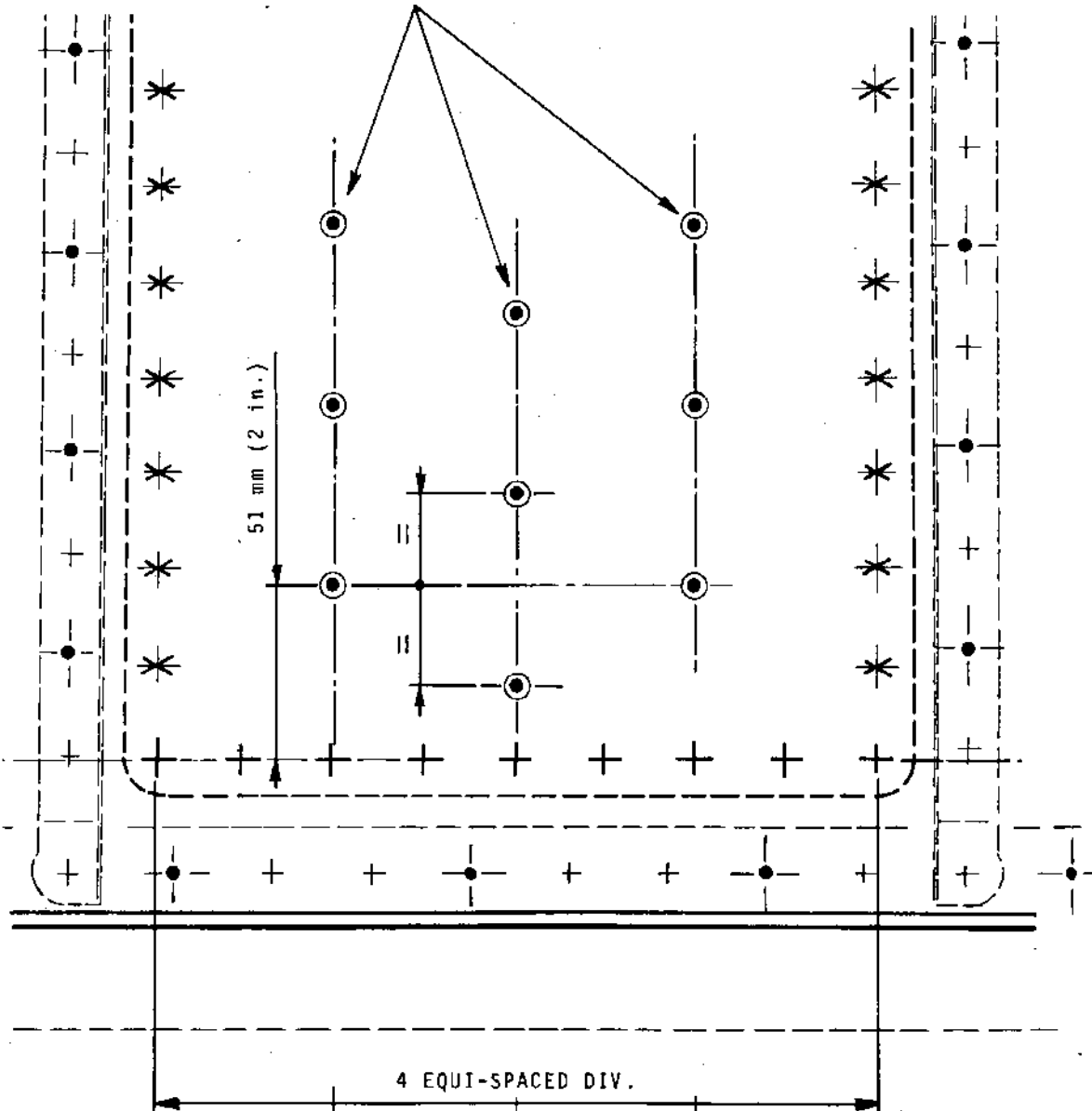
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ZONES "2" AND "5"

LOCATIONS OF THE DOUBLER FIXINGS WITHIN A SOUND AREA

PITCH OF FIXINGS
54 mm (2.13 in.)



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 9 of 18)

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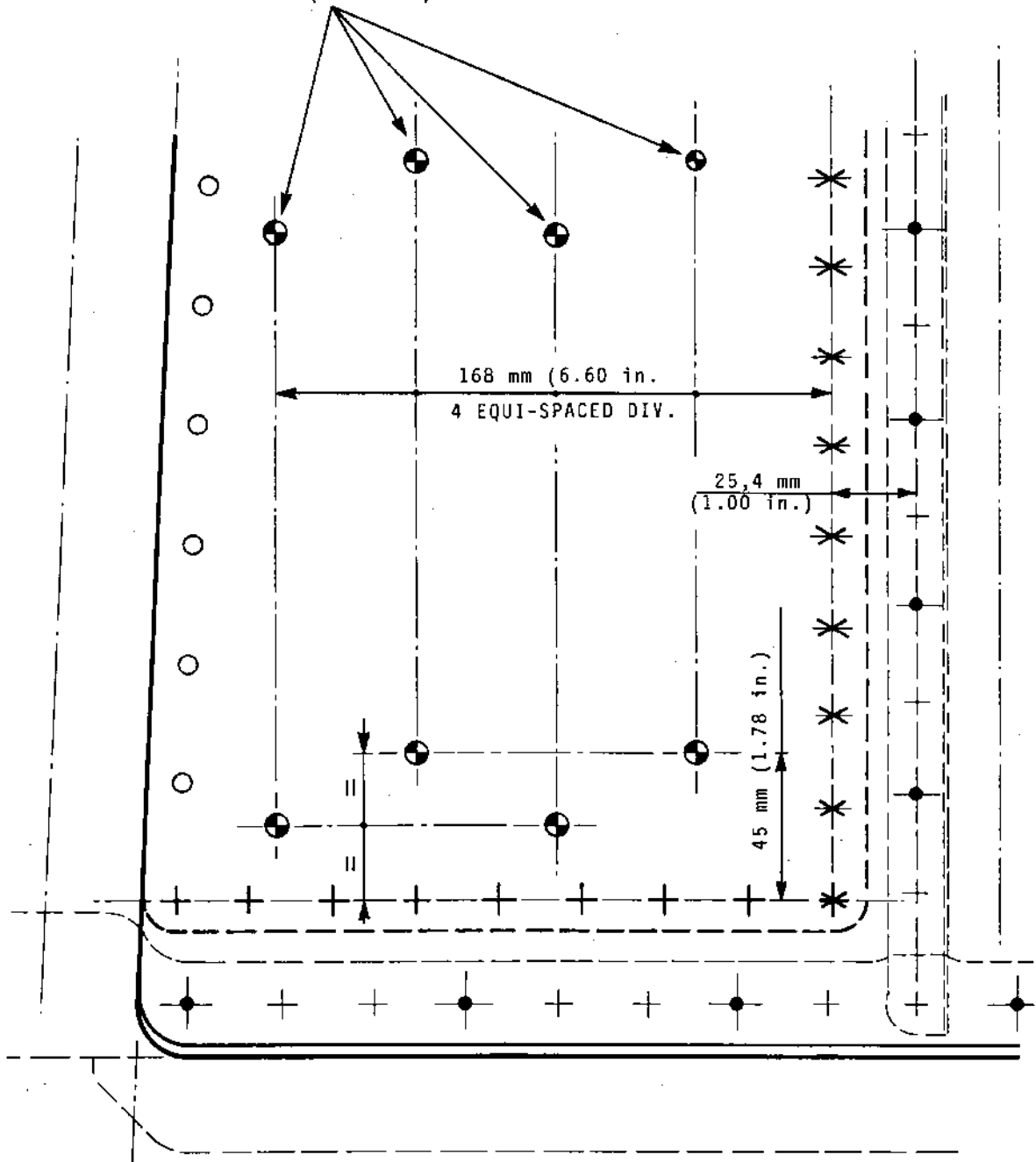
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OVERHAUL



ZONES "3" AND "4"

LOCATIONS OF THE DOUBLER FIXINGS WITHIN A SOUND ARE

PITCH OF FIXINGS
45 mm (1.78 in.)



Repairing Delamination Lying in a Rear Upper Panel
Figure 403 (Sheet 10 of 18)

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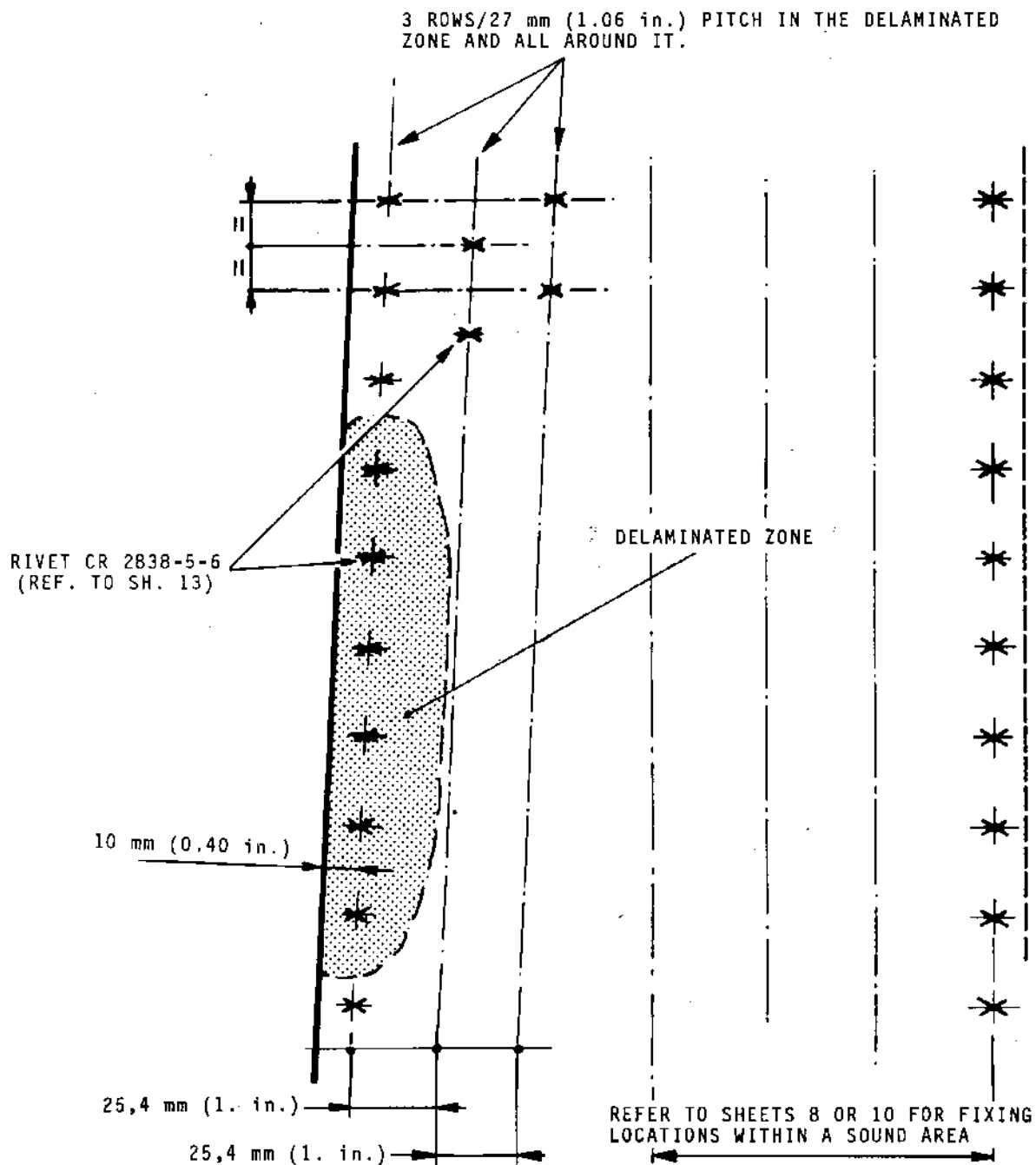


OLYMPUS 593

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OVERHAUL



LOCATIONS OF DOUBLER FIXINGS WITHIN A DELAMINATED ZONE AND NEXT TO IT (E.G. : EDGE OF AN ACCESS DOOR ATTACHMENT ZONE)



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 11 of 18)

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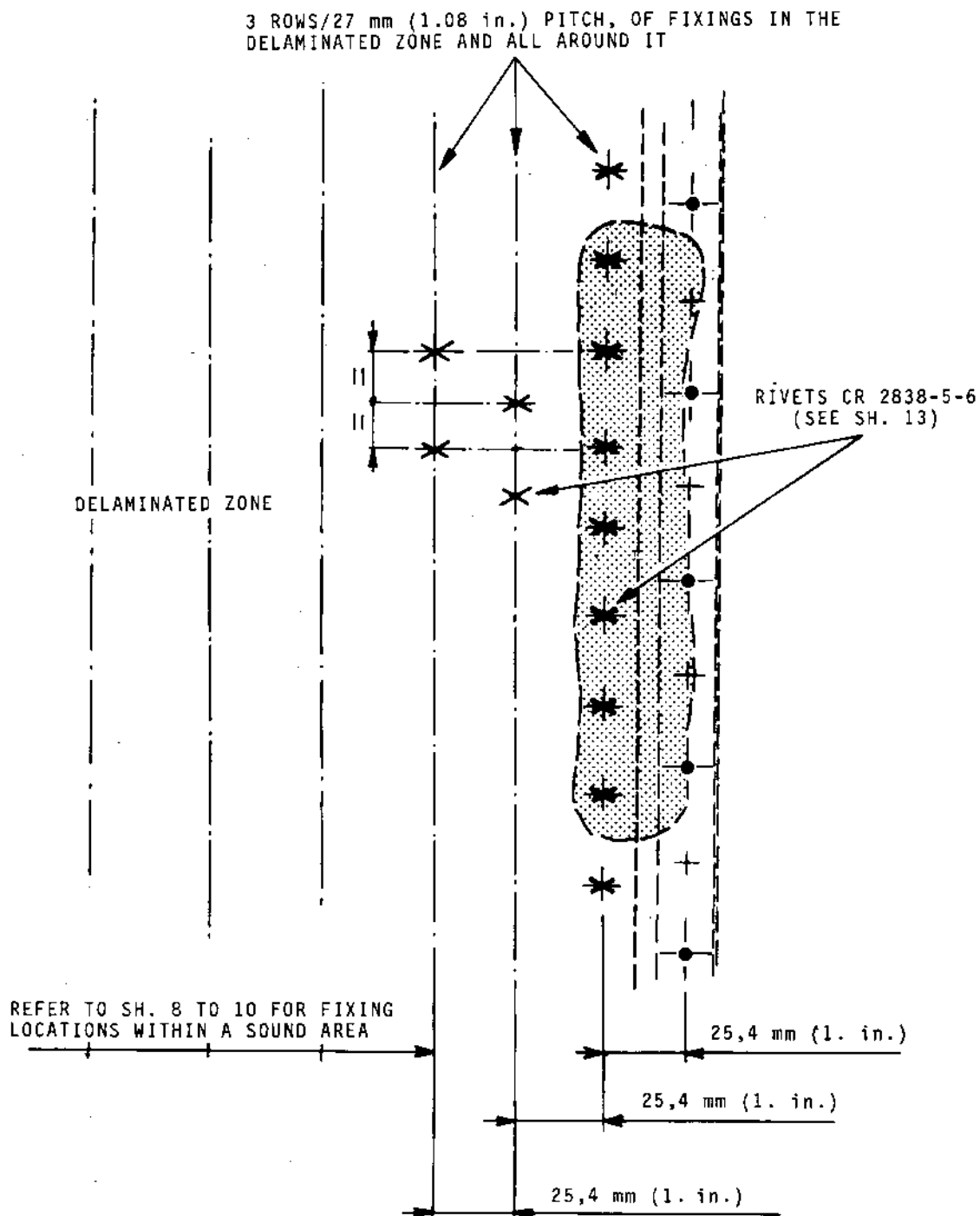


OLYMPUS 593

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OVERHAUL



LOCATIONS OF DOUBLER FIXINGS WITHIN A DELAMINATED ZONE
AND NEXT TO IT (E.G. : IN LINE WITH A FRAME)



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 12 of 18)

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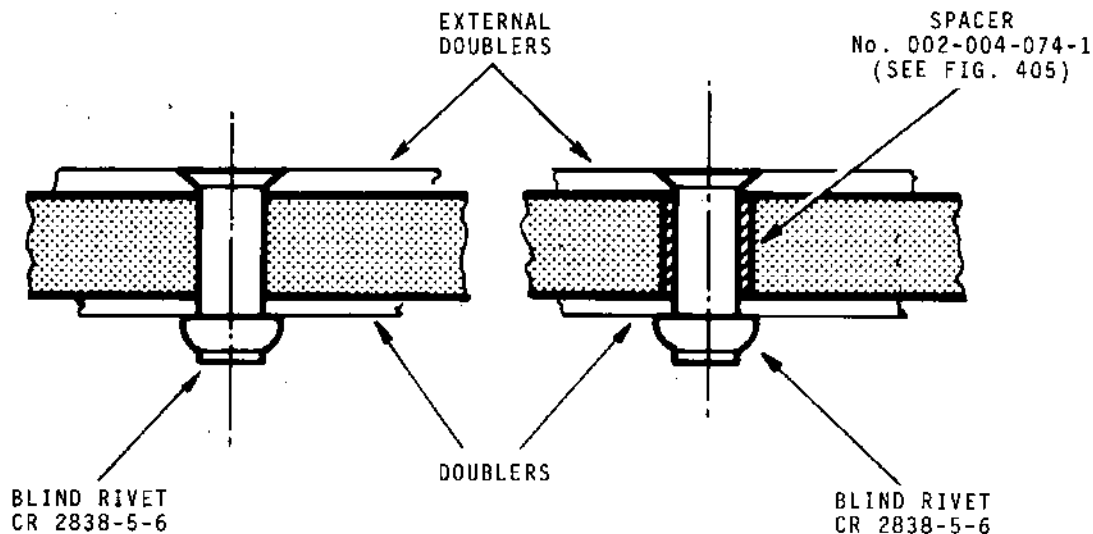
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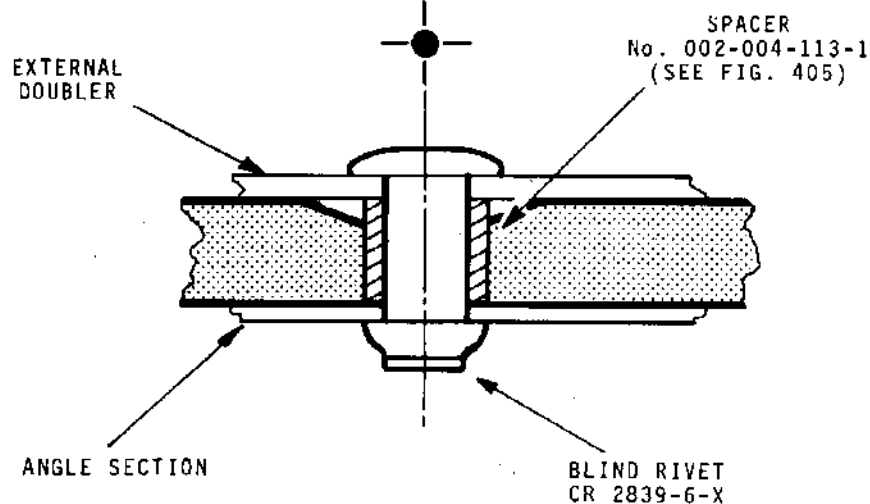
DOUBLER FIXING ARRANGEMENT
(FOR DRILLING, SEE FIG. 405)

IN A SOUND AREA

IN A DELAMINATED ZONE



DOUBLER FIXING ARRANGEMENT
IN LINE WITH EXISTING HOLES
(FOR DRILLING, SEE FIG. 405)



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 13 of 18)

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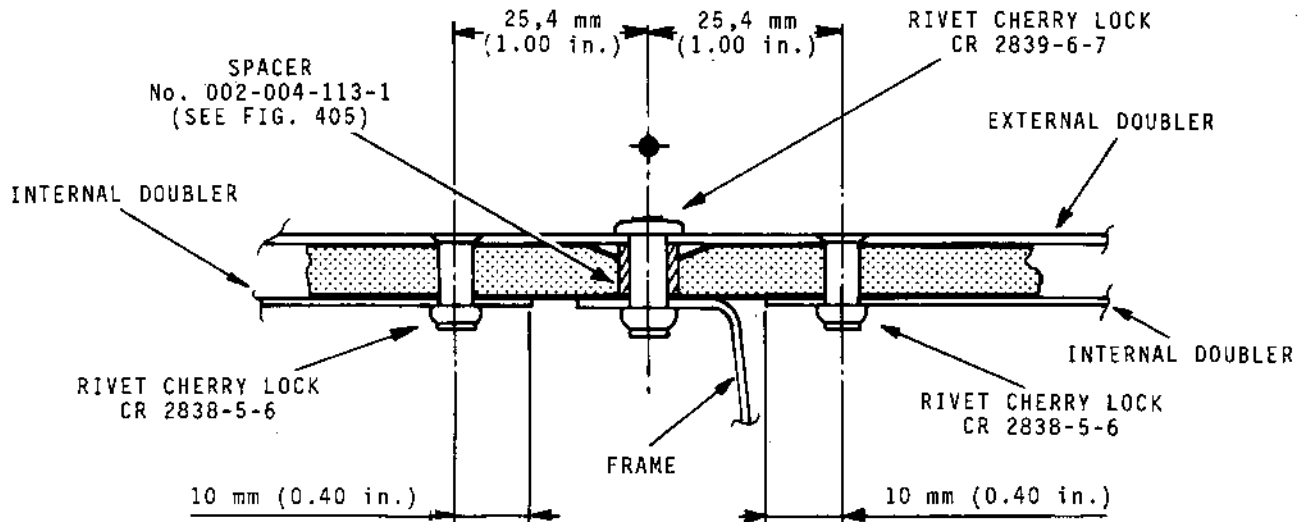
OLYMPUS 593

MK.610-14-28
OVERHAUL

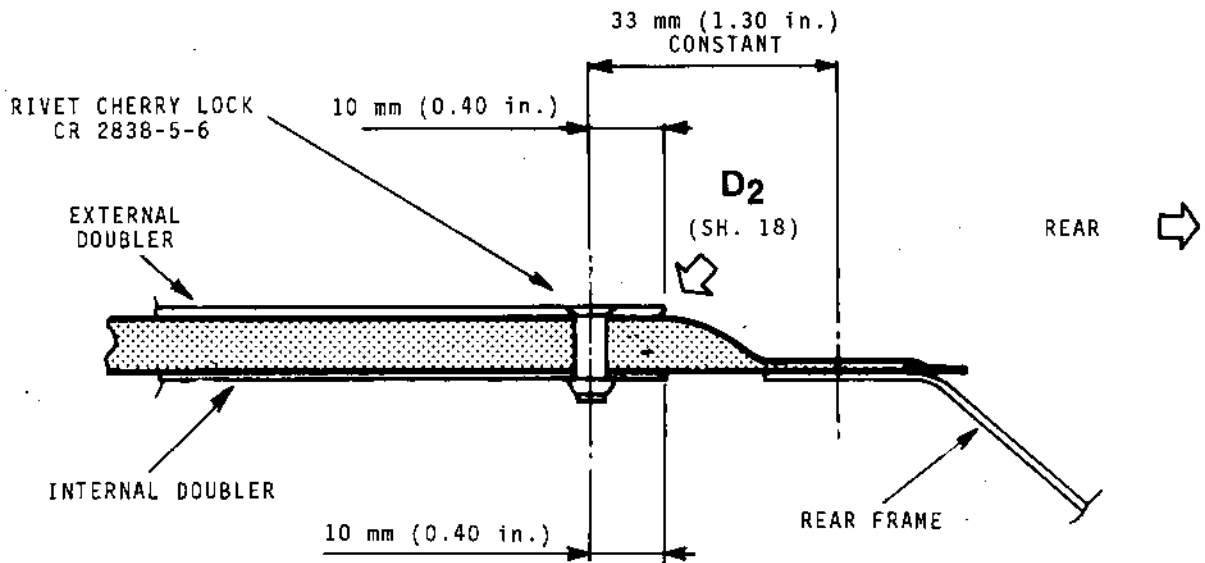


SECTION AA

VALID FOR FIXINGS IN LINE WITH THE FRAMES



SECTION BB



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 14 of 18)

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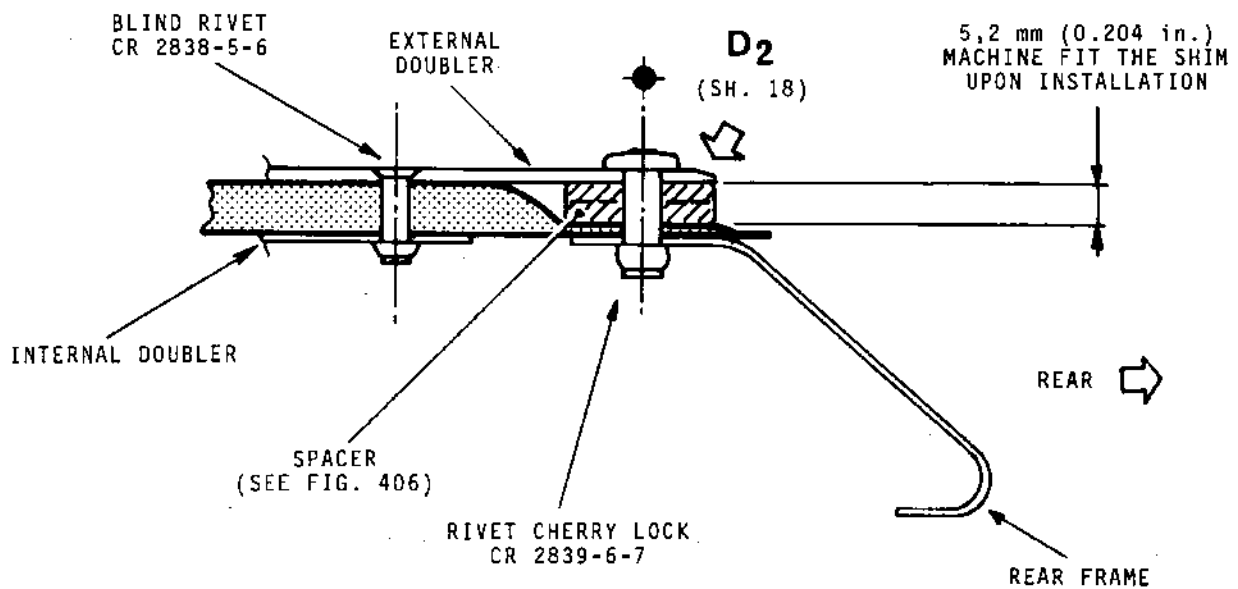


OLYMPUS 593

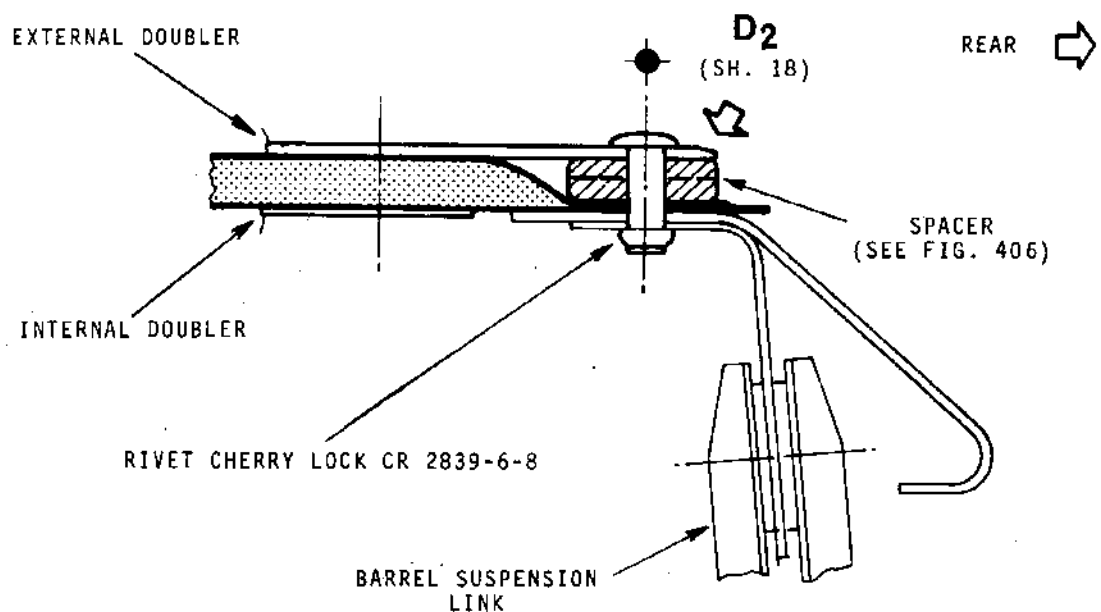
MK.610-14-28
OVERHAUL



SECTION CC



SECTION DD



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 15 of 18)

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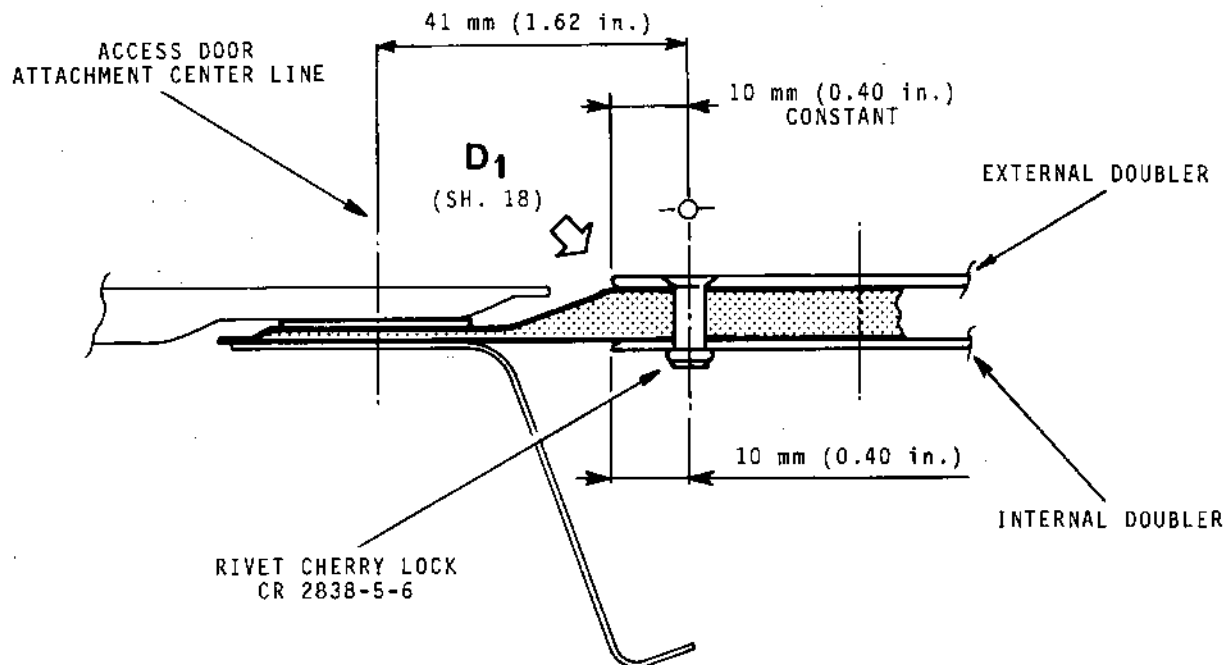


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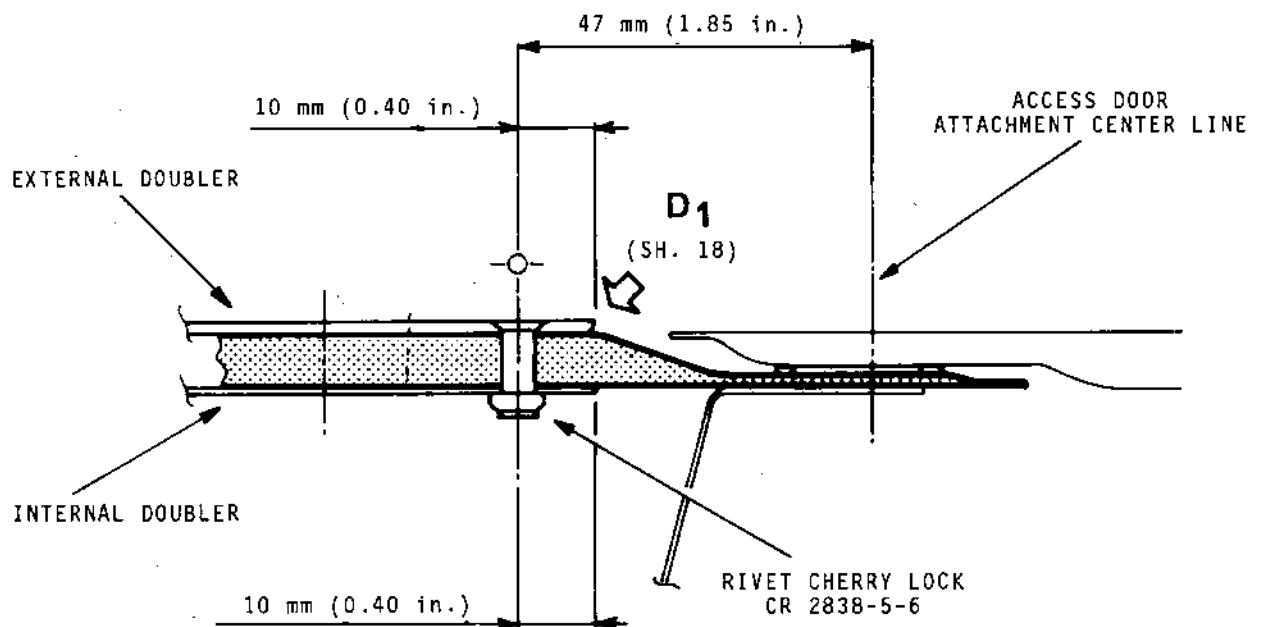
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OVERHAUL



SECTION EE



SECTION FF



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 16 of 18)

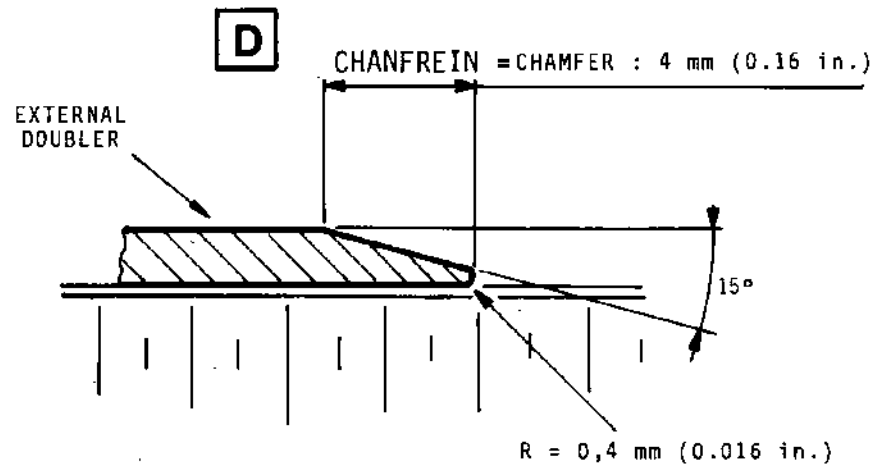
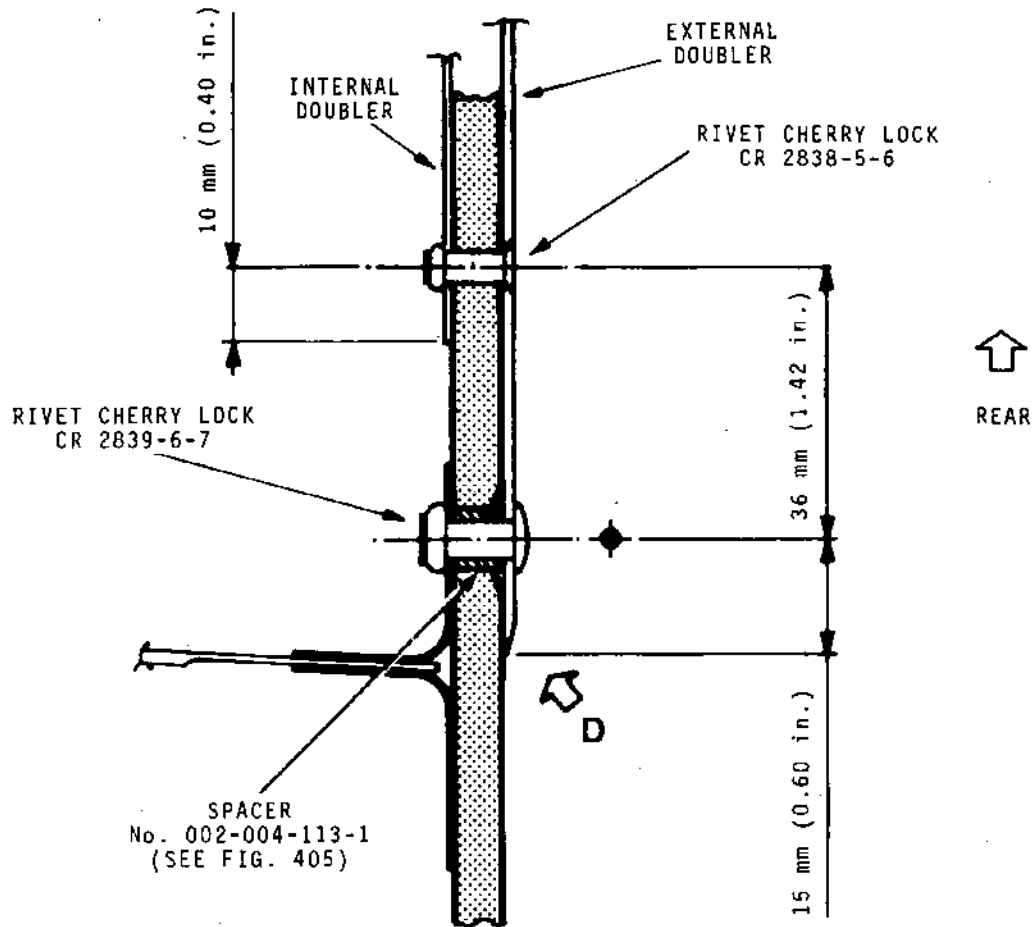


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SECTION GG



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 17 of 18)

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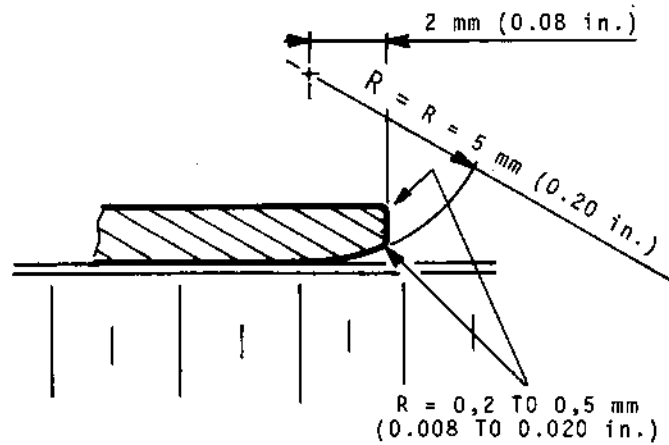
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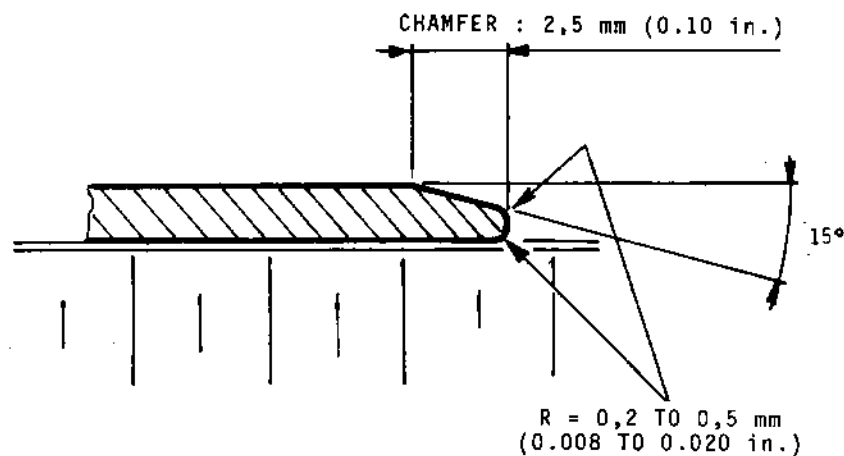
D₁

ROUND OFF (NON-CHAMFERED)
EDGES OF DOUBLERS - FACE
IN CONTACT WITH THE
STRESSKIN PANEL.

PRODUCE RADII BY
WORKING LENGTHWISE



D₂



Repairing Delaminations Lying in a Rear Upper Panel
Figure 403 (Sheet 18 of 18)

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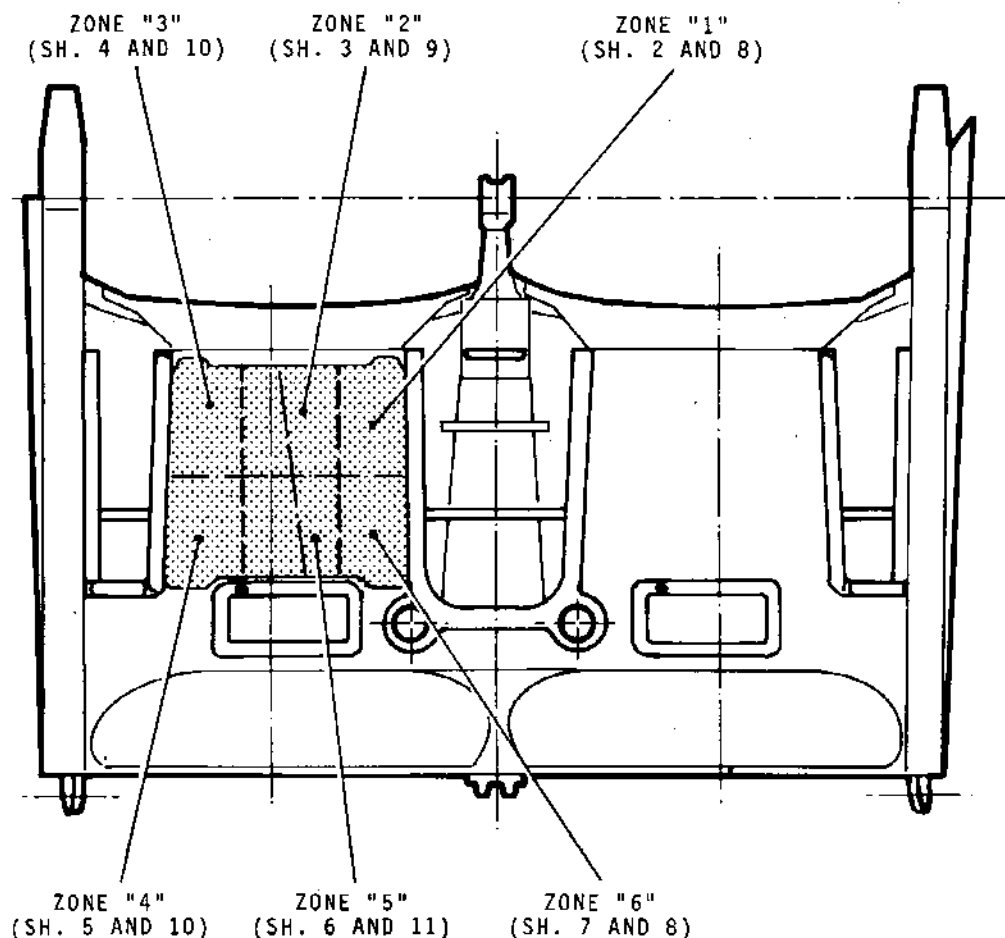
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OVERHAUL



BOTTOM VIEW

REPAIR ON BAYS 1 AND 3 AS SHOWN
REPAIR ON BAYS 2 AND 4 SYMMETRICAL



LOCATIONS OF DOUBLER FIXING :

- AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES, SEE SHEETS 2 THRU 7
- WITHIN A SOUND AREA, SEE SHEETS 8 THRU 11
- WITHIN THE DELAMINATED ZONE AND NEXT TO IT, SEE SHEETS 12 AND 13

EXTERNAL DOUBLER CUT OUT FROM SHEET METAL T60 (P 3344)

THICKNESS : 1.5 mm (0.059 in.)

INTERNAL DOUBLER CUT OUT FROM SHEET METAL P60 (P 3344)

THICKNESS : 1 mm (0.039 in.)

SPACER BUSHES (SEE FIG. 405)

SHIMS (SEE FIG. 406)

Repairing Delaminations Lying in a Lower Panel
Figure 404 (Sheet 1 of 20)

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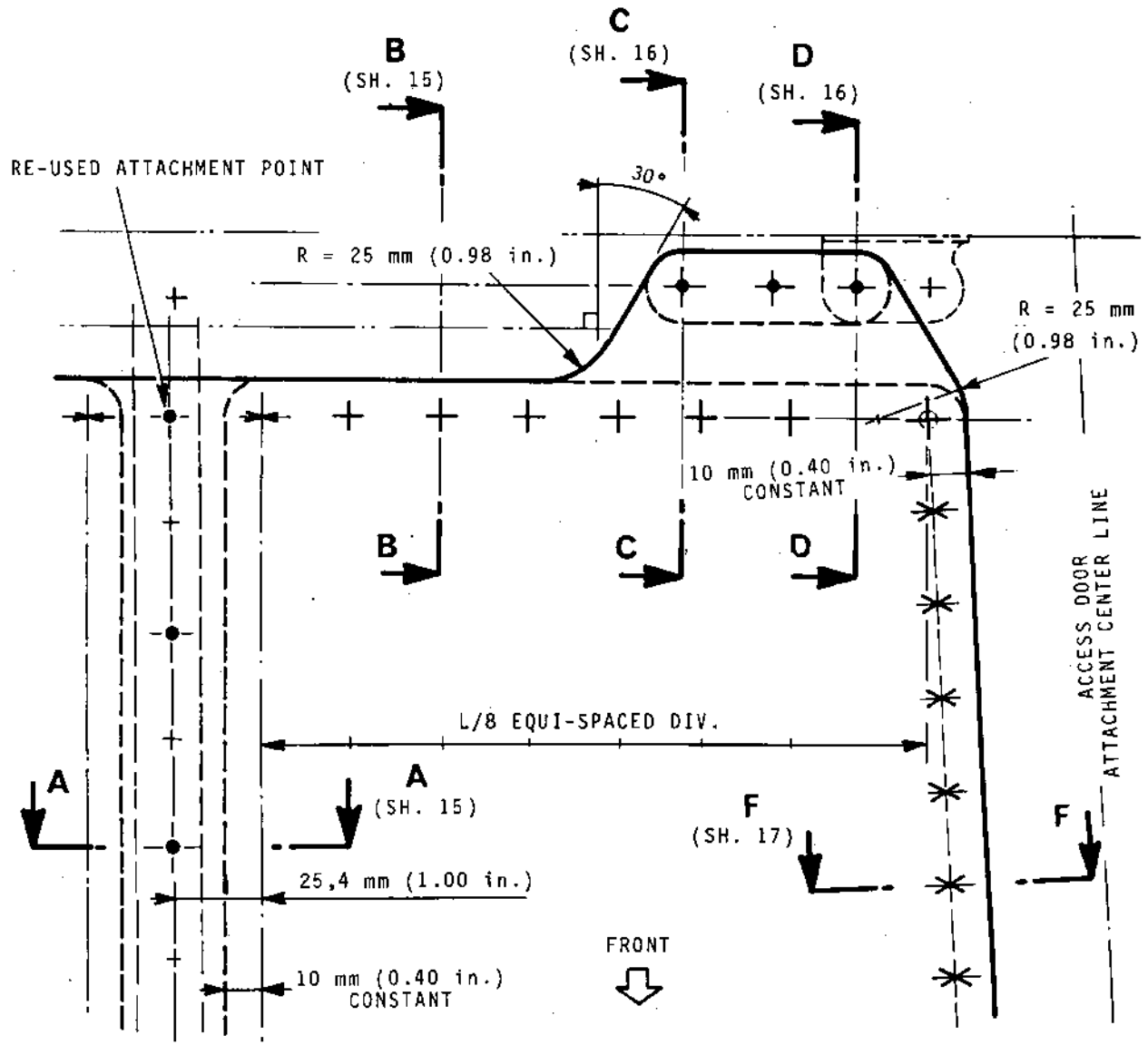
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OVERHAUL



ZONE "1"

LOCATIONS OF FIXINGS AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES

RIVETING PITCH $\times = 27 \text{ mm (1.06 in.)}$
 $\star = \text{EXISTING ATTACHMENT POINTS RE-USED}$
NON-DIMENSIONED RADII = 10 mm (0.40 in.)



Repairing Delaminations Lying in a Lower Panel
Figure 404 (Sheet 2 of 20)

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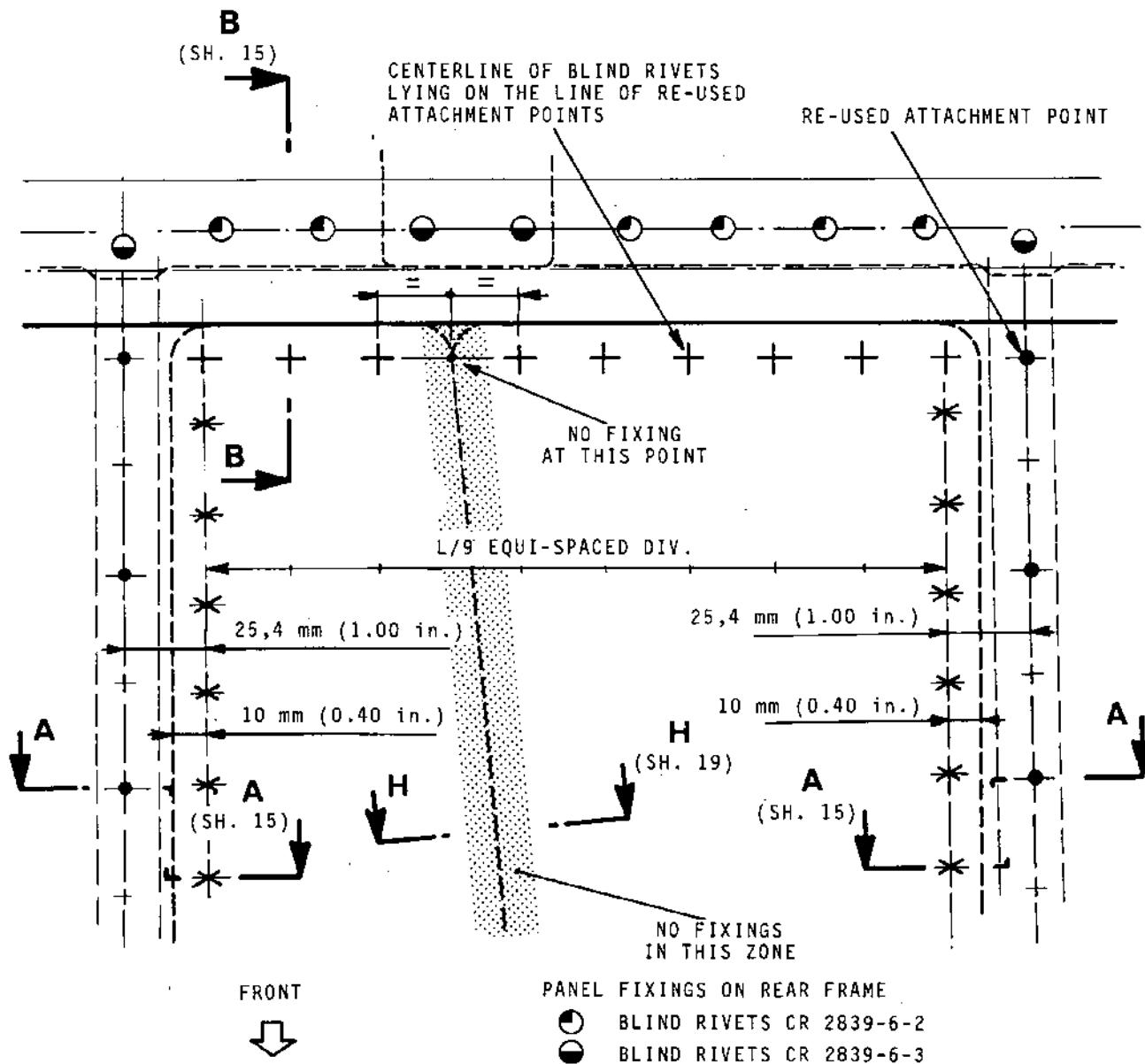
ZONE "2"

LOCATIONS OF FIXINGS AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES

RIVETING PITCH $\star = 27 \text{ mm (1.06 in.)}$

$\bullet = \text{EXISTING ATTACHMENT POINTS RE-USED}$

NON-DIMENSIONED RADII = 10 mm (0.40 in.)



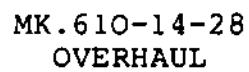
Repairing Delaminations Lying in a Lower Panel
Figure 404 (Sheet 3 of 20)

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MK.610-14-28
OVERHAUL



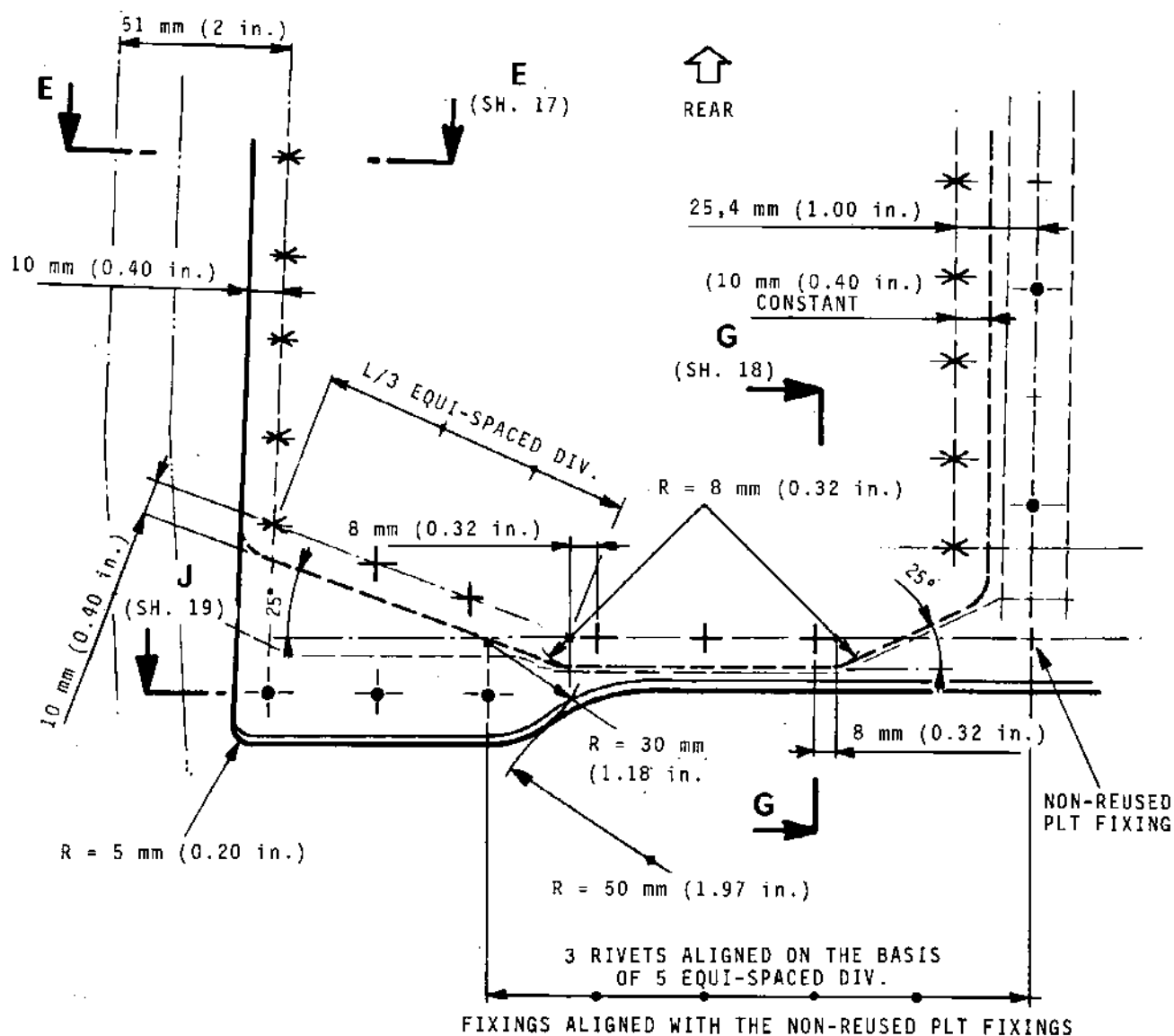
ZONE "4"

LOCATIONS OF FIXINGS AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES

RIVETING PITCH $\times = 27 \text{ mm (1.06 in.)}$

$\bullet = \text{EXISTING ATTACHMENT POINTS RE-USED}$

NON-DIMENSIONED RADII = 10 mm (0.40 in.)



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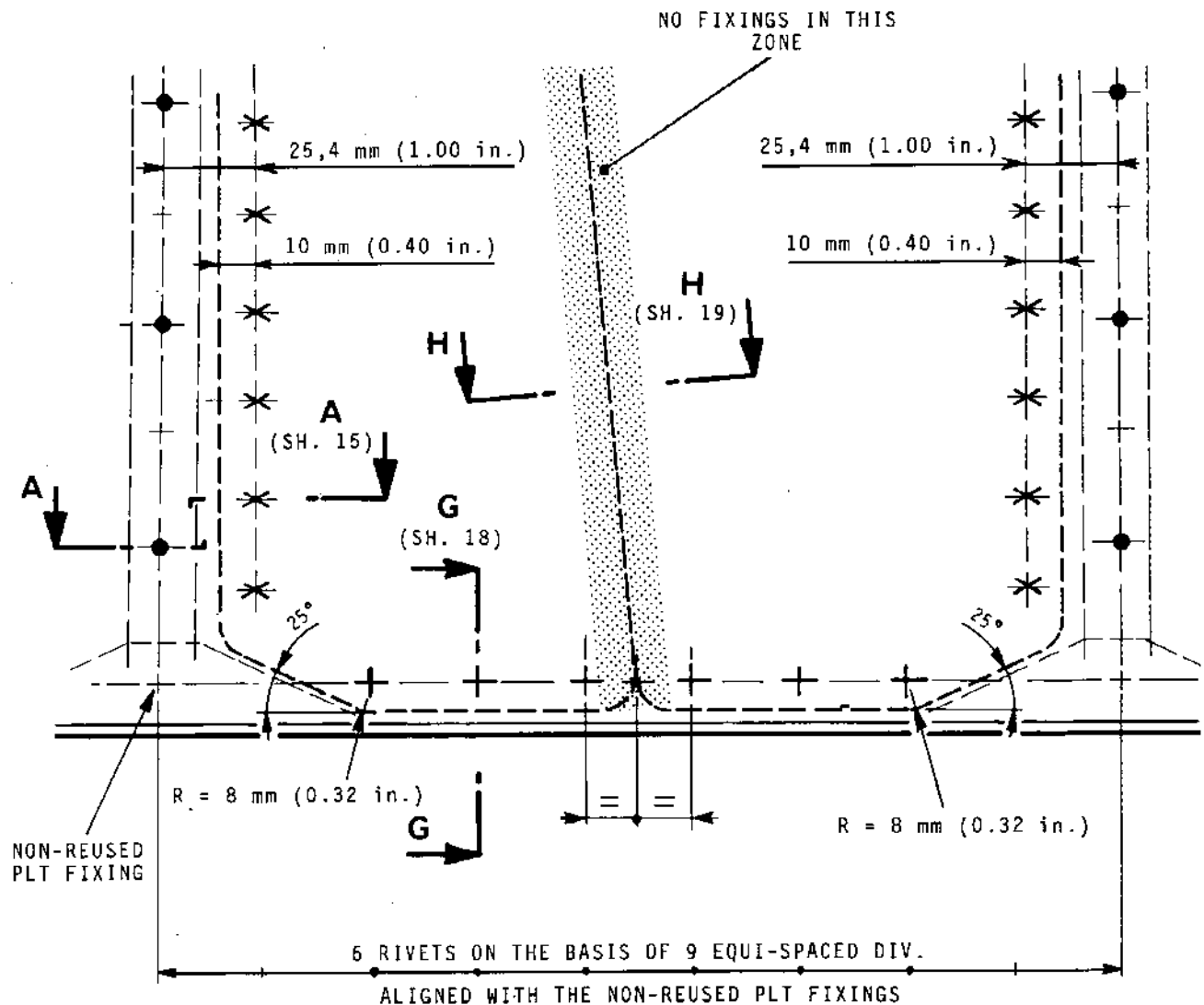
MK.610-14-28
OVERHAUL



ZONE "5"

LOCATIONS OF FIXINGS AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES

RIVETING PITCH * = 27 mm (1.06 in.)
* = EXISTING ATTACHMENT POINTS RE-USED
NON-DIMENSIONED RADII = 10 mm (0.40 in.)



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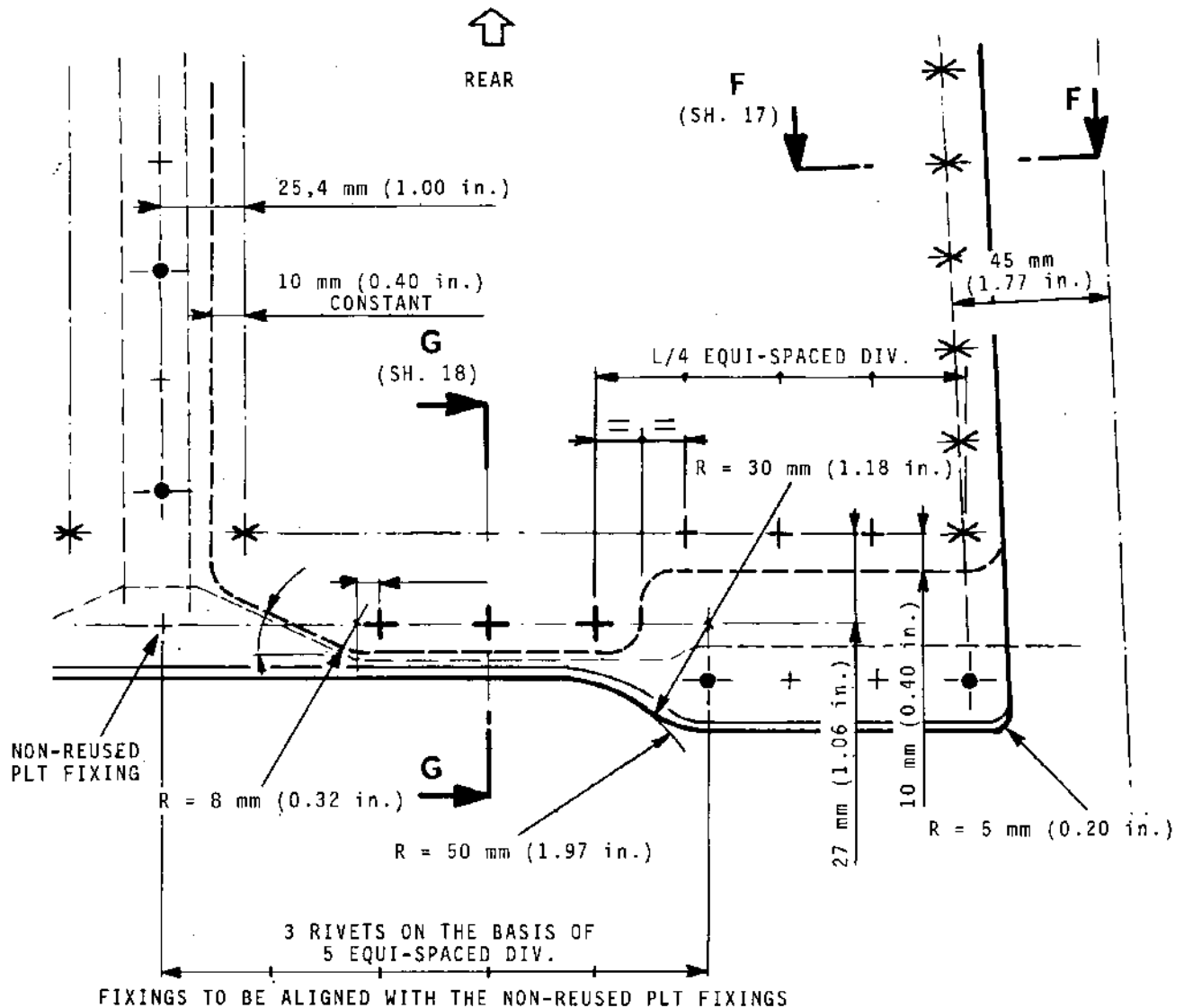
ZONE "6"

LOCATIONS OF FIXINGS AT THE PERIPHERY OF DOUBLERS AND IN LINE WITH THE FRAMES

RIVETING PITCH $\times = 27 \text{ mm (1.06 in.)}$

$\star =$ EXISTING ATTACHMENT POINTS RE-USED

NON-DIMENSIONED RADII = 10 mm (0.40 in.)



Repairing Delaminations Lying in a Lower Panel
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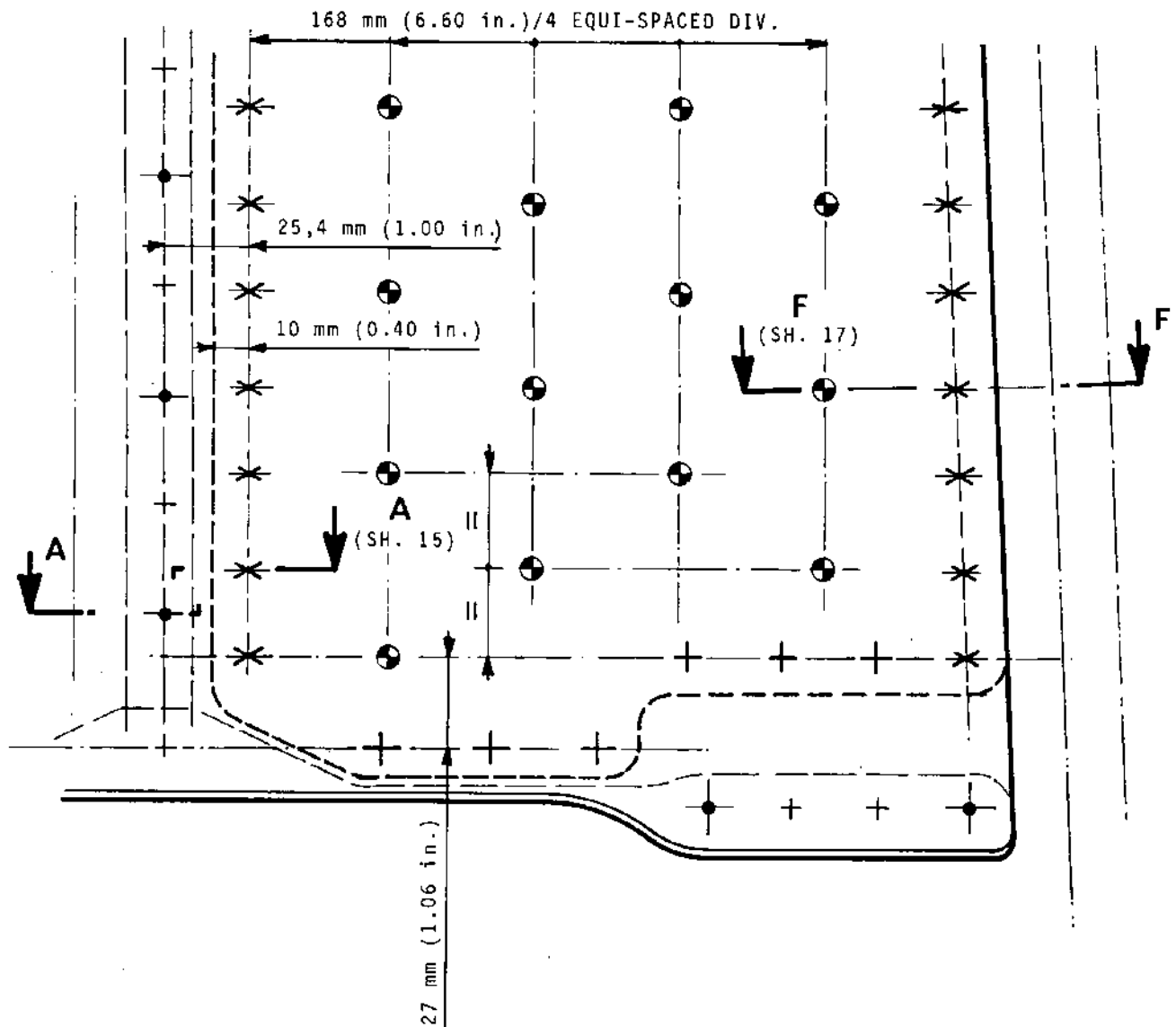
ZONES "1" AND "6"

LOCATION OF DOUBLER FIXINGS WITHIN A SOUND AREA

RIVETING PITCH:  = 45 mm (1.78 in.)

 = 27 mm (1.06 in.)

NON-REUSED ATTACHMENT POINTS 



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ZONE "2"

LOCATION OF DOUBLER FIXINGS WITHIN A SOUND AREA

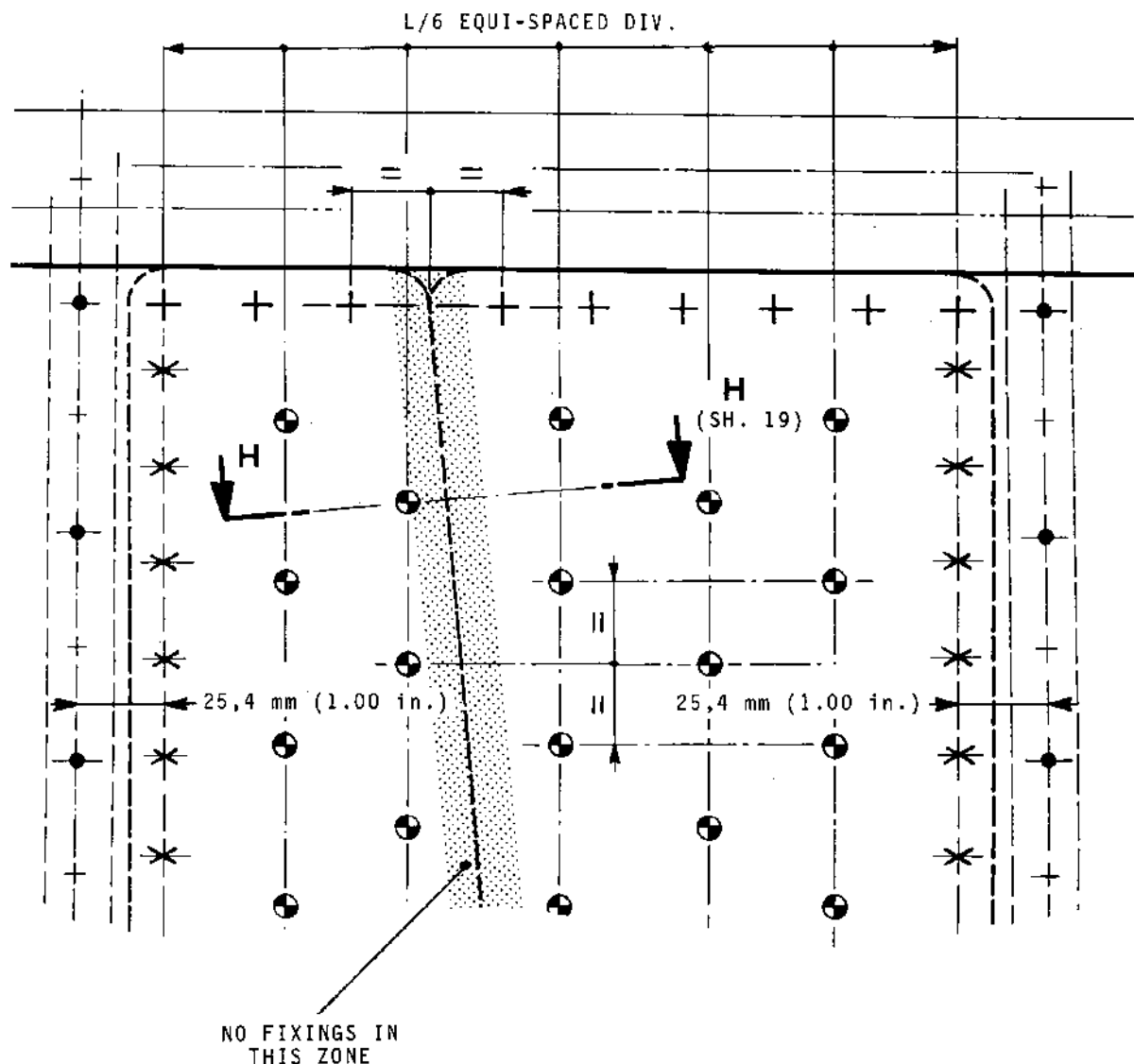
RIVETING PITCH: * = 27 mm (1.06 in.)

⊙ = 45 mm (1.78 in.)

NON-REUSED ATTACHMENT POINTS



PRINTED IN FRANCE



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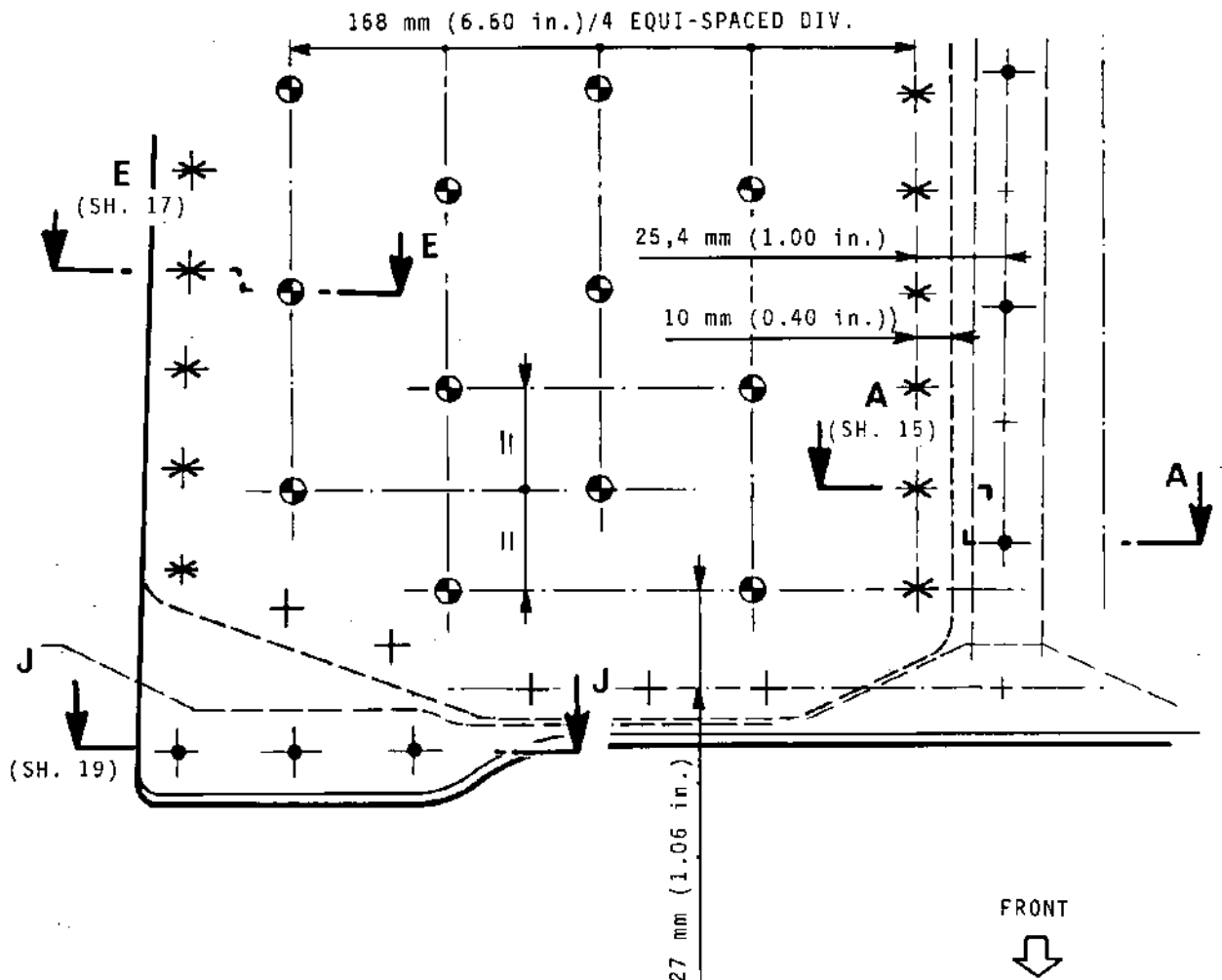


ZONES "3" AND "4"

LOCATION OF DOUBLER FIXINGS WITHIN A SOUND AREA

RIVETING PITCH  = 27 mm (1.06 in.)

NON-REUSED ATTACHMENT POINTS  = 45 mm (1.78 in.)



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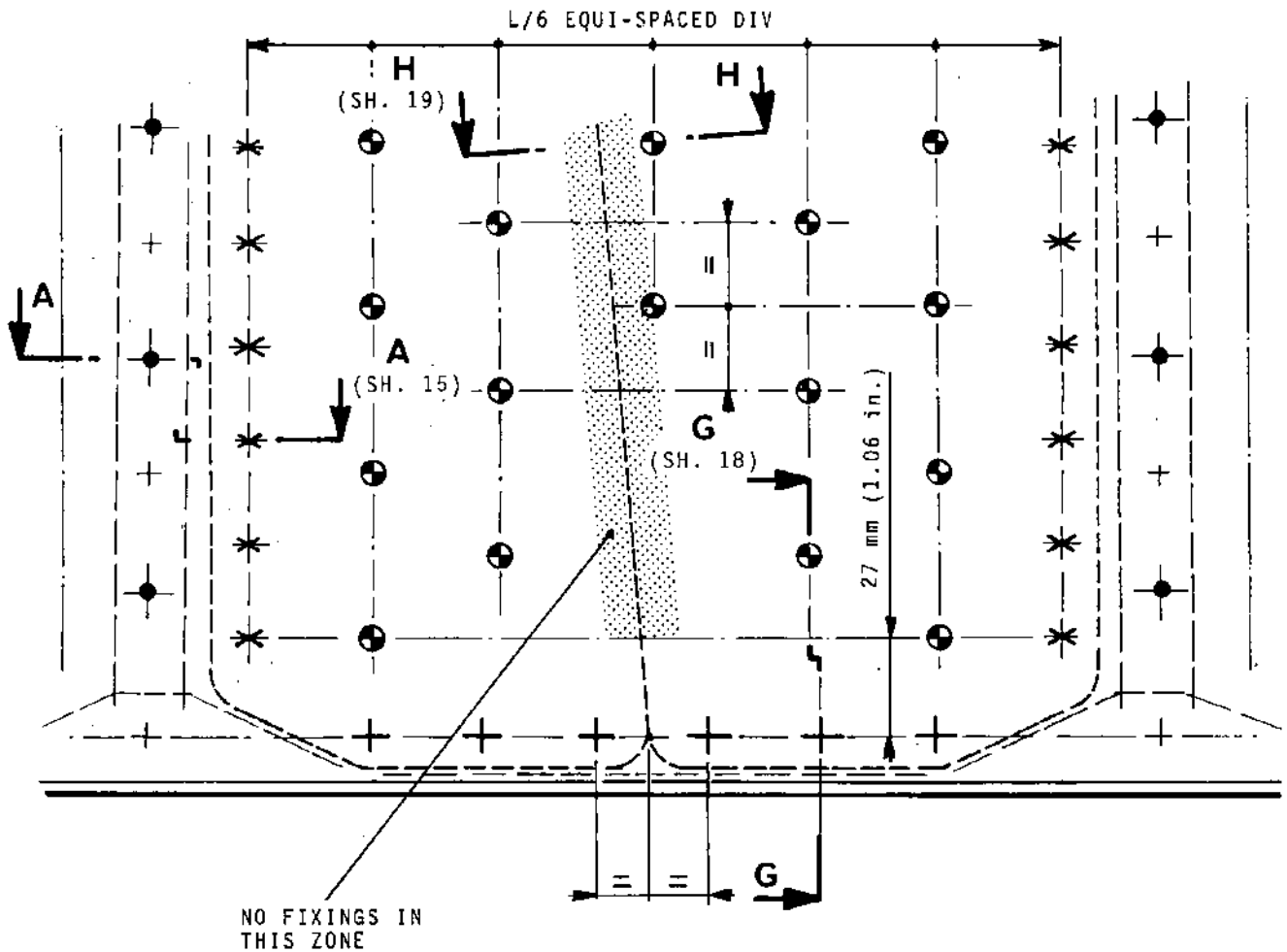
OVERHAUL



ZONE "5"

LOCATIONS OF DOUBLER FIXINGS WITHIN A SOUND AREA

RIVETING PITCH: * = 27 mm (1.06 in.)
● = 45 mm (1.78 in.)



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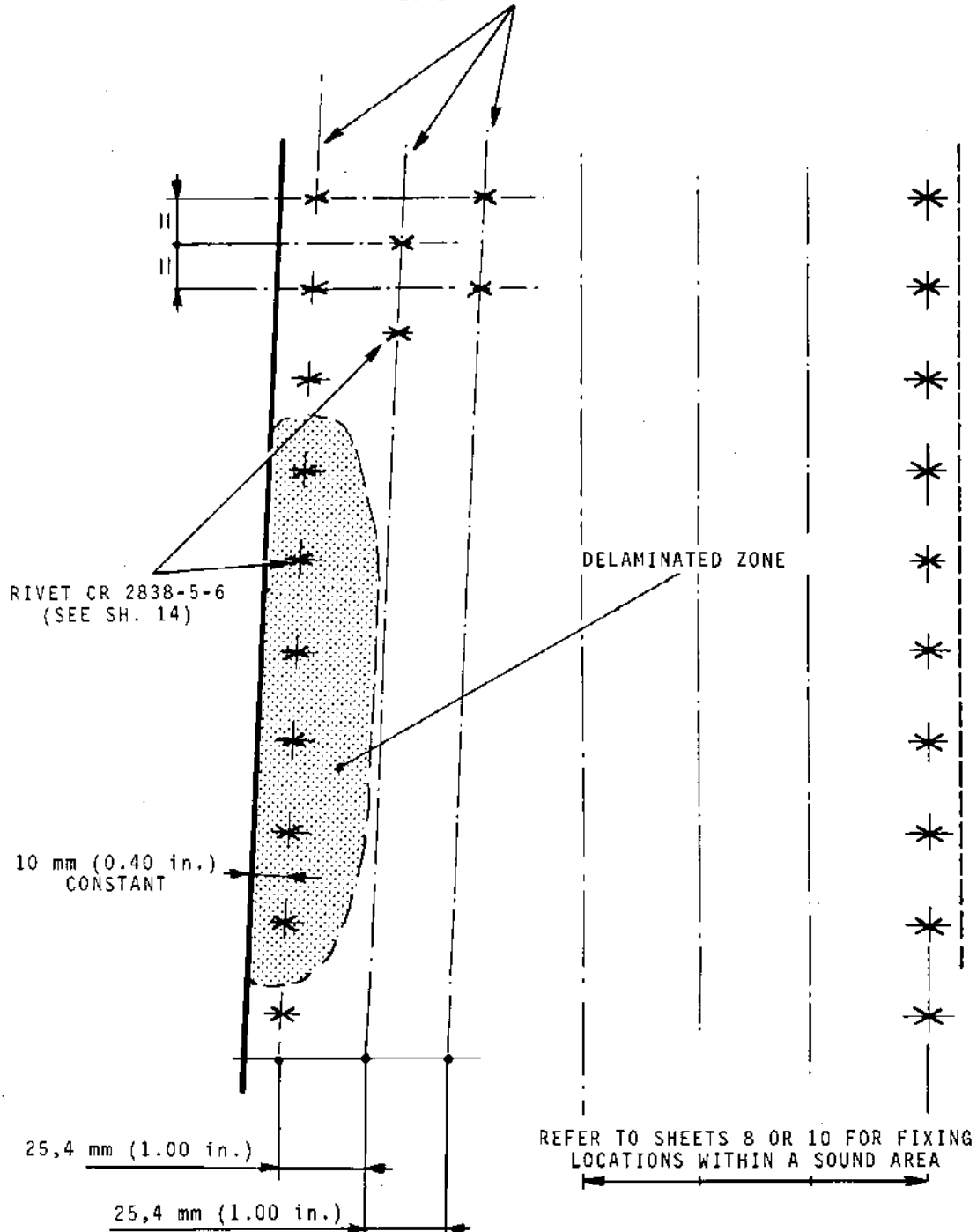
MK.610-14-28

OVERHAUL



LOCATIONS OF DOUBLER FIXINGS WITHIN A DELAMINATED ZONE AND NEXT TO IT (E.G. : EDGE OF AN ACCESS DOOR ATTACHMENT ZONE)

3 ROWS/27 mm (1.06 in.) PITCH IN THE DELAMINATED ZONE AND AROUND IT



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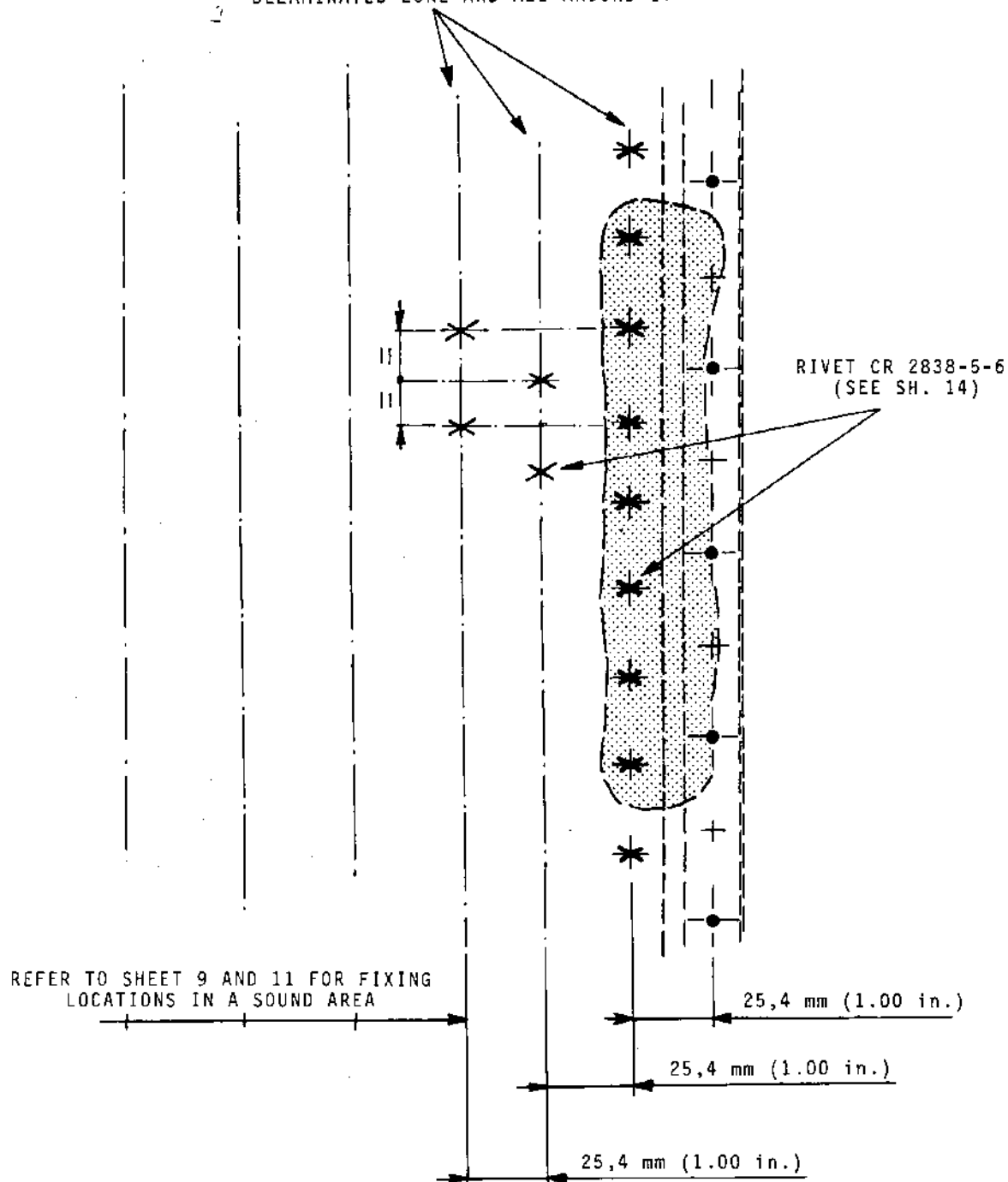
MK.610-14-28

OVERHAUL



LOCATIONS OF DOUBLER FIXINGS WITHIN A DELAMINATED ZONE
AND NEXT TO IT (E.T. : IN LINE WITH A FRAME)

3 ROWS/27 mm (1.06 in.) PITCH IN THE
DELAMINATED ZONE AND ALL AROUND IT



REFER TO SHEET 9 AND 11 FOR FIXING
LOCATIONS IN A SOUND AREA

Repairing Delaminations Lying in a Lower Panel
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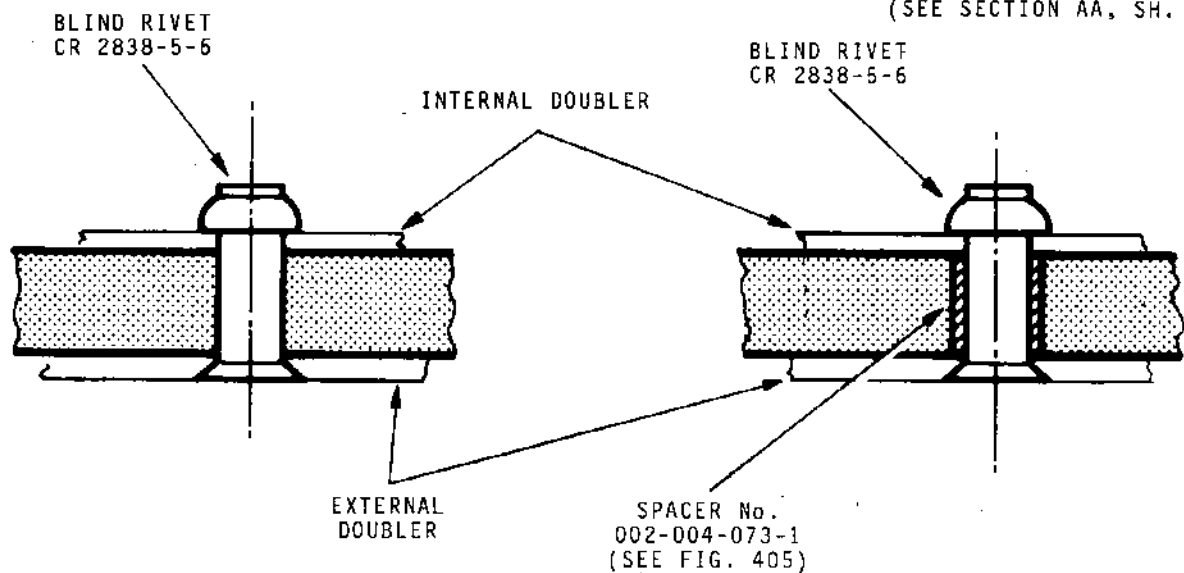
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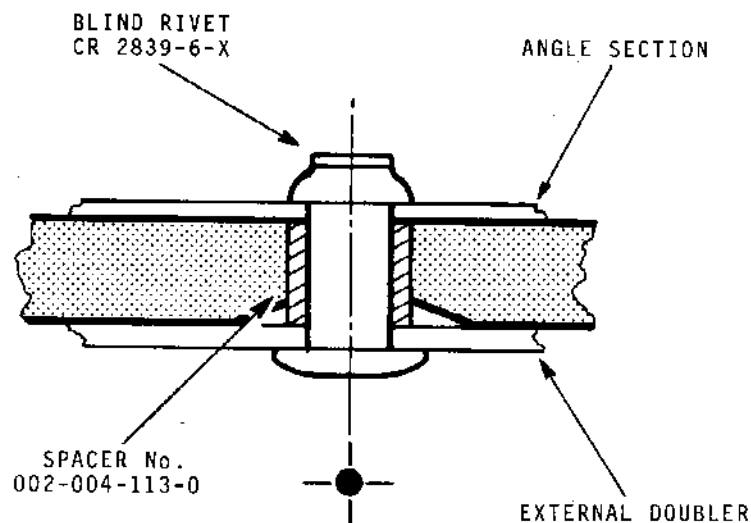


DOUBLER FIXING ARRANGEMENT
(FOR DRILLING, SEE FIG. 405)

VALID FOR FIXINGS IN
LINE WITH THE STRINGERS
PROVIDED HOLES ARE NOT
OUT-OF-ROUND
(SEE SECTION AA, SH. 15)



VALID FOR FIXINGS IN LINE WITH THE FRAMES
VALID FOR FIXINGS IN LINE WITH THE STRINGERS IF HOLES ARE OUT-OF-ROUND
(DRILLING AS PER FIG. 405)



Repairing Delaminations Lying in a Lower Panel
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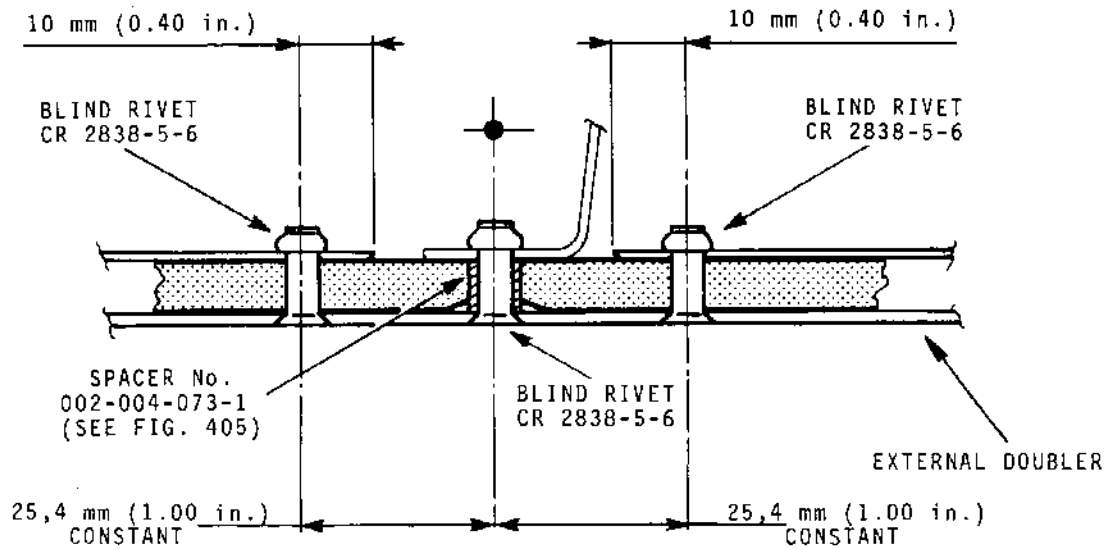
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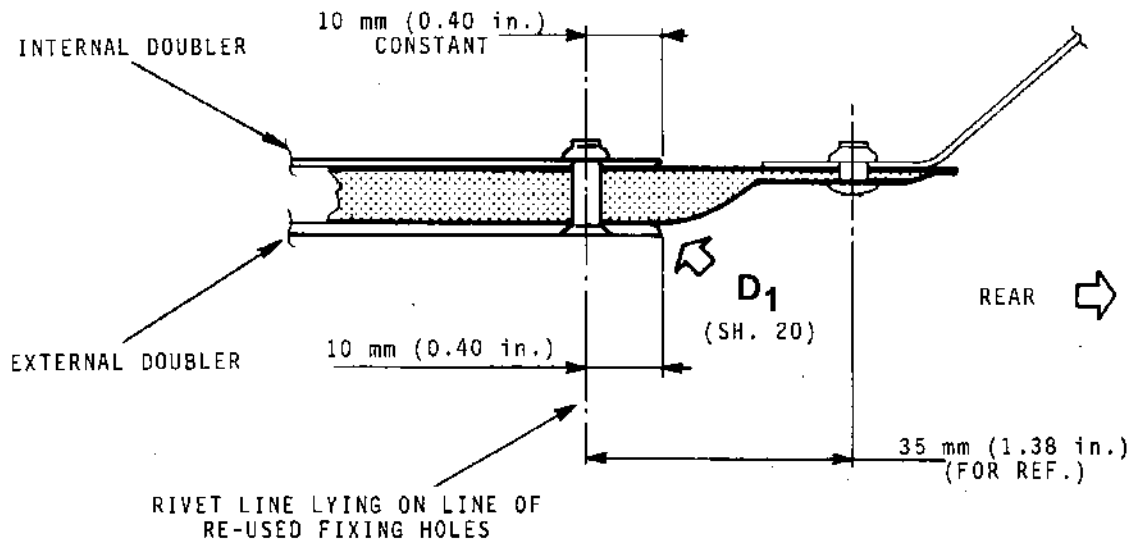
OVERHAUL



SECTION AA
VALID FOR FIXINGS IN LINE WITH THE STRINGERS



SECTION BB



Repairing Delaminations Lying in a Lower Panel
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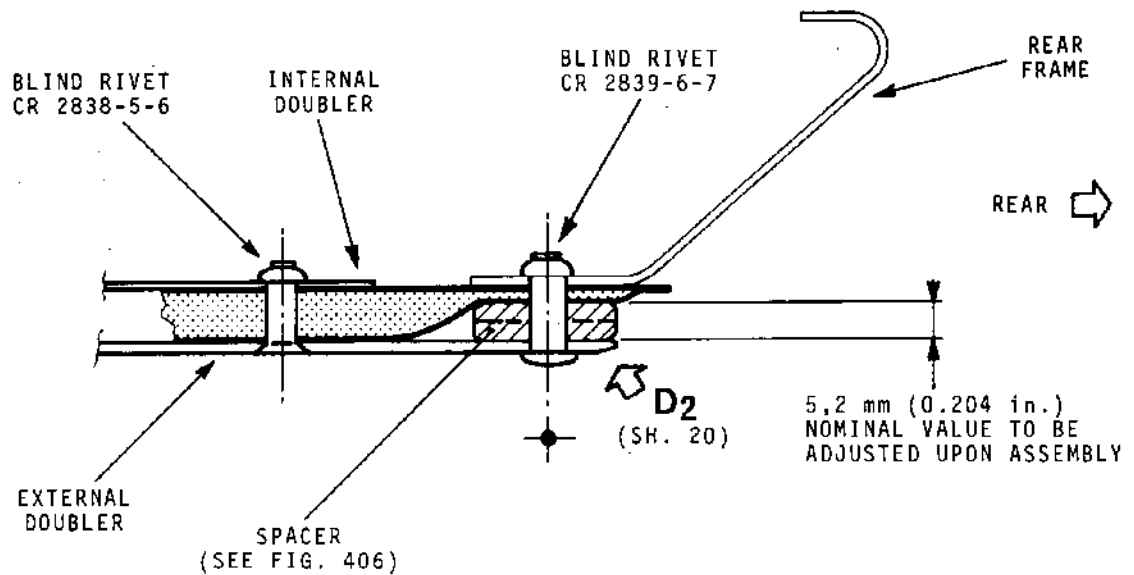


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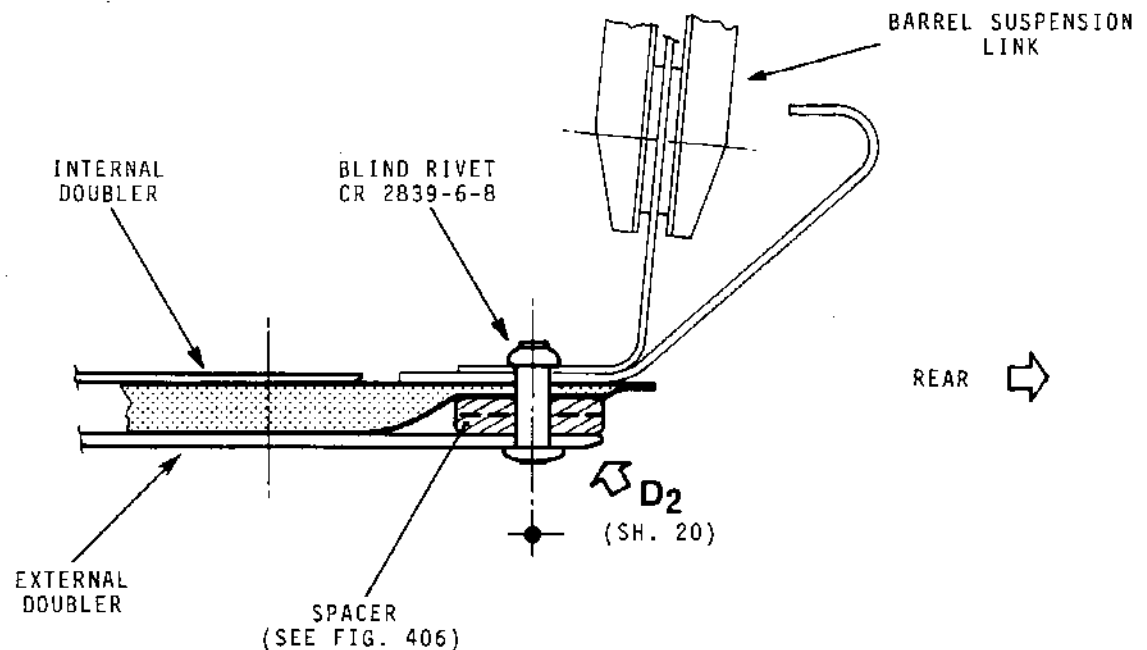
MK.610-14-28
OVERHAUL



SECTION CC



SECTION DD



Repairing Delaminations Lying in a Lower Panel
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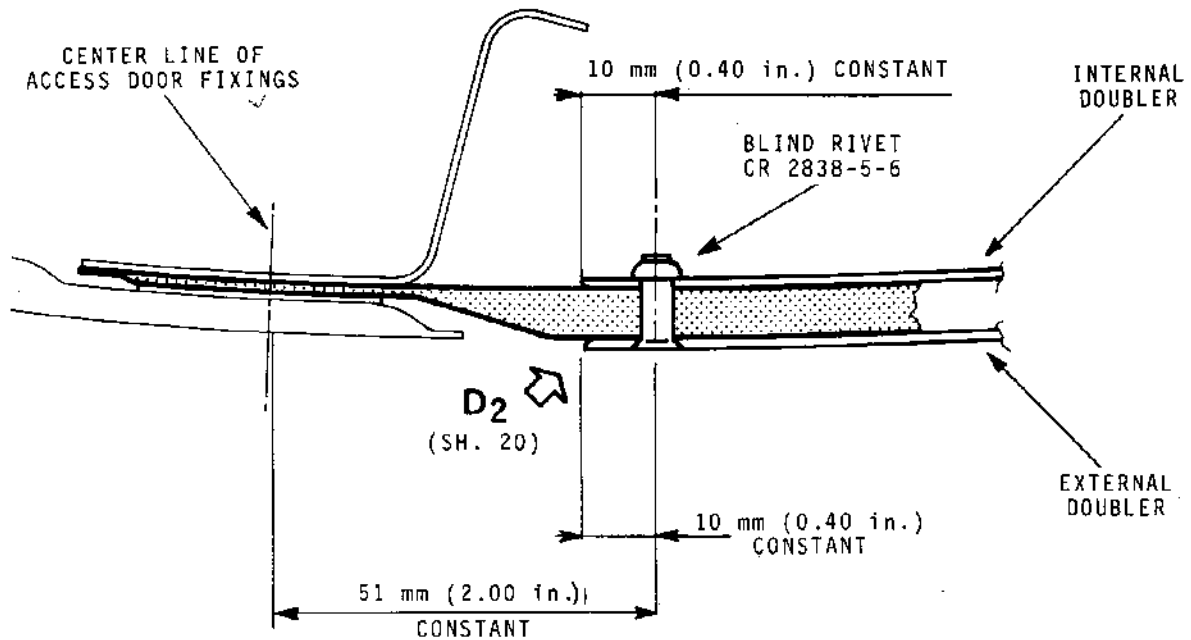
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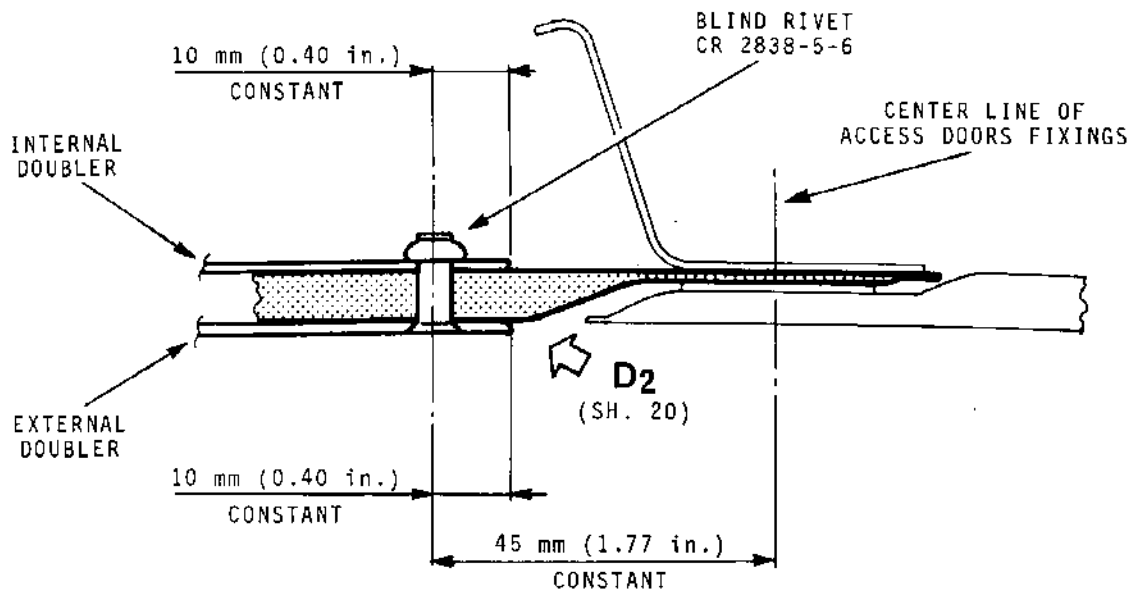
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SECTION EE



SECTION FF



Repairing Delaminations Lying in a Lower Panel
Figure 404 (Sheet 17 of 20)

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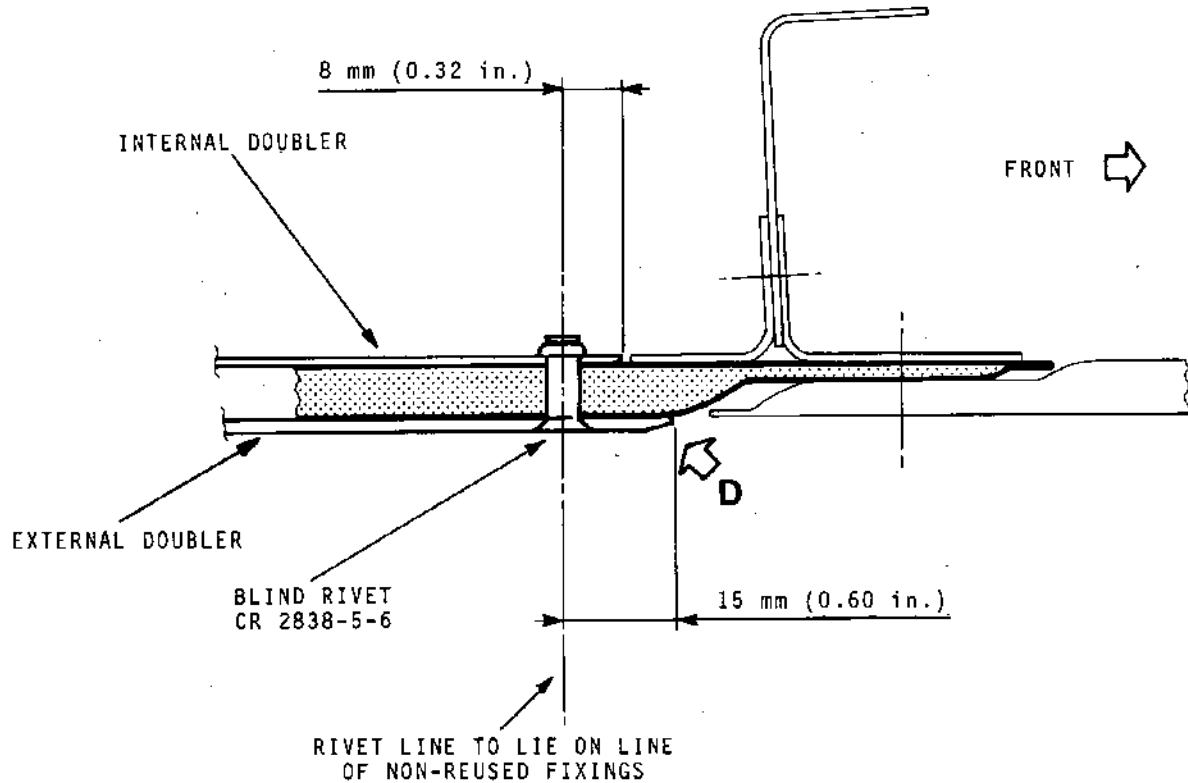


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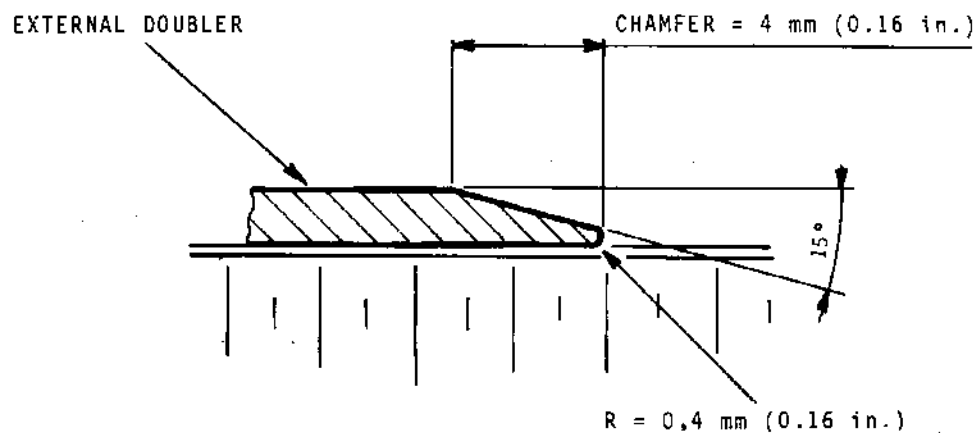
MK.610-14-28
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SECTION GG



D



Repairing Delaminations Lying in a Lower Panel
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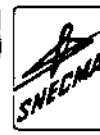
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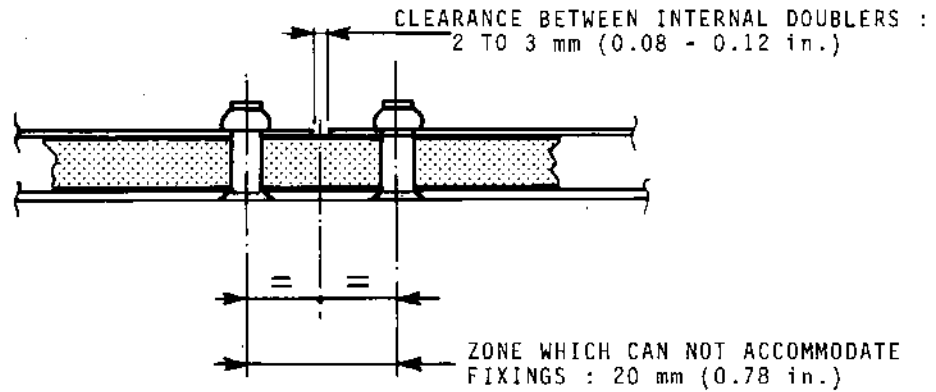
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MK.610-14-28

OVERHAUL

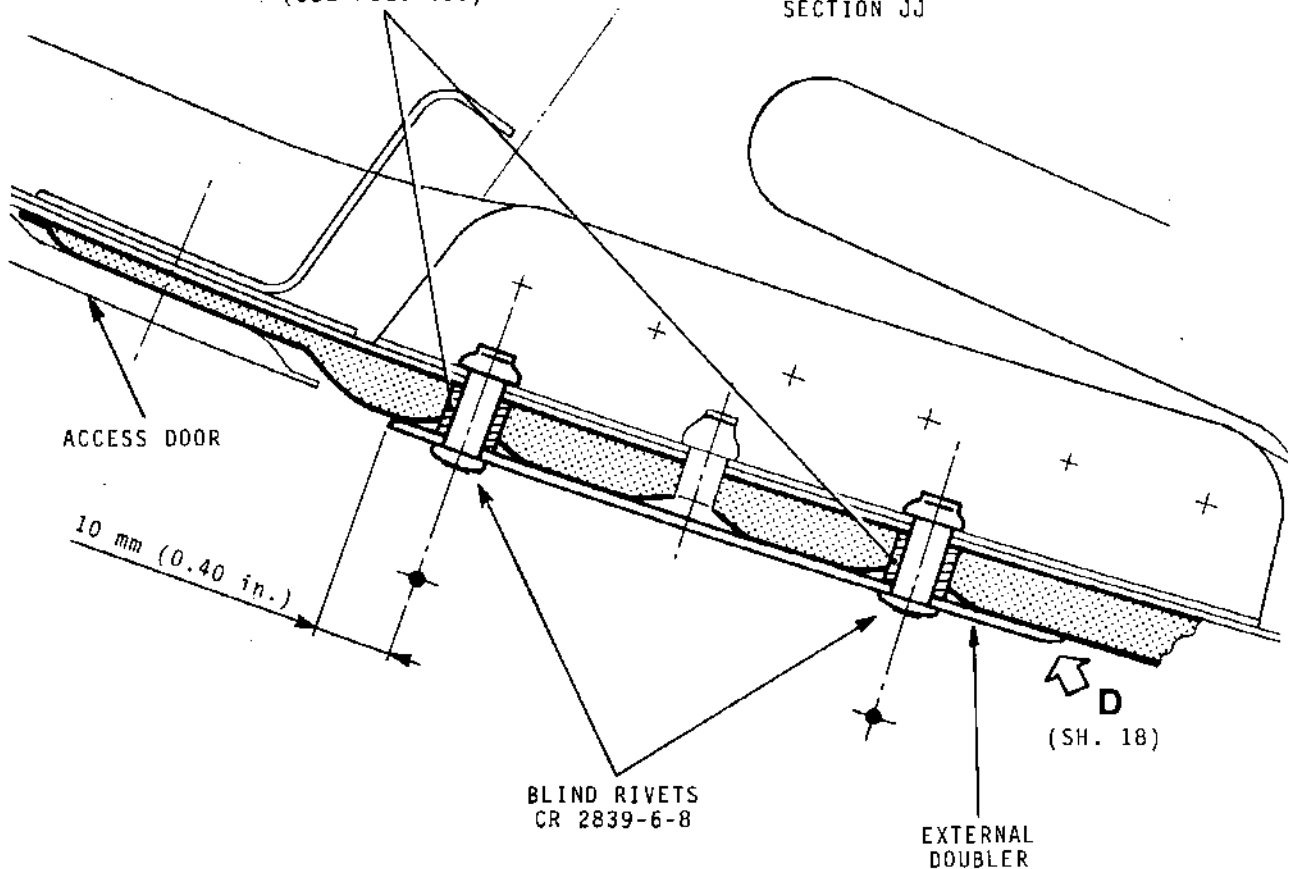


SECTION HH



SPACER No. 002-004-113-1.
(SEE FIG. 405)

SECTION JJ



Repairing Delamination Lying in a Lower Panel
Figure 404 (Sheet 19 of 20)

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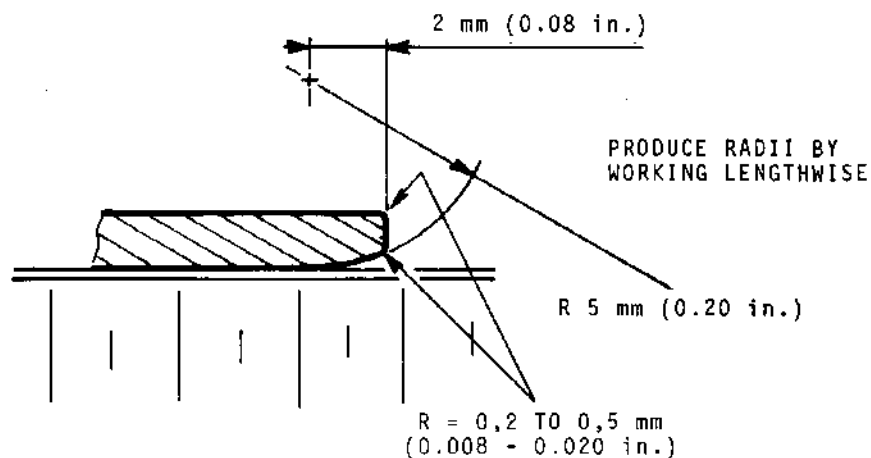
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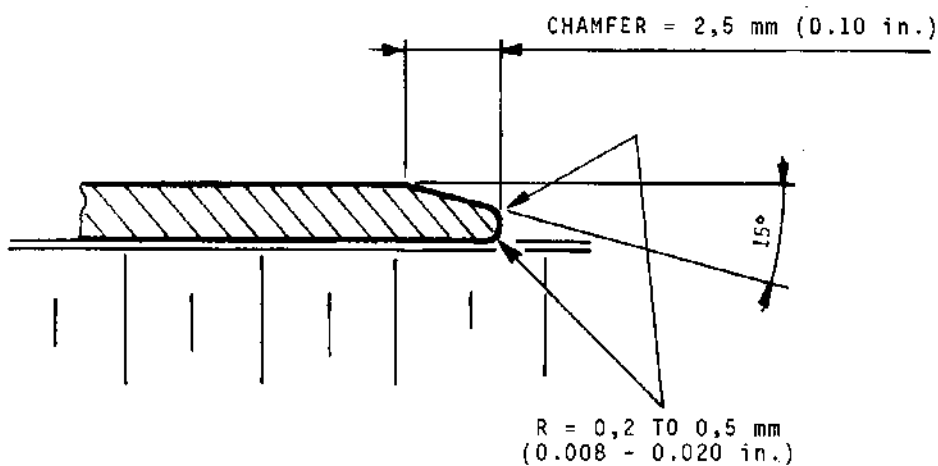


D₁

ROUND OFF (NON-CHAMFERED) EDGES OF DOUBLERS
ON THE FACE IN CONTACT WITH THE STRESSKIN PANEL



D₂



Repairing Delaminations Lying in a Lower Panel
Figure 404 (Sheet 20 of 20)

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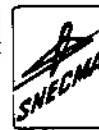
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OLYMPUS 593

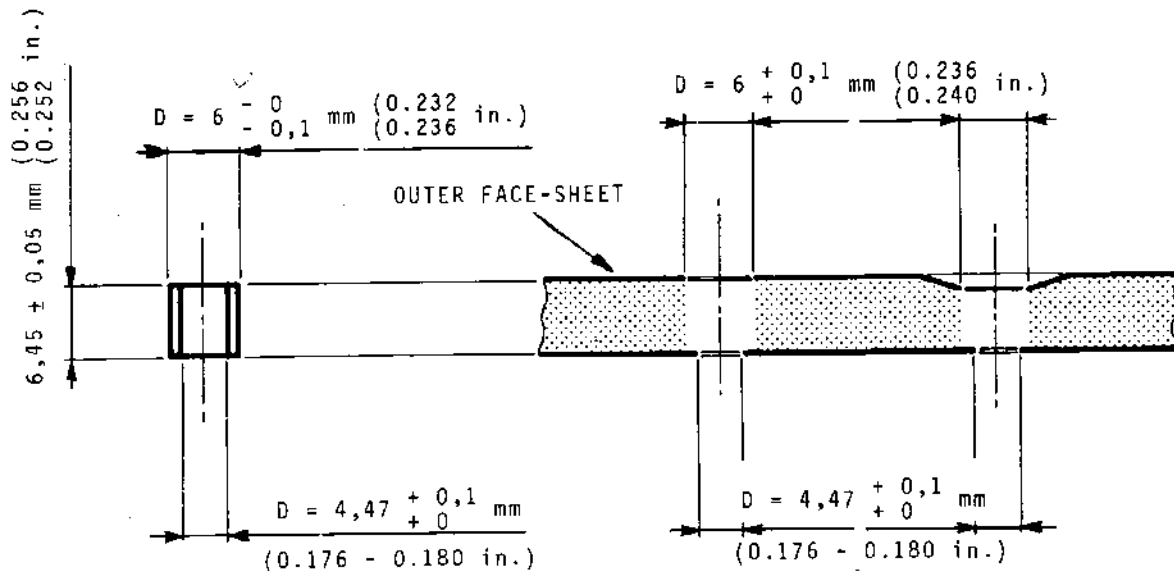
MK.610-14-28

OVERHAUL



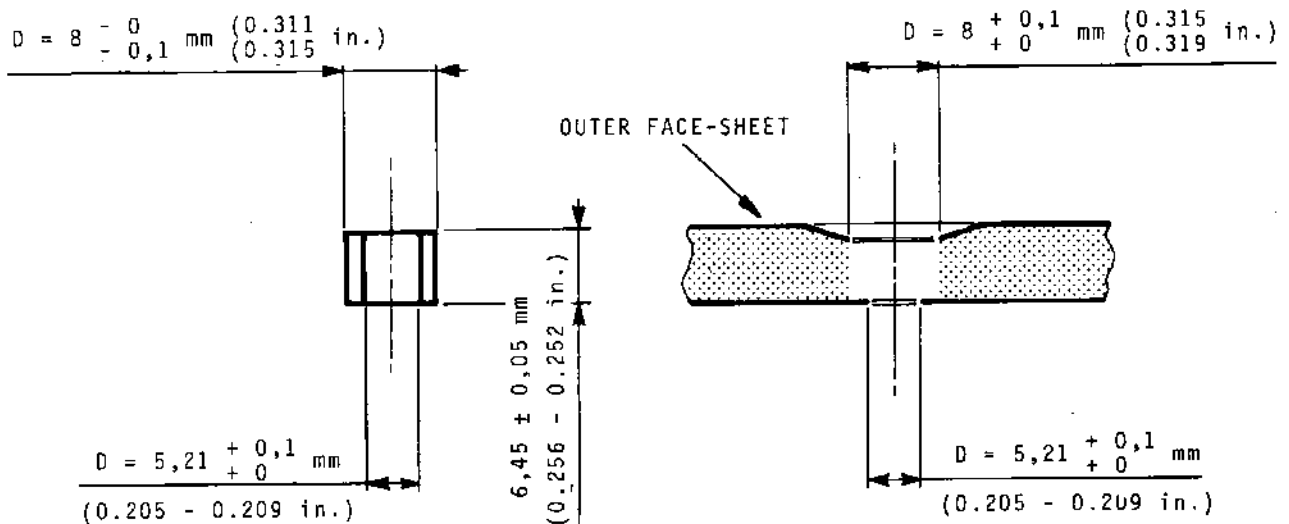
SPACER No. 002-004-073-1
MATERIAL Z6 NCT 25 (P 3601)

DRILLING OF PANEL



SPACER No. 002-004-113-1
MATERIAL Z6 NCT 25 (P 3601)

DRILLING OF PANEL



Producing the Spacers
Figure 405

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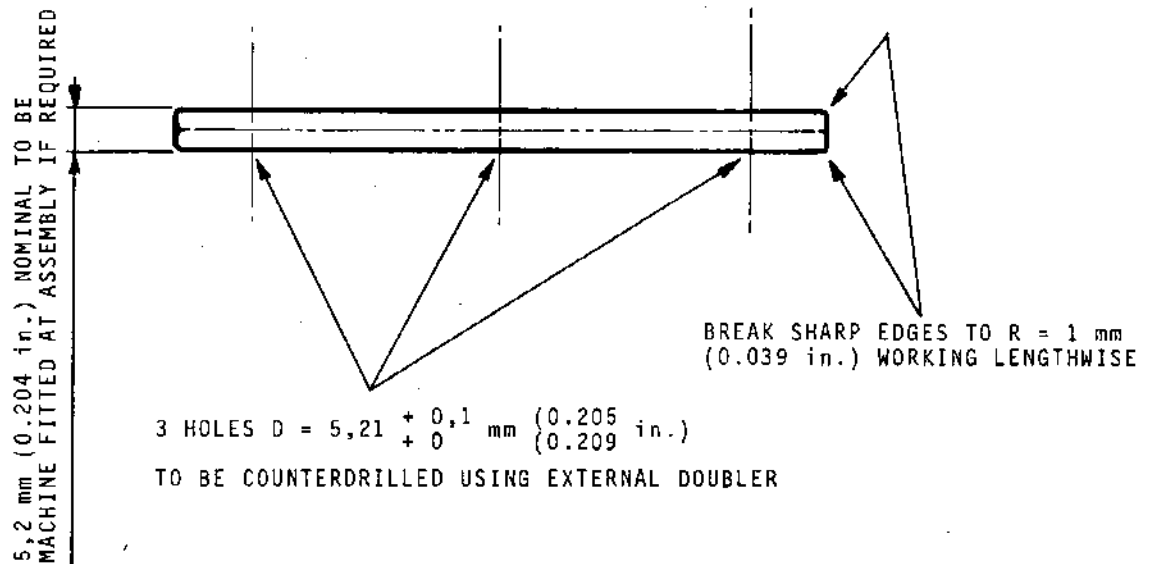
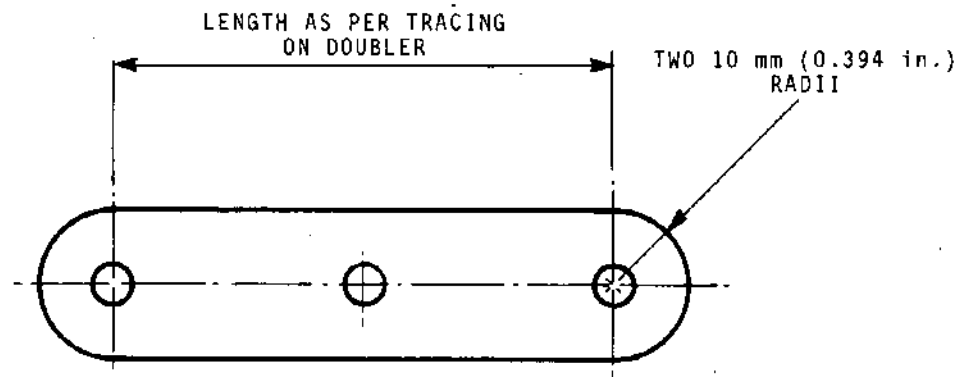


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SHIMS MANUFACTURED FROM SHEET METAL T60 (P 3344)
THICKNESS : 5,2 mm (0.204 in.) OR 2 TIMES 2,6 mm (0.102 in.)



Producing the Shims
Figure 406

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**OLYMPUS 593**MK.610-14-28
OVERHAULREPAIRSECONDARY NOZZLE (29-190)20. Repair of delaminations in the panels of central walls in the primary nozzle centering support zone

PARTS REQUIRED FOR REPAIR

HI-Lock screw 40-5-6	(649-781-294-0)
HI-Lock screw 40-6-5	(649-781-299-0)
HI-Lock screw 40-6-6	(649-781-300-0)
HI-Lock screw 40-6-7	(649-781-301-0)
HI-Lock screw 40-6-8	(649-781-302-0)
HI-Lock screw 40-6-9	(649-781-337-0)
HI-Lock screw 40-8-8	(649-781-306-0)
HI-Lock screw 40-8-9	(649-781-307-0)
Spacer	(002-003-992-1)
Spacer	(002-003-992-3)
HI-Lock nut 97-5	(649-782-257-0)
HI-Lock nut 97-6	(649-782-258-0)
HI-Lock nut 97-8	(649-782-252-0)
Nut NAS 1288C-3	(649-784-225-0)
Nut NAS 1288C-4	(649-784-257-0)
Washer NAS 1288C-3W	(649-784-226-0)
Washer NAS 1288C-4W	(649-784-258-0)
Washer	(649-786-204-0)
Sheet metal Z8 CND 15 (P 3305) thickness 0,3 mm	(0.012 in.)
Sheet metal Z8 CND 15 (P 3305) thickness 1,0 mm	(0.039 in.)
Sheet metal Z8 CND 15 (P 3305) thickness 1,8 mm	(0.070 in.)

A. Introduction.

This procedure is to be used for the repair of delaminations in the panels of central wall, in the primary nozzle centering support zone on condition that the zone in need of repair is within the limits specified in figure 401.

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B. Repair of delamination in the upper part of the panel.

(1) Removal of existing fitting attachments.

- (a) Remove fitting attachments from panel as shown in figure 402 and specified in the following standard practices :

1 chapter 70-50-30 for fitting attachments marked "C" and "E".

2 chapter 70-50-40 for fitting attachments marked "D", "F", "G", "H", "J", "K".

(2) Locating attachment holes for doublers.

- (a) Lightly rub the internal panel of the barrel with a very fine emery cloth until the cellular structure of the zone to be repaired is visible.

- (b) Centre mark the positions of holes "A" and "B" on the panel (see figure 402). Drill these holes in the panel, dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) and deburr.

NOTE : It is essential that each hole be located in the centre of a cell.

- (c) Stick a sheet of stabilene tracing paper to the panel inside of the barrel. On this tracing sheet, centre mark the positions of attachment holes and trace the outlines of the internal doubler and of the foil compensating for the chemical milling of the panel.

NOTE : Before sticking the stabilene make provision for the raised heads of fitting attachments not removed.

- (d) Stick a sheet of stabilene to the external face of the panel, centre mark position of holes "A" and "C" and trace the outlines of the external doubler on this sheet.

(3) Preparation of doublers, shims and foils.

- (a) From sheet metal Z8 CND 15 (P 3305) thickness 1 mm (0.039 in.), cut out :

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- 1 internal doubler to dimensions 240 mm (9.45 in.) X 310 mm (12.2 in.) approx.
 - 2 external doubler to dimensions 250 mm (9.84 in.) X 120 mm (4.72 in.) approx.
 - 3 shim as shown in figure 403 sheet 3 of 3. Pre-fit dimensions (to be reworked if necessary) 230 mm (9.05 in.) X 20 mm (0.78 in.).
- (b) From sheet metal Z8 CND 15 (P 3305) thickness 1,8 mm (0.07 in.) cut out shim as shown in figure 403 sheet 2 of 3. Pre-fit dimensions 317 mm (12.5 in.) X 25 mm (1.0 in.) approx.
 - (c) From sheet metal Z8 CND 15 (P 3305) thickness 0,3 mm (0.012 in.) cut out the first foil to 258 mm (10.15 in.) X 120 mm (4.72 in.) and the second to 290 mm (11.41 in.) X 27 mm (1.06 in.).
 - (d) Shape the doublers and foils according to the outline of the panel (see figure 402 sheet 2 of 4).
 - (e) Stick the stabilene to the side of the internal doubler which will be in contact with the panel. Trace out the outlines of the doubler and on it centre mark the positions of fitting attachments not removed in the zone of overlay of panels.
 - (f) Stick the second stabilene sheet on the side of the doubler which will be in contact with the panel. Proceed in the same way for the internal doubler.
 - (g) Machine the outlines of the two doublers and radius the ends in contact with the panel as shown in figure 403.
 - (h) Drill the previously centre marked holes in the doublers to dia. 18 mm (0.70 in.) and deburr.
 - (i) Stick stabilene sheet to the side of the foils which will be in contact with the panel. Trace out and machine the outlines of the foils.

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- (j) Apply heat treatment to the two doublers according to procedures M 822 and 821 of chapter 70-45-10 of standard practices.
 - (k) Reshape the doublers (see figure 402).
- (4) Drilling the doublers (see figure 402).
- (a) Position the internal doubler on the panel, centre mark the positions of the four holes at the corners.
 - (b) Remove the doubler. Drill the four holes to dia. $3 \pm 0,1 \text{ mm}$ (0.114 - 0.122 in.) and deburr.
 - (c) Offer up the internal doubler to the panel, check alignment of the holes. If necessary, rework the doubler until alignment is correct.
 - (d) Remove the internal doubler, drill the four holes marked "D", "F", "H", "J", to dia. $4,83 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix} \text{ mm}$ (0.190 to 0.194 in.) and deburr.
 - (e) Pin the internal doubler on the panel through the four holes. Centre mark the positions of all the other holes on the doubler.
 - (f) Remove the doubler. Drill all the holes to dia. $3 \pm 0,1 \text{ mm}$ (0.114 - 0.122 in.) and deburr.
 - (g) Pin the internal doubler on the panel to check alignment of the holes. If necessary, rework the holes until alignment is correct.
 - (h) Remove the doubler. Drill.
 - 1 Holes marked "C", "D", "E", "F", "G" to dia. $4,83 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix} \text{ mm}$ (0.190 - 0.194 in.).
 - 2 Holes marked "K" to dia. $6,35 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix} \text{ mm}$ (0.250 - 0.254 in.) and deburr.

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- (i) Pin the doubler on the panel. In the doubler and the panel, counterdrill hole marked "A" and "B" to diameter $4,17 + 0,1$ mm (0.164 - 0.168 in.). Remove the doubler and deburr.
- (j) Position the foils on the internal doubler.
- 1 In the first foil, counterdrill the holes "A" to dia. $4,17 + 0,1$ mm (0.164 - 0.168 in.).
- 2 In the second foil, counterdrill the hole marked "B" to dia. $4,17 + 0,1$ mm (0.164 - 0.168 in.) and the hole marked "D" to dia. $4,83 + 0,1$ mm (0.190 - 0.194 in.). Remove and deburr.
- (k) Position shim on internal doubler, mark positions of openings and attaching holes.
- (l) Remove. Drill openings to dia. 18 mm (0.70 in.) and attaching holes to dia. $4,83 + 0,1$ mm (0.190 - 0.194 in.) and deburr.
- (m) Position second shim on internal doubler and counterdrill the holes marked "B" on the shim to dia. $4,17 + 0,1$ mm (0.164 - 0.168 in.). Remove and deburr.
- (n) Position external doubler on the panel. Locate positions of holes "A" and "C".
- (o) Remove and counterdrill the holes to dia. $3 + 0,1$ mm (0.114 - 0.122 in.) in the doubler.
- (p) Offer external doubler up to panel. Check alignment of holes. If necessary, rework doubler until alignment is correct.

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(g) Remove. In the external doubler drill :

1 holes marked "A" to dia. $4,17 + 0,1$ mm
(0.164 - 0.168 in.).

2 holes marked "C" to dia. $4,83 + 0,1$ mm
(0.190 - 0.194 in.).
Deburr.

(r) On the panel rebores the holes for passage of
spacers (at holes marked "A") to dia.

$5,5 + 0,1$ mm (0.216 - 0.220 in.) and deburr.
 $+ 0$

NOTE : Do not pierce the external skin of
the panel.

(5) Securing doublers.

(a) Install the spacers in their holes with loctite
307 (P 502) to hold them in place during instal-
lation of fitting attachments.

(b) Pin the foils, shims and doublers in position
on the panel.

(c) Secure the assembly as shown in figure 402 and
specified in chapter 70-50-84 of standard
practices.

(d) Check installation of fitting attachments ac-
cording to chapter 70-50-84 of standard
practices.

C. Repair of delamination in lower part of the panel.

(1) Removal of existing fittings.

(a) Remove existing fitting attachments from the
panel as shown in figure 404 and specified in the
following standard practices.

1 chapter 70-50-30 for fitting attachments
marked "D", "E" and "J".

2 chapter 70-50-40 for fitting attachments
marked "F", "G" and "K".

3 chapter 70-50-60 for fitting attachments
marked "L".

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(2) Locating attachment holes for doublers.

- (a) Lightly rub the internal panel of the barrel with a very fine emery cloth until the cellular structure of the zone to be repaired is visible.
- (b) Centre mark the positions of holes "A", "B" and "C" (see figure 404) on the panel. Drill these holes to dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) and deburr.

NOTE : It is essential that each hole be located in the centre of a cell.

- (c) Stick a stabilene tracing sheet to the internal panel of the barrel. On this tracing sheets, locate attachment holes and trace the foil compensating for chemical milling of the panel.

NOTE : Before sticking the stabilene make provision for the raised heads of fitting attachments not removed.

- (d) Stick a stabilene sheet to the external face of the panel. Centre mark the positions of holes "A" and "C" on the stabilene. Trace the outline of the external doubler.

(3) Preparation of doublers, shims and foil.

- (a) From sheet metal, Z8 CND 15 (P 3305), thickness 1 mm (0.039 in.), cut out :

1 internal doubler, dimensions 315 mm
(12.4 in.) X 250 mm (9.84 in.) approx.

2 external doubler, dimensions 260 mm
(10.23 in.) X 120 mm (4.72 in.) approx.

3 shim as indicated in figure 403, sheet 3 of 3.
Pre-fit dimensions 230 mm (9.05 in.) X 20 mm
(0.78 in.).

- (b) From sheet metal, Z8 CND 15, thickness 1,8 mm (0.70 in.) cut out and machine shim according to figure 405 sheet 3 of 3. Pre-fit dimensions 272 mm (10.70 in.) X 25 mm (1.0 in.).

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OVERHAUL



- (c) From sheet metal 28 CND 15 (P 3305), thickness 0,3 mm (0.012 in.) cut out foil to dimensions 260 mm (10.23 in.) X 95 mm (3.74 in.) approx.
- (d) Shape doublers and foil to outline of panel (see figure 402 sheet 2).

For the operations which follow refer, in the order in which they are given, to paragraphs (a) to (h) of the preceding chapter B (3).

(4) Drilling of doublers.

- (a) On the panels and frames, rebore holes marked "L" to dia. $6,35 + 0,1$ mm (0.250 - 0.254 in.) and deburr.
- (b) Position the internal doubler on the panel. Centre mark the positions of the four corner holes on the doubler.
- (c) Remove the doubler. Drill the four holes in it to dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) and deburr.
- (d) Offer up the internal doubler to the panel and check alignment of holes. If necessary rework doubler until alignment is correct.
- (e) Remove the internal doubler. Bore holes marked "E" and "H" to dia. $4,83 + 0,1$ mm (0.190 - 0.194 in.), and holes marked "L" to dia. $6,35 + 0,1$ mm (0.250 - 0.254 in.). Deburr.
- (f) Pin internal doubler to panel by means of the four holes. On the doubler centre mark the positions of all the other holes.
- (g) Remove the doubler. Drill all holes to dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) and deburr.
- (h) Pin the doubler by means of the four corner holes, check alignment of all holes. If necessary rework the doubler until alignment is correct.

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- (i) Remove the internal doubler. Drill.
- 1 holes marked "D", "F", "G", "J" to dia.
 $4,83 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.190 - 0.194 in.).
 - 2 holes marked "K" and "L" to dia.
 $6,35 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.250 - 0.254 in.) and deburr.
- (j) Pin internal doubler onto the panel. In the panel and doubler assembly drill holes marked "A", "B" and "C" to dia. $4,17 \begin{smallmatrix} + 0,1 \\ - 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.). Remove the doubler and deburr.
- (k) Position the foil on the internal doubler. Counterdrill the holes marked "A" on the foil to dia. $4,17 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.). Remove and deburr.
- (l) Position the shim on the internal doubler. On the shim, locate the positions of openings and attachment holes.
- (m) Remove. In the shim, drill openings to dia. 18 mm (0.70 in.) and holes to dia. $4,83 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.190 - 0.194 in.) and deburr.
- (n) Position the second shim on the internal doubler. In the shim, counterdrill holes marked "C" to dia. $4,17 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.). Remove and deburr.
- (o) Position the external doubler on the panel. Locate positions of the holes "A" and "D" on the doubler.
- (p) Remove. Drill the holes to dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.).

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- (q) Offer up external doubler to the panel. Check alignment of holes. If necessary, rework the doubler until alignment is correct.
- (r) Remove. On the doubler, drill :
- 1 holes marked "A" to dia. $4,17 \begin{smallmatrix} + 0,1 \\ - 0 \end{smallmatrix}$ mm
(0.164 - 0.168 in.).
- 2 holes marked "D" to dia. $4,83 \begin{smallmatrix} + 0,1 \\ - 0 \end{smallmatrix}$ mm
(0.190 - 0.194 in.).
- (s) On the panel, redrill the holes for the passage of the spacers (holes marked "A" and "B") to dia. $5,5 \begin{smallmatrix} + 0,1 \\ - 0 \end{smallmatrix}$ mm (0.216 - 0.220 in.).
- NOTE : Do not pierce the external skin of the panel.
- (5) Securing of the doublers.
- (a) Install spacers 002-003-992-1 in holes marked "A" and 002-003-992-3 in holes marked "B" with loc-tite 307 (P 502) to hold them in place during installation of fitting attachments.
- (b) Pin the foil, the shims and the doublers in position on the panel.
- (c) Secure the assembly according to indications of figure 404 and as specified in chapter 70-50-40 of standard practices.
- (d) Check installation of fitting attachments according to chapter 70-50-84 of standard practices.

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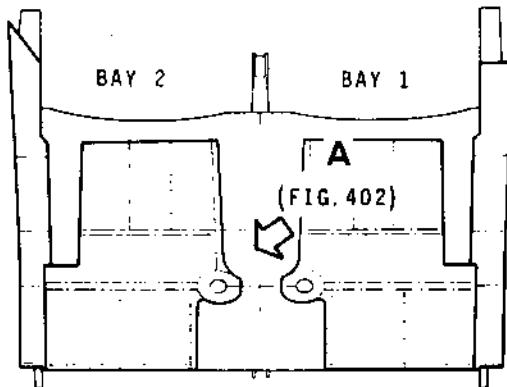
OLYMPUS 593

MK.610-14-28

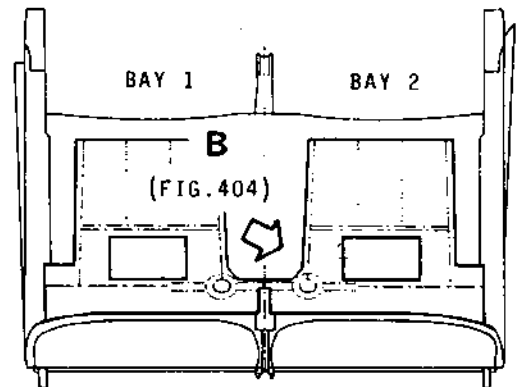
OVERHAUL



LEFT NOZZLE ILLUSTRATED
RIGHT NOZZLE SYMMETRICAL

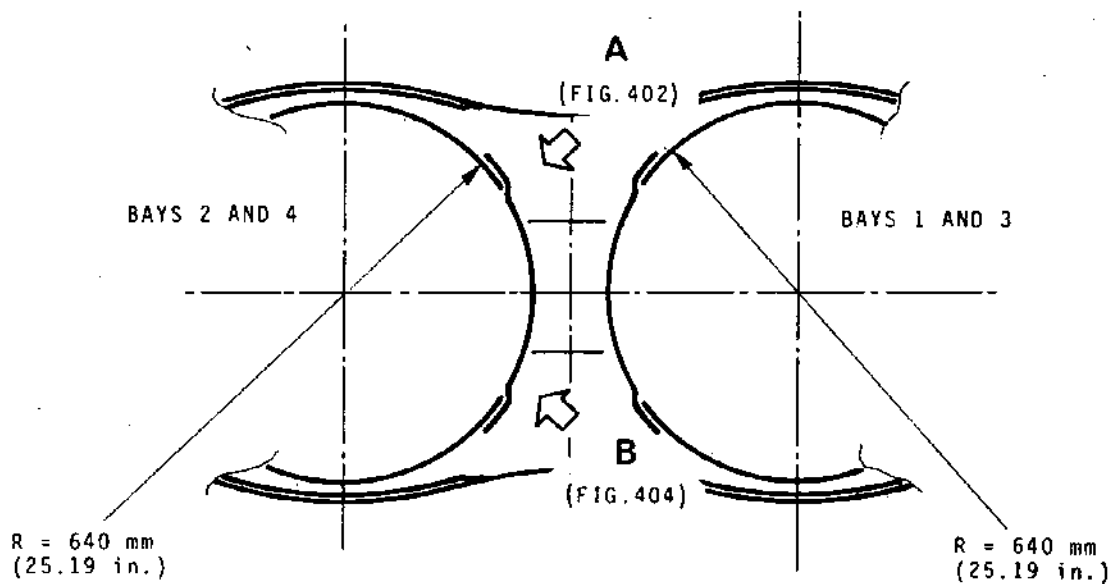


VIEWED FROM ABOVE



VIEWED FROM BELOW

REAR VIEW
BETWEEN XMB 1750.818 AND 1763.500



Location of Zones to be Repaired
Figure 401 (Sheet 1 of 2)

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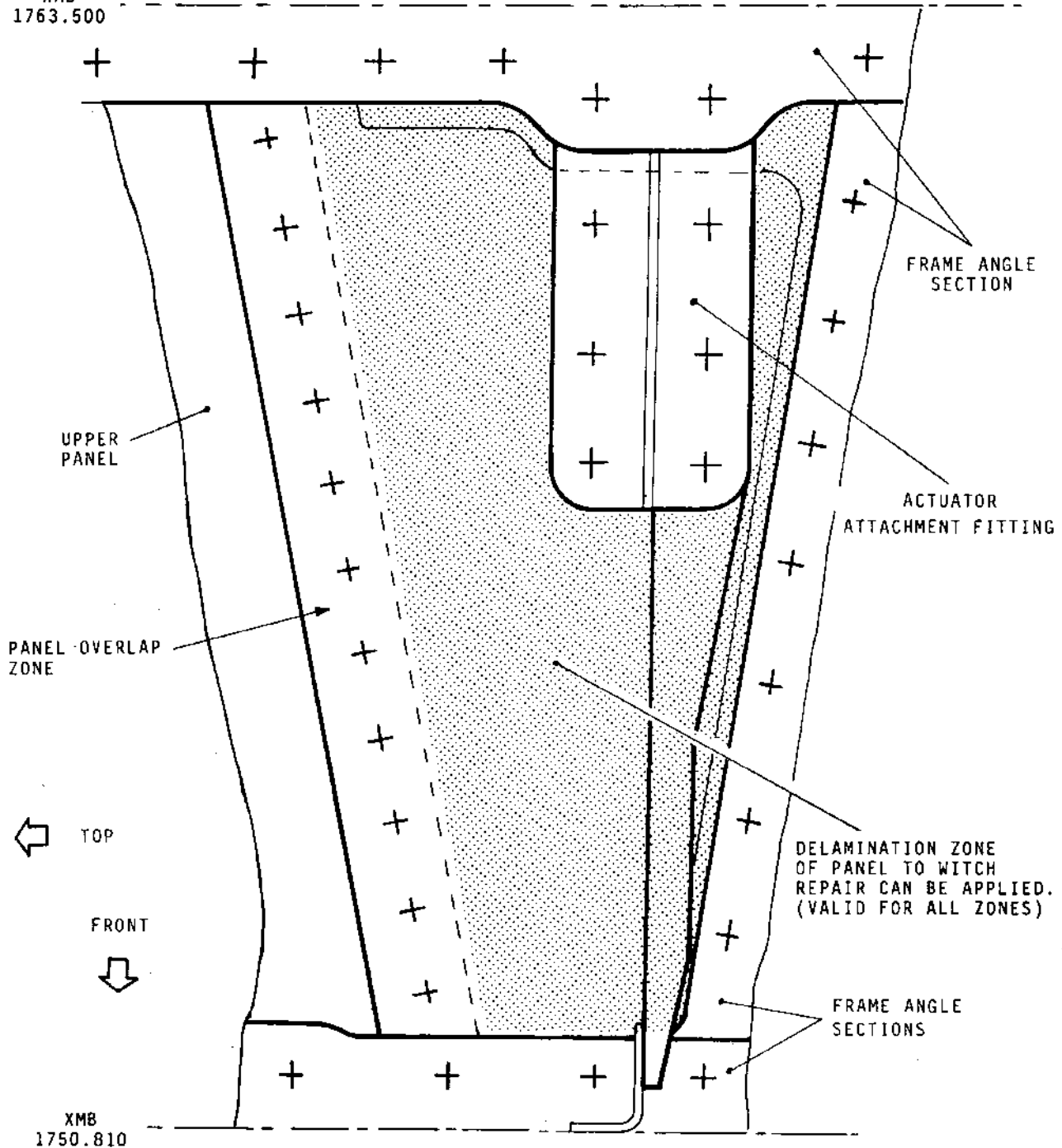
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OVERHAUL



VIEW TOWARDS INTERIOR OF BAY

UPPER PART BAY 2 OR 4 SHOWN
BAY 1 OR 3 SYMMETRICAL
LOWER PART BAY 1 OR 3 SHOWN
BAY 2 OR 4 SYMMETRICAL

XMB
1763.500



Location of Zones to be Repaired
Figure 401 (Sheet 2 of 2)

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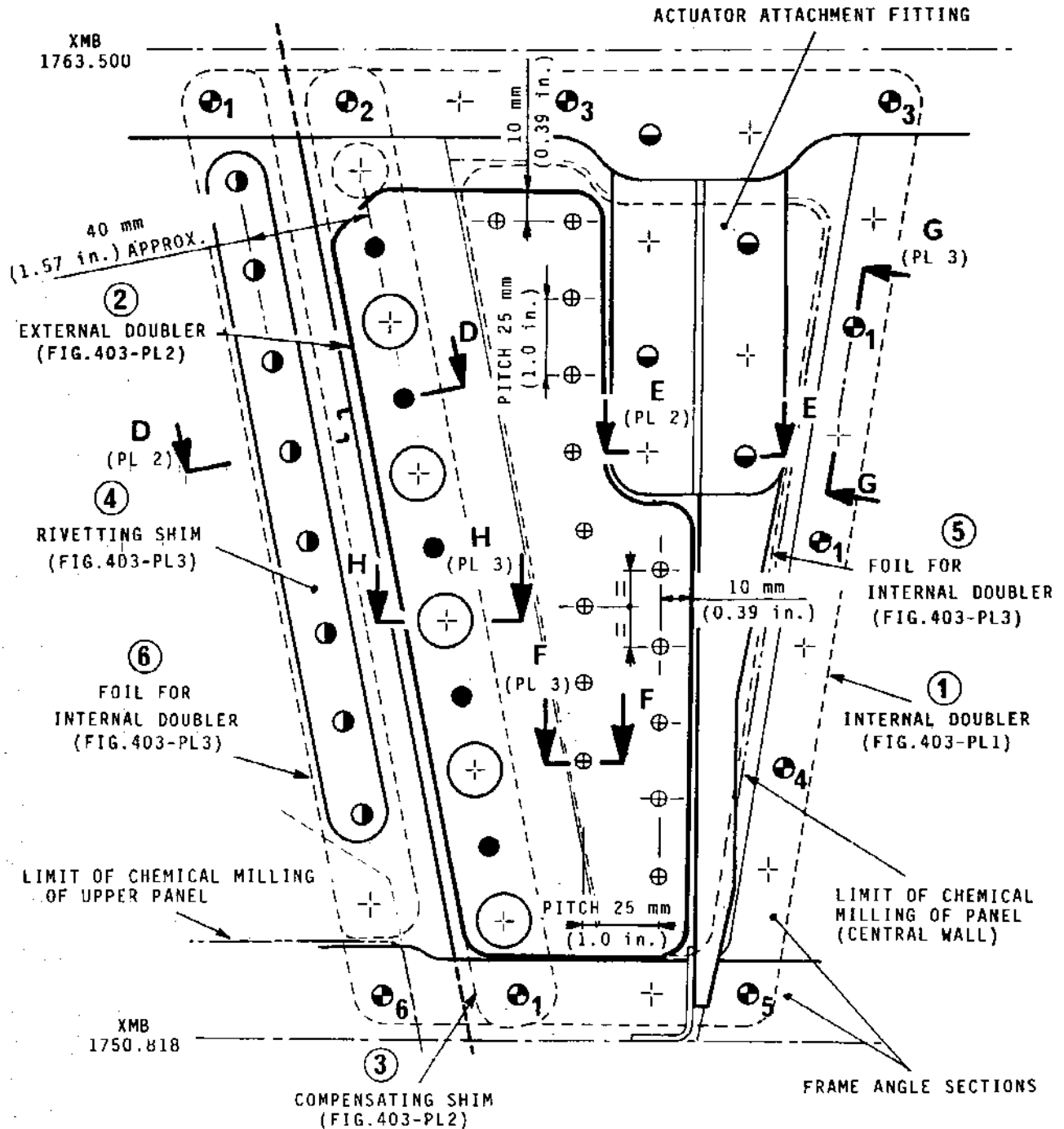


A

ON BAY 2 OR 4 : SHOWN
ON BAY 1 OR 3 : SYMMETRICAL

TOP ↖

↓
FRONT



Repair of Delamination on Central Wall
Near to Attachment Zone of Primary Nozzle
(Upper Zone)

Figure 402 (Sheet 1 of 4)

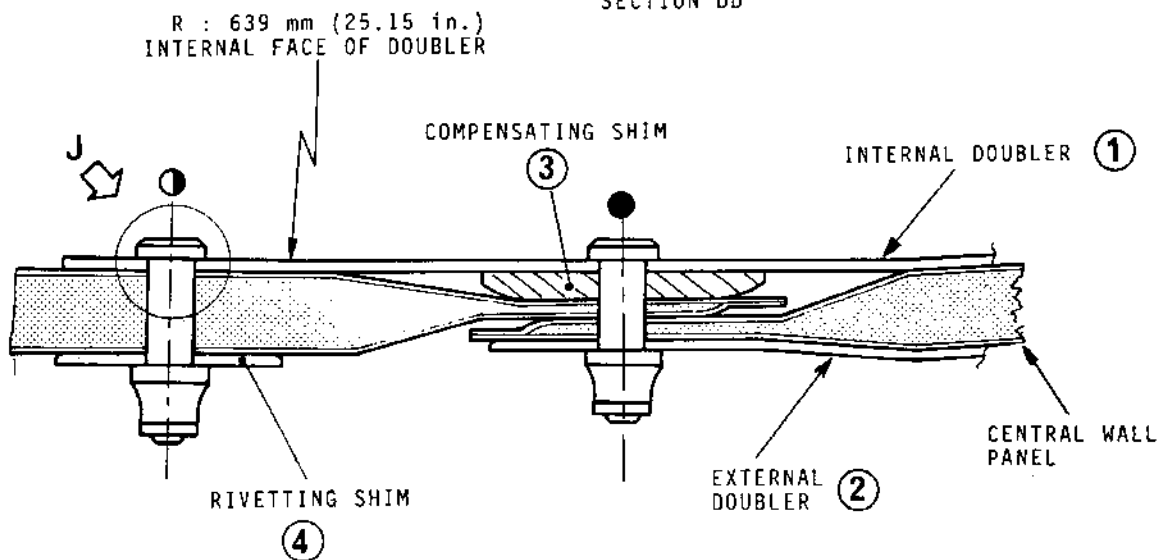
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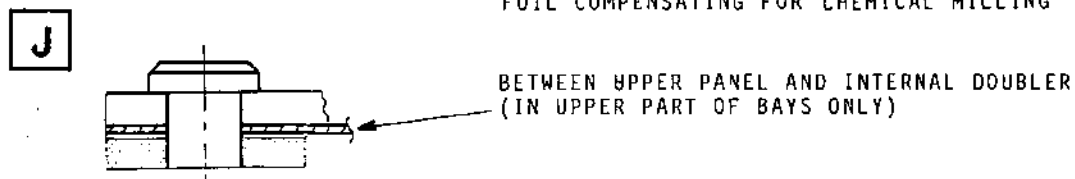
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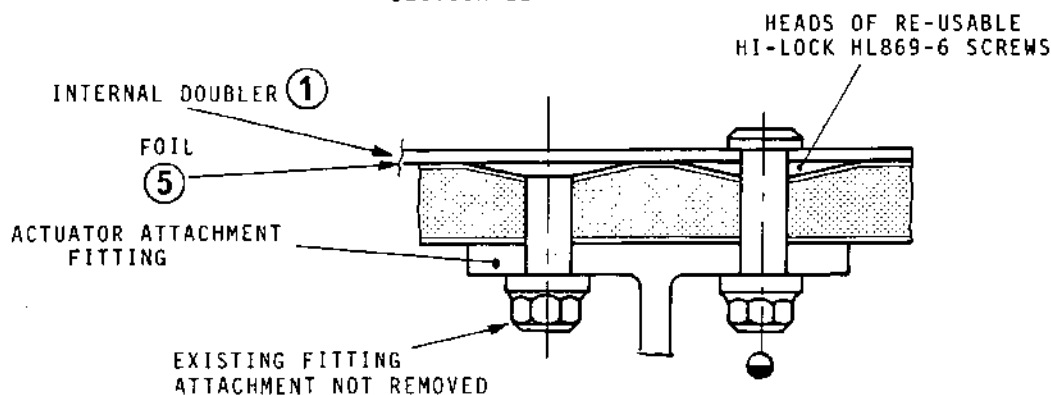
SECTION DD



FOIL COMPENSATING FOR CHEMICAL MILLING (6)



SECTION EE



Repair of Delamination on Central Wall Near to
Attachment Zone of Primary Nozzle (Upper Zone)
Figure 402 (Sheet 2 of 4)

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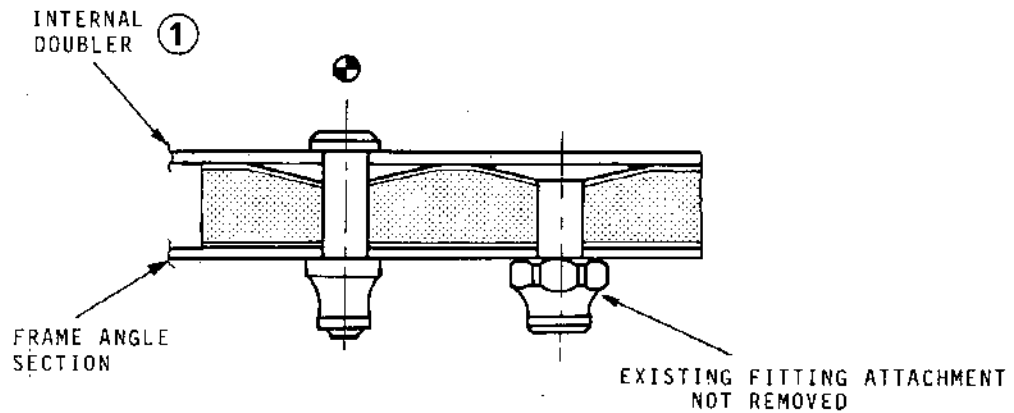


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SECTION GG

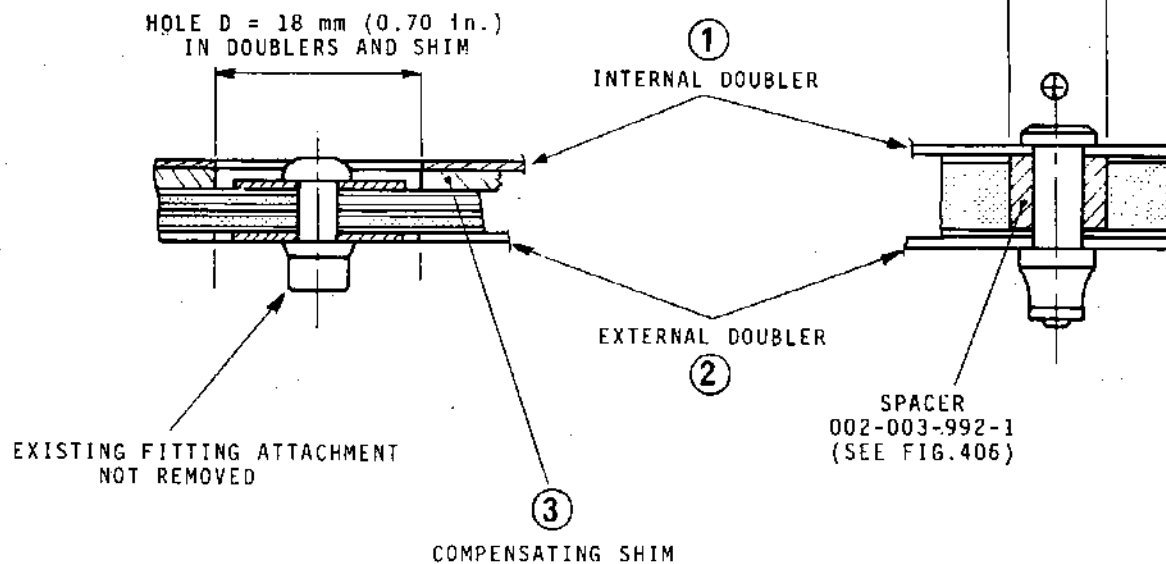


SECTION HH

SECTION FF

DIAMETER OF HOLES TO BE MADE IN PANEL

$$D = 5,5 + 0,1 \text{ mm} \quad \left(\begin{array}{l} 0.216 \\ 0.220 \text{ in.} \end{array} \right)$$



Repair of Delamination on Central Wall
Near to Attachment Zone of Primary Nozzle
(Upper Zone)

Figure 402 (Sheet 3 of 4)

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OVERHAUL



REFERENCE LETTER	SYMBOL	FITTING ATTACHMENT USED FOR REPAIR
"A"		HI-LOCK SCREW 40-5-6 HI-LOCK NUT 97-5 SPACER 002-003-992-1 (SEE FIG. 406)
"B"		HI-LOCK SCREW 40-5-6 HI-LOCK NUT 97-5
"C"		HI-LOCK SCREW 40-6-5 OR 6-6 HI-LOCK NUT 97-6
"D"		HI-LOCK SCREW 40-6-7 HI-LOCK NUT 97-6
"E"		HI-LOCK SCREW 40-6-6 OR 6-7 HI-LOCK NUT 97-6
"F"		HI-LOCK SCREW 40-6-8 HI-LOCK NUT 97-6
"G"		HI-LOCK SCREW 40-6-7 OR 6-8 NUT NAS 1288C-3 WASHER NAS 1288C-3W
"H"		HI-LOCK SCREW 40-6-9 HI-LOCK NUT 97-6
"J"		HI-LOCK SCREW 40-6-8 OR 6-9 HI-LOCK NUT 97-6
"K"		HI-LOCK SCREW 40-8-8 NUT NAS 1288C-4 WASHER NAS 1288C-4W

Repair of Delamination on Central Wall Near to the
Attachment Zone of Primary Zone (Upper Zone)
Figure 402 (Sheet 4 of 4)

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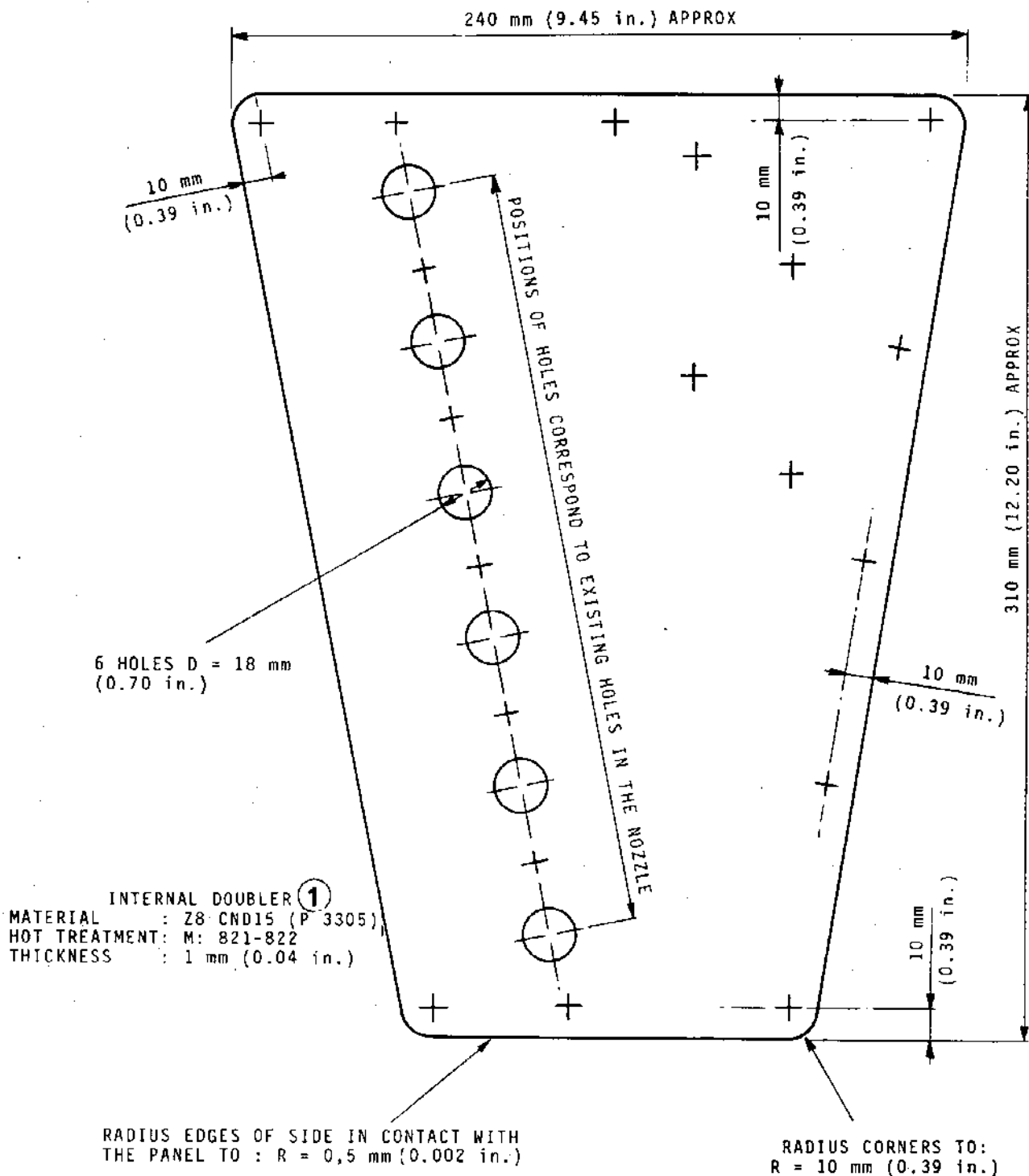
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POSITIONS OF HOLES
MARKED + CORRESPOND
TO THOSE EXISTING IN
NOZZLE BEFORE REPAIR

Manufacturing Details of Doublers and Shims
Figure 403 (Sheet 1 of 3)

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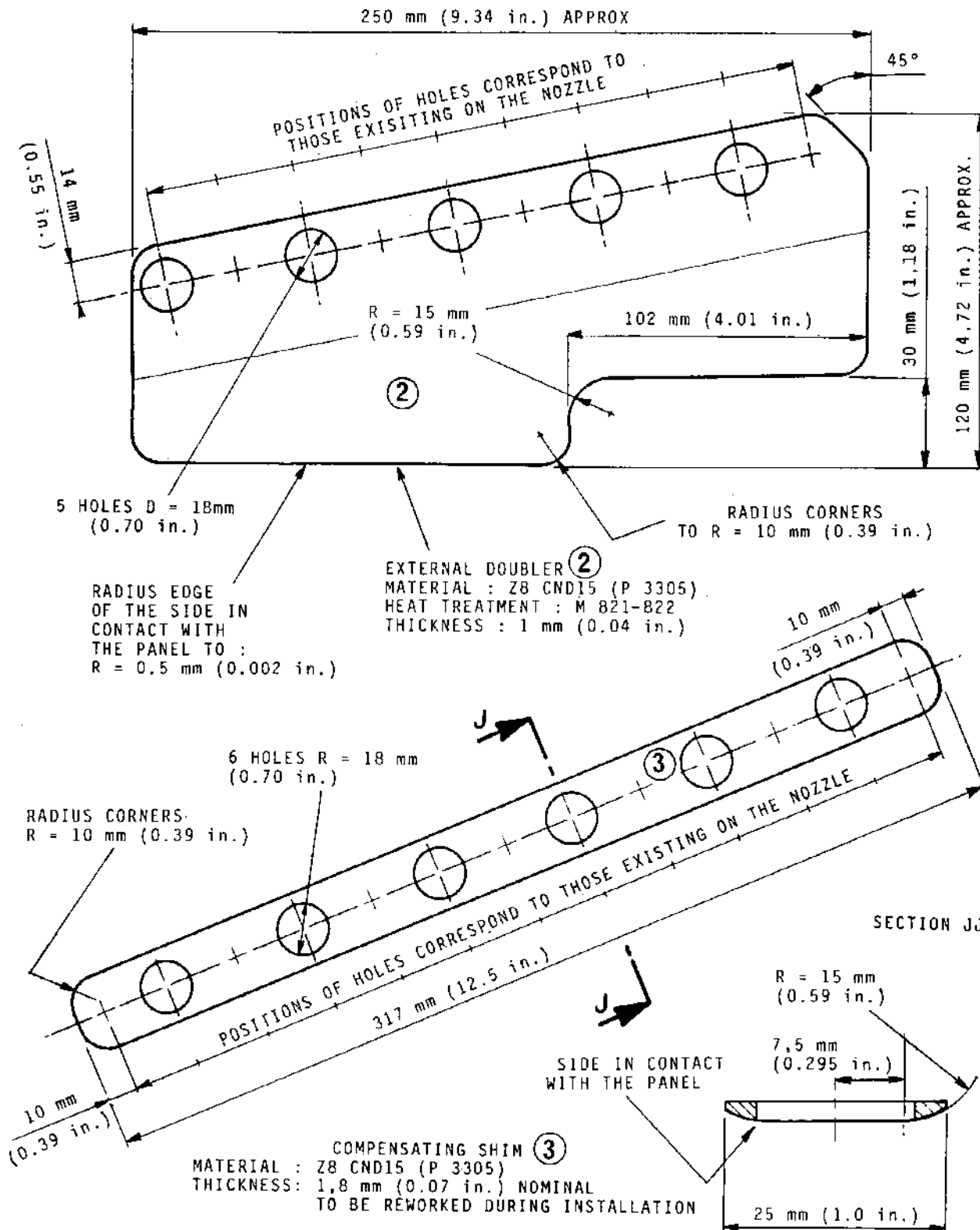
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Manufacturing Details of Doublers and Shims
Figure 403 (Sheet 2 of 3)

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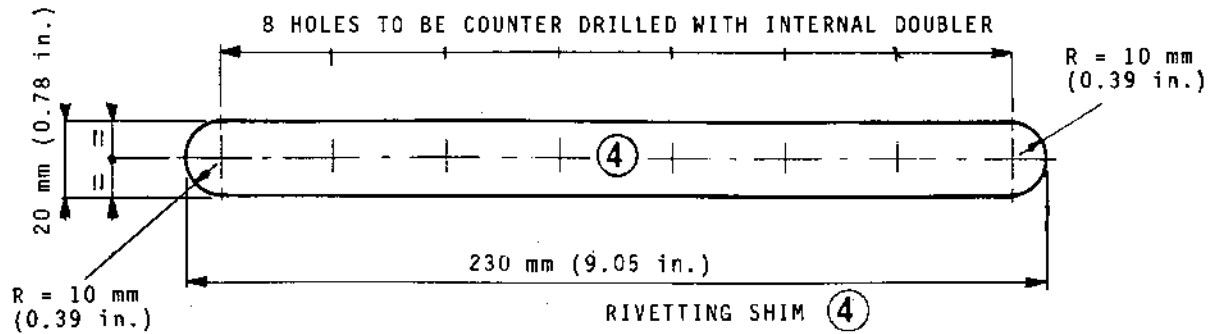
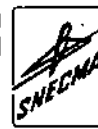
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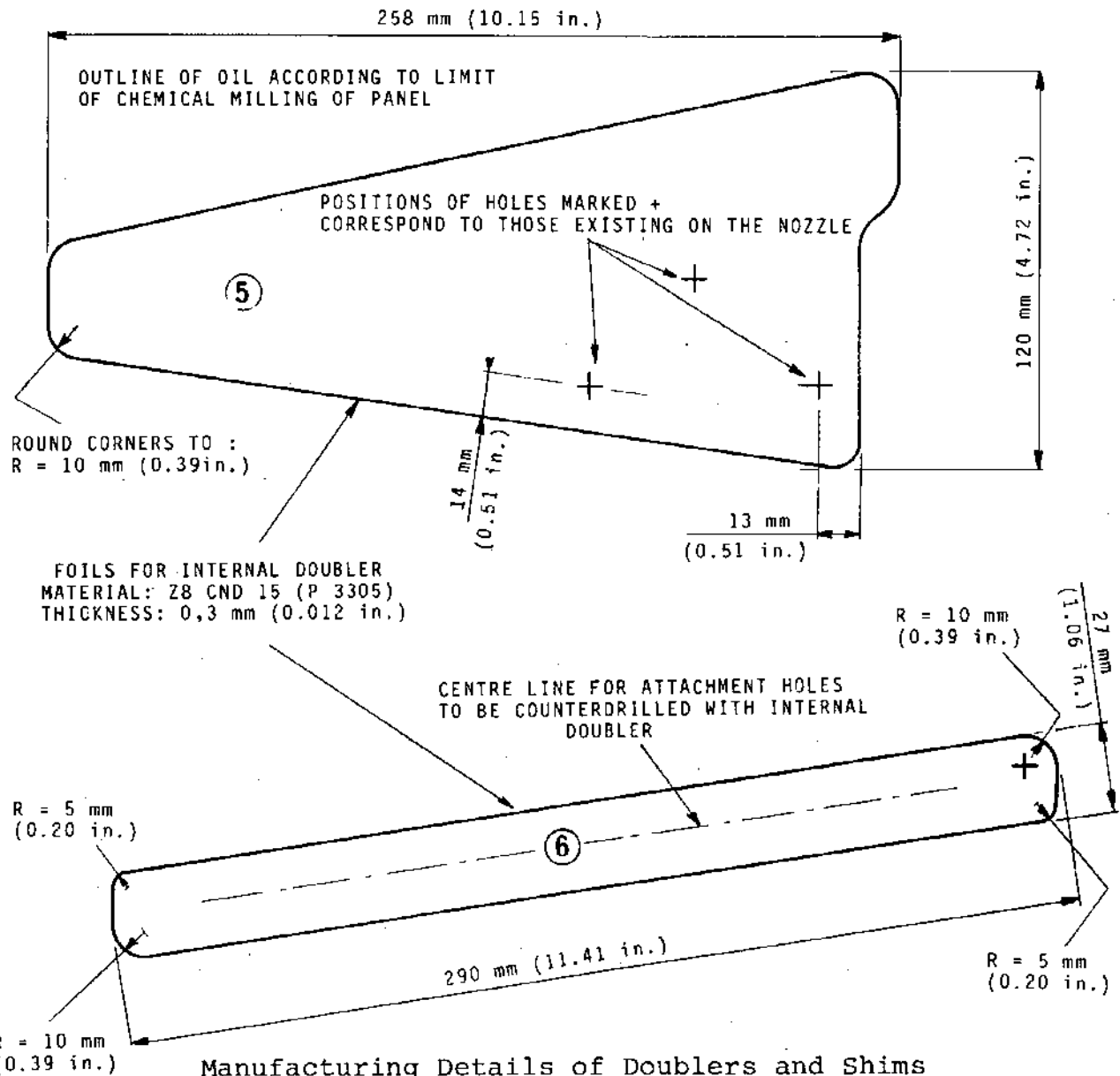


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MATERIAL: Z8 CND15 (P 3305) - THICKNESS: 1 mm (0.04 in.)



Manufacturing Details of Doublers and Shims
Figure 403 (Sheet 3 of 3)

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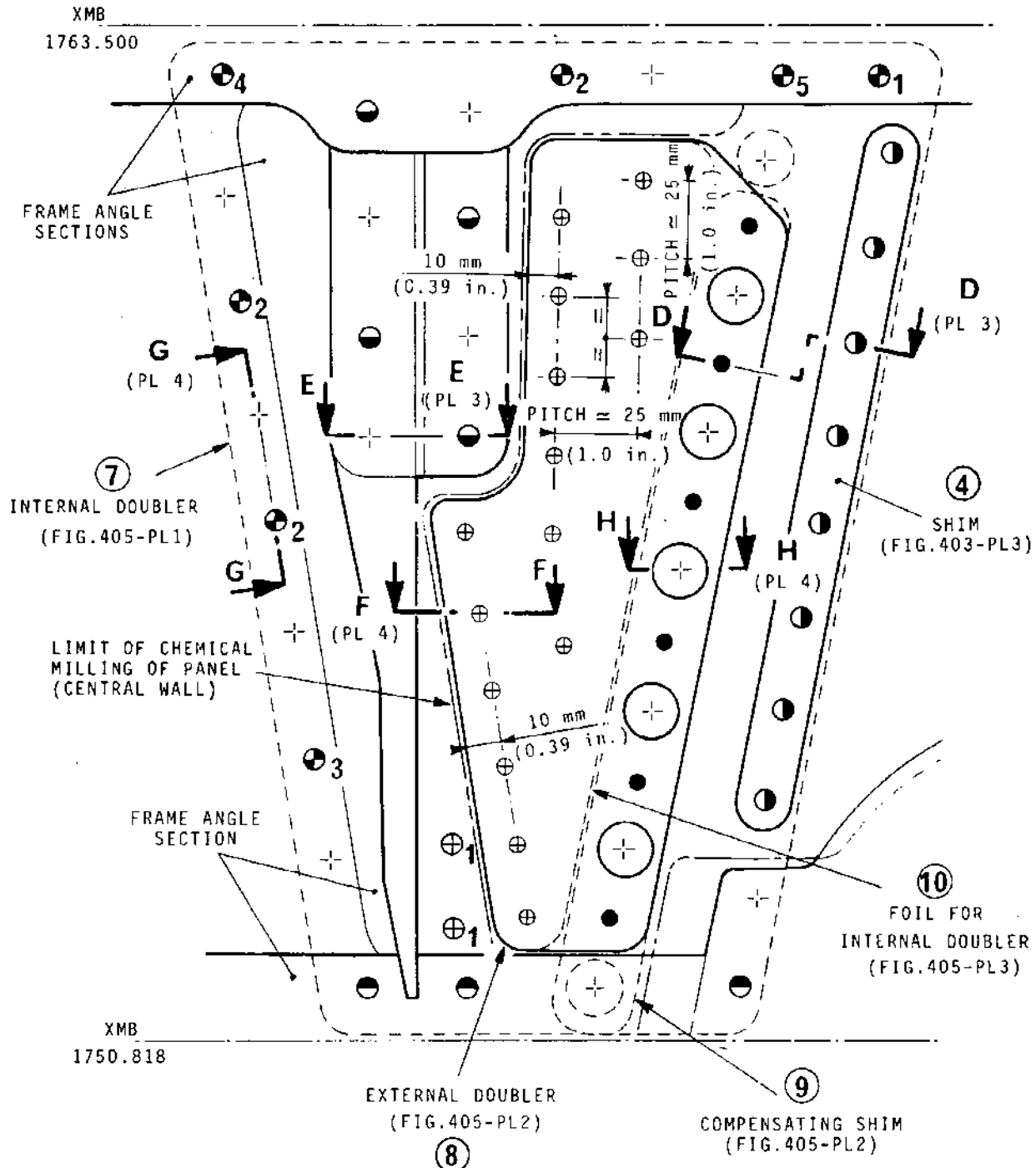


← TOP

B

FRONT
↓

ON BAY 1 OR 3 : SHOWN
ON BAY 2 OR 4 : SYMMETRICAL



Repair of Delamination on Central Wall Near to
Primary Attachment Zone of Primary Nozzle
(Low Zone)

Figure 404 (Sheet 1 of 4)

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REFERENCE LETTER	SYMBOL	FITTING ATTACHMENT USED FOR REPAIR
"A"		HI-LOCK SCREW 40-5-6 HI-LOCK NUT 97-5 SPACER 002-003-992-1 (SEE FIG.406)
"B"		HI-LOCK SCREW 40-5-6 HI-LOCK NUT 97-5 SPACER 002-003-992-3 WASHER UNDER NUT 649-786-204-0
"C"		HI-LOCK SCREW 40-5-6 HI-LOCK NUT 97-5
"D"		HI-LOCK SCREW 40-6-5 OR 6-6 HI-LOCK NUT 97-6
"E"		HI-LOCK SCREW 40-6-5 OR 6-6 HI-LOCK NUT 97-6
"F"		HI-LOCK SCREW 40-6-7 HI-LOCK NUT 97-6
"G"		HI-LOCK SCREW 40-6-7 NUT NAS 1288C-3 WASHER NAS 1288C-3W
"H"		HI-LOCK SCREW 40-6-8 HI-LOCK NUT 97-6
"J"		HI-LOCK SCREW 40-6-6 OR 6-7 HI-LOCK NUT 97-6
"K"		HI-LOCK SCREW 40-8-8 NUT NAS 1288C-4 WASHER NAS 1288C-4W
"L"		HI-LOCK SCREW 40-8-9 NUT HI-LOCK NUT 97-8

Repair of Delamination on Central Wall Near to
Attachment Zone of the Primary Nozzle
(Lower Zone)

Figure 404 (Sheet 2 of 4)

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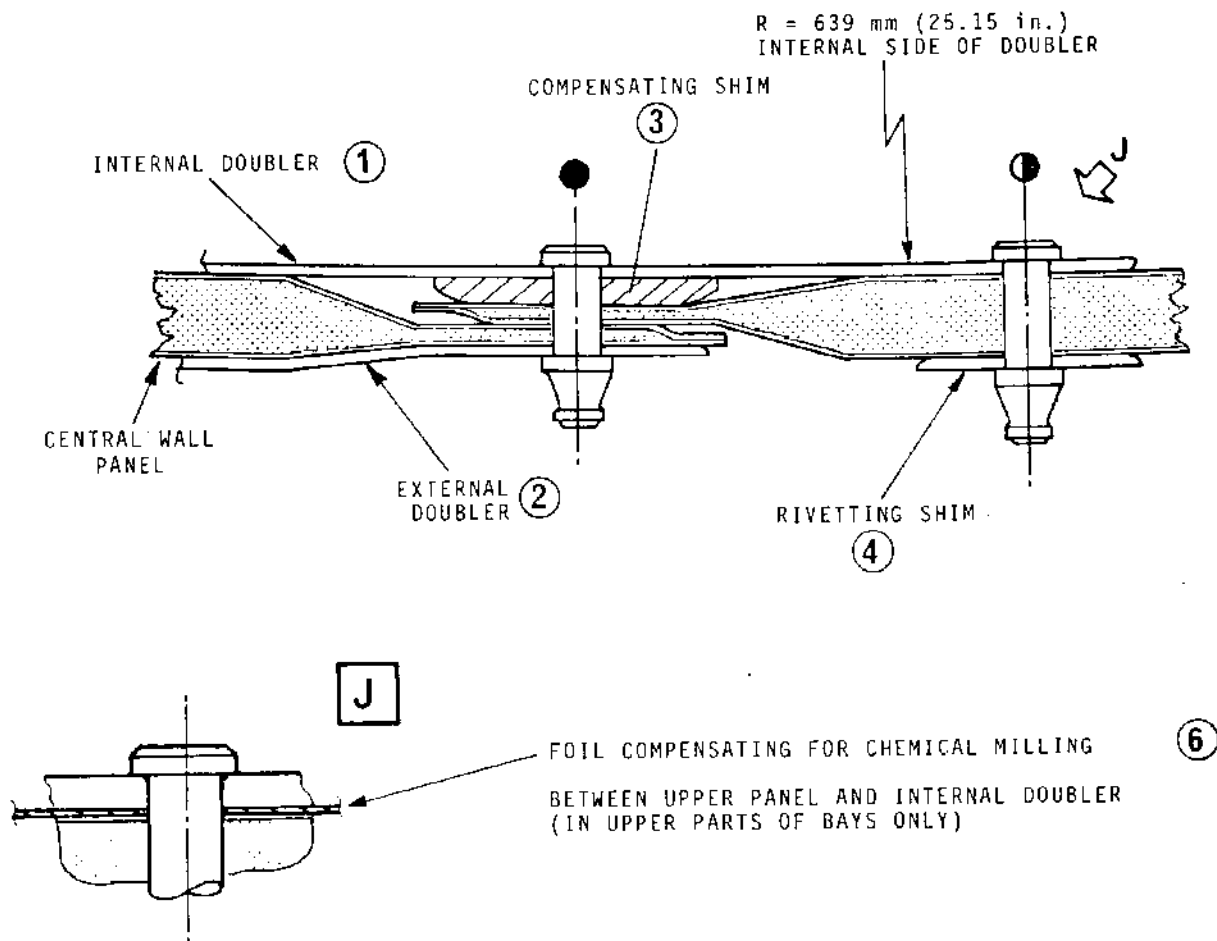


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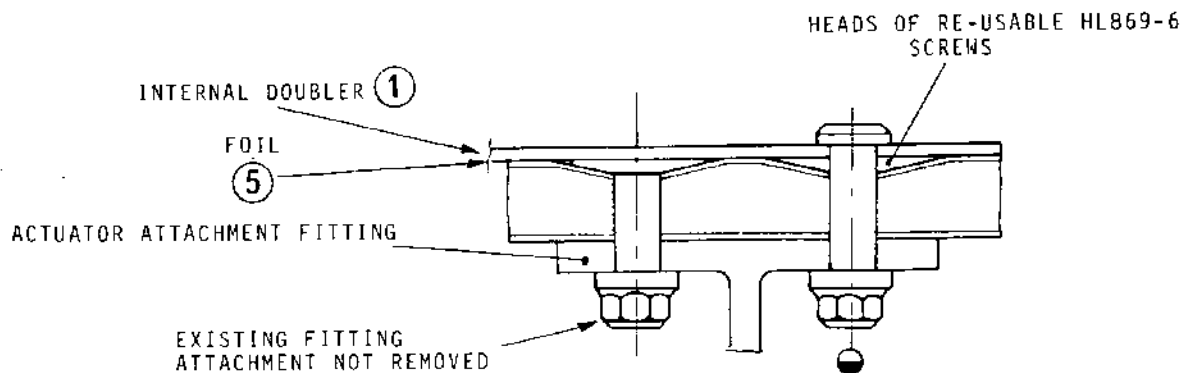
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SECTION DD



SECTION EE



Repair of Delamination on Central Wall Near to
Attachment Zone of Primary Nozzle (Lower Zone)
Figure 404 (Sheet 3 of 4)

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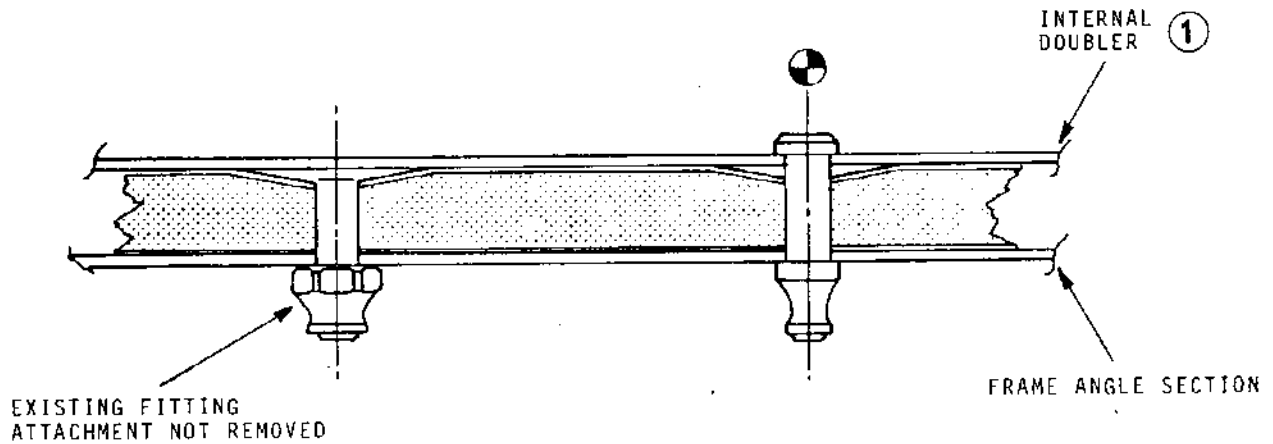


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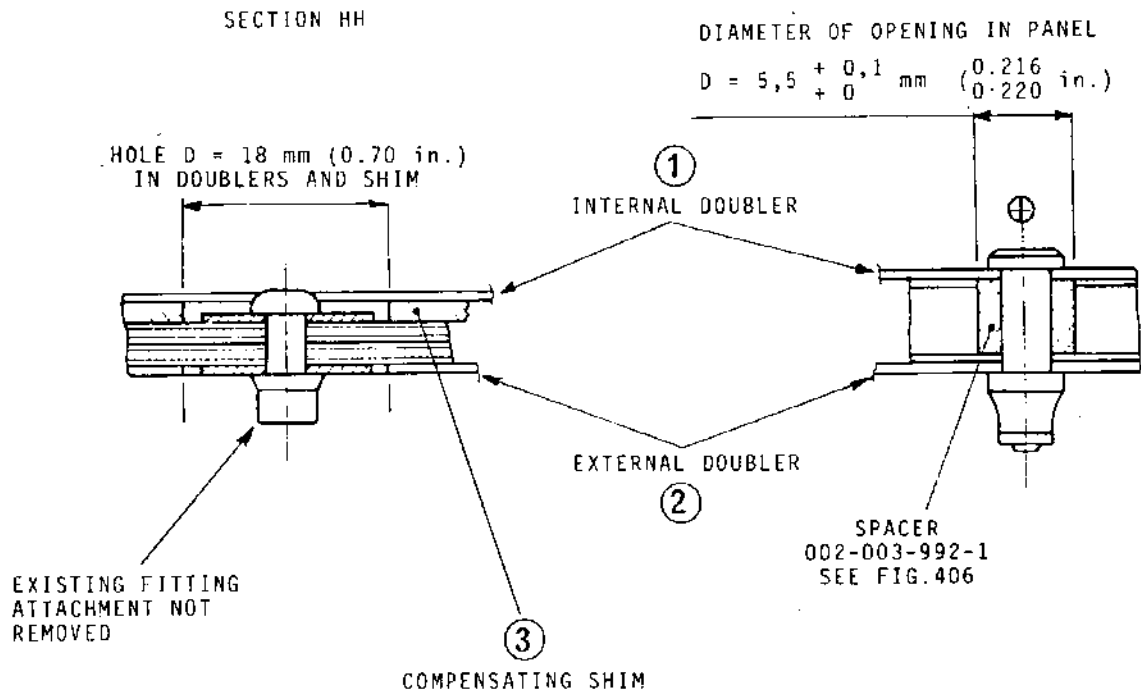
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SECTION GG



SECTION FF



Repair of Delamination on Central Wall Near to
Attachment Zone of Primary Nozzle (Lower Zone)
Figure 404 (Sheet 4 of 4)

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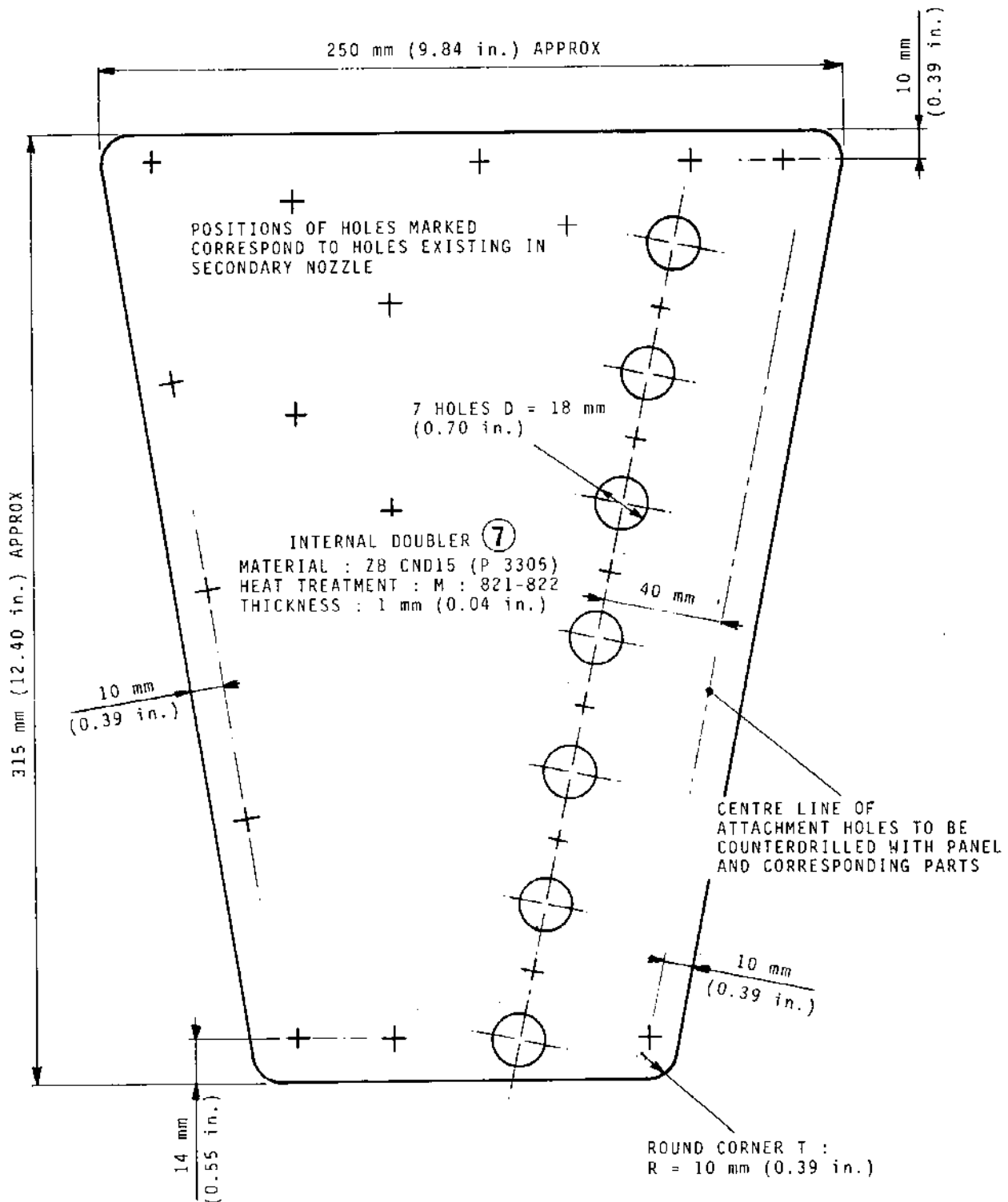
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Manufacturing Details of Doublers and Shims
Figure 405 (Sheet 1 of 3)

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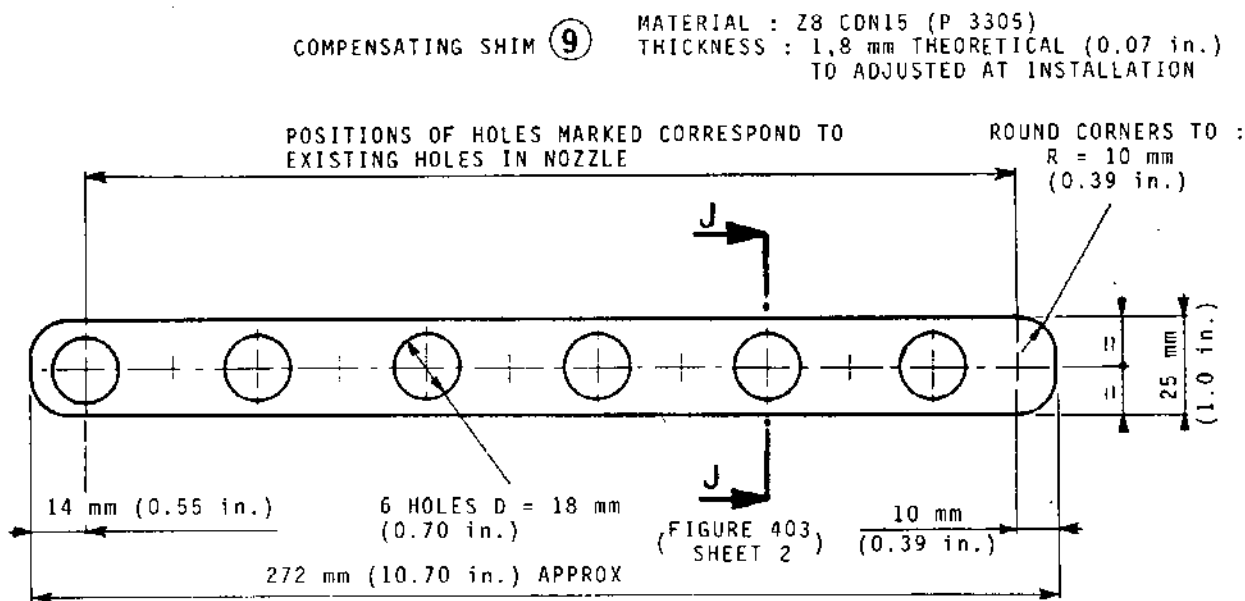
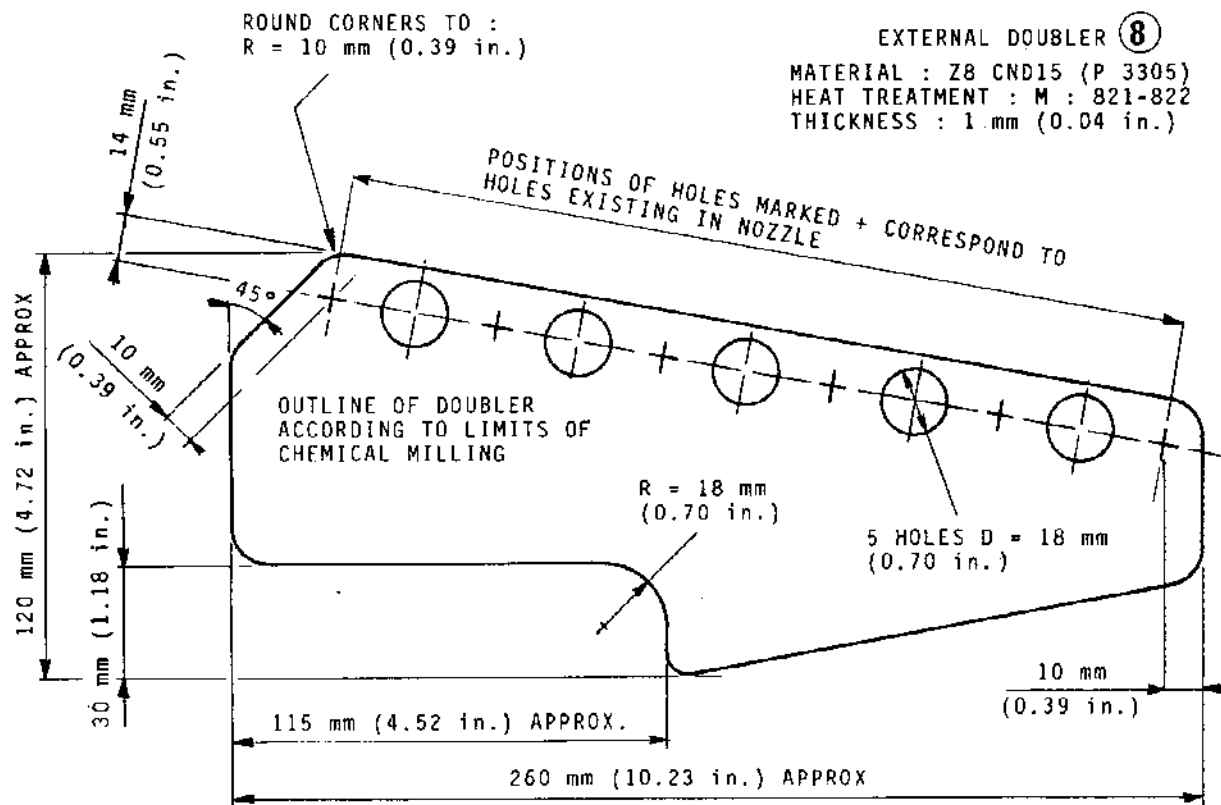
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Manufacturing Details of Doublers and Shims
Figure 405 (Sheet 2 of 3)

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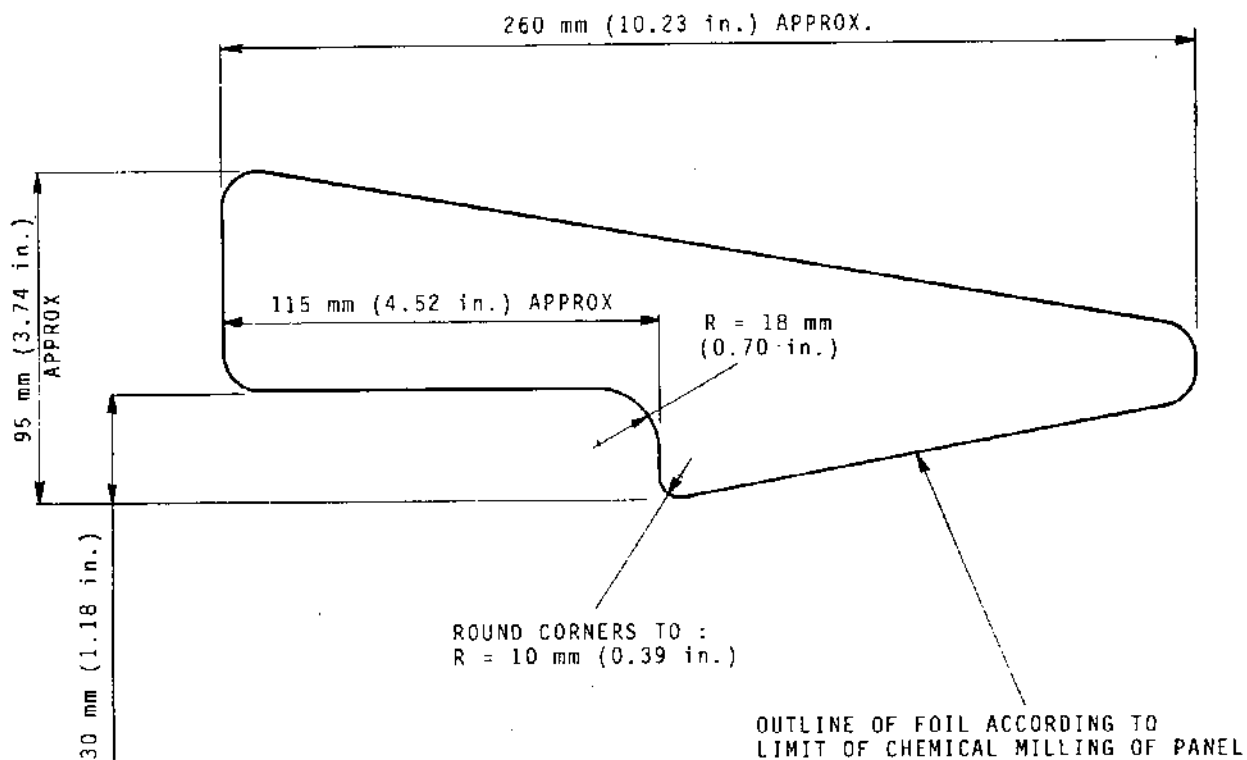
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⑩

FOIL FOR INTERNAL DOUBLER

MATERIAL : Z8 CND15 (P3305)
THICKNESS : 0,3 mm (0.01 in.)



Manufacturing Details of Doublers and Shims
Figure 405 (Sheet 3 of 3)

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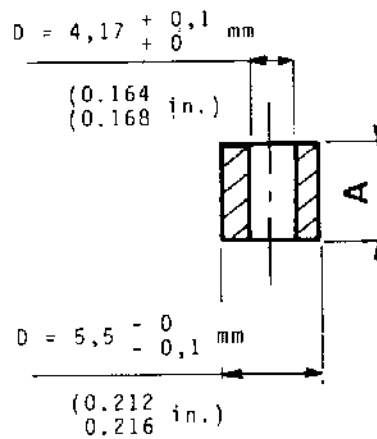
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SPACER

002-003-992-X MATERIAL Z6 NCT 25 sv (P 3601)

PART N°	A		LOCATION
	mm	(in.)	
002-003-992-1	6,45 ± 0,05	(0.254 ± 0.002)	⊕
002-003-992-3	6,75 ± 0,05	(0.265 ± 0.002)	⊕1



Detail of Spacers
Figure 406 (Sheet 1 of 1)



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REPAIR



SECONDARY NOZZLE 29-190

- 21 Repair of delamination in the pressure area lying outside of the barrel suspension link attachment zones (slight deterioration)

PARTS REQUIRED FOR REPAIR

Sheet metal Z8 CND 15 (P 3305) thickness 0,3 mm
(0.012 in.)
Sheet metal Z8 CND 15 (P 3305) thickness 1,2 mm
(0.047 in.)

HI-Lock screw 40-5-6	649-781-294-0
HI-Lock screw 40-5-7	649-781-295-0
HI-Lock screw 40-5-8	649-781-336-0
HI-Lock screw 40-6-3	649-781-297-0
HI-Lock screw 40-6-4	649-781-298-0
HI-Lock screw 40-6-5	649-781-299-0
HI-Lock screw 40-6-6	649-781-300-0
HI-Lock screw 40-6-7	649-781-301-0
HI-Lock screw 40-6-8	649-781-302-0
Blind bolt NAS 1671-3L4	650-089-333-0
Blind bolt NAS 1671-3L5	650-089-334-0
Blind bolt NAS 1671-3L6	650-089-335-0
Blind bolt NAS 1671-3L7	650-089-336-0
Blind bolt NAS 1671-3L8	650-089-337-0
HI-Lock nut 97-5	649-782-257-0
HI-Lock nut 97-6	649-782-258-0
Spacer 002-003-992-1	
Spacer 002-003-992-2	
Spacer 002-003-992-3	
Thrust washer 002-003-995-0	

A. Introduction

This procedure is to be used for repair of delamination in the pressure area lying outside of the barrel suspension link attachment zones if :

The panel is not pierced.
The deteriorated surface area is less than half of the mesh.

NOTE : Mesh is the area of a panel between two stingers and two transverse frames.

If any of these criteria are not satisfied, inform SNECMA.

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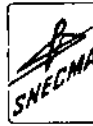
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OVERHAUL



B. Repair of delamination in zone 1 - Figure 402.

(1) Removal of existing attachment fittings.

- (a) Remove attachment fittings as shown in figure 402 and indicated in the following standard practices:

- 1 Chapter 70-50-30 for attachment fittings marked "D"- "E"- "N".
- 2 Chapter 70-50-40 for attachment fittings marked "G"- "F"- "J"- "H".
- 3 Chapter 70-50-60 for attachment fittings marked "L"- "M".

(2) Locating attachment holes for doublers.

- (a) Lightly rub the internal panel of the barrel with a very fine emery cloth until the cellular structure of the zone to be repaired is visible.
- (b) Centre mark the positions of holes "A" and "C" on the panel (see figure 402). Drill these holes in the panel to dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) and deburr.

NOTE : It is essential that each hole be positioned in the centre of a cell.

- (c) Stick stabilene tracing paper to internal panel surface. Locate all of the fixing holes on the stabilene tracing paper, and trace the outline of the internal doubler and internal foil.

NOTE : Before sticking the stabilene tracing paper, make provision for the raised heads of attachment fittings not removed

- (d) Stick two sheets of stabilene tracing paper in the inside of the barrel. Locate the positions of the holes on the tracing sheet and trace the outlines of the external doublers and foils.

(3) Preparation of doublers and foils.

- (a) From sheet metal Z8 CND 15 (P 3305) thickness 1,2 mm (0.047 in.), cut out :

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- 1 The internal doubler, dimensions 495 mm (19.49 in.) x 215 mm (8.46 in.) approx.
 - 2 Forward external doubler, dimensions 215 mm (8.46 in.) x 155 mm (6.10 in.) approx.
 - 3 Rear external doubler, dimensions 250 mm (9.84 in.) x 190 mm (7.48 in.) approx.
- (b) From sheet metal 28 CND 15 (P 3305), thickness 0,3 mm (0.012 in.), cut out :
- 1 Internal foil, dimensions 186 mm (7.32 in.) x 185 mm (7.28 in.) approx.
 - 2 Forward external foil, dimensions 185 mm (7.28 in.) x 155 mm (6.10 in.) approx.
 - 3 Rear external foil, dimensions 212 mm (8.35 in.) x 160 mm (6.3 in.) approx.
- (c) Shape the doublers and foils according to the shape of the panel.
- (d) Stick the stabilene to the side of the internal doubler which will be in contact with the panel. Trace the outline of the doubler as indicated in figure 403. On the doubler, locate the positions of holes, dia. 18 mm (0.71 in.), allowing passage of fitting attachments not removed ; locate positions of the counterbores.
- (e) Stick the other stabilene tracing sheets to the side of the external doublers which will be in contact with the panel. Carry out the same procedure as for the internal doubler.
- (f) Shape the outlines of the doublers and radius the ends in contact with the panel, as specified in figure 402, sheets 3 and 4.
- (g) Drill the dia. 18 mm (0.71 in.) holes in the doublers, counterbore as indicated in figure 402, sheet 3 and deburr.
- (h) Stick the stabilene tracing sheets to the sides of the foils which will be in contact with the panel. Trace the outlines of the foils as indicated in figure 403.
- (i) Apply heat treatment to the doublers according to procedures M 822 and M 821 of chapter 70-45-10 of standard practices.

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- (k) Reshape doublers if necessary.
- (4) Drilling of doublers, figure 402).
- (a) Position the internal doubler on the panel.
Centre mark the positions of the four corner holes on the doubler (on forward frame and longitudinal angle bars).
- (b) Remove doubler and drill the four holes dia.
 $3 \pm 0,1 \text{ mm}$ ($0.114 - 0.122 \text{ in.}$) in it and deburr.
- (c) Offer the doubler up to the panel and check the alignment of the holes. If necessary, rework the doubler until alignment is correct.
- (d) Remove the internal doubler. Bore the two forward holes marked "L" and "N", dia. $5,05 + 0,08$ mm ($0.199 - 0.202 \text{ in.}$) ; and the two rear holes, dia. $4,83 + 0,1$ mm ($0.190 - 0.194 \text{ in.}$). Rebore the hole on the panel marked "N", dia. $5,05 \text{ mm}$ (0.199 in.).
- (e) Pin the doubler in position on the panel using the four holes. Centre mark the positions of all the other holes on the doubler.
- (f) Remove the doubler ; drill all the holes, dia. $3 \pm 0,1 \text{ mm}$ ($0.114 - 0.122 \text{ in.}$) and deburr.
- (g) Pin doubler in position on the panel and check the alignment of the holes. If necessary, rework the doubler until alignment is correct.
- (h) Remove the doubler and bore :
- 1 Holes marked "F", "G", "H", dia. $4,17 + 0,1$ mm ($0.164 - 0.168 \text{ in.}$).
- 2 Holes marked "D", "E", "J", dia. $4,83 + 0,1$ mm ($0.190 - 0.194 \text{ in.}$).
- 3 Hole marked "M", dia. $5,05 + 0,08$ mm ($0.199 - 0.202 \text{ in.}$).
- Deburr.

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- (j) Pin doubler in position on the panel. On the doubler and panel, counterdrill the holes marked "A" and "C", dia. $4,17 + 0,1 \text{ mm}$ ($0.164 - 0.168 \text{ in.}$).
- (k) Position the internal foil on the panel. Centre mark the positions of attachment holes on the foil.
- (l) Remove the foil and drill the holes marked "A" and "G", dia. $4,17 + 0,1 \text{ mm}$ ($0.164 - 0.168 \text{ in.}$) and deburr.
- (m) Position the external doublers on the panel. Centre mark the positions of attachment holes on the doublers.
- (n) Remove doublers. Drill all the holes dia. $3 \pm 0,1 \text{ mm}$ ($0.114 - 0.112 \text{ in.}$) and deburr.
- (o) Position the doublers and check alignment of holes. If necessary, rework until alignment is correct.
- (p) Remove and on the doublers, bore
- 1 Holes marked "A" - "C" - "G" - "H", dia. $4,17 + 0,1 \text{ mm}$ ($0.164 - 0.168 \text{ in.}$).
 - 2 Holes marked "D" - "E", dia. $4,83 + 0,1 \text{ mm}$ ($0.190 - 0.194 \text{ in.}$).
- (q) Position external foils on panel. Centre mark positions of attachment holes.
- (r) Remove foils and drill attachment holes, dia. $4,17 + 0,1 \text{ mm}$ ($0.160 - 0.164 \text{ in.}$) in them. Deburr.
- (s) On the panel, rebore the holes for passage of spacers, dia. $5,5 + 0,1 \text{ mm}$ ($0.216 - 0.220 \text{ in.}$).

NOTE : Do not pierce the inner skin of the panel.



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(5) Installation of doublers.

- (a) Fit spacers 002-003-992-1 in holes "A" and 002-003-992-3 in holes "C" with loctite 307 (P 502) in order to hold them in place during installation of attachment fittings.
 - (b) Pin the foils and doublers in position on the panel.
 - (c) Install the assembly as indicated in figure 402 and in the following standard practices :
 - 1 chapter 70-50-60 for attachment fittings "L"-
"M"- "N"
 - 2 chapter 70-50-40 for other attachment fittings.
- NOTE : In the rear part, those attachment fittings not bearing on the internal doubler are installed with a thrust washer as indicated figure 402, sheet 5/6
- (d) Check the installation of fitting attachments according to standard practices, chapters 70-50-84 and 70-50-86.

C. Repair of delaminations in zone 3. Figure 404.

(1) Removal of existing fitting attachment.

- (a) Remove fitting attachments from the panel as indicated by figure 404 and in the following chapters of standard practices :
 - 1 chapter 70-50-30 for attachment fittings "D"-
"E"- "N"
 - 2 chapter 70-50-40 for attachment fittings "G"-
"F"- "J"- "H"
 - 3 chapter 70-50-60 for attachment fittings "L"-
"M"

(2) Location of attachment holes for doublers.

- (a) Lightly rub the internal panel of the barrel with a very fine emery cloth until the cellular structure of the zone to be repair appears.

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- (b) Centre mark the positions of holes marked "A" and "C" (see figure 404). Drill these holes in the panel, dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) and deburr.

NOTE : It is essential that each hole be positioned in the centre of a cell.

- (c) Stick stabilene tracing paper to the internal face of the panel. Locate the positions of all attachment holes on the stabilene and trace the outline of internal doubler and foil.

NOTE : Before sticking stabilene sheet in a place, make provision for raised heads of remaining attachment fittings.

- (d) Stick two sheets of stabilene to the inside of the barrel. Indicate the locations of the holes and trace the outline of doublers and foils on the stabilene.

(3) Preparation of doublers and foils.

- (a) From sheet metal Z8 CND 15 (P 3305), thickness 1,2 mm (0.047 in.), cut out :

- 1 Internal doubler, dimensions 495 mm (19.49 in.) x 218 mm (8.58 in.) approx.
- 2 Forward external doubler, dimensions 218 mm (8.58 in.) x 155 mm (6.10 in.) approx.
- 3 Rear external doubler, dimensions 250 mm (9.48 in.) x 195 mm (7.67 in.) approx.

- (b) From sheet metal Z8 CND 15 (P 3305), thickness 1,2 mm (0.047 in.), cut out :

- 1 Internal foil, dimensions 186 mm (7.32 in.) x 190 mm (7.48 in.) approx.
- 2 Forward external foil, dimensions 190 mm (7.48 in.) x 155 mm (6.10 in.) approx.
- 3 Rear external foil, dimensions 212 mm (8.35 in.) x 165 mm (6.49 in.) approx.

- (c) Shape the doublers and foils according to the shape of the panels.

- (d) Stick the stabilene sheet to the side of the internal doubler which will be in contact with the

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panel. Trace the outline of the doubler. On the stabilene sheet, indicate the positions of the holes, dia. 18 mm (0.71 in.), for the passage of fitting attachments not removed, and the positions of the counterbores.

- (e) Stick the other stabilene sheets to the sides of the external doublers which will be in contact with the panels. Perform the same operations for the internal doubler.
 - (f) Machine the outlines of the doublers and radius the ends in contact with the panel as specified in figure 402, sheets 3 and 4.
 - (g) Drill the dia. 18 mm (0.71 in.) holes in the doublers and deburr. Machine the counterbores as specified in figure 402, sheet 3.
 - (h) Stick the stabilene sheets to the side of the foil which will be in contact with the panel. Trace out and then machine the outlines of the foils.
 - (j) Apply heat treatment to doublers according to procedures M 822 and M 821 of chapter 70-45-10 of standard practices.
 - (k) Reshape doublers if necessary.
- (4) Drilling of doublers (figure 402).
- (a) Position internal doubler on panel. Centre mark the positions of four corner holes on the doubler (on forward frame and longitudinal angle bars).
 - (b) Remove the doubler. Drill the four dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) holes in the doubler and deburr.
 - (c) Offer up the doubler to the panel, check alignment of holes. If necessary, rework the doubler until alignment is correct.
 - (d) Remove internal doubler. Drill the two forward holes marked "L" and "N", dia. $5,05 \begin{smallmatrix} + 0,08 \\ + 0 \end{smallmatrix}$ mm (0.199 - 0.202 in.) and the two rear holes, dia. $4,83 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.190 - 0.194 in.).

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- (e) Pin the doubler in position on the panel through the four holes ; centre mark all of the other holes on the doubler.
- (f) Remove the doubler, and drill all dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) holes. Deburr.
- (g) Pin the doubler in position on the panel, and check the alignment of holes. If necessary, re-adjust until alignment is correct.
- (h) Remove doubler. Drill :
- 1 Holes marked "F", "G" and "H", dia. $4,17 + 0,1$ mm (0.164 - 0.168 in.).
 $+ 0$
 - 2 Holes marked "D", "E" and "J", dia. $4,83 + 0,1$ mm (0.190 - 0.194 in.).
 $+ 0$
 - 3 Holes marked "L", dia. $5,05 + 0,08$ mm (0.199 - 0.202 in.).
 $+ 0$
- Deburr.
- (j) Pin doubler to panel. On doubler and panel, counterdrill holes marked "A" and "C", dia. $4,17 + 0,1$ mm (0.164 - 0.168 in.).
 $+ 0$
- (k) Position the internal foil on the panel. Centre mark the positions of the attachment holes on the foil.
- (l) Remove the foil. On the foil, drill the following holes in the positions indicated by figure 404 :
holes "A" and "G", dia. $4,17 + 0,1$ mm (0.164 - 0.168 in.) ; holes "J", dia. $4,83 + 0,1$ mm (0.190 - 0.194 in.) and deburr.
 $+ 0$
- (m) Position external doublers on the panel. Centre mark the positions of attachment holes on the doublers.
- (n) Remove doublers. Drill all dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) holes and deburr.

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(o) Position doublers, check alignment of holes. If necessary, re-adjust until alignment is correct.

(p) Remove. Drill the following holes in the doublers :

1 Holes marked "A"-"C"-"G"-"H", dia.

4,17 $\begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.).

2 Holes marked "D"-"E"-"J", dia. 4,83 $\begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm
(0.190 - 0.194 in.).

Deburr.

(q) Position external foils on the panel. Centre mark attachment holes.

(r) Remove foils. Drill attachment holes dia.

4,17 $\begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.) in the foils
and deburr.

(s) Rebore the holes for the spacers, dia.

5,5 $\begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.216 - 0.220 in.) on the panels.

NOTE : Do not pierce the inner skin of the panel.

(5) Installation of doublers.

(a) Fit spacers 002-003-991-1 in holes "A" and spacers 002-003-992-3 in holes "C" with loctite 307 (P 502) to hold them in place during installation of attachment fittings.

(b) Pin the foils and doublers in position on the panel.

(c) Attach assembly according to figure 402 and the following standard practices :

1 chapter 70-50-60 for attachment fittings "L"-"M"-"N",

2 chapter 70-50-40 for other attachment fittings.

NOTE : In the rear part, attachment fittings not bearing on the internal doubler are installed with a thrust washer as indicated in figure 402, sheet 5/6.

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- (d) Check the installation of attachment fittings according to procedures specified in chapters 70-50-84 and 70-50-86 of standard practices.

D. Repair of delaminations in zone 4. Figure 406.

(1) Removal of existing fitting attachments.

- (a) Remove fitting attachments from panel according to procedure specified in figure 406 and in the following standard practices :

- 1 chapter 70-50-30 for fitting attachments marked "D"- "E"- "J"- "N"
- 2 chapter 70-50-40 for fitting attachments marked "G"- "J"- "H"
- 3 chapter 70-50-60 for fitting attachments marked "L"- "M"

(2) Location of attachment holes for doublers.

- (a) Lightly rub the internal panel of the barrel with a very fine emery cloth until the cellular structure of the zone to be repaired is visible.
- (b) Centre mark positions of holes "A" and "C" (see figure 406) on the panel. Drill these holes, dia. $3 \pm 0,1$ mm (0.114 - 0.112 in.) in the panel and deburr.

NOTE : It is essential that each hole be placed in the centre of a cell.

- (c) Stick two stabilene tracing sheets to the inside face of the panel. On the stabilene sheets, locate the positions of all the attachment holes, trace the outline of the internal doublers and foils.

NOTE : Before sticking the stabilene sheets, make provision for the raised heads of fitting attachments not removed.

- (d) Stick two sheets of stabilene tracing paper to the inside of the barrel. On the stabilene sheets, locate the positions of the holes and trace the outlines of the external doublers and foils.

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(3) Preparation of doublers and foils.

- (a) From sheet metal Z8 CND 15 (P 3305), thickness 1,2 mm (0.047 in.), cut out :
 - 1 Forward external doubler, dimensions 215 mm (8.46 in.) x 185 mm (7.28 in.) approx.
 - 2 Rear external doubler, dimensions 225 mm (8.86 in.) x 188 mm (7.40 in.) approx.
 - 3 Forward internal doubler, dimensions 215 mm (8.56 in.) x 180 mm (7.08 in.) approx.
 - 4 Rear internal doubler, dimensions 280 mm (11.02 in.) x 215 mm (8.46 in.).
- (b) From sheet metal Z8 CND 15 (P 3305), thickness 0,3 mm (0.012 in.), cut out the rear external foil, dimensions 165 mm (6.50 in.) x 160 mm (6.3 in.) approx.
- (c) Shape the doublers and foils according to the shape of the panel.
- (d) Stick the stabilene sheets onto the side of the internal doublers which will be in contact with the panel. Trace the outline of the doublers. On the doublers, locate the positions of the holes, dia. 18 mm (0.71 in.) for the passage of fitting attachments not removed. Indicate the positions of the counterbores.
- (e) Stick the other stabilene tracing sheets to the side of the external doublers which will be in contact with the panel. Perform the same operation for the internal doublers.
- (f) Machine the outlines of the doublers and radius the ends in contact with the panel according to figure 402, sheets 3 and 4.
- (g) Drill the holes, dia. 18 mm (0.71 in.) in the doublers. Machine counterbores according to figure 402, sheet 3. Deburr.
- (h) Stick stabilene tracing sheets to the side of the foils which will be in contact with the panel. Trace the outline of the foils and then machine.
- (j) Apply heat treatment to doublers according to procedures M 822 and M 821 of chapter 70-45-10 of standard practices.

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- (k) Reshape doublers if necessary.
- (4) Drilling of doublers (figure 402).
- (a) Position internal doublers on the panel. Centre mark attachment holes on the doublers.
- (b) Remove doublers. Drill the holes, dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) and deburr.
- (c) Offer the doublers up to the panel and check the alignment of holes. If necessary, rework doublers until alignment is correct.
- (d) Remove doublers. Drill as follows :
- 1 Holes "D" and "J", dia. $4,83 + 0,1$ mm (0.190 - 0.194 in.).
- 2 Holes "L", "M", "N", dia. $5,05 + 0,08$ mm (0.199 - 0.202 in.).
- Rebore hole "N" on panel, to dia. 5,05 mm (0.199 in.).
- (e) Pin doublers on the panel. Counterdrill holes marked "A" and "C", dia. $4,17 + 0,1$ mm (0.164 - 0.168 in.) in doublers and panel. Deburr.
- (f) Position external doublers on the panel. Centre mark positions of attachment holes on these doublers.
- (g) Remove the doublers. Drill holes dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.). Deburr.
- (h) Position the doublers and check alignment of holes. If necessary, re-adjust until alignment is correct.
- (j) Remove doublers and drill the following :
- 1 Holes "A"- "C"- "G"- "H", dia. $4,17 + 0,1$ mm (0.164 - 0.168 in.).



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2 Holes "D"-"E"-"J", dia. $4,83 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.190 - 0.194 in.).

Deburr.

(k) Position external foil on panel. Centre mark positions of attachment holes.

(l) Remove foil and drill holes dia. $4,17 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.). Deburr.

(m) On the panel, rebore the holes for the spacers, dia. $5,5 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.216 - 0.220 in.).

NOTE : Do not pierce the internal skin of the panel.

(5) Installation of doublers.

(a) Install spacers 002-003-992-1 in holes "A" and spacers 002-002-992-3 in holes "C", with loctite 307 (P 502) to hold fitting attachments in place.

(b) Pin the foils and doublers in position on the panel.

(c) Attach the assembly according to the procedure specified in figure 402 and the following standard practices :

1 chapter 70-50-60 for fitting attachments "L"-"M"-"N",

2 chapter 70-50-40 for other fitting attachments

NOTE : On the rear part, fitting attachments not bearing directly on the internal doubler are fitted with a thrust washer as indicated in figure 402 sheet 5/6.

(d) Check the installation of fitting attachments according to procedure given in chapters 70-50-84 and 70-50-86 of standard practices.

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E. Repair of delamination in zone 2. Figure 408.

(1) Removal of existing fitting attachments.

- (a) Remove fitting attachments from panel according to procedure specified in figure 408 and in the following chapters of standard practices :

- 1 chapter 70-50-40 for fitting attachments marked "F" and "G"
- 2 chapter 70-50-60 for fitting attachments marked "L"

(2) Location of the position of attachment holes for doublers.

- (a) Lightly rub the internal panel of the barrel with a very fine emery cloth until the cellular structure of the zone to be repaired is visible.
- (b) Centre mark the positions of holes "A" and "B" on the panel (see figure 408). Drill these holes in the panel, dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) and deburr.

NOTE : It is essential that each hole be located in the middle of a cell.

- (c) Stick two sheets of stabilene tracing paper to the inside of the bucket. On these stabilene sheets, locate the positions of the holes and trace the outlines of external doublers and foils.

(3) Preparation of doublers and foils.

- (a) From sheet metal Z8 CND 15 (P 3305), thickness 1,2 mm (0.047 in.), cut out :
- 1 the internal doubler, dimensions 420 mm (16.53 in.) x 275 mm (10.82 in.) approx. These dimensions are greater than those of the finished doubler.
 - 2 The forward external doubler, dimensions 265 mm (10.43 in.) x 150 mm (5.90 in.) approx.
 - 3 The rear external doubler, dimensions 210 mm (8.26 in.) x 170 mm (6.69 in.) approx.

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- (b) From sheet metal Z8 CND 15 (P 3305), thickness 0,3 mm (0.012 in.), cut out :
 - 1 The forward internal foil, dimensions 265 mm (10.43 in.) x 145 mm (5.71 in.) approx.
 - 2 The rear external foil, dimensions 135 mm (5.31 in.) x 90 mm (3.53 in.).
- (c) Shape the doublers and foils according to the outline of the panel.
- (d) Centre mark and drill openings, dia. 18 mm (0.71 in.) in internal doubler (see figure 408) and counterbores in compliance with figure 403 (sheet 3).
- (e) Stick the stabilene sheets to the sides of the external doublers which will be in contact with the panel. Perform the same operations as for internal doubler.
- (f) Machine the outline of the doublers and radius the ends in contact with the panel as specified in figure 402 sheet 4/6.
- (g) Stick the stabilene sheets to the sides of the foils which will be in contact with the panel. Trace out and then machine the outlines of the foils.
- (h) Apply a heat treatment to the doublers according to procedures M 822 and M 821 of chapter 70-45-10 of standard practices.
- (j) Reshape doublers if necessary.
- (4) Drilling of the doublers (figure 408).
 - (a) Position the internal doubler on the panel. Centre mark the positions of holes "F"-"G"-"L" on the doubler.
 - (b) Remove the doubler. Drill the marked holes, dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) and deburr.

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- (c) Offer up the internal doubler to the panel and check alignment of the holes. If necessary, rework until alignment is correct.
- (d) Remove the doubler. On the doubler, rebore :
- 1 the holes "F" and "G", dia. $4,17 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.).
 - 2 the holes "L", dia. $5,05 \begin{smallmatrix} + 0,08 \\ + 0 \end{smallmatrix}$ mm (0.199 - 0.202 in.).
- Deburr.
- (e) Pin the doubler to the panel using holes already drilled. Centre mark the positions of holes "A"- "B"- "C" on the doubler.
- (f) Remove the doubler. Drill holes "A"- "B"- "C", dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) in the internal doubler and deburr.
- (g) Pin the doubler to the panel, check alignment of holes. If necessary, rework until alignment is correct.
- (h) In the panel and internal doubler assembly, drill the holes "A"- "B"- "C", dia. $4,17 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.) and deburr.
- (j) Machine internal doubler to its final dimensions as indicated by figure 409, sheet 3 and figure 402, sheets 3 and 4.
- (k) Stick the stabilene sheets to the sides of the external doublers which will be in contact with the panel. Centre mark the positions of attaching holes on the doublers.
- (l) Drill holes "A"- "B"- "C", dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) in the external doublers and deburr.

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- (m) Position the doublers on the panel. Check alignment of holes. If necessary, rework until alignment is correct.
 - (n) Remove external doublers. Drill holes "A"- "B"- "C",
dia. $4,17 + 0,1$ mm (0.164 - 0.168 in.) and
 $+ 0$
deburr.
 - (o) Stick the stabilene sheets to the sides of the foils which will be in contact with the panels. Repeat the operations (k)-(l)-(m)-(n) on the foils.
 - (p) Rebore the holes for spacers, dia. $5,5 + 0,1$ mm
 $+ 0$
(0.216 - 0.220 in.).
- (5) Installation of doublers.
- (a) Install spacers 002-003-992-1 in holes marked "A", spacers 002-003-992-2 in holes "B" and spacers 002-003-992-3 in holes "C", with loctite 307 (P 502) to hold them in place during installation of fitting attachments.
 - (b) Pin the foils and doublers in position on the panel.
 - (c) Install the assembly according to procedure indicated in figure 402 and in the following chapters of standard practices :
 - 1 chapter 70-50-60 for fitting attachments "L"
 - 2 chapter 70-50-40 for other fitting attachments.
 - (d) Check the installation of fitting attachments according to procedures in chapters 70-50-84 and 70-50-86 of standard practices.

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F. Repair of delamination in zone 5 - Figure 410.

(1) Removal of existing fittings.

- (a) Remove fitting attachments from the panel according to figure 410 and to the procedures specified in the following chapters of standard practices :

- 1 chapter 70-50-40 for fitting attachments marked "F"-"G"-"K"
- 2 chapter 70-50-60 for fitting attachments marked "L"

(2) Location of attachment holes for doublers.

- (a) Lightly rub the panel inside the barrel with very fine emery cloth until the cellular structure of the zone to be repaired is visible.
- (b) Centre mark the positions of holes "A"-"B"-"C" (see figure 402). Drill these holes, dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) in the panel and deburr.

NOTE : It is essential that each hole be located in the centre of a cell.

- (c) Stick stabilene tracing paper to the inside face of the panel. On the stabilene, locate the positions of all attachment holes and trace the outlines of the internal doubler and foil.

NOTE : Before sticking the stabilene, make provision for the raised heads of fitting attachments not removed.

- (d) Stick two sheets of stabilene to the inside of the barrel. On the stabilene locate the positions of the holes and trace the outlines of external doublers and foils.



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(3) Preparation of doublers and foils.

(a) From sheet metal Z8 CND 15 (P 3305), thickness 1,2 mm (0.047 in.), cut out :

- 1 the internal doubler, dimensions 420 mm (16.53 in.) x 275 mm (10.82 in.) approx. These dimensions are larger than the dimensions of the finished doubler.
- 2 the forward external doubler, dimensions 265 mm (10.43 in.) x 150 mm (5.90 in.) approx.
- 3 the rear external doubler, dimensions 210 mm (8.27 in.) x 170 mm (6.69 in.) approx.

(b) From sheet metal Z8 CND 15 (P 3305), thickness 0,3 mm (0.012 in.), cut out :

- 1 the forward internal foil, dimensions 265 mm (10.43 in.) x 150 mm (5.90 in.) approx.
- 2 the rear external foil, dimensions 135 mm (5.31 in.) x 90 mm (3.54 in.) approx.

(c) Shape the doublers and foils according to the outline of the panel.

(d) Centre mark and drill holes in the internal doubler, dia. 18 mm (0.71 in.), see figure 410. Machine the counterbores as indicated in figure 402 sheet 3.

(e) Stick the stabilene sheets to the sides of the external doublers which will be in contact with the panel. Perform the same operations as for the internal doubler.

(f) Machine the outlines of the doublers and radius the ends in contact with the panel as indicated in figure 402, sheet 4/6.

(g) Stick the stabilene sheets to the side of the foils which will be in contact with the panels. Trace the outlines of the foils and then machine.

(h) Apply a heat treatment to the doublers according to procedures M 822 and M821 of chapter 70-45-10 of standard practices.

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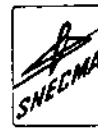
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(4) Drilling of doublers.

- (a) Stick the stabilene sheet for the forward part to the side of the internal doubler which will be in contact with the panel.
- (b) Centre mark the positions of the holes marked "A" on the doubler.
- (c) Drill the holes "A" on the doubler, dia. $2,5 \pm 0,1$ mm (0.094 - 0.102 in.) and deburr.
- (d) Position the internal doubler on the panel and pin it by means of the previously drilled holes. If necessary, rework until alignment is correct.
- (e) Remove the doubler. Bore holes, dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.).
- (f) Pin the internal doubler to the panel. On the internal doubler locate the positions of all the attachment holes.
- (g) Remove the doubler. Drill all the holes dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) and deburr.
- (h) Pin the internal doubler to the panel. Check the alignment of the holes. If necessary, rework until alignment is correct.
- (j) Remove the doubler. Bore :
 - 1 Holes marked "A"- "B"- "C" and "G", dia. $4,17 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.).
 - 2 Holes marked "D", dia. $4,83 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.190 - 0.194 in.).
 - 3 Holes marked "L", dia. $5,05 \begin{smallmatrix} + 0,5 \\ + 0 \end{smallmatrix}$ mm (0.199 - 0.202 in.).Deburr.
- (k) Machine the internal doubler according to figure 402 (sheets 3 and 4), 410 and 411 (sheet 3).



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(l) Stick the stabilene sheets to the sides of the external doublers which will be in contact with the panel. Centre mark the positions of these attachment holes on the doublers.

(m) Drill the holes in the external doublers, dia. $3 \pm 0,1$ mm (0.114 - 0.122 in.) and deburr.

(n) Position the external doublers on the panel. Check alignment of holes. If necessary, rework until alignment is correct.

(o) On the external doubler, bore :

1 Holes marked "A"- "B" and "C", dia. $4,17 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.).

2 Hole marked "K", dia. $4,83 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.190 - 0.194 in.).

Deburr.

(p) Stick the stabilene sheets to the sides of the foils which will be in contact with the panel. Centre mark the positions of attachment holes on the foils.

(q) On the foil, drill :

1 Holes marked "A"- "B" and "C", dia. $4,17 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.).

2 Hole marked "K", dia. $4,83 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.190 - 0.194 in.).

Deburr.

(r) On the panel, drill the holes marked "A"- "B"- "C", dia. $4,17 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.164 - 0.168 in.).
Deburr.

(s) On the panel, bore the holes for the spacers, dia. $5,5 \begin{smallmatrix} + 0,1 \\ + 0 \end{smallmatrix}$ mm (0.216 - 0.220 in.).

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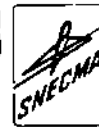
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NOTE : Do not pierce the internal skin of the panel.

(5) Installation of the doublers.

- (a) Install spacers 002-003-992-1 in holes marked "A", spacers 002-003-992-2 in holes marked "B" and 002-003-992-3 in holes marked "C", with loctite 307 (P 502) to hold them in position during installation of fitting attachments.
- (b) Pin the foils and doublers in position on the panel.
- (c) Install the assembly according to figure 410 and to procedures specified in the following standard practices
 - 1 chapter 70-50-60 for fitting attachments marked "L"
 - 2 chapter 70-50-40 for other fitting attachments

NOTE : On the rear part, fitting attachments not bearing on the internal doubler are to be fitted with a thrust washer as indicated in figure 402 sheet 5/6.

- (d) Check the installation of fitting attachments according to chapters 70-50-84 and 70-50-86 of standard practices.

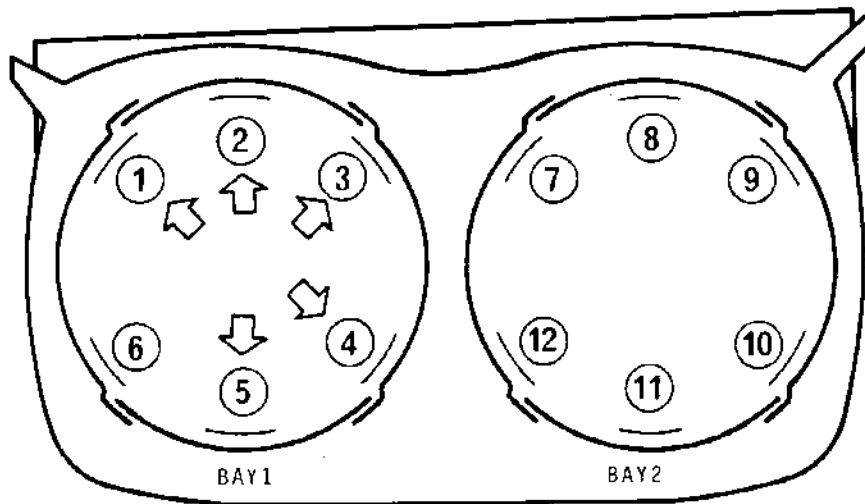


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LEFT NOZZLE REPRESENTED
RIGHT NOZZLE SYMMETRICAL



VIEW FROM REAR

ZONE ① SHOWN IN FIGURE 403	ZONES ⑥ ⑨ ⑩ SIMILAR
ZONE ③ SHOWN IN FIGURE 405	ZONE ⑫ SIMILAR
ZONE ④ SHOWN IN FIGURE 407	ZONE ⑦ SIMILAR
ZONE ② SHOWN IN FIGURE 409	ZONE ⑧ SIMILAR
ZONE ⑤ SHOWN IN FIGURE 411	ZONE ⑪ SIMILAR

Location of Zones to be Repaired
Figure 401

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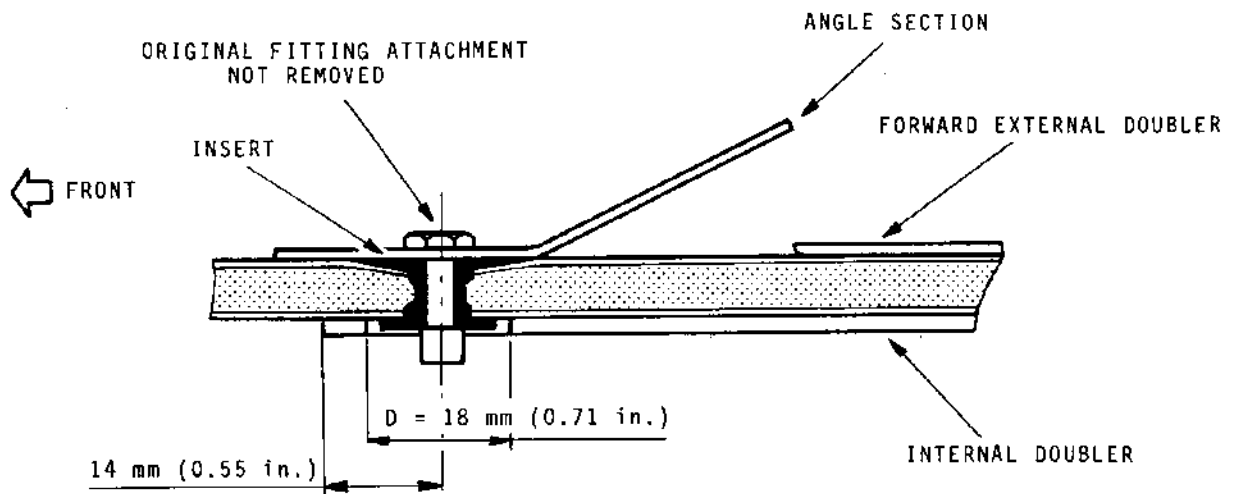


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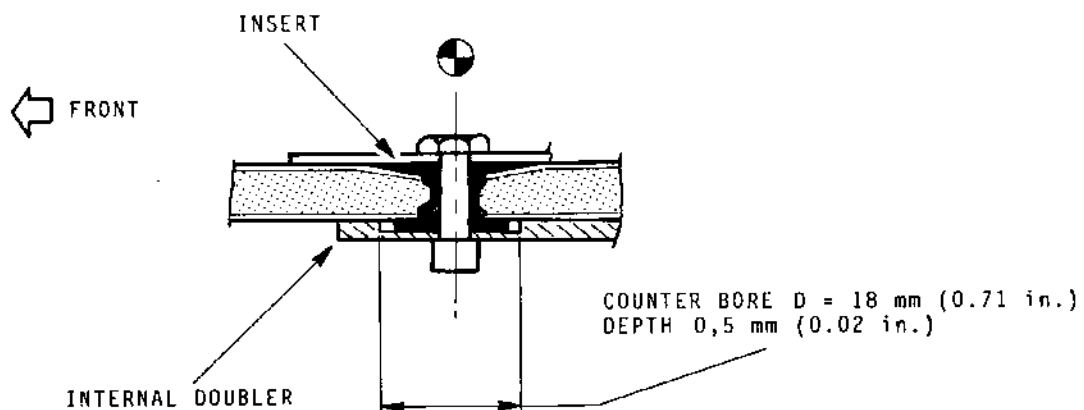


SECTION AA



THESE SECTIONS APPLY TO ALL ZONES OF
FORWARD PART OF INTERNAL DOUBLERS

SECTION BB



FOR DEFINITION OF FITTING ATTACHMENTS SEE SHEET 6 OF 6

Repair of Delaminations in the Pressure Area
Lying Outside of the Panel Suspension
Link Attachment Zones
Figure 402 (Sheet 1 of 4)

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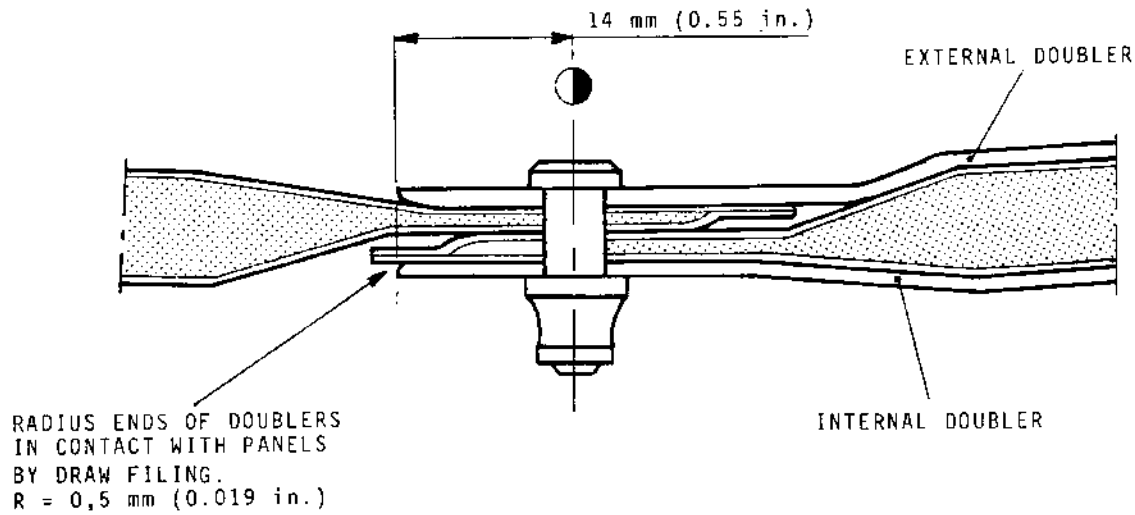


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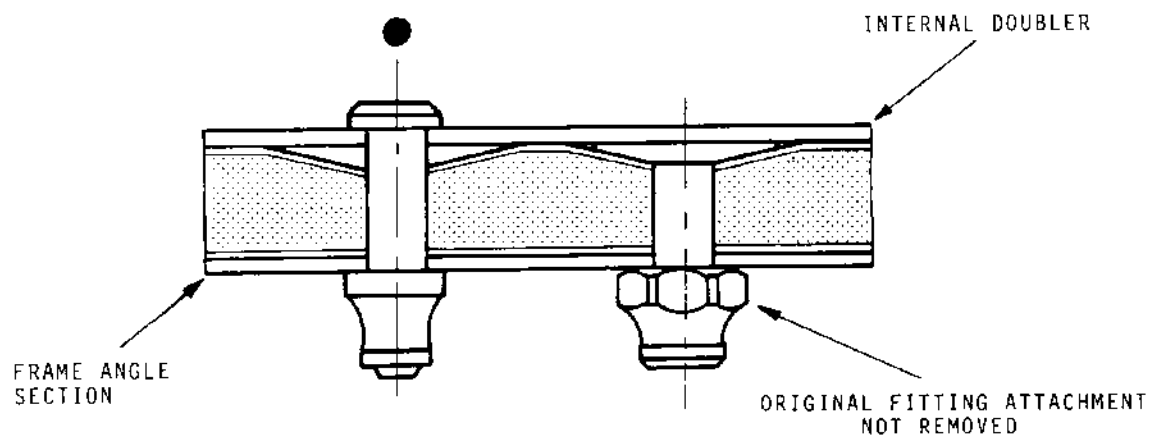


SECTION CC



FOR ATTACHMENT DETAILS, SEE TABLE FIGURE 6/6

SECTION FF



Repair of Delaminations in the Pressure
Area Lying Outside of the Barrel
Suspension Link Attachment Zones
Figure 402 (Sheet 2 of 4)

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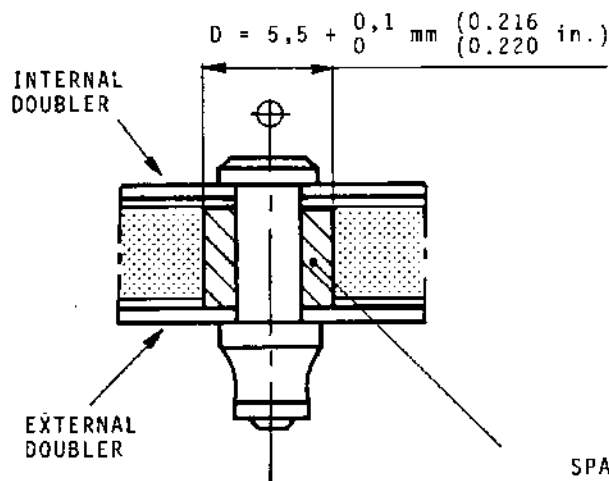
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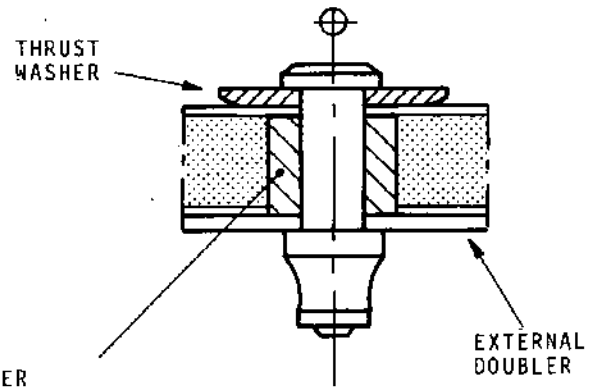


SECTION DD

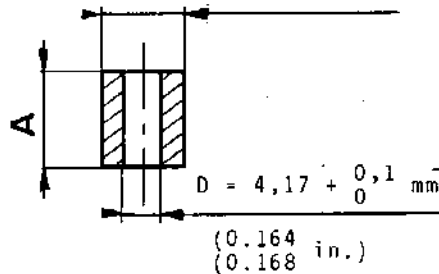
FOR INSTALLATION OF SPACERS



SECTION EE

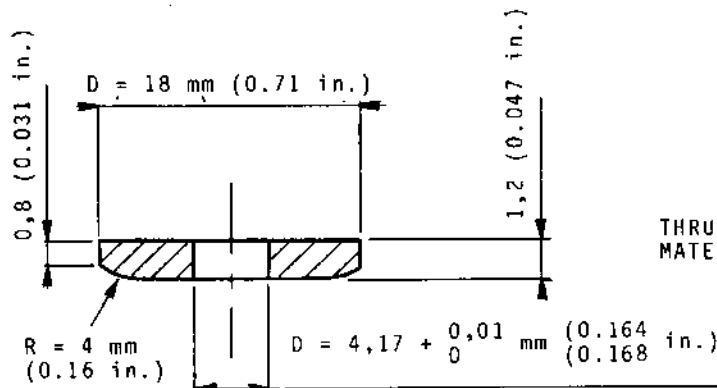


$$D = 5,5 + \frac{0}{-0,1} \text{ mm } (0.212 \text{ in. to } 0.216 \text{ in.})$$



PART N°	A		LOCATION
	mm	in.	
002-003-992-1	$6,45 + \frac{0,05}{-0}$	$(0.254 + \frac{0,002}{-0})$	⊕
002-003-992-2	$6,60 + \frac{0,05}{-0}$	$(0.260 + \frac{0,002}{-0})$	⊕ 1
002-003-992-3	$6,75 + \frac{0,05}{-0}$	$(0.226 + \frac{0,002}{-0})$	⊕ 2

SPACER 002-003-992-X
MATERIAL Z6 NCT 25sv (P3601)



THRUST WASHER 002-003-992-0
MATERIAL Z10 CNT 18 (P3301)

Repair of Delaminations in the Pressure
Area Lying Outside of the Barrel
Suspension Link Attachment Zones
Figure 402 (Sheet 3 of 4)

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SYMBOL	REF. LETTER	DRILLING DIA.		FITTING ATTACHMENT USED
		mm	in.	
	"A"	4,17 + 0,1 + 0	(0.164) (0.168)	HI-LOCK SCREW 40-5-7 HI-LOCK NUT HL 97-5 SPACER 002-003-992-1
1	"B"	4,17 + 0,1 + 0	(0.164) (0.168)	HI-LOCK SCREW 40-5-7 HI-LOCK NUT HL 97-5 SPACER 002-003-992-2
2	"C"	4,17 + 0,1 + 0	(0.164) (0.168)	HI-LOCK SCREW 40-5-7 HI-LOCK NUT 97-5 SPACER 002-003-992-3
	"D"	4,83 + 0,1 + 0	(0.190) (0.194)	HI-LOCK SCREW 40-6-4 OR 6-5 HI LOCK NUT HL 97-6
1	"E"	4,83 + 0,1 + 0	(0.190) (0.194)	HI-LOCK SCREW 40-6-3 OR 6-4 HI-LOCK NUT HL 97-6
2	"F"	4,17 + 0,1 + 0	(0.164) (0.168)	HI-LOCK SCREW 40-5-6 OR 5-7 HI-LOCK NUT 97-5
3	"G"	4,17 + 0,1 + 0	(0.164) (0.168)	HI-LOCK SCREW 40-4-7 HI-LOCK NUT 97-5
4	"H"	4,17 + 0,1 + 0	(0.164) (0.168)	HI-LOCK SCREW 40-5-8 HI-LOCK NUT 97-5
5	"I"	4,83 + 0,1 + 0	(0.190) (0.194)	HI LOCK SCREW 40-6-7 HI-LOCK NUT 97-6
6	"J"	4,83 + 0,1 + 0	(0.190) (0.194)	HI-LOCK SCREW 40-6-6 HI-LOCK NUT 97-6
7	"K"	4,83 + 0,1 + 0	(0.190) (0.194)	HI-LOCK SCREW 40-6-6 HI-LOCK NUT 97-6
8	"L"	5,05 + 0,08 + 0	(0.199) (0.202)	BOLT NAS1671-3L6 OR NAS1671-3L7
9	"M"	5,05 + 0,08 + 0	(0.199) (0.202)	BOLT NAS1671-3L7 OR NAS1671-3L8
10	"N"	5,05 + 0,08 + 0	(0.199) (0.202)	BOLT NAS1671-3L4 OR NAS1671-3L5

Repair of Delaminations in the Pressure
Area Lying Outside of the Barrel
Suspension Link Attachment Zones
Figure 402 (Sheet 4 of 4)

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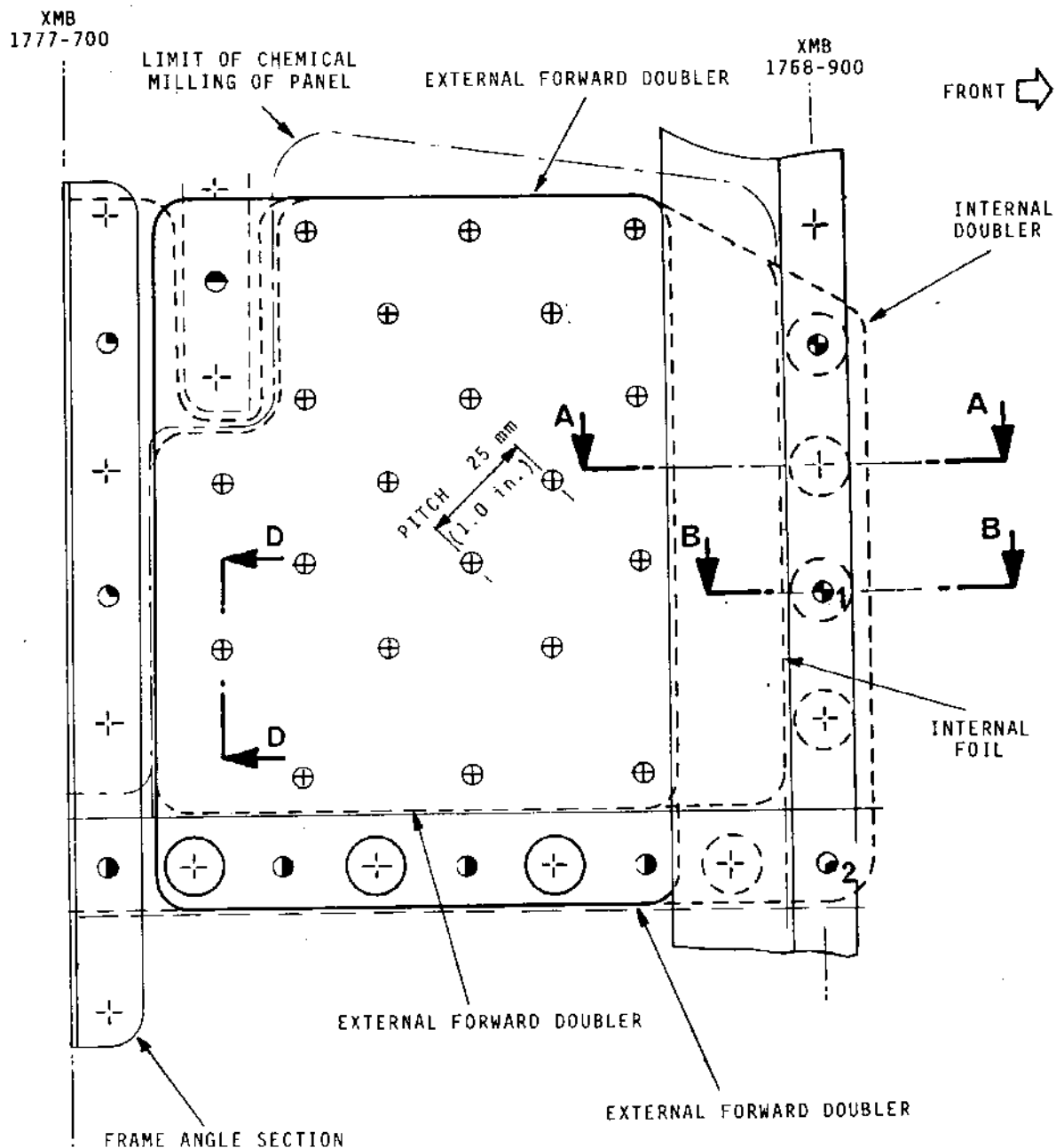


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ZONE ① REPRESENTED (FRONT PART)
VIEWED FROM INTERIOR



FOR DEFINITION OF FITTING ATTACHMENTS SEE FIGURE 402 (SHEET 4 OF 4)

Repair of Delaminations in the Pressure
Area Lying Outside of the Barrel
Suspension Link Attachment Zones
Figure 403 (Sheet 1 of 2)

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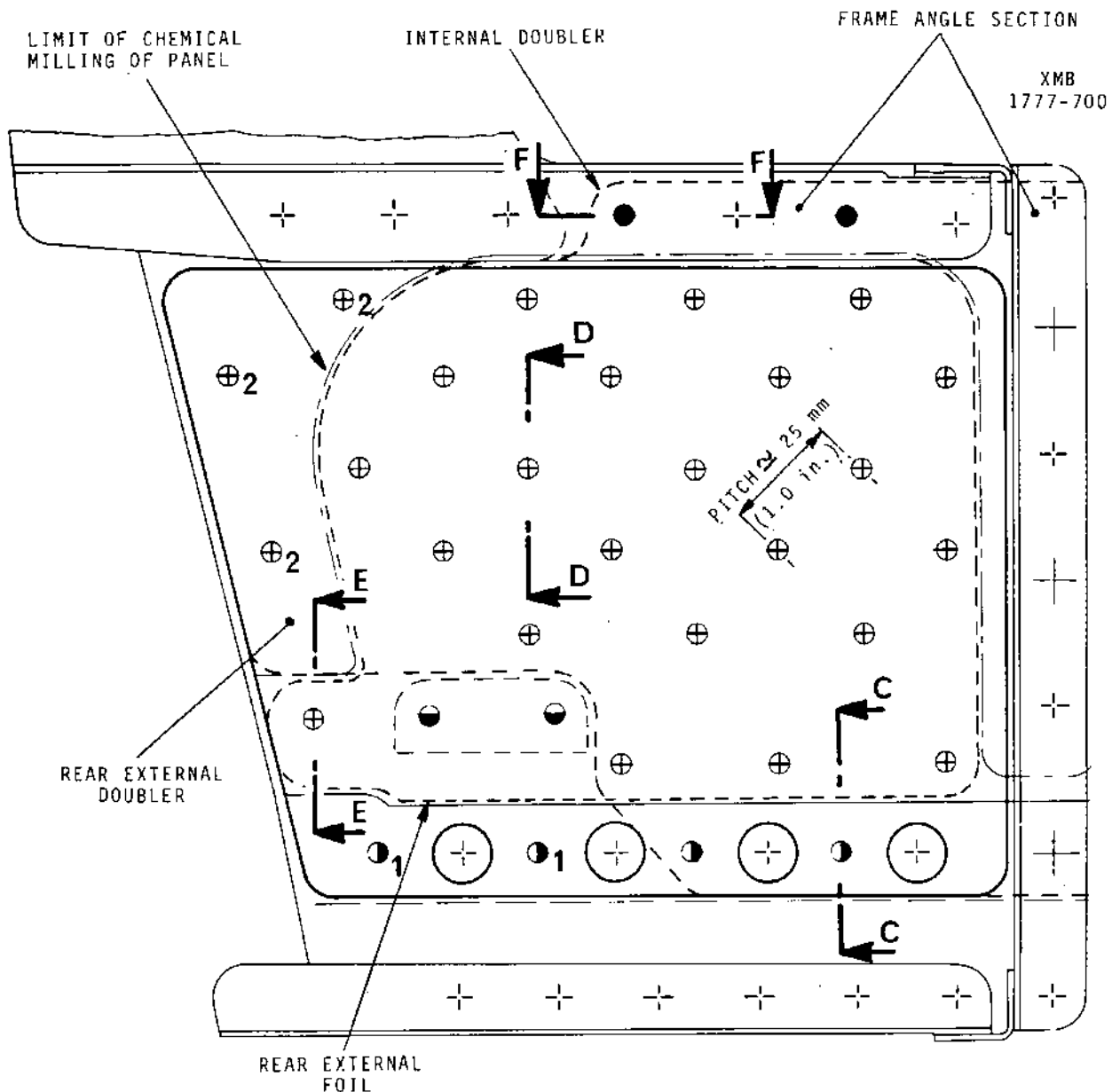
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OVERHAUL



ZONE ① REPRESENTED (REAR PART)
VIEWED FROM INTERIOR

FRONT →



FOR DEFINITION OF FITTING ATTACHMENTS SEE FIGURE 402 (SHEET 4 OF 4)

Repair of Delaminations in the Pressure
Area Lying Outside of the Barrel
Suspension Link Attachment Zones
Figure 403 (Sheet 2 of 2)

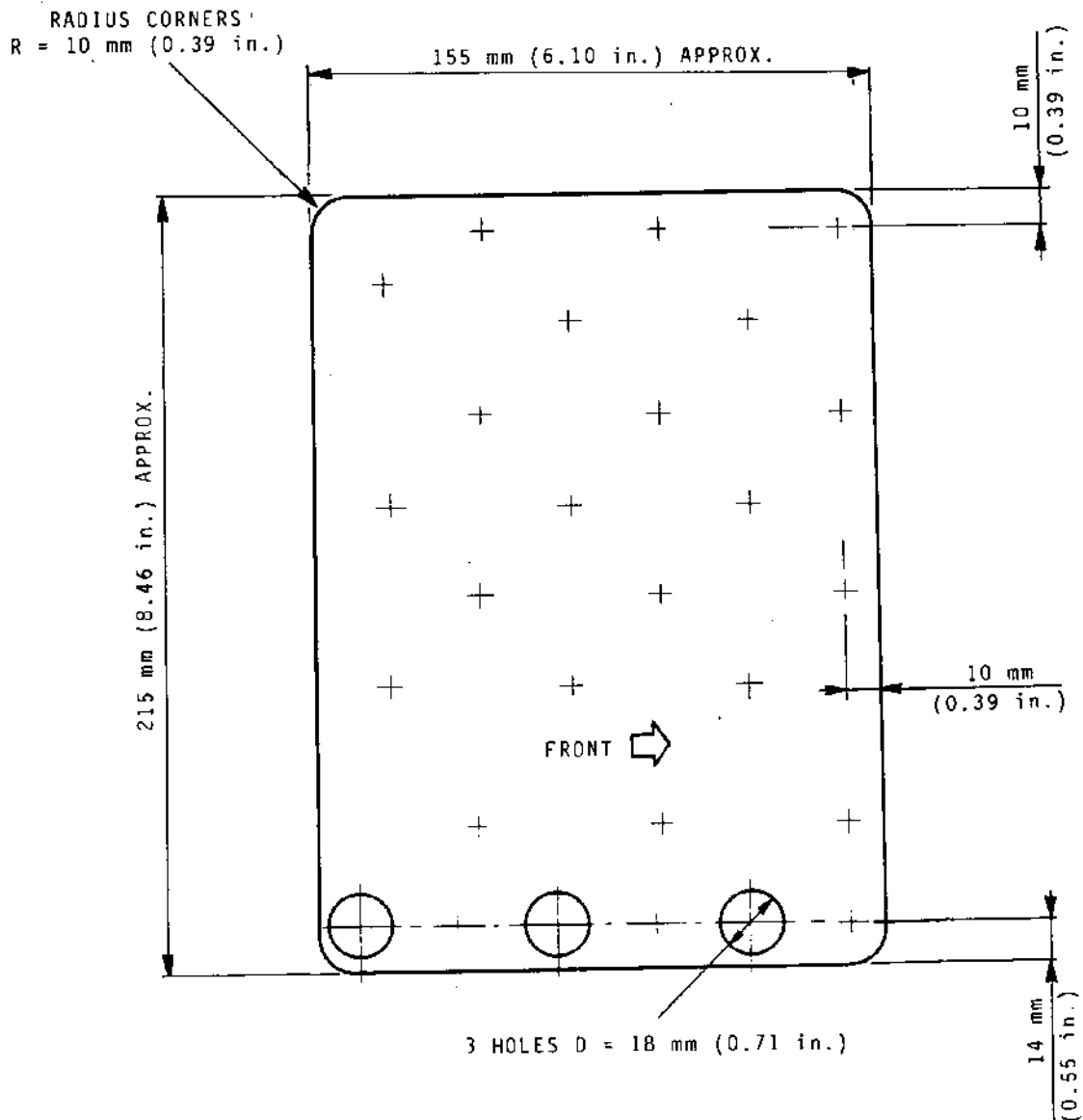
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FORWARD EXTERNAL DOUBLER ZONE (1)

MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 1,2 mm (0.047 in.)
HEAT TREATMENT : M821-822

Manufacturing Details of Doublers (Lateral Wall)
Figure 404 (Sheet 1 of 5)

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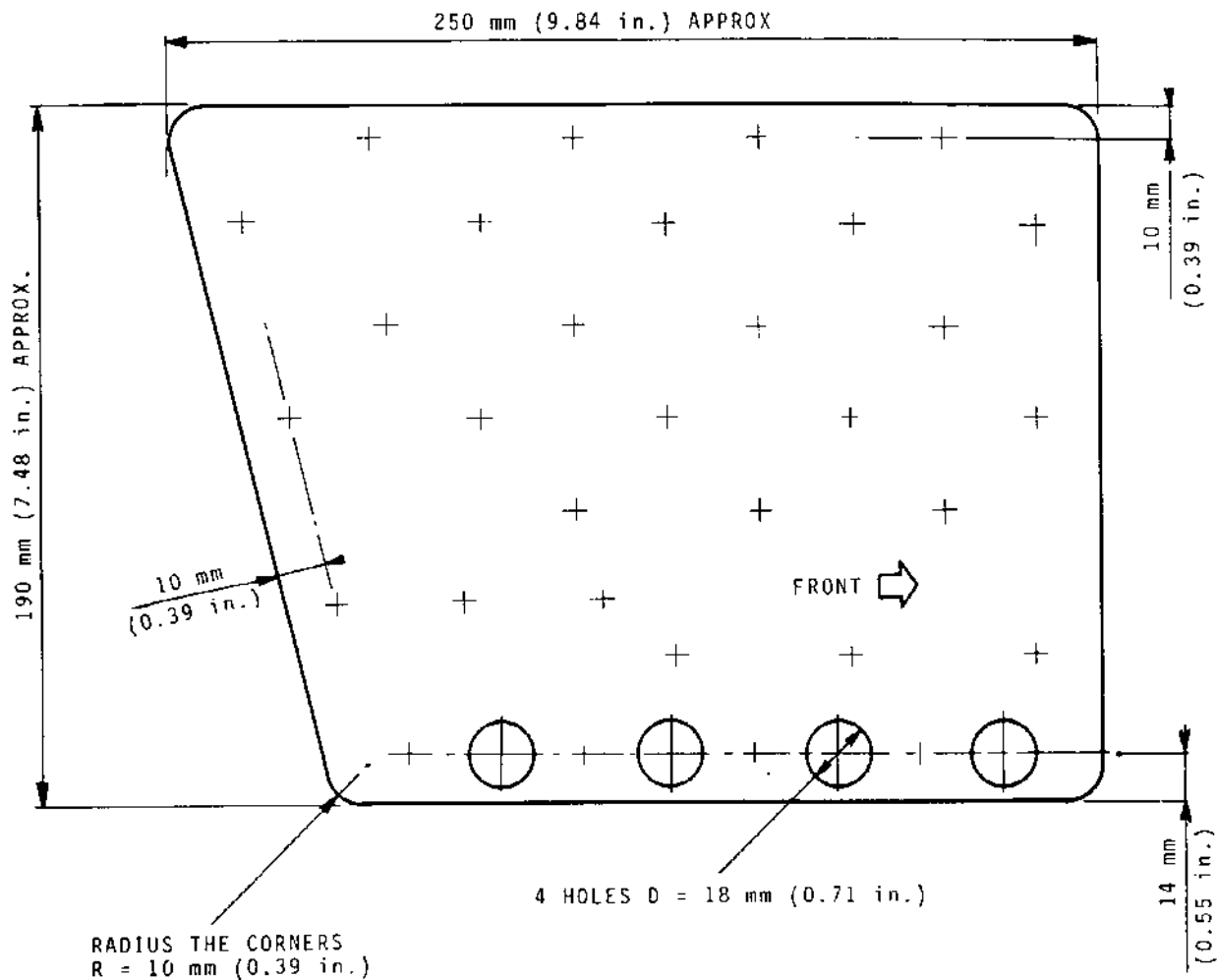
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EXTERNAL DOUBLER ZONE ①
MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 1,2 mm (0.047 in.)
HEAT TREATMENT : M821-822

Manufacturing Details of Doublers (Lateral Wall)
Figure 404 (Sheet 2 of 5)

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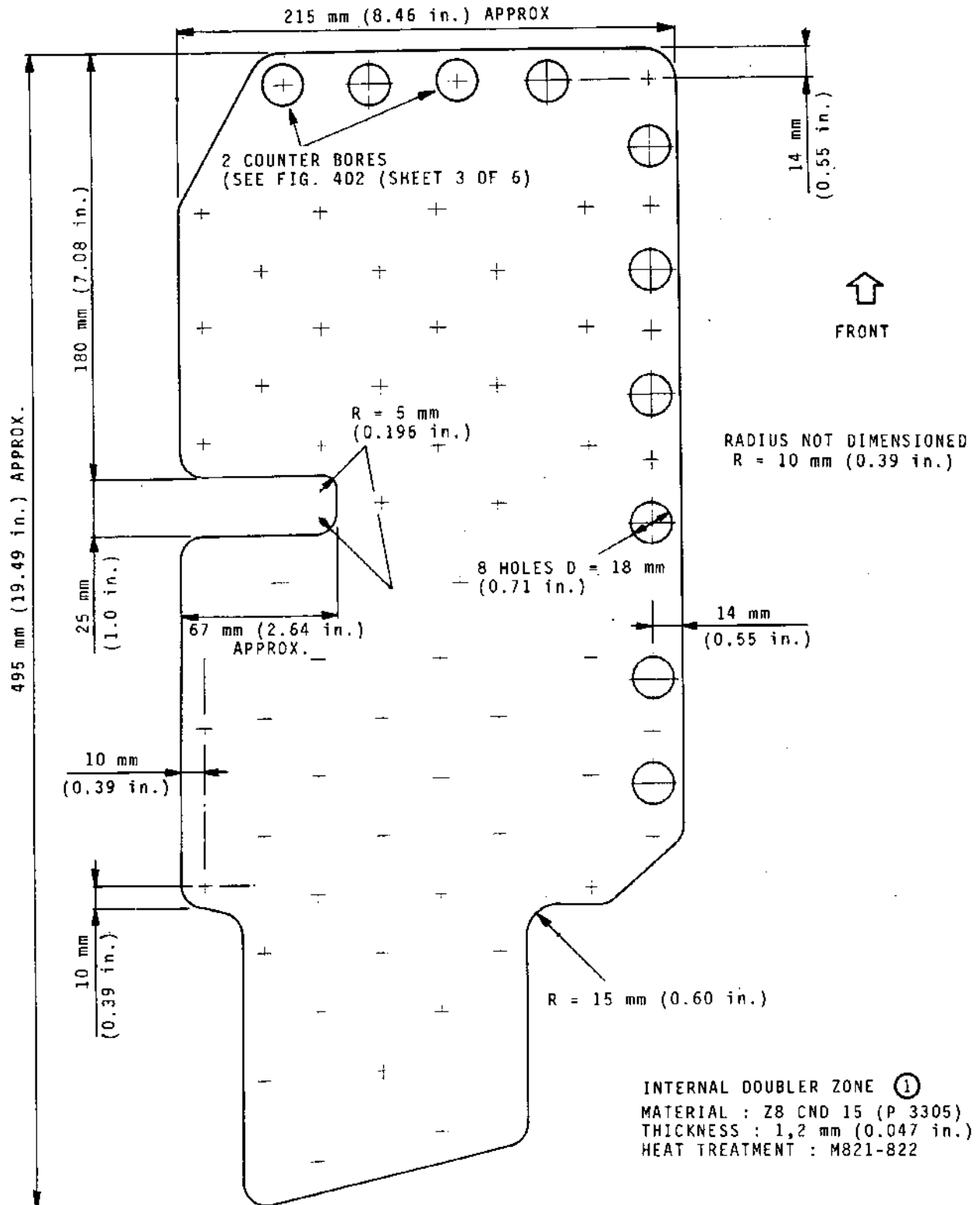
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Manufacturing Details of Doublers (Lateral Wall)
Figure 404 (Sheet 3 of 5)

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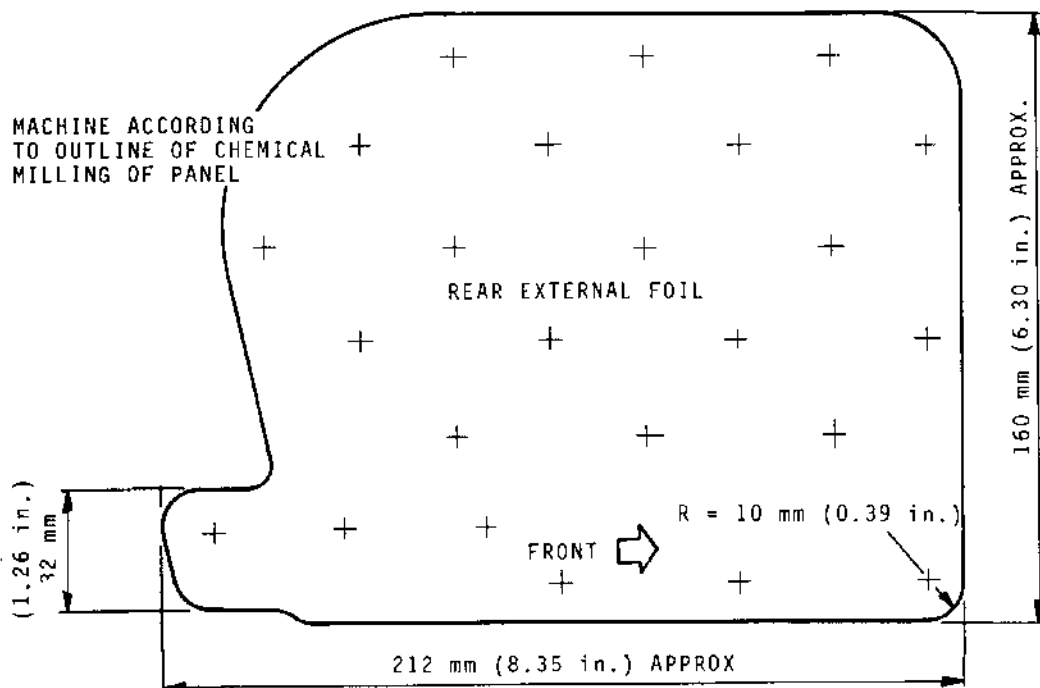


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MK.610-14-28
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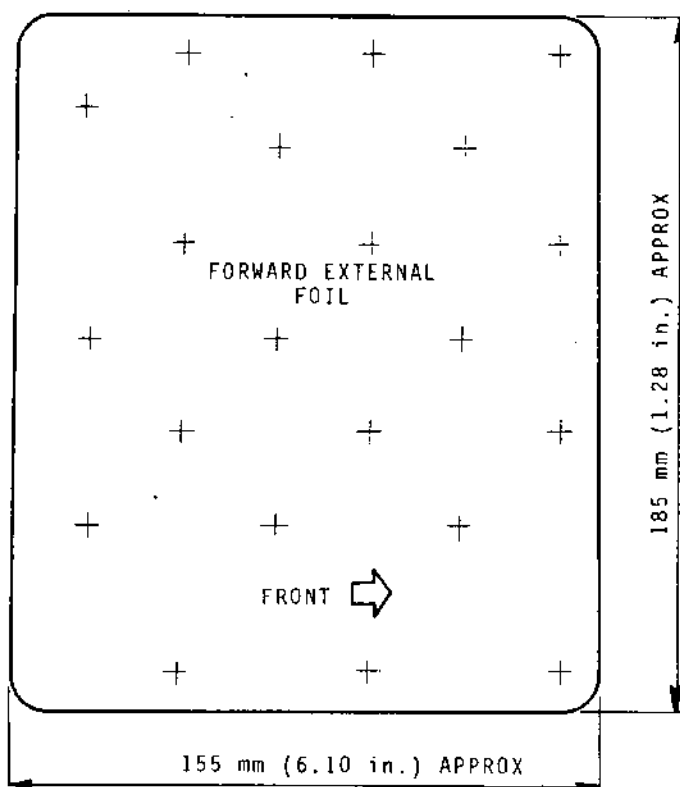
MACHINE ACCORDING
TO OUTLINE OF CHEMICAL
MILLING OF PANEL



FOILS COMPENSATING FOR
CHEMICAL MILLING OF PANEL
ZONE ①

MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 0,3 mm (0.012 in.)

RADIUS THE CORNERS
R = 10 mm (0.39 in.)



Manufacturing Details of Doublers (Lateral Wall)
Figure 404 (Sheet 4 of 5)

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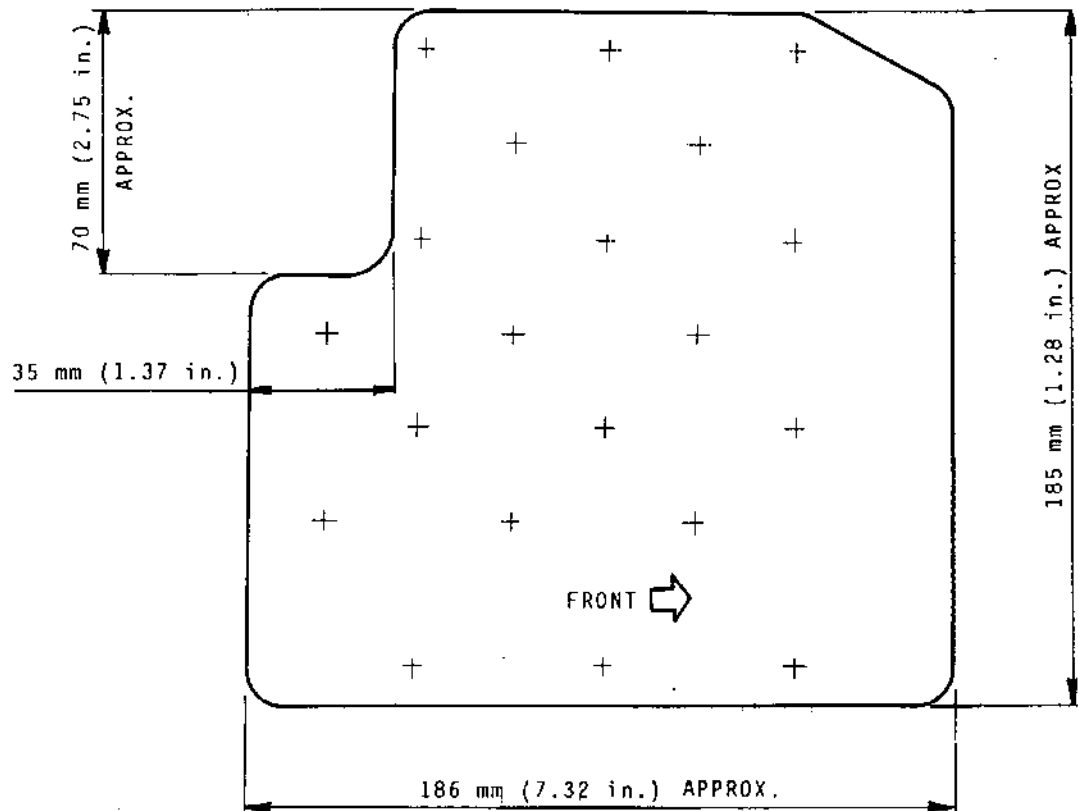
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FOIL COMPENSATING FOR CHEMICAL MILLING OF PANEL
ZONE ① FRONT INTERNAL PART

MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 0,3 mm (0.012 in.)
RADIUS THE CORNER R = 10 mm (0.39 in.)

Manufacturing Details of Doublers (Lateral Wall)
Figure 404 (Sheet 5 of 5)



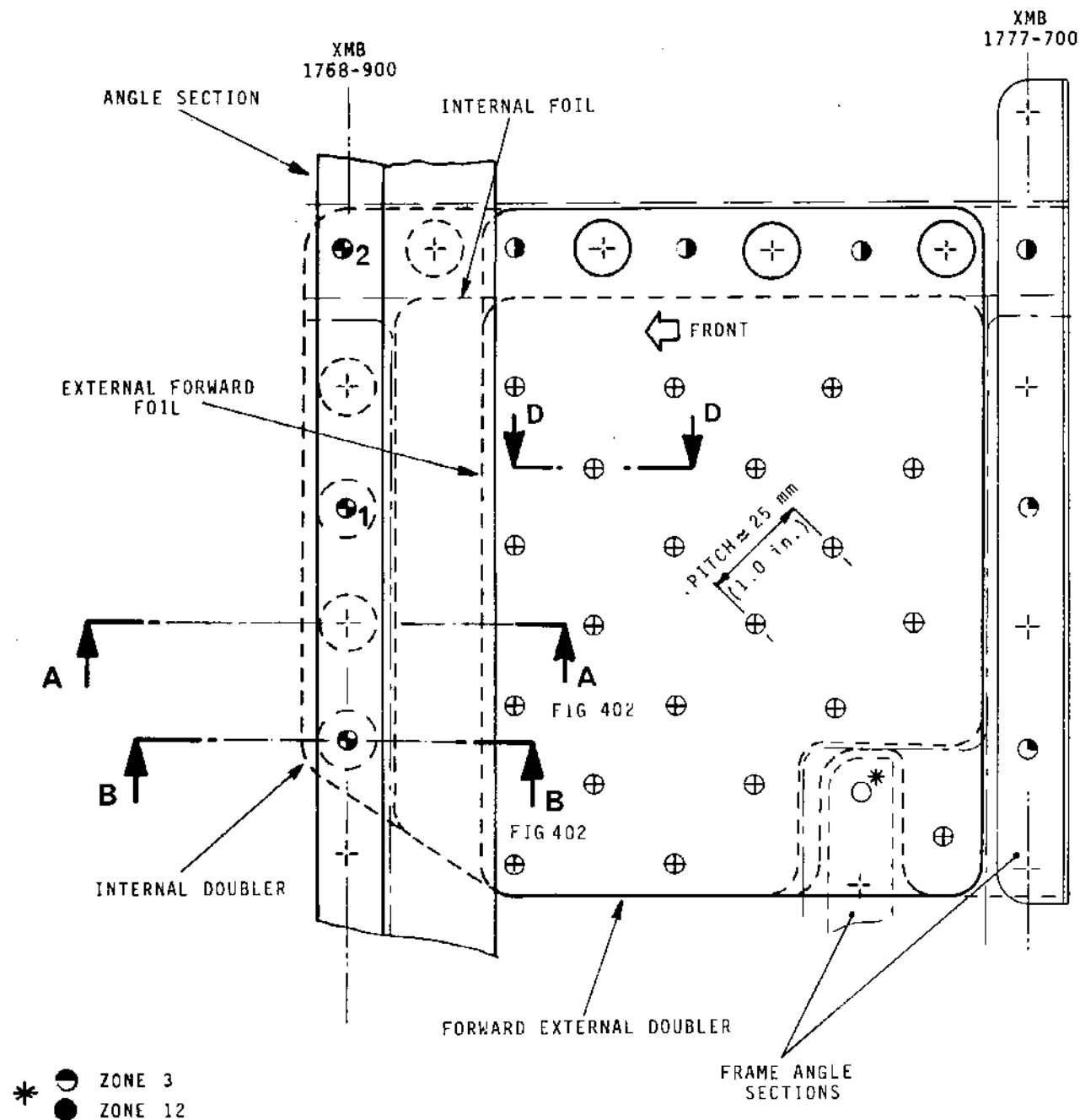
OLYMPUS 593

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OVERHAUL



ZONE ③ REPRESENTED (FRONT PART)
VIEWED FROM INTERIOR



FOR DETAILS OF FITTING ATTACHMENTS SEE FIGURE 402 (SHEET 4 OF 4)

Repair of Delamination in Pressure Area
Lying Outside of the Barrel Suspension
Link Attachment Zones
Figure 405 (Sheet 1 of 2)

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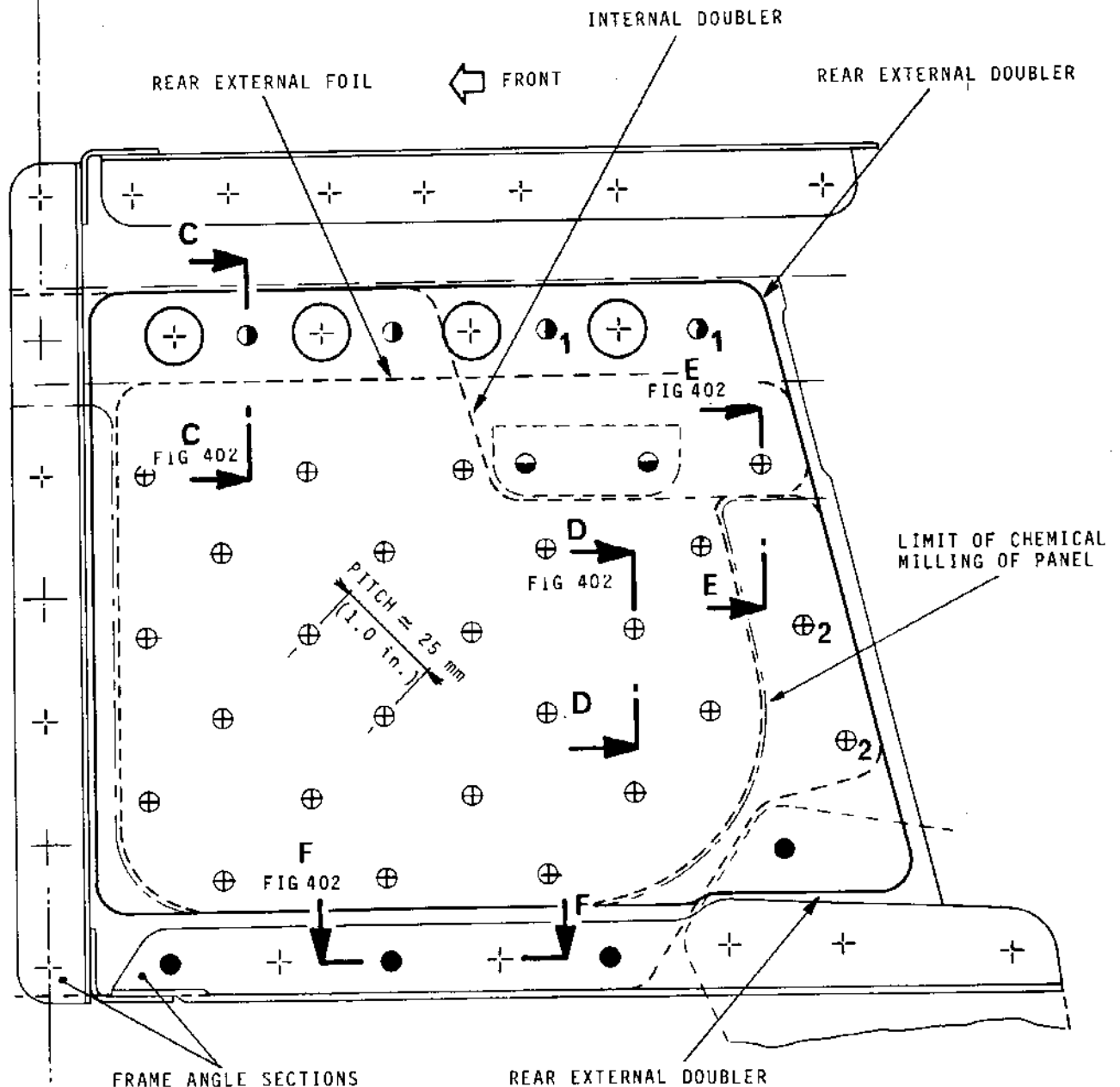
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ZONE ③ REPRESENTED (REAR PART)
VIEWED FROM INTERIOR

XMB
1777-700



FOR DETAILS OF FITTING ATTACHMENTS SEE FIGURE 402 (SHEET 4 OF 4)

Repairs of Delaminations in the Pressure
Zone Lying Outside of the Barrel Suspension
Link Attachment Zones
Figure 405 (Sheet 2 of 2)

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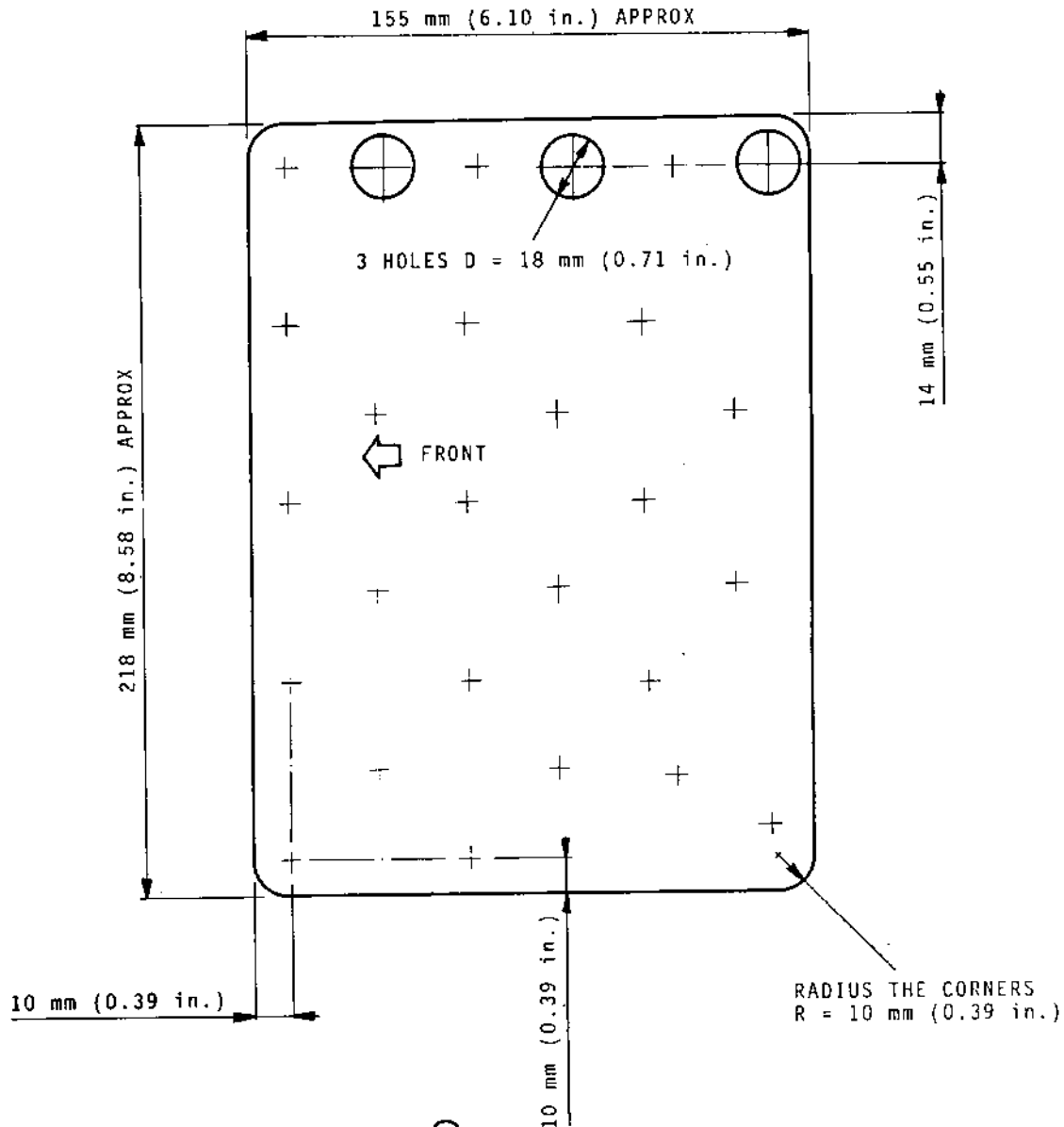
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FORWARD EXTERNAL DOUBLER ZONE ③
MATERIAL : Z8 CND 15 (P3305)
THICKNESS : 1.2 mm (0.047 in.)

HEAT TREATMENT : M 821-822

Manufacturing Detail of Doubless (Central Wall)
Figure 406 (Sheet 1 of 5)

78-13-01

REP 29-190-21

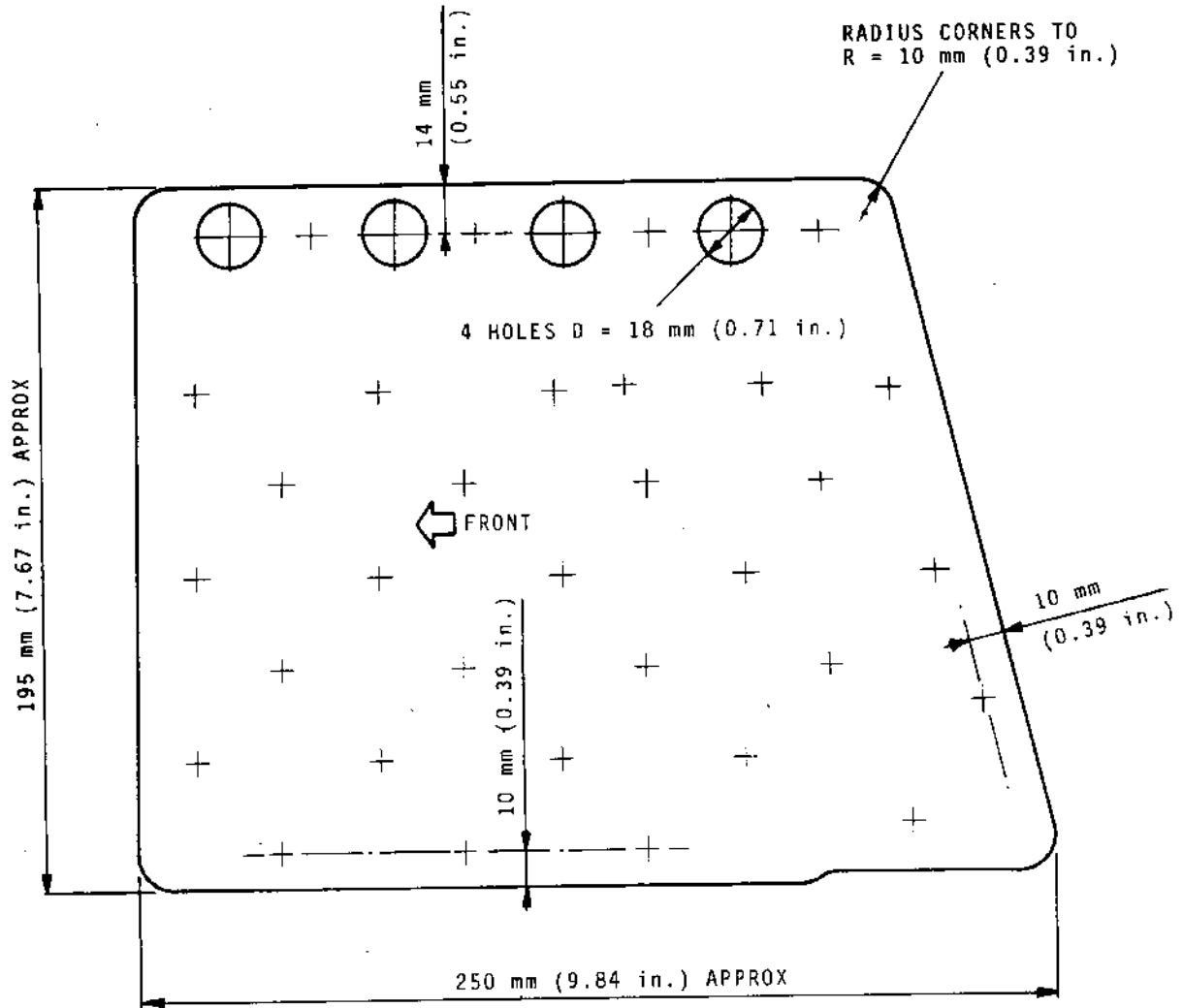
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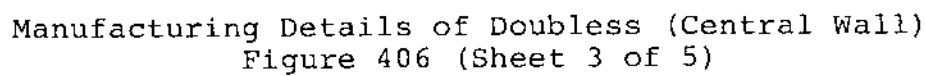
REAR EXTERNAL DOUBLER ZONE (3)
MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 1,2 mm (0.047 in.)

HEAT TREATMENT : M 821-822

Manufacturing Details of Doubless (Central Wall)
Figure 406 (Sheet 2 of 5)

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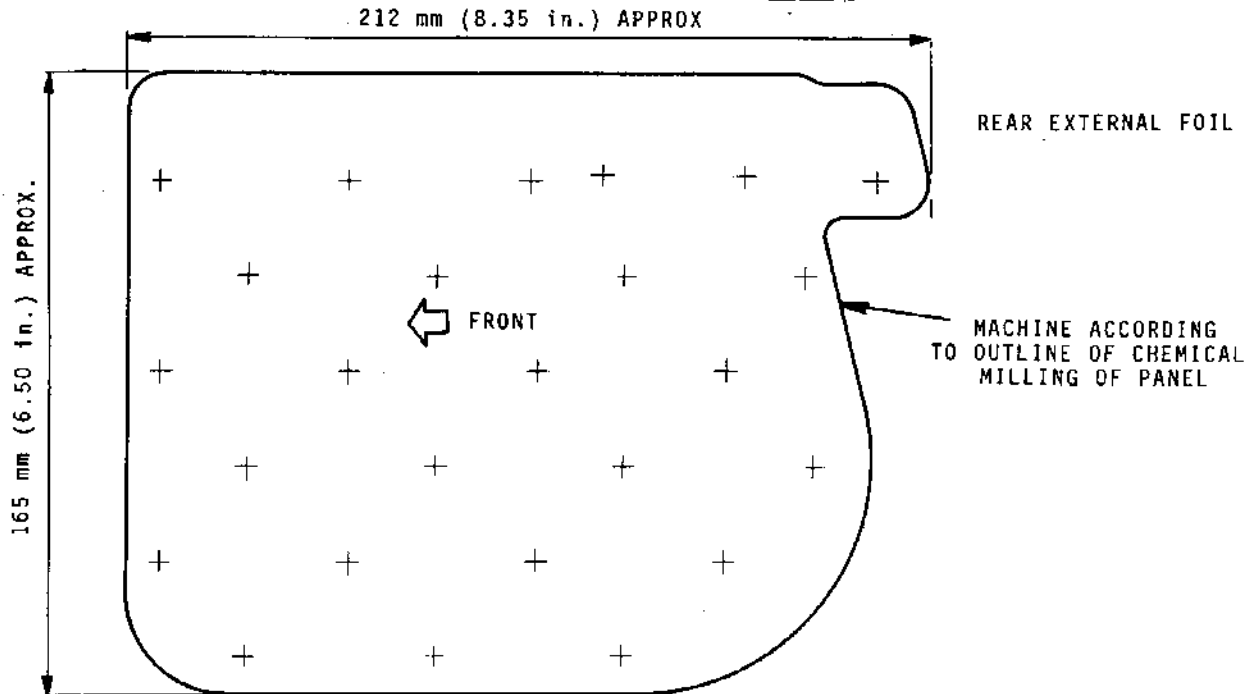
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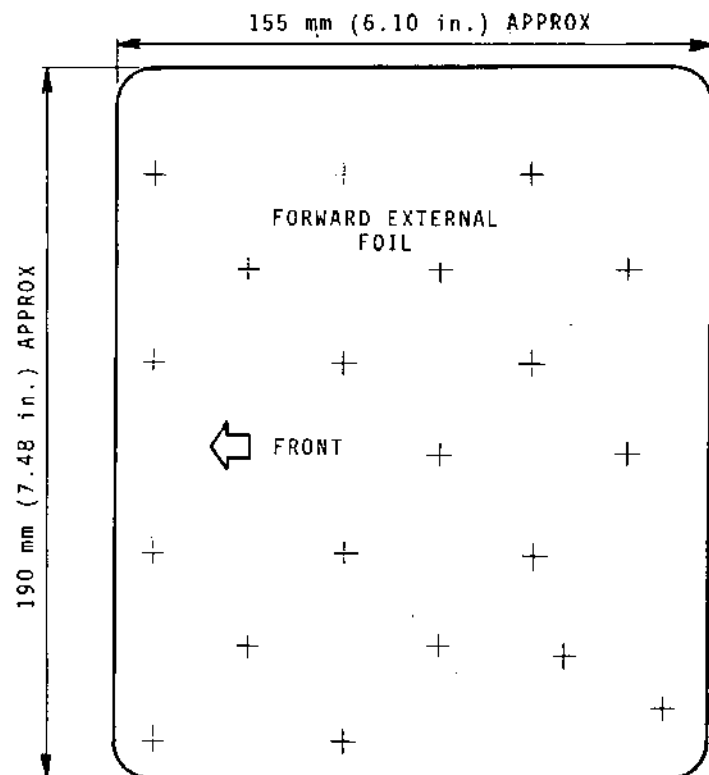
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OVERHAUL



COMPENSATING FOILS FOR
CHEMICAL MILLING OF THE
PANEL ZONE ③
MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 0,3 mm (0.012 in.)

RADIUS CORNERS
R = 10 mm (0.39 in.)



Manufacturing Details of Doubless (Central Wall)
Figure 406 (Sheet 4 of 5)

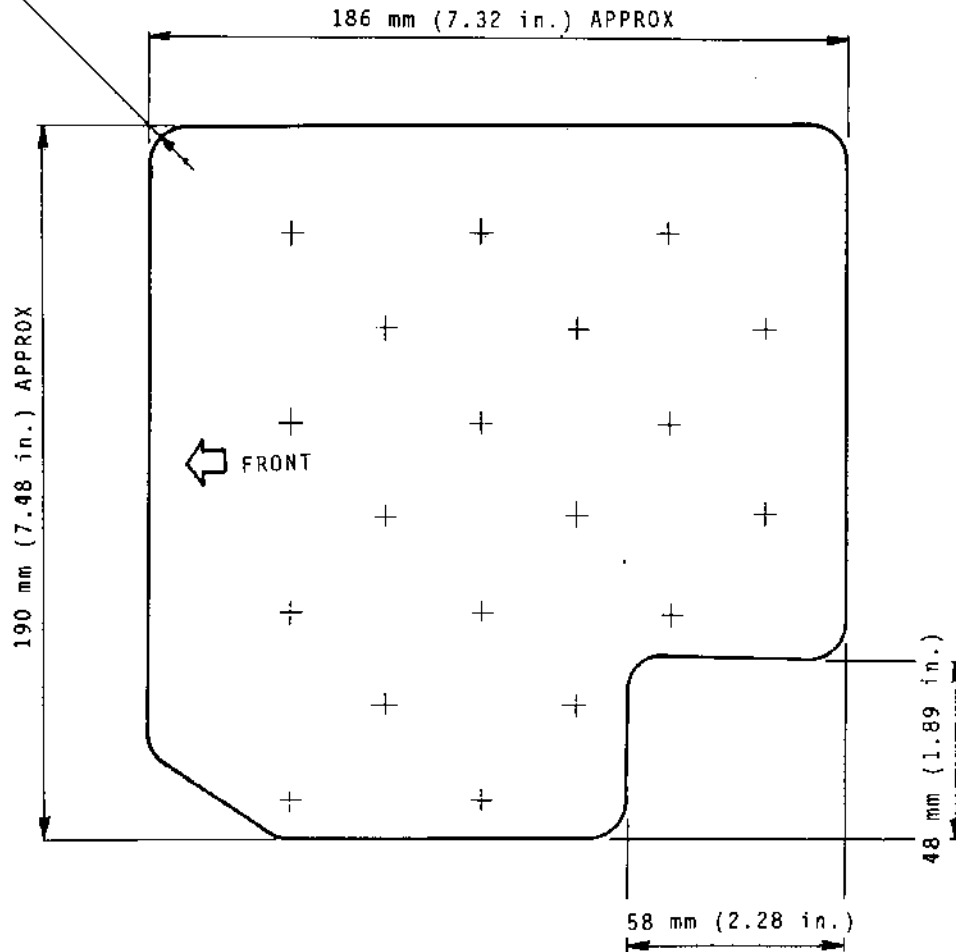


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RADIUS CORNERS
R = 10 mm (0.39 in.)



COMPENSATING FOIL FOR CHEMICAL MILLING OF PANEL

ZONE (3) FORWARD INTERNAL PART

MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 0,3 mm (0.012 in.)

Manufacturing Details of Doubless (Central Wall)
Figure 406 (Sheet 5 of 5)

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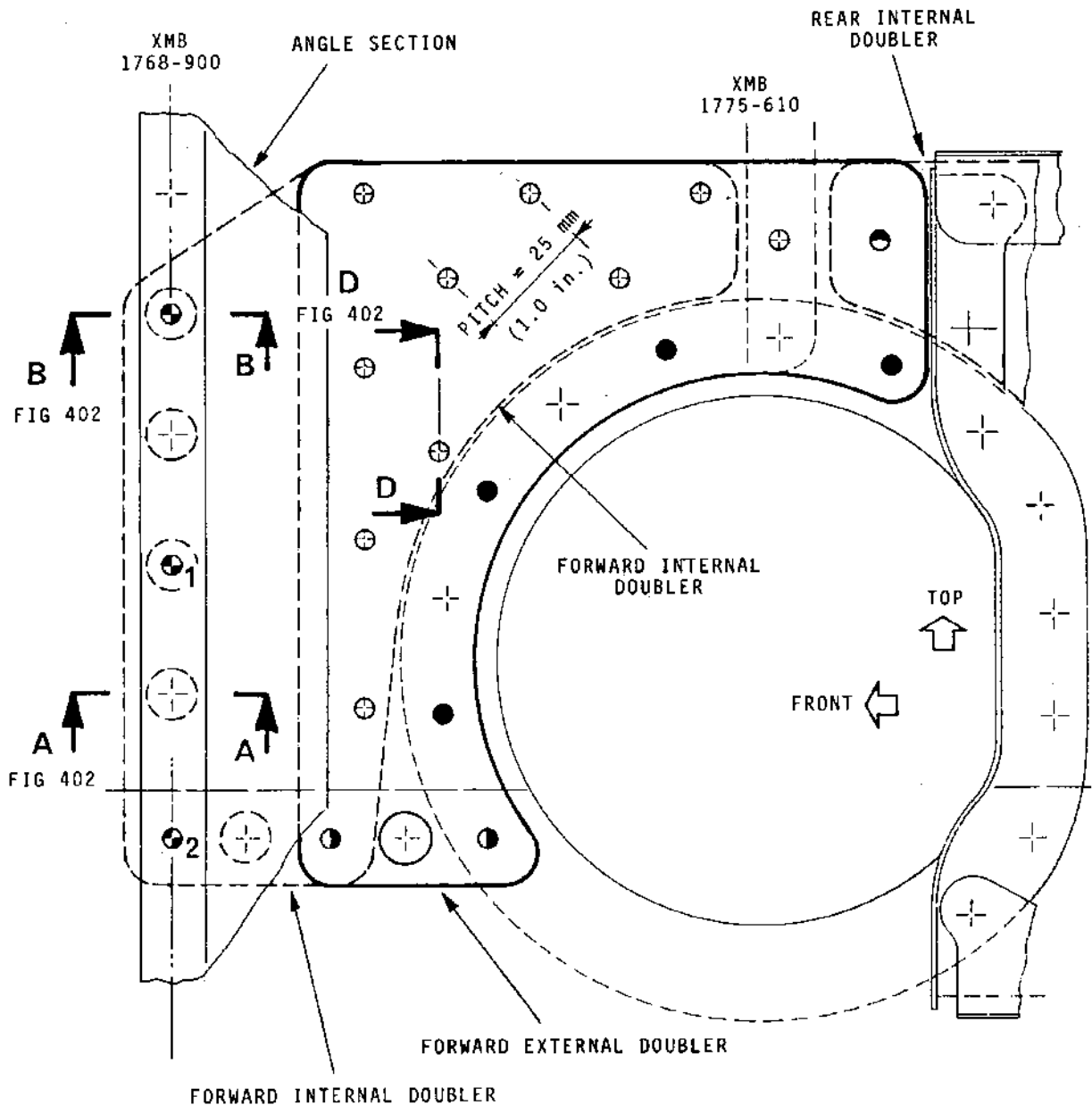
OLYMPUS 593

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ZONE ④ REPRESENTED (FORWARD PART)
VIEWED FROM IN



FOR DETAILS OF FITTING ATTACHMENTS FIGURE 402 - SHEET 4 of 4

Repair of Delaminations in Pressure
Zone Lying Outside of Barrel Suspension
Link Attachment Zones
Figure 407 (Sheet 1 of 2)

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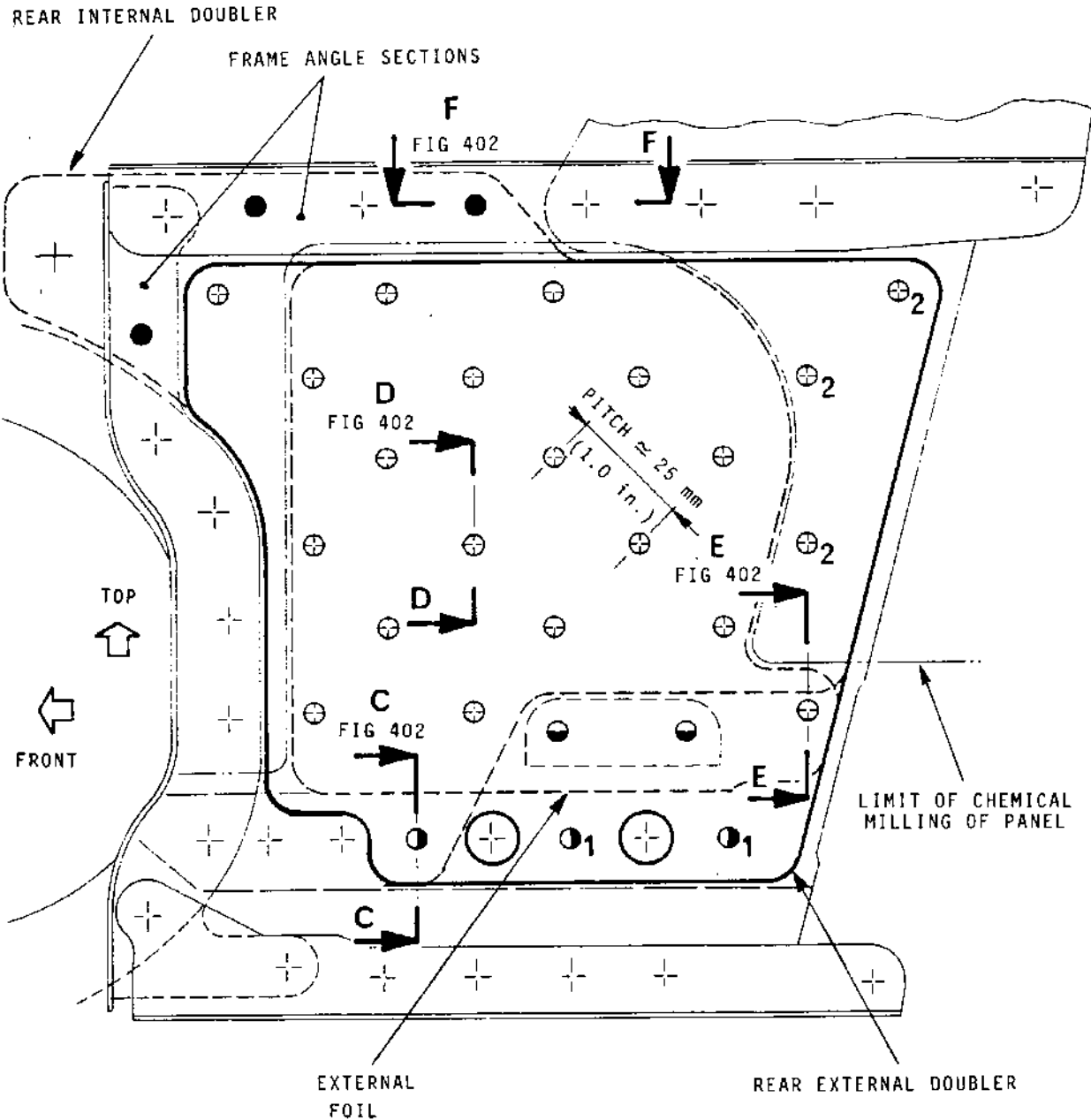


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ZONE 4 REPRESENTED (REAR PART).
SEEN FROM INSIDE

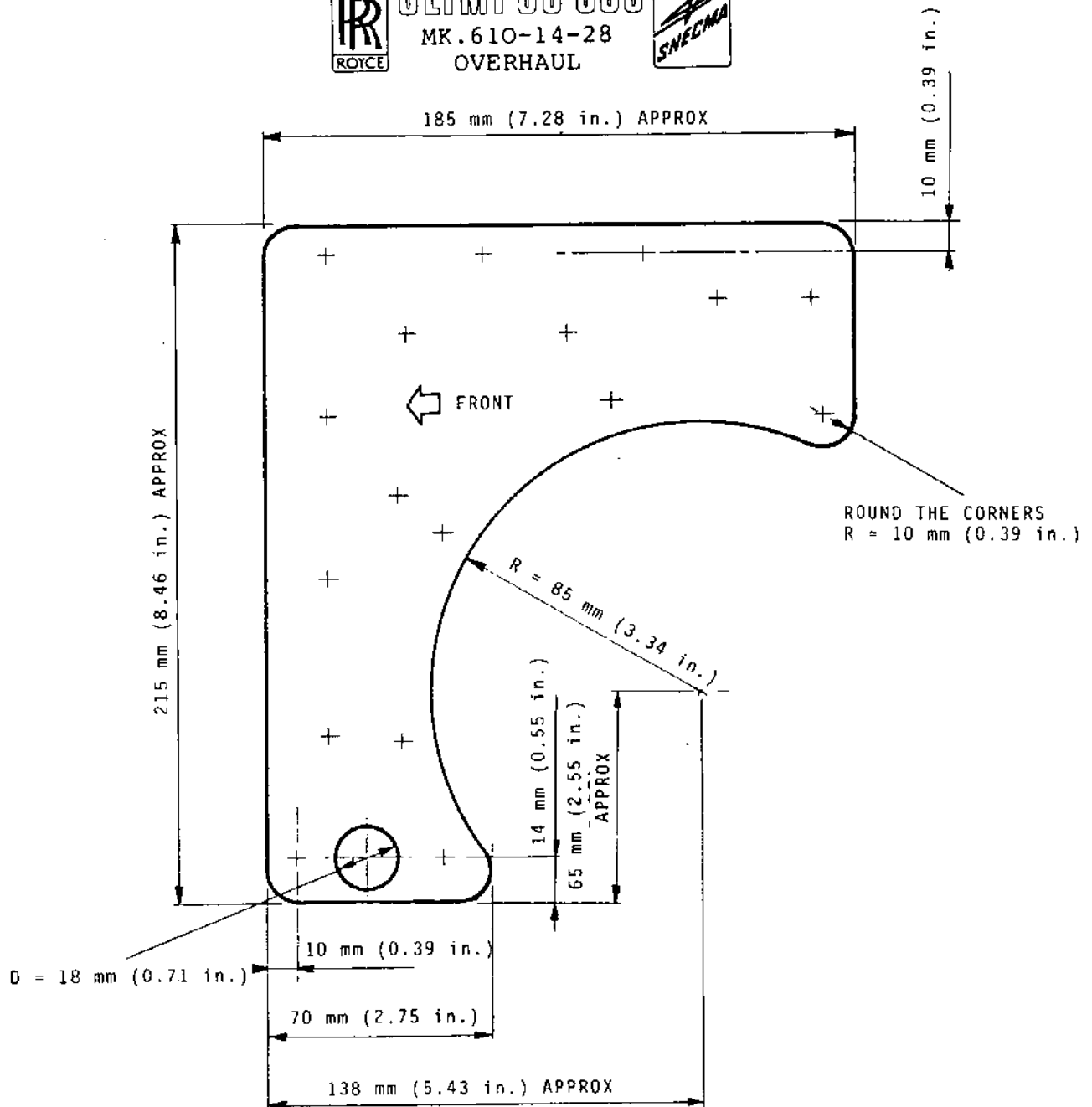


FOR DETAILS OF FITTING ATTACHMENTS SEE FIGURE 402 - SHEET 4 of 4

Repair of Delaminations in Pressure
Zone Lying Outside of Barrel Suspension
Link Attachment Zones
Figure 407 (Sheet 2 of 2)

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FORWARD EXTERNAL DOUBLER ZONE (4)
MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 1,2 mm (0.047 in.)
HEAT TREATMENT : M 821-822

Manufacturing Details of Doubless (Central Wall)
Figure 408 (Sheet 1 of 5)

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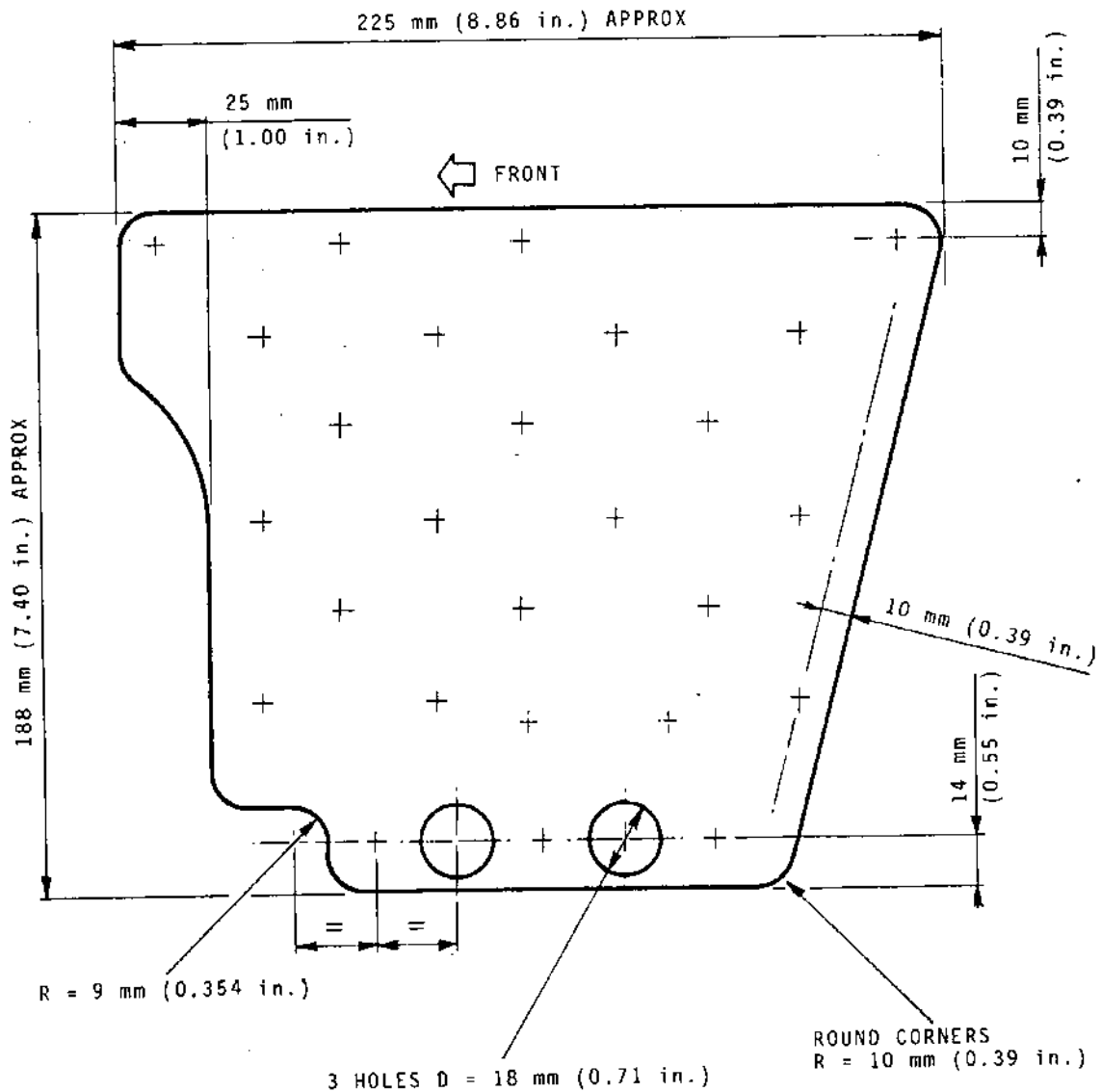
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REAR EXTERNAL DOUBLER 4
MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 1.2 mm (0.047 in.)

HEAT TREATMENT : M 821-822

Manufacturing Details of Doubless (Central Wall)
Figure 408 (Sheet 2 of 5)

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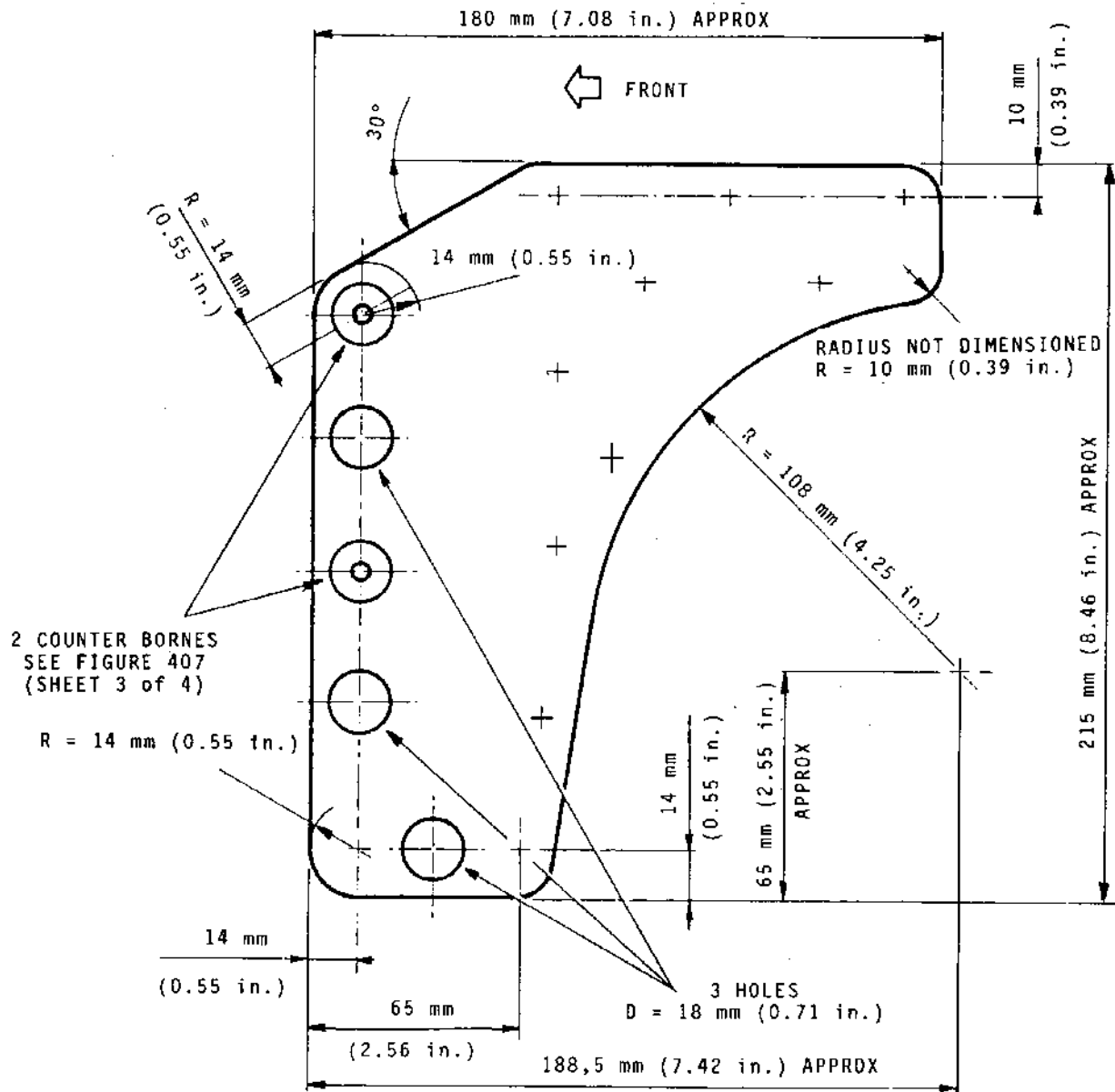
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FORWARD INTERNAL DOUBLER ZONE (4)
MATERIAL : 28 CND 15 (P 3305)
THICKNESS : 1,2 mm (0.047 in.)
HEAT TREATMENT : M 821-822

Manufacturing Details of Doubless (Central Wall)
Figure 408 (Sheet 3 of 5)

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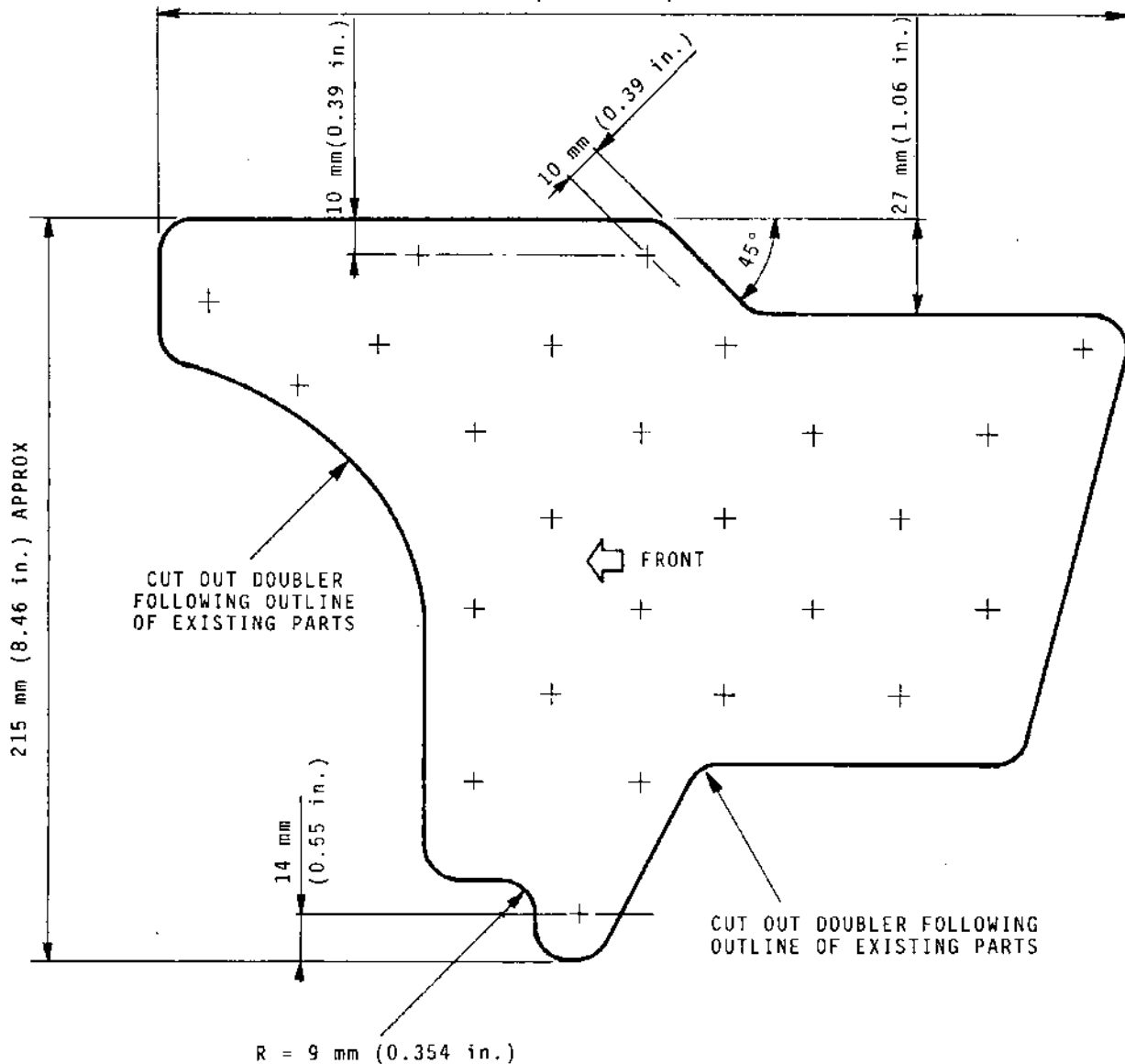


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280 mm (11.02 in.) APPROX



REAR INTERNAL DOUBLER ZONE ④
MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 1,2 mm (0.047 in.)
HEAT TREATMENT : M 821-822

ROUND CORNERS TO R = 10 mm (0.39 in.) UNLESS OTHERWISE INDICATED

Manufacturing Details of Doubless (Central Wall)
Figure 408 (Sheet 4 of 5)

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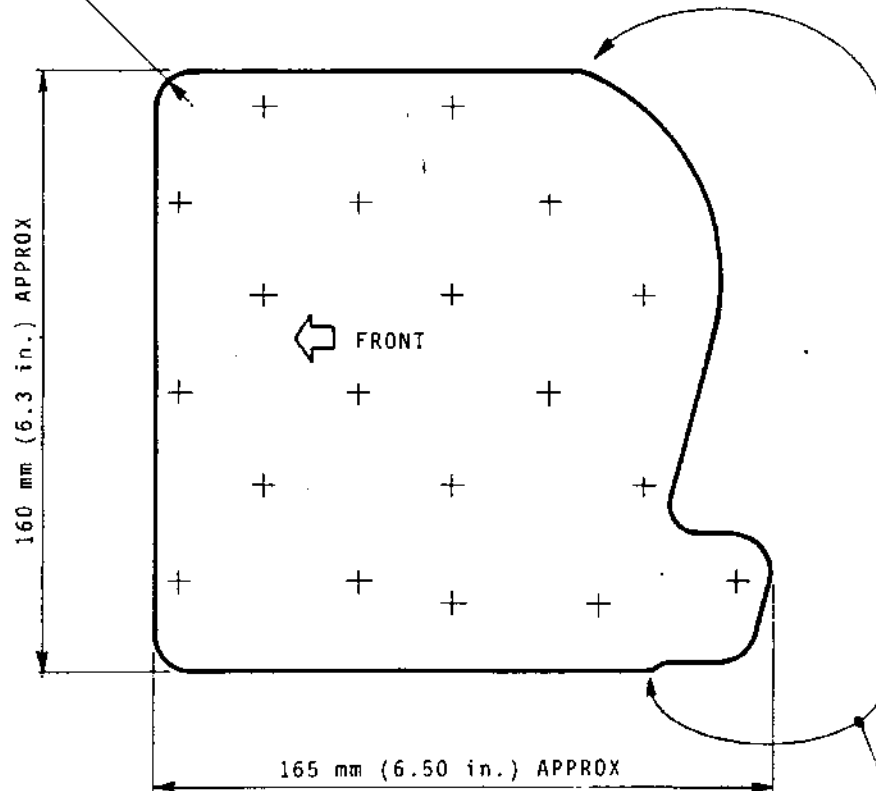


OLYMPUS 593

MK.610-14-28
OVERHAUL



ROUND CORNERS
R = 10 mm (0.39 in.)



MACHINE ACCORDING TO
OUTLINE OF CHEMICAL MILLING
OF PANEL

COMPENSATING FOIL FOR CHEMICAL MILLING OF PANEL

ZONE ④ REAR EXTERNAL FOIL
MATERIAL : 28 CND 15 (P 3305)
THICKNESS : 0,3 mm (0.012 in.)

Manufacturing Details of Doubless (Central Wall)
Figure 408 (Sheet 5 of 5)

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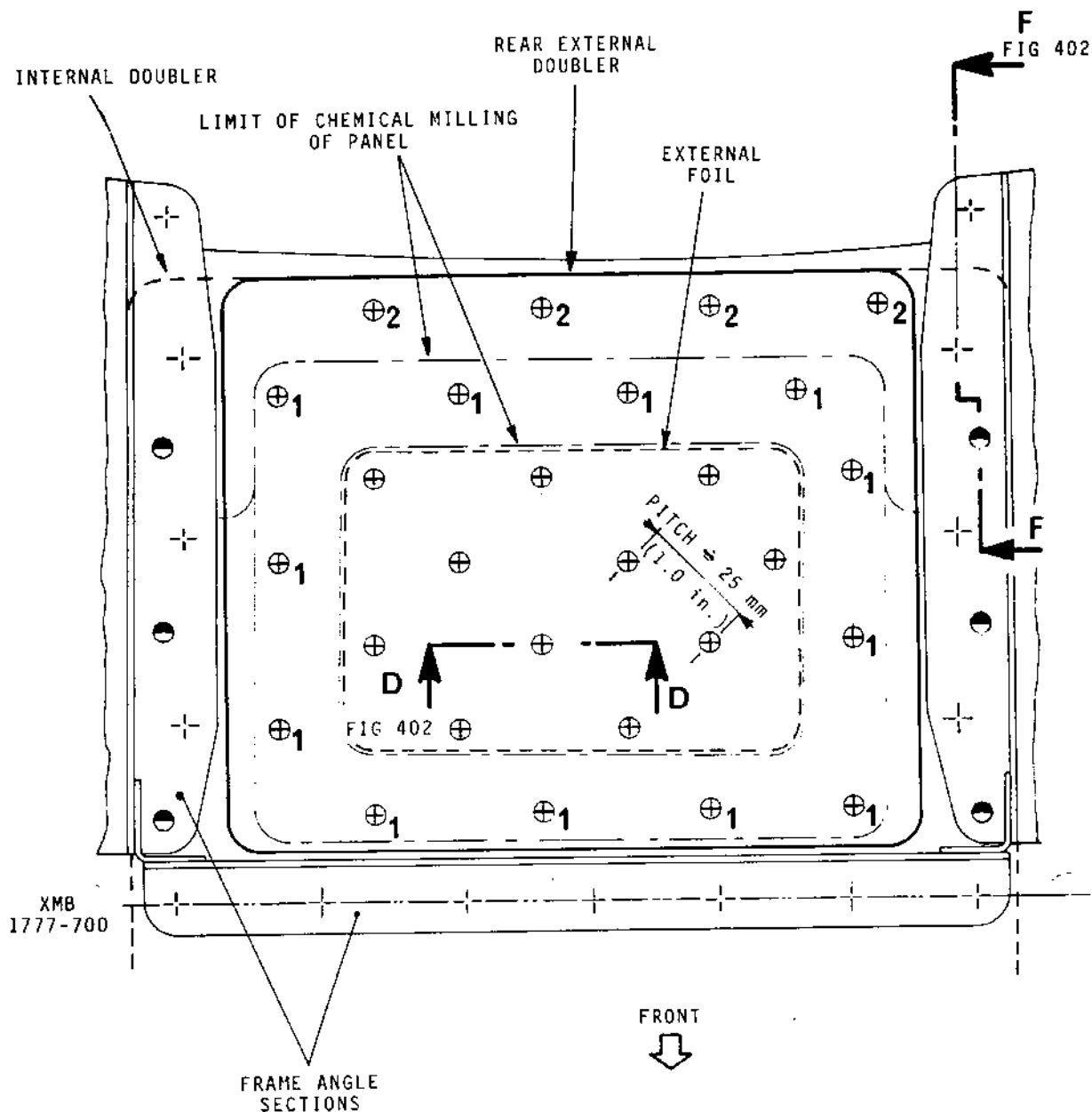
MK.610-14-28

OVERHAUL



ZONE ② REPRESENTED (REAR PART)

VIEW FOR INTERIOR



FOR DETAILS OF FITTING ATTACHMENTS SEE FIGURE 402 - SHEET 4 OF 4

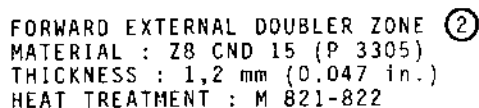
Repair of Delaminations in Pressure
Area Lying Outside of Barrel Suspension
Link Attachment Zones (Upper Panel)
Figure 409 (Sheet 2 of 2)

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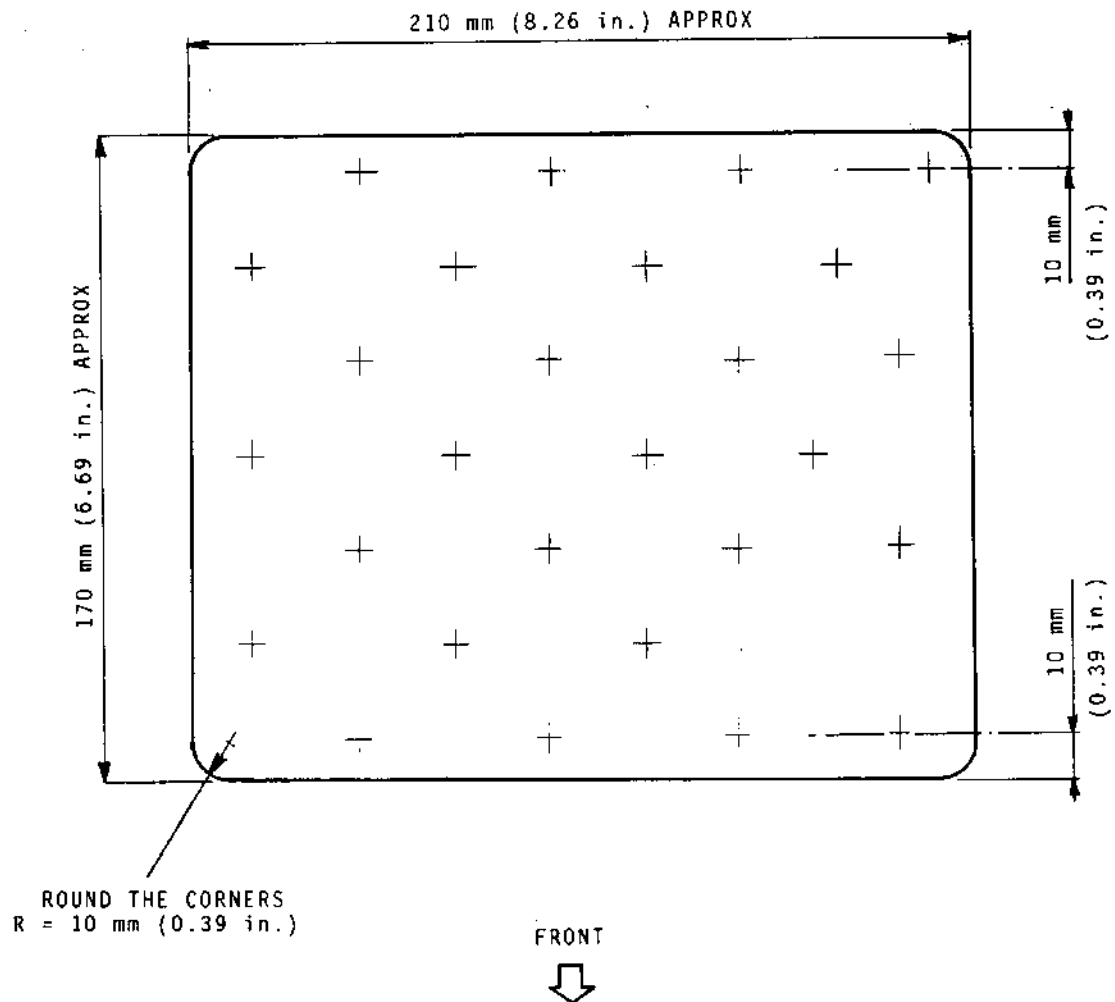
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OVERHAUL



REAR EXTERNAL DOUBLER ZONE ②
MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 1,2 mm (0.047 in.)
HEAT TREATMENT : M 821-822

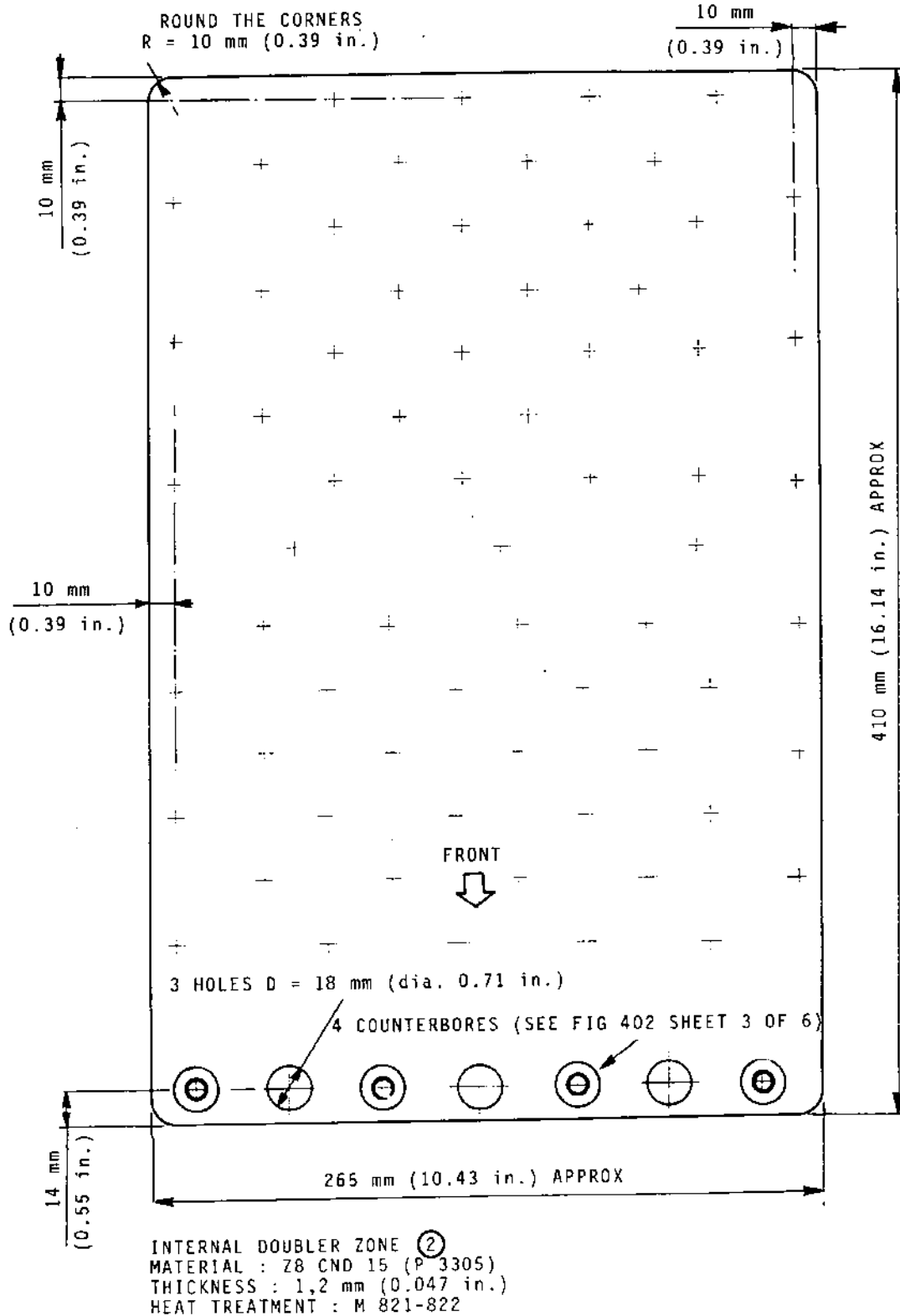
Manufacturing Details of Doubless (Upper Panel)
Figure 410 (Sheet 2 of 4)



OLYMPUS 593

MK.610-14-28

OVERHAUL



Manufacturing Details of Doubless (Upper Panel)
Figure 410 (Sheet 3 of 4)

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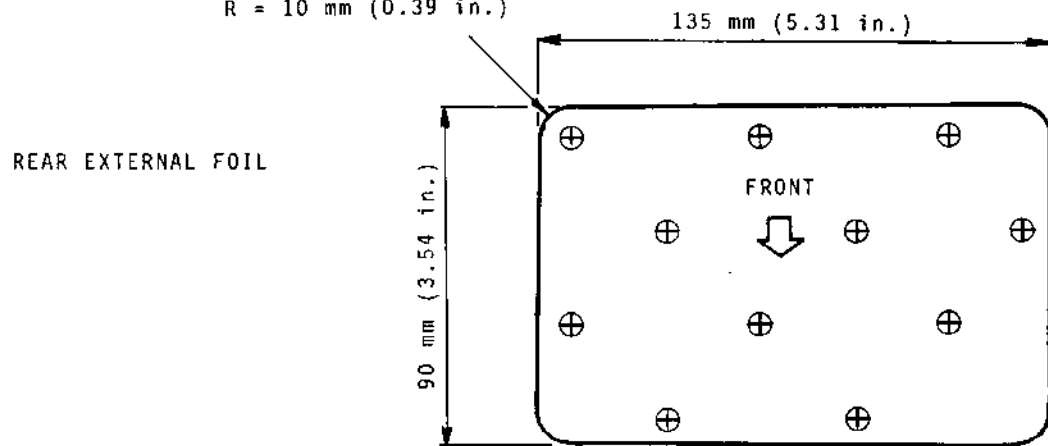


OLYMPUS 593

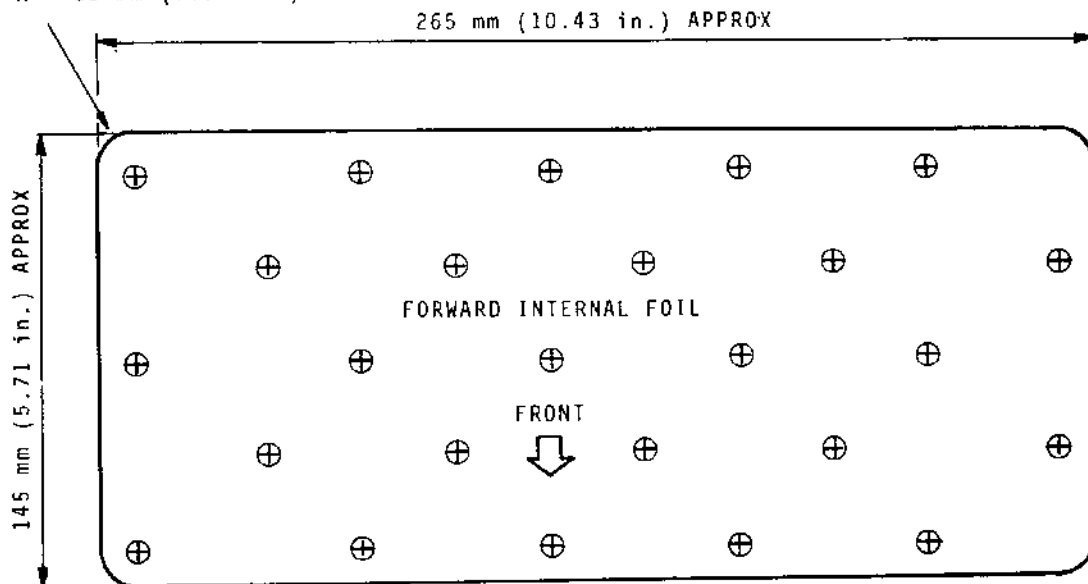
MK.610-14-28
OVERHAUL



ROUND THE CORNERS
R = 10 mm (0.39 in.)



ROUND THE CORNERS
R = 10 mm (0.39 in.)



COMPENSATING FOILS FOR CHEMICAL MILLING OF PANEL ZONE (4)
MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 0,3 mm (0.012 in.)

Manufacturing Details of Doubless (Upper Panel)
Figure 410 (Sheet 4 of 4)

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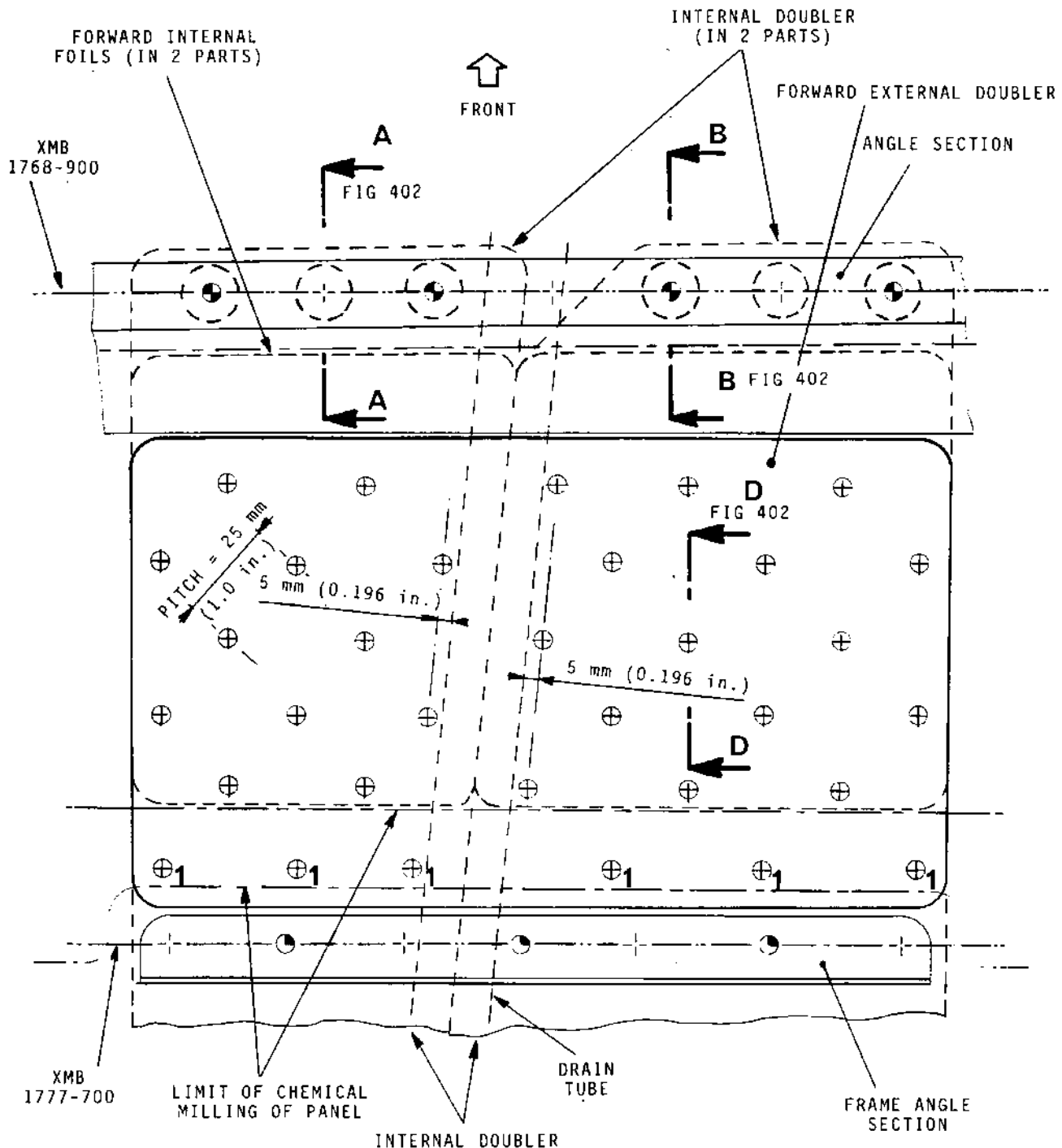


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OVERHAUL



ZONE ⑤ REPRESENTED (FORWARD PART)
VIEWED FROM INSIDE



FOR DETAILS OF FITTING ATTACHMENTS FIG 402 - SHEET 4 OF 4

Repair of Delaminations in Pressure
Area Lying Outside of Barrel Suspension
Link Zone (Front Panel)
Figure 411 (Sheet 1 of 2)

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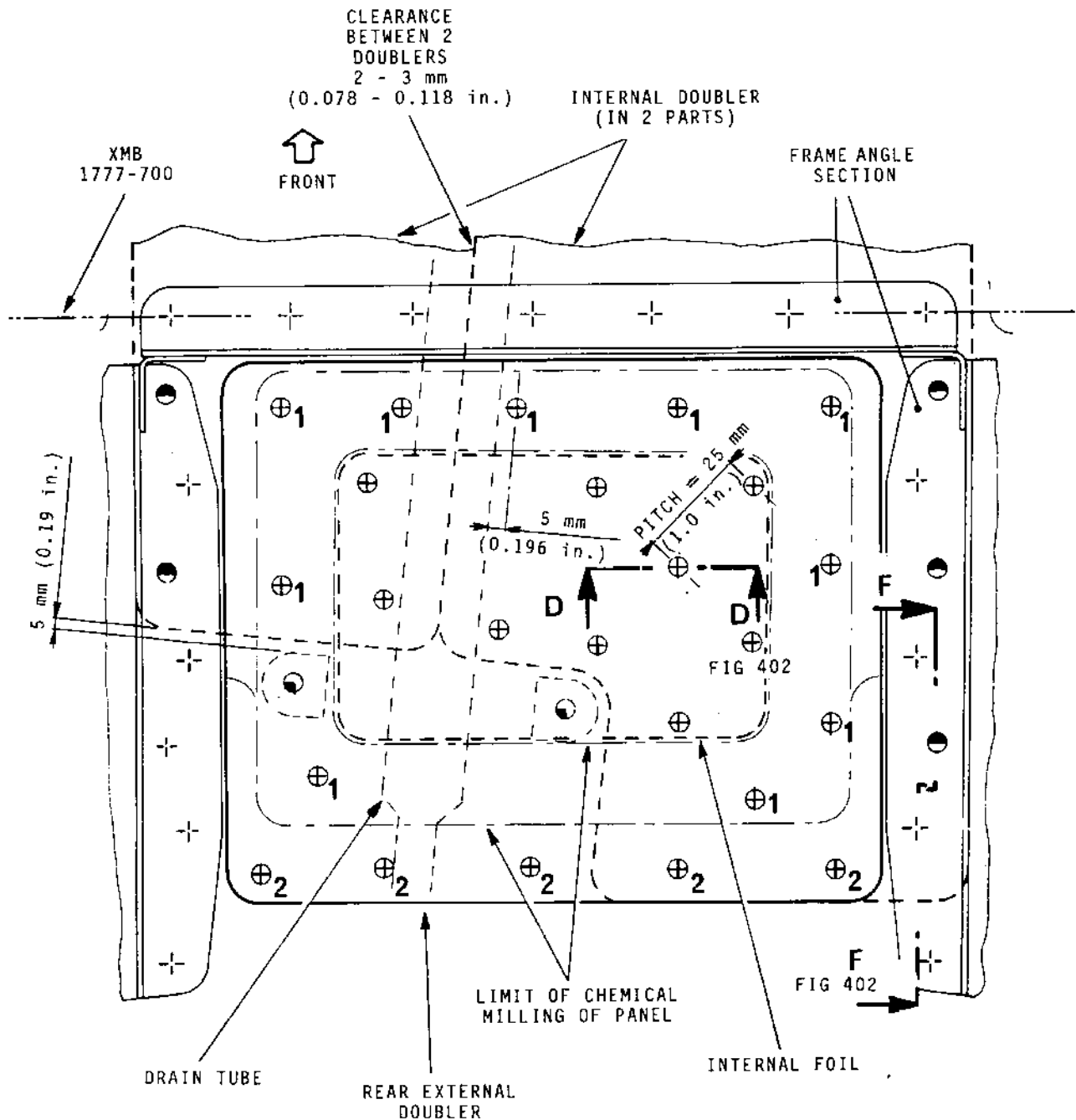
MK.610-14-28

OVERHAUL



ZONE ⑤ REPRESENTED (REAR PART)

VIEWED FROM INTERIOR



FOR DETAILS OF FITTING ATTACHMENTS SEE FIGURE 402 - SHEET 4 OF 4

Repair of Delaminations in Pressure
Area Lying Outside of Barrel Suspension
Link Zone (Front Panel)
Figure 411 (Sheet 2 of 2)

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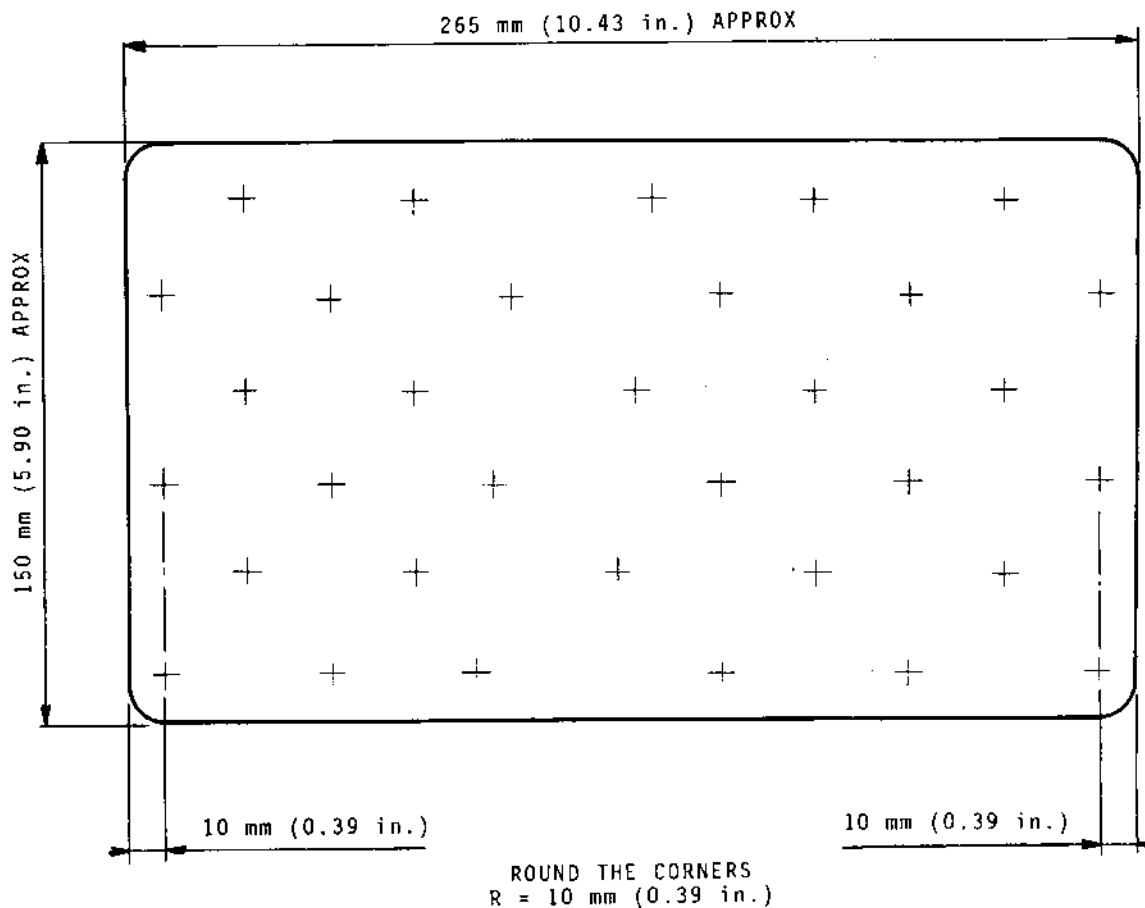


OLYMPUS 593

MK.610-14-28
OVERHAUL



FRONT



FORWARD EXTERNAL DOUBLER ZONE (5)
MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 1,2 mm (0.047 in.)
HEAT TREATMENT : M 821-822

Manufacturing Details of Doubless (Front Panel)
Figure 412 (Sheet 1 of 4)

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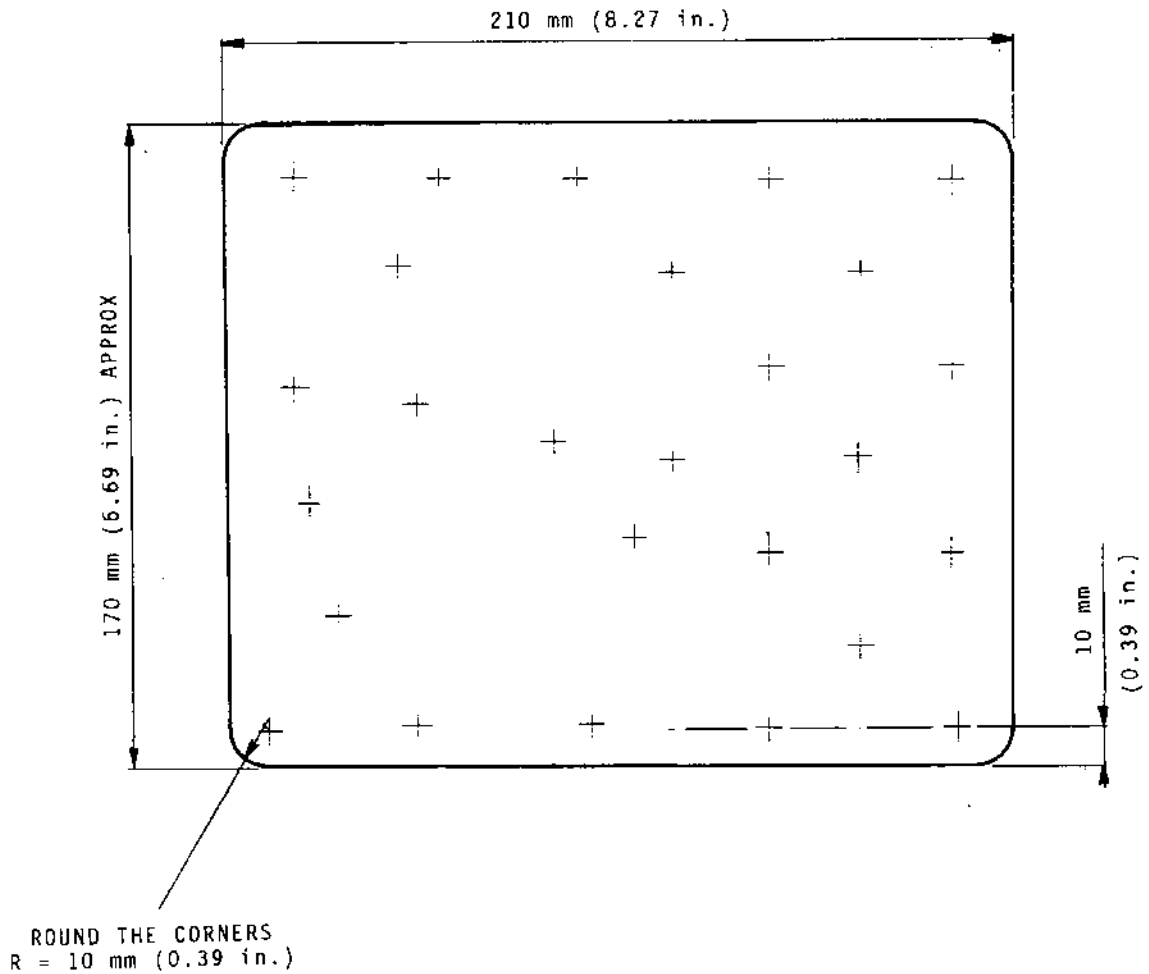


OLYMPUS 593

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OVERHAUL



FRONT



REAR EXTERNAL DOUBLER ZONE ⑤
MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 1,2 mm (0.047 in.)
HEAT TREATMENT : M 821-822

Manufacturing Details of Doubless (Front Panel)
Figure 412 (Sheet 2 of 4)

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REP 29-190-21

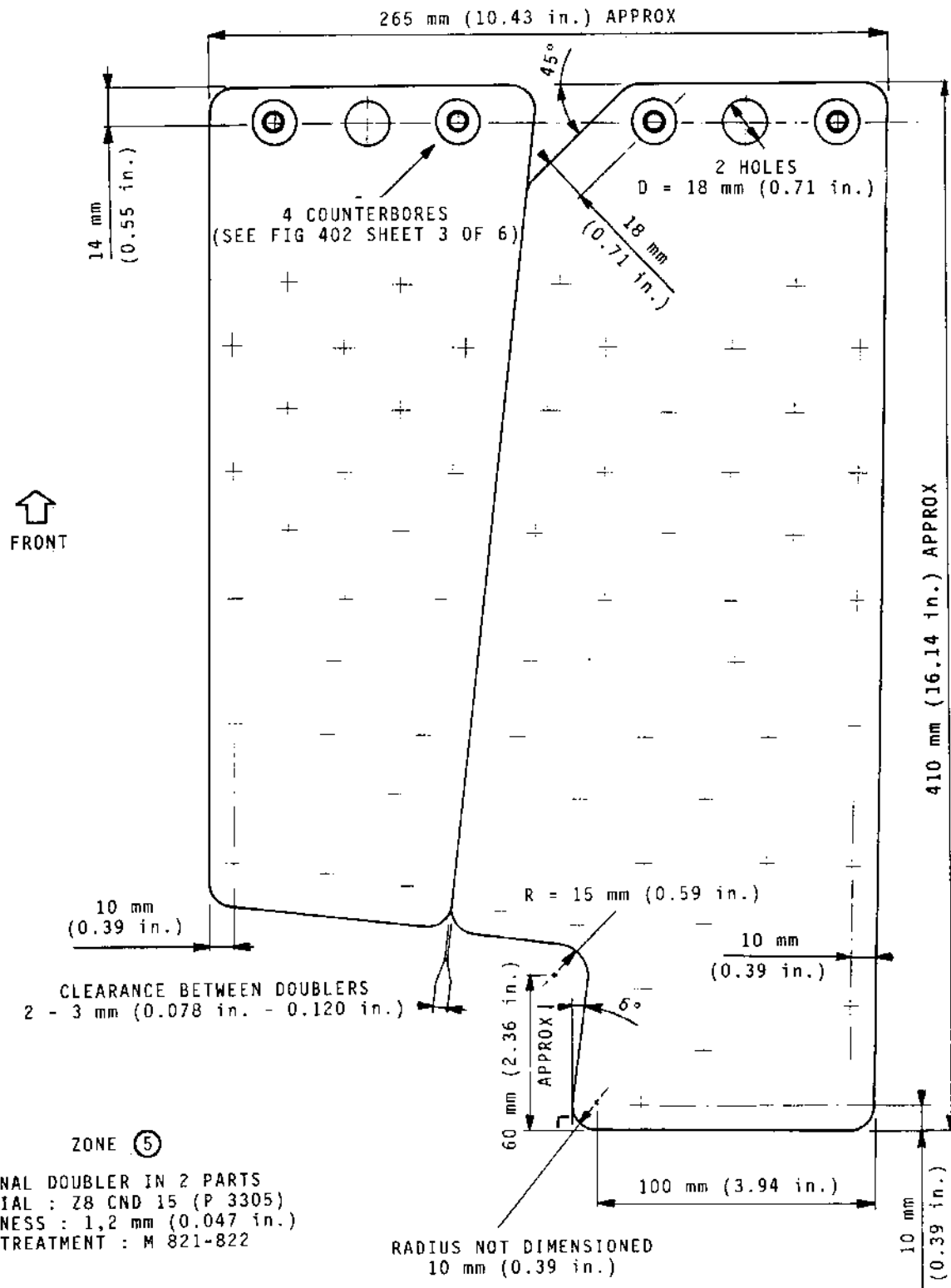
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Manufacturing Details of Doubless (Front Panel)
Figure 412 (Sheet 3 of 4)

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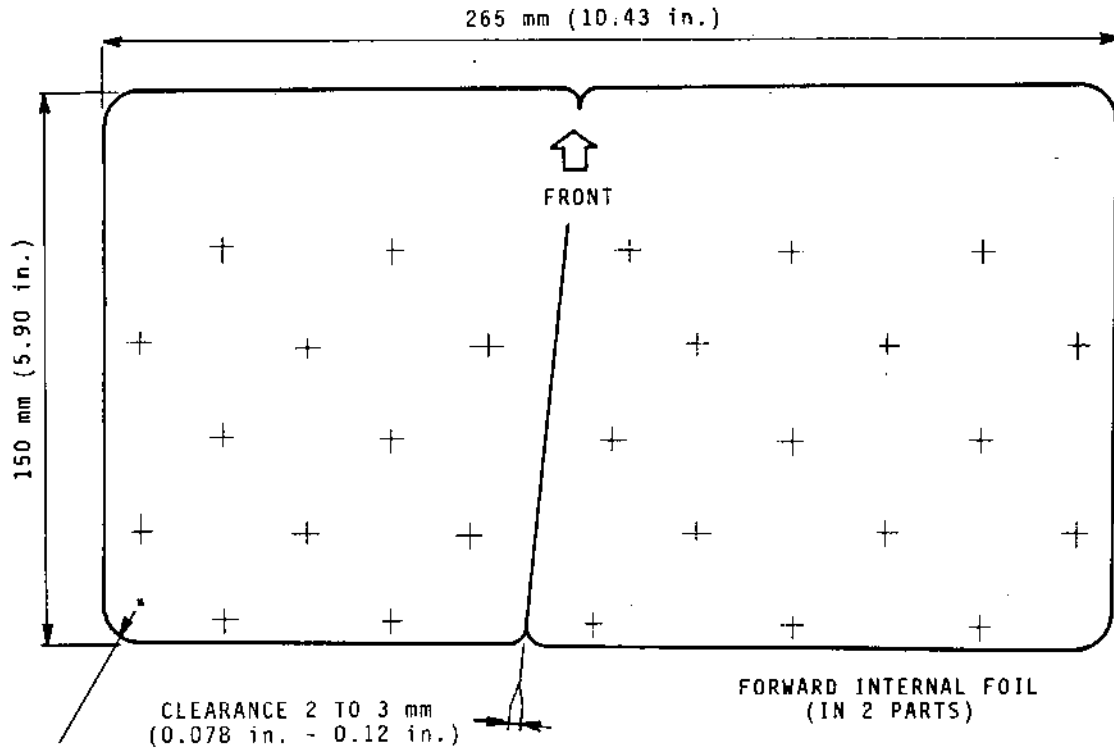
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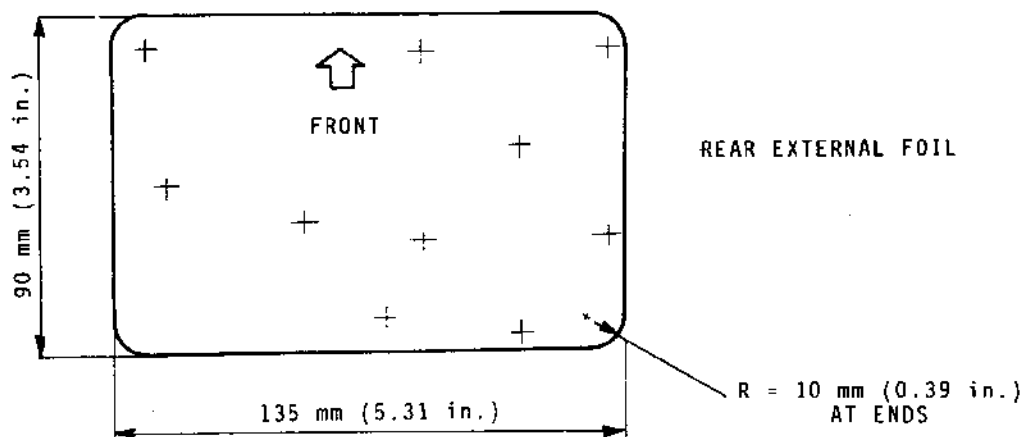
OVERHAUL



R = 10 mm (0.39 in.)
AT ENDS

COMPENSATING FOILS FOR CHEMICAL MILLING OF PANEL

MATERIAL : Z8 CND 15 (P 3305)
THICKNESS : 0,3 mm (0.012 in.)



Manufacturing Details of Doubless (Front Panel)
Figure 412 (Sheet 4 of 4)

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**OLYMPUS 593**

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OVERHAUL

REPAIRTWIN SECONDARY NOZZLE (29-190)23. Replacement of inner and outer skin panels.

PARTS REQUIRED FOR REPAIR

Outer skin panels (see figure 401).

ITEM No.	LH NOZZLE	RH NOZZLE
1	301-030-803-6	301-030-753-6
2	301-025-801-6	301-018-151-6
3	301-025-400-6	301-017-750-6
4	300-896-500-6	300-892-650-6
5	300-860-053-6	300-860-053-6
6	301-055-252-6	301-055-252-6
7	301-055-202-6	301-055-202-6
8	300-860-003-6	300-860-003-6
9	300-892-600-6	300-896-550-6
10	301-017-700-6	301-025-450-6
11	301-018-101-6	301-025-851-6
12	301-030-703-6	301-030-853-6
13	301-031-901-6	301-031-951-6
14	301-012-101-6	301-018-850-6
15	301-018-800-6	301-012-151-6

Inner skin panels (see figure 401)

ITEM No.	LH NOZZLE	RH NOZZLE
1	301-041-904-6	301-041-904-6
2	300-856-905-6	300-856-905-6
3	301-058-101-6	301-058-101-6
4	301-059-202-6	301-059-202-6
5	300-865-702-6	300-865-702-6
6	301-041-954-6	301-041-954-6
7	300-865-752-6	300-865-752-6
8	301-058-151-6	301-058-151-6
9	301-059-252-6	301-059-252-6
10	300-856-955-6	300-856-955-6

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PARTS REQUIRED FOR REPAIR

The type and dimensions of the fasteners are given in REP 29-190-9.

FOR REPLACING THE PANELS, ASSEMBLY JIGS AND TOOLS USED FOR PRODUCTION ARE NECESSARY. THEREFORE, THE NOZZLE SHALL BE RETURNED TO SNECMA TO BE REPAIRED.

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REP 29-190-23

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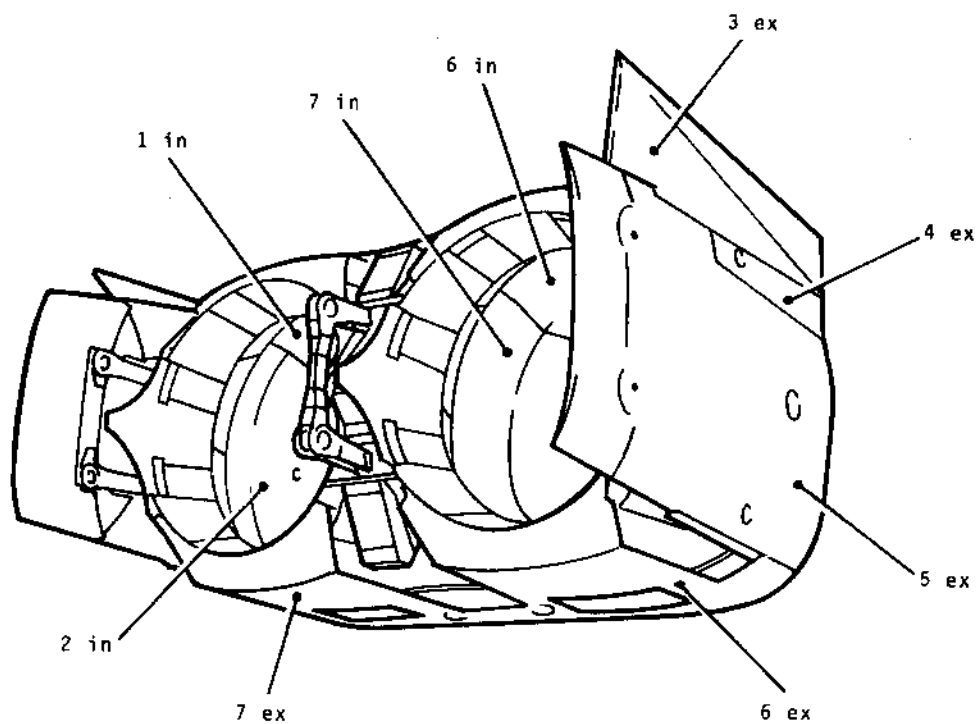
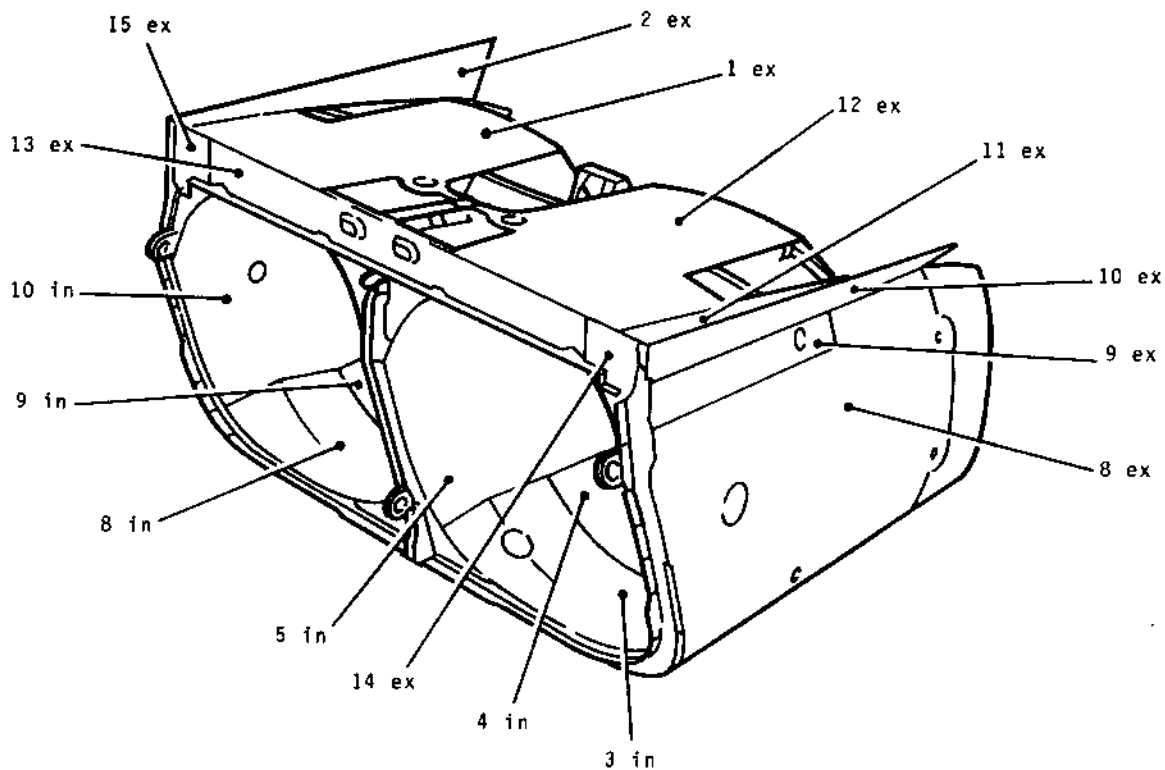
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OVERHAUL



Identification of Skin Panels
Figure 401

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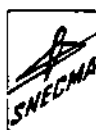
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Jan 31/81

**OLYMPUS 593**

MK.610-14-28

OVERHAUL

REPAIRSECONDARY NOZZLE (29-190/-191)24. Reconditioning of the attachment points of the ballscrew gearboxes recess blanking plates.

PARTS REQUIRED FOR REPAIR

Flat washer	AN960C10L	(649-786-069-0) x 8
Blind rivet	CR2662-3-4	(649-772-061-0) x 16
Blind rivet	CR2838-5-4	(649-772-077-0) x 20
Blind rivet	CR2839-4-2	(649-772-192-0) x 16
Blind rivet	CR2839-6-4	(649-772-090-0) x 8
Solid rivet	MS20427M3-3	(650-022-041-0) x 48
Solid rivet	NAS1200-3-4	(649-772-045-0) x 24
Solid rivet	NAS1200-3-5	(649-772-045-0) x 4
Solid rivet	MS20427M3-6	(650-022-046-0) x 16
Blind rivet or	CR2662-3-5	(649-772-062-0) ALT
Floating nut	NAS686C4	(649-785-095-0) x 4
Floating nut	NAS687C4	(649-785-092-0) x 4
Fixed nut	NAS697C3	(649-785-005-0) x 13
Fixed nut	NAS697C4	(649-785-004-0) x 4
Blind bolt	NAS1671-3L6	(650-089-335-0) x 4
Blind bolt	NAS1671-3L8	(650-089-337-0) x 2
Blind bolt	NAS1753-3L4	(650-089-333-1) x 2
Blind bolt	PLT120-6-8	(649-772-054-0) x 2
Blind rivet or	CR2838-6-8	(649-772-198-0) ALT
Blind bolt	PLT121-5-8	(649-772-314-1) x 4
Blind rivet or	CR2838-5-8	(649-772-165-0) ALT

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REP 29-190-24

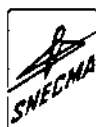
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MK.610-14-28
OVERHAUL



A. Introduction.

- (1) In this repair procedure, two cases of nut replacement may occur:
 - (a) Replacement of accessible nuts, according to instructions of paragraph B.
 - (b) Replacement of nuts riveted on support plates, according to paragraph C.

B. Replacement of accessible nuts.

- (1) Remove the damaged nuts according to figure 401, after having removed the attachment parts according to:

- (a) Chapter 70-50-10 of the Standard Practices and plate 9 (section NN) for the solid rivets.

NOTE: Recover the shims BAS9373C4WJ and/or 302-042-500-0 from under the nuts.

- (b) Chapter 70-50-50 of the Standard Practices and plates 7 (view F2) and 10 (section P) for the blind rivets.

- (2) Install and secure a new rivet as follows:

- (a) Plate 9 (section N) and chapter 70-50-10 of the Standard Practices for the solid rivets or chapter 70-50-50 of the Standard Practices for the blind rivets.

NOTE: Do not forget to position the shims under the nuts removed in paragraph B (1).

- (b) Plate 7 (view F2) and/or plate 10 (section P) and chapter 70-50-50 of the Standard Practices for the blind rivets.

- (3) Check the riveting of the attachment parts of the nuts on the nozzle according to:

- (a) Chapter 70-50-81 of the Standard Practices for the solid rivets.
 - (b) Chapter 70-50-85 of the Standard Practices for the blind rivets.

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C. Replacement of the nuts riveted on the support plates.

(1) Remove the access blanking panels:

- (a) To plates 1 and/or 4 and/or 5 and/or 6 and/or 9, according to figure 401 plates 2 and 3 and DISASSEMBLY section paragraph 28 or this overhaul manual.
- (b) To plates 2 and/or 3 and/or 7 and/or 8 by removing the blind rivets according to chapter 70-50-50 of the Standard Practices and figure 401 plate 3 view F1.

(2) Remove the support plates of the nuts according to figure 401 and as follows:

- (a) Use a copper wire, or equivalent, to secure the support plates to prevent them from falling to the bottom of the sealed chambers, during the removal of the attachment parts.
- (b) Remove the attachment parts of the plates on the structure, according to:

1 Chapter 70-50-50 of the Standard Practices for plates 2, 3, 7, 8, 10 and 11.

2 Chapter 70-50-60 of the Standard Practices for plates 1, 4, 5, 6 and 9.

3 Recover the shims and/or the washers after having marked their position on the structure.

- (c) Remove the support plates by the passage holes. Mark their position on the structure.

(3) Replace the damaged nuts on the support plates, according to figure 402 and as follows:

- (a) Remove the damaged nut by removing the solid rivets according to chapter 70-50-10 of the Standard Practices.
- (b) Position a new nut on the plate, then install new solid rivets according to chapter 70-50-10 of the Standard Practices.

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- (c) Check the riveting of the nuts on the support plate according to chapter 70-50-81 of the Standard Practices.
- (4) Install the support plates on the structure according to figure 401 and as follows:
 - (a) If blind rivets are selected for installation in section J of plate 5, rebores the components to be installed to 5,21-5,31 mm diameter (0.205-0.209 in Dia).
 - (b) Using a copper wire or equivalent, in function of the positions marked in paragraph 2.C, position then fasten the support plate(s), the milled washers and/or the riveting plate.
 - (c) Install the attachment part according to:
 - 1 Chapter 70-50-50 of Standard Practices for the blind rivets.
 - 2 Chapter 70-50-60 of Standard Practices for blind bolts.

NOTE: Do not forget the plain washers under the hexagon heads of the bolts.

 - (d) Check the riveting of the support plates on the structure, according to:
 - 1 Chapter 70-50-85 of the Standard Practices for the blind rivets.
 - 2 Chapter 70-50-86 of the Standard Practices for the blind bolts.
- (5) Remove all shavings and debris from inside the sealed chamber by suction, through the plates passage holes.
- (6) Blank the plates passage holes according to figure 401 plates 2 and 3.
 - (a) Install the borescope access door(s) according to ASSEMBLY section paragraph 30 of this overhaul manual.

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- (b) Install the blanking plates and secure with blind rivets according to chapters 70-50-50 and 70-50-85 of Standard Practices.

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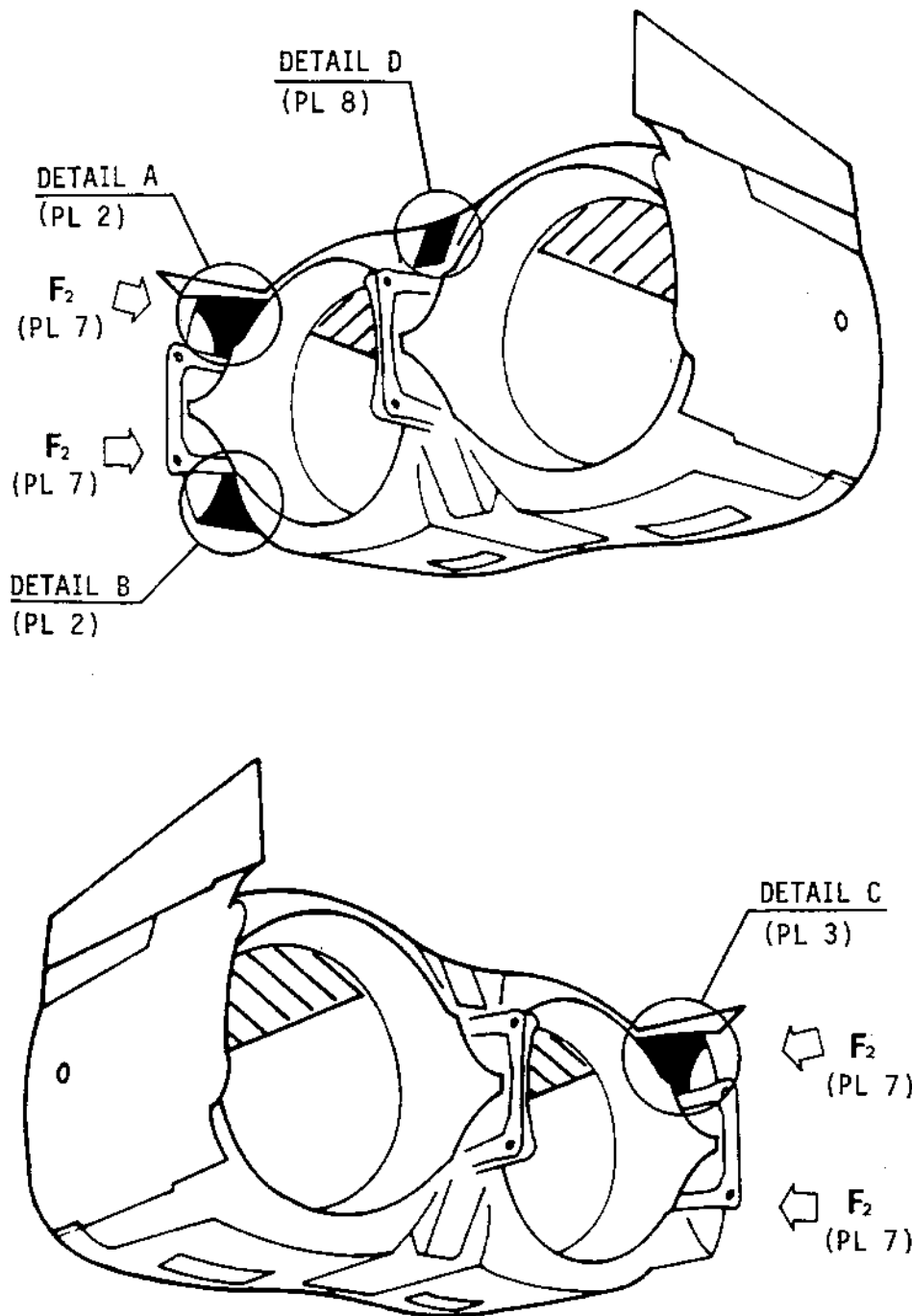
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Reconditioning of the attachment points
of the ballscrew gearboxes recess blanking plates
Figure 401 (Sheet 1 of 10)

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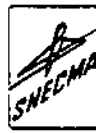
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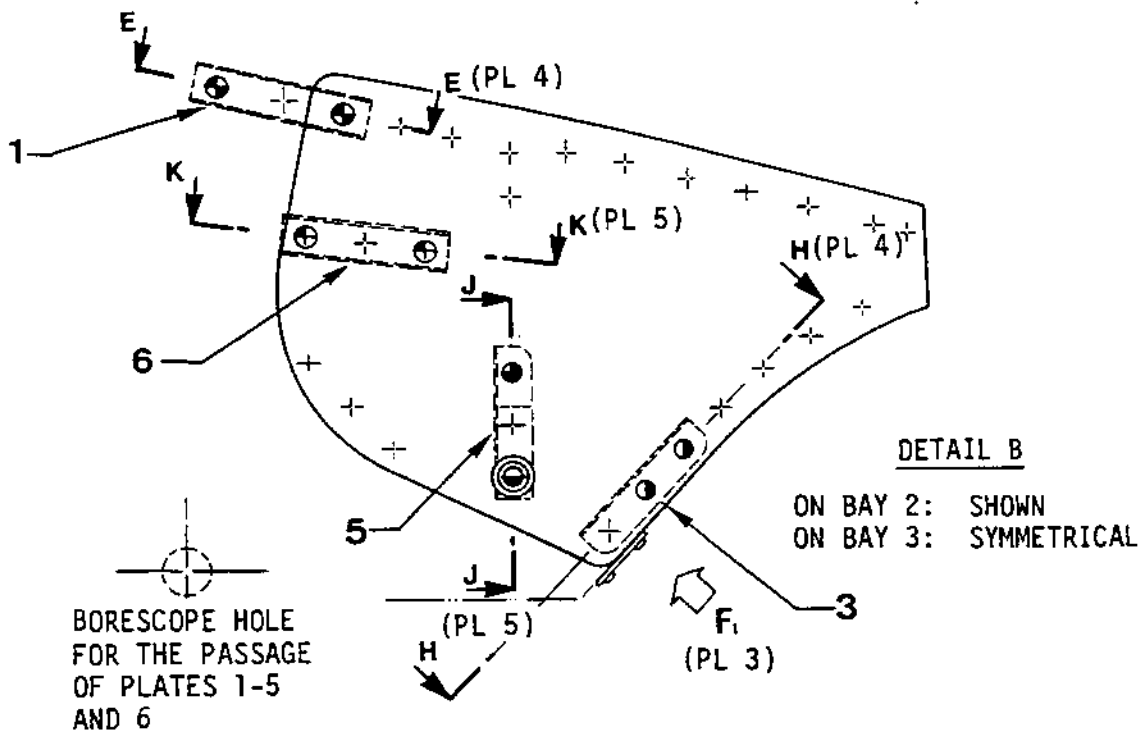
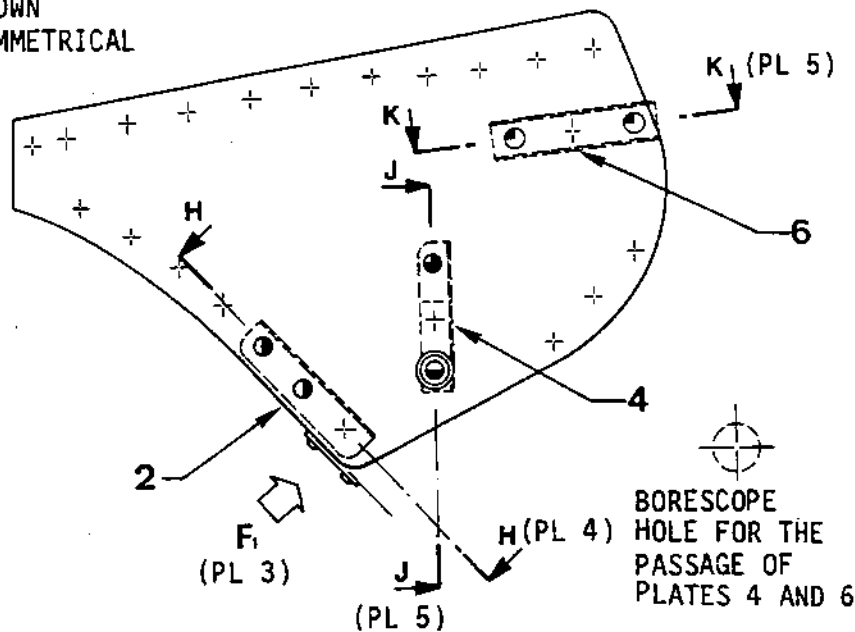
OLYMPUS 593

MK.610-14-28
OVERHAUL



DETAIL A

ON BAY 1: SHOWN
ON BAY 4: SYMMETRICAL



DETAIL B

ON BAY 2: SHOWN
ON BAY 3: SYMMETRICAL

Reconditioning of the attachment points
of the ballscrew gearboxes recess blanking plates
Figure 401 (Sheet 2 of 10)

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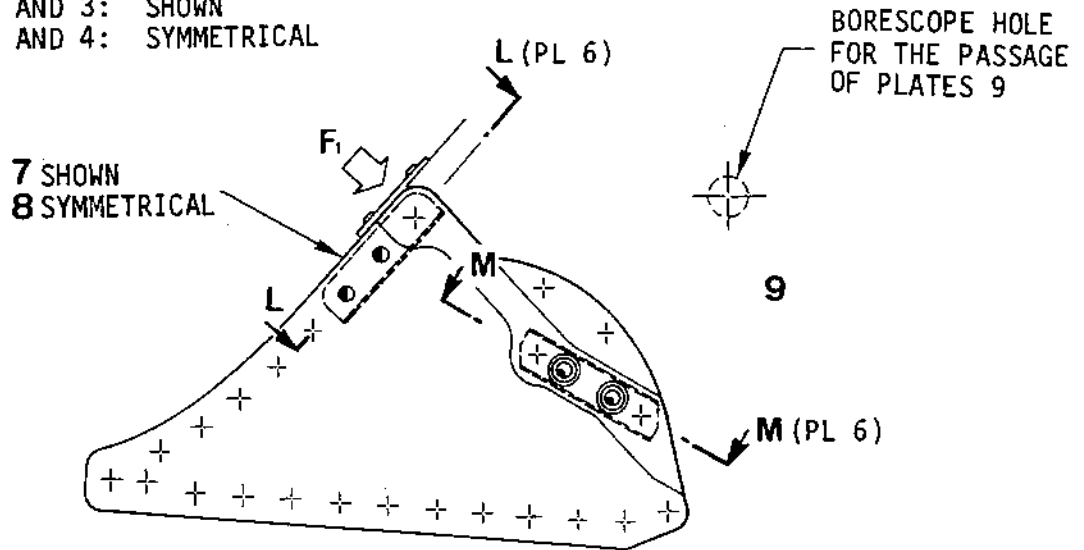
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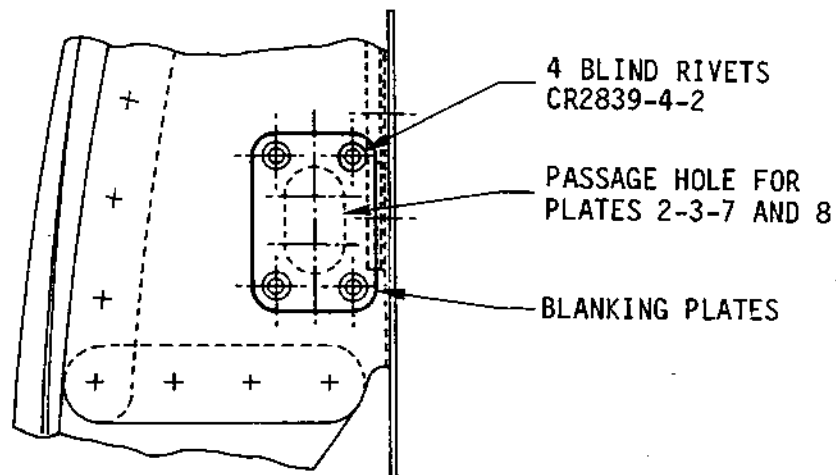


DETAIL C

ON BAYS 1 AND 3: SHOWN
ON BAYS 2 AND 4: SYMMETRICAL



VIEW F₁
(VALID IN 4 LOCATIONS)



Reconditioning of the attachment points
of the ballscrew gearboxes recess blanking plates
Figure 401 (Sheet 3 of 10)

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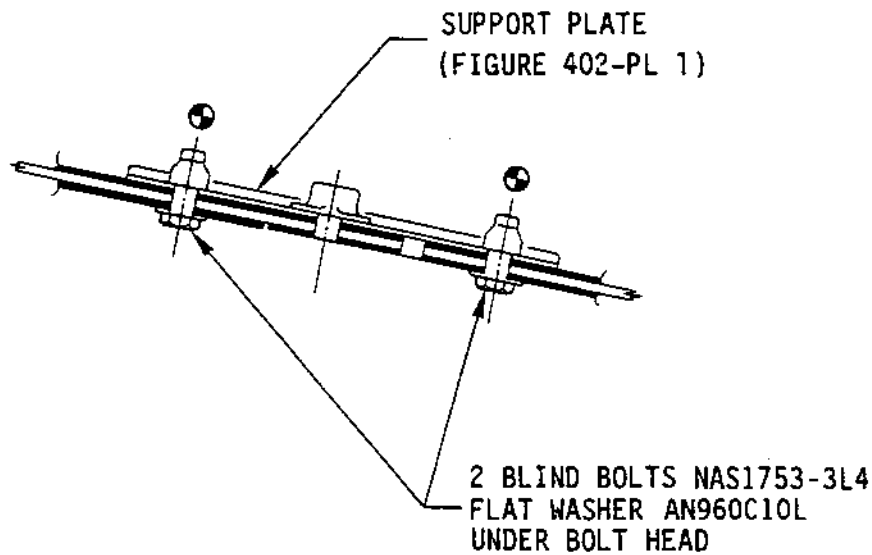


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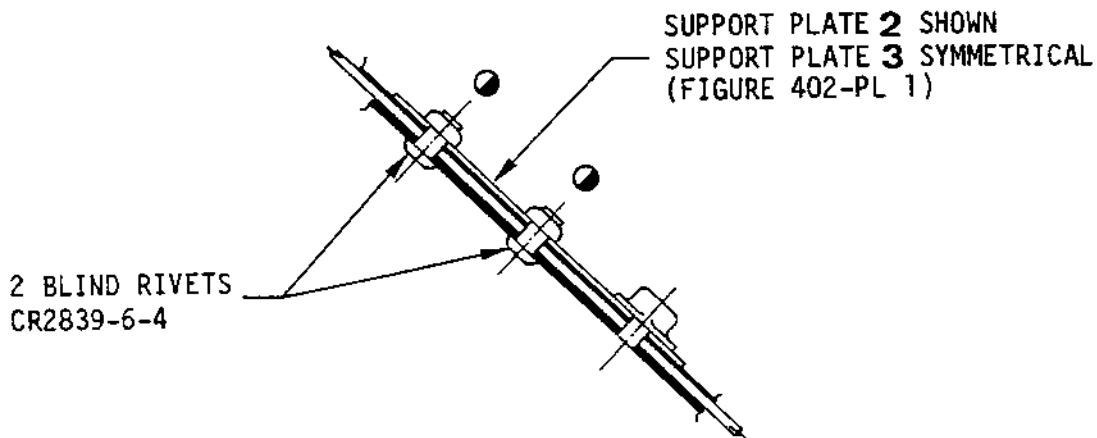
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OVERHAUL



SECTION E E



SECTION HH



Reconditioning of the attachment points
of the ballscrew gearboxes recess blanking plates
Figure 401 (Sheet 4 of 10)

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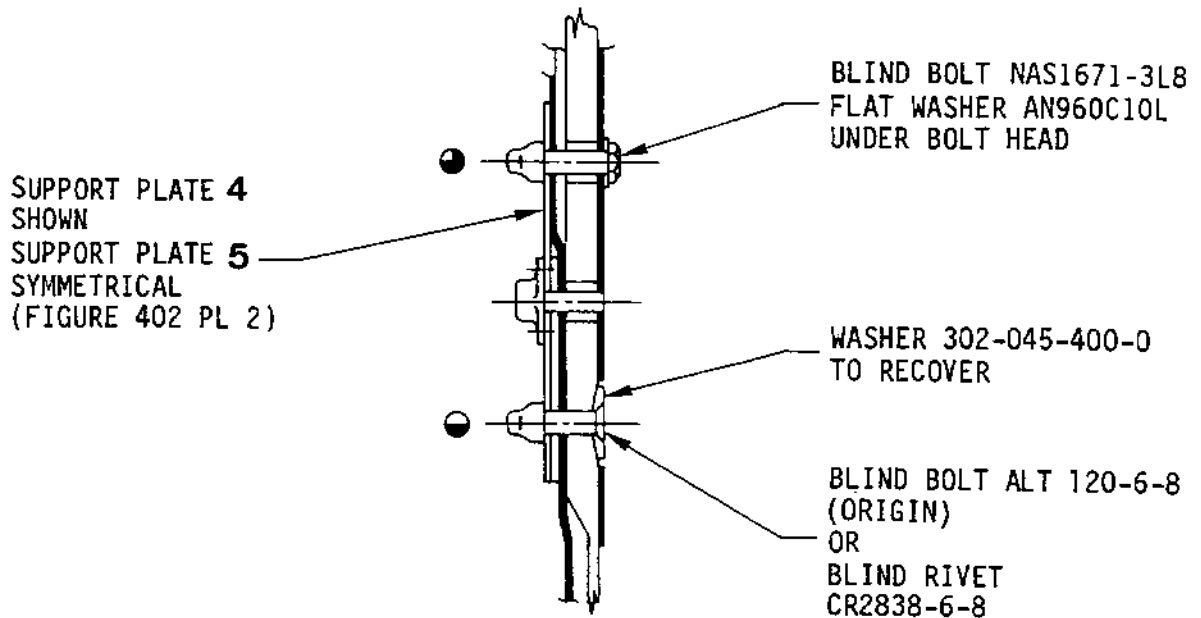


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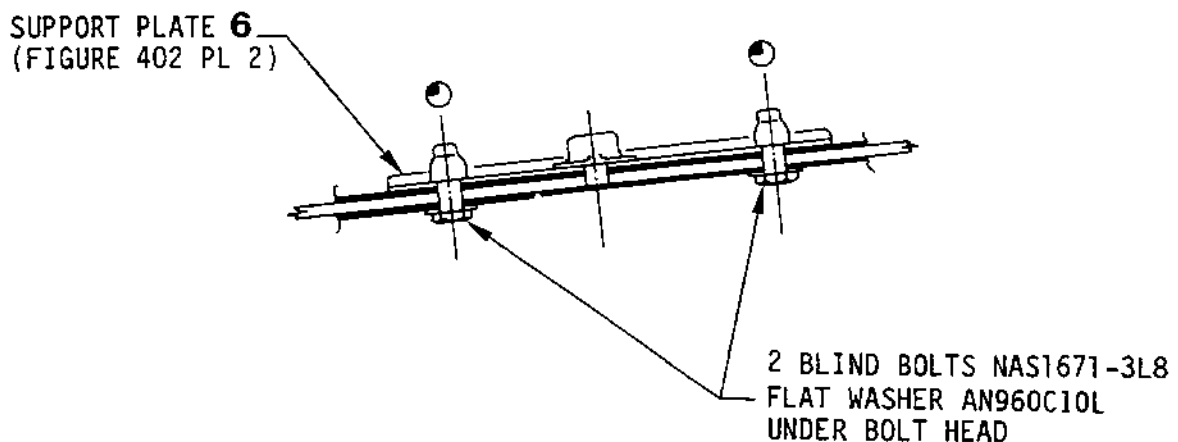
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SECTION JJ



SECTION KK



Reconditioning of the attachment points
of the ballscrew gearboxes recess blanking plates
Figure 401 (Sheet 5 of 10)

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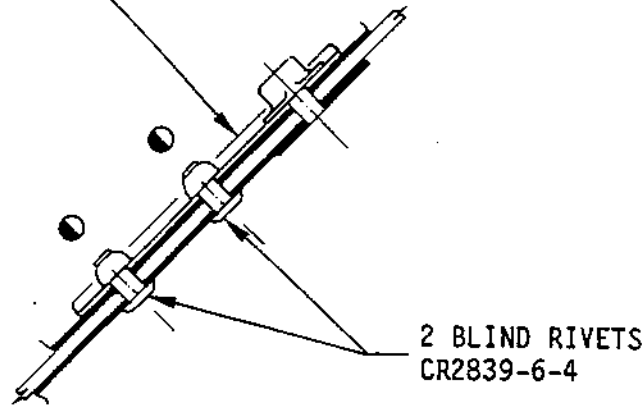
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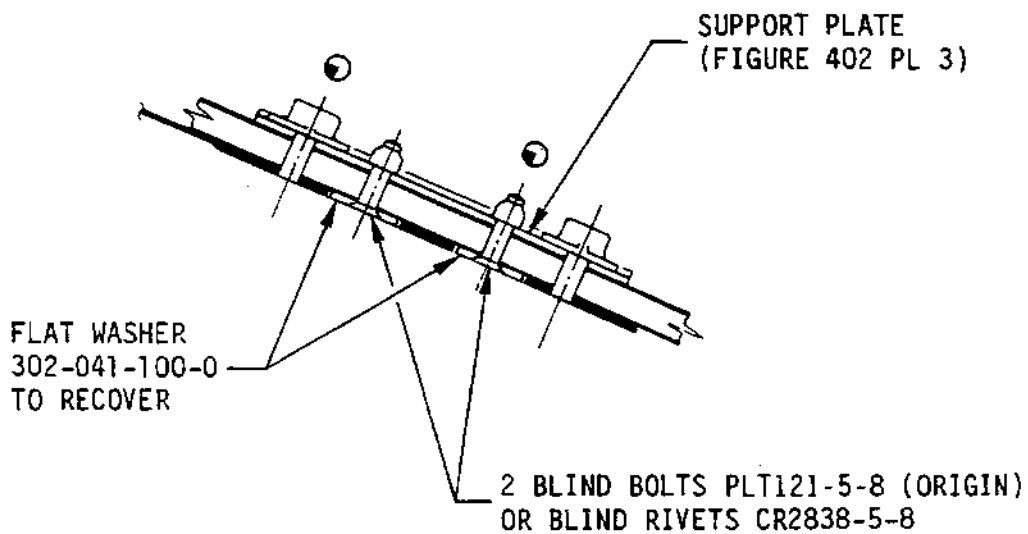


SECTION LL

SUPPORT PLATE 7 SHOWN
SUPPORT PLATE 8 SYMMETRICAL
(FIGURE 402 PL 3)



SECTION MM



Reconditioning of the attachment points
of the ballscrew gearboxes recess blanking plates
Figure 401 (Sheet 6 of 10)

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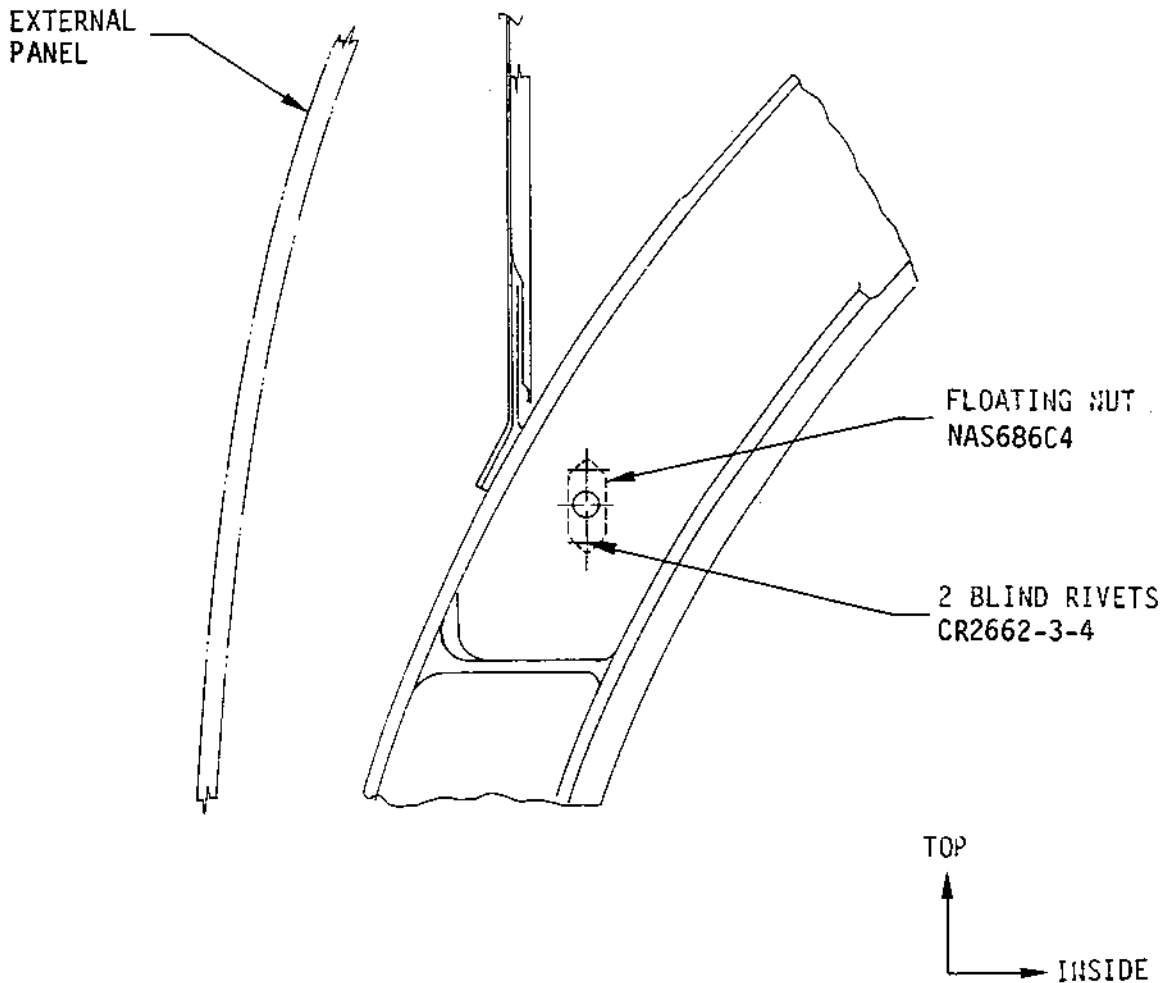
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VIEW F₂

UPPER PART BAYS 1 AND 3 SHOWN
BAYS 2 AND 4 SYMMETRICAL

LOWER PART BAYS 1 AND 3 SYMMETRICAL
BAYS 2 AND 4 SHOWN



Reconditioning of the attachment points
of the ballscrew gearboxes recess blanking plates
Figure 401 (Sheet 7 of 10)



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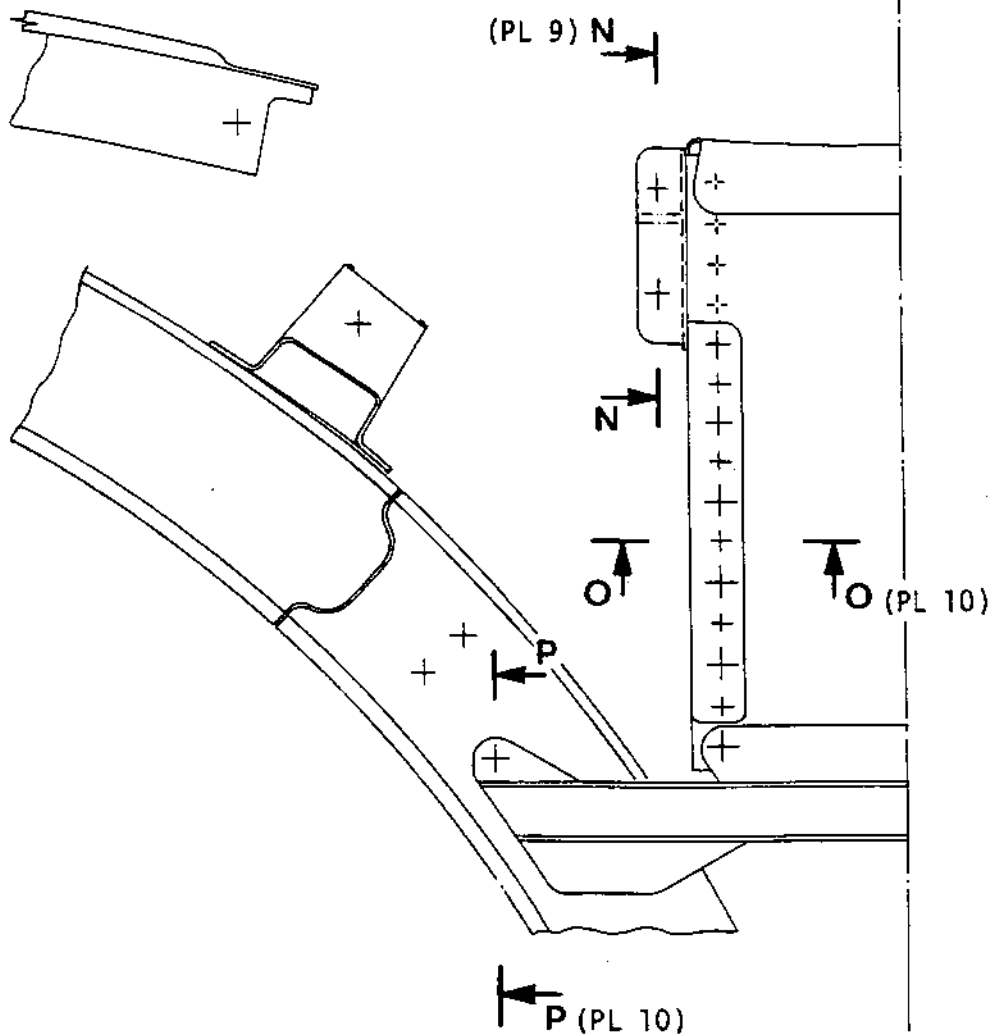
MK.610-14-28
OVERHAUL



DETAIL D

UPPER PART BAYS 1 AND 3 SHOWN
BAYS 2 AND 4 SYMMETRICAL

LOWER PART BAYS 1 AND 3 SYMMETRICAL
BAYS 2 AND 4 SHOWN



Reconditioning of the attachment points
of the ballscrew gearboxes recess blanking plates
Figure 401 (Sheet 8 of 10)

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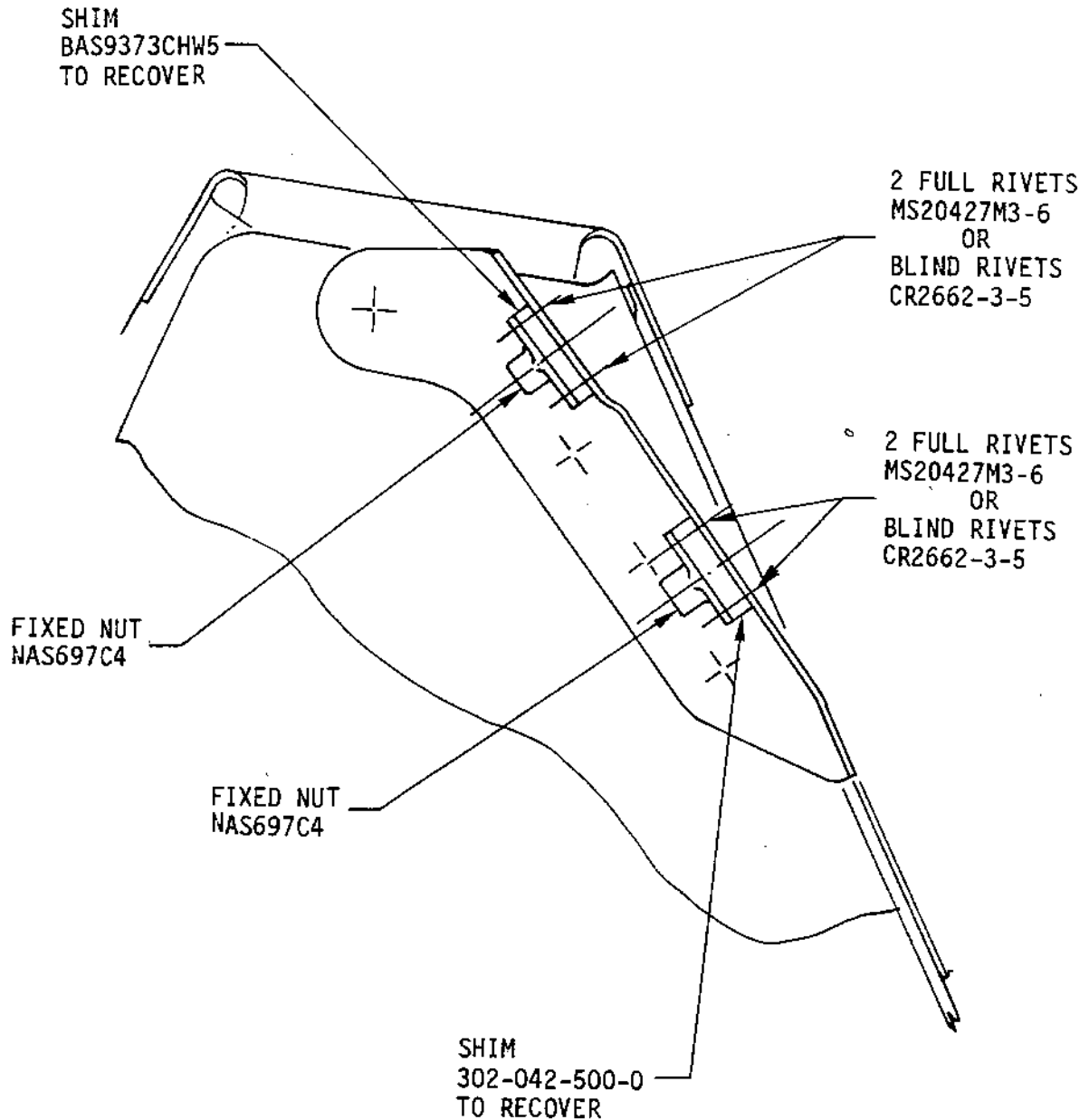


OLYMPUS 593

MK.610-14-28
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SECTION NN



Reconditioning of the attachment points
of the ballscrew gearboxes recess blanking plates
Figure 401 (Sheet 9 of 10)



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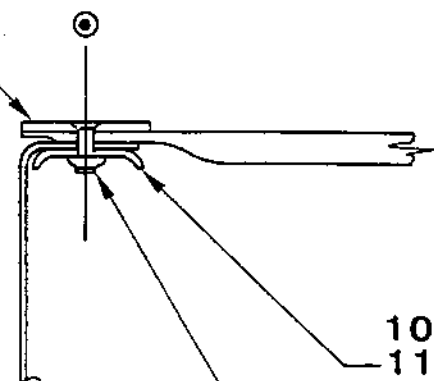
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OVERHAUL



SECTION OO

PLATE 302-047-200-0
TO RECOVER

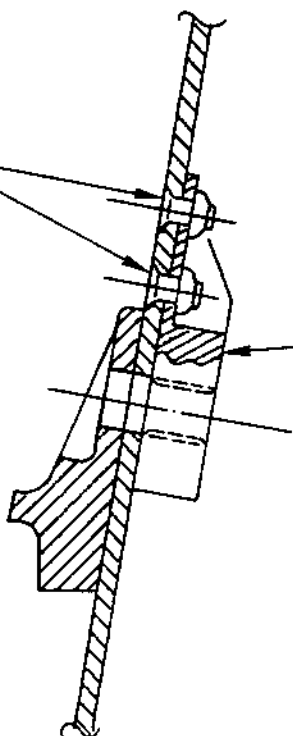


10 SHOWN
11 SYMMETRICAL
(FIGURE 402 PL 4)

BLIND RIVETS
IN 5 LOCATIONS
CR2838-5-4

SECTION PP

2 BLIND RIVETS
CR2662-3-4



NUT
NAS687C4

Reconditioning of the attachment points
of the ballscrew gearboxes recess blanking plates
Figure 401 (Sheet 10 of 10)

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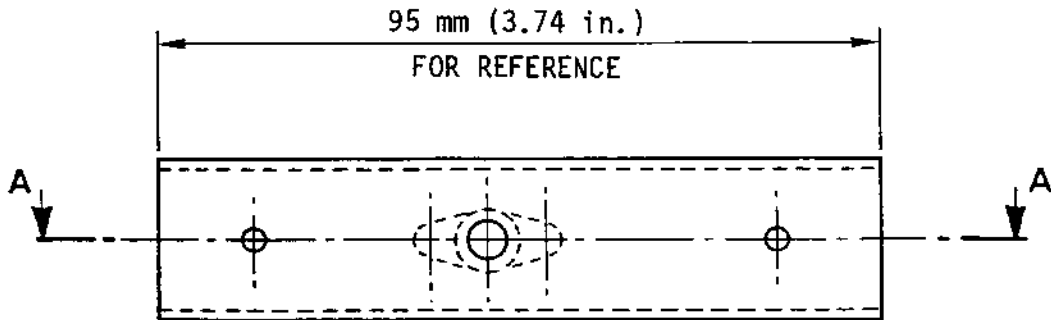


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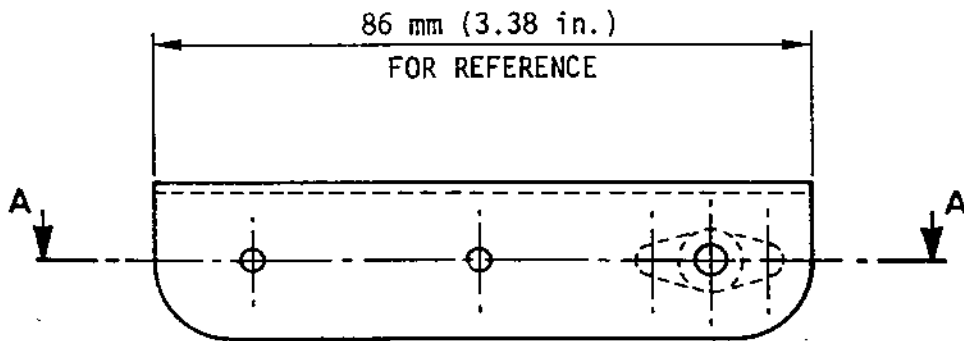
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OVERHAUL



SUPPORT PLATE 1



SUPPORT PLATE 2 SHOWN
SUPPORT PLATE 3 SYMMETRICAL



Nut replacement on the support plates
Figure 402 (Sheet 1 of 5)

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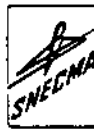
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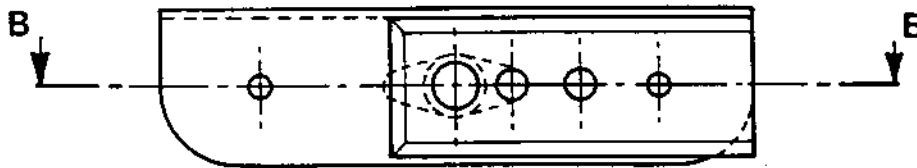


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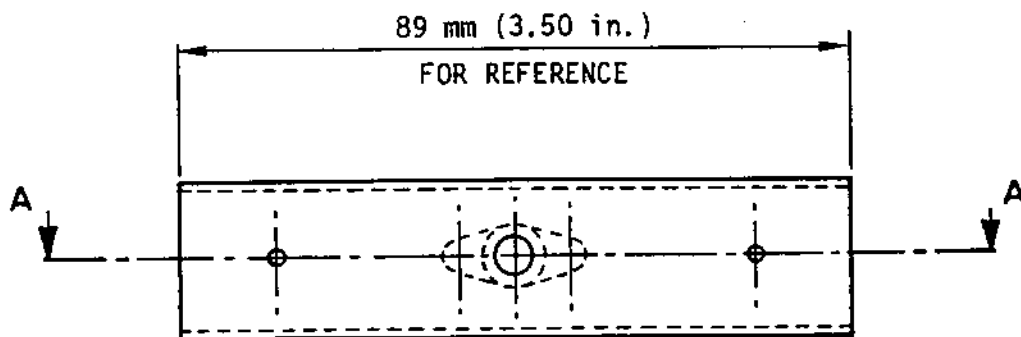
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SUPPORT PLATE 4 SHOWN
SUPPORT PLATE 5 SYMMETRICAL



SUPPORT PLATE 6



Nut replacement on the support plates
Figure 402 (Sheet 2 of 5)

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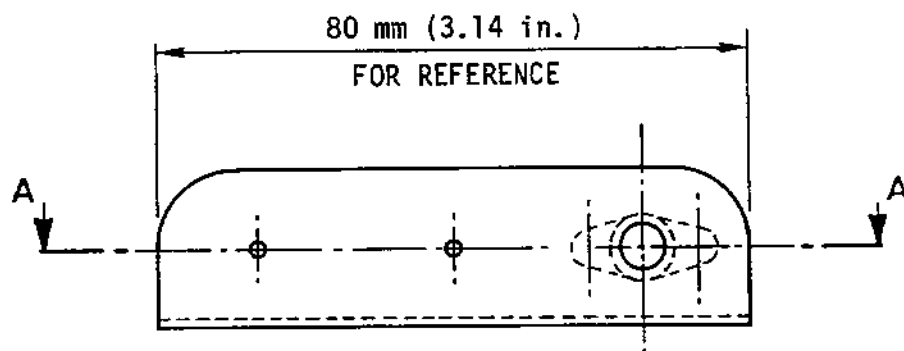


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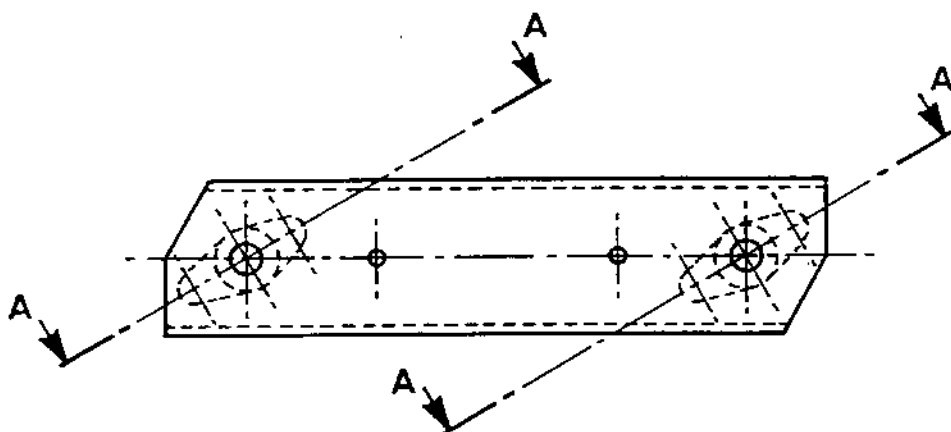
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SUPPORT PLATE 7 SHOWN
SUPPORT PLATE 8 SYMMETRICAL



SUPPORT PLATE 9



Nut replacement on the support plates
Figure 402 (Sheet 3 of 5)

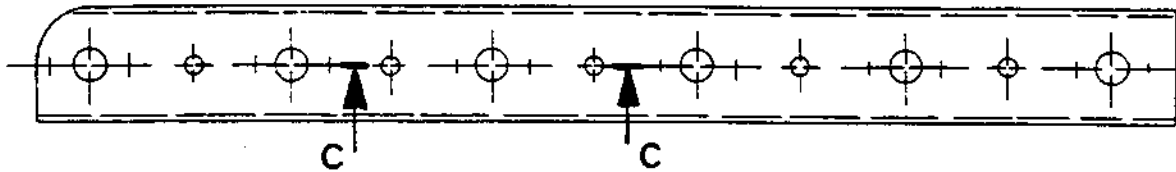


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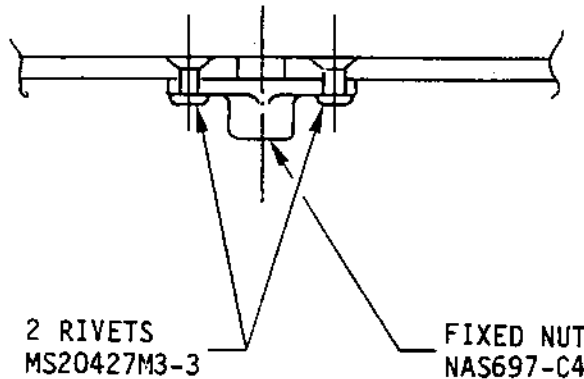
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SUPPORT PLATE 10 SHOWN
SUPPORT PLATE 11 SYMMETRICAL



SECTION C C
(VALID IN 6 LOCATIONS)



Nut replacement on the support plates
Figure 402 (Sheet 4 of 5)

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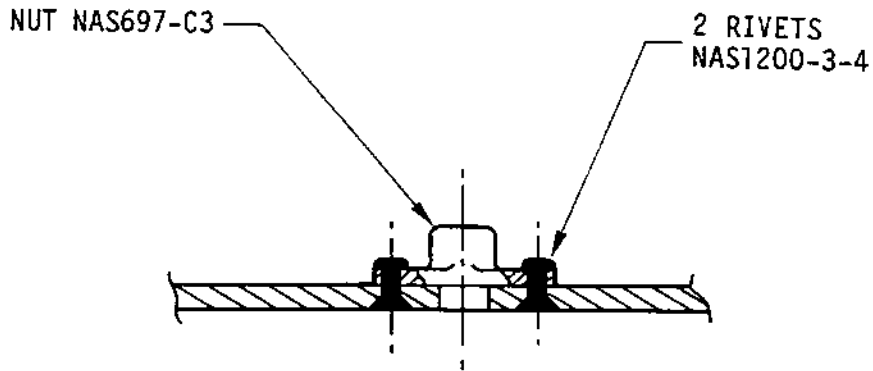


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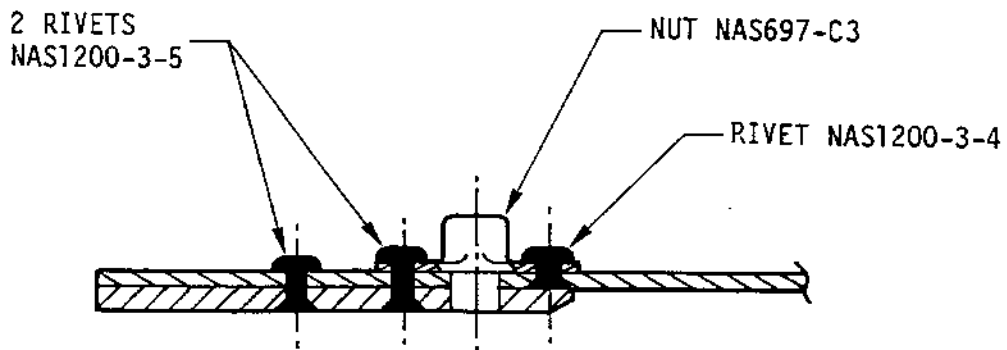
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SECTION A A



SECTION B B



Nut replacement on the support plates
Figure 402 (Sheet 5 of 5)



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REPAIR

TWIN SECONDARY NOZZLE (29-190, 191)

25. Replacement of the bushes in the fitting at the attachment point "R"

PARTS REQUIRED FOR REPAIR

Round Bar Z6NCT25 or A286 (P3601) Diameter 45 mm
(1.78 in.)

- A. Remove the bushes per figure 401 and the following procedure:
- (1) Make the extraction tool per figures 402 and 403.
 - (2) Install the nut in the bushes to be removed.
 - (3) Install the bell and the bolt.
 - (4) Remove the bushes by turning the screw while holding the nut.
- B. Clean the locating diameters for the bushes in the fitting using a clean cloth moistened with P325 (Acetone) or P422 (Methylethylketone) solvent.
- C. Re-bore the bushes recess with a 32 mm diameter (1.25 in.) reamer, able of 300 mm long (11.8 in.) boring, installed on a hand held pneumatic grinder, per figure 404, and the following procedure:
- (1) Re-bore the first locating diameter, using the second one as a guide.
 - (2) Continue the rework, in the second locating diameter, using the first re-bored diameter as a guide.
 - (3) Brake sharp angle per figure 404.

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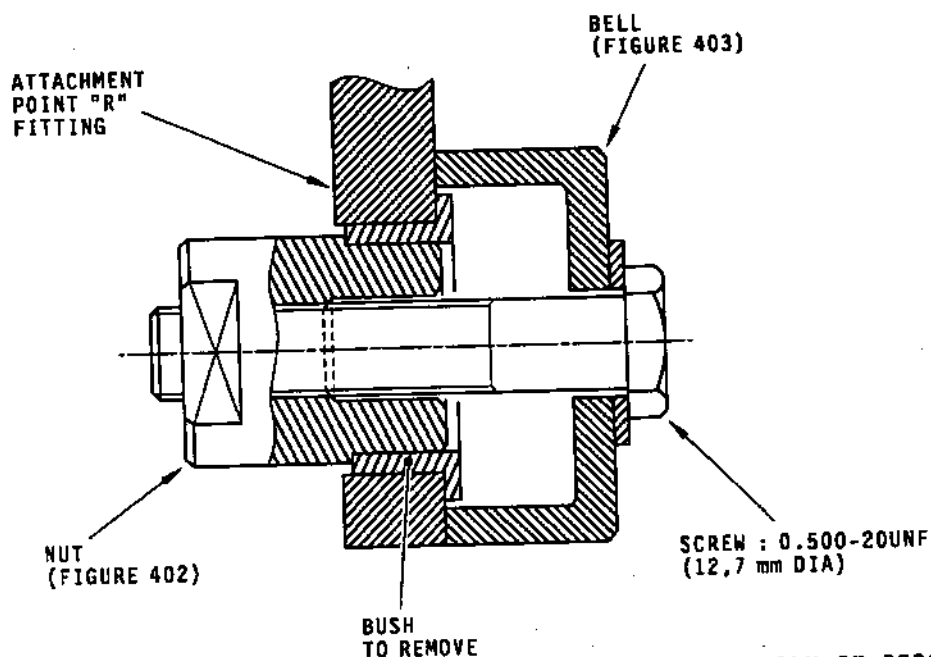
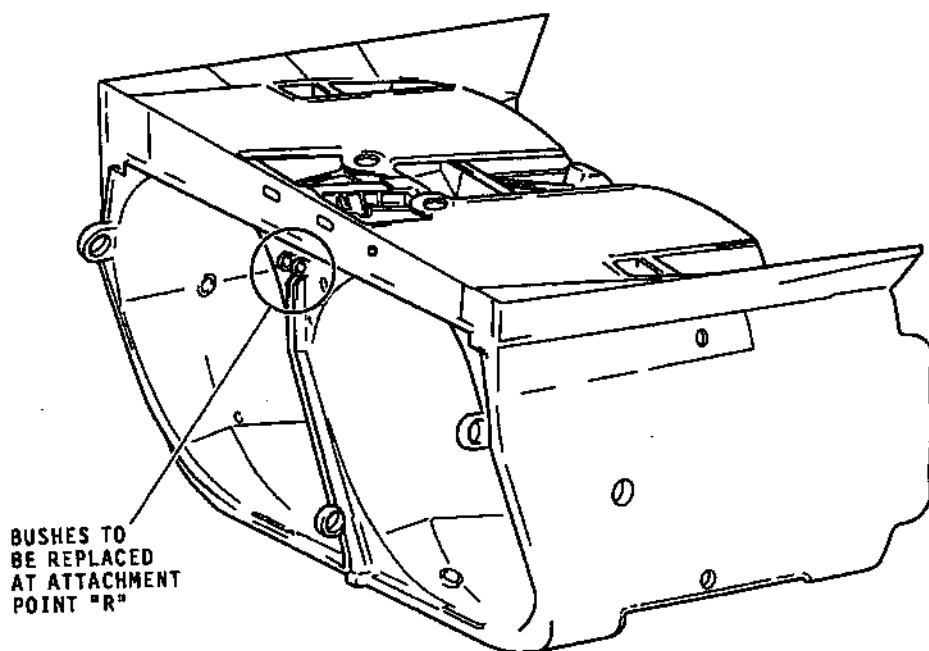
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Removal of Bushes at Attachment Point "R"
Figure 401

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D. Perform a water washable dye penetrant check per standard practice M503A of chapter 70-20-10.

No cracks allowed.

E. Measure and record the exact bushes recess diameters in the fitting.

F. Machine the repair bushes out of round bar P3601 (A286 or Z6NCT25) per figure 405 and the following procedure:

(1) Rework the bush outer diameter to obtain an assembly fit of 0 to 0,046 mm (0.0018 in.) with the reworked fitting diameter.

(2) Mark the position of the bushes on the fitting per standard practice M21 of chapter 70-10-10.

G. Clean the locating diameters for the bushes in the fitting, and the bushes using a clean cloth moistened with P325 (Acetone) or P422 (Methylethylketone).

H. Install the bushes in the fitting per figure 406 and the following procedure:

(1) Chill the bush in liquid nitrogen.

(2) Position and install the bush in its recess using the nut (figure 402).

(3) Make sure the flange of the bush is in firm contact with the fitting.

(4) Perform the same procedure for the second bush.

I. Check the correct alignment of the bushes inner diameter per figure 406 by free installation of a 28,555-28,568 mm diameter rod (1.1242-1.1247 in.) or of the screw E51-1270.

J. If necessary, re-bore the inner diameter of the bushes to 28,6 mm maxi (1.126 in.).

K. Mark "REP 25" after the nozzle identification number per standard practice M21 of chapter 70-10-10.

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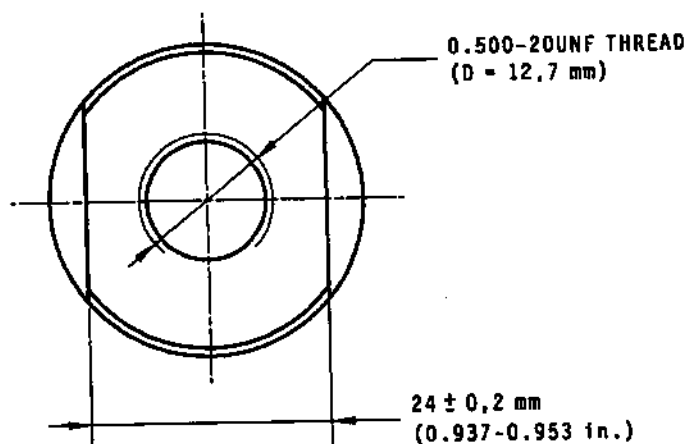
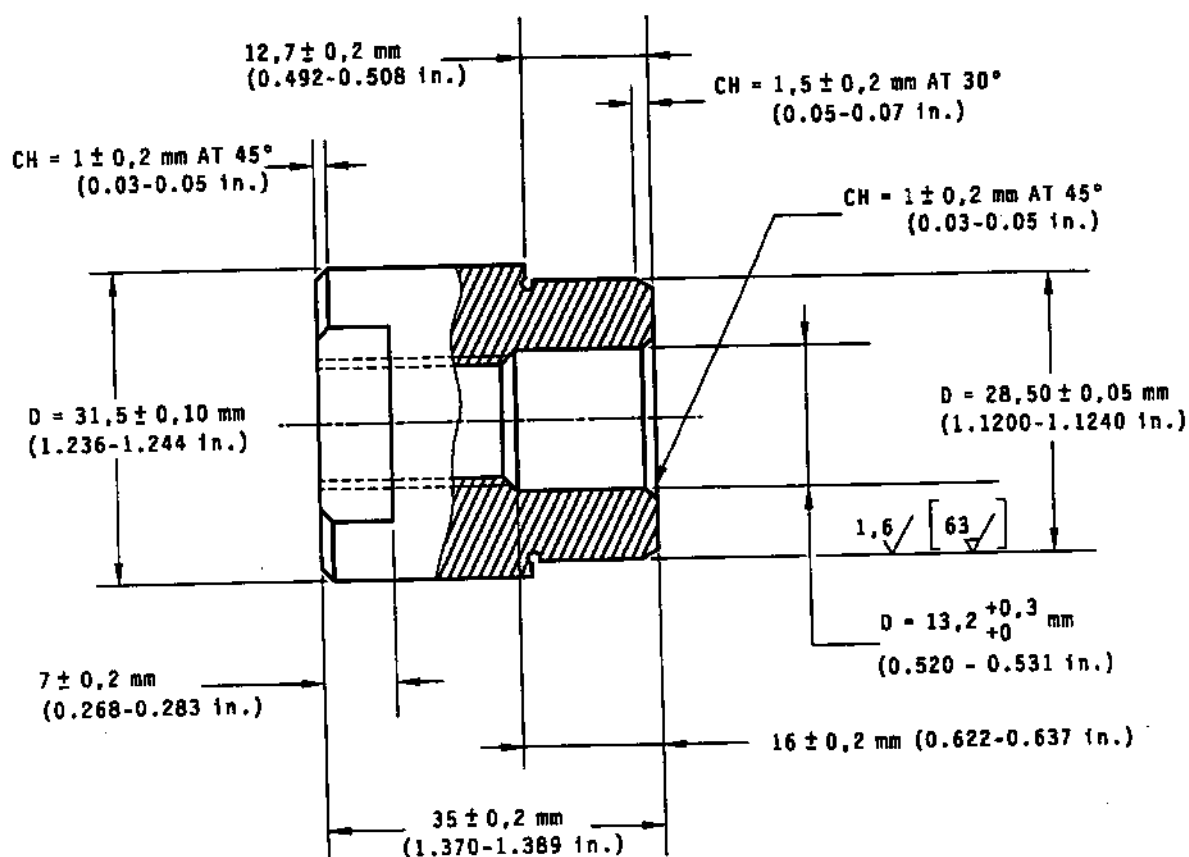
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NOTE :

MATERIAL : XC38 (SAE 1030-1040)

ROUGHNESS : 3.2 / [125]

UNLESS OTHERWISE SPECIFIED

S-OLY-SM-00012-00-B

Machining of Nut
Figure 402

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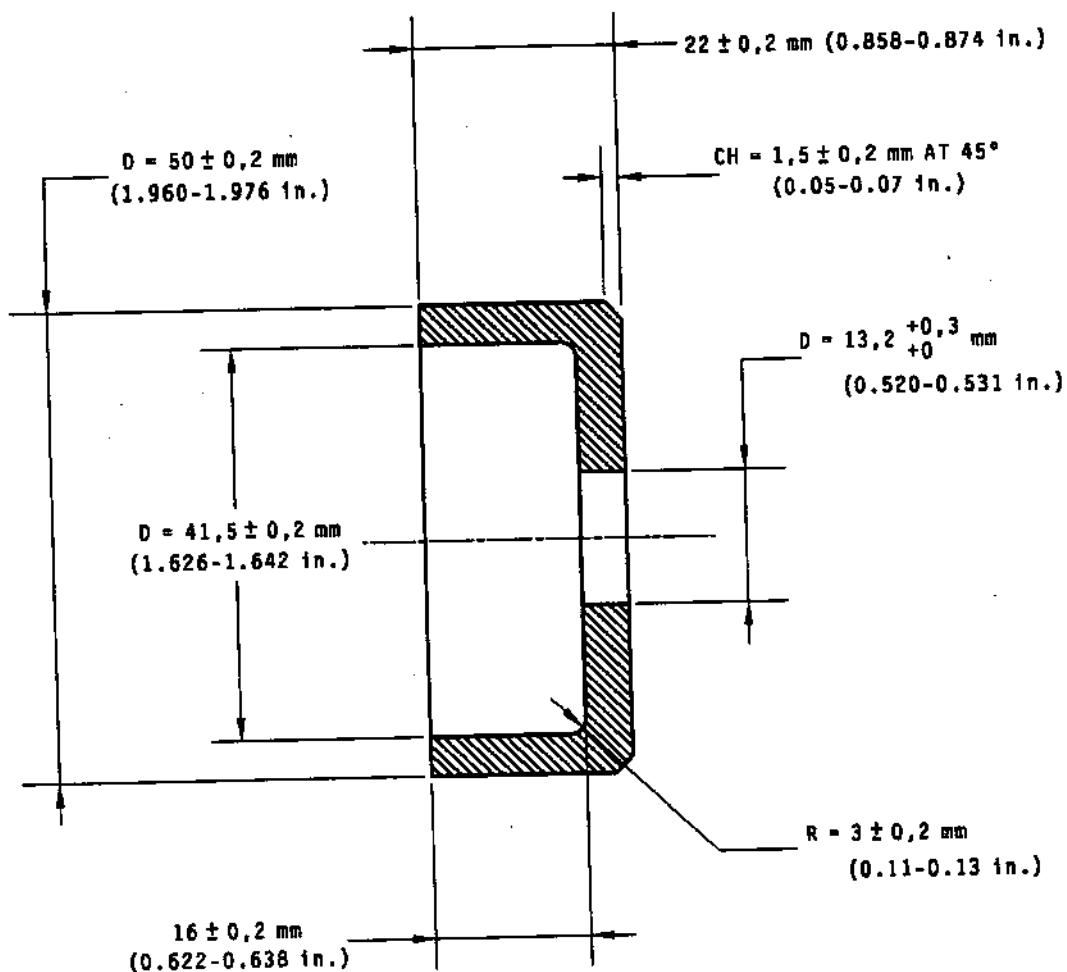
OLYMPUS 593

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NOTE :

MATERIAL : XC38 (SAE 1030-1040)

ROUGHNESS : $3,2 \sqrt{\text{V}}$ $\left[126 \sqrt{\text{V}} \right]$

S-OLY-SM-00013-00-B

Machining of Bell
Figure 403

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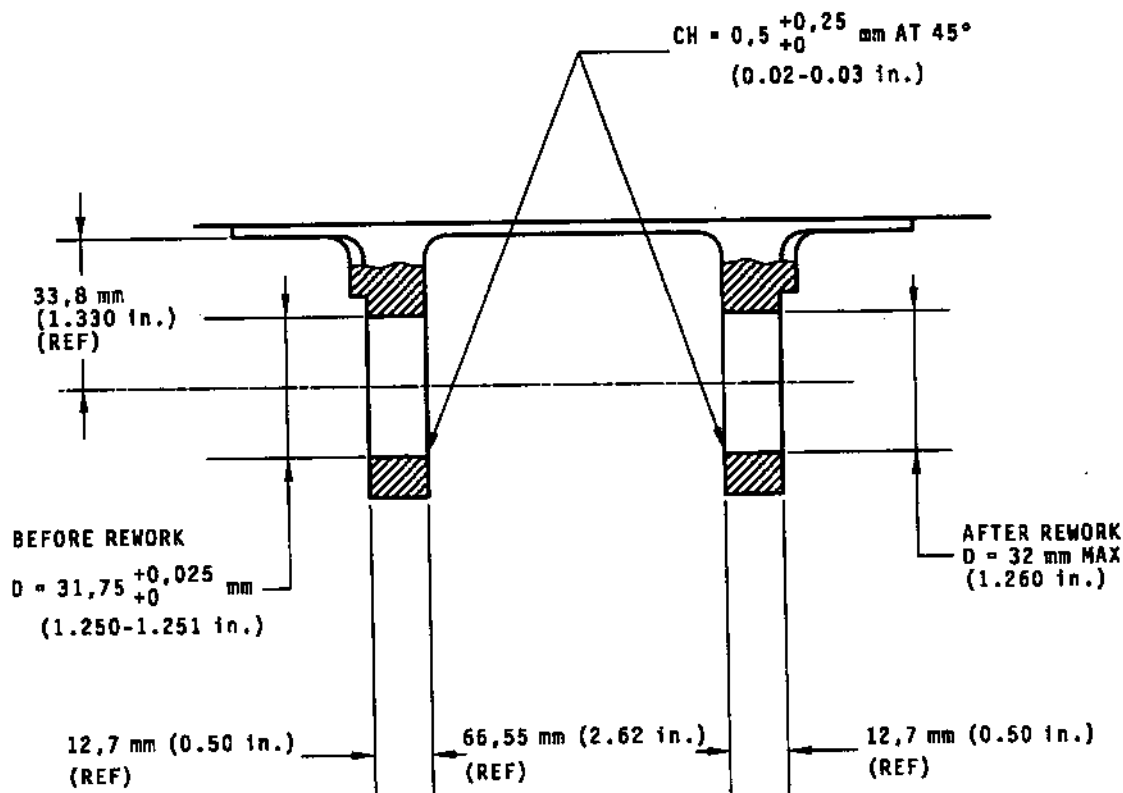
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NOTE :

FITTING MATERIAL : T1 6V-4L (TA6V)

ROUGHNESS OF REWORK : $1,6 \sqrt{[63 \sqrt{}]}$

S-OLY-SM-00014-00-B

Rework of Fitting
Figure 404

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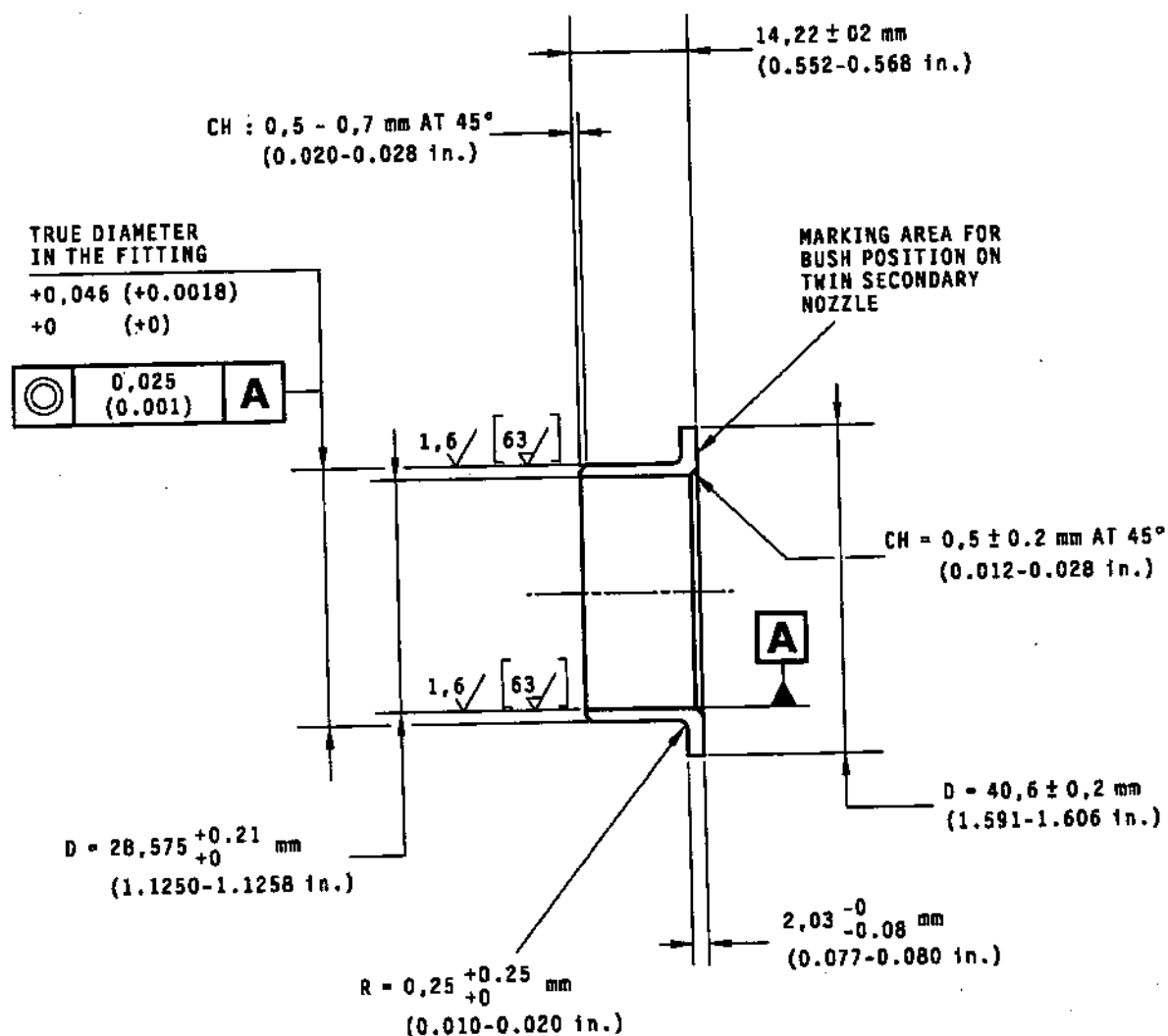
OLYMPUS 593

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NOTE :

MATERIAL : A286 (Z6NCT25)

ROUGHNESS : $3,2 / [126]$

UNLESS OTHERWISE SPECIFIED

S-OLY-SM-00015-00-B

Machining of the Repair Bushes
Figure 405

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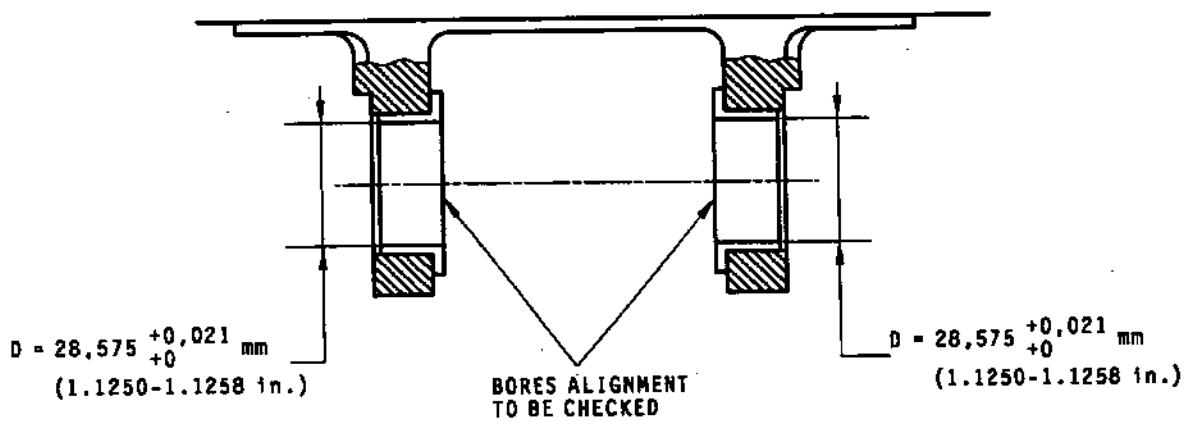


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S-OLY-SM-00016-00-B

Check of the Bores Alignment
Figure 406

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**REPAIRTWIN SECONDARY NOZZLE (29-190/191)26. Replacement of the Ballscrew Gearbox Access Doors

PARTS REQUIRED FOR REPAIR

Access Door	301-004-002-6	(Lateral Upper. Bay 1)
Access Door	301-004-052-6	(Lateral Upper. Bay 4)
Access Door	301-058-702-6	(Lateral Upper. Bay 2)
Access Door	301-058-752-6	(Lateral Upper. Bay 3)
Access Door	301-060-602-6	(Central Upper. Bays 1 and 2)
	or 301-060-603-6	
Access Door	301-060-402-6	(Central Upper. Bays 3 and 4)
	or 301-060-403-6	
Access Door	301-058-401-6	(Lateral Lower. Bays 1 and 3)
Access Door	301-058-451-6	(Lateral Lower. Bays 2 and 4)
Access Door	301-153-702-6	(Central Lower)
Insert	302-063-600-0	
Crimping Ring	302-063-900-0	
Insert	SPC 9102C8CB-SFC274	(649-772-249-0)
Crimping Ring	SPC 9102C8CB-GF	(649-772-248-0)

A. Record of Position. (See figure 401).

- (1) Install the tool on the access door to be replaced.
Position in attachment inserts to be matchmarked
using following pins:
 - (a) 7 mm (0.276 in.) dia. for the lateral upper
access doors.
 - (b) 6,6 mm (0.260 in.) dia. for the central and the
lateral lower access doors.
- (2) Tighten the tool with the knurled screws.
- (3) Install the arms on each sides of the tool.
Position the arms in the "actual" inserts of the new
access door using the 7 mm (0.276 in.) or 6,6 mm
(0.260 in.) dia. pins. Tighten the arms.

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- (4) Remove the tool from the access door to be replaced taking care not to move the arms.
- (5) Install the tool on the new access door. Position it on the inserts at the arms position using the 7 mm (0.276 in.) or 6,6 mm (0.260 in.) dia. pins.
- (6) Tighten the tool with the knurled screws.

B. Drilling of the Insert Holes. (See figure 402).

- (1) Install the new access door, fitted with the tool, on a vice.
- (2) Screw the drill guides in the tool for:
 - (a) 13 to 13,05 mm (0.512 - 0.514 in.) dia. holes for the lateral upper access doors.
 - (b) 11,05 to 11,10 mm (0.435 - 0.427 in.) dia. holes for the central and the lateral lower access doors.
- (3) Install a step drill fitted in a hand held drilling machine. Drill insert holes as described in chapter 70-30-10 and as follows:
 - (a) Drill from one side of the door until the pilot diameter of the step drill passes through the door.
 - (b) Ream the pilot hole from the other side of the door.
- (4) Remove the access door and the tool.
- (5) Draw-file the holes to break the sharp angles. Blow clean with shop air.

C. Recessing. (See figure 402).

- (1) Install the tool fitted with a drill guide on the new access door. Position in the hole drilled in step B.
- (2) Remove the drill guide and replace by the dies. Screw the dies until they come in contact with the door.

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- (3) Stamp recesses in the door by alternatively screwing the dies by a quarter of a turn each time, until the contact between the two dies is established.
- (4) Unscrew the dies and remove the tool.
- (5) Visually check recesses for cracks. No cracks allowed.

D. Crimping of Inserts. (See figure 403).

NOTE: This step can be performed after drilling of the other insert holes.

- (1) Install the tool on the access door and position using the insert hole.
- (2) Install the inserts in their holes as follows:
 - (a) Insert PN 302-063-600-0 with crimping ring PN 302-063-900-0 for the lateral upper access doors.
 - (b) Insert PN SPC 9102C8CB-SFC274 with crimping ring PN SPC 9102C8CB-GF for the central and the lateral lower access doors.
- (3) Screw the die, into the tool. Lightly tighten the inserts to bring them in contact with the door.
- (4) Screw the punch into the tool. Crimp the part by tightening the punch until it comes in contact with the die.
- (5) Remove the tool.

E. Inspection.

- (1) Check the crimping and inserts fitting per Figure 404.

F. Marking. (See figure 401).

- (1) Mark "REP 26" and serial number of the corresponding nozzle per method 28 of chapter 70-10-10 after the part number of the access door.

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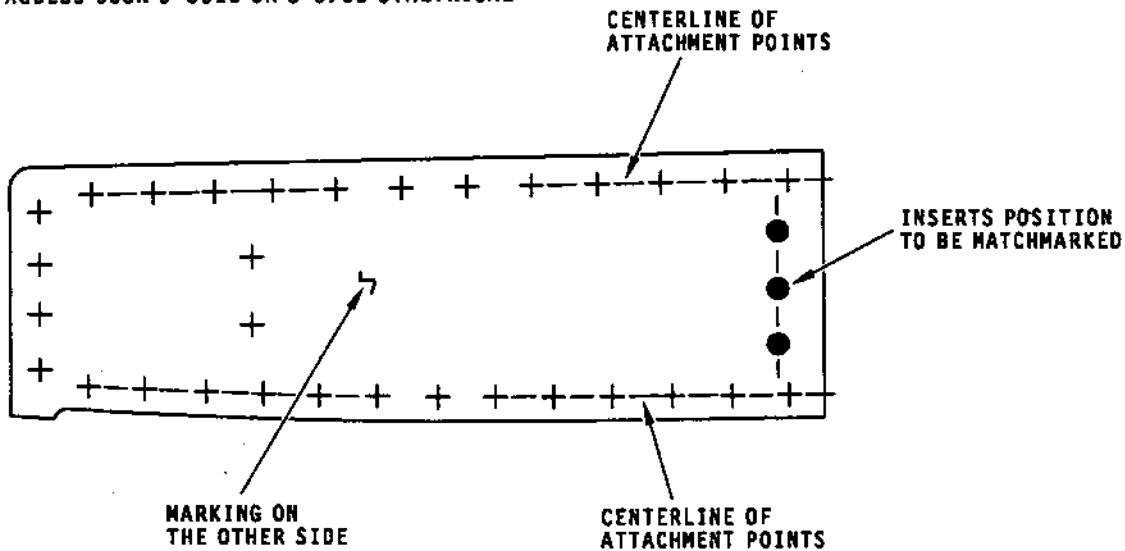


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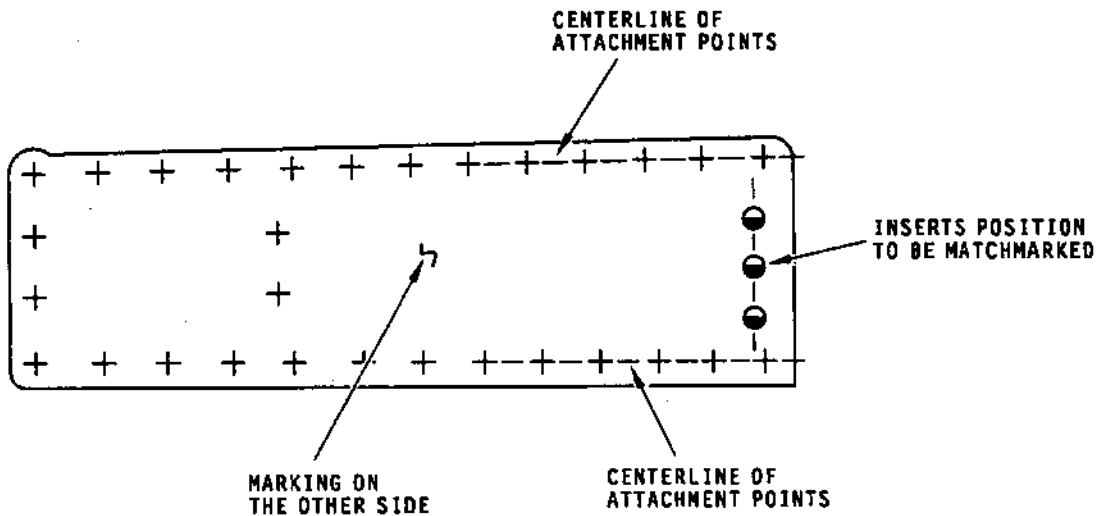
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ACCESS DOOR 3-350C OR 3-371C SHOWN
ACCESS DOOR 3-351C OR 3-370C SYMETRICAL



ACCESS DOOR 4-30B OR 4-51B SHOWN
ACCESS DOOR 4-31B OR 4-50B SYMETRICAL



S-OLY-SM-00003-00-B

Recording of the Inserts Position
Figure 401 (Sheet 1 of 2)

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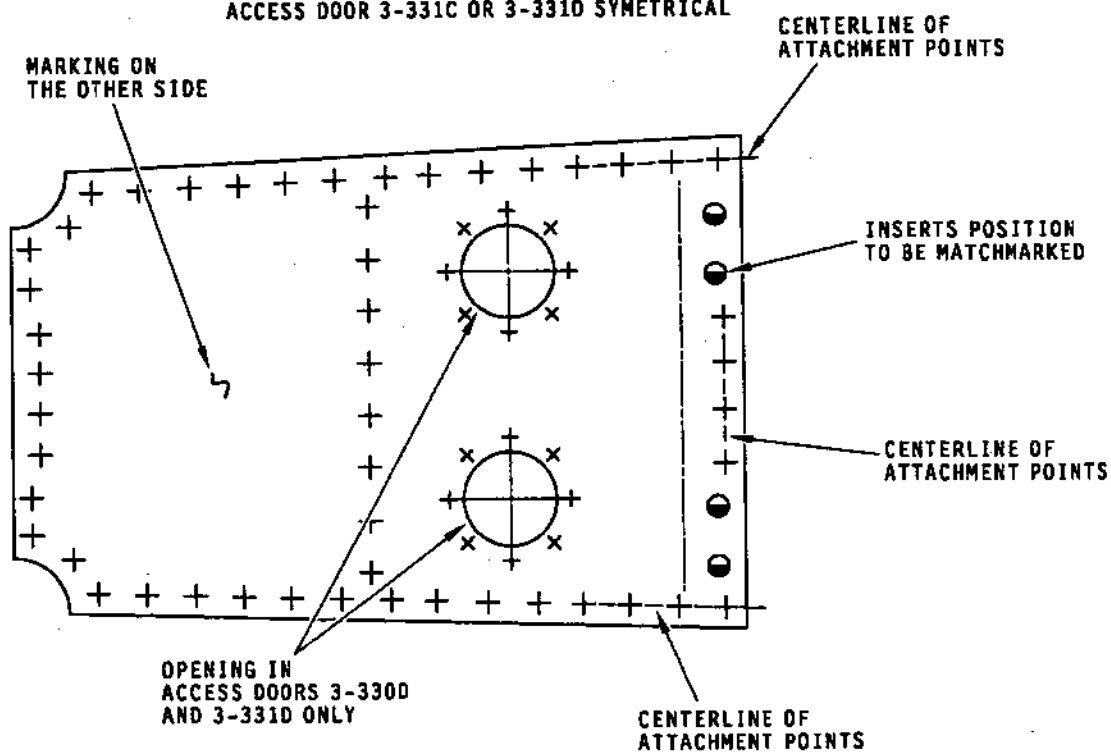
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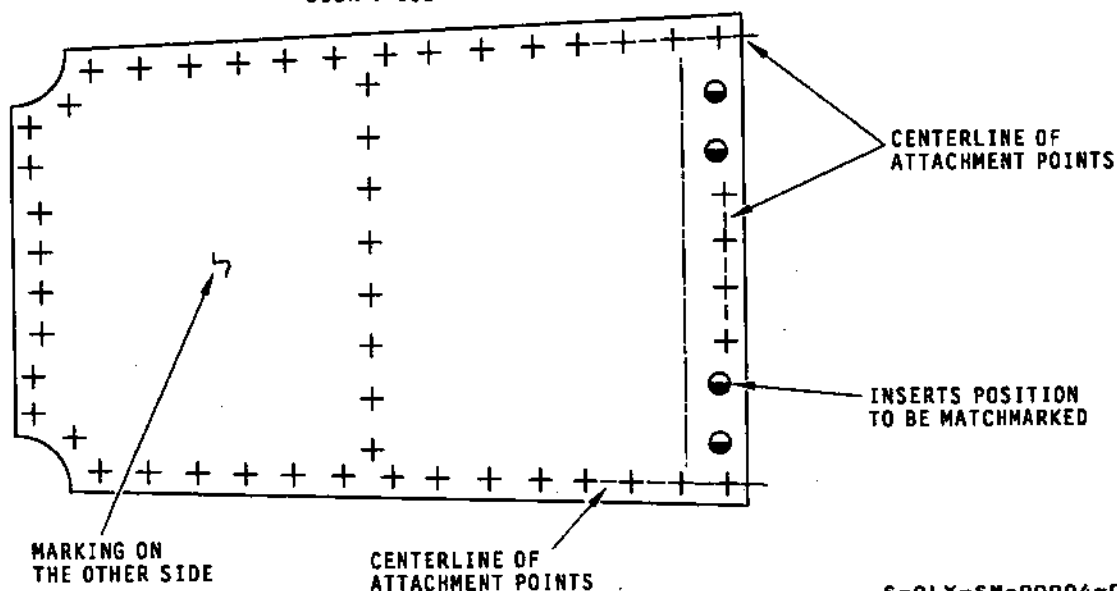


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ACCESS DOOR 3-330C OR 3-330D SHOWN
ACCESS DOOR 3-331C OR 3-331D SYMETRICAL



DOOR 4-10C



S-OLY-SM-00004-00-B

Recording of the Inserts Position
Figure 401 (Sheet 2 of 2)

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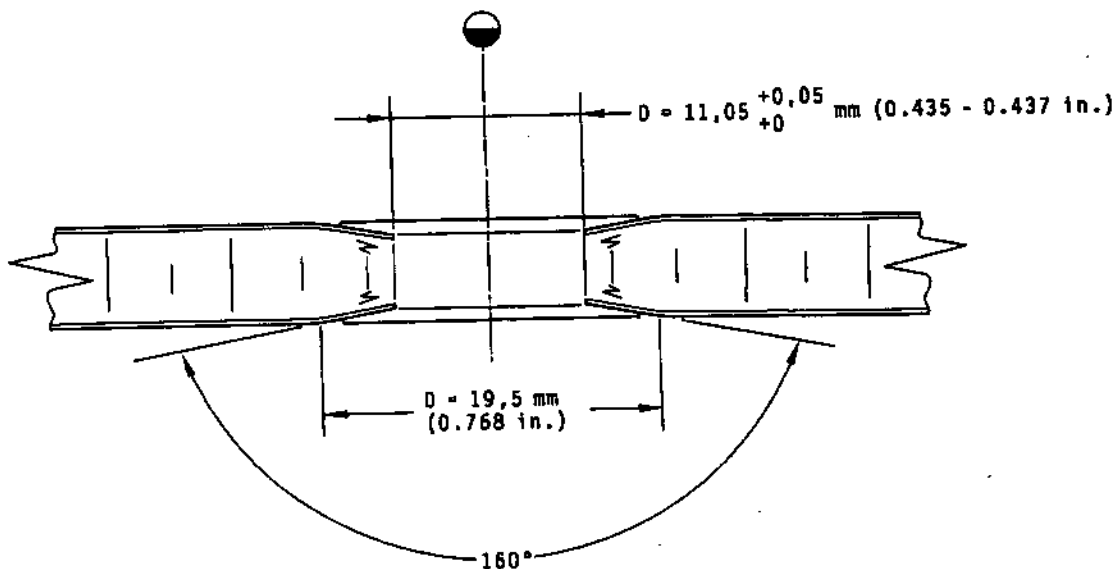
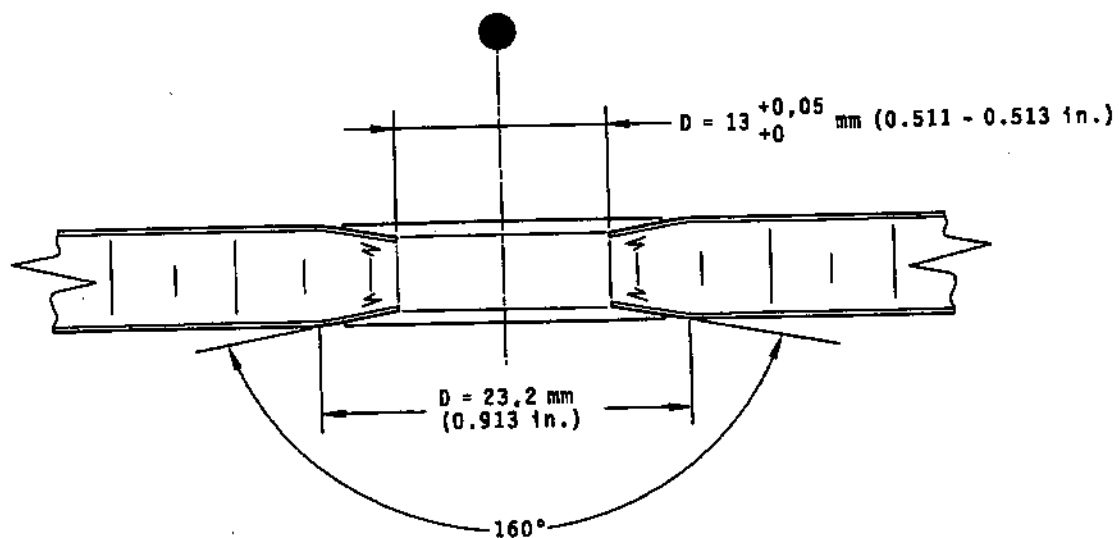
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Drilling and Recessing of Insert Holes
Figure 402

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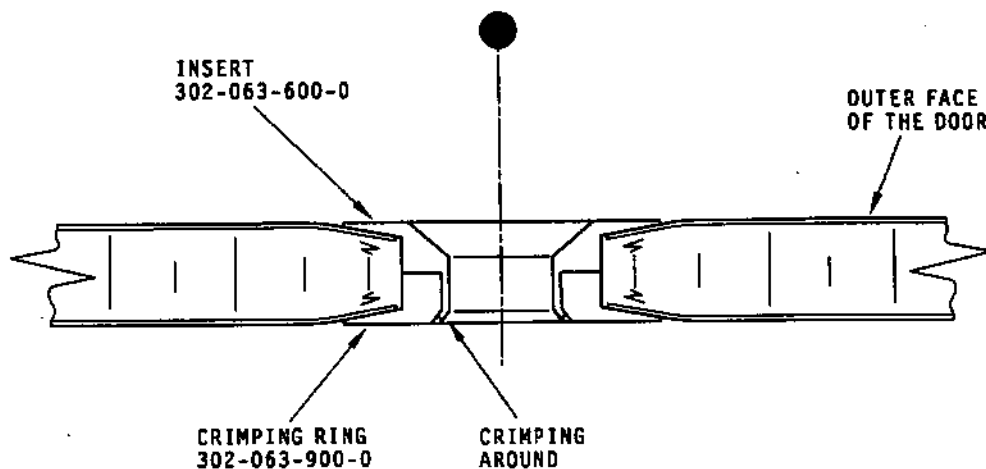
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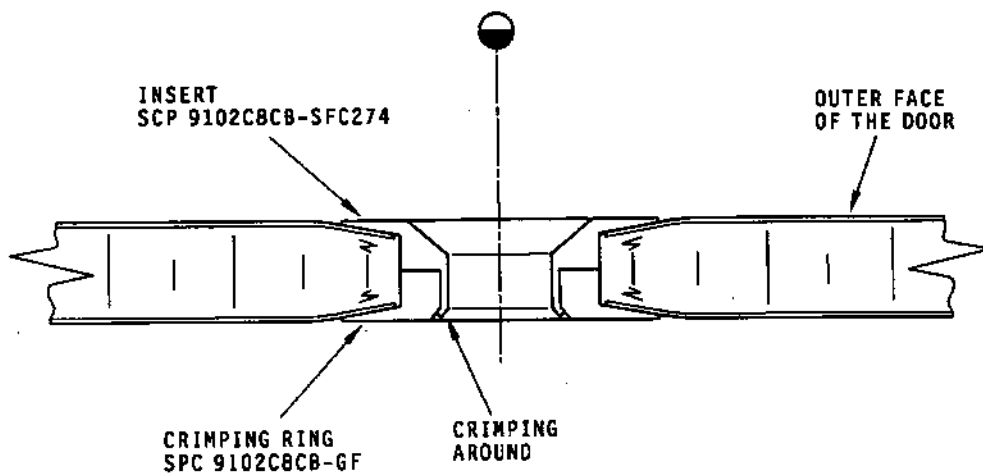


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FOR LATERAL UPPER DOORS



FOR CENTRAL AND LATERAL LOWER DOORS



S-OLY-SM-00006-00-B

Installation of Inserts
Figure 403

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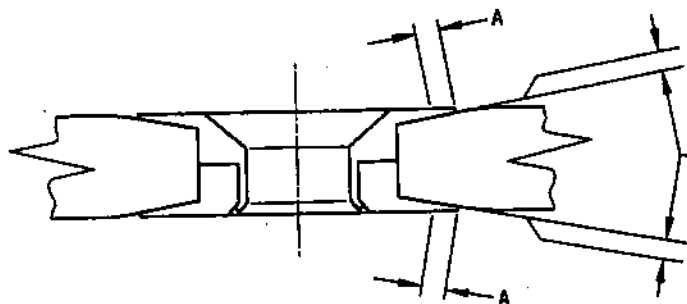
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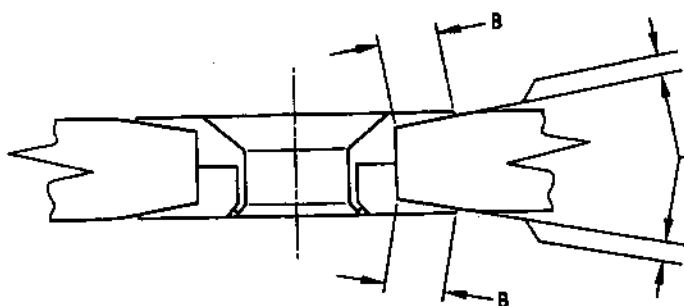
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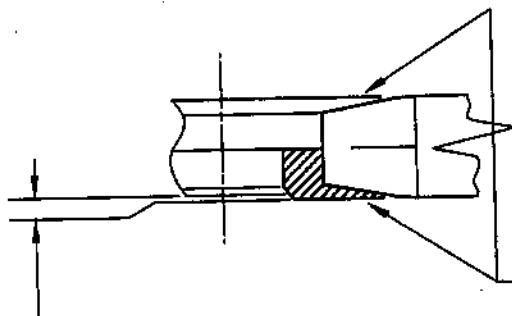
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MAXIMUM GAP = 0,05 mm (0.002 in.)
ALL AROUND INSERT AND CRIMPING
RING OVER A LENGTH A =
- 1.4 mm (0.055 in.) MAX
FOR INSERTS TYPE 
- 1.1 mm (0.043 in.) MAX
FOR INSERTS TYPE 



MAXIMUM GAP = 0,1 mm (0.004 in.)
OVER 30 % MAX OF INSERT PERIPHERY
ON A LENGTH B =
- 4,2 mm (0.165 in.) MAX
FOR INSERTS TYPE 
- 3,3 mm (0.130 in.) MAX
FOR INSERTS TYPE 



CRIMPING RECESSING
TO BE WITHIN
0 - 0,5 mm (0 - 0.020 in.)

OUT OF FLUSH :
0,10 mm (0.004 in.) MAX
TOLERANCES :
0,25 (+0,10 -0,25) mm
(+0.004 -0.010 in.) MAX

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Inspection of Crimping
Figure 404

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OVERHAUL



ASSEMBLY

1. General

- A. During assembly, follow the recommendations given in chapter 70-65-00 of the Manual of Standard Practices, and in the working procedures section of the Overhaul Manual.
- B. Use only tools and other special equipment nominated in the assembly procedures, and identified by a number SC... The tools are shown in the Illustrated Tools and Equipment Manual (I.T.E.M).
- C. During assembly of bolts and nuts, refer to pages 601-700 of the "Fits and Clearances" Chapter for :
 - (1) The tightening torque for the nut or bolt.
 - (2) The lubrication to be applied to the nut or bolt before assembly.

NOTE : Wire-locking of nuts or bolts is to be carried out using NC 15 Fe wire 0,8 mm (0.032 in) diameter, except for the electrical harnesses, where 0,6 mm (0.024 in) wire is to be used.

- D. The clearances to be checked during assembly are identified by a number. Refer to pages 601-700 of the "Fits and Clearances" chapter for the values to be respected.
- E. In the working procedures section of the Manual, parts are referenced to the I.P.L by two numbers in brackets, the first of which is the figure number in the I.P.L on which the part is shown, the second being the item number within that figure.

2. Location

The twin secondary nozzle is a monobloc assembly common to two engines (1-2 and 3-4) which, in addition to its function of ducting exhaust gas, ensures continuity of lines of the engine nacelle.

The two twin secondary nozzles fitted to the aircraft are not identical due to the geometrical evolution of the nacelles between two adjacent engines and the aircraft axis of symmetry.

The assembly operations detailed in this chapter pertain to the L.H. twin secondary nozzle (bays 1 and 2). When a difference exists for assembly of the R.H. twin secondary nozzle, this difference appears in the text.

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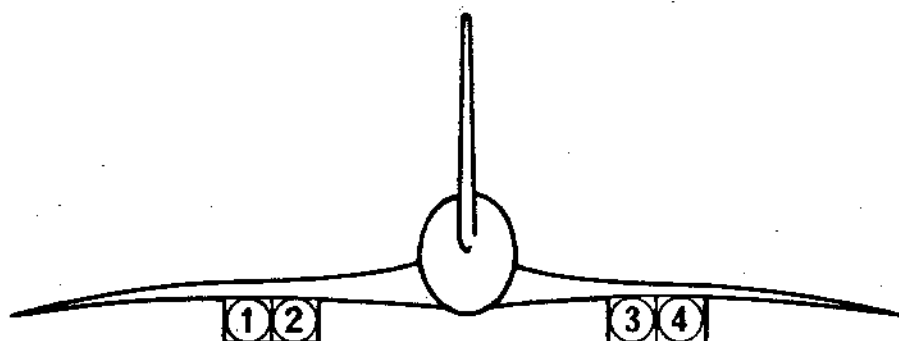


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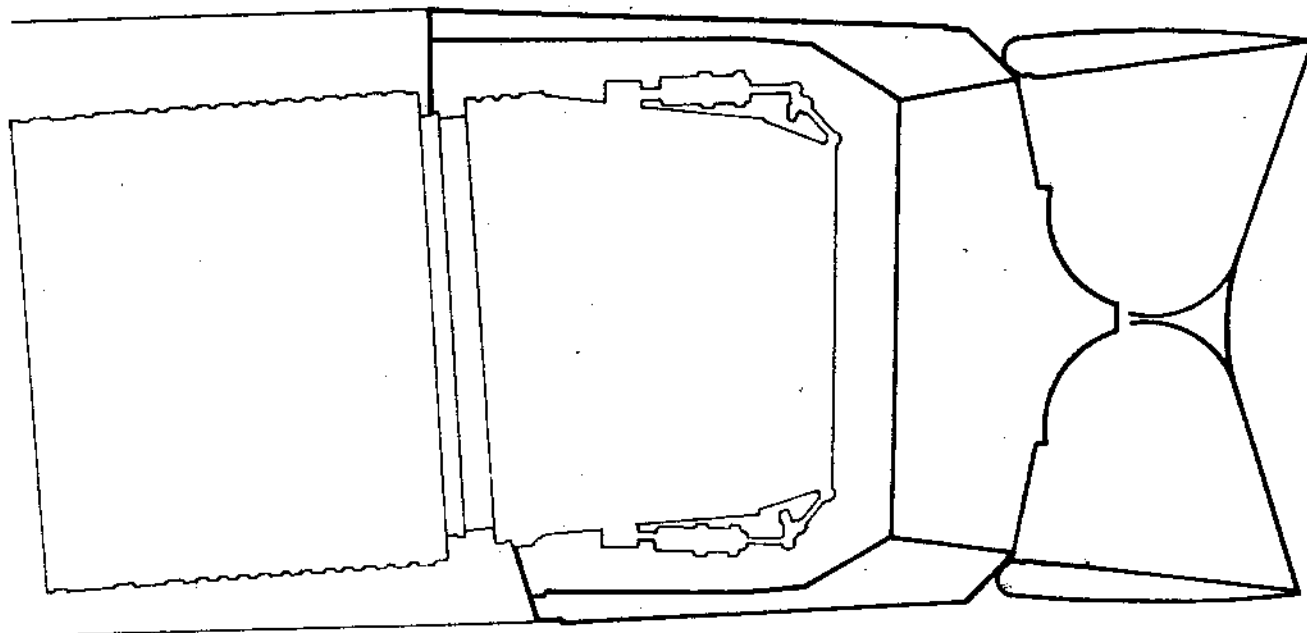


VIEW FROM
REAR



L.H. TWIN SECONDARY NOZZLE
BAYS 1 AND 2

R.H. TWIN SECONDARY NOZZLE
BAYS 3 AND 4



Location of the Twin Secondary Nozzles on Aircraft
Figure 501

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OVERHAUL



3. Fitting of Front Framework Attachment Links

NOTE : The twin secondary nozzle assembly is fixed to the transport trolley - tool SC 36 -

A. Equipment of the Brackets on the Side Walls

Carry out the following operations for each bracket :

- (1) Fit the bearing housing (29-110) in each bracket. secure each bearing housing with a locking ring (29-90).
- (2) Tighten the locking ring to the recommended torque and lock it using split pin (29-80).
- (3) Fit a spherical bearing (29-100) to each bearing housing, and retain it with locking ring (29-70).
- (4) Tighten the locking ring to the recommended torque and lock it with the split pin (29-60).

NOTE : The head of the split pin is inside the ring.

- (5) Fit spherical bearing bushes (29-50) and pin (29-40).

B. Fitting of the Attachment Links on the Central Wall

- (1) Fit the bearing housing (29-180) in the bracket. Fix the bearing housing using locking ring (29-160).
- (2) Tighten the locking ring to the recommended torque and lock it using split pin (29-150).
- (3) Fit bearing (29-170) into the bearing housing and retain it using locking ring (29-140).
- (4) Tighten the locking ring to the recommended torque and lock it using split pin (29-130).

NOTE : The head of the pin is inside the ring.

- (5) Fit the spherical bearing bushings (29-120).



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OVERHAUL



4. Installation of the Twin Secondary Nozzle on the Assembly/
Disassembly Workstand

- A. Installation of the Upper Handling Attachment Point -
tool SC 194
- (1) Rotate the handling equipment attachment point on the crossbeam, at the level of the access doors to the bucket pneumatic actuators.
 - (2) Secure the fitting with two bolts, tighten the bolts.
- B. Position the Twin Secondary Nozzle Assembly on the Rotating Stand - tool SC 117
- (1) Position the hoisting beam - tool SC 195 - above the secondary nozzle and secure it to the three hoisting points.
 - (2) Take up the slack in the slings and adjust the hoisting beam centre of gravity to balance the load.
 - (3) Free the secondary nozzle from the transport trolley and raise it.
 - (4) Position the nozzle on the rotating stand (in the horizontal position) and secure it using the three pins.
Secure the pins with the locking pins provided for this purpose.

NOTE : Do not forget to install the protection rings.

- (5) Remove the hoisting beam - tool SC 195.

5. Installation of Electrical Wiring Harnesses

CAUTION

PRIOR TO THE FINAL TIGHTENING OF THE ATTACHMENT BOLTS, ENSURE A 5 MM (0.1968 IN) CLEARANCE WITH RESPECT TO THE STRUCTURE SHARP EDGES, BOLT HEADS, RIVET HEADS, NUTS.

- A. Operate the Rotating Stand - tool SC 117 - to Bring the Secondary Nozzle into the Vertical Position.
- B. Installation of the Bay 1 Electrical Wiring Harness (27-60)
(figure 502)
- (1) Position the support assembly (27-210) and secure it using bolt (27-200) and nut (27-190).

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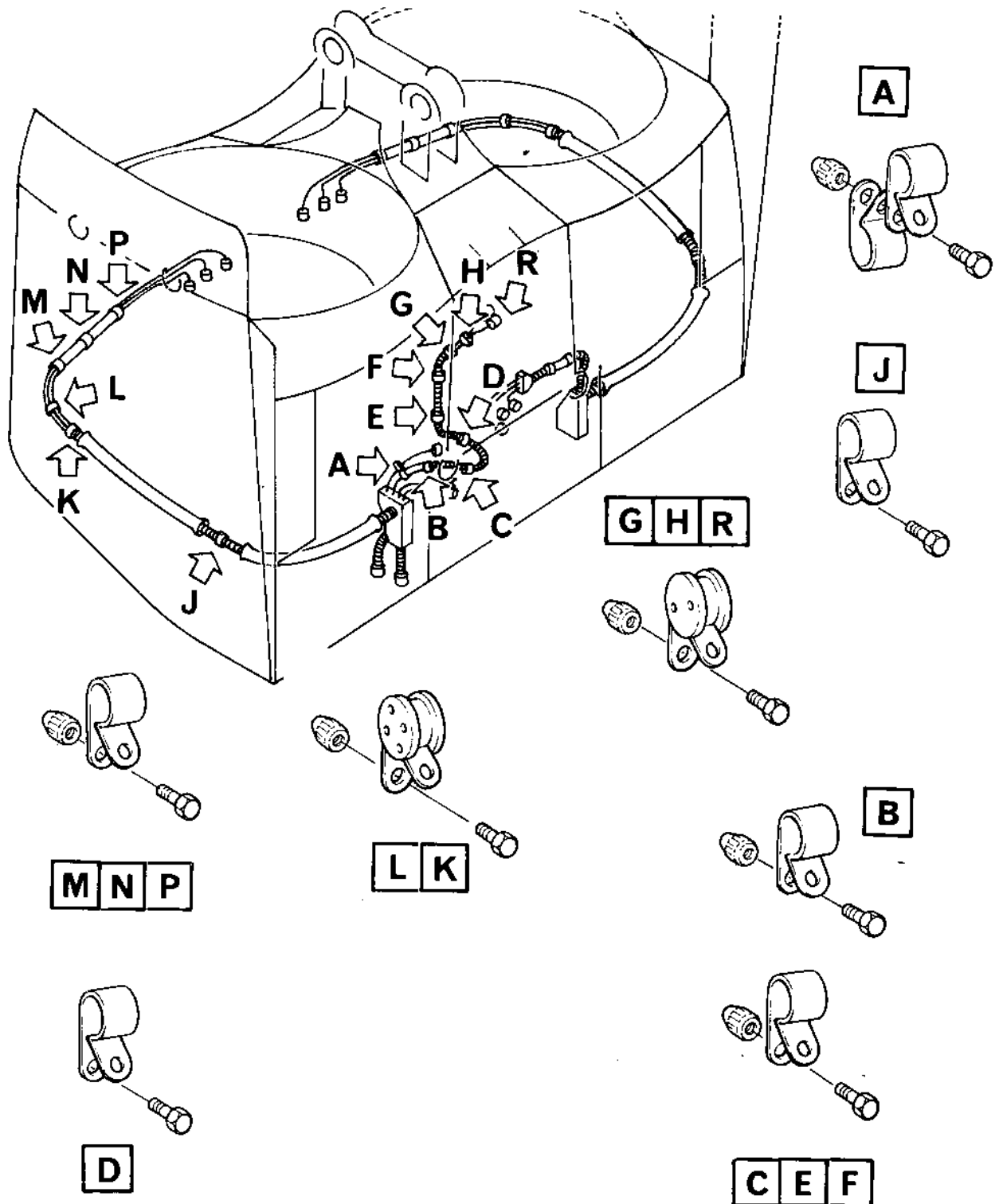


- (2) Introduce the sheathed harness (thermo-shrinking sheath) in the guide-tube up to the location of the bucket position transmitter (indicator).
 - (3) Fix the wiring box using bolts (27-160).
 - (4) Position clip D and secure it using bolt (27-110) and self-locking nut (27-100).
 - (5) Secure clip C using bolt (27-90) and the locking plate.
 - (6) Position the teflon spiral (27-220) on the cable and secure it using clips E and J.
 - (7) Secure the clips :
 - (a) clip E using self-locking nut (27-100) and bolt (27-110)
 - (B) clip J using bolt (27-170).
 - (8) Locate the teflon sheathed wiring harness in the channel unit and secure it using three clips, F, G and H, around the gutter by bolts (27-130) and self-locking nuts (27-120).
 - (9) Position the wiring harness leading to the bucket drive pneumatic actuator and secure the junction box using bolts (27-150) and self-locking nuts (27-140).
 - (10) Secure clips A and B, which retain the wiring harness in the channel, using bolts (27-80) and self-locking nuts (27-70).
 - (11) Tighten the bolts and nuts to the recommended torques.
- C. Installation of the Bay 2 Electrical Wiring Harness (26-10) (figure 503)
- (1) Introduce the sheathed wiring harness (thermo-shrinking sheath) into the guide-tube up to the location of the bucket position transmitter (indicator).
 - (2) Secure the harness distribution box using bolts (26-200) and (26-210).
 - (3) Secure clip K using bolt (26-150) and self-locking nuts (26-140).



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Bay 2 Electrical Harness
Figure 503

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- (4) Check that the wiring harness is correctly positioned and secure clip J using the locking plate and bolt (26-130).
 - (5) Locate the teflon spiral (26-250) to the wiring harness, and secure it in position using clip (26-240) and clip L.
 - (6) Secure clip L using bolt (26-150) and self-locking nut (26-140).
 - (7) Position the wiring harness in the gutter and secure clips M, N and P using bolts (26-170) and self-locking nuts (26-160).
 - (8) Secure the two connectors, located at the front of the box, in the supports, and secure them using bolts (26-190) and self-locking nuts (26-180).
 - (9) Attach the largest sheath to the gutter, using clip B secured by bolt (26-50) and self-locking nut (26-40).
 - (10) Simultaneously secure the large sheath and the upper smaller sheath which leads to the bucket drive pneumatic actuator, using clips A secured by bolts (26-30), self-locking nuts (26-20) and the locking plate.
 - (11) Secure the large sheath to the structure using three clips C, E and F secured by bolts (26-70) and self-locking nuts (26-60) and the locking plates.
 - (12) Secure the large sheath to the structure using clip D, secured by bolt (26-80) and a locking plate.
 - (13) Secure the larger sheath using clips G and H and bolts (26-100) and nuts (26-90).
 - (14) Tighten the mounting elements to the recommended torques.
 - (15) Attach the end with the connectors to the structure using adhesive tape, pending installation of a cross-feed isolation valve.
- D. Installation of the Bay 1 Primary Nozzle Area Transducer Harness
- (1) Remove the blanking cap (30-30) from the fixed connector of harness (28-10).

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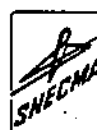
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- (2) Position square plate (28-300) to the fixed connector using cylindrical head screws (28-20) and square spaces (28-30). Wire lock screws (28-30) in pairs and refit the blanking cap.
- (3) Introduce the harness into the passage hole in the front framework, and position the harness in the structure (figure 504).
- (4) Secure a half clamp (28-90) inside the bay, using bolts (28-70) fitted with washers (28-80).
- (5) Secure the other half clamp (28-90) by pinching the cable at the location where a protection sleeve is crimped onto the cable sheath.
- (6) Position bolts (28-70), complete with washers (28-80) to secure the half clamp to the structure.
- (7) Secure the half clamps together, using bolts (28-40), washers (28-60) and nuts (28-50).

NOTE : Before securing the harness with half clamps, make sure that the locating lug of the mobile connector is positioned towards the side wall of the structure, adjacent to the bay.

- (8) Secure the harness end which carries the fixed connector to the front frame, using bolts (28-280) fitted with washers (28-290).

NOTE : When securing the fixed connector to the nozzle front frame, ensure that the locating lug of the connector is directed towards the upper part of the structure.

- (9) Secure clip C using bolt (28-100), washer (28-120) and self-locking nut (28-110). Check the clearance existing between the harness and the edge of the wall penetration hole. (See figure 504). If this clearance is less than 5 mm, carry out the following operations:
- (a) Unscrew self-locking nut (28-110), remove bolt (28-100) and washer (28-120).
 - (b) Place a washer (28-115) between the clip and the structure.
 - (c) Fit a new bolt (28-105), washer (28-120) and self-locking nut (28-110).

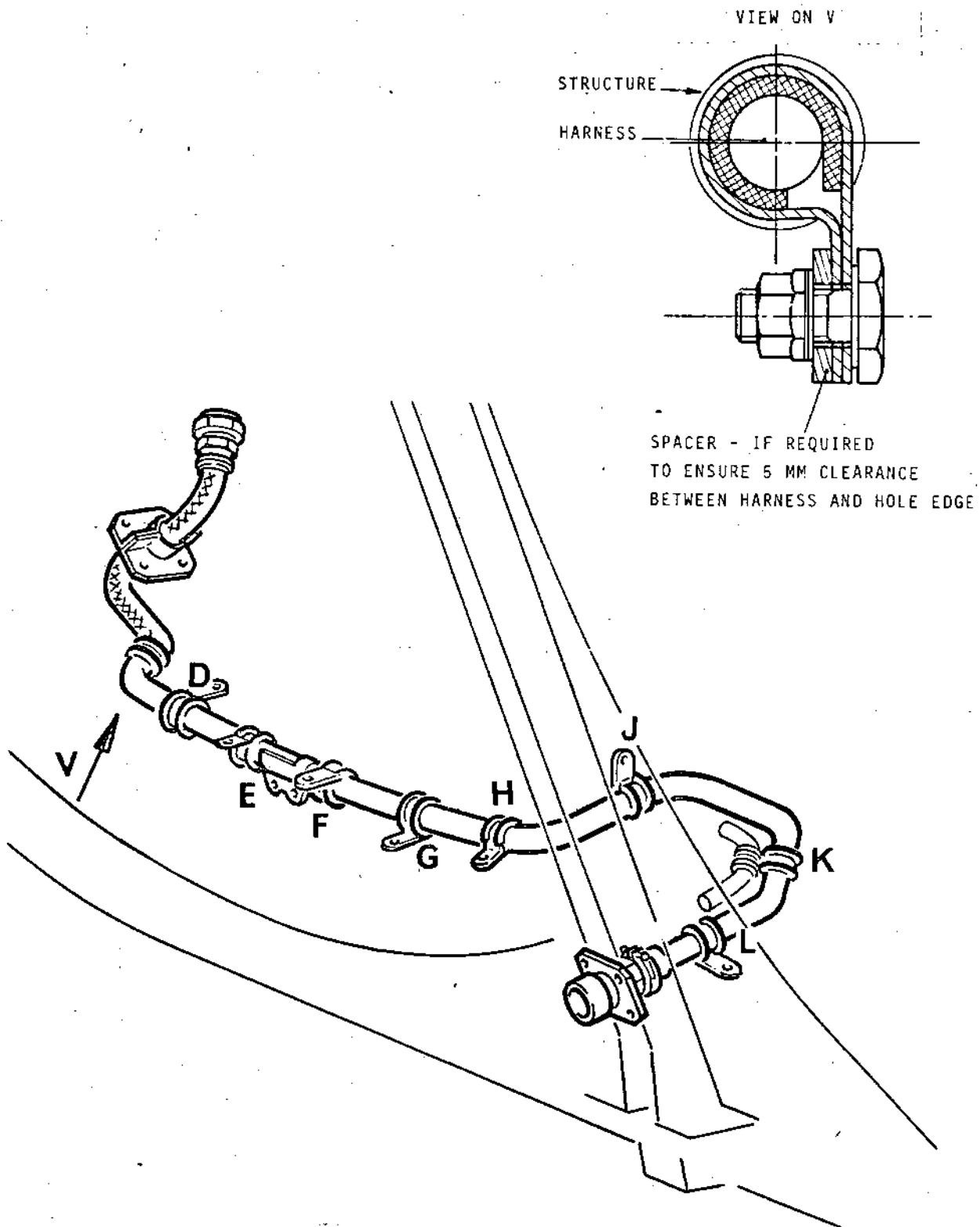
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Installation of Primary Nozzle Area Transducer Harness
Figure 504

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- (10) Ensure that the clip is correctly located on the ring crimped to the cable sheath.
- (11) Secure clips E and F using round head bolts (28-160), plain washers (28-180) and self-locking nuts (28-170).
- (12) Secure clips D and K using hex head bolts (28-130), washers (28-150) and self-locking nuts (28-140).
- (13) Secure clips G and H using bolts (28-190), plain washers (28-210) and self-locking nuts (28-200).
- (14) Secure clip J using bolts (28-220), plain washers (28-240) and self-locking nut (28-230).
- (15) Secure clip L using bolt (28-250), plain washer (28-270) and self-locking nut (28-260).
- (16) Ensure that the harness is correctly run, and that it has no pronounced kinks or abnormal strains. Ensure that the harness main plate, located close to clip L is not obscured by the clip.
- (17) Tighten the mounting elements to the recommended torque.
- (18) At the bucket position transmitter (indicator) level, the harness passes through a gutter (28-278), which is secured to the transmitter (indicator) front support by two bolts.
Pending mounting of the gutter during installation of the bucket position transmitter (indicator), position gutter (28-278) to the harness. Locate the sheath (28-277) and slightly tighten the gutter unit clip, using bolt (28-272), washer (28-275) and nut (28-273). The gutter will be finally positioned, and nut (28-273) finally tightened when the transmitter (indicator) is installed.

E. Installation of the Bay 2 Primary Nozzle Area Transducer Electrical Harness.

Since the harnesses for bay 1 and bay 2 are symmetrical about the secondary nozzle centre line, their installation is identical. Therefore, repeat the operations given in paragraph 4.D to assemble the primary nozzle area transducer electrical harness for bay 2.

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6. Installation of Link Assembly (24-10)

A. Assembly of the Link

- (1) Screw locknut (24-130) to the end-fitting assembly (24-120).
- (2) Screw the end fitting assembly, complete with locknut, onto the fork end (24-140).
- (3) Fit flanged bushings (24-150) and (24-160) into the link assembly yoke. (The shoulder on the bushings is to be inside the yoke.)

B. Install the Assembled Link

- (1) Fit flanged bushings (24-170) and (24-180) into the yoke on the structure. (The shoulder on the bushings is to be inside the yoke).
- (2) Position the spherical end fitting on the link assembly into the yoke, and secure with the shouldered hex head bolt (24-100), complete with plain washer (24-110).
- (3) Fit plain washer (24-90) and hex nut (24-80).
- (4) Tighten the nut to the recommended torque and lock using split pin (24-70).
- (5) Offer the fork end of the link up to the structure, and adjust it by screwing or unscrewing 1/2 turn at a time until shouldered hex. head bolt (24-50) can be freely inserted.
- (6) Secure the fork end using shouldered hex. head bolt (24-50) complete with plain washer (24-60).
- (7) Fit plain washer (24-40) and hex nut (24-30).
- (8) Tighten the nut to the recommended torque and lock using split pin (24-20).
- (9) Restrain the fork end with a spanner, and tighten lock nut (24-130) to the recommended torque. Wire lock.

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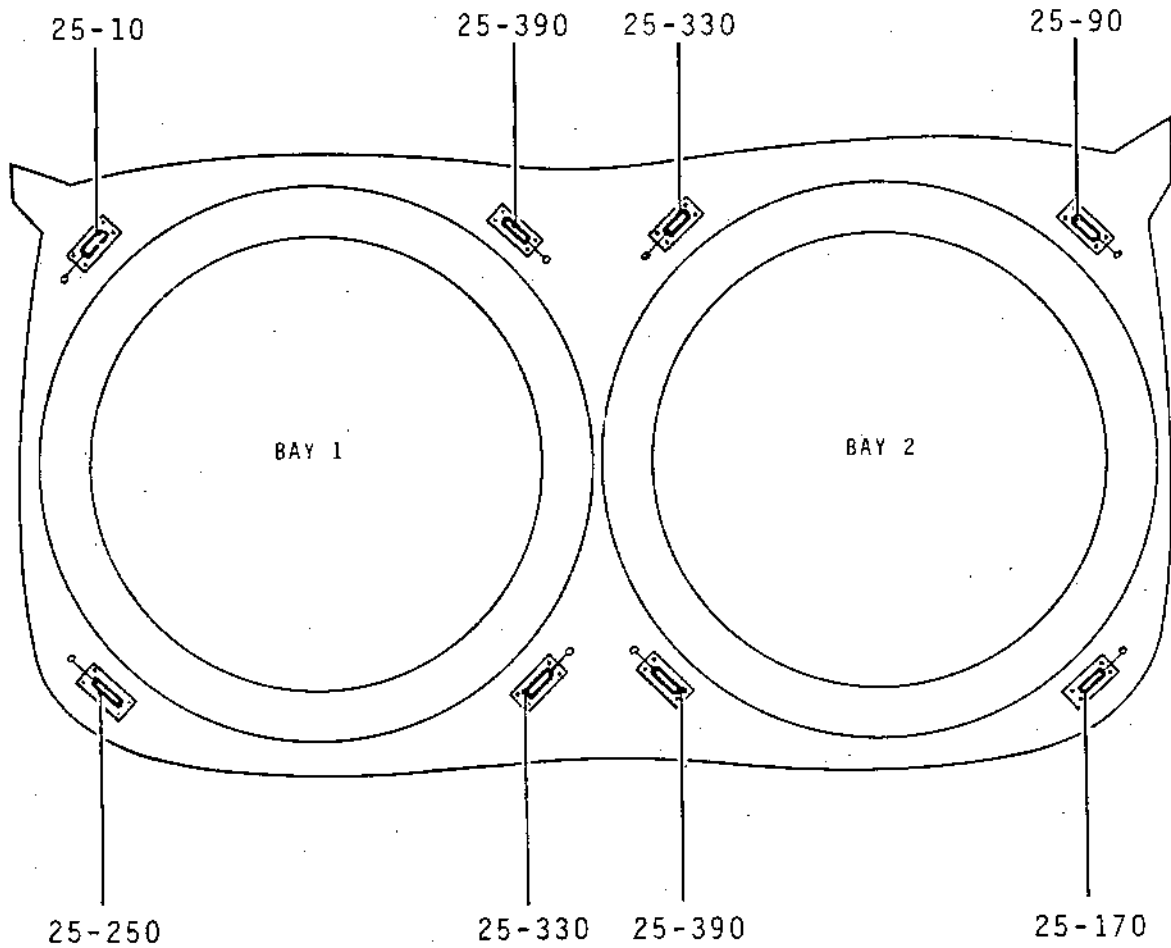
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Location of the Bucket Ballscrew Gearbox Support Fittings
Figure 505

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7. Installation of Ballscrew Gearbox Support Fittings (Fig 505)

NOTE 1 : The chamfer on the internal diameter of the washers must be fitted on the bolt head side.

NOTE 2 : All ballscrew gearbox support fitting attachment bolts are fitted such that the heads are towards the front of the twin secondary nozzle.

A. Installation of Ballscrew Gearbox Support Fittings (25-10)

- (1) Position the support fitting (25-10) to the structure.
- (2) Fit bolts (25-50) complete with plain washers (25-60), fit plain washers (25-80) and self-locking nuts (25-70).
- (3) Fit bolts (25-20) complete with washers (25-30).
- (4) Restrain the bolts (25-20) using special spanners No.1 and No. 2 of tool SC 265. Fit washers (25-45) and nuts (25-40B).
- (5) Tighten all nuts to recommended torques.

B. Installation of Ballscrew Gearbox Support Fitting (25-90)

- (1) Position the support fitting (25-90) to the structure.
- (2) Fit bolts (25-130) complete with plain washers (25-140), fit plain washers (25-160) and self-locking nuts (25-150).
- (3) Fit bolts (25-100) complete with washers (25-110).
- (4) Restrain the bolts (25-100) using special spanners No. 3 and No. 4 of tool SC 265. Fit washers (25-125) and nuts (25-120B).
- (5) Tighten all nuts to recommended torques.

C. Installation of Ballscrew Gearbox Support Fitting (25-170)

- (1) Position the support fitting (25-170) to the structure.
- (2) Fit bolts (25-210) complete with plain washers (25-220), fit plain washers (25-240) and self-locking nuts (25-30).

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- (3) Fit bolts (25-180) complete with washers (25-190).
- (4) Restrain bolts (25-180) using special spanners No. 1 and No. 2 of tool SC 265. Fit washers (25-205) and nuts (25-200B).
- (5) Tighten all nuts to recommended torques.

D. Installation of Ballscrew Gearbox Support Fitting (25-250)

- (1) Position the support fitting (25-250) to the structure.
- (2) Fit bolts (25-290) complete with plain washers (25-300), fit plain washers (25-320) and self-locking nuts (25-310).
- (3) Fit bolts (25-260) complete with washers (25-270).
- (4) Restrain bolts (25-260) using special spanners No. 3 and No. 4 of tool SC 265. Fit washers (25-285) and nuts (25-280B).
- (5) Tighten all nuts to recommended torques.

E. Installation of Ballscrew Gearbox Support Fitting (25-330)

Carry out the following operations for each support fitting :

- (1) Engage a bolt (25-340), complete with a plain washer (25-350) into the support (25-330) and position the support on the structure.
- (2) Position cruciform spacer (25-380), fit washer (25-370) and self-locking nut (25-360).
- (3) Fit bolts (25-340), complete with plain washers (25-350) and (25-370) and self-locking nuts (25-360).
- (4) Tighten the nuts to the recommended torque.

F. Installation of Ballscrew Gearbox Support Fitting (25-390)

Carry out the following operations for each support fitting :

- (1) Engage a bolt (25-400), complete with a plain washer (25-410) into the support fitting (25-390) and position the fitting on the structure.



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- (2) Position cruciform spacer (25-440), fit plain washer (25-430) and self-locking nut (25-420).
- (3) Fit bolts (29-400) complete with plain washers (25-410) and (25-430) and self-locking nuts (25-440).
- (4) Tighten the nuts to the recommended torque.

8. Installation of Welded Housing Assemblies (22-30)

Carry out the following operations for each housing assembly :

A. Position the housing assembly (22-30) against the external face of the front frame.

- (1) Secure the housing assembly using bolts (22-40) complete with plain washers (22-50).

- (2) Tighten the bolts to the recommended torques.

B. Introduce the slotted plate assembly (22-20) into the housing assembly, the openings pointing downwards and the spacers rearwards.

- (1) Provisionally secure the slotted plate using bolts (22-10).

NOTE : Final attachment of the slotted plate will be carried out when the twin secondary nozzle assembly is fitted to the aircraft.

9. Installation of the P3 Air Supply Tube Supports to the Bucket Drive Pneumatic Actuators

NOTE : The position of support brackets (21-10) and (21-170) may be adjusted by machining spacers fitted between the support brackets and the structure mating face.

A. Installation of Support Bracket (21-10)

- (1) Position the hi-lock bolt (21-140), complete with spacer washer (21-160) to the structure.
- (2) Position the plain washer (21-150) and then the support bracket (21-10).
- (3) Fit plain washer (21-130) and nut (21-120) without tightening the latter.

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- (4) Between the support and the structure, fit laminated shim (21-100) and plain washer (21-90).
- (5) Insert hi-lock bolt (21-80), complete with spacer washer (21-110) in the structure, along with the laminated shim and plain washer.
- (6) Fit the plain washer (21-70) and self-locking nut (21-60) without tightening.
- (7) Fit the laminated shim (21-50) between the support fixing and the structure.
- (8) Introduce hi-lock screw (21-40) into the structure, washer (21-50) and the support bracket.
- (9) Fit plain washer (21-30) and self-locking nut (21-20).
- (10) Tighten the nuts to the recommended torques.

B. Installation of Support Bracket (21-170)

- (1) Position hi-lock bolt (21-330), complete with spacer washer (21-340) into the structure.
- (2) Position the support bracket (21-170).
- (3) Fit laminated shim (21-360) and self-locking nut (21-350) without tightening.
- (4) Fit the hi-lock bolt (21-370), complete with plain washer (21-380), the laminated shim (21-400) and self-locking nut (21-390) without tightening.
- (5) Fit plain washers (21-300) and spacer washer (21-310) between the support and the structure.
- (6) Insert the hi-lock bolt (21-290), complete with laminated shim (21-320) into the structure, along with the washers and the support brackets.
- (7) Fit plain washer (21-280) and self-locking nut (21-270) without tightening.
- (8) Fit plain washer (21-250) between the support bracket and the structure.
- (9) Introduce the hi-lock bolt (21-240) complete with laminated shim (21-260) into the structure, the plain washer (21-250) and the support bracket.

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- (10) Fit plain washer (21-230) and self-locking nut (21-220) without tightening.
- (11) Place the laminated shim (21-210) between the structure and the support bracket.
- (12) Introduce the hi-lock screw (21-200) into the structure, the laminated shim (21-210) and the support bracket.
- (13) Fit the plain washer (21-190) and self-locking nut (21-180).
- (14) Tighten the nuts to the recommended torques.

10. Installation of the Convergent Section Panels (Figure 506)

- A. Operate the Rotating Fixture - tool SC 117 - to Bring the Twin Secondary Nozzle into the Horizontal Position.

CAUTION : DURING ASSEMBLY OPERATIONS, THE OPERATOR MUST TAKE CARE TO PLACE A RUBBER MAT IN THE NOZZLE ASSEMBLY, TO AVOID ANY DAMAGE DUE TO BLOWS OR SCRATCHES.

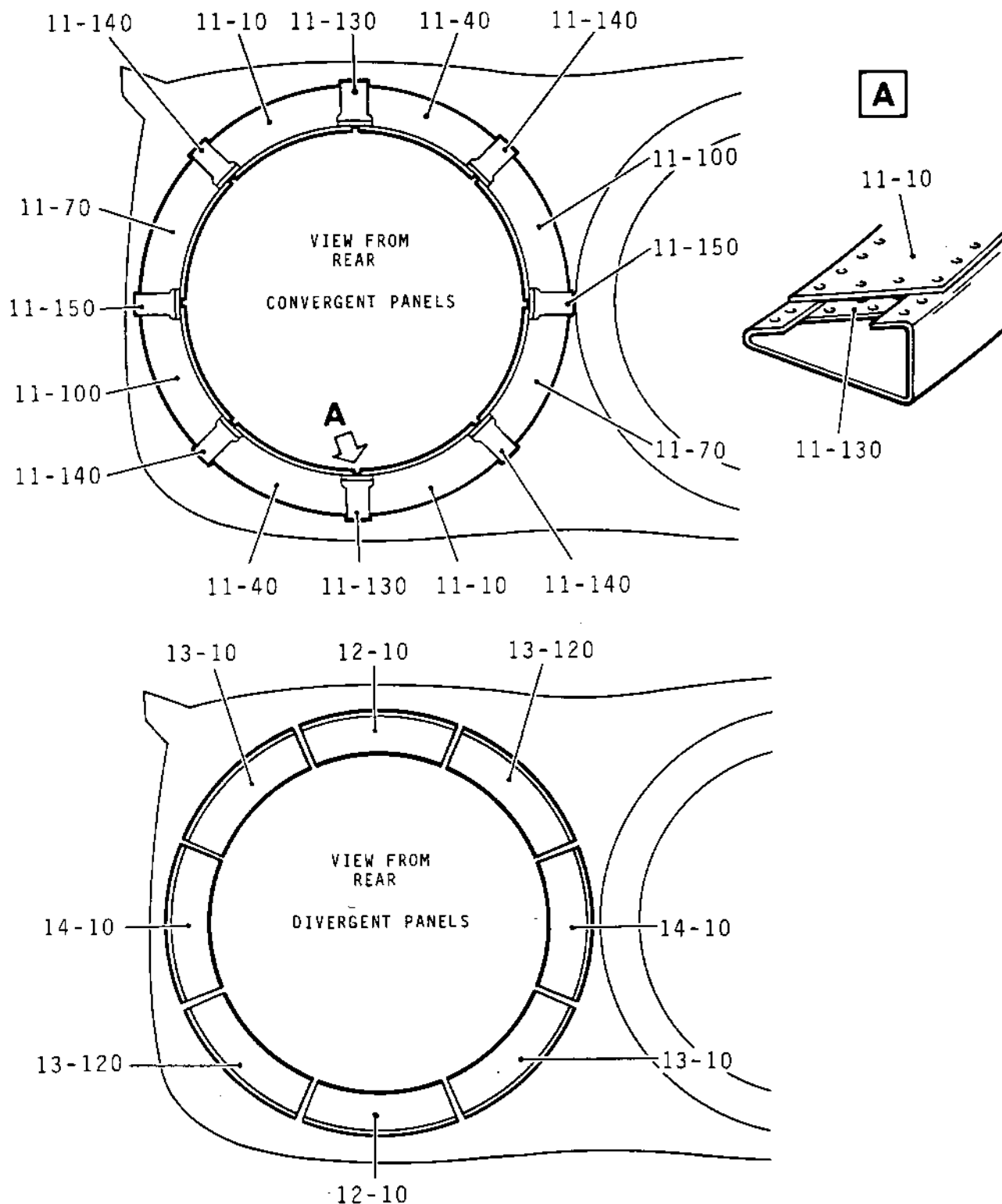
- B. Installation of the Convergent panels.

Carry out the following operations for each bay :

- (1) Locate the joint plate (11-130) under the channels in the twin secondary nozzle (Figure 506).
- (2) Position the convergent panel assembly (11-10) and secure the panel/joint plate assembly by the end countersunk head screw (11-20) and the end hex. head bolt (11-30).
- (3) Locate the joint plate (11-140) and secure it with the convergent panel (11-10) by the end countersunk head screw (11-20) and the end hex. head bolt (11-30).
- (4) Position convergent panel (11-70) and secure it to the joint plate (11-140) by the end countersunk head screw (11-80) the end hex. head bolt (11-90).
- (5) Position the joint plate (11-150) and secure it to the convergent panel (11-70) by the end countersunk head screw (11-80) and the end hex. head bolt (11-90).

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Installation of Convergent and Divergent Panels
Figure 506



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- (6) Position the convergent panel (11-100) and secure it to the joint plate (11-150) by the end countersunk head screw (11-110) and the end hex. head bolt (11-120).
- (7) Locate the joint plate (11-140) and secure it to the convergent panel (11-100) by the end countersunk head screw (11-110) and the end hex. head bolt (11-120).
- (8) Locate the convergent panel (11-40) and secure it to the joint plate (11-140) by the end countersunk head screw (11-50) and the end hex. head bolt (11-60).
- (9) Assemble the other half of the convergent section repeating the operations above, (1), (2), (3), (4), (5), (6), (7), (8).
- (10) Secure the last panel installed (11-40) to the first joint plate installed (11-130) by the end countersunk head screw (11-50) and the end hex. head bolt (11-60).
- (11) Fit all countersunk head screws (11-20, 50, 80, 110) and then all the bolts (11-30, 60, 90, 120).
- (12) Check that each panel is correctly positioned.
- (13) Tighten the bolts and screws to the recommended torques.
- (14) Check that the gaps between panels are evenly distributed.

C. Replacement of a convergent panel by a new panel (11-10/40/70/100).

Do the following operations:

- (1) Remove the affected panel.
Position the new panel on the removed panel.

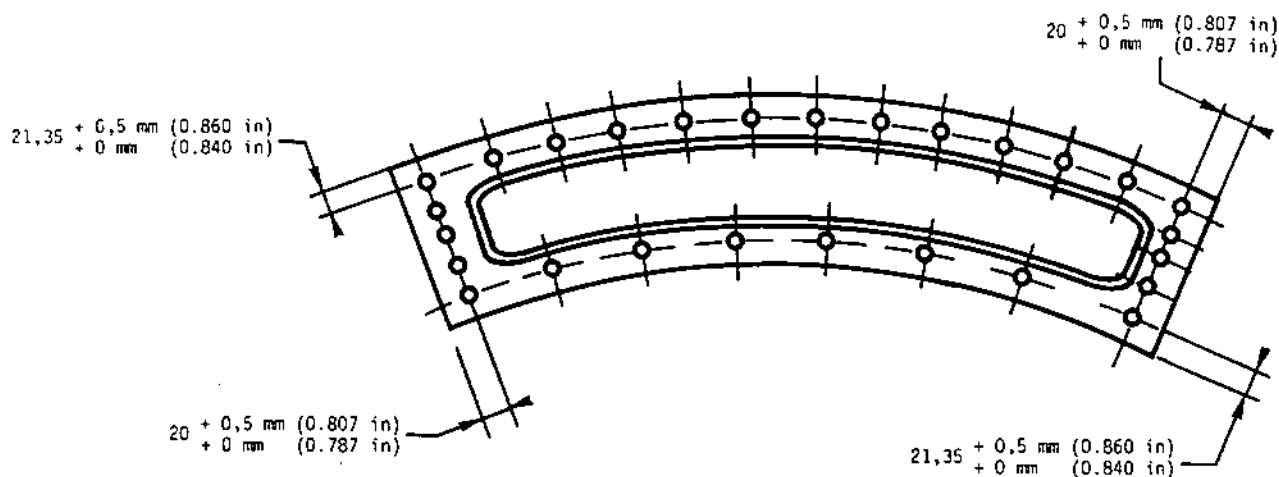
CAUTION: CHECK, USING 4 MEASURING RODS, THAT THE ATTACHMENT HOLES ARE CORRECTLY POSITIONED. THIS IS TO AVOID CUTTING OUT OF A PANEL, WHICH DESPITE ITS SIMILAR APPEARANCE DOES NOT CORRESPOND TO THAT OF THE ORIGINAL PANEL.

- (2) Trace the outline to prepare for the cut-out.

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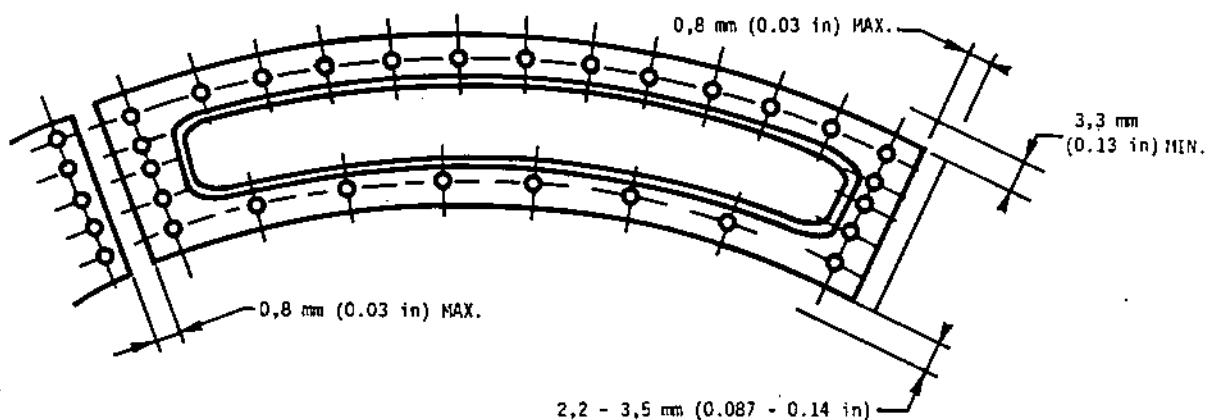
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- (3) Cut out the new panel per the given dimensions (figure 506A).



Cutting out of Panel
 Figure 506A

- (4) Adjust the panel to obtain the following clearances (figure 506B).



Installation of Panel
 Figure 506B



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1. Installation of Divergent Section Panels (Figure 506)

A. Fit the six cover assemblies (20-20) which are located below the divergent panels. The holes are located as follows (view from the rear) :

- (1) Two holes at three o'clock in bay 1,
- (2) Two holes at nine o'clock in bay 1,
- (3) Two holes at three o'clock in bay 2.

* B. Installation of Lateral Divergent Panels (14-10A).

Carry out the following operations for each of the panels :

- (1) Check that all assembly elements are correctly located on the template - tool SC 196.

* 301-203-501-0 and 301-203-601-0

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- (2) Position the lateral divergent panel (14-10A) on the nozzle and fit countersunk head screws (14-20) complete with special washers (14-30).
- (3) Fit washers (14-140) between the panel and the nozzle.
- (4) Successively fit :
 - (a) countersunk head screws (14-100) complete with special washers (14-110),
 - (b) countersunk head screws (14-120) complete with special washers (14-130),
 - (c) countersunk head screws (14-40) complete with special washers (14-50),
 - (d) countersunk head screws (14-60) complete with special washers (14-70),
 - (e) countersunk head screws (14-80) complete with special washers (14-90).

*** B. Installation of Lateral Divergent Panels (14-10B)

Carry out the following operations for each panel :

- (1) Check that all assembly elements are correctly located on the template - tool SC 196.
- (2) Position the lateral panel (14-10B) on the nozzle and successively fit :
 - (a) countersunk head screws (14-20),
 - (b) countersunk head screws (14-100),
 - (c) countersunk head screws (14-120),
 - (d) countersunk head screws (14-40),
 - (e) countersunk head screws (14-60),
 - (f) countersunk head screws (14-80).

* C. Installation of the Divergent Panels at the 45 deg. Position (13-10A).

Carry out the following operations for each panel :

- (1) Check that all the assembly elements are correctly located on the template - tool SC 197.

* 301-203-501-0 and 301-203-601-0

*** 301-203-502-0 and subsequent
301-203-602-0 and subsequent

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- (2) Position the divergent panel (13-10A) on the nozzle and fit countersunk head screw (13-100) complete with special washer (13-110) and countersunk head screw (13-40) complete with special washer (13-50).
- (3) Successively fit :
 - (a) countersunk head screws (13-60) complete with special washers (13-70),
 - (b) countersunk head screws (13-20) complete with special washers (13-30),
 - (c) countersunk head screws (13-80) complete with special washers (13-90).

*** C. Installation of Divergent Panels at the 45 deg Position (13-10B).

Carry out the following operations for each panel :

- (1) Check that all assembly elements are correctly located on the template - tool SC 197.
- (2) Position divergent panel (13-10B) on the nozzle and successively fit :
 - (a) countersunk head screws (13-60),
 - (b) countersunk head screw (13-100) complete with special washer (13-110),
 - (c) countersunk head screw (13-40) complete with special washer (13-50),
 - (d) countersunk head screw (13-80) complete with special washers (13-90),
 - (e) countersunk head screws (13-20).

* D. Installation of Divergent Panels at the 45 deg. Position (13-120A).

Carry out the following operations for each panel :

- (1) Check that all assembly elements are correctly located on the template - tool SC 197.
- (2) Position divergent panel (13-120A) on the nozzle and fit countersunk head screw (13-210) complete with special washer (13-220) and countersunk head screw (13-150) complete with special washer (13-160).

* 301-203-501-0 and 301-203-601-0
** 301-203-502-0 and subsequent
301-203-602-0 and subsequent

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(3) Successively fit :

- (a) Countersunk head screws (13-170) complete with special washers (13-180);
- (b) Countersunk head screws (13-130) complete with special washers (13-140);
- (c) countersunk head screws (13-190) complete with special washers (13-200).

*** D. Installation of the Divergent Panels at 45 deg. position (13-120B).

Carry out the following operations for each panel :

- (1) Check that all the assembly elements are correctly located on the template - tool SC 197.
- (2) Position divergent panel (13-120B) on the nozzle and successively fit :
 - (a) Countersunk head screws (13-170),
 - (b) Countersunk head screw (13-210) complete with special washer (13-220),
 - (c) Countersunk head screw (13-150) complete with special washer (13-160),
 - (d) Countersunk head screw (13-190) complete with special washer (13-200),
 - (e) Countersunk head screws (13-130).

E. Installation of Vertical Divergent Panels (12-10).

Carry out the following operations for each panel :

- (1) Check that all the assembly elements are correctly located on the template - tool SC 198.
- (2) Position panel (12-10) and fit countersunk head screws (12-20) complete with washers (12-30).
- (3) Successively fit :
 - (a) Countersunk head screws (12-60) complete with special washers (12-70),
 - (b) Countersunk head screws (12-40) complete with special washers (12-50).



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F. Final Installation of Divergent Panels.

- (1) Check that each panel is correctly located.
- (2) Tighten the screws to the recommended torques.
- (3) Check that the clearance between panels is equally distributed.

12. Installation of the Fire Detection Support Bracket Assemblies

A. Installation of the Support Bracket Assembly (23-10).

- (1) Locate the support bracket assembly (23-10) to the upper right hand internal section of the bay 1 front framework.
- (2) Fit the hi-lock screw (23-30) and the tubular nut (23-20) without tightening.
- (3) Position spacer washers (23-80) between the structure and the support bracket assembly (23-10).
- (4) Fit hi-lock bolts (23-60) complete with plain washers (23-70).
- (5) Fit plain washers (23-50) and self-locking nuts (23-40)
- (6) Tighten the nut to the recommended torques.

NOTE : Carry out the same operations to install the support bracket assembly (23-11) in bay 3.

B. Installation of the Support Bracket Assembly (23-90).

- (1) Locate the support bracket assembly (23-90) to the upper left hand internal section of the bay 1 front frame.
- (2) Fit the hi-lock screw (23-110) and tubular nut (23-100) without tightening.
- (3) Fit spacer washers (23-160) between the structure and the support bracket assembly (23-90).
- (4) Fit the hi-lock bolts (23-140) complete with plain washers (23-150).

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(5) Fit plain washers (23-130) and self-locking nuts (23-120).

(6) Tighten the nuts to the recommended torques.

NOTE : Carry out the same operations to install the support bracket assembly (23-171) in bay 4.

C. Installation of the Support Bracket Assembly (23-250)

- (1) Locate the support bracket assembly (23-250) to the upper LH internal section of the bay 2 front framework.
- (2) Fit the hi-lock screw (23-270) and tubular nut (23-260) without tightening.
- (3) Position the spacer washers (23-320) between the structure and the support bracket assembly (23-250).
- (4) Fit the hi-lock bolts (23-300) complete with plain washers (23-310).
- (5) Fit plain washers (23-290) and the self-locking nuts (23-280).
- (6) Tighten the nuts to the recommended torques.

NOTE : Carry out the same operations as above to fit the support bracket assembly (23-251) in bay 4.

13. Installation of the Side Fairing Assemblies and Heat Shields

A. Installation of the Side Fairing Assemblies (Figure 507).

(1) Definition of Spacers

When installing the fairing assemblies, it will sometimes be necessary to fit spacers between the structure and the fairing assembly, in order to ensure a continuous aerodynamic form of the secondary nozzle external walls. In the same way, spacers may be fitted between the fairing assemblies and the brackets so as to obtain an assembly free from built-in stresses. These spacers are to be produced from Z 10 CNT 18 (P 3301). Their dimensions will be defined on assembly.

(2) Installation of the LH Fairing Assembly (9-10).

- (a) Check that all the assembly elements are correctly located on the rack - tool SC 199.



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- (b) Position the fairing assembly (9-10) and secure it using special countersunk head screws (9-20) and self-locking nuts (9-30), without tightening.
- (c) Using hand pressure, bring the central section of the fairing assembly into contact with the structure.
- (d) Using a straight edge, check that the panel is flush with the structure. If necessary, fit spacers at the four central mounting points.
- (e) Next check the clearance between the fairing assembly and the bracket. Fit spacers if required (at the same mounting points as in operation (4)).
- (f) Fit the four central countersunk head screws (9-250) and self-locking nuts (9-260).
- (g) Tighten the nuts to the specified torques.
- (h) Check that the panel/structure are flush at the level of the four adjacent upper mounting points, and carry out operations (3), (4) and (5).
- (i) Fit the two special countersunk head screws (9-250) and the self-locking nuts (9-260), along with the two countersunk head screws (9-230) and self-locking nuts (9-240).
- (j) Tighten the nuts to the specified torques.
- (k) Carry out operations (8), (9) and (10) for the four symmetrical mountings.
- (l) By hand pressure, at the level of the reverser bucket mounting points, bring the fairing assembly into contact with the structure.
- (m) Using a straight edge, check that the panel is flush with the structure and fit spacers if required.
- (n) Successively fit :
 - 1 Special countersunk head screws (9-200), plain washers (9-220) and self-locking nuts (9-210)
 - 2 Special countersunk head screws (9-170), plain washers (9-190) and self-locking nuts (9-180).

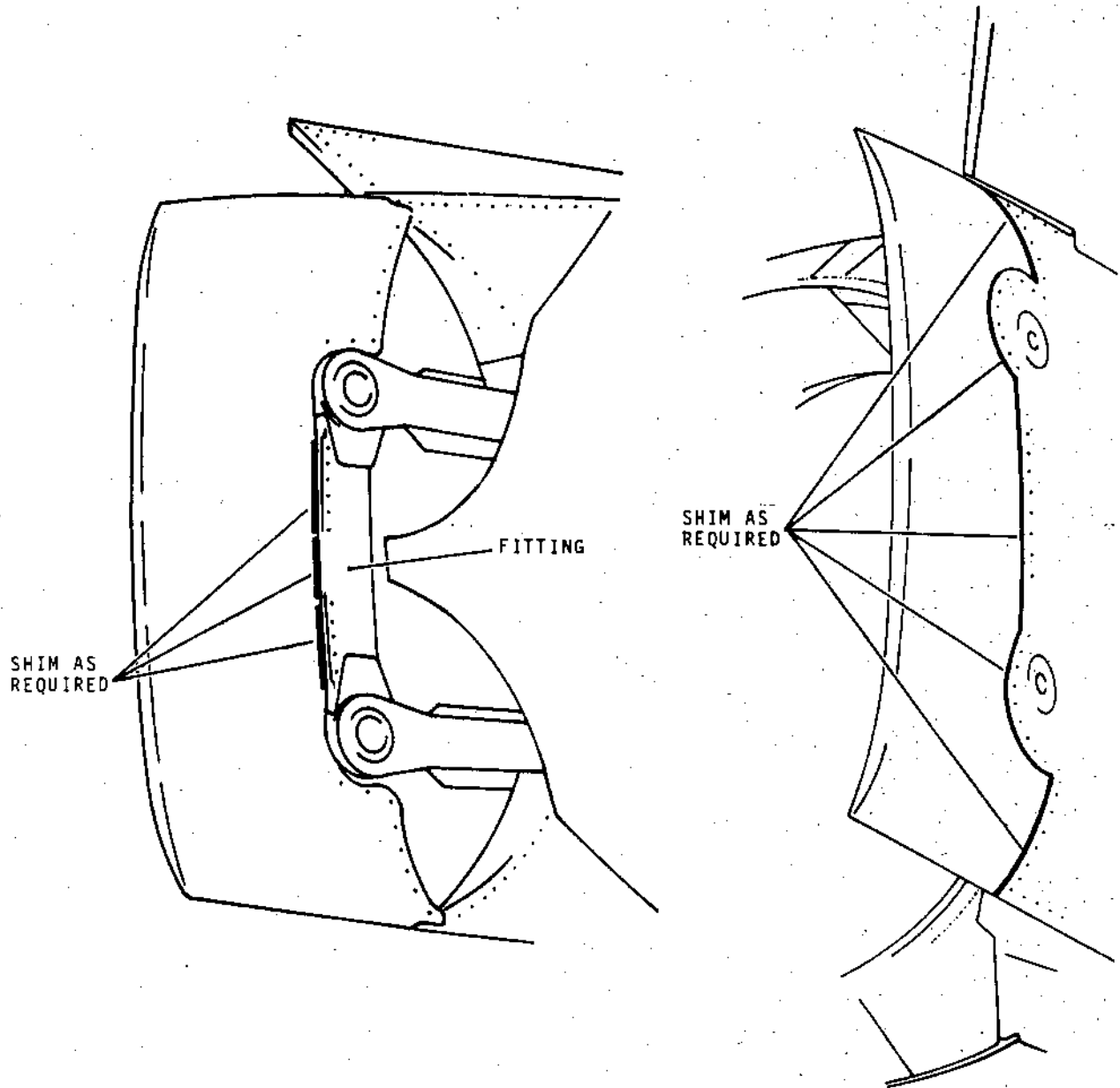
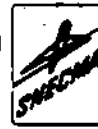
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Installation of Fairing Assemblies
Figure 507

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- 3 Special countersunk head screws (9-140), plain washers (9-160) and self-locking nuts (9-150).
- 4 Special countersunk head screws (9-110), plain washers (9-130) and self-locking nuts (9-120),
- 5 Special countersunk head screws (9-70), spacers (9-100), washers (9-90) and self-locking nuts (9-80).

- (o) Torque the nuts to the specified values.
- (p) Using hand pressure, bring the edge segments of the fairing assembly into contact with the structure.
- (q) Check with a straightedge that the panel is flush with the structure. Fit spacers, if necessary.

NOTE : If there is need for spacing, remove nut (9-30) and screw (9-20), and remount them when the spacers have been fitted.

- (r) Put angle brackets (9A-577) and (9A-727) in position.
- (s) Fit special countersunk head screws (9-40), plain washers (9-60) and self-locking nuts (9-50).
- (t) Torque the nuts to the specified values.
- (u) Make sure that the panel is flush with the structure.

NOTE : Proceed in the same way to install rear fairing assembly (9-11) on RH twin secondary nozzle assy.

(3) Installation of RH Side Fairing Assembly (9-270)

- (a) Ascertain that all elements of the assembly are properly arranged on the template - tool SC 199.
- (b) Put side fairing (9-270) in position and secure it with special countersunk head screws (9-280) and self-locking nuts (9-290) without locking them tight.
- (c) By hand pressure, bring the central section of the fairing assy into contact with the structure.
- (d) Using a straightedge, ascertain that the panel is flush with the structure. If necessary, fit spacers at the four central mounting points.

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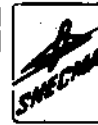
- (e) Next check the clearance between fairing assembly and bracket. If necessary, fit spacers at the four central mounting points.
 - (f) Fit the four central countersunk head screws (9-510) and self-locking nuts (9-520).
 - (g) Tighten the nuts to the specified torques.
 - (h) Check that the fairing is flush with the structure at the four adjacent upper mounting points and carry out operations (3), (4) and (5).
 - (i) Next fit two countersunk head screws (9-510) and locking nuts (9-520) along with the two countersunk head screws (9-490) and self-locking nuts (9-500).
 - (j) Tighten the nuts to the specified torques.
 - (k) Carry out operations (8), (9) and (10) for the four symmetrical mounting points.
 - (l) By hand pressure, bring the fairing into contact with the structure at the bucket mounting point level.
 - (m) Using a straightedge, check that the panel is flush with the structure. Fit spacers if necessary.
 - (n) Successively fit :
 - 1 Countersunk head screws (9-460), plain washers (9-480) and self-locking nuts (9-470).
 - 2 Countersunk head screws (9-430), plain washers (9-450) and self-locking nuts (9-440).
 - 3 Countersunk head screws (9-400), plain washers (9-420) and self-locking nuts (9-410).
 - 4 Countersunk head-screws (9-370), plain washers (9-390) and self-locking nuts (9-380).
 - 5 Countersunk head-screws (9-330), spacers (9-360), plain washers (9-350) and self-locking nuts (9-340).
 - (p) Tighten the nuts to the specified torques.
 - (q) By hand pressure, bring the ends of the fairing assembly into contact with the structure.
 - (r) With a straightedge, check that the panel is flush with the structure. Fit spacers if required
- NOTE : If there is need to fit spacers, remove self-locking nut (9-290) and countersunk

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head screw (9-280). Remount them after fitting spacers.

- (s) Put angle brackets (9A-577) and (9A-727) in position.
- (t) Fit countersunk head screws (9-300), plain washers (9-320) and self-locking screws (9-310).
- (u) Torque the nuts to the specified values.
- (v) Check that the panel is flush with the structure.

NOTE : Proceed in the same way to install fairing assembly (9-271) on the RH twin secondary nozzle assembly.

B. Installation of Heat Shields

(1) Installing Heat Shield (9A-530).

- (a) Locate head shield (9A-530) on the side fairing, inserting shim (9A-570), and fix countersunk head screws (9A-560).
- (b) Mount hex head bolts (9A-540), together with plain washers (9A-550).
- (c) Make sure that the shield is firmly seated and does not damaged the bracket.
- (d) Torque screws and bolts to the specified values.

(2) Installing Heat Shield (9A-580)

- (a) Locate heat shield (9A-580) on the side fairing, inserting shim (9A-620) and fix countersunk head screws (9A-610).
- (b) Mount hex head bolts (9A-590) together with plain washers (9A-600).
- (c) Make sure that the shield is firmly seated and does not damaged the bracket.
- (d) Torque screws and bolts to the specified values.

(3) Installing Heat Shield (9A-630).

- (a) Locate heat shield (9A-630) on the side fairing, inserting shim (9A-670), and fix countersunk head screws (9A-660).
- (b) Mount hex head bolts (9A-640) together with plain washers (9A-650).
- (c) Make sure that the shield is firmly seated and

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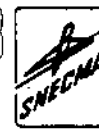
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does not injure the bracket.

(d) Torque screws and bolts to the specified values.

(4) Installing Heat Shield (9A-680)

(a) Locate heat shield (9A-680) on the side fairing, inserting shim (9A-720), and fix countersunk head screws (9A-710).

(b) Mount hex head bolts (9A-690), together with plain washers (9A-700).

(c) Make sure the shield is firmly seated and doesn't damaged the bracket.

(d) Torque screws and bolts to the specified values.

(5) Installing Heat Shield (9B-730)

(a) Locate heat shield (9B-730) on the side fairing.

(b) Mount hex head bolts (9B-780), together with plain washers (9B-790).

(c) Mount hex head bolts (9B-760), together with plain washers (9B-770).

(d) Mount hex head bolts (9B-740), together with plain washers (9B-750).

(e) Make sure the shield is firmly seated and doesn't damaged the bracket.

(f) Torque screws and bolts to the specified values.

(6) Installing Heat Shield (9B-800).

(a) Locate heat shield (9B-800) on the side fairing.

(b) Mount hex head bolts (9B-850), together with plain washers (9B-860).

(c) Mount hex head bolts (9B-830), together with plain washers (9B-840).

(d) Mount hex head bolts (9B-810), together with plain washers (9B-820).

(e) Make sure the shield is firmly seated and does not damaged the bracket.

(f) Torque screws and bolts to the specified values.

(7) Installing Heat Shield (9B-870).

(a) Locate heat shield (9B-870) on the side fairing.

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- (b) Mount hex head bolts (9B-920), together with plain washers (9B-930).
 - (c) Mount hex head bolts (9B-900), together with plain washers (9B-910).
 - (d) Mount hex head bolts (9B-880), together with plain washers (9B-870).
 - (e) Make sure the shield is firmly seated and does not damaged the bracket.
 - (f) Torque screws and bolts to the specified values.
- (8) Installing Heat Shield (9B-940)
- (a) Locate heat shield (9B-940) on the side fairing.
 - (b) Mount hex head bolts (9B-990), together with plain washers (9B-995):
 - (c) Mount hex head bolts (9B-970), together with plain washers (9B-980).
 - (d) Mount hex head bolts (9B-950), together with plain washers (9B-960).
 - (e) Make sure the shield is firmly seated and does not damaged the bracket.
 - (f) Torque screws and bolts to the specified values.

14. Installation of the Support Assemblies to the Rear Framework

A. Installation of Support Assemblies (7-10).

Carry out the following operations for each support assembly.

- (1) Position the support assembly (7-10) on the structure.
- (2) Fit the bolt (7-140) complete with plain washer (7-150). Fit plain washer (7-130) and self-locking nut (7-120), without tightening.
- (3) Fit spacer (7-70) between the support assembly (7-10) and the structure.
- (4) Fit bolts (7-60) complete with washers (7-65). Fit plain washers (7-55) and self-locking nuts (7-50).
- (5) Fit bolts (7-30) complete with washers (7-35). Fit plain washers (7-40) and self-locking nuts (7-20).
- (6) Fit bolt (7-100) complete with plain washer (7-110). Fit plain washer (7-90) and self-locking nut (7-80).
- (7) Tighten the nuts to the specified torques.

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B. Installation of Support Assemblies (7-160)

Carry out the following operations for each support assembly.

- (1) Position the support assembly (7-160) on the structure.
- (2) Fit the bolt (7-290) complete with plain washer (7-300). Fit plain washer (7-280) and self-locking nut (7-270), without tightening.

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- (3) Fit spacer (7-220) between the support assembly (7-160) and the structure.
- (4) Fit bolts (7-210) complete with washers (7-215). Fit plain washers (7-205) and self-locking nuts (7-200).
- (5) Fit bolt (7-180) complete with washer (7-185). Fit plain washer (7-190) and self-locking nut (7-170).
- (6) Fit bolt (7-250) complete with plain washer (7-260) fit plain washer (7-240) and self-locking nut (7-230).
- (7) Tighten the nuts to the recommended torques.

15. Installation of Heat Shield Assemblies to the Rear Frame.

NOTE : For the position of the various components, and the assembly elements, refer to figure 508A.

A. Installation of the Bay 1 Upper Heat Shield Assembly.

- (1) Check that all the assembly elements are correctly located on the template - tool SC 266.
- (2) Fit the bushes (5-330) to the structure.
- (3) At the end of the heat shield assembly (5-260), fit retaining plates (5-90) and (5-120) using countersunk head screws (5-80) and (5-110) respectively. Also fit nuts (5-70) and (5-100) without tightening.
- (4) Position the heat shield assembly to the rear framework and progressively fix it using :
 - (a) Bolts (5-310) complete with washers (5-320).
 - (b) Bolts (5-340) complete with washers (5-350).
 - (c) Bolts (5-360A) complete with washers (5-370A).
- (5) Tighten the heat shield retaining elements to the recommended torques.
- (6) Withdraw the locking wire which holds the lower seal element (5-190) to the seal assembly (5-170). Fit this plate to the heat shield assembly at the seventh and eighth bolt position from the left.

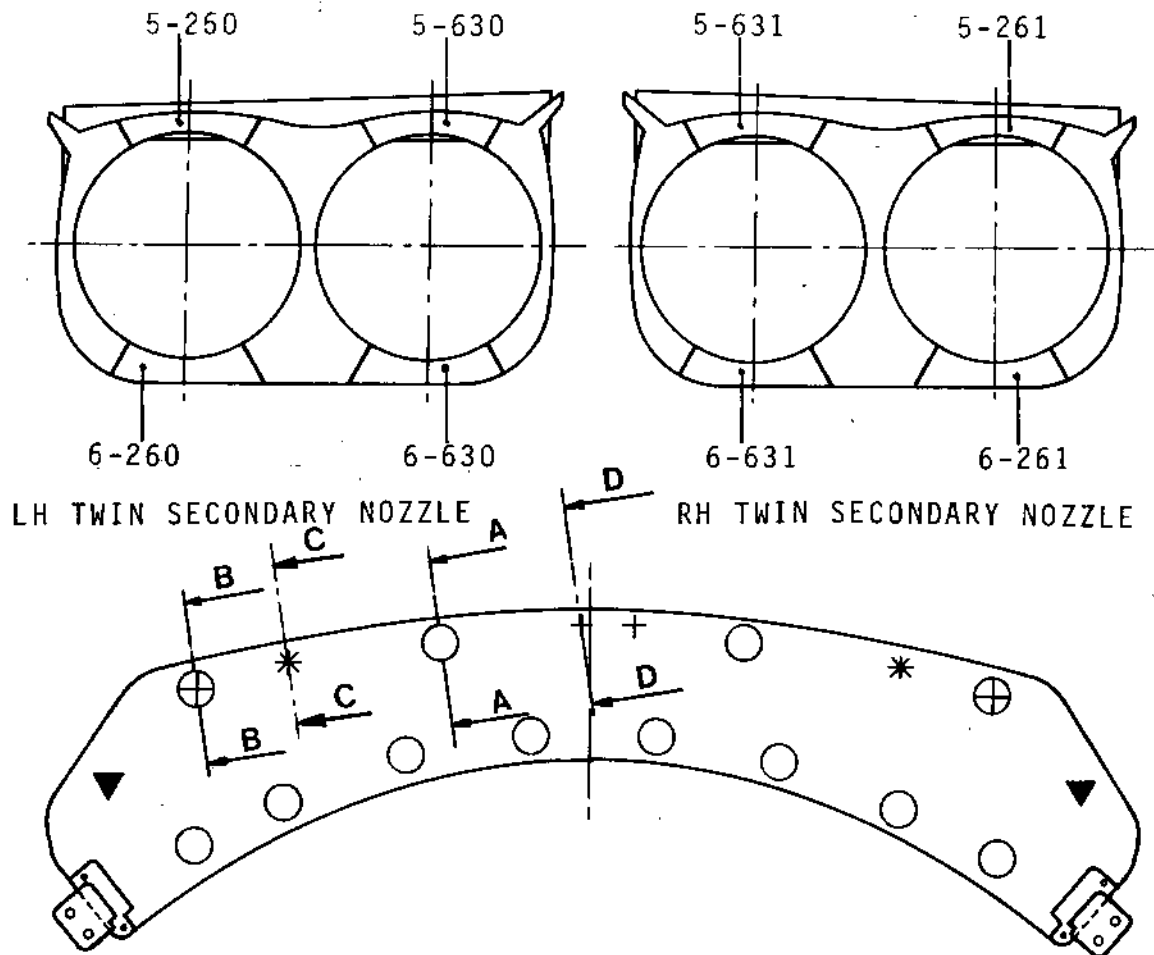
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	5-260	5-630	6-260	6-630
	5-261	5-631	6-261	6-631
+	5-310	5-680	6-310	6-680
	5-320	5-690	6-320	6-690
	5-330	5-700	6-330	6-700
○	5-360A	5-730A	6-360A	6-730A
	5-370A	5-740A	6-370A	5-740A
*	5-340	5-710	6-340	6-710
	5-350	5-720	6-350	6-720

NOTE : ⊕ ▼ FASTENERS MOUNTED SUBSEQUENTLY

Installation of Heat Shields
Figure 508A (Sheet 1 of 4)

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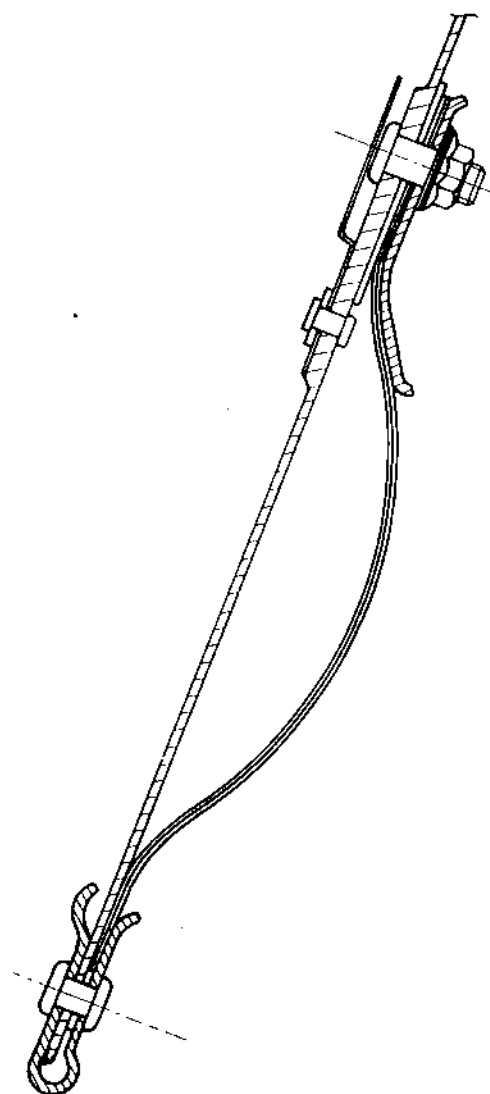
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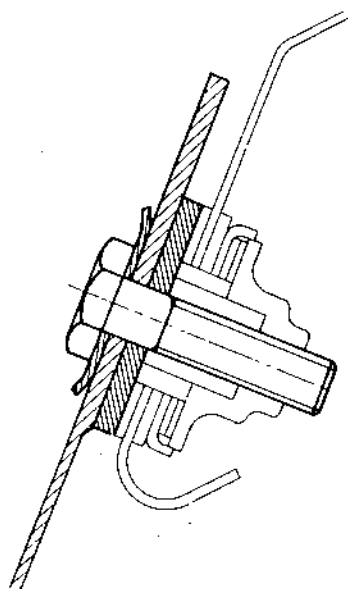


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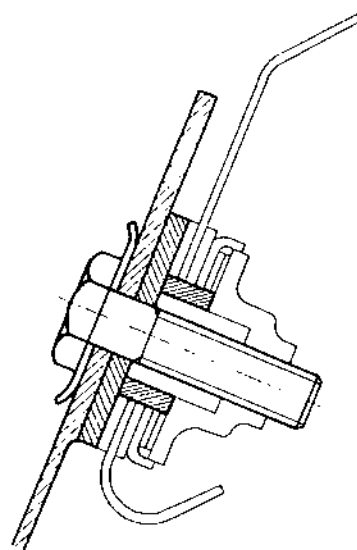
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SECTION CC



SECTION AA



SECTION DD

Installation of Heat Shields
Figure 508A (Sheet 2 of 4)

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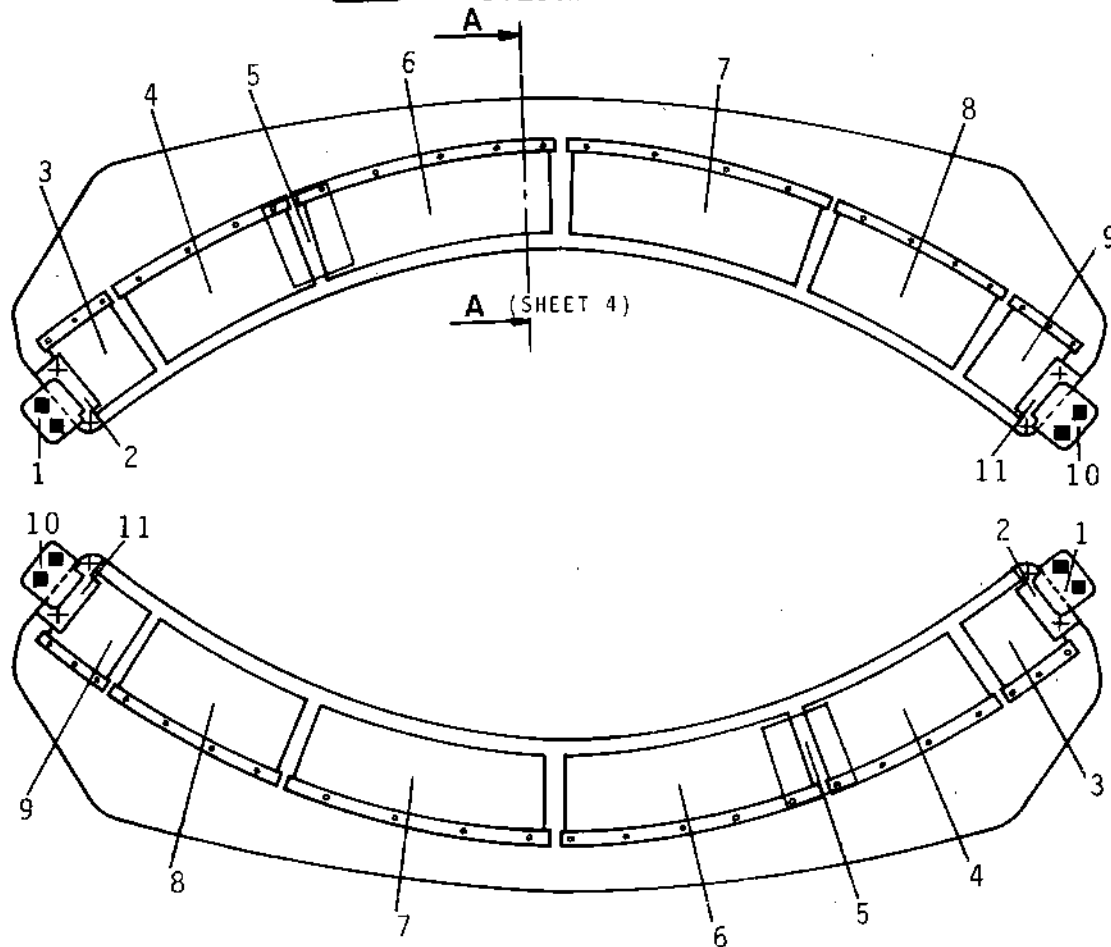
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	1	2	3	4	5	6	7	8	9	10	11
BAY 1 UPPER	5-30	5-90	5-130	5-150	5-190	5-170	5-200	5-220	5-240	5-60	5-120
BAY 1 LOWER	6-30	6-90	6-130	6-150	6-190	6-170	6-200	6-220	6-240	6-60	6-120
BAY 2 UPPER	5-400	5-460	5-500	5-520	5-560	5-540	5-570	5-590	5-610	5-430	5-490
BAY 2 LOWER	6-400	6-460	6-500	6-520	6-560	6-540	6-570	6-590	6-610	6-430	6-490
BAY 3 UPPER	5-400	5-460	5-500	5-520	5-560	5-540	5-570	5-590	5-610	5-430	5-490
BAY 3 LOWER	6-400	6-460	6-500	6-520	6-560	6-540	6-570	6-590	6-610	6-430	6-490
BAY 4 UPPER	5-30	5-90	5-130	5-150	5-190	5-170	5-100	5-220	5-240	5-60	5-120
BAY 4 LOWER	6-30	6-90	6-130	6-150	6-190	6-170	6-100	6-220	6-240	6-60	6-120

Installation of Heat Shields
Figure 508A (Sheet 3 of 4)

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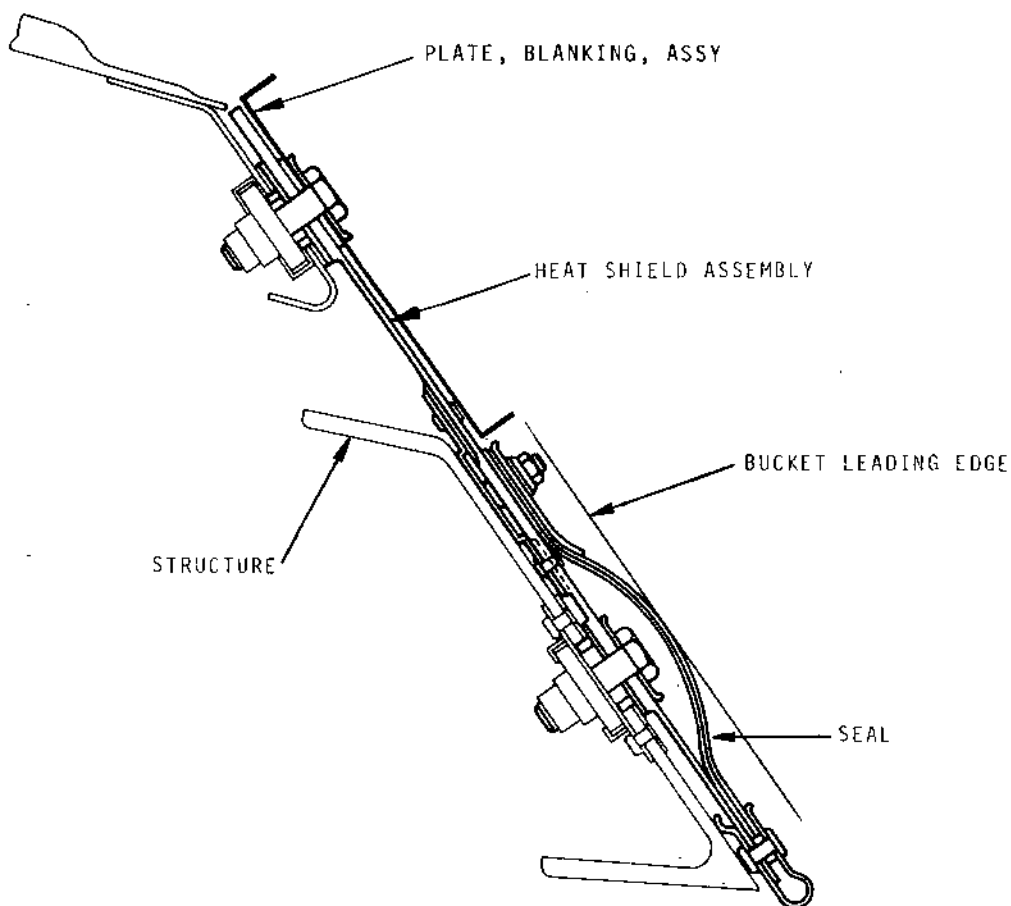


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SECTION AA



Installation of Heat Shields
Figure 508A (Sheet 4 of 4)

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- (7) Fit the seal assembly (5-150) and nuts (5-160) without tightening.
- (8) Fit the seal assembly (5-130) by engaging it under the retaining plate (5-90) and fit nuts (5-140) without tightening.
- (9) Simultaneously fit seal assembly (5-170) and seal assembly (5-200). Fit nuts (5-180) and (5-210), without tightening.
- (10) Successively fit :
 - (a) Seal assembly (5-220) and nuts (5-230) without tightening.
 - (b) Seal assembly (5-240), by engaging it under retaining plate (5-120) and fit nuts (5-250) without tightening.
- (11) Check the position of all seal assemblies and that they overlap correctly.
- (12) Tighten the securing elements for the seal assemblies, and the retaining plates to the recommended torques.

B. Installation of the Bay 2 Upper Heat Shield Assembly.

- (1) Check that all the assembly elements are correctly in position on the template - tool SC 266.
- (2) Fit bushes (5-700) to the structure.
- (3) Fit retaining plates (5-460) and (5-490) to the ends of the heat shield assembly (5-630), using hi-lok bolts (5-450) and (5-480), with nuts (5-440) and (5-470) respectively. Do not tighten.
- (4) Position the heat shield assembly to the rear frame, and secure it using successively :
 - (a) Bolts (5-680) with washers (5-690),
 - (b) Bolts (5-710) with washers (5-720),
 - (c) Bolts (5-730A) with washers (5-740A).
- (5) Tighten the heat shield securing elements to the recommended torques.

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- (6) Withdraw the lockwire which secures the lower seal element (5-560) to the seal assembly (5-540), and fit this plate to the heat shield at the level of the seventh and eighth screws from the left.
 - (7) Fit the seal assembly (5-520) and nuts (5-530) without tightening.
 - (8) Fit the seal assembly (5-500), engaging under retaining plate (5-90). Fit nuts (5-510) without tightening.
 - (9) Simultaneously fit seal assembly (5-540) and (5-570). Fit nuts (5-550) and (5-580).
 - (10) Successively fit :
 - (a) Seal assembly (5-590) and nuts (5-600), without tightening.
 - (b) Seal assembly (5-610), engaging under retaining plate (5-490). Fit nuts (5-620) without tightening.
 - (11) Check position of all the seals and that they are correctly overlapping.
 - (12) Tighten all the assembly elements for the seals, and retaining plates to the recommended torques.
- C. Installation of the Bay 3 Upper Heat Shield Assembly.
- (1) Fit heat shield assembly (5-631) and its seal as per instructions in paragraph 15.B.
- D. Installation of Bay 4 Upper Heat Shield Assembly
- (1) Fit heat shield assembly (5-261) and its seal as per instructions in paragraph 15.A.
- E. Installation of the Bay 1 Lower Heat Shield Assembly
- (1) Check that all the assembly elements are correctly positioned on the templates - tool SC 266.
 - (2) Fit the bushes (6-330) to the structure.

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- (3) Fit retaining plates (6-90) and (6-120) to the end of the heat shield assembly (6-260), using respectively bolts (6-80) and (6-110), with nuts (6-70) and (6-100), without tightening.
- (4) Position the heat shield assembly to the rear frame, and secure it using successively :
 - (a) Bolts (6-310) and washers (6-320) ;
 - (b) Bolts (6-340) and washers (6-350) ;
 - (c) Bolts (6-360A) and washers (6-370A).
- (5) Tighten the heat shield retaining elements to the recommended torques.
- (6) Withdraw the retaining wire which retains the lower shield plate (6-190) to the seal assembly (6-170), and position this plate to the heat shield at the seventh and eighth bolt from the right.
- (7) Fit seal assembly (6-150) and nuts (6-160) without tightening.
- (8) Fit seal assembly (6-130), engaging it under retaining plate (6-90). Fit nuts (6-140) without tightening.
- (9) Simultaneously fit seal assemblies (6-170) and (6-200). Fit nuts (6-180) and (6-210) without tightening.
- (10) Successively fit :
 - (a) Seal assembly (6-220) and nuts (6-230). Do not tighten.
 - (b) Seal assembly (6-240), engaging it under retaining plate (6-120). Fit nuts (6-250) without tightening.
- (11) Check the position of all seals, and that they overlap correctly.
- (12) Tighten all the retaining elements for the seals, and clips, to the recommended torques.

F. Installation of the Bay 2 Lower Heat shield Assembly

- (1) Check that all the assembly elements are correctly located on the template - tool SC 266.
- (2) Fit the bushes (6-700) to the structure.

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- (3) Fit retaining plates (6-460) and (6-490) to the ends of the heat shield assembly (6-630), using bolts (6-450) and (6-480) and nuts (6-440) and (6-470) respectively. Do not tighten.
 - (4) Position the heat shield assembly to the rear frame and secure it using successively :
 - (a) Bolts (6-680) and washers (6-690)
 - (b) Bolts (6-710) and washers (6-720)
 - (c) Bolts (6-730A) and washers (6-740A)
 - (5) Tighten the heat shield retaining elements to the recommended torques.
 - (6) Withdraw the retaining wire which retains the lower seal plate (6-560) to the seal assembly (6-540) and fit this plate to the heat shield at the seventh and eighth screw from the right.
 - (7) Fit the seal assembly (6-520) and nuts (6-530) without tightening.
 - (8) Fit the seal assembly (6-500), engaging it under retaining plate (6-460). Fit nuts (6-510) without tightening.
 - (9) Simultaneously fit the seal assemblies (6-540) and (6-570). Fit nuts (6-550) and (6-580).
 - (10) Successively fit :
 - (a) Seal assembly (6-590) and nuts (6-600) without tightening.
 - (b) Seal assembly (6-610), engaging it under retaining plate (6-490). Fit nuts (6-620) without tightening.
 - (11) Check the position of all the seals and that they overlap correctly.
 - (12) Tighten the elements which retain the seals, and retaining plates, to the recommended torques.
- G. Installation of the Bay 3 Lower Heat Shield Assembly.
- (1) Fit heat shield assembly (6-631) and its seal as per instructions in paragraph 15.F.

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H. Installation of Bay 4 Lower Heat Shield Assembly.

- (1) Fit heat shield assembly (6-621) and its seal as per instructions in paragraph 15.E.

16. Installing the Blanking Plates onto the Ballscrew Gearbox Recesses.

NOTE : For the arrangement of the various assembly component, see Fig. 508 B.

A. Installing Upper Blanking Plate (22A-85), Bay 1.

- (1) Place washers (5-305) and (5-375) on the heat shield.
- (2) Put blanking plate (22A-85) in position.
- (3) Fit shim(s) (22A-130).
- (4) Screw in bolts (22A-100) (22A-110) and (22A-120) without locking tight, together with their washers (22A-105), (22A-115) and (22A-125).
- (5) Screw in, but do not tighten, bolt (22A-90) with its washer (22A-95).
- (6) Mount stiffener (5-30).
- (7) Screw in, but do not tighten, bolts (5-10) with associated washers (5-20).
- (8) Screw in, but do not tighten, bolt (5-360B) with its washer (5-370B).
- (9) Fit bolt (5-290) with its washer (5-300), and screw on nut (5-270) and spacer (5-280) without tightening.
- (10) Tighten bolts and nut to recommended torques.

B. Installing Upper Blanking Plate (22C-360), Bay 1.

- (1) Place washers (22C-375), (5-305) and (5-375) on the heat shield.
- (2) Put blanking plate (22C-360) in position.
- (3) Screw in, but do not tighten, bolts (22C-380), together with associated washers (22C-385).

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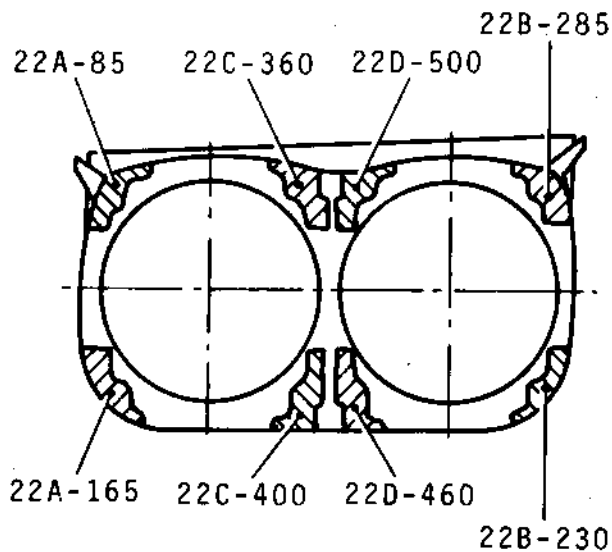
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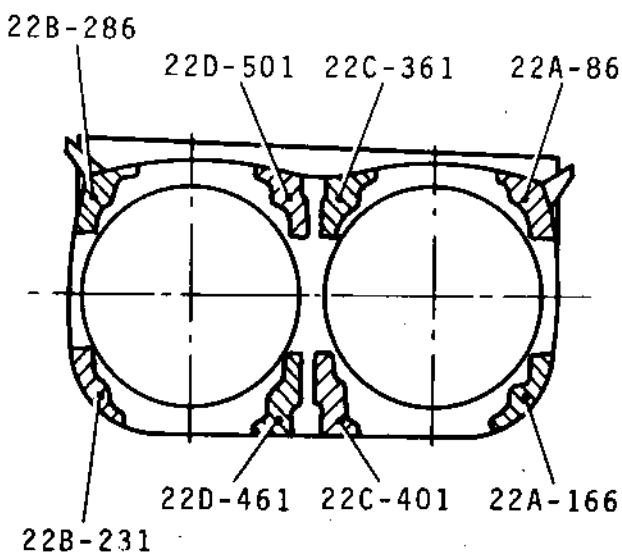
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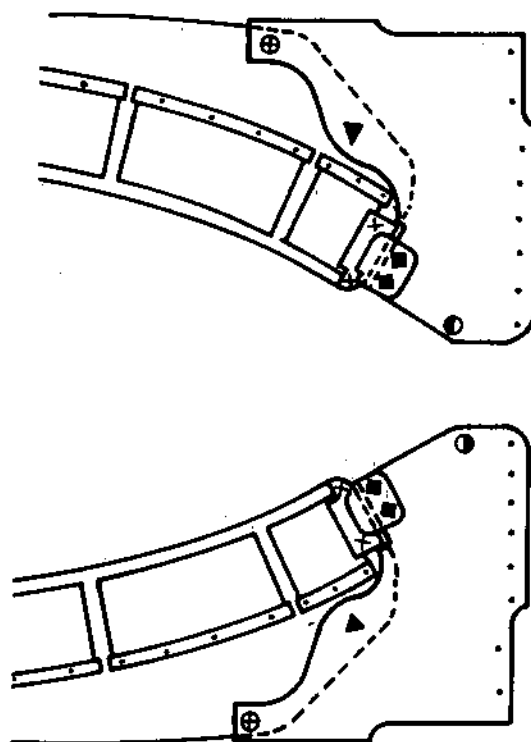
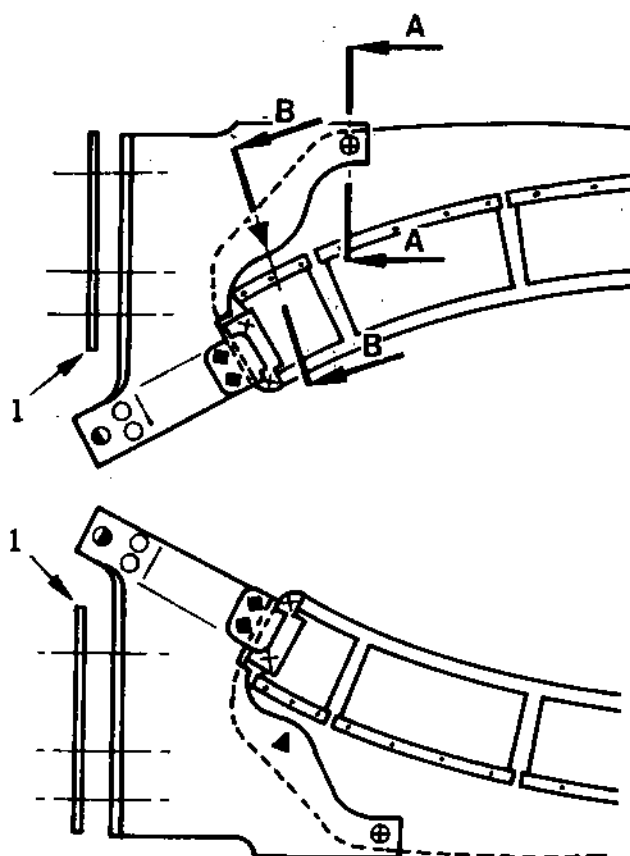
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LH TWIN SECONDARY NOZZLE



RH TWIN SECONDARY NOZZLE



Installing the Ballscrew Gearbox Blanking Plates
Figure 508B (Sheet 1 of 2)

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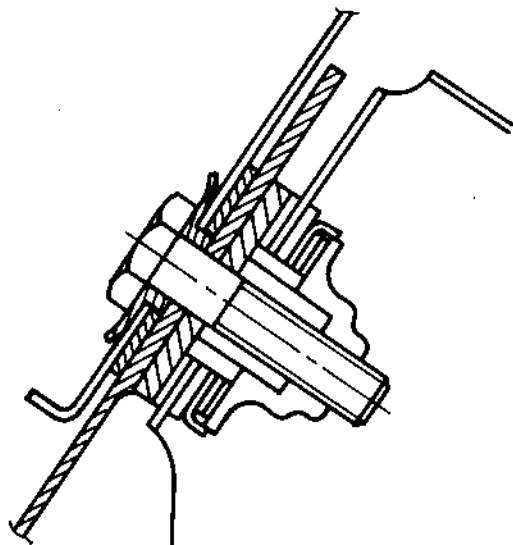
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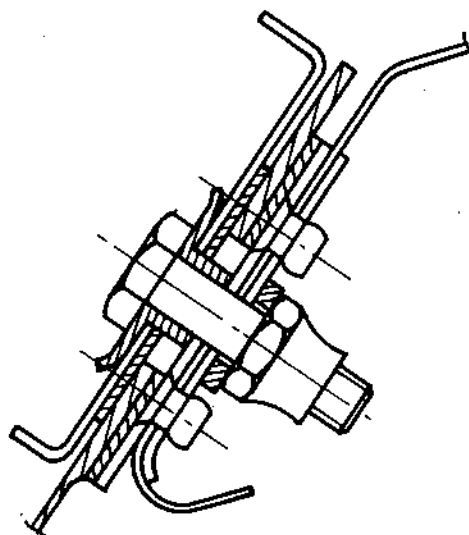
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SECTION BB



SECTION AA

	22A-85 22A-86	22A-165 22A-166	22B-285 22B-286	22B-230 22B-231	22C-360 22C-361	22C-400 22C-401	22D-460 22D-461	22D-500 22D-501
⊕	5-270 5-280 5-290 5-300 5-305	6-270 -280 -290 -300 -305	5-640 -650 -660 -670 -675	6-640 -650 -660 -670 -675	5-270 -280 -290 -300 -305	6-270 -280 -290 -300 -305	6-640 -650 -660 -670 -675	5-640 5-650 -660 -670 -675
▼	5-360B 5-370B 5-375	6-360B -370B -375	5-730B -740B -745	6-730B -740B -745	5-360B -370B -375	6-360B -370B -375	6-730B -740B -745	5-730B -740B -745
◆	5-10 5-20	6-40 6-50	5-410 -420	6-380 -390	5-40 -50	6-10 -20	6-410 -420	5-380 -390
●	22A-90 22A-95	22A-170 -175	22B-290 -295	22B-235 -240	22C-365 -370 -375	22C-405 -410 -415	22D-465 -470 -475	22D-505 -510 -515
●					22C-380 -385	22C-420 -425	22D-480 -485	22D-520 -525
1	22A-130 22A-125 22A-120 -115 -110 -105 -100	22A-195 -190 -185 -180	22B-345 -340 -335 -330 -325 -320 -315 -310 -305 -300	22B-260 -255 -250 -245				

Installing the Ballscrew Gearbox Blanking Plates
Figure 508B (Sheet 2 of 2)

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- (4) Screw in bolt (22C-365) with its washer (22C-370).
- (5) Mount stiffener (5-60).
- (6) Screw in, but do not tighten, bolts (5-40), together with associated washers (5-50).
- (7) Screw in, but do not tighten, bolt (5-360B) with its washer (5-370B).
- (8) Fit bolt (5-290) with its washer (5-300), and screw on nut (5-270) with spacer (5-280) without tightening.
- (9) Tighten bolts and nut to recommended torques.

C. Installing Upper Blanking Plate (22D-500), Bay 2.

- (1) Place washers (22D-515), (5-675) and (5-445) on the heat shield.
- (2) Put blanking plate (22D-500) in position.
- (3) Screw in bolts (22D-520) with washers (22D-525) without tightening.
- (4) Screw in, but do not tighten, bolt (22D-505) with its washer (22D-510).
- (5) Mount stiffener (5-400).
- (6) Screw in bolts (5-380) with washers (5-390) without tightening.
- (7) Screw in, but do not tighten, bolt (5-730B) with washer (5-740B).
- (8) Fit bolt (5-660) with washer (5-670), and screw on nut (5-640) with spacer (5-650) without tightening.
- (9) Tighten bolt and nut to recommended torques.

D. Installing Upper Blanking Plate (22B-285), Bay 2.

- (1) Place washers (5-745) and (5-675) on the heat shield.
- (2) Put blanking plate (22B-285) in position.
- (3) Fit shim(s) (22B-345) and washer (22B-340).

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- (4) Screw in, but do not lock tight, bolts (22B-300), (22B-310), (22B-320) and (22B-330), together with associated washers (22B-305), (22B-315), (22B-325) and (22B-335).
 - (5) Screw in, but do not tighten, bolt (22B-290) with its washer (22B-295).
 - (6) Mount stiffener (5-430).
 - (7) Screw in bolts (5-410) with associated washers (5-420) without tightening.
 - (8) Screw in, but do not tighten, bolt (5-730B) with its washer (5-740B).
 - (9) Fit bolt (5-660) with its washer (5-670), and screw on nut (5-640) with spacer (5-650) without tightening.
 - (10) Tighten bolts and nuts to recommended torques.
- E. Installing Lower Blanking Plate (22A-165), Bay 1.
- (1) Place washers (6-305) and (6-375) on the heat shield.
 - (2) Put lower blanking plate (22A-165) in position.
 - (3) Fit shim(s) (22A-195).
 - (4) Screw in, but do not lock tight, bolts (22A-180) and (22A-185) with washer (22A-190).
 - (5) Screw in bolt (22A-170) with washer (22A-175) without tightening.
 - (6) Mount stiffener (6-60).
 - (7) Screw in, but do not tighten, bolts (6-40) with washers (6-50).
 - (8) Screw in bolt (6-360B) with washer (6-370B) without tightening.
 - (9) Fit bolt (6-290) with washer (6-300), and screw on nut (6-270) with spacer washer (6-280).
 - (10) Tighten bolts and nuts to recommended torques.



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F. Installing Lower Blanking Plate (22C-400), Bay 1.

- (1) Place washers (6-305) and (6-375) and spacer (22C-415) on the heat shield.
- (2) Put lower blanking plate (22C-400) in position.
- (3) Screw in, but do not tighten, bolts (22C-420) with associated washers (22C-425).
- (4) Fit bolt (22C-405) with washer (22C-410) without tightening.
- (5) Mount stiffener (6-30).
- (6) Screw in, but do not tighten, bolt (6-10) together with associated washers (6-20).
- (7) Screw in bolt (6-360B) with washer (6-370B) without tightening.
- (8) Fit bolt (6-290) with washer (6-300), and screw on nut (6-270) with spacer (6-280) without tightening.
- (9) Tighten bolts and nuts to recommended torques.

G. Installing Lower Blanking Plate (22D-460), Bay 2.

- (1) Place spacer (22D-475) and washers (6-675) and (6-745).
- (2) Put lower blanking plate (22D-460) in position.
- (3) Screw in, but do not tighten, bolts (22D-480) with associated washers (22D-485).
- (4) Fit bolt (22D-465) with washer (22D-470) without tightening.
- (5) Mount stiffener (6-430).
- (6) Screw in but do not tighten, bolts (6-410) with washers (6-420).
- (7) Screw in bolt (6-730B) with washer (6-740B) without tightening.
- (8) Fit bolt (6-660) with washer (6-670), and screw on nut (6-640) with spacer (6-650) without tightening.

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(9) Tighten bolts and nut to recommended torques.

H. Installing Lower Blanking Plate (22B-230), Bay 2

- (1) Place washers (6-675) and (6-745).
- (2) Put lower blanking plate (22B-230) in position.
- (3) Fit shim(s) (22B-260).
- (4) Screw in, but do not lock tight, bolts (22B-245) and (22B-250) with washer (22B-255).
- (5) Screw in bolt (22B-235) with washer (22B-240) without tightening.
- (6) Mount stiffener (6-400).
- (7) Screw in, but do not lock tight, bolts (6-380) with washers (6-390).
- (8) Screw in, but do not lock, bolt (6-730B) with washer (6-740B).
- (9) Fit bolt (6-660) with washer (6-670), and screw on nut (6-640) with spacer (6-650).
- (10) Tighten bolts and nut to recommended torques.

I. Installing the Bay 4 Upper Blanking Plates.

- (1) Install upper blanking plate assy (22A-86) as instructed under 16-A.
- (2) Install upper blanking plate assy (22C-361) as instructed under 16-B.

J. Installing the Bay 4 Lower Blanking Plates.

- (1) Install lower blanking plate assy (22A-166) as instructed under 16-E.
- (2) Install lower blanking plate assy (22C-401) as instructed under 16-F.

K. Installing the Bay 3 Upper Blanking Plates.

- (1) Install upper blanking plate assy (22D-501) as instructed under 16-C.

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- (2) Install upper blanking plate assy (22B-286) as instructed under 16-D.

L. Installing the Bay 3 Lower Blanking Plates.

- (1) Install lower blanking plate assy (22D-461) as instructed under 16-G.
- (2) Install lower blanking plate assy (22B-231) as instructed under 16-H.

17. Installation of Bucket Position Transmitters (Indicators)

- A. Operate the rotating stand - tool SC 117 - to bring the twin secondary nozzle assembly into the vertical position.

- B. Installation of the welded bracket assemblies (16-220)
Carry out the following operations for each bracket assembly :

- (1) Insert a countersunk head screw (16-200) into its housing, from inside the bay.
- (2) Locate the welded bracket assembly (16-220) on the screw in the transmitter (indicator) housing.
- (3) Fit self-locking nut (16-210).
- (4) Fit the other countersunk head screws (16-200) and self-locking nuts (16-210).
- (5) Tighten the nuts to the recommended torques.

- C. Installation of Welded Bracket Assemblies (16-250).

Carry out the following operations for each of the bracket assemblies :

- (1) Insert a countersunk head screw (16-230) into its housing, from inside the bay.
- (2) Locate the welded bracket assembly (16-250) on the screw in the transmitter (indicator) housing.
- (3) Fit self-locking nut (16-240).
- (4) Fit the other countersunk head screws (16-230) and self-locking nuts (16-240).
- (5) Tighten the nuts to the recommended torques.

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D. Installation of Bucket Position Transmitters (Indicators)
(16-70)

NOTE : Before installation, check that the transmitter
(indicator) is in the locked zero position (Fig. 509);

Carry out the following operations for each of the transmitters (indicators) :

- (1) Fit the appropriate spherical bearings (16-120) and (16-170) to the spherical bearing housings (16-130) and (16-180).
- (2) Fit the spherical bearing assembly (16-160) and secure it with bolts (16-140) and plain washers (16-150).
- (3) Locate the transmitter (indicator) (16-70) by introducing the front location peg into the spherical bearing assembly (16-160). The manual lock is located on the transmitter (indicator) housing access door side.
- (4) Fit the spherical bearing assemblies (16-100) to the side mounting pegs and secure them with bolts (16-80) complete with washers (16-90).
- (5) Measure the clearance between the spherical bearing internal ring and the mounting peg front shoulder, and determine the thickness of the shim (16-910), in order to obtain the required clearance.

$$\begin{aligned} \text{Thickness of the shim (mm)} &= \\ \text{measured clearance} &- 1,27 \begin{array}{l} + 1,02 \\ - 0,0 \end{array} \text{ mm} \\ & \quad (0.050 \begin{array}{l} + 0.040 \\ - 0 \end{array} \text{ in.}) \end{aligned}$$

- (6) Withdraw bolts (16-140) and washers (16-150).
- (7) Fit shim (16-190) to the thickness determined above, between the bracket and the spherical bearing (16-160) assemblies.
- (8) Fit the lower bolt (16-140), complete with washer (16-150).
- (9) Position the channel unit (28-278) and secure it using bolts (16-140) and washers (16-150).
- (10) Check that the primary nozzle area transducer harness is correctly installed and tighten nut (28-300) and bolts (16-140) to the recommended torques.

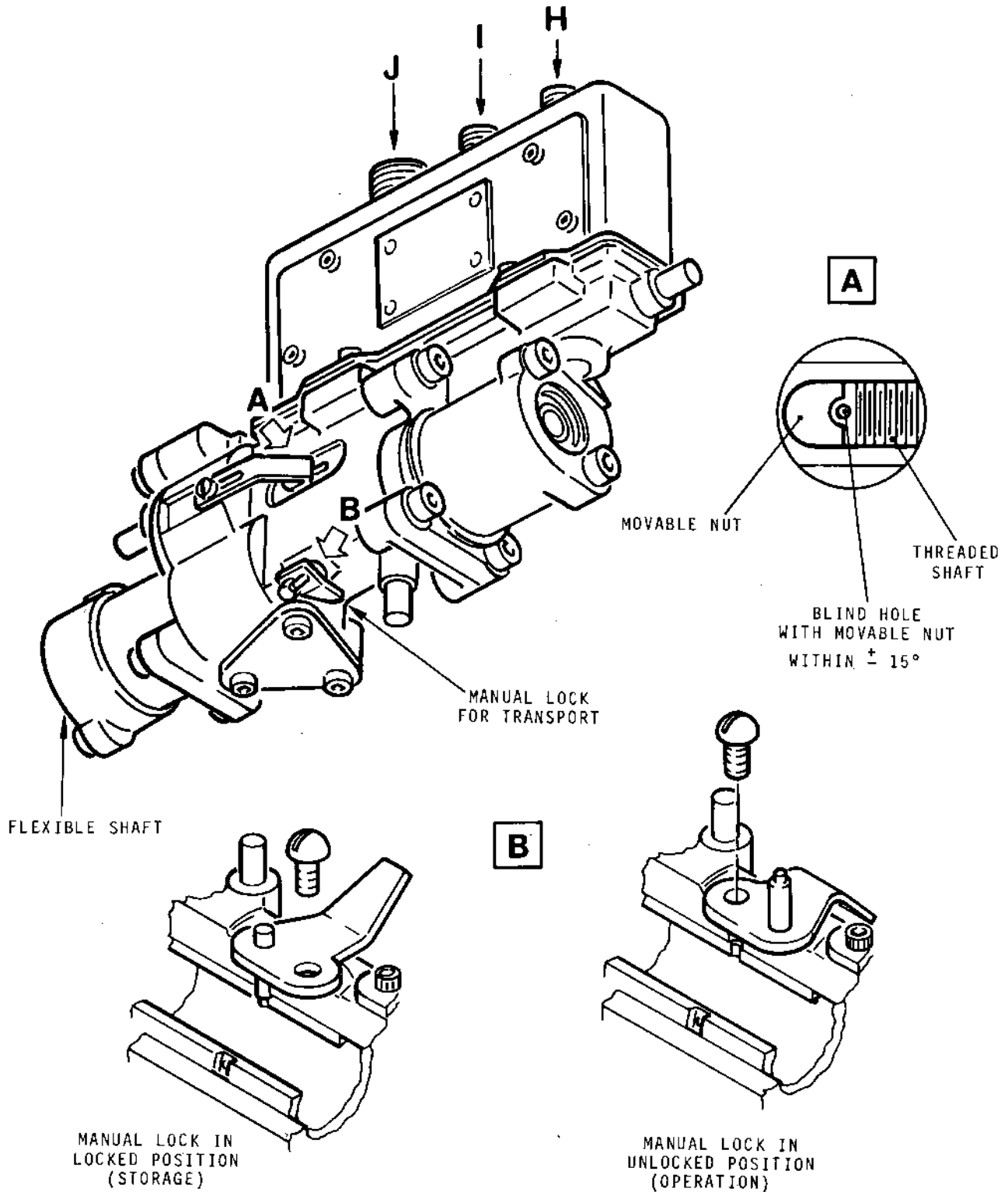
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Bucket Position Transmitter (Indicator) Zero Position
Figure 509 (Sheet 1 of 2)

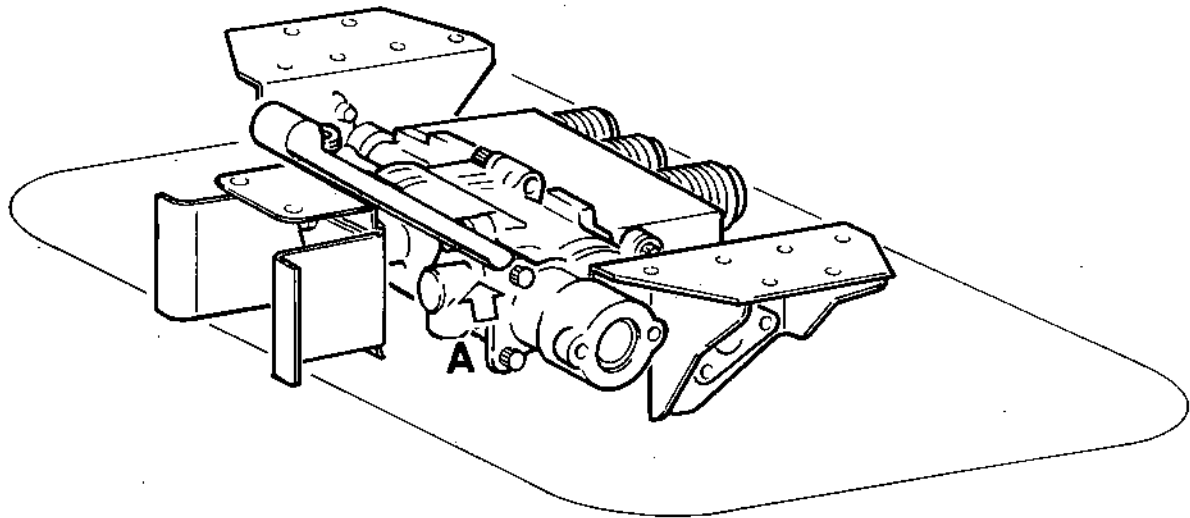
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A

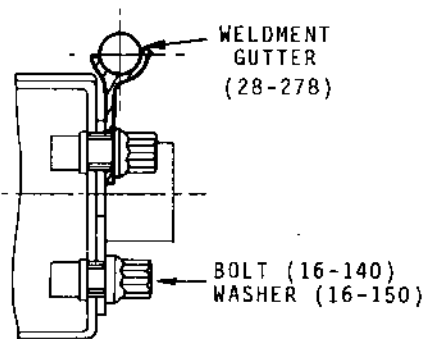


Figure 509 (Sheet 2 of 2)

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- (11) Adjust the clearance between the spherical bearing inner rings and the side trunnion shoulders as follows :
 - (a) Measure the existing clearance.
 - (b) Determine the thickness of the shim :
$$\begin{array}{rcl} (\text{mm}) & = & 1,27 \quad + 1,02 \\ & & \quad - 0,0 \quad - \text{measured clearance} \\ \\ (\text{in.}) & = & 0.050 \quad + 0.040 \\ & & \quad - 0 \quad - \text{measured clearance} \end{array}$$
- (12) Withdraw bolts (16-80) and washers (16-90).
- (13) Remove the spherical bearing assemblies (16-130) and fit shims (16-100) as determined above.
- (14) Refit the spherical bearing assemblies (16-100) and secure them using bolts (16-80) and washers (16-90).
- (15) Tighten the bolts to the recommended torques.
- (16) Check the clearance at all three mounting points.
- (17) Check the clearance between the transmitter (indicator) and the structure (min. = 3,8 mm (0.115 in.)).
- (18) Remove the protective caps fitted to the transmitter (indicator) and electrical harness connectors.
- (19) Plug connectors H, I, J into the transmitter (indicator).
- (20) Tighten the nuts to the recommended torques and wire lock.

18. Installation of Ballscrew Gearboxes

NOTE 1 : Before installing the ballscrew gearboxes, check that they are in the retracted position.

NOTE 2 : The bolts which attach the ballscrew gearboxes to their appropriate support assemblies must be fitted such that the castellated nuts are accessible via the side access doors (for the lateral attachment points). The heads of the central attachment bolts must face the inside of the bay.

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A. Carry out the following operations for each ballscrew gearbox :

- (1) Position the ballscrew gearbox (16-10) such that the anti-rotation peg on the support fitting engages in the ballscrew gearbox attachment yoke.
- (2) Fit bolt (16-50) complete with plain washer (16-60).
- (3) Fit plain washer (16-40) and castellated nut (16-30).
- (4) Tighten the nut to the recommended torque and lock it using split pin (16-20).

B. Position pieces of polyurethane foam between the ballscrew gearbox bodies and the structure, and secure the former to the latter using brass wire.

Hold the ballscrew gearbox fast by the use of tool SC 268.

19. Installation of Flexible Shafts

CAUTION : DO NOT KINK THE FLEXIBLE SHAFTS.

DO NOT REMOVE THE FLEXIBLE SHAFT FROM ITS SHEATH.

A. Preparation for Installation.

Before installing the flexible shaft on the structure, carry out the following operations for each of them :

- (1) Check the difference in the length between the flexible shaft and its sheath. This difference must conform to the values given below :

I P L Item Number Value of Shaft/Sheath Δl

15-10	63,25 to 72,99 mm	(2.49 to 2.87 in.)
15-20	66,80 to 76,45 mm	(2.63 to 3.01 in.)
15-30	60,96 to 70,61 mm	(2.40 to 2.78 in.)
15-40	60,96 to 70,61 mm	(2.40 to 2.78 in.)
15-50	64,26 to 73,91 mm	(2.53 to 2.91 in.)
15-150	61,47 to 71,12 mm	(2.42 to 2.80 in.)
15-160	68,07 to 77,72 mm	(2.68 to 3.06 in.)
15-170	60,96 to 70,61 mm	(2.40 to 2.78 in.)

- (2) If the difference in length is too low (the sheath tends to shrink during storage), proceed as follows :

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sneema

- (a) Secure the end of the sheath (with the larger diameter collar) in a vice fitted with suitable soft jaws.
 - (b) On the other end flange of the sheath, fit the flange for stretching the sheath - tool SC 267 - and connect the dynamometer.
 - (c) Stretch the flexible shaft sheath by applying a load of 15 to 20 kg (30 to 40 lb).
 - (d) Measure the difference in length.
 - (e) If this difference is too low, repeat operations (a), (b), (c), (d).
- (3) Ensure that the protective springs on the flexible shafts are in their appropriate position, as shown on figure 510.

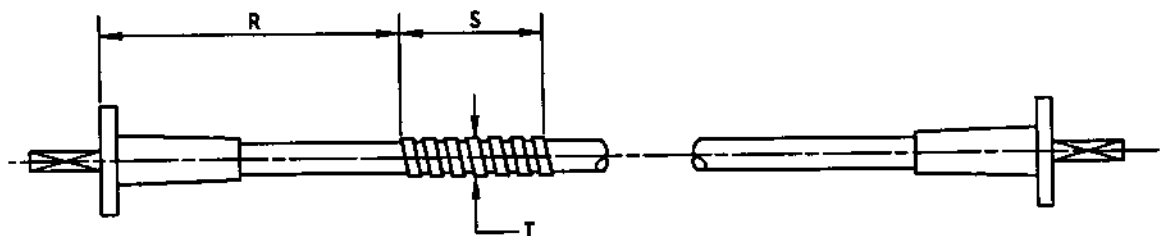
B. Installation of Flexible Shafts (Figure 511).

NOTE: Check that the flexible shaft closed retaining flanges are in place on the large collar end.

CAUTION: THE FLEXIBLE SHAFTS MUST BE INTRODUCED INTO THE GUIDE TUBES BY PULLING ON THE SHEATHS USING TOOL SC 188.
WHEN INSTALLING THE FLEXIBLE SHAFTS INTO THE STRUCTURE, OR PENDING ATTACHMENT TO THE TRANSMITTER (INDICATORS) OR THE PNEUMATIC DRIVE ACTUATORS, FIT A CABLE SUPPORT (TOOL SC 187) TO EACH END OF EACH SHEATH, TO AVOID THE FLEXIBLE CORE SLIDING OUT OF THE SHEATH.

- (1) Position flexible shaft (15-50) in the structure (bay 1 or 3).
 - (a) Insert hexagon (1) of the flexible shaft into bucket ballscrew gearbox 3.
 - (b) Secure the flexible shaft flange to the bucket ballscrew gearbox using nuts (15-56).
 - (c) Insert hexagon (2) of the flexible shaft into the bucket position transmitter (indicator), rotating it plus or minus thirty degrees using spanner tool SC 249.

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FLEXIBLE-SHAFT (FIG - ITEM)	R	S	T
15 - 30	260 (10.24)	76 (3.00)	13,2 (.52) 12,45 (.49)
15 - 40	260 (10.24)	76 (3.00)	13,2 (.52) 12,45 (.49)
15 - 50	335 (13.20)	101 (4.00)	13,2 (.52) 12,45 (.49)
15 - 170	260 (10.24)	76 (3.00)	13,2 (.52) 12,45 (.49)

NOTE :

**DIMENSION R IS A MEAN VALUE
AND MAY BE ALTERED DURING
INSTALLATION INTO THE NOZZLE
ASSEMBLY.**

**DIMENSIONS ARE IN MILLIMETRES WITH
INCH CONVERSIONS IN PARENTHESES.**

S-OLY-SM-00055-00-B

Location of Protective Springs on Flexible Shafts
Figure 510

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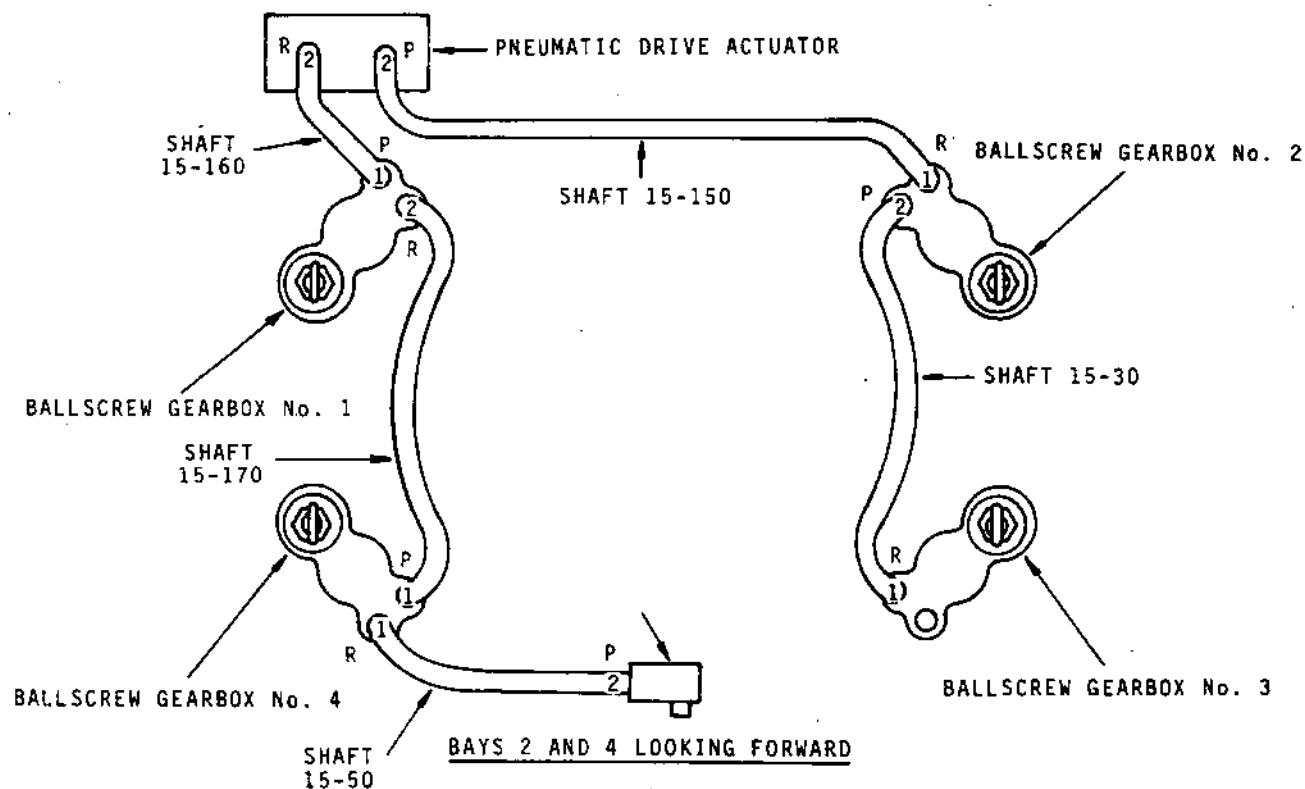
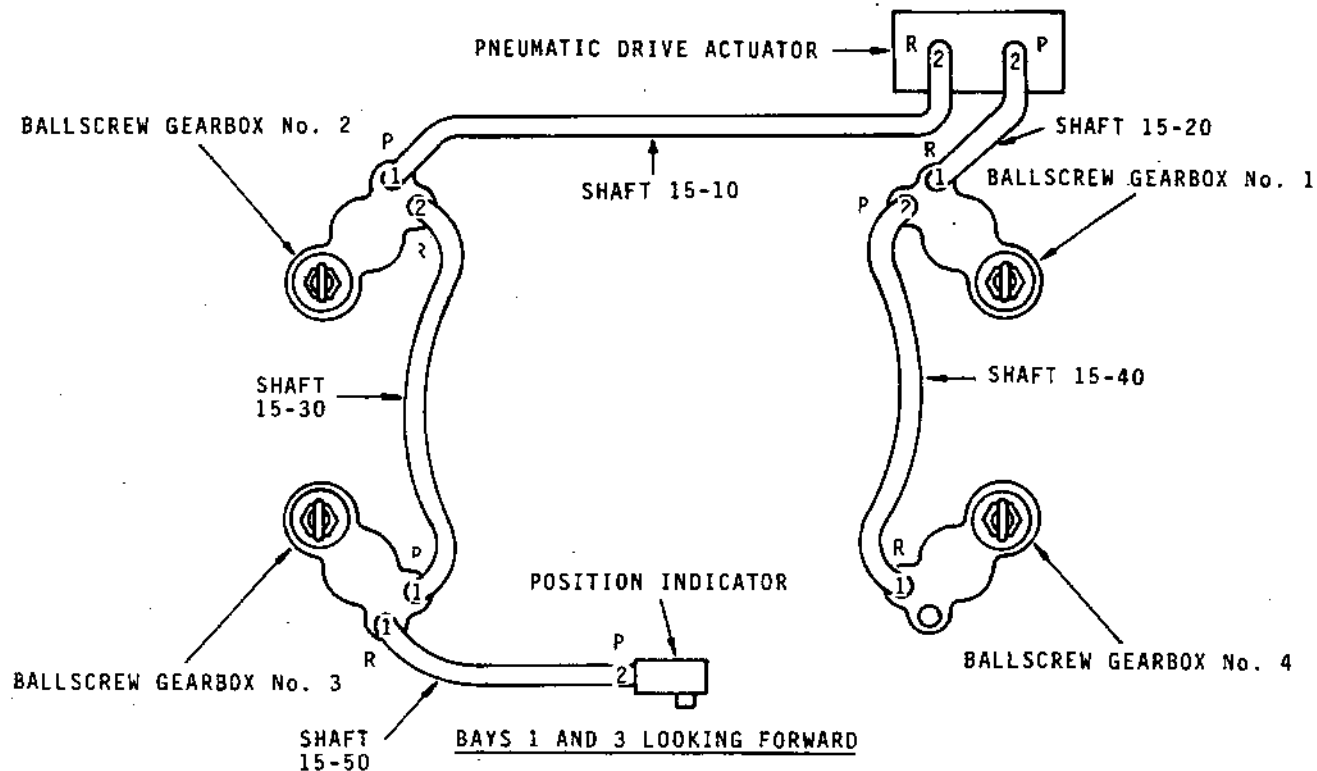


Figure 511

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sneema

- (d) Measure the clearance between the collar and the bucket position transmitter (indicator):
- If the clearance is less than 3 mm (0.118 in.) secure the flexible shaft flange to the bucket position transmitter (indicator) using bolts (15-52).
 - If the clearance lies between 3 and 5 mm (0.118 and 0.197 in.) insert a 4 mm (0.157 in.) shim (15-54) between the bucket position transmitter (indicator) and the flexible shaft flange and secure the flange using bolts (15-52).
 - If the clearance is greater than 5 mm (0.197 in.) insert a 6 mm (0.236 in.) shim (15-55) between the bucket position transmitter (indicator) and the flexible shaft flange and secure the flange using bolts (15-53).
- (2) Position flexible shaft (15-30) in the structure (bay 1 or 3) by inserting it into the guide-tube, from ballscrew gearbox 2 toward gearbox 3.
- (a) Insert hexagon (2) of the flexible shaft into ballscrew gearbox 3.
- (b) Secure the flexible shaft flange to the bucket ballscrew gearbox using nuts (15-35).
- (c) Insert hexagon (2) of the flexible shaft into ballscrew gearbox 2, rotating it anticlockwise, sixty degrees maximum (looking in from the end of the flexible shaft) using spanner-tool SC 249.
- (d) Measure the clearance between the collar and ballscrew gearbox 2.
- If the clearance is less than 3 mm (0.118 in.), secure the flexible shaft flange to ballscrew gearbox 2 using nuts (15-35).
 - if the clearance lies between 3 and 5 mm (0.118 and 0.197 in.) insert a 4 mm (0.157 in.) shim (15-36 in.) between the flange and the ballscrew gearbox.
 - if the clearance is greater than 5 mm (0.197 in.) insert a 6 mm (0.236 in.) shim (15-37) between the flange and the ballscrew gearbox.
- (3) Position the flexible shaft (15-170) in the structure (bay 2 or 4) by inserting it into the guide-tube from ballscrew gearbox 4 toward ballscrew gearbox 1.

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- (a) Insert hexagon (1) of the flexible shaft into ballscrew gearbox 4.
- (b) Secure the flexible shaft flange to the ballscrew gearbox using nuts (15-175).
- (c) Insert hexagon (2) of the flexible shaft into ballscrew gearbox 1, rotating it clockwise sixty degrees maximum (looking in from the end of the flexible shaft) using spanner - tool SC 249.
- (d) Measure the clearance between the collar and ballscrew gearbox 1.
 - if the clearnce is less than 3 mm (0.118 in.) position the open flange and secure it using nuts (15-172).
 - if the clearance lies between 3 and 5 mm (0.118 and 0.197 in.), insert a 4 mm (0.157 in.) shim (15-173) between the ballscrew gearbox and the open flange.
 - if the clearance is greater than 5 mm (0.197 in.) insert a 6 mm (0.236 in.) shim (15-174) between the ballscrew gearbox and the open flange.
- (4) Position the flexible shaft (15-160) in the structure (bay 2 or 4).
 - (a) Insert hexagon (1) of the flexible shaft into ballscrew gearbox 1.
 - (b) Secure the flexible shaft flange of ballscrew gearbox 1 using nuts (15-167).
- (5) Position the flexible shaft (15-150) in the structure (bay 2 or 4) inserting it in the guide-tube from the bucket pneumatic drive actuator toward ballscrew gearbox 2.
 - (a) Insert hexagon (1) of the flexible shaft into ballscrew gearbox 1.
 - (b) Position the open flange and secure it using nuts (15-157).
- (6) Tighten the securing components to the specified torques.

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20. Installation of P3 Air Feeds

A. Installation of Pipe Assembly (19-100).

- (1) Locate the spherical bearing (19-90) in its housing on the pipe assembly (19-100).
- (2) Position the pipe assembly in the housing for the bucket drive pneumatic actuator of bay 1. Introduce the threaded section through the front frame until the collar abuts, the pipe being correctly centered.
- (3) Fit pipe end nut (19-40) without tightening.
- (4) Align the tube flange hole with the hole in the support bracket (21-10).
- (5) Measure the clearance between the rear face of the flange and the front face of the support bracket, and machine spacer (19-60) in line with the measured clearance.
- (6) Secure the pipe assembly to the support bracket, using bolt (19-70), complete with washer (19-80) and fit nut (19-50).
- (7) Tighten nuts (19-50) and, subsequently, (19-40) to the recommended torques and wire-lock the pipe end nut (19-40).
- (8) Fit cover plates (19-20) and (19-30), ensuring that they overlap but do not touch the pipe.
- (9) Fit bolts (19-10) and tighten to the recommended torque.

NOTE : The cover plates (19-20) and (19-30) have two common fixing points.

B. Installation of Pipe Assembly (19-200).

- (1) Locate the spherical bearing (19-190) in its housing on the pipe assembly (19-200).
- (2) Position the pipe assembly in the housing for the bucket drive pneumatic actuator on bay 2. Introduce the threaded section through the front frame until the collar abuts, the pipe being correctly centered.



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- (3) Fit pipe end nut (19-140) without tightening.
- (4) Align the tube flange hole with the hole in the support bracket (21-170).
- (5) Measure the clearance between the rear face of the flange and the front face of the support bracket, and machine spacer (19-160) in line with the measured clearance.
- (6) Secure the pipe assembly to the support bracket, using bolt (19-170), complete with washer (19-180) and fit nut (19-150).
- (7) Tighten nuts (19-140) and subsequently, (19-150) to the recommended torques and wire-lock the pipe end nut (19-140).
- (8) Fit cover plates (19-120) and (19-130), ensuring that they overlap but do not touch the pipe.
- (9) Fit bolts (19-110) and tighten to the recommended torque.

NOTE: The cover plates (19-20) and (19-30) have two common fixing points.

- (a) Insert hexagon (2) of the flexible shaft into the ballscrew gearbox, rotating it clockwise sixty degrees maximum (looking in from the flexible shaft) using spanner - tool SC 249.
- (b) Measure the clearance between the collar and bucket ballscrew gearbox 2:
 - if the clearance is less than 3 mm (0.118 in.) fit the open flange and secure it using nuts (15-32).
 - if the clearance lies between 3 mm and 5 mm (0.118 and 0.197 in.) insert a 4 mm (0.157 in.) shim (15-33) between the ballscrew gearbox and the open flange.
 - if the clearance is greater than 5 mm (0.197 in.) insert a 6 mm (0.236 in.) shim (15-34) between the ballscrew gearbox and the open flange.

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- (10) Position the flexible shaft (15-40) in the structure (bay 1 or 3) by inserting it in the guide-tube from ballscrew gearbox 1 toward ballscrew gearbox 4.
- (a) Insert hexagon (1) of the flexible shaft into ballscrew gearbox 4.
 - (b) Secure the open flange of the flexible shaft to the ballscrew gearbox using nuts (15-45).
 - (c) Insert hexagon (2) of the flexible shaft in ballscrew gearbox 1, rotating it anti-clockwise sixty degrees maximum (looking in from the end of the flexible shaft) using spanner - tool SC 249.
 - (d) Measure the clearance between the collar and ballscrew screw gearbox 1.
 - if the clearance is less than 3 mm (0.118 in.), secure the flexible shaft flange to ballscrew gearbox 1 using nuts (15-42).
 - if the clearance lies between 3 and 5 mm (0.118 and 0.197 in.), insert a 4 mm (0.157 in.) shim (15-43) between the flange and the ballscrew gearbox.
 - if the clearance is greater than 5 mm (0.197 in.) insert a 6 mm (0.236 in.) shim (15-44) between the flange and the ballscrew gearbox.
- (11) Position the flexible shaft (15-20) in the structure (bay 1 or 3).
- (a) Insert hexagon (1) of the flexible shaft in ballscrew gearbox 1.
 - (b) Position the open flange and secure it to ballscrew gearbox 1 using nuts (15-27).
- (12) Position the flexible shaft (15-10) in the structure (bay 1 or 3) by inserting it into the guide-tube from ballscrew gearbox 2 toward the bucket pneumatic drive actuator.
- (a) Insert hexagon (1) of the flexible shaft in ballscrew gearbox 2.
 - (b) Secure the flexible shaft flange to ballscrew gearbox 2 using nuts (15-17).

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- (13) Position the flexible shaft (15-50) in the structure (bay 2 or 4).
- (a) Insert hexagon (1) of the flexible shaft in ballscrew gearbox 4.
 - (b) Secure the open flange of the flexible shaft to the ballscrew gearbox using nuts (15-56).
 - (c) Insert hexagon (2) of the flexible shaft into the bucket position transmitter (indicator), rotating it plus or minus thirty degrees using spanner - tool SC 249.
 - (d) Measure the clearance between the collar and the bucket position transmitter (indicator).
 - if the clearance is less than 3 mm (0.118 in.), secure the flexible shaft flange to the bucket position transmitter (indicator) using bolts (15-52).
 - if the clearance lies between 3 and 5 mm (0.118 and 0.197 in.) insert a 4 mm (0.157 in.) shim (15-54) between the flexible shaft flange and the bucket position transmitter (indicator) and secure the flange using bolts (15-52).
 - if the clearance is greater than 5 mm (0.197 in.) insert a 6 mm (0.236 in.) shim (15-55) between the bucket position transmitter (indicator) and the flexible shaft flange and secure the flange using bolts (15-53).
- (14) Position the flexible shaft (15-30) in the structure (bay 2 or 4) by inserting it into the guide-tube from ballscrew gearbox 2 toward ballscrew gearbox 3.
- (a) Insert hexagon (1) of the flexible shaft into ballscrew gearbox 3.
 - (b) Secure the open flange of the flexible shaft to the ballscrew gearbox using nuts (15-32).

21. Installation of the Crossfeed Isolation Valve (18-310).
(Figure 512).

A. Installation of the Tube Assemblies.

- (1) Position the angle bracket (18-550) to the wall which separates the pneumatic actuator housings from the crossfeed isolation valves housing (on the pneumatic actuator side).

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- (2) Fix the angle bracket (18-550) using bolts (18-540), plain washers (18-530) and self-locking nuts (18-520). (The nuts are located on the crossfeed isolation valve side).
- (3) Fit the P clip (18-510) to the tube assembly (18-430).
- (4) Couple the tube assembly (18-430) to the P3 air elbow assembly (17-170).
 - (a) Fit dee head bolts (18-470), spherical washers (18-460) and (18-450) and nuts (18-440) (nuts (18-440) being on the crossfeed isolation valve side).
 - (b) Fit bolts (18-476) complete with spherical washers (18-477) and (18-478), washers (18-474) and nuts (18-472). (The nut (18-472) being on the pneumatic actuator housing side).
- (5) Secure P clip (18-510) to angle bracket (18-550) using bolt (18-500), plain washer (18-490) between the clip and angle bracket and plain washer (18-490) and self-locking nut (18-480).
- (6) Position the P clip (18-420) to the tube assembly (18-340).
- (7) Couple the tube assembly (18-340) to the P3 air elbow assembly (17-110) using bolts (18-380), spherical washers (18-370) and (18-360) and nuts (18-350). (The nuts (18-350) being on the crossfeed isolation valve side).
- (8) Fix the P clip (18-420) to the angle bracket (18-550) using bolt (18-410), a plain washer (18-420) between the clip and the angle bracket, and a plain washer (18-420) and self-locking nut (18-390).
- (9) Secure the half clamp assembly (18-330) using bolt (18-320), ensuring the tubes are secured in position.
- (10) Tighten the mounting elements to the recommended torques.
- (11) Wire locknuts (18-440) and (18-350).

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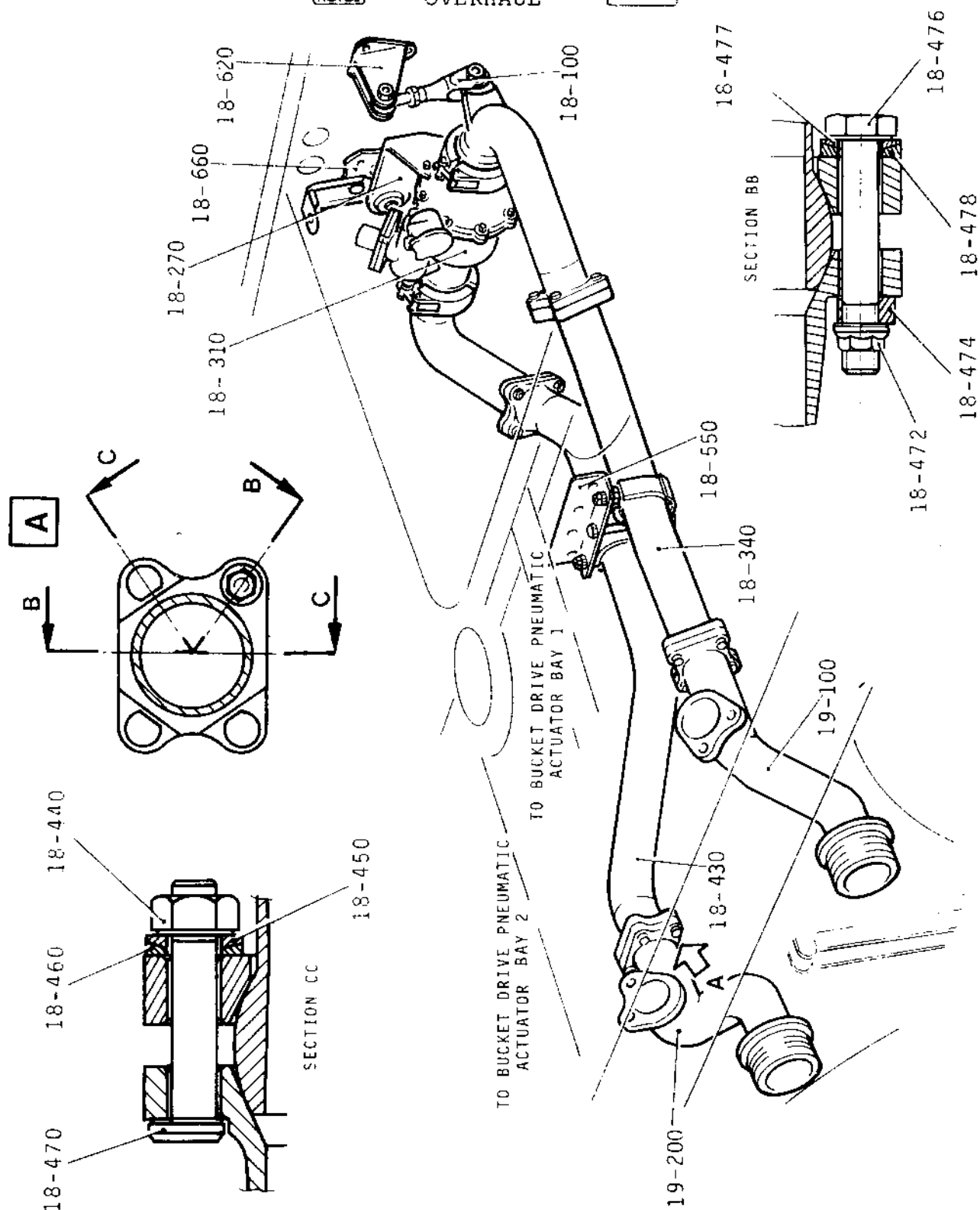
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Installation of Crossfeed Isolation Valve
Figure 512 (Sheet 1 of 2)

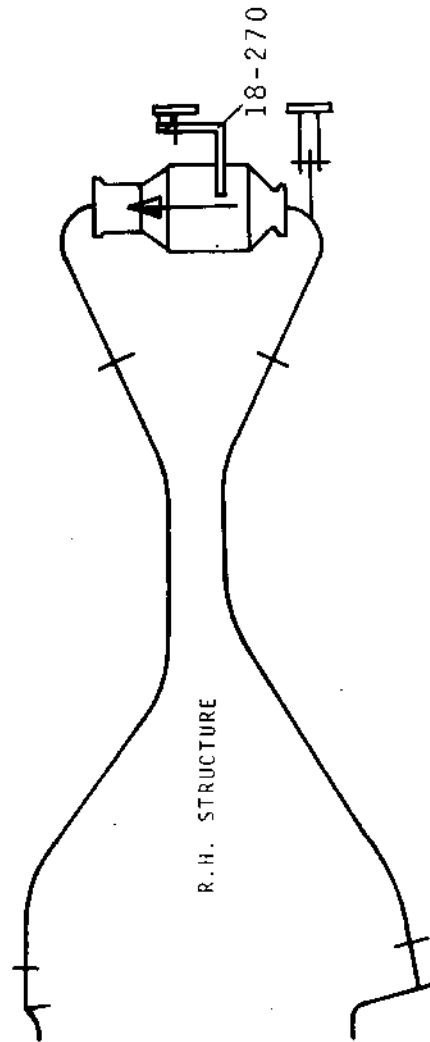
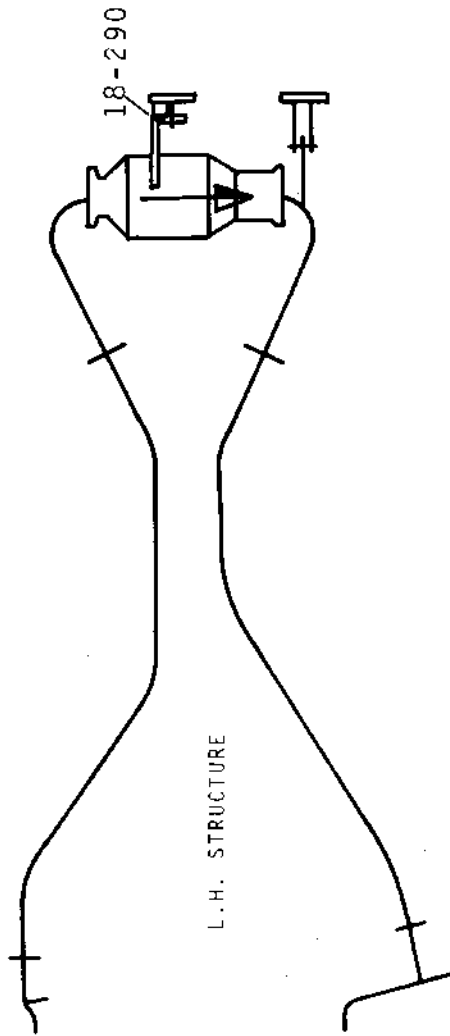
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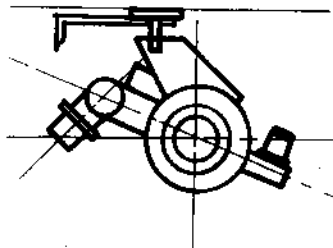
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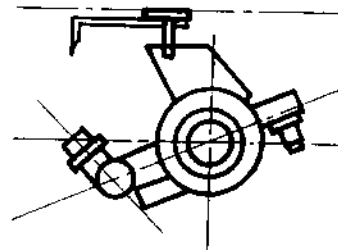
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VIEW ON F1



VIEW ON F2



Installation of Crossfeed Isolation Valve
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B. Installation of Elbow Assemblies.

- (1) Couple the elbow assembly (18-190) to the tube assembly (18-430), using dee head bolts (18-230), spherical washers (18-220) and (18-210) and nuts (18-200).
- (2) Fit the spherical bearing (18-180) to the lug on the elbow assembly (18-110).
- (3) Couple the elbow assembly (18-110) to the tube assembly (18-340), using dee head bolts (18-150), spherical washers (18-140) and (18-130), and nuts (18-120).
- (4) Tighten the mounting elements to the recommended torques.
- (5) Wire locknuts (18-200) and (18-120) in pairs.

C. Installation of the Mounting yoke (18-620).

- (1) Locate the mounting yoke (18-620) to the rear wall of the crossfeed isolation valve housing.
- (2) Retain the yoke using :
 - (a) bolts (18-590), plain washers (18-580) and self-locking nuts (18-570). (For the upper and lower LH mounting points).
 - (b) fit clip (18-597) and secure it and the yoke, using bolt (18-593), plain washer (18-580) and self-locking nut (18-570). (For the upper RH mounting point).
- (3) Fit the flanged bushings (18-600) and (18-610) to the yoke. (The bushing shoulders to be located to the inside of the yoke).

D. Installation of Pivot (18-660).

- (1) Position the pivot (18-660) on the rear wall of the crossfeed isolation valve housing, and secure it with two bolts (18-650), two plain washers (18-640) and two self-locking nuts (18-630).
- (2) Fit bracket (18-670) to the pivot.
- (3) Secure the bracket to the pivot, using two bolts (18-650), two plain washers (18-640) and two self-locking nuts (18-630).

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(4) Tighten the nuts to the recommended torques.

E. Installation of the Crossfeed Isolation Valve (18-310).

- (1) Fit spherical bearing (18-280) to the isolation valve support bracket (18-270). Carry out the same operation with the support bracket (18-290) and the spherical bearing (18-280).
- (2) Carry out the following operations to fit the isolation valve support bracket (18-270) or (18-290) (see Fig. 512, sheet 2.) :
 - (a) Fit the spherical bearing (18-280) to the isolation valve support bracket (18-270).
 - (b) Unlock and withdraw the three bolts (18-260) which secure the isolation valve housing.
 - (c) Fit the isolation valve support bracket and secure it with three bolts (18-260).

NOTE : The valve support bracket must be held between the heads of bolts (18-260) and the isolation valve housing.

- (d) Tighten the bolts to the recommended torque and wire lock them.
- (3) Fit collar clamps (18-160) and (18-240) to elbow assemblies (18-110) and (18-190).
- (4) Remove the blanks fitted to the isolation valve air inlets.
- (5) Push the air feed tubes to one side and position the crossfeed isolation valve to its mounting point.
- (6) Fit sealing rings (18-170) and (18-250).
- (7) Fit and tighten collar clamps (18-240) and (18-160).

F. Installation of the Mounting Link Assembly (18-10).

- (1) Fit locknut (18-90) to the rod end (18-80).
- (2) Screw the rod end clevis (18-100) to the rod end.
- (3) Fit flanged bushings (18-60) and (18-70) to the rod end clevis, with the bushing shoulders to the inside of the yoke.



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- (4) Adjust the between-centres distance of the link to the nominal dimension of 63,11 mm (6.422 in) without tightening the locking nut (18-90).
 - (5) Set the link assembly to the mounting yoke (18-620).
 - (6) Fit bolt (18-50), complete with washers (18-55) and (18-40) and castellated nut (18-30).
 - (7) Position the link clevis end to the lug on the elbow and adjust the length by screwing or unscrewing half-a-turn at a time, until bolt (18-50) can be freely inserted.
 - (8) Secure the clevis rod end with bolt (18-50), plain washer (18-40) and castellated nut (18-30).
 - (9) Tighten the nuts (18-30) to the recommended torques and lock with split pins (18-20).
- G. Connecting the Electrical Wiring Harness (26-10) to the Crossfeed Isolation Valve
- (1) Remove the blanking caps fitted to the isolation valve receptacles.
 - (2) Remove the adhesive tape which secures the electrical wiring end to the structure (see paragraph 5.C.(15)).
 - (3) Remove the blanking caps fitted to connectors G and F of the electrical wiring harness (26-10).
 - (4) Fix the wiring harness (26-10) to the bracket (18-670) using clip Q (see figure 503), bolt (26-230) and nut (26-220).
 - (5) Plug in the connectors.
 - (a) The connector identified G to the upper part of the crossfeed isolation valve.
 - (b) The connector identified F to the lower part of the crossfeed isolation valve.
 - (6) Tighten the mounting elements to the recommended torques.
 - (7) Wire lock the connector nuts.

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22. Installation of Bucket Drive Pneumatic Actuators (Figure 513)

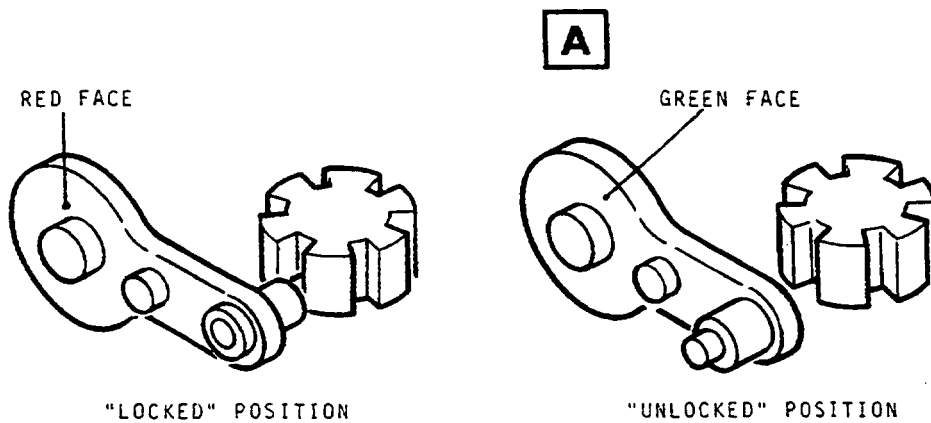
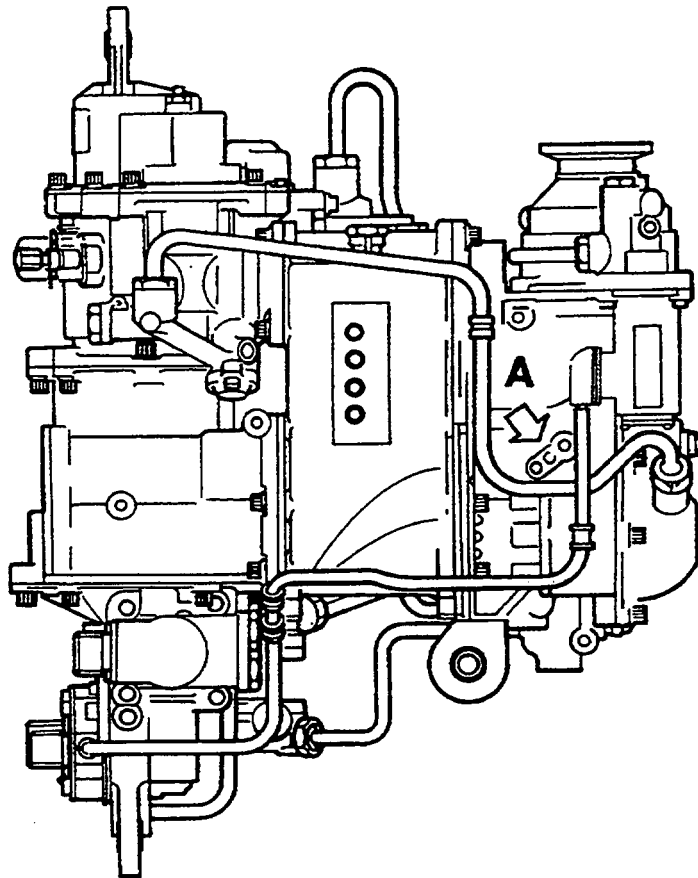
CAUTION: FAILURE TO STRICTLY OBSERVE THE WHOLE BUCKET DRIVE PNEUMATIC ACTUATOR INSTALLATION PROCEDURE IN ITS ENTIRETY COULD RESULT IN EXTREMELY HOT AIR LEAKING INTO DRIVE BAY AREA CAUSING MALFUNCTION OF UNIT AND DISTRESS TO SURROUNDING STRUCTURE, AND MAY LEAD TO AN INADVERTENT MOVEMENT OF THE BUCKETS TOWARDS THE REVERSE POSITION.

A. Preparation for Installation of the Rod Assemblies

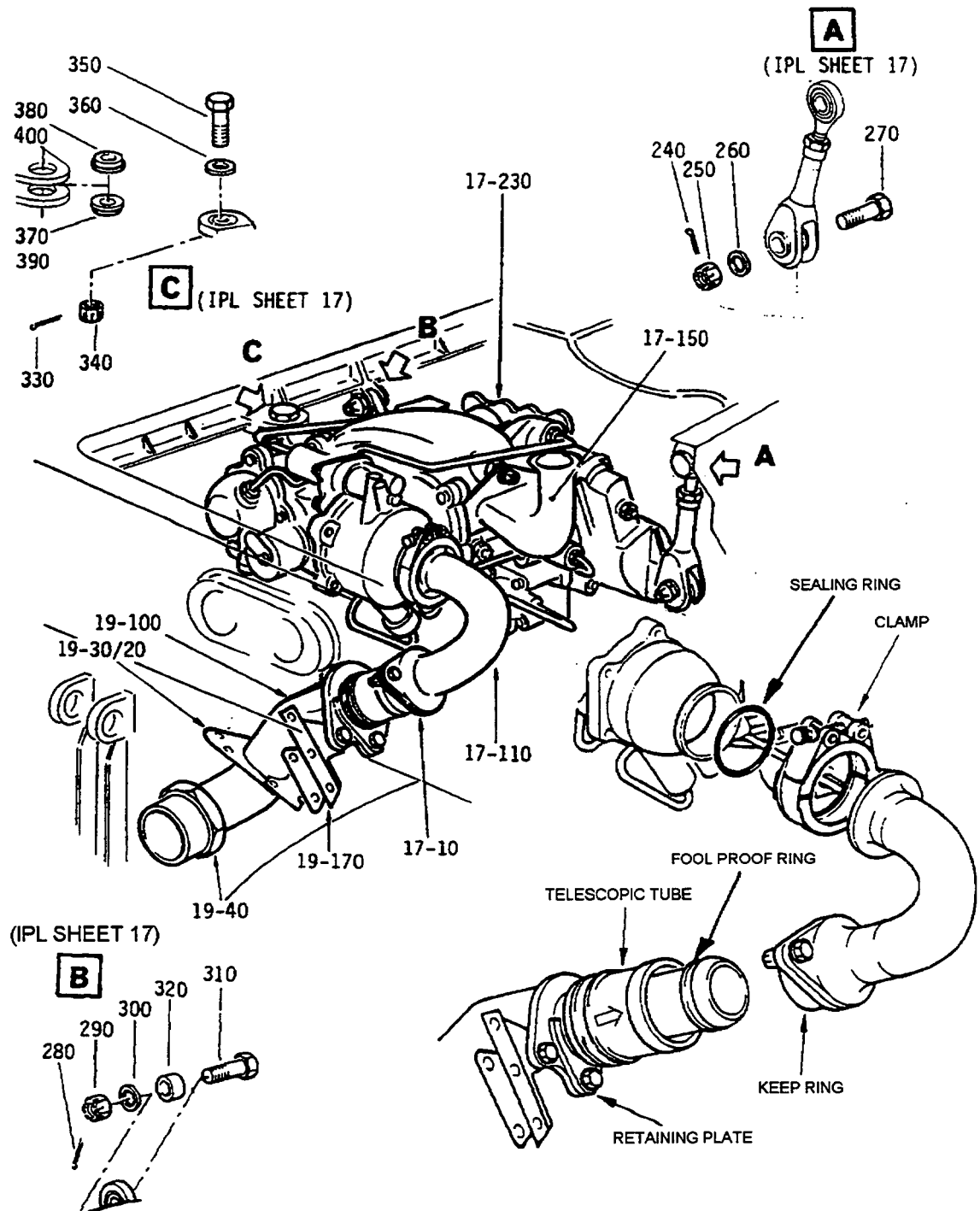
NOTE: When adjusting the between-centres distance of the rod assemblies, use 6,35 mm (0.250 in) and 12,70 mm (0.500 in) diameter pin gauges.

- (1) Preparation of LH rod assembly (19-210) for assembly to bay 1.
 - (a) Fit locknut (19-270) to rod end (19-260).
 - (b) Screw the rod end assembly onto the fork end (19-280).
 - (c) Adjust the rod assembly between-centres distance to the nominal value of 101,10 mm (3.98 in) (dimension over pin gauges = 110,60 mm (4.35 in)).
 - (d) Tighten locknut (19-270) to the recommended torque.
 - (e) Fit flanged bushings (19-370) and (19-380) to the rod assembly, the bush shoulders being inside the yoke.
- (2) Preparation of LH rod assembly (29-290) for assembly to bay 3.
 - (a) Fit locknut (19-350) to rod end (19-340).
 - (b) Screw the rod end assembly onto the fork end (19-360).
 - (c) Adjust the rod assembly between-centres distance to the nominal values of 118,62 mm (4.89 in) (dimension over gauge pins = 128,12 mm (5.05 in)).
 - (d) Tighten locknut (19-350) to the recommended torque.
 - (e) Fit flanged bushings (19-370) and (19-380) to the rod assembly, the bush shoulders being inside the yoke.
- (3) Preparation of LH rod assembly (19-410) for assembly to bay 2 or 4.

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Installation of Bucket Drive Pneumatic Actuators
Figure 513 (Sheet 1 of 2)



Installation of Bucket Drive Pneumatic Actuators
Figure 513 (Sheet 2 of 2)



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- (a) Fit locknut (19-470) to rod end (19-460).
- (b) Screw the rod end assembly onto the fork end (19-480).
- (c) Adjust the rod assembly between-centres distance to the nominal value of 94,66 mm (3.313 in) (dimension over gauge pins = 104,56 mm (4.12 in)).
- (d) Tighten locknut (19-470) to the recommended torque.
- (e) Fit flange bushings (19-490) and (19-500) to the rod assembly, the bush shoulders being inside the yoke.

B. Preparation for Installation of the Bucket Drive Pneumatic Actuators.

NOTE: Before installing the pneumatic actuators, check that they are in the locked position (red lock visible).

- (1) Fit the appropriate rod assembly to each bucket drive pneumatic actuator (17-230).
i.e.: (19-210) for bay 1
 (19-290) for bay 3
 (19-410) for bays 2 and 4,
and secure them with bolts (17-270), plain washers (17-260) and castellated nuts (17-250).
- (2) Tighten the castellated nuts to the minimum recommended torque, and lock using split pin (17-240).
- (3) Fit flanged bushings (19-390) and (19-400) in the yoke end of the rod assemblies, the shoulder being inside the yoke (bay 1).
- (4) Fit flanged bushings (19-510) and (19-520) in the yoke end of the rod assemblies, the shoulder being inside the yoke (bay 2).
- (5) Fit flanged bushings (17-370) and (17-380) in the yoke end of the rod assemblies on the bay 1 pneumatic actuator, then the bushings (17-390) and (17-400) in the yoke end of the bay 2 pneumatic actuator.

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C. Installation of the Bay 2/4 Bucket Drive Pneumatic Actuator

- (1) Place the pneumatic actuator (17-230) in its bay slightly tilted towards the centre of the twin secondary nozzle. Introduce it slowly. Position the rod assembly in the suspension yoke.
- (2) Position the actuator boss in the yoke on the structure and fit bolt (17-350) complete with plain washer (17-360). The head of the bolt is to be towards the inside of the actuator housing.
- (3) Position the rear boss on the drive actuator in the yoke on the structure and fit bolt (17-310) complete with bushing (17-320), the head of the bolt being rearwards.
- (4) Fit the rod assembly in the yoke, using a bolt (19-450) the head being rearwards.
- (5) Fit washer (19-440) and castellated nut (19-430) without tightening.
- (6) Fit washer (17-300) and castellated nut (17-290).
- (7) Fit castellated nut (17-340).
- (8) Tighten castellated nut (17-290) and then (17-340) to the minimum recommended torques. Lock using split pins (17-280) and (17-330).
- (9) Install the telescopic tube (17-10)

CAUTION: THE NON-APPLICATION OF THIS DRILL WOULD PROBABLY LEAD TO AN INADVERTENT MOVEMENT OF THE BUCKETS TOWARDS THE REVERSE POSITION.

CAUTION: INTRODUCTION OF ANY ANTI-SEIZE OR LUBRICATING PRODUCT IS STRICTLY FORBIDDEN. SEND THE TELESCOPIC TUBE TO SHOP FOR MAINTENANCE WHEN FOUND STIFF TO MOVE DURING GROUND MAINTENANCE.

- (a) Ensure Telescopic Tube is installed the correct way round (Ref. Fig. 513 Sheet 2 of 2).
- (b) Ensure foolproof ring is present on telescopic tube.
- (c) Engage lip of spherical seal at large diameter end with the retaining plate (17-50). Check lip has engaged by giving tube a sharp pull away from plate.

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- (d) If retaining plate has been removed do not tighten retaining bolt (17-30) until Telescopic Tube is fully engaged on the spherical seal.
 - (10) Fit elbow assembly (17-170) to the actuator, with a new sealing ring (17-180) and secure it by collar clamp (17-160) without tightening.
 - (11) Engage the inner cylinder of the telescopic tube in the telescopic tube keep ring (17-90) installed on the P3 air supply elbow.
 - (12) Align pipe assembly (19-200) and elbow assembly (17-170) for installation of the telescopic tube (17-10).
 - (a) Set the alignment by rotating elbow assembly (17-170) and, if necessary, by changing the length of the rod assembly.
 - (b) Tighten the collar clamp (17-160) to the recommended torque.
 - (c) Check the clearance between the pneumatic actuator and the structure (min. 6,35 mm (0.25 in)).
- NOTE: If the length of the rod assembly has been changed, do not omit to retighten nut (19-470) to the recommended torque.
- (d) Wire lock nut (19-470).
 - (e) Tighten the castellated nut (19-430) to the minimum recommended torque, and lock it using split pin (19-420).
 - (f) Apply a coat of elastomer RTV 3145 (P678) to the castellated nut (19-430) and the end of bolt (19-450):
 - 1 Clean the surfaces to be coated using isopropyl alcohol (P442).
 - 2 Apply a coat of primer (P594) with a brush to the degreased surfaces. Leave to dry for 30 minutes at ambient temperature.
 - 3 Prepare the required quantity of elastomer RTV 3175 (P678). Using a spatula, mix this product with additive 4812A (P546) in the proportion of 3%.
 - 4 Apply a coat of elastomer RTV 3145 with a spatula to the castellated nut and the end of the bolt.
- After drying, apply a second coat of elastomer.

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- 5 Leave the elastomer to polymerize for a minimum of 24 hours at ambient temperature and in contact with air moisture.

- (13) Installation of the pneumatic actuator exhaust elbow assembly (17-210).
- (a) Fit studs (17-220) to the pneumatic actuator (17-230).
 - (b) Tighten the studs to the recommended torque and wire lock them.
 - (c) Locate the exhaust elbow assembly (17-210) to the pneumatic actuator.
 - (d) Secure the exhaust elbow assembly using flat washers (17-200) and self-locking nuts (17-190).
 - (e) Tighten the nuts to the recommended torques.

D. Installation of the Bay 1/3 Bucket Drive Pneumatic Actuator

- (1) Place the pneumatic actuator (17-230) in its bay slightly tilted towards the centre of the twin secondary nozzle. Introduce it slowly. Position the rod assembly in the suspension yoke.
- (2) Position the actuator boss in the yoke on the structure and fit bolt (17-350) complete with plain washer (17-360). The head of the bolt is to be towards the inside of the actuator housing.
- (3) Position the rear boss on the drive actuator in the yoke on the structure and fit bolt (17-310) complete with bushing (17-320), the head of the bolt being rearwards.
- (4) Fit the rod assembly in the yoke, using a bolt (19-450) the head being rearwards.
- (5) Fit washer (19-440) and castellated nut (19-430) without tightening.
- (6) Fit washer (17-300) and castellated nut (17-290).
- (7) Fit castellated nut (17-340).
- (8) Tighten castellated nut (17-290) and then (17-340) to the minimum recommended torques. Lock using split pins (17-280) and (17-330).

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(9) Install the telescopic tube (17-10)

CAUTION: THE NON-APPLICATION OF THIS DRILL WOULD PROBABLY LEAD TO AN INADVERTENT MOVEMENT OF THE BUCKETS TOWARDS THE REVERSE POSITION.

CAUTION: INTRODUCTION OF ANY ANTI-SEIZE OR LUBRICATING PRODUCT IS STRICTLY FORBIDDEN SEND THE TELESCOPIC TUBE TO SHOP FOR MAINTENANCE WHEN FOUND STIFF TO MOVE DURING GROUND MAINTENANCE.

- (a) Ensure Telescopic Tube is installed the correct way round (Ref. Fig. 513 Sheet 2 of 2).
 - (b) Ensure foolproof ring is present on telescopic tube.
 - (c) Engage lip of spherical seal at large diameter end with the retaining plate (17-50). Check lip has engaged by giving tube a sharp pull away from plate.
 - (d) If retaining plate has been removed do not tighten retaining bolt (17-30) until Telescopic Tube is fully engaged on the spherical seal.
- (10) Fit elbow assembly (17-170) to the actuator, with a new sealing ring (17-180) and secure it by collar clamp (17-160) without tightening.
- (11) Engage the inner cylinder of the telescopic tube in the telescopic tube keep ring (17-90) installed on the P3 air supply elbow.
- (12) Align pipe assembly (19-200) and elbow assembly (17-170) for installation of the telescopic tube (17-10).
- (a) Set the alignment by rotating elbow assembly (17-170) and, if necessary, by changing the length of the rod assembly.
 - (b) Tighten the collar clamp (17-160) to the recommended torque.
 - (c) Check the clearance between the pneumatic actuator and the structure (min. 6,35 mm (0.25 in)).
- NOTE: If the length of the rod assembly has been changed, do not omit to retighten nut (19-470) to the recommended torque.
- (d) Wire lock nut (19-470).

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- (e) Tighten the castellated nut (19-430) to the minimum recommended torque, and lock it using split pin (19-420).
- (f) Apply a coat of elastomer RTV 3145 (P678) to the castellated nut (19-430) and the end of bolt (19-450):
 - 1 Clean the surfaces to be coated using isopropyl alcohol (P442).
 - 2 Apply a coat of primer (P594) with a brush to the degreased surfaces. Leave to dry for 30 minutes at ambient temperature.
 - 3 Prepare the required quantity of elastomer RTV 3175 (P678). Using a spatula, mix this product with additive 4812A (P546) in the proportion of 3%.
 - 4 Apply a coat of elastomer RTV 3145 with a spatula to the castellated nut and the end of the bolt.
After drying, apply a second coat of elastomer.
 - 5 Leave the elastomer to polymerize for a minimum of 24 hours at ambient temperature and in contact with air moisture.
- (13) Installation of the pneumatic actuator exhaust elbow assembly (17-210).
 - (a) Fit studs (17-220) to the pneumatic actuator (17-230).
 - (b) Tighten the studs to the recommended torque and wire lock them.
 - (c) Locate the exhaust elbow assembly (17-210) to the pneumatic actuator.
 - (d) Secure the exhaust elbow assembly using flat washers (17-200) and self-locking nuts (17-190).
 - (e) Tighten the nuts to the recommended torques.

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- E. Secure the Flexible Shaft (15-20) to the Bucket Pneumatic Drive Actuator or Bay 1 or 3 (Figure 511).
- (1) Remove the shaft support - tool SC 187 - fitted on the end of the flexible shaft (15-20).
 - (2) Insert hexagon 2 of the flexible shaft in the bucket pneumatic drive actuator, rotating it plus or minus 30 degrees using spanner - tool SC 249.
 - (3) Measure the clearance between the collar and the bucket pneumatic drive actuator:
 - if the clearance is less than 3 mm (0.118 in), secure the flange to the bucket pneumatic drive actuator using bolts (15-22),
 - if the clearance lies between 3 and 5 mm (0.118 and 0.197 in), insert a 4 mm (0.157 in) shim (15-25) between the flange and the pneumatic drive actuator and secure the assembly using bolts (15-23),
 - if the clearance is greater than 5 mm (0.197 in), insert a 6 mm (0.236 in) shim (15-26) between the flange and the bucket pneumatic drive actuator and secure the assembly using bolts (15-24).
- F. Secure the Flexible shaft (15-10) to the Bucket Pneumatic Drive Actuator of Bay 1 or 3 (Figure 511)
- (1) Remove the shaft support - tool SC 187 - fitted on the end of the flexible shaft (15-10).
 - (2) Insert hexagon (2) of the flexible shaft into the bucket pneumatic drive actuator, rotating it clockwise sixty degrees (looking in from the end of the flexible shaft) using spanner - tool SC 249.
 - (3) Measure the clearance between the collar and the bucket pneumatic drive actuator:
 - if the clearance is less than 3 mm (0.118 in), position the open flange and secure it using bolts (15-12),
 - if the clearance lies between 3 and 5 mm (0.118 and 0.197 in), insert a 4 mm (0.157 in) shim (15-15) between the open flange and the bucket pneumatic drive actuator and secure the assembly using bolts (15-13),

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- if the clearance is greater than 5 mm (0.197 in), insert a 6 mm (0.236 in) shim (15-11) between the open flange and the bucket pneumatic drive actuator and secure the assembly using bolts (15-14).

G. Secure the Flexible Shaft (15-160) on the Bucket Pneumatic Drive Actuator of Bay 2 or 4 (Figure 511)

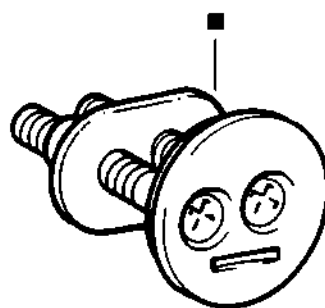
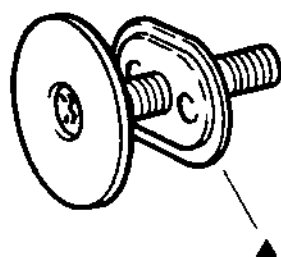
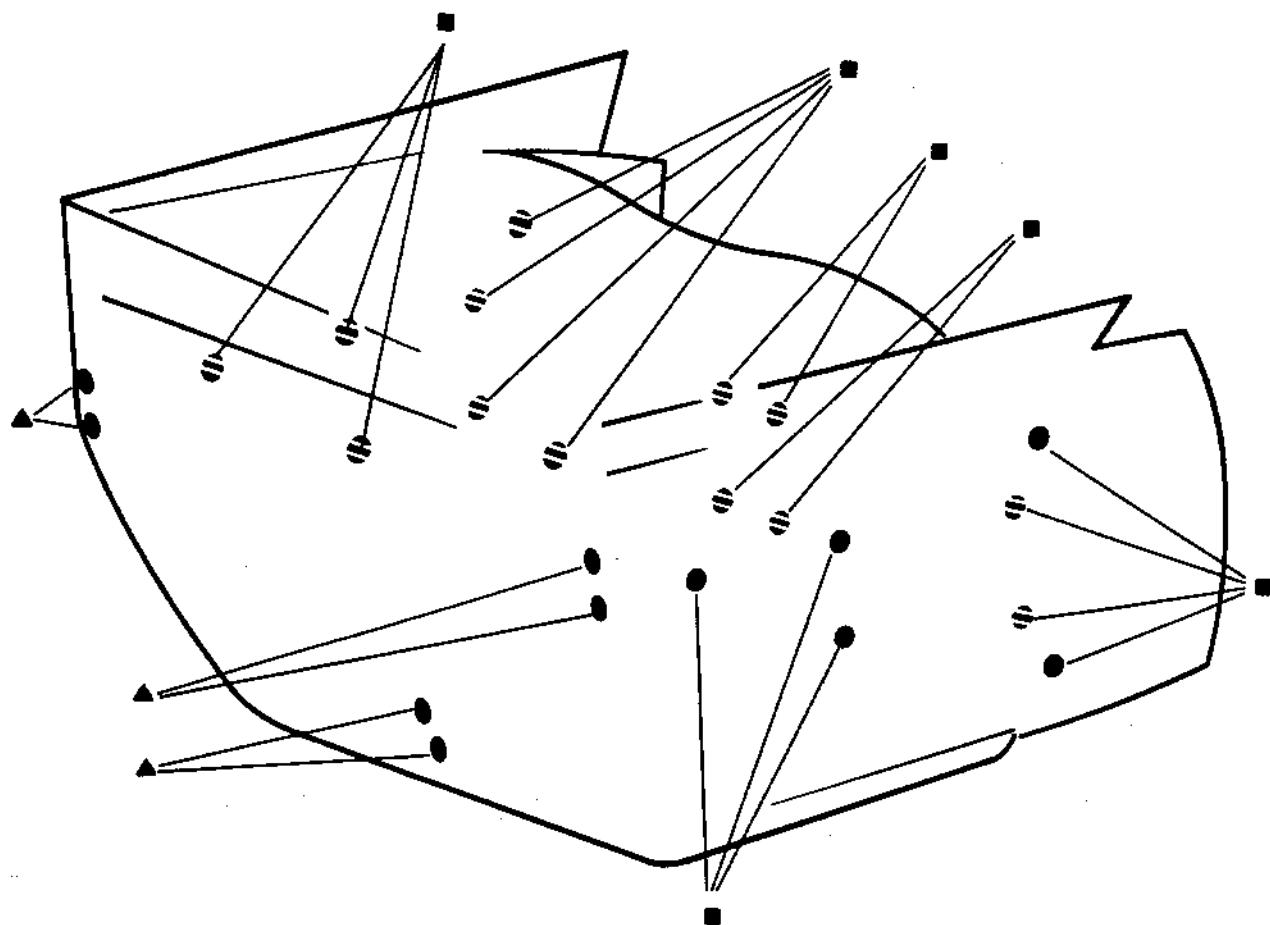
- (1) Remove the shaft support - tool SC 187 - fitted on the end of the flexible shaft (15-160).
- (2) Insert hexagon (2) of the flexible shaft into the bucket pneumatic drive actuator, rotating it plus or minus thirty degrees using spanner - tool SC 249.



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Fitting of Cover Assemblies
Figure 511

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(3) Measure the clearance between the collar and the bucket pneumatic drive actuator:

- if the clearance is less than 3 mm (0.118 in.), position the open flange and secure it using bolts (15-162),
- if the clearance lies between 3 and 5 mm (0.118 and 0.197 in.), insert a 4 mm (0.157 in.) shim (15-165) between the open flange and the bucket pneumatic drive actuator and secure the assembly using bolts (15-163),
- if the clearance is greater than 5 mm (0.197 in.), insert a 6 mm (0.236 in.) shim (15-166) between the open flange and the bucket pneumatic drive actuator and secure the assembly using bolts (15-164).

H. Secure the Flexible Shaft (15-150) on the Bucket Pneumatic Drive Actuator of Bay 2 or 4 (Figure 511).

- (1) Remove the shaft support - tool SC 187 - fitted on the end of the flexible shaft (15-150).
- (2) Insert hexagon (2) of the flexible shaft into the bucket pneumatic drive actuator, rotating it anti-clockwise sixty degrees maximum (looking in from the end of the flexible shaft) using spanner - tool SC 249.
- (3) Measure the clearance between the collar and the bucket pneumatic drive actuator:
 - if the clearance is less than 3 mm (0.118 in.) secure the flexible shaft flange to the bucket pneumatic drive actuator using bolts (15-152).
 - if the clearance lies between 3 and 5 mm (0.118 and 0.197 in.), insert a 4 mm (0.157 in.) shim (15-155) between the flexible shaft flange and the bucket pneumatic drive actuator and secure the assembly using bolts (15-153),
 - if the clearance is greater than 5 mm (0.197 in.), insert a 6 mm (0.235 in.) shim (15-156) between the flexible shaft flange and the bucket pneumatic drive actuator and secure the assembly using bolts (15-154).

J. Connection of Electrical Wiring Harness to the Bucket Drive Pneumatic Actuators.

Carry out the following operations for each pneumatic actuator:

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- (1) Remove the blanking caps fitted to the actuator receptacles and the wiring connectors.
- (2) Connect wiring harness connector C to the pneumatic actuator receptacle, tighten the nut to the recommended torque and wire lock.
- (3) Connect wiring harness connector D to the pneumatic actuator, tighten the nut to the recommended torque and wire lock.
- (4) Connect the wiring harness connector E to the pneumatic actuator, tighten the nut to the recommended torque and wire lock.

22A. Installation of Mounting Pin Assembly

A. Installation of Mounting Pin Assembly.

- (1) Deleted.
- (2) Deleted.
- (3) Position the pin assembly thus formed in its housing in the upper part of bay 1 of the twin secondary nozzle assembly.
- (4) Position cup washer (8-100).
- (5) Fit spherical stop (8-90) to the dogged washer (8-80).
- (6) Fit the dogged washer/spherical stop assembly to the structure and lock the dogged washer.
- (7) Using a spanner, move the spherical stop to bring it into contact with the cup washer. Lock to the recommended torque.
- (8) Fit the lock plate (8-70).
- (9) Lock the plate using split pin (8-60).
- (10) Fit spacer (8-50) and secure it with countersunk head screw (8-40).
- (11) Tighten the screw (8-40) to the recommended torque.
- (12) Secure the cover (8-30) to the spacer, using countersunk head screws (8-20).

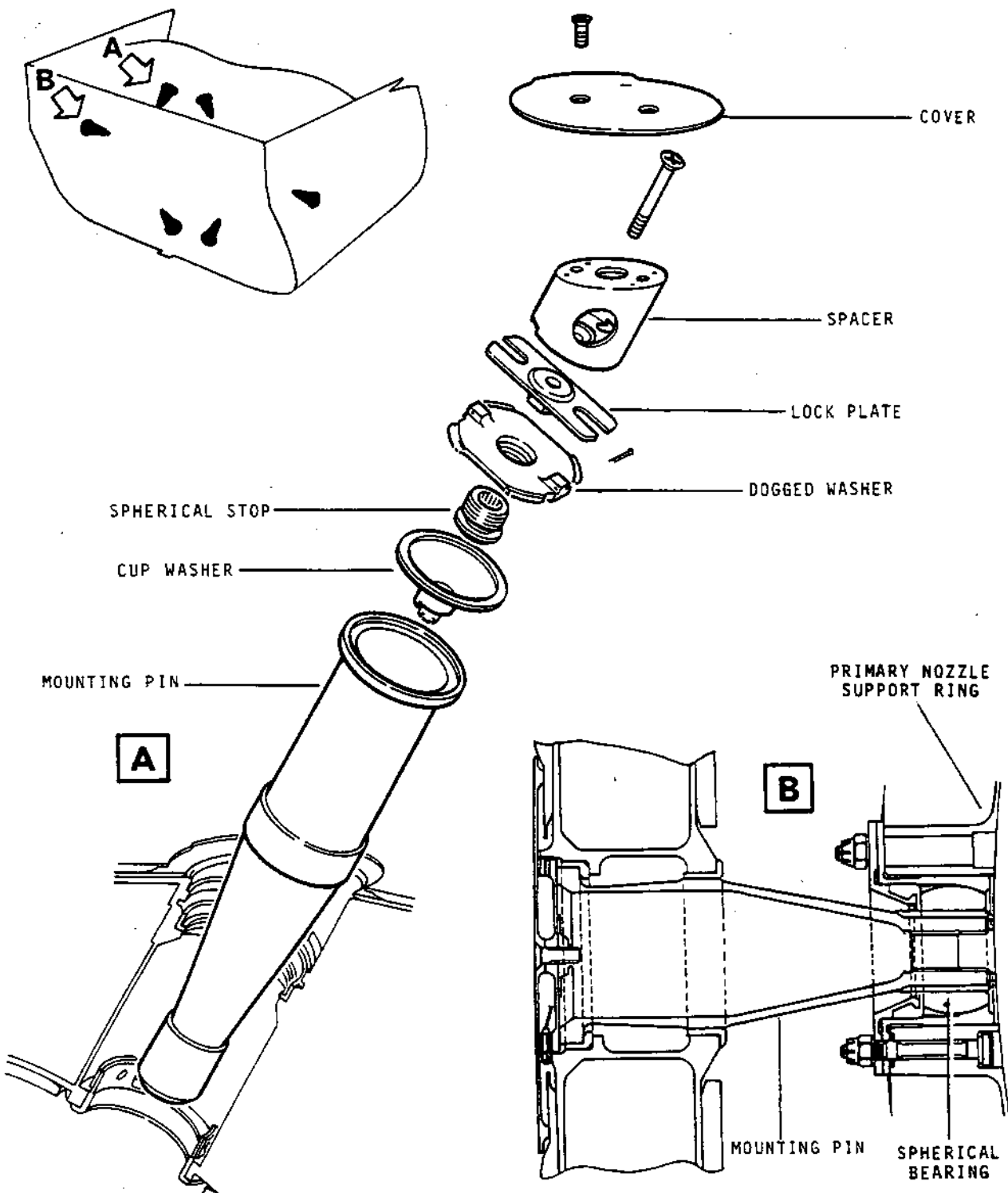
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Installation of Mounting Pins Assemblies
Figure 514

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- (13) Tighten countersunk head screws (8-20) to the recommended torques.

NOTE: Installation of mounting pin (8-10) for bay 3 is identical to that described above, but uses spacer (8-51) and cover (8-31).

B. Installation of Mounting Pin Assembly (8-140).

- (1) Deleted.
- (2) Deleted.
- (3) Position the pin assembly thus formed in its housing in the upper part of bay 2 of the twin secondary nozzle assembly.
- (4) Position the cup washer (8-230).
- (5) Fit spherical stop (8-220) to the dogged washer (8-210).
- (6) Fit the dogged washer/spherical stop assembly to the structure and lock the dogged washer.
- (7) Using a spanner, move the spherical stop to bring it into contact with the cup washer. Lock to the recommended torque.
- (8) Fit the lock plate (8-200).
- (9) Lock the plate using split pin (8-190).
- (10) Fit spacer (8-180) and secure it with countersunk head screw (8-170).
- (11) Tighten the screw (8-170) to the recommended torque.
- (12) Secure the cover (8-160) to the spacer, using countersunk head screws (8-150).
- (13) Tighten countersunk head screws (8-150) to the recommended torques.

NOTE: Installation of mounting pin (8-140) for bay 4 is identical to that described above, but uses spacer (8-181) and cover (8-161).

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C. Installation of Mounting Pin Assembly (8-270).

- (1) Deleted.
- (2) Deleted.
- (3) Position the pin assembly thus formed in its housing in the upper part of bay 2 of the twin secondary nozzle assembly.
- (4) Position the cup washer (8-360).
- (5) Fit spherical stop (8-350) to the dogged washer (8-340).
- (6) Fit the dogged washer/spherical stop assembly to the structure and lock the dogged washer.
- (7) Using a spanner, move the spherical stop to bring it into contact with the cup washer. Lock to the recommended torque.
- (8) Fit the lock plate (8-330).
- (9) Lock the plate using split pin (8-320).
- (10) Fit spacer (8-310) and secure it with countersunk head screw (8-300).
- (11) Tighten the screw (8-300) to the recommended torque.
- (12) Secure the cover (8-290) to the spacer, using countersunk head screws (8-280).
- (13) Tighten countersunk head screws (8-280) to the recommended torques.

NOTE: Installation of mounting pin (8-270) for bay 3 is identical to that described above, but uses spacer (8-311) and cover (8-291).

D. Installation of Mounting Pin Assembly (8-400).

- (1) Deleted.
- (2) Deleted.

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- (3) Position the pin assembly thus formed in its housing in the lower part of bay 2 of the twin secondary nozzle assembly.
- (4) Position the cup washer (8-490).
- (5) Fit spherical stop (8-480) to the dogged washer (8-470).
- (6) Fit the dogged washer/spherical stop assembly to the structure and lock the dogged washer.
- (7) Using a spanner, move the spherical stop to bring it into contact with the cup washer. Lock to the recommended torque.
- (8) Fit the lock plate (8-460).
- (9) Lock the plate using split pin (8-450).
- (10) Fit spacer (8-440) and secure it with countersunk head screw (8-430).
- (11) Tighten the screw (8-430) to the recommended torque.
- (12) Secure the cover (8-420) to the spacer, using countersunk head screws (8-410).
- (13) Tighten countersunk head screws (8-410) to the recommended torques.

NOTE: Installation of mounting pin (8-400) for bay 3 is identical to that described above, but uses spacer (8-441) and cover (8-421).

E. Installation of Mounting Pin Assembly (8-530).

NOTE: The installation of mounting pin assemblies (8-530) is described in this chapter, but is only to be carried out when the secondary nozzle assembly is fitted to the aircraft. The mounting pin assemblies should be packed and accompany the secondary nozzle assembly.

Carry out the following operations for each pin assembly:

- (1) Deleted.

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- (2) Deleted.
- (3) Position the pin assembly thus formed in its housing in the side part of bay 1, 2, 3 or 4 of the twin secondary nozzle assembly.
- (4) Position the cup washer (8-600).
- (5) Fit spherical stop (8-590) to the dogged washer (8-580).
- (6) Fit the dogged washer/spherical stop assembly to the structure and lock the dogged washer.
- (7) Using a spanner, move the spherical stop to bring it into contact with the cup washer. Lock to the recommended torque.
- (8) Fit the lock plate (8-570).
- (9) Lock the plate using split pin (8-560).
- (10) Fit spacer (8-550) and secure it with countersunk head screw (8-540).
- (11) Tighten the screw (8-540) to the recommended torque.

23. Installation of Reverser Bucket Assemblies to the Structure

- A. Operate the Rotating Stand - tool SC 117 - to bring twin secondary nozzle assembly into the horizontal position.
- B. Installation of the trunnion locking pins (Figure 515).
 - (1) Secure the trunnion locking pins (2-380) into the bores which house the upper trunnions on the side walls.

Carry out the following operations for each attachment point:

- (a) Fit the trunnion locking pins (2-380) by introducing them into their housing from inside the bore which houses the trunnion.
- (b) Fit plain washers (2-370) and nuts (2-360), without tightening.
- (c) Fit the bucket trunnion bearing (2-350) and move the locking pins (2-380) such that the flats on their heads fall within the trunnion bearing slots.

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- (d) Tighten nuts (2-360) to the recommended torques.
 - (e) Wire lock the trunnion locking pins (2-380) and withdraw the trunnion bearing.
- (2) Installation of the trunnion locking pins (2-200) into the bores which house the upper and lower bucket trunnion bearings on the central wall.

Carry out the following operations for each attachment point :

- (a) Fit the trunnion locking pin (2-200) by inserting it into its housing from inside the bore which houses the trunnion bearing.
 - (b) Fit plain washer (2-190) and nut (2-180) without tightening.
 - (c) Fit the bucket trunnion bearing (2-160) or (2-170) and move the locking pin (2-200), such that the flats on its head lie within the slot on the trunnion bearing.
 - (d) Tighten nut (2-180) to the recommended torque.
 - (e) Lock the locking pin (2-200) to the adjacent pin and withdraw the trunnion bearing.
- (3) Installation of trunnion locking pins (2-290) into the bores which house the lower bucket trunnion bearing on the side walls.

Carry out the following operations for each attachment point :

- (a) Fit the trunnion locking pins (2-290) by inserting them into their housing from inside the bore which houses the trunnion bearing.
- (b) Fit washers (2-280) and nuts (2-270), without tightening.
- (c) Fit the bucket trunnion bearing (2-260) and move the locking pins (2-290) such that the flats on their heads lie in the slots on the trunnion bearing.
- (d) Tighten nuts (2-270) to the recommended torques.
- (e) Wire lock the locking pins (2-290) and withdraw the trunnion bearing.

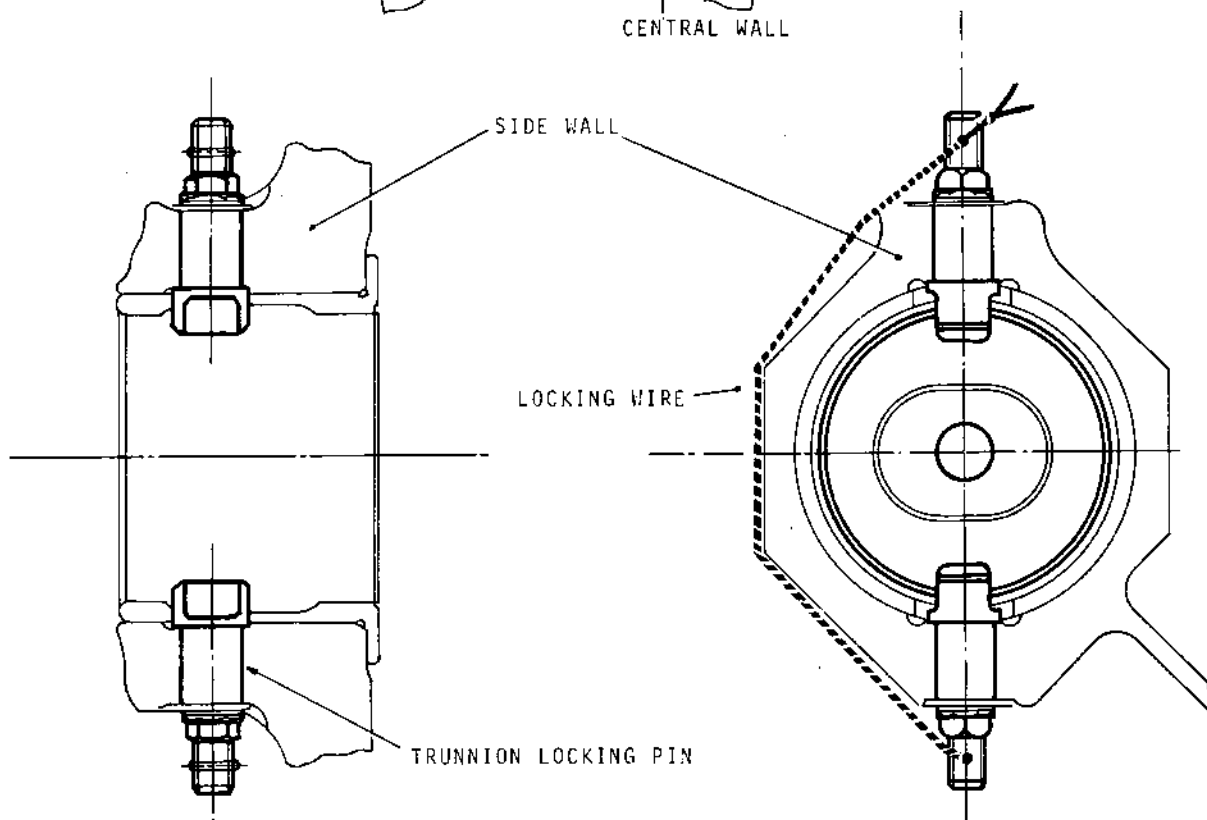
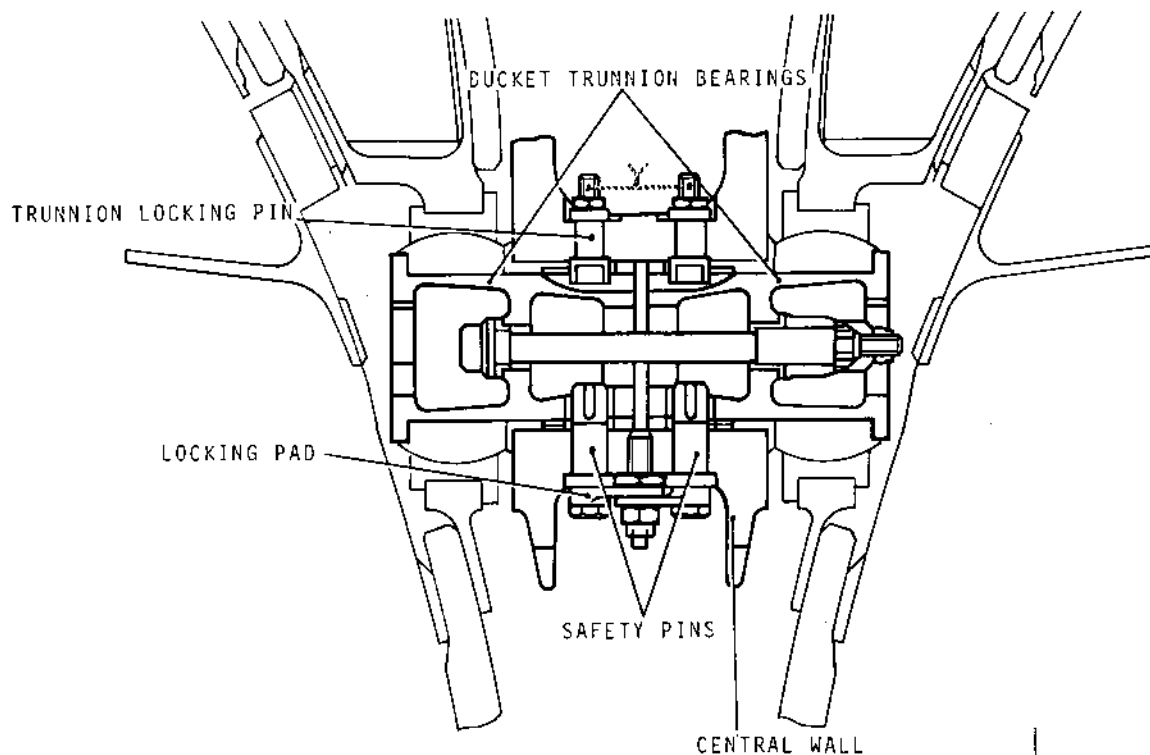
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Installation of Trunnion Locking Pins and Safety Pin Locking Pads
Figure 515

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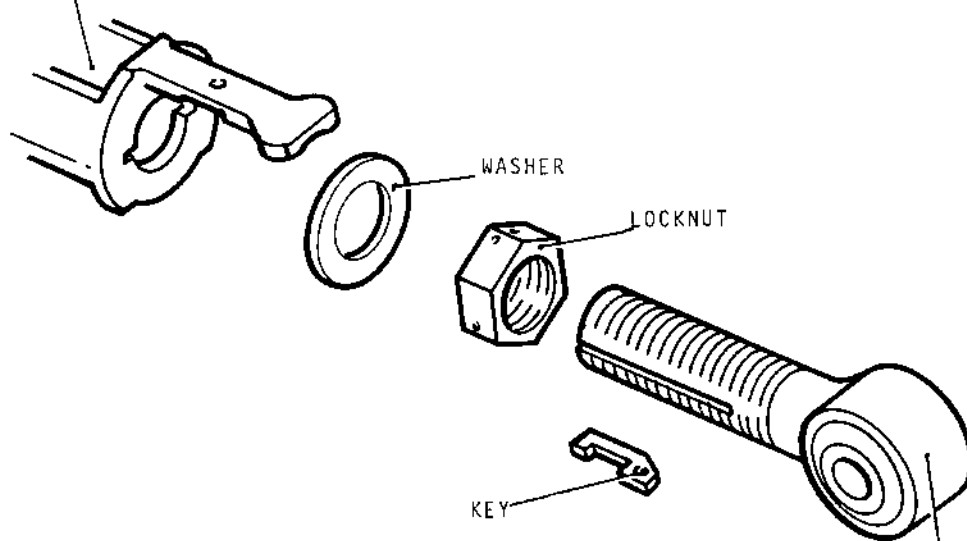
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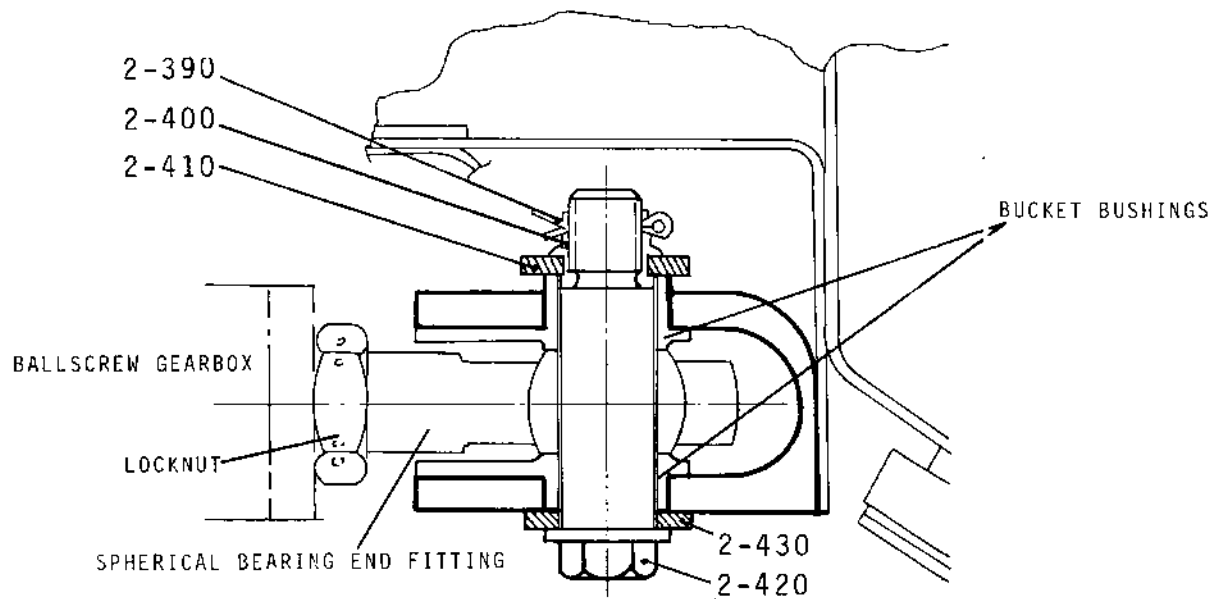
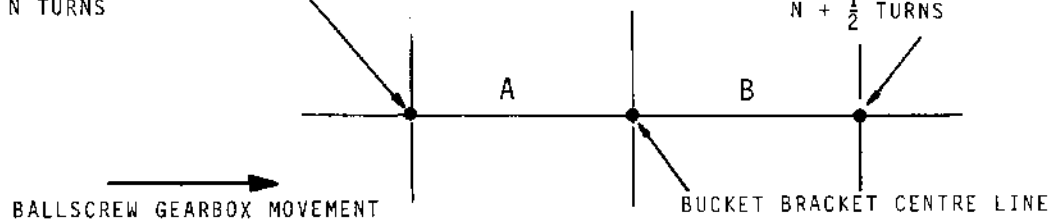
BALLSCREW GEARBOX



SPHERICAL BEARING END FITTING

POSITION OF SPHERICAL BEARING END
FITTING CENTRE LINE WHEN UNSCREWED
N TURNS

POSITION OF SPHERICAL BEARING END
FITTING CENTRE LINE WHEN UNSCREWED
 $N + \frac{1}{2}$ TURNS



Bucket Adjustment
Figure 516

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C. Installation of the Safety Pin Locking Pads

Carry out the following operations for each attachment point :

- (1) Fit the double ended bolts (2-140) complete with adjusting shims (2-150) to the central wall brackets.
- (2) On each double ended bolt, fit the two locking pads (2-120), taking care to position them as follows :
 - (a) The first locking pad is positioned with its boss turned towards the operator.
 - (b) The second locking pad is positioned with its boss turned towards the structure.
- (3) Fit the plain washer (2-100) and the castellated nut (2-90).
- (4) Tighten the castellated nut to the minimum recommended torque and lock it using split pin (2-80).

D. Preparation for Adjustment of the Reverser Buckets

- (1) Unlock the bucket drive pneumatic actuators (see fig. 513).
- (2) Withdraw the blank from the reduction gearbox on a ballscrew gearbox and, using adaptor - tool SC 203 - turn the ballscrew gearbox driving shaft two turns towards the reverse jet position.
- (3) Lock the pneumatic actuator (see fig. 513).
- (4) Carry out the same operation on the other bay.

E. Installation of the Bay 1 Upper Reverser Bucket

- (1) With the reverser bucket assembly (2-10) on the workstand - tool SC 37 - position the hoisting bea - tool SC 205 - using a hoist, and secure it to th bucket assembly.
- (2) Free the reverser bucket assembly on the workstand and, by operating the hoist, position the bucket assembly on the structure.
- (3) Remove the brass wires which secure the bay 1 upper ballscrew gearboxes and the polyurethane foam.
- (4) Position the bucket assembly and fit the bucket trunnion bearing (2-170) on the central wall side, and (2-260) on the side wall.



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- (5) Fit the trunnion bearing attachment bolt (2-340), inserting it from outside the structure.
- (6) Fit the trunnion attachment bolt washer (2-330) and self-locking nut (2-320).
- (7) Tighten the nut (2-320) to the recommended torque using the special spanner - tool SC 254.
- (8) Fit the anti-rotation sleeve (2-310), its skirt bearing against self-locking nut (2-320).
- (9) Fit locknut (2-300) and tighten to the recommended torque, using the special spanner - tool SC 254.
- (10) Fit the safety pin (2-130) to restrain the bucket trunnion bearing (2-170), the flat on the pin head being in contact with a flat on the double ended bolt (2-140).
- (11) Secure the safety pin to the locking pad (2-120) using bolt (2-110).
- (12) Tighten bolt (2-110) to the recommended torque.
- (13) Unlock the locknut (figure 516) on the spherical joint end fitting of the upper ballscrew gearboxes in bay 1. Using special spanner - tool SC 263 - slacken the locknut.
- (14) Bring the leading edge of the reverser bucket into contact with the heat shield seal.

CAUTION : THE SEAL MUST NOT BE COMPRESSED.

- (15) Unscrew the ballscrew gearbox end fitting, a half-a- turn at a time, until the ballscrew gearbox may be pinned to the reverser bucket using pin - tool SC 39 - in line with the limits given below.
 - (a) If the ballscrew gearbox end fitting pin is upstream of the reverser bucket bracket centre line (area A, figure 516), unscrew the ballscrew gearbox end fitting by a half-a-turn before pinning.
 - (b) If the ballscrew gearbox end fitting pin is downstream of the reverser bucket bracket centre line (area B, figure 516), carry out pinning.
- (16) Measure the maximum clearance which exists between then seal and the leading edge of the bucket.
 - (a) If the clearance is less than 2,5 mm (0.1 in.) the setting is correct.

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(b) If the clearance is more than 2,5 mm (0.1 in.), screw in the ballscrew gearbox end fittings by half-a-turn, and pin.

(17) Using the special spanner - tool SC 263 - tighten the ballscrew gearbox spherical end fitting locknuts and check that the key is in place. Wire lock the locknut.

F. Installation of the Bay 1 Lower Reverser Bucket Assembly

- (1) With the bucket assembly (2-10) on the workstand - tool SC 37 - position the hoisting beam - tool SC 205 - using a hoist, and secure it to the bucket assembly.
- (2) Free the bucket assembly from the workstand and, by operating the hoist, position the reverser bucket to the structure.
- (3) Withdraw the brass wires which secure the bay 1 lower ballscrew gearboxes, and the polyurethane foam.
- (4) Position the bucket assembly and fit the bucket trunnion bearing (2-160) on the central wall side, and (2-350) on the side wall.
- (5) Fit the trunnion bearing attachment bolt (2-250), inserting it from the outside of the structure.
- (6) Fit the trunnion attachment bolt washer (2-240) and self-locking nut (2-230).
- (7) Tighten the nut (2-230) to the recommended torque, using the special spanner - tool SC 254.
- (8) Fit the anti-rotation sleeve (2-220), the skirt bearing against the nut (2-230).
- (9) Fit locknut (2-210) and tighten to the recommended torque, using special spanner - tool SC 254.
- (10) Fit safety pin (2-130) to restrain the bucket trunnion bearing (2-160), the flat of the head on the safety pin being in contact with a flat of the double ended bolt (2-140).
- (11) Secure the safety pin to the locking pad (2-120), using bolt (2-110).
- (12) Tighten bolt (2-110) to the recommended torque.



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- (13) Slacken the locknut (Figure 516) of the bay 1 lower ballscrew gearbox end fitting, and using special spanner - tool SC 263 - slacken the locknut.
- (14) Repeat operations (14), (15), (16), (17) of preceding paragraph E.

G. Installation of the Bay 2 Upper Reverser Bucket Assembly

- (1) With the reverser bucket assembly (2-10) on the workstand - tool SC 37 - position the hoisting beam - tool SC 205 - using a hoist, and secure it to the bucket assembly.
- (2) Free the bucket assembly from the workstand, and operate the hoist to position the bucket assembly on the structure.
- (3) Withdraw the brass wires which secure the bay 2 upper ballscrew gearboxes and the polyurethane foam.
- (4) Position the bucket assembly and fit bucket trunnion bearing (2-160) on the central wall side and (2-350) on the side wall.
- (5) Fit the trunnion bucket attachment bolt (2-340) by inserting it from the outside of the structure.
- (6) Fit the trunnion attachment bolt washer (2-330) and self-locking nut (2-320).
- (7) Tighten the nut (2-320) to the recommended torque, using the special spanner - tool SC 254.
- (8) Fit the anti-rotation sleeve (2-310), the skirt bearing against nut (2-320).
- (9) Fit the locknut (2-300) and tighten it to the recommended torque, using special spanner - tool SC 254.
- (10) Fit the safety pin (2-130) to restrain the bucket trunnion bearing (2-160), the flat on the head of the pin being in contact with a flat on the double ended bolt (2-140).
- (11) Secure the safety pin to the locking pad (2-120), using bolt (2-110).
- (12) Tighten bolt (2-110) to the recommended torque.



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- (13) Wire lock both bolts (2-110) (see figure 515).
- (14) Fit the trunnion attachment bolt (2-60) complete with its washer (2-70), inserting it from bay 1.
- (15) Fit the trunnion attachment bolt washer (2-50) and self-locking nut (2-40).
- (16) Tighten the nut (2-40) to the recommended torque, using the special spanner - tool SC 254.
- (17) Fit the anti-rotation sleeve (2-30), the skirt bearing against the nut (2-40).
- (18) Fit the locknut (2-20) and tighten it to the recommended torque, using the special spanner - tool SC 254.
- (19) Unlock the locknut (figure 516) on the bay 2 lower ball screw gearbox end fitting and, using the special spanner - tool SC 263 - slacken the locknut.
- (20) Repeat the operations (14), (15), (16), (17) of preceding paragraph E.

H. Installation of the Bay 2 Lower Reverser Bucket Assembly

- (1) With the bucket assembly (2-10) on the workstand - tool SC 37 - position the hoisting beam - tool SC 205 - using a hoist, and secure it to the bucket assembly.
- (2) Free the bucket assembly from the workstand and, by operating the hoist, position the bucket assembly to the structure.
- (3) Withdraw the brass wires which secure the bay 2 lower ballscrew gearboxes and the polyurethane foam.
- (4) Position the bucket assembly and fit the bucket trunnion bearing (2-170) on the central wall side, and (2-260) on the side wall.
- (5) Fit the trunnion bearing attachment bolt (2-250), inserting it from outside the structure.
- (6) Fit the trunnion attachment bolt washer (2-240) and self-locking nut (2-230).
- (7) Tighten the nut (2-230) to the recommended torque, using the special spanner - tool SC 254.

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- (8) Fit the anti-rotation sleeve (2-220), the skirt bearing against the nut (2-230).
- (9) Fit the locknut (2-210) and tighten it to the recommended torque using special spanner - tool SC 254.
- (10) Fit the safety pin (2-130) to restrain the trunnio bucket bearing (2-170), the flat on the head of the pin being in contact with a flat of the double ended bolt (2-140).
- (11) Secure the safety pin to the locking pad (2-120) using bolt (2-110).
- (12) Tighten the bolt (2-110) to the recommended torque.
- (13) Wire lock the two bolts (2-110) (see figure 515).
- (14) Fit the trunnion attachment bolt (2-60), complete with its washer (2-70), inserting it from bay 1.
- (15) Fit trunnion attachment bolt washer (2-50) and self-locking nut (2-40).
- (16) Tighten the nut (2-40) to the recommended torque, using the special spanner - tool SC 254.
- (17) Fit the anti-rotation sleeve (2-30), the skirt bearing against the nut (2-40).
- (18) Fit the locknut (2-20) and tighten it to the recommended torque, using the special spanner - tool SC 254.
- (19) Unlock the locknut (figure 516) on the bay 2 lower ballscrew gearbox spherical bearing end fitting, and using special spanner - tool SC 263 - slacken the locknut.
- (20) Repeat the operating (14), (15), (16), (17) of preceding paragraph E.

J. Installation of the Ballscrew Gearbox Attachment Bolt

- (1) Unlock the bucket drive pneumatic actuators (see fig. 513).
- (2) Using a drill fitted with the adaptor - tool SC 203 - turn the reduction gearbox drive shaft on a ballscrew gearbox until the reverser buckets on the bay are in the 45° position approximately.
- (3) Carry out the following operations for each ballscrew gearbox/reverser bucket link :

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- (a) Withdraw the provisional pin - tool SC 39.
 - (b) Check that the bushes are correctly located in the bucket yoke (figure 516).
 - (c) Fit the ballscrew gearbox attachment bolt (2-420) complete with plain washer (2-430).
 - (d) Fit plain washer (2-410) and castellated nut (2-400).
 - (e) Tighten the nut to the recommended torque and lock it using split pin (2-390).
- (4) Using an electric drill fitted with the adaptor - tool SC 203 - drive the buckets into the reverse check position.
 - (5) Check the clearance between the trailing edges of the two reverser bucket primary heat shields. This clearance must be 8 ± 6 mm ($.31496 \pm .23622$ in.).
 - (6) Return the buckets to the 0° position and check that the structure which carries the seal and the bucket structure do not interfere. If interference occurs, unscrew the ballscrew gearbox end-piece a maximum of one-half turn.
 - (7) Lock the bucket drive pneumatic actuators (see fig.513)

24. Installation of Deflector Assemblies

A. Installation of Deflector Assembly (1-10)

- (1) Check that all the assembly elements are correctly positioned on the template - tool SC 200.
- (2) Fit the deflector assembly (1-10) to the reverser bucket assembly.
- (3) Fit bolts (1-140), complete with plain washers (1-150) without tightening.
- (4) Fit bolt (1-160) complete with plain washer (1-170), without tightening.
- (5) Fit the cover strip (1-100).
- (6) Fit bolts (1-60), complete with plain washers (1-70), bolt (1-80), complete with plain washer (1-90).



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- (7) Fit bolt (1-20), complete with plain washers (1-30) and (1-50) and self-locking nut (1-40).
- (8) Fit bolts (1-180), complete with plain washers (1-190).
- (9) Fit bolts (1-110), (1-120) and (1-130).
- (10) Tighten the assembly elements to the recommended torques.

B. Installation of Deflector Assembly (1-200)

- (1) Check that all the assembly elements are correctly positioned on the template - tool SC 200.
- (2) Fit the deflector assembly (1-200) to the reverse bucket assembly.
- (3) Fit bolts (1-330), complete with plain washers (1-340), without tightening.
- (4) Fit bolt (1-350), complete with plain washer (1-360), without tightening.
- (5) Fit the cover strip (1-290).
- (6) Fit bolts (1-250), complete with plain washers (1-260), bolt (1-270) complete with plain washer (1-280).
- (7) Fit bolt (1-210), complete the plain washer (1-220), plain washer (1-240) and self-locking nut (1-230).
- (8) Fit bolts (1-370), complete with plain washers (1-380).
- (9) Fit bolts (1-300), (1-310) and (1-320).
- (10) Tighten the assembly elements to the recommended torques.

25. Fitting out of the Front Framework

NOTE : The operations for equipping the front framework are described in this chapter, since it is an assembly operation. However, they should only be carried out after testing, when the secondary nozzle assembly is on the transport trolley - tool SC 36.



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A. Installation of the Seal Plates Around the Bay 1 Front Framework

- (1) Fit seal plate (10-240) and secure it using countersunk head screws (10-230) and nuts (10-245).
- (2) Fit seal plate (10-220) and secure it with countersunk head screws (10-210) and nuts (10-225).
- (3) Fit seal plate (10-200) and secure it with countersunk head screws (10-190) and nuts (10-205).
- (4) Fit the seal plate (10-180) and secure it with countersunk head screws (10-170) and nuts (10-185).
- (5) Fit the seal plate (10-160) and secure it with the countersunk head screws (10-150) and nuts (10-165).
- (6) Fit the seal plate (10-140) and secure it with the countersunk head screws (10-130) and nuts (10-145).
- (7) Fit the seal plate (10-120) and secure it with the countersunk head screws (10-110) and nuts (10-125).
- (8) Fit the seal plate (10-100) and secure it with the countersunk head screws (10-90) and nuts (10-105).
- (9) Fit the seal plate (10-80) and secure it with the countersunk head screws (10-70) and nuts (10-85).
- (10) Fit the seal plate (10-60) and secure it with the countersunk head screws (10-50) and nuts (10-65).
- (11) Fit the seal plate (10-40) and secure it with the countersunk head screws (10-30) and nuts (10-45).
- (12) Fit the seal plate (10-20) and secure it with :
 - (a) screws (10-17), washers (10-15) and nuts (10-12) ;
 - (b) screws (10-10) and nuts (10-5).
- (13) Tighten the screws to the recommended torques.

NOTE : Carry out the above operations for the following seal plates which are fitted to the RH twin secondary nozzle assembly : (10-221), (10-201), (10-181), (10-161), (10-141), (10-121), (10-101), (10-81), (10-61), (10-41), (10-21).

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B. Installation of the Seal Plates Around the Bay 1 Front Framework

- (1) Fit seal plate (10-480) and secure it using counter-sunk head screws (10-470) and nuts (10-485).
- (2) Fit seal plate (10-460) and secure it with counter-sunk head screws (10-450) and nuts (10-465).
- (3) Fit seal plate (10-440) and secure it with counter-sunk head screws (10-430) and nuts (10-445).
- (4) Fit the seal plate (10-420) and secure it with countersunk head screws (10-410) and nuts (10-425).
- (5) Fit the seal plate (10-400) and secure it with the countersunk head screws (10-390) and nuts (10-405).
- (6) Fit the seal plate (10-380) and secure it with the countersunk head screws (10-370) and nuts (10-385).
- (7) Fit the seal plate (10-360) and secure it with the countersunk head screws (10-350) and nuts (10-365).
- (8) Fit the seal plate (10-340) and secure it with the countersunk head screws (10-330) and nuts (10-345).
- (9) Fit the seal plate (10-320) and secure it with the countersunk head screws (10-310) and nuts (10-325).
- (10) Fit the seal plate (10-300) and secure it with the countersunk head screws (10-290) and nuts (10-305).
- (11) Fit the seal plate (10-280) and secure it with the countersunk head screws (10-270) and nuts (10-285).
- (12) Fit the seal plate (10-260) and secure it with :
 - (a) screws (10-257), washers (10-255) and nuts (10-252) ;
 - (b) screws (10-250) and nuts (10-245).
- (13) Tighten the screws to the recommended torques.

NOTE : Carry out the above operations for the following seal plates which are fitted to the RH twin secondary nozzle assembly : (10-461), (10-441), (10-421), (10-401), (10-381), (10-361), (10-341), (10-321), (10-301), (10-281), (10-261).

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C. Installation of Anti-Fret Strips on the Central Wall

- (1) Position the anti-fret strips (10-520) and (10-530) and the throat washer (10-510).
- (2) Secure these elements with blind bolts (10-500).
- (3) Position the anti-fret strips (10-560) and (10-570) and the throat washer (10-550).
- (4) Secure these elements with blind bolts (10-540).
- (5) Position the anti-fret strips (10-600) and (10-610) and the throat washer (10-590).
- (6) Secure these elements with the blind bolts (10-580).
- (7) Position the anti-fret strips (10-640) and (10-650) and the throat washer (10-630).
- (8) Secure these elements with the blind bolts (10-620).
- (9) Position the anti-fret strips (10-690) and (10-700).
- (10) Secure the assembly using bolts (10-680), washers (10-670) and self-locking nuts (10-660).
- (11) Tighten the assembly elements to the recommended torques.

D. Installation of threaded pins (10-490)

- (1) Fit the threaded pins (10-490) to the lower front section of the central wall.
- (2) Tighten to the recommended torques and wire lock the pins.

E. Installation of the lateral trunnions

Carry out the following operations for each trunnion :

- (1) Fit the two spring pins (20-160) to the trunnion (20-170).
- (2) Fit the trunnion assembly thus formed into its support (20-150), the pins foremost.

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- (3) Position the trunnion support assembly on the structure.
- (4) Secure the support using countersunk head screws (20-90), plain washer (20-80) and self-locking nut (20-70).
- (5) Position the laminated shim (20-140) between the support and the structure.
- (6) Fit the bolt (20-120) complete with plain washer (20-130).
- (7) Fit the plain washer (20-110) and self-locking nut (20-100).
- (8) Tighten the nuts to the recommended torques.

f. Installation of the Lower Trunnion Assemblies

Carry out the following operations for each trunnion :

- (1) Fit the pivot bolt (29-20) to the trunnion bodge bolts (29-30).
- (2) Fit and tighten the nuts (29-10) to the recommended torques.

26. Sealing of the access doors to the bucket position transmitter (indicator)

This operation described hereafter is carried out systematically during the re-installation of the access doors to the bucket position transmitters (indicators).

A. Preparation of the surfaces (Figure 517)

- (1) Check that all the surfaces destined to receive the seal are entirely clean, otherwise clean as described in chapter "Cleaning" of this manual.
- (2) Using clean pliers, apply a coat of MB Primer (P475) on the area where the seal is to be located (areas A and B).

CAUTION : AVOID TOUCHING THE AREA COVERED WITH MB PRIMARY.

- (3) Spray a film of Luborflon (P541) on surface C of the secondary nozzle. Check to see that the Luborflon coating is even over the entire surface.

CAUTION : THE LUBORFLON SPRAY CAN MUST BE SHAKEN BEFORE USING.

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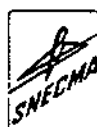
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- (4) Apply a film of oil on the bolts which secure the door to the nozzle to prevent the Rhodorsil from sticking to the threads.

B. Preparation of the Rhodorsil elastomer

- (1) Weigh 100 grams (3.527 oz.) of Rhodorsil CAF 4 THIXO (P474) and put it on a metal plate.
- (2) Weigh 4 grams (0.140 oz.) of additive 4812A (P546) and add to the elastomer.
- (3) Using a spatula, rapidly mix the two products thoroughly.

C. Application of the seal (Figure 518)

- (1) Using a spatula, apply the elastomer to area A, all around the door.

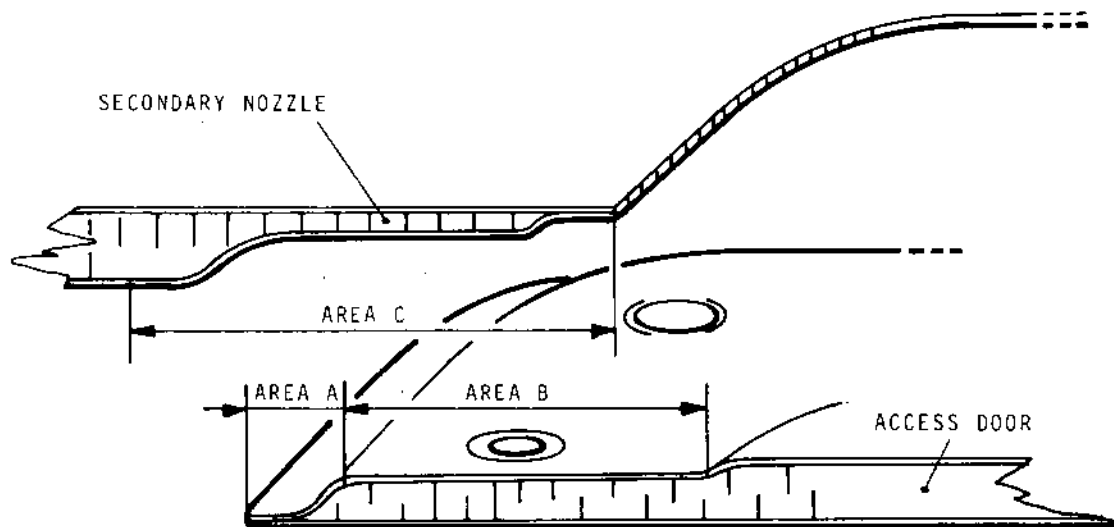
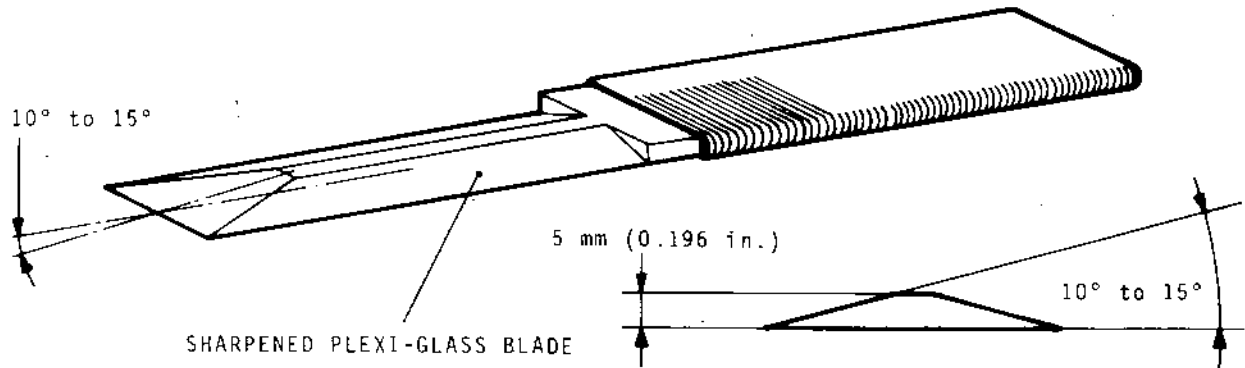
CAUTION : THIS OPERATION MUST BE CARRIED OUT AS FAST AS POSSIBLE BEFORE THE POLYMERIZATION OF THE ELASTOMER HINDERS HANDLING. DEPENDING ON THE AMBIENT TEMPERATURE, THE POLYMERIZATION MAY OCCUR VERY RAPIDLY.

- (2) Position two bolts at opposite corners of the door and fit the door on the nozzle using the two bolts.
- (3) Fit all the bolts and tighten to the specified torque.
- (4) Remove excess elastomer using a sharpened plexiglass blade (Figures 517 and 518).
- (5) Leave the elastomer to polymerize at least 24 hours.
- (6) After polymerization, remove the door. If necessary, use a sharpened light alloy blade to exert a force between the door and the nozzle.
- (7) Clean the bolts securing the door and remove the elastomer sticking to the threads.



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Prepare to renew the Seal on the Bucket
Position Transmitter (Indicator) Access Panel
Figure 517

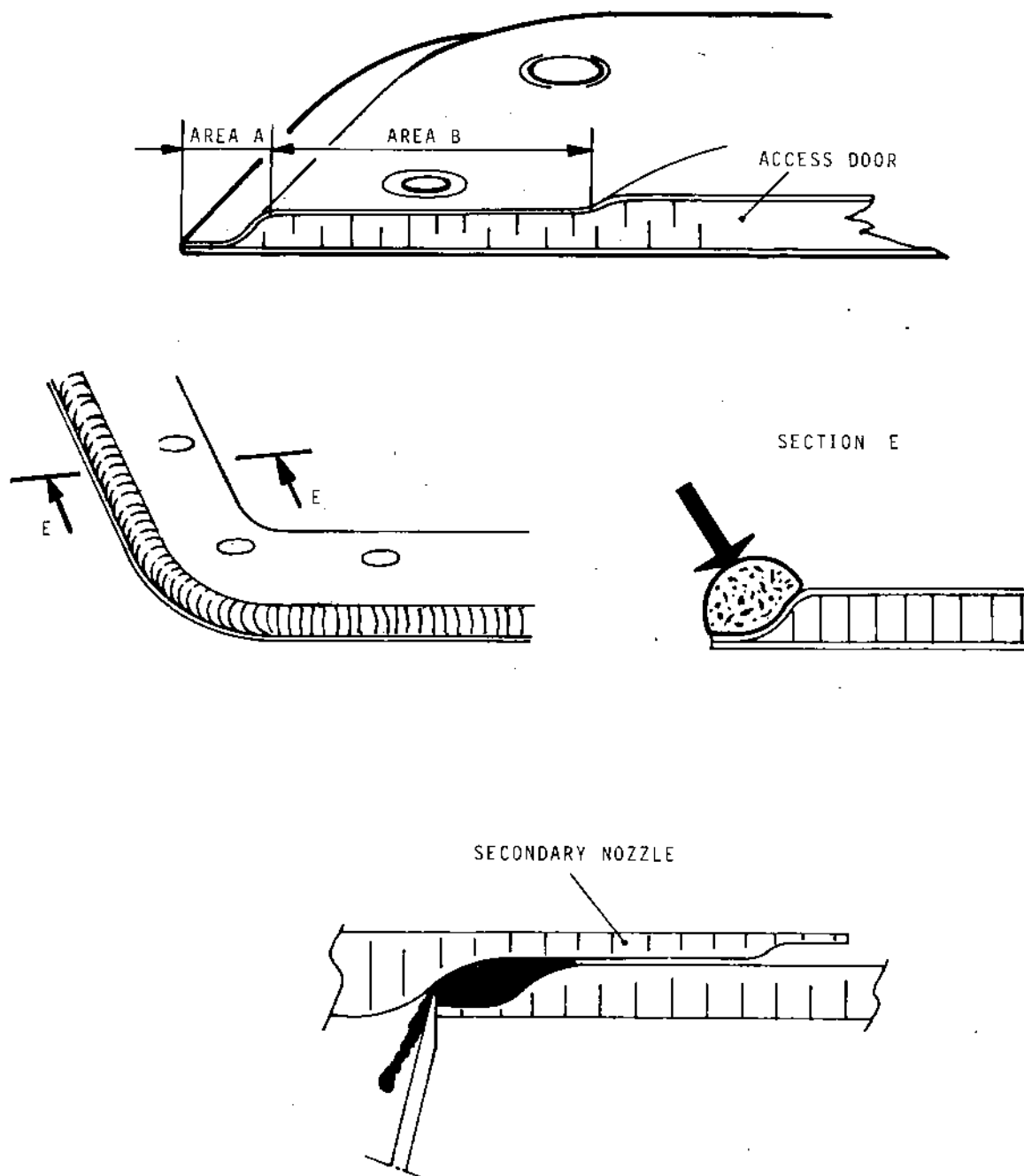


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Renewing the seal on the Bucket Position
Transmitter (Indicator) Access Panel
Figure 518

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D. Restoration of the Seal

NOTE: Following the removal of the door, flaws may appear in the quality of the seal. These are generally due to an improper distribution of elastomer on the door. It is possible to make up the lack of elastomer if it jeopardizes the quality of the seal by carrying out the following operations.

- (1) Clean the area to be reworked with acetone (P325) and avoid touching this cleaned area.
- (2) Make up the lack of elastomer using a tube of Rhodorsil. Additive 4812A (P546) is not required for this operation.
- (3) Use a spatula to even out the elastomer and remove excess Rhodorsil.
- (4) Leave to polymerize for at least one hour.

27. Installation of Access Doors (LH Twin Secondary Nozzle Assembly)

A. General

Installation of the access doors is described in this chapter, since it is an assembly operation. It should only be carried out, however, after the tests, when the twin secondary nozzle assembly is on the transport trolley-tool SC 36.

NOTE: These operations are the same for all the access doors except those on the bucket position transmitter (indicators). When installing a new access door, proceed as indicated in paragraph B below.

B. Preparation of a new door before installation (Refer to REP 29-190-26).

NOTE: This procedure is applicable to all the access doors with the exception of those to the bucket position transmitters (indicators).

- (1) Transfer the contour of the access door on a sheet of Stabilene tracing paper applied on the nozzle.
- (2) Place the Stabilene paper on the pre-machined replacement door and reproduce the above contour.
- (3) Cut out the replacement door to fit the contour using a rotary file mounted on a pneumatic tool.

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- (4) Deburr the door and smooth out lengthwise with an emery cloth.

NOTE : No crosswise marks allowable.

- (5) Position the door on the nozzle.
- (6) Check for correct cut out and clearances as shown on figure 519.
- (7) Install the door in accordance with the procedures and instructions given in paragraphs "Installation of Access Doors".

C. Installation of LH Access Door (3-10)

- (1) Position the sleeve assembly (3-130) to the sleeve support plate (3-120).
- (2) Fit the sleeve support assembly (3-140) to the door, on the internal face.
- (3) Secure the sleeve support plate/sleeve support assembly, using countersunk head screws (3-110), plain washers (3-100) and self-locking nuts (3-90).
- (4) Fit the sleeve assembly (3-70) to the sleeve support plate (3-60).
- (5) Position the sleeve support (3-80) to the door internal face.
- (6) Secure the sleeve support plate/sleeve support assembly, using countersunk head screws (3-50), plain washers (3-40) and self-locking nuts (3-30).
- (7) Tighten the nuts to the recommended torques.
- (8) Fit the door assembly thus formed to the bay 1 bucket pneumatic drive actuator, checking that the sleeves locate correctly into the actuator exhaust elbows.
- (9) Secure the access door using countersunk head screws (3-20).
- (10) Tighten the screws to the recommended torques.

D. Installation of LH Access Door (3-170)

- (1) Fit the access door (3-170) to the bay 2 bucket pneumatic drive actuator housing.

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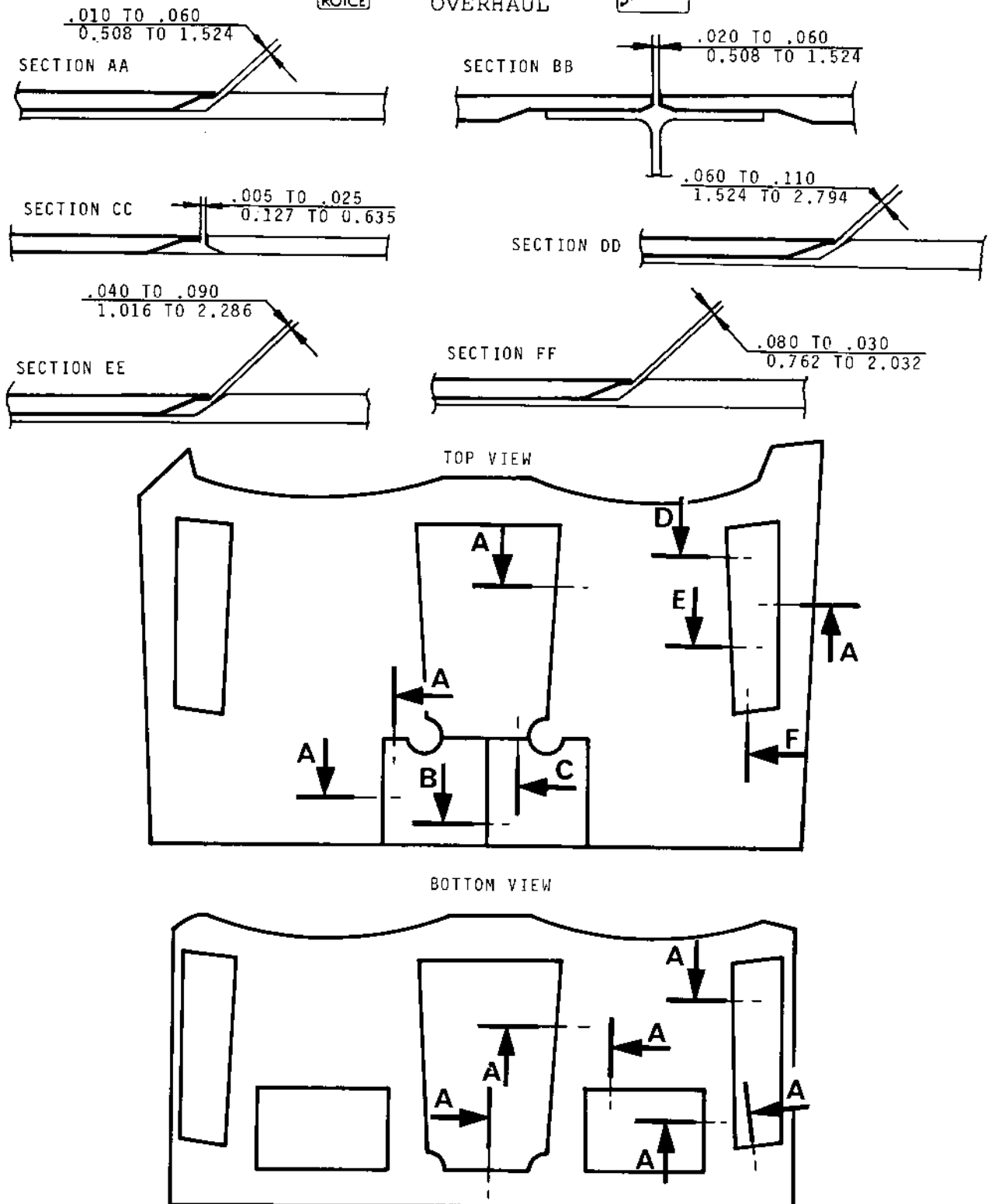
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Doors to Panels Clearance Check
Figure 519

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(2) Secure the door, using countersunk head screws (20-180).

(3) Tighten these screws to the recommended torques.

E. Installation of the LH Access Door (3-330)

(1) Position the access door (3-330) to the housing of the crossfeed isolation valve and the upper central ballscrew gearboxes.

(2) Secure the access doors using countersunk head screws (3-340).

(3) Tighten the screws to the recommended torques.

F. Installation of LH Access Door (3-350)

(1) Position the access door (3-350) to the bay 1 upper LH ballscrew gearbox housing.

(2) Secure the door using countersunk head screws (3-360).

(3) Tighten the screws to the recommended torques.

G. Installation of LH Access Door (3-370)

(1) Position the access door (3-370) to the bay 2 upper RH ballscrew gearbox housing.

(2) Secure the door using countersunk head screws (3-380).

(3) Tighten the screws to the recommended torques.

H. Installation of the RH Access Doors (3-390)

Carry out the following operations for each access door :

(1) Fit the countersunk head screw (3-410) to the cover plate (3-430).

(2) Screw the nut plate assembly (3-420) onto the screw (3-410).

(3) Fit the split pin (3-400).

(4) Fit the access door assembly into its housing on the structure and tighten the screw (3-410) to the recommended torque.

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J. Installation of Access Doors (3-440)

Carry out the following operations for each access door assembly :

- (1) Fit the countersunk head screw (3-360) to the cover plate (3-480).
- (2) Screw the nut plate assembly (3-470) onto the screw (3-460).
- (3) Fit the split pin (3-450).
- (4) Fit the cover plate assembly into its housing on the structure and tighten the screw (3-460) to the recommended torques.

K. Installation of Access Door (4-10)

- (1) Position the access door (4-10) to the housing of the lower central ballscrew gearboxes.
- (2) Secure the door using countersunk head screws (4-20).
- (3) Tighten the screws to the recommended torques.

L. Installation of LH Access Door (4-30)

- (1) Fit the access door (4-30) to the housing of the bay 1 lower LH ballscrew gearbox.
- (2) Secure the door using countersunk head screws (4-40).
- (3) Tighten the screws to the recommended torques.

M. Installation of LH Access Door (4-50)

- (1) Fit the access door (4-50) to the housing for the bay 2 lower RH ballscrew gearbox.
- (2) Secure the door using countersunk head screws (4-60).
- (3) Tighten the screws to the recommended torques.



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28. Installation of Access Doors (RH Twin Secondary Nozzle Assembly)

NOTE : The installation of the access doors is described in this chapter, since it is an assembly operation. However, it should only be carried out after the tests when the twin secondary nozzle assembly is on the transport trolley - tool SC 36.

A. Installation of RH Access Door (3-150)

- (1) Position the access door (3-150) to the housing of the bay 4 bucket drive pneumatic actuator.
- (2) Secure the door using countersunk head screws (3-160).
- (3) Tighten the screws to the recommended torques.

B. Installation of RH Access Door (3-190)

- (1) Position the sleeve assembly (3-310) on the sleeves support plate (3-300).
- (2) Fit the sleeve support assembly (3-320) to the door, on the internal face.
- (3) Secure the sleeve support plate/sleeve support assembly, using countersunk head screws (3-290), plain washers (3-280) and self-locking nuts (3-270).
- (4) Fit the sleeve assembly (3-250) to the sleeve support plate (3-240).
- (5) Position the sleeve support (3-260) to the door internal face.
- (6) Secure the sleeve support plate/sleeve support assembly, using countersunk head screws (3-230), plain washers (3-220) and self-locking nuts (3-210).
- (7) Tighten the nuts to the recommended torques.
- (8) Fit the door assembly thus formed to the bay 3 bucket pneumatic drive actuator, checking that the sleeves locate correctly into the actuator exhaust elbows.

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(9) Secure the access door using countersunk head screws (3-200).

(10) Tighten the screws to the recommended torques.

C. Installation of RH Access Door (3-331)

(1) Position the access door (3-331) to the housing of crossfeed isolation valve and the upper central ballscrew gearboxes.

(2) Secure the door using countersunk head screws (3-340).

(3) Tighten the screws to the recommended torques.

D. Installation of RH Access Door (3-351)

(1) Position the access door (3-351) to the housing of the bay 4 lower RH ballscrew gearbox.

(2) Secure the door using countersunk head screws (3-360).

(3) Tighten the screws to the recommended torques.

E. Installation of RH Access Door (3-371).

(1) Position the access door (3-371) to the housing of the bay 3 upper LH ballscrew gearbox.

(2) Secure the door using countersunk head screws (3-380).

(3) Tighten the screws to the recommended torques.

F. Installation of Access Doors (3-390)

(1) Repeat the operations given in paragraph 25 F.

G. Installation of Access Doors (3-440)

(1) Repeat the operations given in paragraph 25 G.

H. Installation of RH Access Door (4-10)

(1) Repeat the operations given in paragraph 25 H.



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J. Installation of RH Access Door (4-31)

- (1) Position the access door (4-31) to the housing of the bay 4 lower RH ballscrew gearbox.
- (2) Secure the door using countersunk head screws (4-40).
- (3) Tighten the screws to the recommended torques.

K. Installation of RH Access Door (4-51)

- (1) Position the access door (4-51) to the housing of the bay 3 lower LH ballscrew gearbox.
- (2) Secure the door using countersunk head screws (4-60).
- (3) Tighten the screws to the recommended torques.

29. Installation of Access Doors to the Bucket Position Transmitter (Indicator) (LH and RH Twin Secondary Nozzle)

General

Installation of the access is described in this chapter, since it is an assembly operation.

It should only be carried out, however, after the tests, when the twin secondary nozzle assembly is on the transport trolley-tool SC 36.

NOTE : These operations are the same for the LH and RH access doors. When installing a new access door, proceed as indicated below.

A. Prepare to install a new door (4-70), (4-100), (4-71), (4-101)

- (1) Transfer the contour of the access door on a sheet of stabilene tracing paper applied on the nozzle.
- (2) Place the stabilene on the pre-machined replacement door and reproduce the above contour.
- (3) Cut out the replacement door to fit the contour using a rotary file mounted on a pneumatic tool.
- (4) Deburr the door and smooth out lengthwise with an emery cloth.

NOTE : No crosswise marks allowable.

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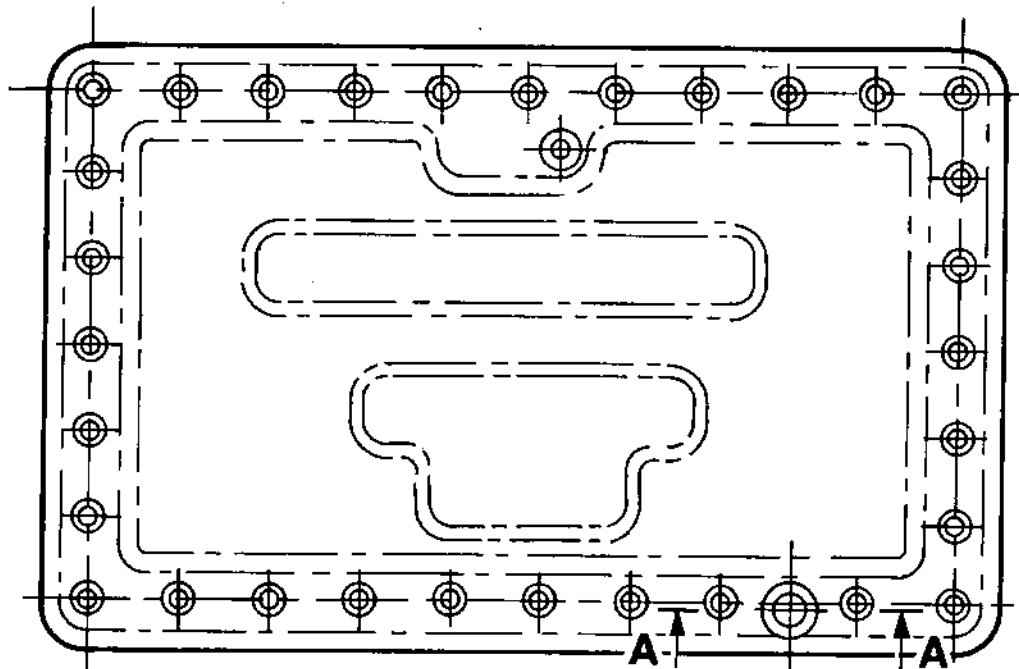
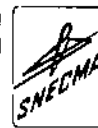
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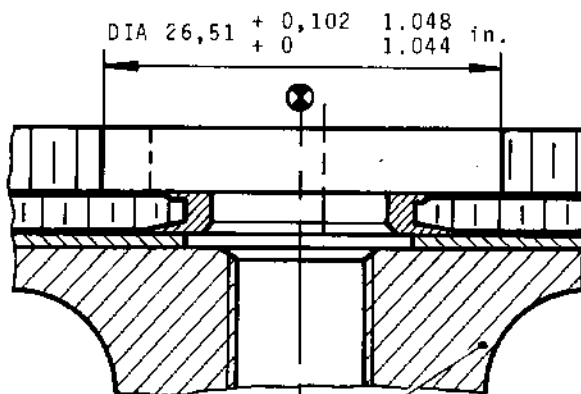
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SECTION A

F



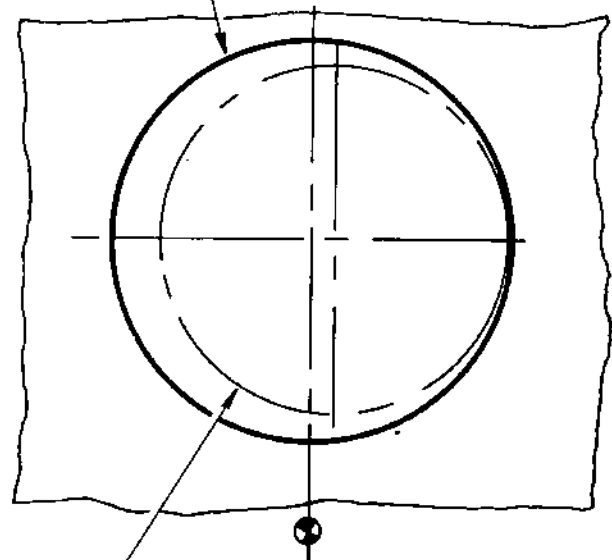
(301-009-501-0)



No. 525-003-968-0

VIEW F

DIA 26,51 + 0,102 1.048 in.
+ 0 1.044 in.



23,01 + 0,102 1.048 in. DIA. HOLE
+ 0 1.044 in.

ACCOMMODATING INSERT No. 302-007-900-0

Location of the Hole Provided
for the Insert
Figure 520

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- (5) Check for correct cut out ; rework if necessary.
- (6) Secure the replacement door to the nozzle structure using four (4) screws, one at each corner.
- (7) Locate the position of hole provided for the screws (4-90) or (4-120) and check the clearances (figure 519). If the screw (4-90) or (4-120) does not fit, carry out step (8) to (12) inclusive.
- (8) Machine out the insert 302-007-900-0 fitted to the door then rework as follows :
 - (a) If mismatch between the hole in the door and the one in the nozzle structure is less than 1,75 mm (0.07 in.); drill coaxially to the threaded hole of fitting (fig. 520).
 - (b) If mismatch is equal to 1,75 mm (0.07 in.) drill coaxially to the threaded hole of the fitting but tangentially to the offset hole.
 - (c) If mismatch is equal to 1,75 mm (0.07 in.) and is less than 3,5 mm (0.14 in.) do not drill coaxially to the threaded hole of fitting but tangentially to the offset hole.
- (9) Deburr hole using an emery cloth ; no radial marks allowable.
- (10) Position the replacement door on the structure to check for correct location of hole relative to the fitting.
- (11) Remove the door.
- (12) Crimp the insert 525-003-968-0 to the door.
- (13) Prepare the door for the application of a Rhodorsil seal as described in paragraph 26.
- (14) After the seal application, position the door on the structure.
- (15) Tighten the screws to the prescribed torques.

B. Installation of LH Access Door (4-70)

- (1) Fit the threaded plug (4-90) to the access door and tighten it to the recommended torque.
- (2) Position the access door to the housing of the bay 2 bucket position transmitter (indicator)

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(3) Secure the door using countersunk head screws (4-80).

(4) Tighten the screws to the recommended torques.

C. Installation of the LH Access Door (4-100)

(1) Fit the threaded plug (4-120) to the door and tighten it to the recommended torque.

(2) Position the access door to the housing of the bay 1 bucket position transmitter (indicator).

(3) Secure the door using countersunk head screws (4-110).

(4) Tighten the screws to the recommended torques.

D. Installation of RH Access Door (4-71)

(1) Fit the threaded plug (4-90) to the access door and tighten it to the recommended torque.

(2) Position the access door on the housing of the bay 3 nozzle position transmitter (indicator).

(3) Secure the door using countersunk head screws (4-80).

(4) Tighten the screws to the recommended torques.

E. Installation of RH Access Door (4-101)

(1) Fit the threaded plug (4-120) to the door and tighten it to the recommended torque.

(2) Position the access door on the housing of the bay 4 bucket position transmitter (indicator).

(3) Secure the door using countersunk head screws (4-110).

(4) Tighten the screws to the recommended torques.

30. Installation of Cover Assemblies (Figure 521)

A. Installation of Cover Assemblies (20-10)

(1) Position the cover assemblies (20-10) to the structure.

(2) Tighten the countersunk headscrew for each cover assembly to the recommended torque.

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B. Installation of Cover Assemblies (20-20)

- (1) Position the cover assemblies (20-20) to the structure.
- (2) Tighten the screws of each cover assembly to the recommended torques.

C. Installation of Cover Assemblies (20-180/190)

- (1) Position the cover assemblies (20-180/190) to the structure.
- (2) Tighten the screw of each cover assembly to the recommended torque.

31. Installation of the Twin Secondary Nozzle Assembly to the Transport Trolley

NOTE : Testing of the twin secondary nozzle assembly is to be carried out when it is installed on the rotating stand - tool SC 117. Installation to the transport trolley - tool SC 36 - should only be carried out after testing.

A. Fitting the Hoisting Beam - tool SC 195

- (1) Using a hoist, position the hoisting beam on the twin secondary nozzle assembly.
- (2) Secure the three strands of the hoisting beam to the secondary nozzle lifting points (upper handling point and lateral attachment points).
- (3) Take up the slack in the cables and free the twin secondary nozzle from the rotating stand.
- (4) Operate the handle on the hoisting beam to move the centre of gravity and balance the load.

B. Installation of the Twin secondary Nozzle Assembly onto the Transport Trolley

- (1) Operate the hoist to position the twin secondary nozzle assembly to the transport trolley - tool SC 36.
- (2) Fit the mounting elements at the rear side points and at the lateral primary nozzle mounting pin housings.
- (3) Remove the hoisting beam - tool SC 195.

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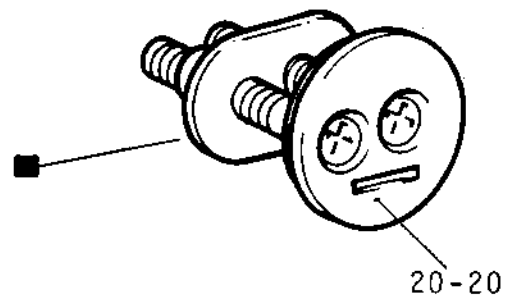
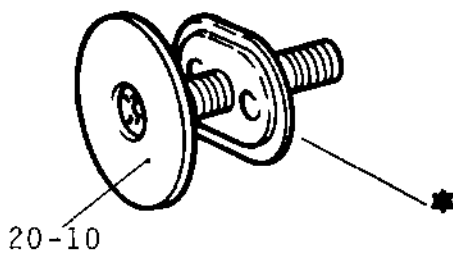
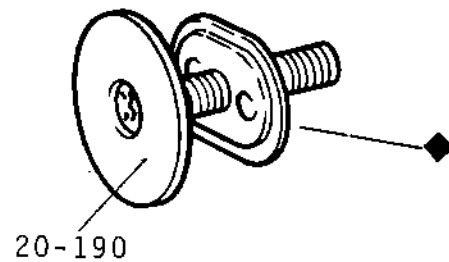
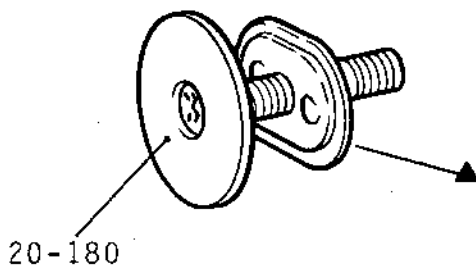
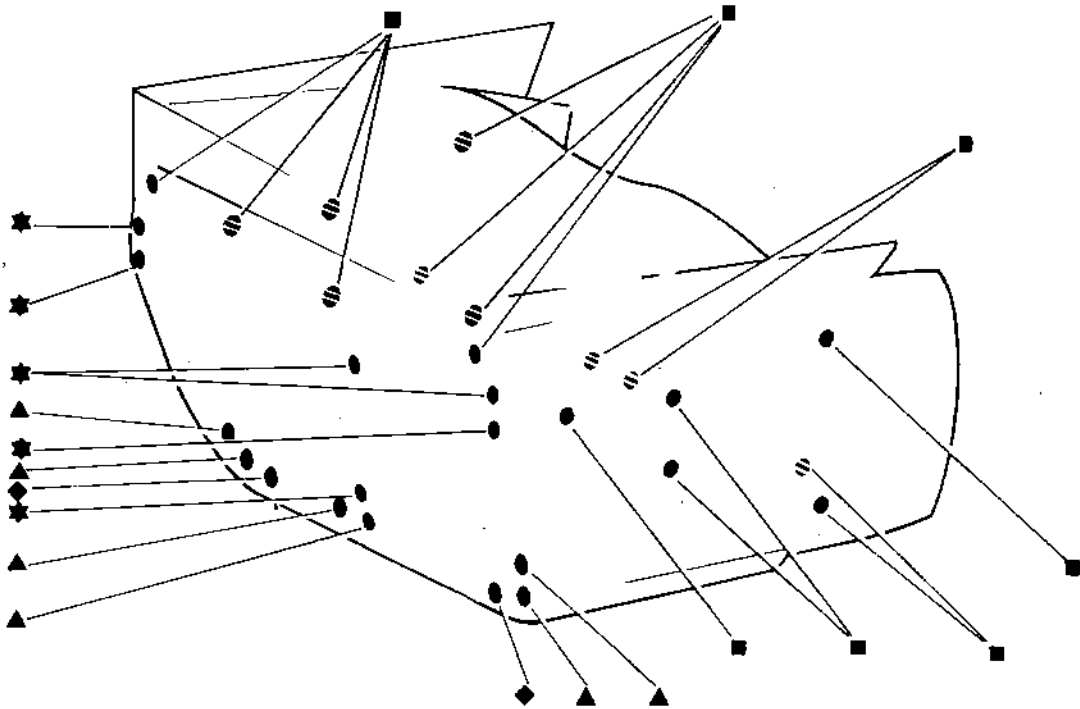
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Installation of Cover Assemblies
Figure 521

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**FITS AND CLEARANCES****1. General****A. Layout**

- (1) The table of clearances gives the machining tolerances of parts in new condition and acceptable wear limits. The values are expressed in millimeters.

ITEM FIG.	IPL FIGURE ITEM	NOMINAL DIMENSION	TYPE	CLEARANCES		MAX LIMIT	CAT.	REMARKS SELECTIONS
				MIN	MAX			
1	2	3	4	5	6	7	8	9

- (2) The item numbers in column (1) by reference to the corresponding figure provide a means of locating the clearance or dimension to be measured.
- (3) The item numbers in column (2) identify the parts in the "Illustrated Parts List". (FIGURE + ITEM).
- (4) Column (3) gives the manufacturing dimensions of parts together with the machining tolerances.
- In the case of two parts which form an assembly the first one is always the male part.
- (5) The code letters in column (4) indicate the type of clearance.
- A denotes an axial clearance
 - D denotes a diametral clearance
 - L denotes a side clearance
- (6) Columns (5) and (6) give the clearance (symbol J) or the interference (symbol S) which result from the manufacturing tolerances.
- Column (9) is used to indicate that a smaller clearance than that resulting from the manufacturing tolerances is required. This reduced clearance is obtained by selective assembly of parts.

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- (7) The digits or letter in column (8) give the clearance category the definition of which is as follows :

M - Check or adjustment to be carried out at each assembly

1 - Check to be systematically carried out.

2 - Check to be carried out if the condition of parts makes it necessary.

3 - Dimensions intended for use by Design Offices (not applicable in this document).

4 - Check to be systematically carried out on the equipments intended for ageing studies (Sampling).

B. Max. after wear (column 7)

(1) The MAX. LIMITS are the maximum wear limits within which a part can be accepted for a further period of use.

(2) Parts worn beyond these limits will be either repaired in accordance with the instructions given in chapter "REPAIR" or replaced as applicable.

(3) Therefore the values given in this column will change as experience is gained with the repaired equipment or the equipment intended for ageing studies.

(4) This kind of information may be entered in this column.

(a) Clearance

The maximum clearance or the minimum interference between two parts will be given only if they are matched parts. The distribution of this clearance on the male or female part is left to the discretion of the repairer.

(b) Dimension

In order to preserve interchangeability, the degree of permissible wear on male and female parts is given, thus ensuring a correct assembly at all times whatever the mating parts may be.

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2. Torque values

As torque is variable with respect to lubrication, we indicate in this paragraph both the torque and lubrication to comply with during assembly. Bolts, nuts... bear the I.P.L. references.

Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
1-20	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-40	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-60	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-80	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-110	Lubricate thread with anti-seizing graphite grease (P189)	0,30 to 0,4 daN.m (2.21 to 2.95 lbf.ft)
1-120	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-130	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-140	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-160	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-180	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-210	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-230	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-250	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)

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OVERHAULBolts or
nuts
Fig. Item
(I.P.L.)Lubrication when
assemblyTorque
value

1-270	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-300	Lubricate thread with anti-seizing graphite grease (P189)	0,30 to 0,40 daN.m (2.21 to 2.95 lbf.ft)
1-310	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-320	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-330	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-350	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
1-370	Lubricate thread with anti-seizing graphite grease (P189)	0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
2-20	Lubricate thread with anti-seizing graphite grease (P189)	0,67 to 0,96 daN.m 4.94 to 7.08 lbf.ft)
2-40	Lubricate thread with anti-seizing graphite grease (P189)	2 to 3 daN.m (14.8 to 22.1 lbf.ft)
2-90	Lubricate thread with anti-seizing graphite grease (P189)	0,5 to 0,6 daN.m (3.69 to 4.42 lbf.ft)
2-110	Lubricate thread with anti-seizing graphite grease (P189)	0,5 to 0,6 daN.m (3.69 to 4.42 lbf.ft)
2-140	Lubricate thread with anti-seizing graphite grease (P189)	0,8 daN.m (5.89 lbf.ft)
2-180	Lubricate thread with anti-seizing graphite grease (P189)	0,5 to 0,6 daN.m (3.69 to 4.43 lbf.ft)
2-210	Lubricate thread with anti-seizing graphite grease (P189)	0,67 to 0,96 daN.m (4.94 to 7.08 lbf.ft)
2-230	Lubricate thread with anti-seizing graphite grease (P189)	2 to 3 daN.m (14.8 to 22.1 lbf.ft)

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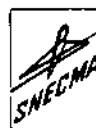
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Bolts or
nuts
Fig. Item
(I.P.L.)

Lubrication when
assembly

Torque
value

2-270	Lubricate thread with anti-seizing graphite grease (P189)	0,5 to 0,6 daN.m (3.69 to 4.43 lbf.ft)
2-300	Lubricate thread with anti-seizing graphite grease (P189)	0,67 to 0,96 daN.m (4.94 to 7.08 lbf.ft)
2-320	Lubricate thread with anti-seizing graphite grease (P189)	2 to 3 daN.m (14.8 to 22.1 lbf.ft)
2-360	Lubricate thread with anti-seizing graphite grease (P189)	0,5 to 0,6 daN.m (3.69 to 4.43 lbf.ft)
2-400	Lubricate thread with anti-seizing graphite grease (P189)	1,00 to 1,10 daN.m (7.37 to 8.10 lbf.ft)
3-20		0,60 daN.m (4.42 lbf.ft)
3-30		0,60 daN.m (4.42 lbf.ft)
3-90		0,60 daN.m (4.42 lbf.ft)
3-160		0,60 daN.m (4.42 lbf.ft)
3-180		0,60 daN.m (4.42 lbf.ft)
3-200		0,60 daN.m (4.42 lbf.ft)
3-400		0,60 daN.m (4.42 lbf.ft)
3-360		0,60 daN.m (4.42 lbf.ft)
3-380		0,60 daN.m (4.42 lbf.ft)
3-410		0,60 daN.m (4.42 lbf.ft)

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Bolts or
nuts
Fig. Item
(I.P.L.)

Lubrication when
assembly

Torque
value

3-460		0,60 daN.m (4.42 lbf.ft)
4-20		0,60 daN.m (4.42 lbf.ft)
4-40		0,60 daN.m (4.42 lbf.ft)
4-60		0,60 daN.m (4.42 lbf.ft)
4-80		0,60 daN.m (4.42 lbf.ft)
4-110		0,60 daN.m (4.42 lbf.ft)
5-10	Lubricate thread with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
5-40	Lubricate thread with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
5-70	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-100	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-140	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-160	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-180	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-210	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-230	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)

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Bolts or
nuts
Fig. Item
(I.P.L.)

Lubrication when
assembly

Torque
value

5-250	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-290	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
5-310	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
5-340	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
5-360A	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
5-360B	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
5-380	Lubricate thread with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
5-410	Lubricate thread with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
5-440	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-470	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-510	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-530	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-550	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-580	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-600	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)

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Bolts or
nuts
Fig. Item
(I.P.L.)

Lubrication when
assembly

Torque
value

5-620	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
5-660	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
5-680	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
5-710	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
5-730	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
6-10	Lubricate thread with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
6-40	Lubricate thread with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
6-70	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-100	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-140	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-160	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-180	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-210	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-230	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-250	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)

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**OLYMPUS 593**MK.610-14-28
OVERHAULBolts or
nuts
Fig. Item
(I.P.L.)Lubrication when
assemblyTorque
value

6-290	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
6-310	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
6-340	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
6-360A	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
6-360B	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
6-380	Lubricate thread with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
6-410	Lubricate thread with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
6-440	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-470	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-510	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-530	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-550	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-580	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-600	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)
6-620	Lubricate thread with anti-seizing graphite grease (P189)	0,16 to 0,20 daN.m (1.18 to 1.47 lbf.ft)

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
6-660	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
6-680	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
6-710	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
6-730	Lubricate thread with anti-seizing graphite grease (P189)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
7-20	Lubricate thread with anti-seizing graphite grease (P189)	
7-50	Lubricate thread with anti-seizing graphite grease (P189)	
7-80	Lubricate thread with anti-seizing graphite grease (P189)	
7-120	Lubricate thread with anti-seizing graphite grease (P189)	
7-170	Lubricate thread with anti-seizing graphite grease (P189)	
7-200	Lubricate thread with anti-seizing graphite grease (P189)	
7-230	Lubricate thread with anti-seizing graphite grease (P189)	
7-270	Lubricate thread with anti-seizing graphite grease (P189)	
8-20	Lubricate threads with lanolin (P194)	0,9 daN.m (6.64 lbf.ft)
8-40	Lubricate threads with lanolin (P194)	0,55 to 0,65 daN.m (4.05 to 4.80 lbf.ft)
8-90	Lubricate threads and spherical bearing with lanoline (P194)	1,3 to 2,5 daN.m (9.59 to 18.4 lbf.ft)

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
8-110	Lubricate threads with lanoline (P194)	2,6 to 2,9 daN.m (19.2 to 21.4 lbf.ft)
8-150	Lubricate threads with lanoline (P194)	0,9 daN.m (6.64 lbf.ft)
8-170	"	0,55 to 0,65 daN.m (4.05 to 4.80 lbf.ft)
8-220	"	1,3 to 2,5 daN.m (9.59 to 18.4 lbf.ft)
8-240	"	2,6 to 2,9 daN.m (19.2 to 21.4 lbf.ft)
8-280	"	0,9 daN.m (6.64 lbf.ft)
8-300	"	0,55 to 0,05 daN.m (4.05 to 4.80 lbf.ft)
8-350	"	1,3 to 2,5 daN.m (9.59 to 18.4 lbf.ft)
8-370	"	2,6 to 2,9 daN.m (19.2 to 21.4 lbf.ft)
8-410	"	0,9 daN.m (6.64 lbf.ft)
8-430	"	0,55 to 0,65 daN.m (4.05 to 4.80 lbf.ft)
8-480	"	1,3 to 2,5 daN.m (9.59 to 18.4 lbf.ft)
8-500	"	2,6 to 2,9 daN.m (19.2 to 21.4 lbf.ft)
8-540	"	0,55 to 0,65 daN.m (4.05 to 4.80 lbf.ft)
8-590	"	1,3 to 2,5 daN.m (9.59 to 18.4 lbf.ft)

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
8-610	Lubricate threads with lanoline (P194)	2,6 to 2,9 daN.m (19.2 to 21.4 lbf.ft)
9-30	Lubricate threads with anti- seizing graphite grease (P189)	
9-50	Lubricate threads with anti- seizing graphite grease (P189)	
9-80	Lubricate threads with anti- seizing graphite grease (P189)	
9-120	Lubricate threads with anti- seizing graphite grease (P189)	
9-150	Lubricate threads with anti- seizing graphite grease (P189)	
9-180	Lubricate threads with anti- seizing graphite grease (P189)	
9-210	Lubricate threads with anti- seizing graphite grease (P189)	
9-240	Lubricate threads with anti- seizing graphite grease (P189)	
9-260	Lubricate threads with anti- seizing graphite grease (P189)	
9-290	Lubricate threads with anti- seizing graphite grease (P189)	
9-310	Lubricate threads with anti- seizing graphite grease (P189)	
9-340	Lubricate threads with anti- seizing graphite grease (P189)	
9-380	Lubricate threads with anti- seizing graphite grease (P189)	
9-410	Lubricate threads with anti- seizing graphite grease (P189)	

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
9-440	Lubricate threads with anti-seizing graphite grease (P189)	
9-470	Lubricate threads with anti-seizing graphite grease (P189)	
9-500	Lubricate threads with anti-seizing graphite grease (P189)	
9-510	Lubricate threads with anti-seizing graphite grease (P189)	
9-540		0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-560		0,288 to 0,345 daN.m (2.12 to 2.54 lbf.ft)
9-590		0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-610		0,288 to 0,345 daN.m (2.12 to 2.54 lbf.ft)
9-640		0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-660		0,288 to 0,345 daN.m (2.12 to 2.54 lbf.ft)
9-690		0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-710		0,288 to 0,345 daN.m (2.12 to 2.54 lbf.ft)
9-740		0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-760		0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-780		0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)

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Bolts or
nuts
Fig. Item
(I.P.L.)

Lubrication when
assembly

Torque
value

9-810	0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-830	0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-850	0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-880	0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-900	0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-920	0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-950	0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-970	0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
9-990	0,260 to 0,339 daN.m (1.92 to 2.50 lbf.ft)
10-10	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-30	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-50	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-70	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-90	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-110	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)

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(I.P.L.)Lubrication when
assemblyTorque
value

10-130	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-150	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-170	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-190	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-210	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-230	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-250	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-270	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-290	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-310	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-330	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-350	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-370	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-390	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-410	0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
10-430		0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-450		0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-470		0,13 to 0,16 daN.m (0.959 to 1.18 lbf.ft)
10-490	Lubricate threads with anti- seizing graphite grease to AIR 4247 (P189C)	1,4 daN.m (10.3 lbf.ft)
10-500		
10-540		
10-580		
10-620		
10-660	Lubricate threads with anti- seizing graphite grease (P189)	0,5 daN.m (3.69 lbf.ft)
11-20	Lubricate threads with anti- seizing graphite grease (P189)	
11-30	Lubricate threads with anti- seizing graphite grease (P189)	
11-50	Lubricate threads with anti- seizing graphite grease (P189)	
11-60	Lubricate threads with anti- seizing graphite grease (P189)	
11-80	Lubricate threads with anti- seizing graphite grease (P189)	
11-90	Lubricate threads with anti- seizing graphite grease (P189)	
11-110	Lubricate threads with anti- seizing graphite grease (P189)	

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Bolts or
nuts
Fig. Item
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Lubrication when
assembly

Torque
value

11-120	Lubricate threads with anti-seizing graphite grease (P189)	
12-20	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
12-40	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
12-60	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
13-20	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
13-40	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
13-60	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
13-80	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
13-100	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
13-130	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
13-150	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
13-170	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
13-190	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
13-210	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
14-20	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)

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nuts
Fig. Item
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Lubrication when
assembly

Torque
value

14-40	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
14-60	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
14-80	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
14-100	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
14-120	Lubricate threads with anti-seizing graphite grease (P189)	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
15-17		0,22 to 0,28 daN.m (1.62 to 2.07 lbf.ft)
15-27		0,22 to 0,28 daN.m (1.62 to 2.07 lbf.ft)
15-32		0,22 to 0,28 daN.m (1.62 to 2.07 lbf.ft)
15-35		0,22 to 0,28 daN.m (1.62 to 2.07 lbf.ft)
15-42		0,22 to 0,28 daN.m (1.62 to 2.07 lbf.ft)
15-45		0,22 to 0,28 daN.m (1.62 to 2.07 lbf.ft)
15-56		0,22 to 0,28 daN.m (1.62 to 2.07 lbf.ft)
15-157		0,22 to 0,28 daN.m (1.62 to 2.07 lbf.ft)
15-167		0,22 to 0,28 daN.m (1.62 to 2.07 lbf.ft)
15-172		0,22 to 0,28 daN.m (1.62 to 2.07 lbf.ft)

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
15-175		0,22 to 0,28 daN.m (1.62 to 2.07 lbf.ft)
Bucket pneumatic actuator to flexible shaft attachment bolts		0,22 to 0,28 daN.m (1.62 to 2.06 lbf.ft)
Bucket position transmitter (indicator) to flexible shaft attachment bolts		0,22 to 0,28 daN.m (1.62 to 2.06 lbf.ft)
Ball-screw gear box to flexible shaft attachment bolts		0,22 to 0,28 daN.m (1.62 to 2.06 lbf.ft)
16-10	Locknut of spherical bearing end fitting	5,5 to 7,8 daN.m (40.55 to 57.5 lbf.ft)
16-30		1 to 1.10 daN.m (7.38 to 8.11 lbf.ft)
16-80		0,79 to 0,9 daN.m (5.82 to 6.63 lbf.ft)
16-140		0,79 to 0,9 daN.m (5.82 to 6.63 lbf.ft)
16-210		
16-240		
17-20		0,7 to 0,8 daN.m (5.16 to 5.90 lbf.ft)
17-60		1 to 1,1 daN.m (7.38 to 8.11 lbf.ft)
17-100		1,35 to 1,5 daN.m (9.96 to 11.1 lbf.ft)
17-130		0,28 to 0,32 daN.m (2.06 to 2.36 lbf.ft)
17-160		1,35 to 1,5 daN.m (9.96 to 11.1 lbf.ft)
17-180		0,28 to 0,32 daN.m (2.06 to 2.36 lbf.ft)

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
17-220		0,28 to 0,32 daN.m (2.06 to 2.36 lbf.ft)
17-250		0,50 to 0,68 daN.m (4.13 to 5.01 lbf.ft)
17-290		0,56 to 0,68 daN.m (4.13 to 5.01 lbf.ft)
17-340		1,80 to 2,20 daN.m (13.3 to 16.24 lbf.ft)
18-30		0,2 to 0,6 daN.m (1.48 to 4.43 lbf.ft)
18-90		
18-120	Lubricate threads with lanolin (P194)	0,15 to 0,20 daN.m (1.11 to 1.48 lbf.ft)
18-160		
18-200	Lubricate threads with lanolin (P194)	0,15 to 0,20 daN.m (1.11 to 1.48 lbf.ft)
18-240		
18-260		0,35 to 0,40 daN.m (2.58 to 2.95 lbf.ft)
18-320	Lubricate threads with lanolin (P194)	0,1 to 0,25 daN.m (0.738 to 1.84 lbf.ft)
18-350	Lubricate threads with lanolin (P194)	0,15 to 0,20 daN.m (1.11 to 1.47 lbf.ft)
18-410		0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
18-440	Lubricate threads with lanolin (P194)	0,15 to 0,20 daN.m (1.11 to 1.48 lbf.ft)
18-500		0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)

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Bolts or
nuts
Fig. Item
(I.P.L.)

Lubrication when
assembly

Torque
value

18-520	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
18-570	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
18-593	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
18-630	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
18-650	0,7 to 0,9 daN.m (5.16 to 6.64 lbf.ft)
19-10	0,3 to 0,4 daN.m (2.22 to 3.04 lbf.ft)
19-40	6,70 to 7,46 daN.m (49.4 to 55.0 lbf.ft)
19-50	1 to 1,1 daN.m (7.30 to 8.11 lbf.ft)
19-110	0,3 to 0,4 daN.m (2.21 to 2.94 lbf.ft)
19-140	6,70 to 7,46 daN.m (49.4 to 55.0 lbf.ft)
19-150	1 to 1,1 daN.m (7.38 to 8.11 lbf.ft)
19-230	0,56 to 0,68 daN.m (4.13 to 5.01 lbf.ft)
19-250	0,8 to 0,9 daN.m (5.90 to 6.64 lbf.ft)
19-270	0,8 to 0,9 daN.m (5.90 to 6.64 lbf.ft)
19-430	0,56 to 0,68 daN.m (4.13 to 5.01 lbf.ft)

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
19-470		0,80 to 0,90 daN.m (5.90 to 6.64 lbf.ft)
20-10		0,8 to 0,9 daN.m (5.90 to 6.64 lbf.ft)
20-20		0,8 to 0,9 daN.m (5.90 to 6.64 lbf.ft)
20-70		0,30 to 0,40 daN.m (2.2 to 2.9 lbf.ft)
20-100		0,30 to 0,40 daN.m (2.2 to 2.9 lbf.ft)
20-180		0,8 to 0,9 daN.m (5.9 to 6.64 lbf.ft)
20-190		0,8 to 0,9 daN.m (5.9 to 6.64 lbf.ft)
21-20		0,34 to 0,45 daN.m (2.51 to 3.31 lbf.ft)
21-60		0,45 to 0,56 daN.m (3.31 to 4.12 lbf.ft)
21-120		0,45 to 0,56 daN.m (3.31 to 4.12 lbf.ft)
21-180	Lubricate threads with lanolin (P194)	0,34 to 0,45 daN.m (2.51 to 3.31 lbf.ft)
21-220	Lubricate threads with lanolin (P194)	0,45 to 0,56 daN.m (3.31 to 4.13 lbf.ft)
21-270	Lubricate threads with lanolin (P194)	0,45 to 0,56 daN.m (3.31 to 4.13 lbf.ft)
21-350	Lubricate threads with lanolin (P194)	0,45 to 0,56 daN.m (3.31 to 4.13 lbf.ft)
21-390	Lubricate threads with lanolin (P194)	0,45 to 0,56 daN.m (3.31 to 4.13 lbf.ft)

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
22-10	Lubricate threads with lanolin (P194)	
22-40	Lubricate threads with lanolin (P194)	
22A-90	Lubricate threads with lanolin (P194)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
22A-100	Lubricate threads with lanolin (P194)	0,23 to 0,29 daN.m (1.69 to 2.13 lbf.ft)
22A-110	Lubricate threads with lanolin (P194)	0,23 to 0,29 daN.m (1.69 to 2.13 lbf.ft)
22A-120	Lubricate threads with lanolin (P194)	0,23 to 0,29 daN.m (1.69 to 2.13 lbf.ft)
22A-170	Lubricate threads with lanolin (P194)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
22A-180	Lubricate threads with lanolin (P194)	0,23 to 0,29 daN.m (1.69 to 2.13 lbf.ft)
22A-185	Lubricate threads with lanolin (P194)	0,23 to 0,29 daN.m (1.69 to 2.13 lbf.ft)
22B-235	Lubricate threads with lanolin (P194)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
22B-245	Lubricate threads with lanolin (P194)	0,23 to 0,29 daN.m (1.69 to 2.13 lbf.ft)
22B-250	Lubricate threads with lanolin (P194)	0,23 to 0,29 daN.m (1.69 to 2.13 lbf.ft)
22B-290	Lubricate threads with lanolin (P194)	0,8 to 1 daN.m (5.90 to 7.36 lbf.ft)
22B-300	Lubricate threads with anti- seizing graphite grease (P189)	0,23 to 0,29 daN.m (1.69 to 2.13 lbf.ft)
22B-310	Lubricate threads with anti- seizing graphite grease (P189)	0,23 to 0,29 daN.m (1.69 to 2.13 lbf.ft)

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OVERHAUL

Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
22B-320	Lubricate threads with anti-seizing graphite grease (P189)	0,23 to 0,29 daN.m (1.69 to 2.13 lbf.ft)
22B-330	Lubricate threads with anti-seizing graphite grease (P189)	0,23 to 0,29 daN.m (1.69 to 2.13 lbf.ft)
22C-365	Lubricate threads with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
22C-380	Lubricate threads with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
22C-405	Lubricate threads with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
22C-420	Lubricate threads with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
22D-465	Lubricate threads with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
22D-480	Lubricate threads with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
22D-505	Lubricate threads with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
22D-520	Lubricate threads with anti-seizing graphite grease (P189)	0,25 to 0,35 daN.m (1.84 to 2.58 lbf.ft)
23-20	Lubricate threads with lanolin (P194)	
23-40	Lubricate threads with lanolin (P194)	
23-100	Lubricate threads with lanolin (P194)	
23-120	Lubricate threads with lanolin (P194)	
23-180	Lubricate threads with lanolin (P194)	

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembly	Torque value
23-200	Lubricate threads with lanolin (P194)	
23-260	Lubricate threads with lanolin (P194)	
23-280	Lubricate threads with lanolin (P194)	

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembling	Torque Value
24-30	Lubricate threads with lanolin (P194)	
24-80	"	0,34 to 0,45 daNm (2.51 to 3.31 lbf.ft)
24-130	"	1,30 to 1,47 daNm (9.59 to 10.8 lbf.ft)
25-20	"	1,30 to 1,47 daNm (9.59 to 10.8 lbf.ft)
25-70	"	1,30 to 1,47 daNm (9.59 to 10.8 lbf.ft)
25-150	"	1,30 to 1,47 daNm (9.59 to 10.8 lbf.ft)
25-180	"	1,30 to 1,47 daNm (9.59 to 10.8 lbf.ft)
25-230	"	1,30 to 1,47 daNm (9.59 to 10.8 lbf.ft)
25-260	"	1,30 to 1,47 daNm (9.59 to 10.8 lbf.ft)
25-310	"	1,30 to 1,47 daNm (9.59 to 10.8 lbf.ft)
25-360	"	1,30 to 1,47 daNm (9.59 to 10.8 lbf.ft)
25-420	"	1,30 to 1,47 daNm (9.59 to 10.8 lbf.ft)
26-10	"	
Connector C	"	1,09 daNm (8.04) lbf.ft)
Connector D	"	0,68 daNm (5.01 lbf.ft)
Connector E	"	0,82 daNm (6.04 lbf.ft)
Connector F	"	0,68 daNm (5.01 lbf.ft)

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Bolts or
nuts
Fig. Item
(I.P.L.)

Lubrication when
assembling

Torque
Value

Connector G	Lubricate threads with lanolin (P194)	0,80 to 0,90 daNm (5.89 to 6.63 lbf.ft)
Connector H	"	0,80 to 0,90 daNm (5.89 to 6.63 lbf.ft)
Connector I	"	0,65 to 0,70 daNm (4.79 to 5.15 lbf.ft)
Connector J	"	(1,05 to 1,15 daNm (7.73 to 8.85 lbf.ft)
26-20	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-40	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-60	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-80	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-90	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-110	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-130	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-140	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-160	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-170	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-180	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-190	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-200	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)

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Bolts or nuts Fig. Item (I.P.L.)	Lubrication when assembling	Torque value
26-210	Lubricate threads with lanolin (P194)	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-220	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
26-60	"	
Connector C	"	1,05 to 1,15 daNm (7.73 to 8.47 lbf.ft)
Connector D	"	0,65 to 0,75 daNm (4.79 to 5.77 lbf.ft)
Connector E	"	0,80 to 0,90 daNm (5.89 to 6.63 lbf.ft)
Connector H	"	0,68 daNm (5.01 lbf.ft)
Connector I	"	0,82 daNm (6.04 lbf.ft)
Connector J	"	1,09 daNm (8.04 lbf.ft)
27-70	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
27-90	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
27-100	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
27-120	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
27-140	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
27-160	"	0,40 to 0,45 daNm (2.95 to 3.31 lbf.ft)
28-20	"	0,30 to 0,40 daNm (2.21 to 2.95 lbf.ft)
28-50	"	0,30 to 0,40 daNm (2.21 to 2.95 lbf.ft)
28-70	"	0,30 to 0,40 daNm (2.21 to 2.95 lbf.ft)

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Bolts or
nuts
Fig. Item
(I.P.L.)

Lubrication when
assembling

Torque
Value

28-110	Lubricate threads with lanolin (P194)	0,30 to 0,40 daNm (2.21 to 2.95 lbf.ft)
28-140	"	0,30 to 0,40 daNm (2.21 to 2.95 lbf.ft)
28-170	"	0,30 to 0,40 daNm (2.21 to 2.95 lbf.ft)
28-200	"	0,30 to 0,40 daNm (2.21 to 2.95 lbf.ft)
28-230	"	0,30 to 0,40 daNm (2.21 to 2.95 lbf.ft)
28-260	"	0,30 to 0,40 daNm (2.21 to 2.95 lbf.ft)
28-273	"	0,30 to 0,40 daNm (2.21 to 2.95 lbf.ft)
28-280	"	0,30 to 0,40 daNm (2.21 to 2.95 lbf.ft)
29-10	"	0,68 to 0,79 daNm (5.01 to 12,65 lbf.ft)
29-70	"	12,20 to 12,65 daNm (89.98 to 93.3 lbf.ft)
29-90	"	12,20 to 12,65 daNm (89.98 to 93.3 lbf.ft)
29-140	"	12,20 to 12,65 daNm (89.98 to 93.3 lbf.ft)
29-160	"	12,20 to 12,65 daNm (89.98 to 93.3 lbf.ft)

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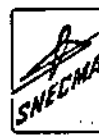
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TESTING

1. General

The post-overhaul testing to be carried out the twin secondary nozzle assembly encompass the following separate tests/checks :

- A. Manual functional test of the reverse bucket system including measurement and recording of the drag torque loads and a check of the feedback signals in the various system operating modes.
- B. Functional test of the bucket system including a check of the bucket transit (travel) times.
- C. Functional test of the bucket system through actuation of the bucket crossfeed (crossbleed) isolation valve, also including a check of bucket transit times.
- D. Check of electrical continuity of the primary nozzle area transducer electrical harness.

2. Test Equipment Requirements

Perform testing on the twin secondary nozzle assembly after having it installed on rotating stand - tool SC 177 - .

A. Manual functional test

This test necessitates the use of :

- (1) One pneumatic power tool complete with a special adaptor - tool SC 203 -.
- (2) A test bench unit - tool SC 204 -.
- (3) Feed connection - tool SC 262 -.
- (4) One torque wrench (as an option, a torque wrench, model T.E.C. 3 FU, accurate to 2 % of the full scale and available from the STOKVIS Company) may be used.

B. Functional test of bucket system with check of transit times.

This test necessitates :

- (1) The test bench unit - tool SC 204 -.

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- NOTE : - The air supply for this test must allow a flow of 450 m³/hr. at a pressure of 3 bar. It must include a de-oiler, a de-hydrator, a 5 micron filter and a 0-6 bar pressure gauge with an accuracy of 1 %.
- The rig electrical supply shall be 220 Volts - 50 Hz.
- (2) One pneumatic power tool fitted with the adaptor
- tool SC 203 -.

C. Functional test of bucket system through actuation of the bucket crossfeed isolation valve

This test necessitates the same equipment as for the above functional test (refer to para. 2.B).

D. Electrical continuity check of the primary nozzle area transducer harness.

This check necessitates :

- (1) A 0.1 Ω to 0.5 K Ω ohmmeter; accuracy 0.01.

E. Testing sequence

Each bay being tested separately, the chronological order of the tests is as follows :

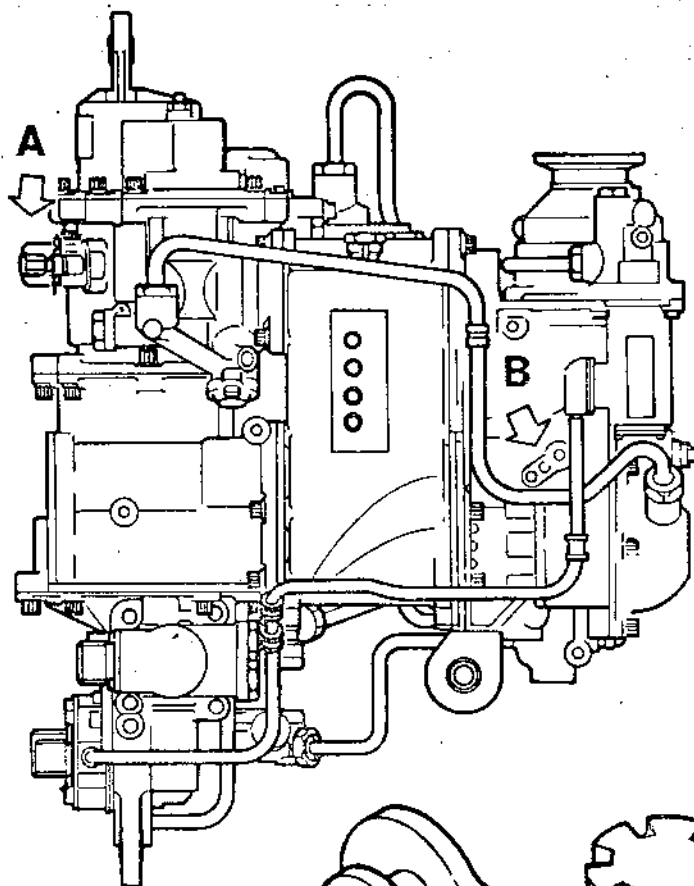
- (1) Manual functional test for bays 1 or 4.
- (2) Functional test associated with check of bucket transit times for bays 1 or 4.
- (3) Manual functional test for bays 2 or 3.
- (4) Functional test associated with check of bucket transit times for bays 2 or 3.
- (5) Functional test through actuation of bucket crossfeed isolation valve.
- (6) Electrical continuity check of primary nozzle area transducer electrical harness.



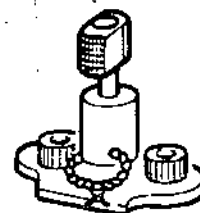
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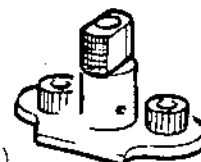
OVERHAUL



A



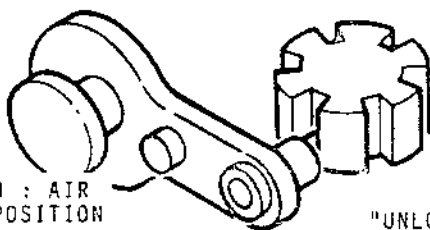
"UNLOCKED" POSITION



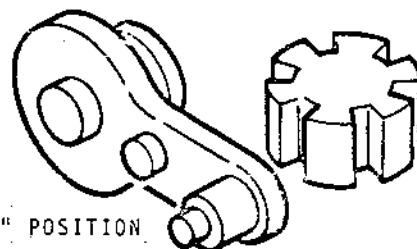
"LOCKED" (ENGAGED)
POSITION-OPERATION
LIMITED TO STRAIGHT
THROUGH EXHAUST FLOW

REVERSE THRUST
MANUAL LOCKOUT

B

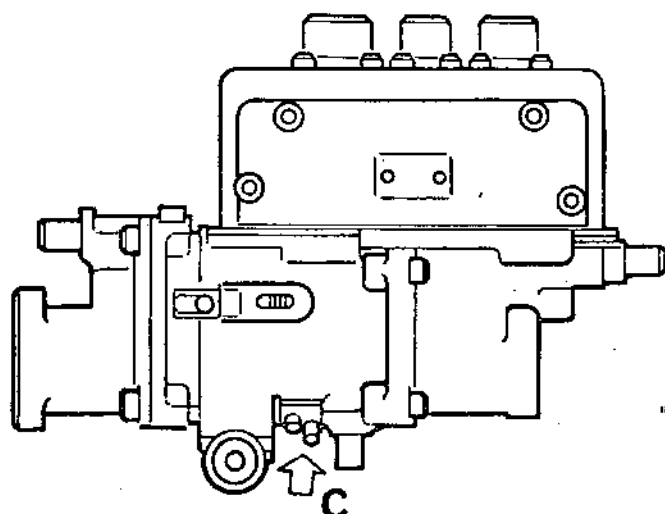


"LOCKED" POSITION : AIR
MOTOR LOCKED IN POSITION

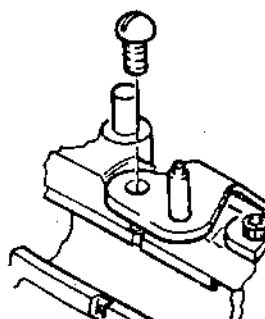


"UNLOCKED" POSITION

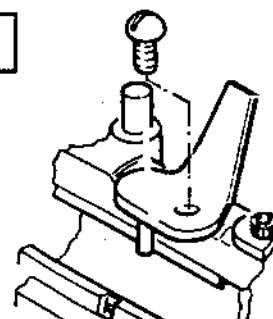
SYSTEM MANUAL LOCKOUT AND SHIPPING LOCK



C



"OPERATING" POSITION



"STORAGE" POSITION

BUCKET POSITION TRANSMITTER MANUAL LOCK

Bucket Pneumatic Drive Actuator and Position
Transmitter (Indicator) - Positions of the Locking Systems
Figure 701

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OVERHAUL



3. Manual Functional Test

A. Prepare for test

- (1) On the bucket pneumatic drive actuator, ensure that the reverse thrust manual lockout, is in the "unlocked" position (knurled knob disengaged). Ref. Fig. 701, detail A.
- (2) On the bucket pneumatic drive actuator, place the system manual lock and shipping lock, in the "unlocked" position. Ref. Fig. 701, detail B.
- (3) On the bucket position transmitter (indicator), place the manual lock in the "unlocked" (operating) position. Ref. Fig. 701, detail C.
- (4) On the upper central bucket ballscrew gearbox of the bay, remove access cover located on the reduction gearbox's housing - opposite to the input shafts - so as to enable installation of the transducer probe providing for count of the flexible shaft cores' numbers of revolutions.
- (5) On the upper lateral bucket ballscrew gearbox of same bay, remove access cover located on the reduction gearbox's housing - opposite to the input shafts - so as to enable installation of the pneumatic power tool used to actuate the flexible shafts, as well as the installation of the torque wrench used for measurement of the drag torques.
- (6) Locate the transducer probe in position and secure it with the two attaching bolts.
- (7) Remove the blanking parts from the appropriate boundary receptacles of electrical harnesses and plug in the mobile connectors of test bench unit - tool SC 204 -.

B. Test sequence

- (1) Before energizing the test bench unit, ensure that electrical circuits of the air inlet shut-off valve (ASOV) electro-magnetic control valve (torque motor) and crossfeed isolation valve, are open.
- (2) Energize the test bench unit. With the bucket system in the "straight through flow" configuration, ensure that :

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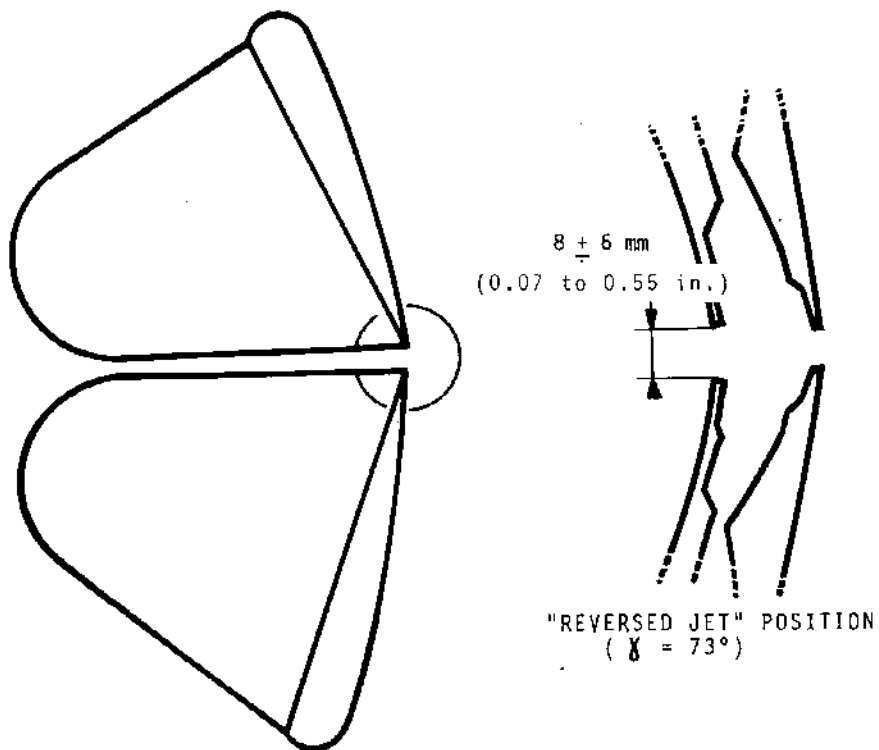


- (a) the SW1, SW2 and SW4 lamps are OFF.
- (b) the SW3 and SW5 lamps are ON.
- (3) Measure the static drag torque. To this end, carry out the following :
- (a) Locate the torque wrench in position on the reduction gearbox.
- (b) Turn the torque wrench at a slow, constant speed (1 revolution per each 10 seconds) and perform five (5) full revolutions.
- (c) After completing the 5 revolutions, record the maximum torque load observed during the rotation.
Maximum torque : 1,95 N.m (17,5 lb.in.)
- (d) Repeat the above steps (b) and (c) turning, this time, in the opposite direction.
- (4) Using the pneumatic power tool, fitted with the adaptor - tool SC 203 -, actuate the bucket drive system up to 145 ± 5 RPM. Within these limits ensure that :
- (a) SW1 and SW2 lamps are OFF,
- (b) SW3 lamp goes OFF,
- (c) SW4 lamp goes ON,
- (d) SW5 lamp is ON.
- (5) Using the pneumatic power tool, actuate the drive system up to 260 RPM (bucket position $\gamma = 45$ deg.).
- (6) In this bucket position, measure the drag torque load as detailed in step (3).
- (7) Using the pneumatic power tool, actuate the drive system up to 264 ± 5 RPM. In the corresponding bucket position, check that :
- (a) SW1 lamp goes ON,
- (b) SW2 and SW3 lamps are OFF,
- (c) SW4 and SW5 lamps are ON.
- (8) Using the pneumatic power tool, actuate the system up to 417 RPM. In this bucket position, check that :



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"Reversed Jet" and "Straight Through Flow"
Buckets Positions - Checking the Gaps
Figure 702

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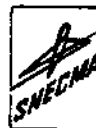
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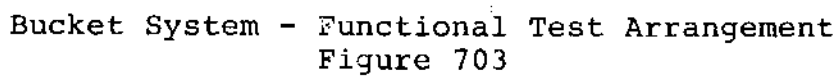


- PRINTED IN FRANCE
- (a) SW1 lamp is ON,
 - (b) SW2 lamp goes ON at 417 ± 1.25 RPM,
 - (c) SW3 lamp is OFF,
 - (d) SW4 lamp is ON,
 - (e) SW5 lamp goes OFF at 417 ± 2.5 RPM.
- (9) Using the pneumatic power tool, actuate the system up to 427 RPM (bucket position $\gamma = 73$ deg.). When reaching this position, ensure that :
- (a) SW1 and SW2 lamps are ON,
 - (b) SW3 lamp is OFF,
 - (c) SW4 lamp is ON,
 - (d) SW5 lamp is OFF.
- (10) In this position, which corresponds to the "reversed jet" configuration, check the gap between the respective trailing edge of the basic bucket structural frame-works. Ref. Fig. 702. This gap dimension is to be equal to : 8 ± 6 mm (0.07 to 0.55 in.)
- (11) In this "reversed jet" position, measure and record the drag torque load as detailed in step (3).
- (12) Using the pneumatic power tool, return the bucket to the "straight through flow" configuration ($\gamma = 0$ deg)
4. Functional Test with Measurement of Bucket Transit Times
- A. Prepare for test
- (1) Remove blanking part from the P3 air inlet pipe connection, located on the twin secondary nozzle front frame.
 - (2) Connect the pneumatic source to the above connection.
- B. Test sequence (refer to fig. 703)
- (1) Using the pneumatic power source, actuate the bucket drive system up to 109 RPM (bucket position $\gamma = 21$ deg.).
 - (2) Flip the "ASOV" switch to "ON" to close the air shut-off valve's electrical supply circuit (closing of the valve).

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- (3) Open the air pressure supply (33.35 psig).
- (4) Flip the "TORQUE MOTOR" switch to "ON" to energize the electro-magnetic control valve (torque motor).
- (5) Flip the "ASOV" switch to "OFF" to open the air shut-off valve (electrical circuit open). The buckets shall move from 21 to 73 deg position ("reversed jet" configuration).
- (6) Check both transit time and the number of turns of the flexible shafts.
 - The transit time shall be lower or equal to two (2) seconds.
 - The number of revolutions of the flexible shafts shall be equal to 427 RPM.
- (7) De-energize the electro-magnetic control valve (torque motor) : the buckets shall return to "straight through flow" position ($\gamma = 0$ deg.).

5. Functional Test Via Actuation of the Crossfeed Isolation Valve

A. Prepare for test

This test is to be carried out on bays 2 or 3 with :

- (1) The air supply hose connected to the bay 1 or 4 air inlet tube.
- (2) The bay 2 or 3 air inlet tube blanked off.
- (3) The test bench unit's mobile connectors plugged in the bay 2 or 3 boundary electrical receptacles.

B. Test sequence

- (1) Using the pneumatic power tool, actuate the bucket drive system up to 109 RPM (bucket position $\gamma = 21$ deg.).
- (2) Flip the "ASOV" switch to "ON" to close the air shut-off valve's electrical circuit (closing of the valve).
- (3) Flip the "CROSSFEED ISOL. VALVE" to "ON" to open the crossfeed (crossbleed) isolation valve.

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- (4) Open the air pressure supply (33.35 psig.).
- (5) Flip the "TORQUE MOTOR" switch to "ON" to energize the electro-magnetic control valve (torque motor).
- (6) Flip the "ASOV" switch to "OFF" to open the air shut-off valve (electrical circuit open). The buckets shall move from 21 to 73 deg. position ("reversed jet" configuration).
- (7) Check both the transit time and the number of revolutions of the flexible shafts.
 - The transit time shall not exceed 0.2 second in the direct (air) supply configuration.
- (8) De-energize the electro-magnetic control valve (torque motor). The buckets shall return to the "straight through flow" configuration (or zero deg. position).
- (9) De-energize the crossfeed isolation valve.
- (10) De-energize the test bench unit.

C. After completing this test, disconnect both the test bench connectors and the compressed air supply hose. Remove the transducer probe and re-install the blanking parts on the bucket ballscrew reduction gearboxes and on the nozzle P3 air inlet connections.

6. Electrical Continuity Check of the Primary Nozzle Area Transducer Electrical Harness.

- A. Use the ohmmeter defined in paragraph 2.D.(1), measure between the corresponding pins, the line resistance of each of the leads constituting the electrical harness. This line resistance shall be lower or equal to 0.5 Ohm.

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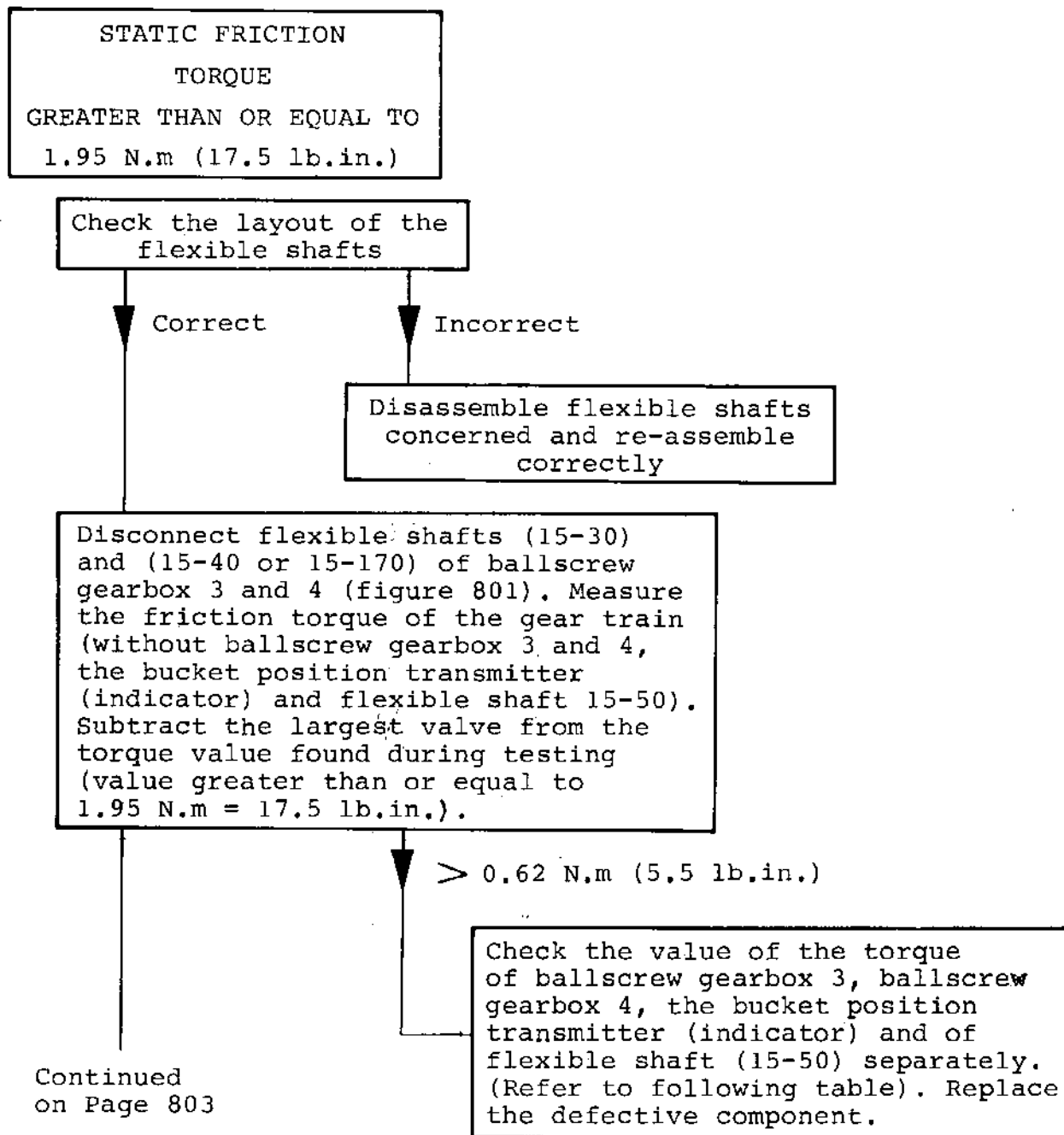


TROUBLE SHOOTING

1. General

The breakdown analysis has been established with the aim of searching out elements responsible for operating malfunctions during assembled twin secondary nozzle testing.

2. Analysis



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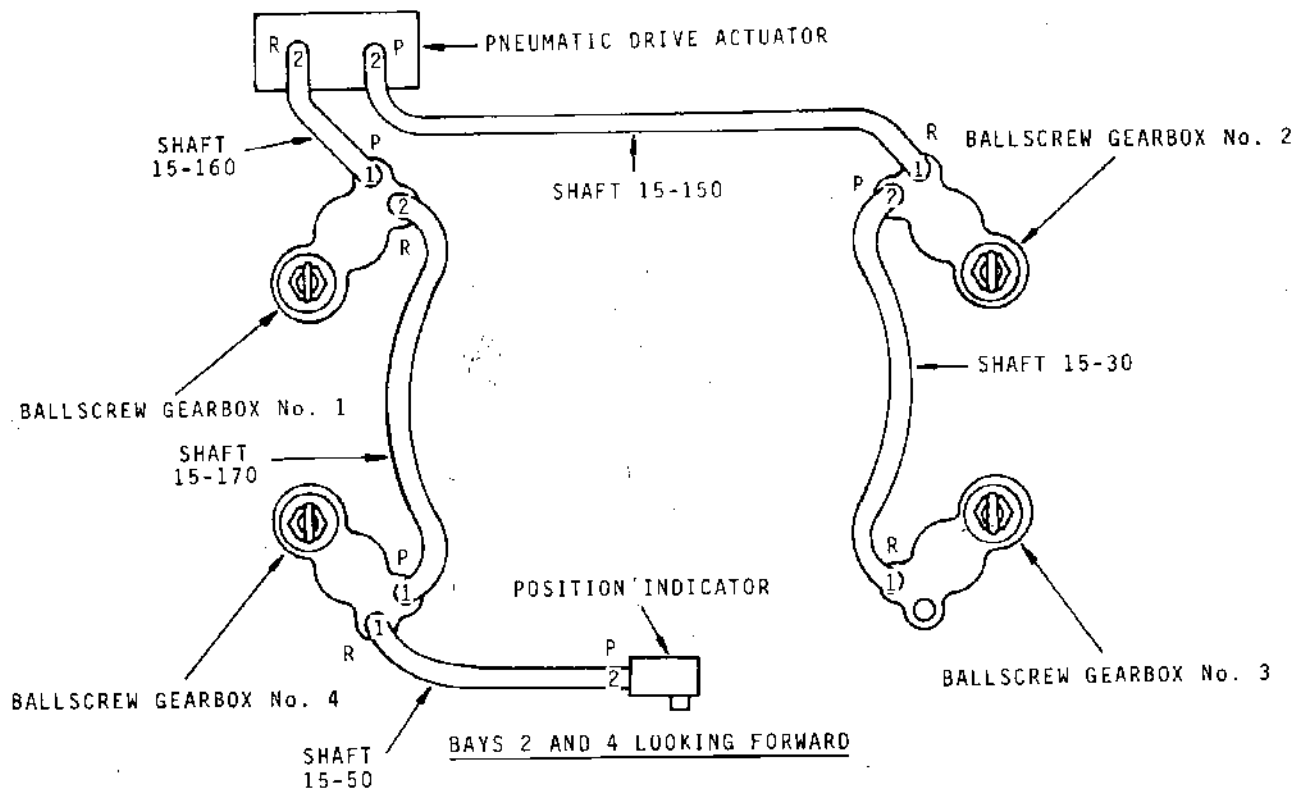
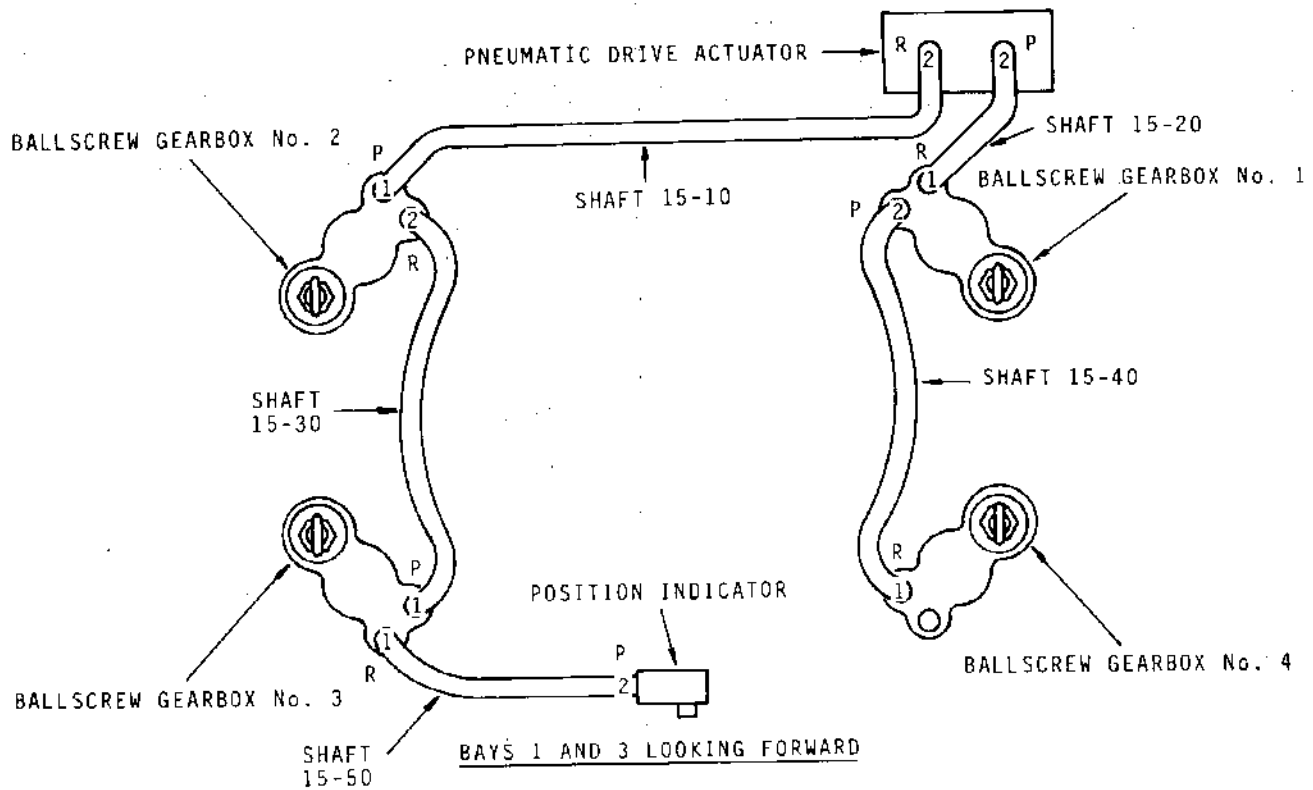


Figure 801

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OVERHAUL



Continued
from page 801

≤ 0.62 N.m (5.5 lb.in.)

Disconnect flexible shafts (15-30) and (15-40 or 15-170) of ballscrew gearbox 1 and 2. Measure the friction torque of the geartrain (without ballscrew gearbox 3 and 4, the bucket position transmitter (indicator), flexible shafts 15-50, 15-30, 15-40 or 15-170). Subtract the largest value from the torque value found during testing.

≤ 1.13 N.m (10 lb.in.)

> 1.13 N.m (10 lb.in.)

Separately check the torque value of flexible shafts 15-30, 15-40, or 15-170 (refer to following table). Replace the defective component.

Separately check the torque value of ballscrew gearbox 1 and 2 flexible shafts 15-10 or 15-150, 15-20 or 15-160 (refer to the following table).

As per value indicated
in following table

> Value indicated in
following table

Replace the defective
component

Check the hinges of
ballscrew gearbox/buckets
and bucket/structure for
gripping

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MAXIMUM ADMISSIBLE TORQUE

COMPONENT	MAXIMUM TORQUE	
	N.m	lb.in
Bucket pneumatic drive actuator	0.11	1.00
Ballscrew gearbox 1 to 4	0.17	1.50
Bucket position transmitter (indicator)	0.17	1.50
Flexible shaft 15-50	0.08	0.75
Flexible shafts 15-30, 15-40, 15-170	0.23	2.00
Flexible shafts 15-20, 15-160	0.11	1.00
Flexible shafts 15-10, 15-150	0.23	2.00

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STORAGE



1. General

- A. The container used for storage and transportation of the twin secondary nozzle is designed as per the requirements of specification ATA 300, category II, i.e. : capable to withstand a minimum of ten (10) expeditions. This container is composed of three separate sections (refer to figure 901).
- (1) A lower section, made of rigid material (heavy duty plywood), which provides support for the attaching frame.
 - (2) A metallic attaching frame, anchored to the container lower section through shock-absorbing elements, accommodates the twin secondary nozzle secured to it at four mounting points.
 - (3) A plywood cover, reinforced from the inside by means of three removable tubular arches fitted to the lower section.
- B. The complete container weighs 765 kg (1672 lb)

Handling of the container is performed using a fork-lift truck. The forks minimum useful length should be 2500 mm (98.42 in).

If required for transport, the container has the capacity to accommodate the twin secondary nozzle complete with its reverse buckets.

2. Removing the twin secondary nozzle from its container

- A. Remove the container cover
- (1) Free the cover from the container lower section.
 - (2) Locate hoist and slings in position.
 - (3) Operate the hoist and clear the cover aside.
- B. Remove the protective arches.
- C. Remove the access doors to the twin secondary nozzle bucket pneumatic drive actuator recesses in order to secure the attachment points of the hoisting "T" beam - tool SC 195 -
- D. Free the twin secondary nozzle from the container attaching frame (refer to figure 902).

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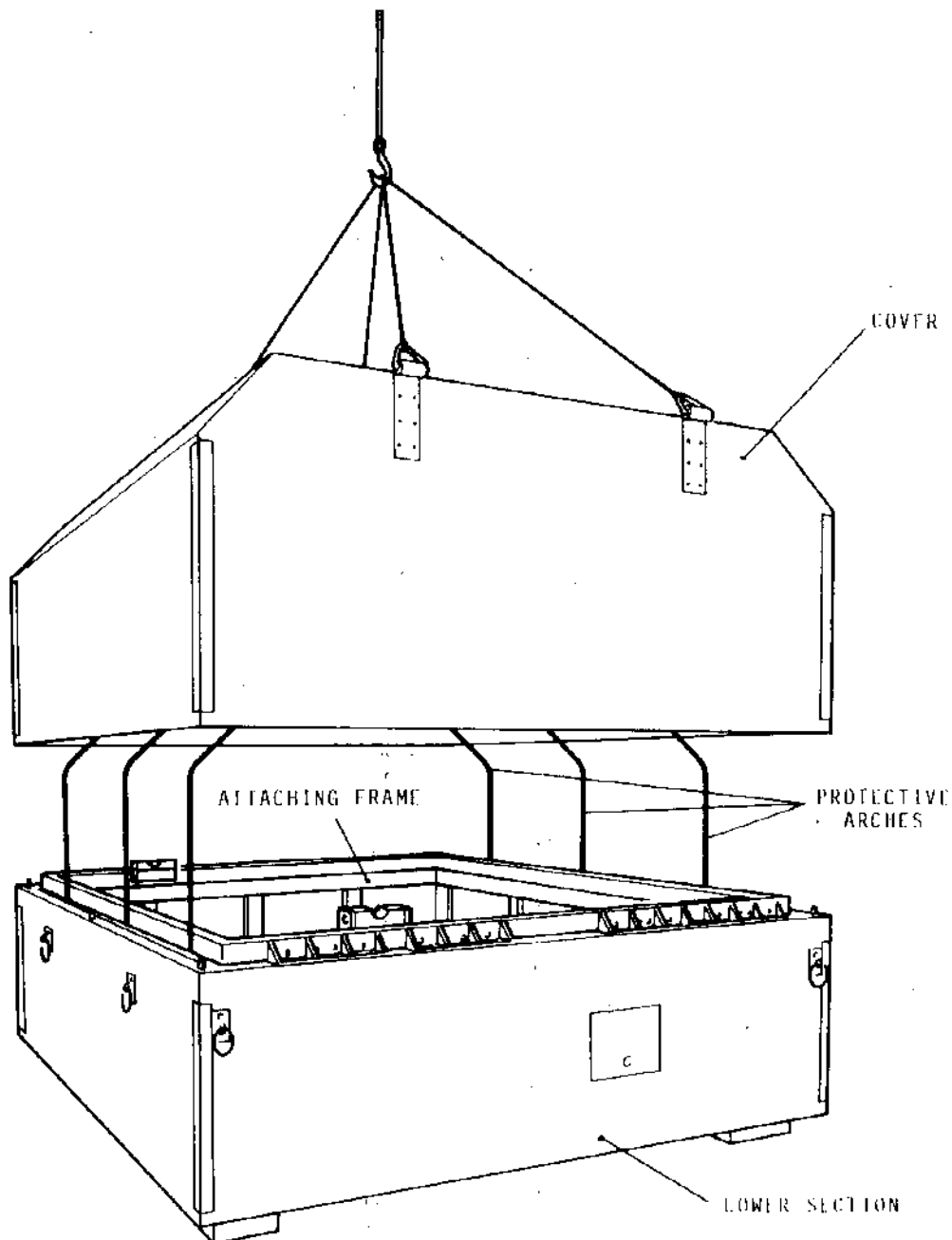
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Twin Secondary Nozzle Container
Figure 901

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- (1) Unlock and remove the nuts and washers securing the front upper half-journals.
 - (2) Remove the front upper half-journals.
 - (3) Free the base plates of the rear mounting point assemblies by removing bolts and nuts (1).
- E. Position the hoisting "T" beam - tool SC 195 - and secure the strands to the structure.

NOTE : In view of the fact there currently exists two types of hoisting beam for installation of the twin secondary nozzle on nacelle, the lateral handling attachments points are provided with two adaptors (lifting arm and attachment fitting) which are considered as details of the container nomenclature. These adaptors if applicable, will have to be removed prior to securing the lateral branches of hoisting beam - tool SC 195. Figure 902.

- F. Operate the hoist, raise and remove the secondary nozzle from the container, then lower it on the transportation trolley - tool SC 36 - Secure the nozzle to the trolley and remove the hoisting beam.

3. Installing the twin secondary nozzle into the container

A. Prepare the container

- (1) Place the container in the same room as the secondary nozzle, sufficiently in advance of the packaging operation for it to attain the same temperature as the secondary nozzle, in order to avoid any risk of condensation.
- (2) Check for good condition of the container (general cleanliness, lifting and handling rings, document boxes, closures etc...)
- (3) Free the cover from the container lower section and remove it using a hoist with slings.
- (4) Remove the protective arches from the container lower section and remove the front upper half-journals.
- (5) Clean the joint faces and check for good condition of the seal, flexible mountings and internal fittings.
- (6) Wipe the container inner walls to remove any residual moisture.

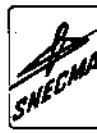
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DETAIL A



PLASTIC
WASHER

A

TOOL SC 195

REAR LATERAL MOUNTING POINT

ATTACHMENT
FITTING

ATTACHING FRAME

BASE PLATE

FRONT UPPER
HALF-JOURNAL

FRONT TRUNNION

SCREWS RETAINING
LIFTING ARM IN
STORED POSITION

LIFTING ARM IN
STORED POSITION

FRONT LATERAL MOUNTING POINT

ATTACHING FRAME

Twin Secondary Nozzle/Container Mounting Points
Figure 902

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B. Prepare the twin secondary nozzle

For the following operations, it is understood that the secondary nozzle is installed on the transportation trolley - tool SC 36 -

The personnel in charge of the following operations must wear synthetic rubber gloves and protect the eyes against cleaning and protecting products.

- (1) Apply CLENSEOL MECA (P 470) by dabbing on all metal parts to clean.
- (2) Wipe with clean dry rags to eliminate all traces of degreasing solvent and check that all contamination is has been removed.
- (3) Apply RUST VETO FILM 377 (P 469) by dabbing on "Stressskin" material only.
- (4) Protect the spherical bearings of the secondary nozzle front frame attachment links to nacelle with preservation oil AIR 1504 (P 223). Secure the spherical bearings with a brass wire.
- (5) Check that the blanking plugs of the cables at the level of the front boundary plane are well in place and are locked.
- (6) Blank the exhaust grids of the bucket pneumatic drive actuator using red adhesive tape.

C. Place the twin secondary nozzle into the container

- (1) Wrap the primary nozzle two lateral mounting pin assemblies in crepe paper and place them in the container accessory box.
- (2) Locate the hoisting beam - tool SC 195 - in position.
- (3) Free the secondary nozzle from the transportation trolley - tool SC 36 -
- (4) Operate the hoist to raise the secondary nozzle above the trolley and lower it into the container. Check that the front trunnions are properly seated in the half-journals.
- (5) Remove the hoisting beam and the upper handling attachment point - tool SC 194 -



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- (6) Position the hoisting sling (or attachment) on the rear mounting points. Before securing the hoisting sling to the structure, check that the washers are well in place (detail A figure 902).

NOTE : If one or more washers are missing take care to replace them so that during storage the hoisting sling does not damage the structure.

- (7) Position the front upper half-journals and secure them using the nuts. Tighten and lockwire nuts in pairs.
- (8) Secure the rear mounting point base plates to the container attaching frame using bolts and nuts.
- (9) Install the protective arches and secure them in the centering holes located at the upper edge of the container lower section.
- (10) Inside the container, secure to the attaching frame, the shock indicators ("hit or miss" release system) model "OMNING", calibrated to 4, 6 and 8 g, along each of the container three axes, in order to check transport and handling conditions.
If one of these shock indicators is found mechanically released and even if the equipment is apparently intact, check for absence of shock marks.
- (11) Using a hoist fitted with slings, position the container cover.
- (12) Lockwire the container and seal its closure.
- (13) In the document box located outside the container, place all the technical documents concerning the stored twin secondary nozzle (log book, shipping notes, etc ...).
- (14) Close and seal the document box

NOTE : The customs documents will be inserted in the box provided for this purpose and accessible from the outside of the container ; this box is not sealed.

- (15) In the black rectangle painted on the container, stencil mark :
- the serial number of the stored twin secondary nozzle.
 - the date of packaging
 - the duration of storage

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4. Storage duration

A. In container

Short duration (less than 3 months)

- (1) No other packaging or protection other than those carried out during preparation of the equipment are required.
- (2) Keep the container away from sunlight and adverse weather conditions.

B. Out of container

- (1) Install the twin secondary nozzle on the transportation trolley - tool SC 36 -
- (2) Pad the nozzle sharp edges using polyurethane foam tied up with adhesive tape in order to prevent tearing of the protective bag.
- (3) Cover the equipment using an anti-dust protective bag (non air-tight) made of polythene material.
- (4) Check the equipment on a 3 months period basis if ambient humidity is less than 60% ; above this humidity rate a check is necessary every month.
- (5) At the first occurrence of pitting (oxidation), clean and re-apply a protective coating as indicated in paragraph 3.B.

5. Return of the empty containers

Before returning the empty containers, the nozzle/container support fittings must be recovered, that is :

- the trunnions for the front lateral mounting points
- the totality of the rear lateral mounting points.

If these support fittings are not available due to the secondary nozzle being secured to the transportation trolley - tool SC 36 - care will be taken to place in the container the trolley support fittings similar to those of the container.

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SPECIAL TOOLS, FIXTURES AND EQUIPMENT (LIST)

TOOL N°	PART NUMBER	DESCRIPTION	UTILIZATION							PAGE
			DISASSEMBLY	CLEANING	CHECK	REPAIR	ASSEMBLY	TESTING	STORAGE	
SC 36	9970-541-049	TRANSPORT TROLLEY	X	X			X		X	1001
SC 37	9970-521-069	STORAGE AND WORKSTAND	X				X		X	1002
SC 39	9970-525-530	TEMPORARY CONNECTING PIN					X			1003
SC 44	9970-521-064	- DELETED -					X			1004
SC 117	852-500-124-0	ROTATING STAND	X				X	X		1005
SC 186	852-500-045-0	- REPLACED BY - TOOL SC 249					X			1006
SC 187	852-500-046-0	TOOL FOR RETAINING THE FLEXIBLE CORE IN ITS CASING	X				X			1007
SC 188	852-500-044-0	PULLER TOOL FOR FLEXI- BLE SHAFTS INSTALLATION					X			1008
SC 194	852-500-134-0	UPPER HANDLING ATTACH- MENT FITTING (DETAIL OF TOOL SC 195)								
SC 195	852-500-135-0	HOISTING "T" BEAM	X				X		X	1009
SC 196	852-500-136-0	TEMPLATE FOR DIVERGENT LATERAL PANELS	X	X			X			1010
SC 197	852-500-137-0	TEMPLATE FOR 45° DIVER- GENT PANELS	X	X			X			1011
SC 198	852-500-138-0	TEMPLATE FOR DIVERGENT VERTICAL PANELS	X	X			X			1012
SC 199	852-500-139-0	TEMPLATE FOR DIVERGENT REAR LATERAL PANELS	X	X			X			1013
SC 200	852-500-140-0	TEMPLATE FOR BUCKETS DEFLECTORS	X	X			X			1014
SC 201	852-500-141-0	ADJUSTING TELESCOPIC TUBE					X			1015
SC 202	852-500-142-0	- DELETED -					X			1016
SC 203	852-500-143-0	ADAPTOR FOR SCREWING PNEUMATIC TOOL	X				X	X		1017
SC 204	852-750-005-0	TEST BENCH						X		1018
SC 205	852-500-145-0	HOISTING BEAM	X				X			1019
SC 209	852-500-148-0	BUCKET TRUNNION EXTRAC- TOR	X							1020

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SPECIAL TOOLS, FIXTURES AND EQUIPMENT (LIST)

TOOL N°	PART NUMBER	DESCRIPTION	UTILIZATION						PAGE
			DISASSEMBLY	CLEANING	CHECK	REPAIR	ASSEMBLY	TESTING	
SC 219	852-630-141	DRILLING JIG FOR INSPEC- TION DOOR				X			1021
SC 220	852-630-142	DRILLING JIG FOR INSPEC- TION DOOR				X			1022
SC 221	852-630-143	DRILLING JIG FOR INSPEC- TION DOOR				X			1023
SC 222	852-630-144	DRILLING JIG FOR INSPEC- TION DOOR				X			1024
SC 223	852-630-145	DRILLING JIG FOR INSPEC- TION DOOR				X			1025
SC 224	852-630-146	DRILLING JIG FOR INSPEC- TION DOOR				X			1026
SC 225	852-630-147	DRILLING JIG FOR INSPEC- TION DOOR				X			1027
SC 226	852-630-148	DRILLING JIG FOR INSPEC- TION DOOR				X			1028
SC 227	852-630-149	DRILLING JIG FOR INSPEC- TION DOOR				X			1029
SC 228	852-630-150	DRILLING JIG FOR INSPEC- TION DOOR				X			1030
SC 229	852-630-151	DRILLING JIG FOR INSPEC- TION DOOR				X			1031
SC 230	852-630-152	DRILLING JIG FOR INSPEC- TION DOOR				X			1032
SC 231	852-630-153	DRILLING JIG FOR INSPEC- TION DOOR				X			1033
SC 232	852-630-154	DRILLING JIG FOR INSPEC- TION DOOR				X			1034
SC 233	852-630-155	DRILLING JIG FOR INSPEC- TION DOOR				X			1035
SC 234	852-630-167-0	CRIMPING FIXTURE				X			1036
SC 240	852-630-156	DRILLING JIG				X			1037
SC 241	852-630-157	DRILLING JIG				X			1038
SC 242	852-630-158	DRILLING JIG				X			1039
SC 243	852-630-159	DRILLING JIG				X			1040
SC 249	852-500-149-0	FLEX. SHAFT CORE HEX. DRIVE END POSITIONING WRENCH						X	1041

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SPECIAL TOOLS, FIXTURES AND EQUIPMENT (LIST)

TOOL N°	PART NUMBER	DESCRIPTION	UTILIZATION							PAGE
			DISASSEMBLY	CLEANING	CHECK	REPAIR	ASSEMBLY	TESTING	STORAGE	
SC 253	852-630-138-0	INSERT CRIMPING FIXTURE				X				1042
SC 254	852-630-083-0	BUCKET SPECIAL WRENCH	X				X			1043
SC 262	9970-543-063	SUPPLY CONNECTION						X		1044
SC 263	9970-511-043	SPECIAL WRENCH FOR ROD END BEARING	X				X			1045
SC 265	852-500-156-0	WRENCH FOR BALLSCREW GEARBOX FITTING SUPPORT	X				X			1046
SC 266	852-500-157-0	TEMPLATE FOR HEAT- SHIELDS.	X				X			1047
SC 267	852-500-158-0	SPECIAL ADAPTOR FLANGE FOR FLEXIBLE SHAFT STRETCHING						X		1048
SC 268	9970-511-044-0	BUCKET BALLSCREW GEARBOXES FIXTURE					X			1049
SC 295	852-500-170-0	INSERT SECURING TOOL				X				1050
SC 318	852-630-182-0	TEST APPARATUS FOR BUCKET DEFLECTORS				X				1051

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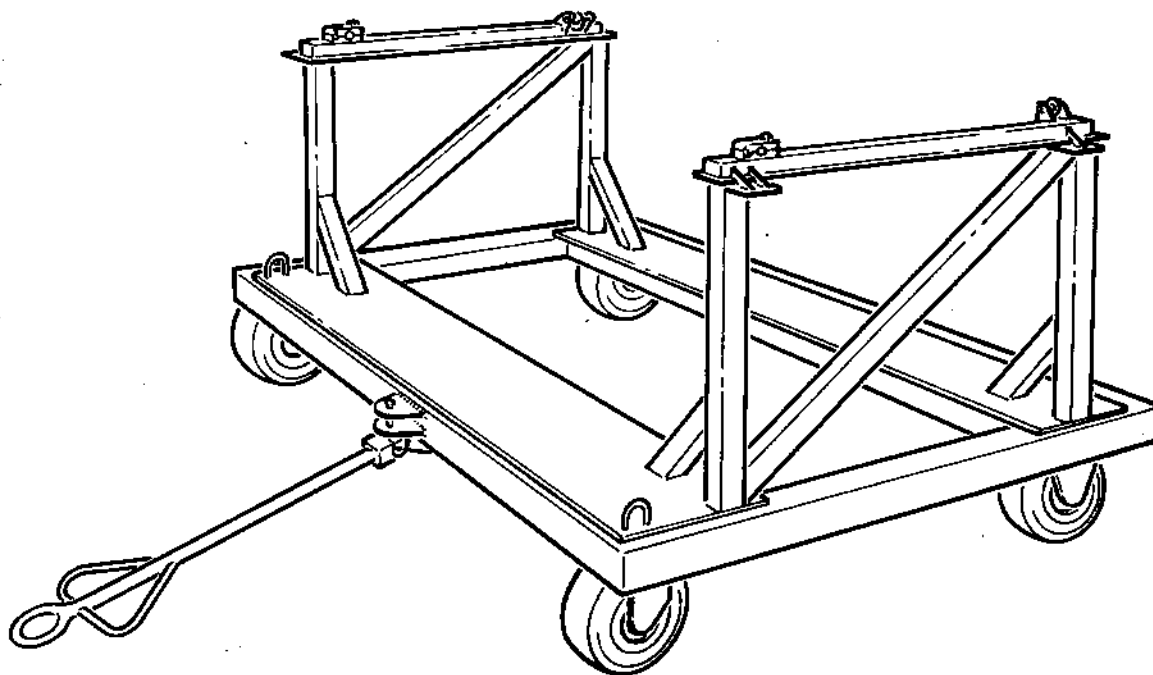
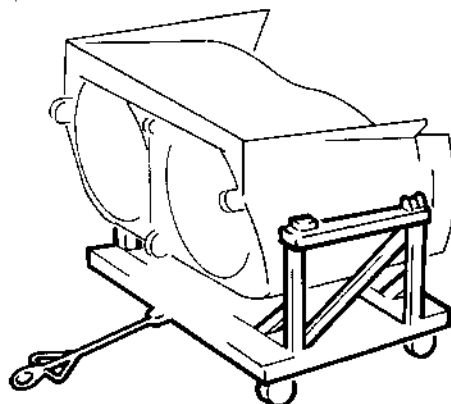
TRANSPORT TROLLEY - TWIN SECONDARY NOZZLE

SNECMA No. 9970-541-049

Description..... This dolly is used for the fitting out and transport of the twin secondary nozzle.

Weight..... 1250 Kg (2750 lb)

Dimensions..... 3100 x 2500 x 1700 mm (122 x 98 x 67 in.)



Tool
SC 36

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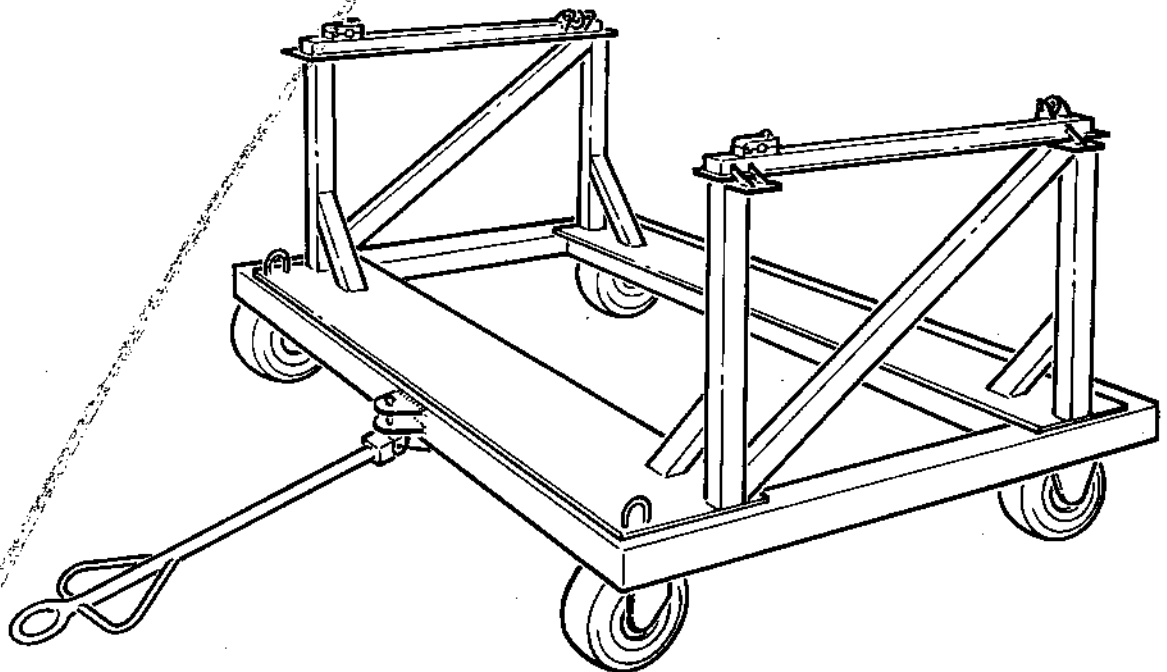
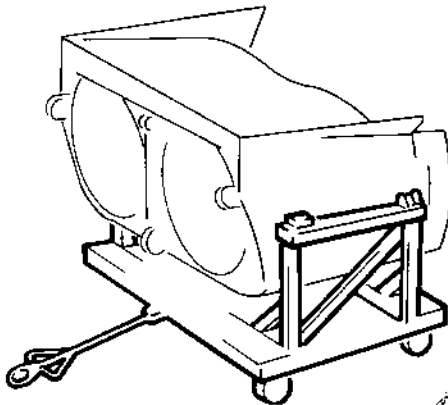
TRANSPORT TROLLEY - TWIN SECONDARY NOZZLE

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Tool
SC 36

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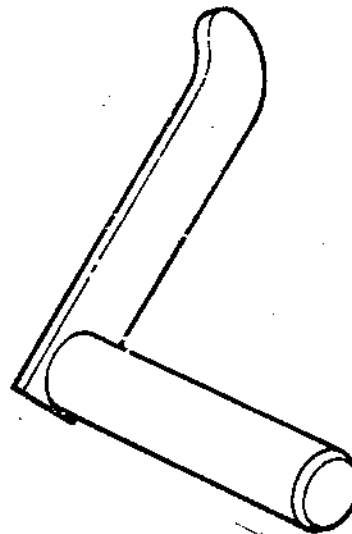
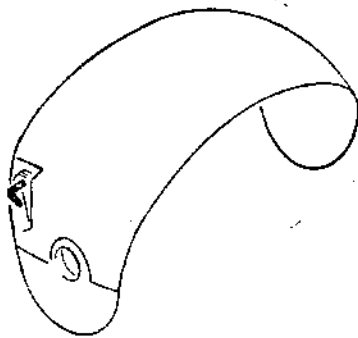
TEMPORARY CONNECTING PIN - BUCKET

SNECMA No. 9970-525-530

Description..... This pin replaces the bucket/ballscrew gearbox connecting pin located on the sidewall, when removing the ballscrew gearbox or the bucket.

Weight..... 0,050 Kg (0.1 lb)

Dimensions..... 40 x 50 x 15 mm (1.6 x 1.6 x 0.6 in.)



Tool
SC 39

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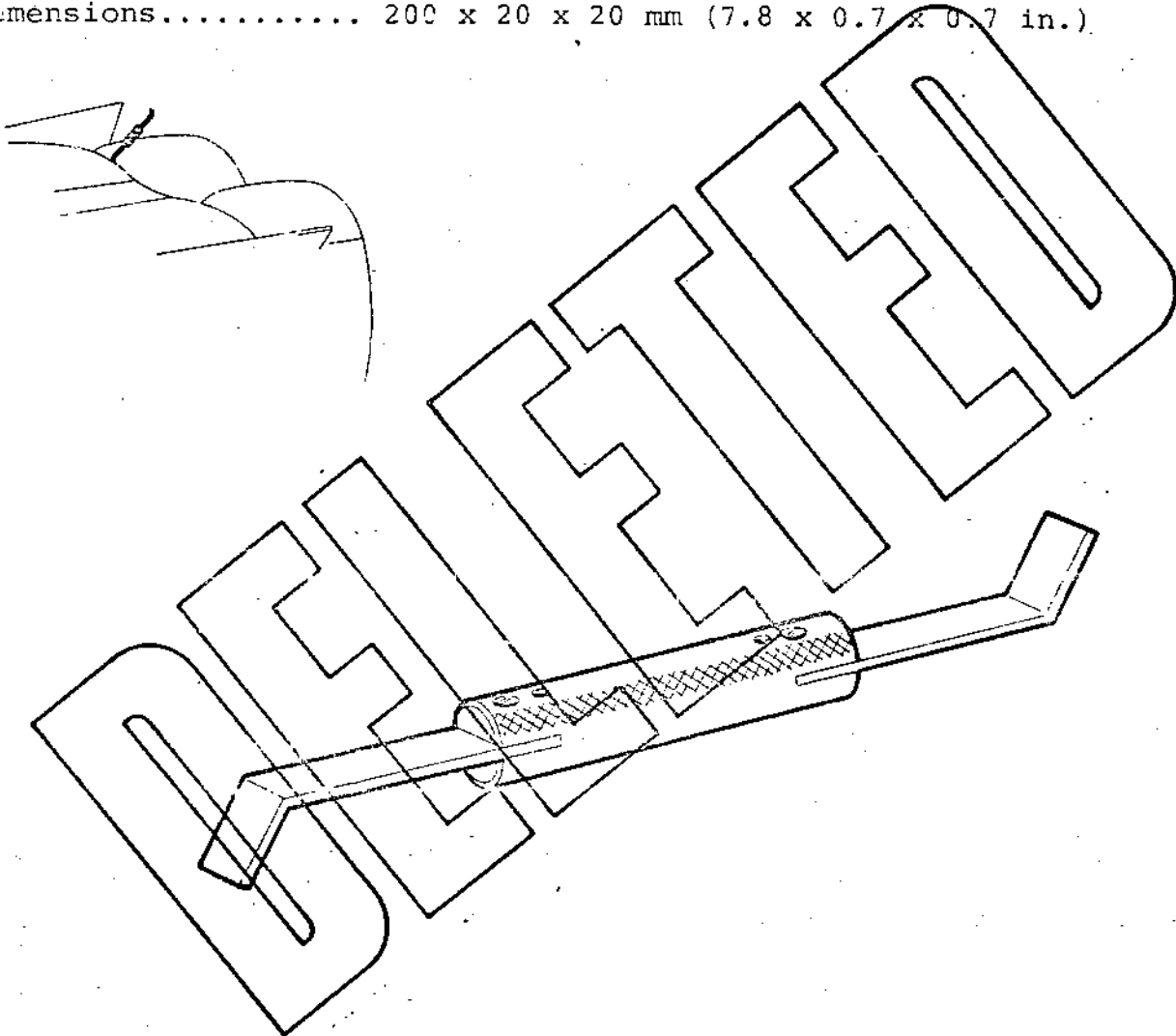
SHIM - BUCKET

SNECMA No. 9970-521-064

Description..... Used to adjust or check the clearance between
the buckets and the secondary nozzle.

Weight..... 0,5 Kg (1.1 lb)

Dimensions..... 200 x 20 x 20 mm (7.8 x 0.7 x 0.7 in.)



Tool
SC 44

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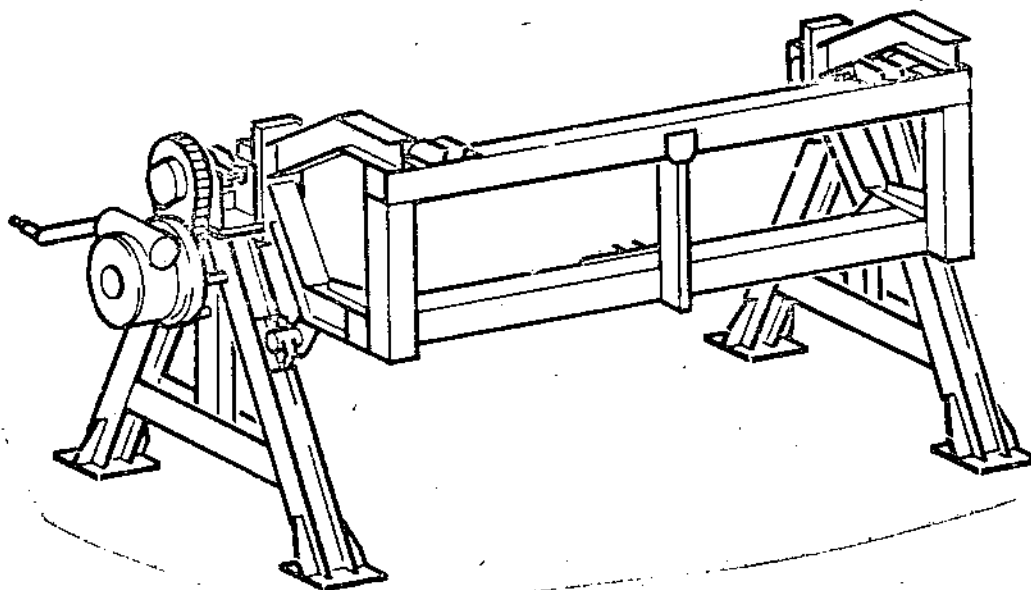
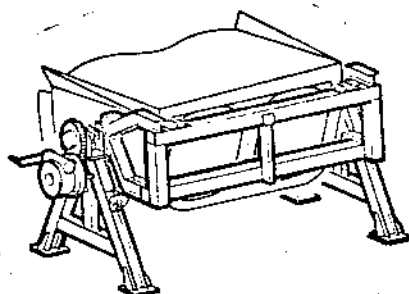
ROTATING STAND - TWIN SECONDARY NOZZLE

SNECMA No. 852-500-124-0

Description..... This stand is used for the disassembly and assembly of the twin secondary nozzle.

Weight..... 550 Kg (1210 lb)

Dimensions..... 4630 x 2135 x 1800 mm (180 x 84 x 70 in.)



Tool
SC 117

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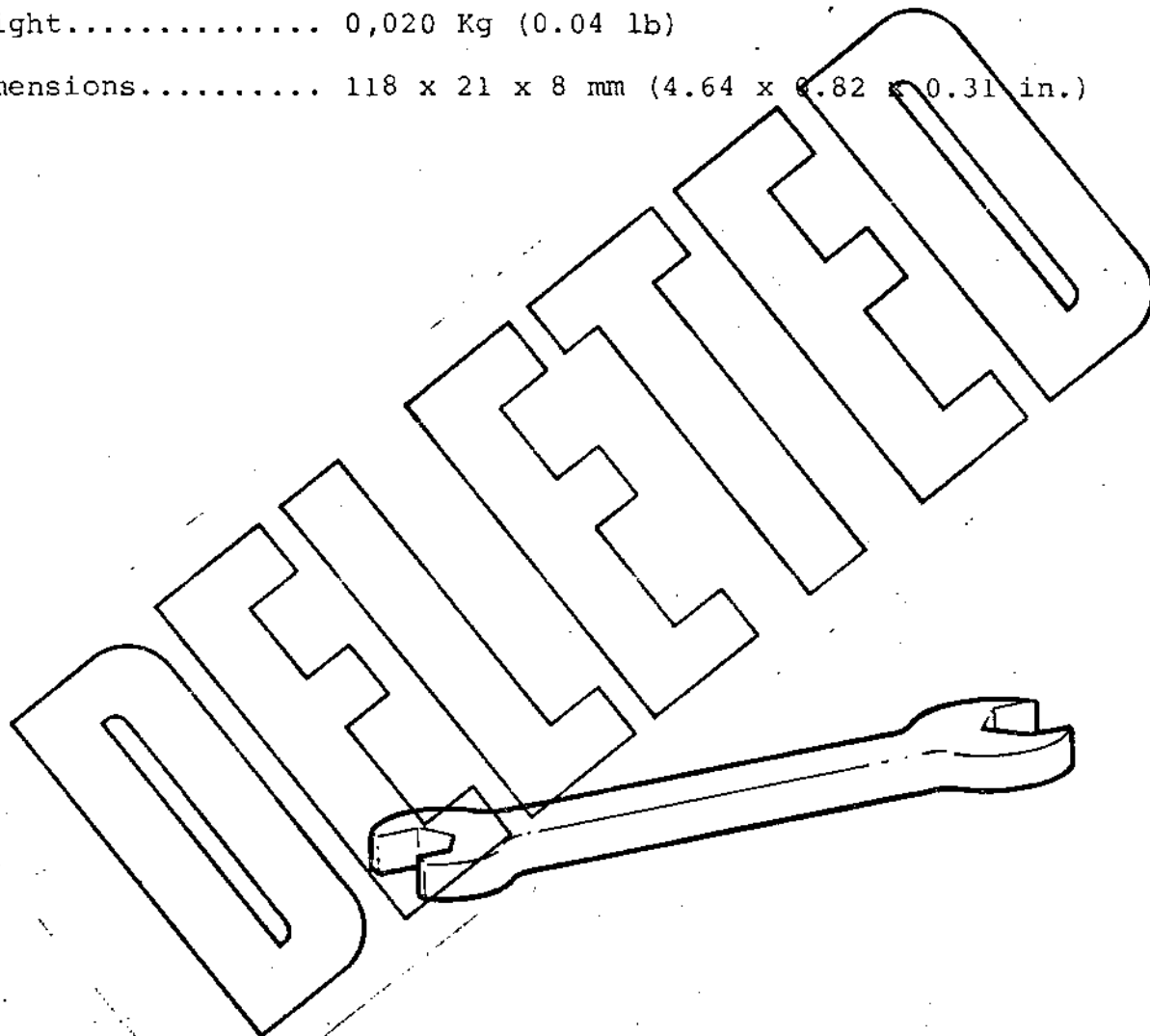
FLEXIBLE SHAFT CORE HEX. DRIVE END POSITIONING WRENCH

SNECMA No. 852-500-045-0

Description..... This wrench, made of light alloy, is used for positioning (coupling) the flexible shafts core hex. drive ends during installation of the flexible shafts.

Weight..... 0,020 Kg (0.04 lb)

Dimensions..... 118 x 21 x 8 mm (4.64 x 0.82 x 0.31 in.)



Tool
SC186

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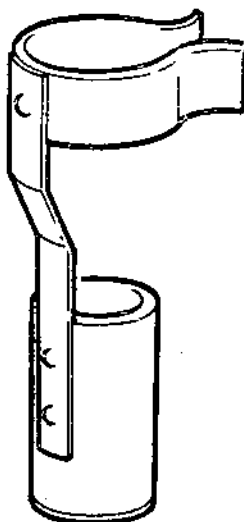
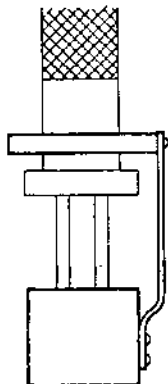
TOOL FOR RETAINING THE FLEXIBLE CORE IN ITS CASING

SNECMA No. 852-500-046-0

Description..... This tool allows to clamp the flexible shaft core in position in its casing during the installation and/or removal steps. Owing to the fact that each flexible shaft has two different ends, there are two types of retaining tool. Tool SC 187 comprises a set of ten (10) retaining (clamping) tools of each type.

Weight..... 0,020 Kg (0.04 lb) for each retaining (clamping) tool

Dimensions..... 60 x 35 x 22,5 mm (2.36 x 1.37 x 0.87 in.)



Tool
SC 187

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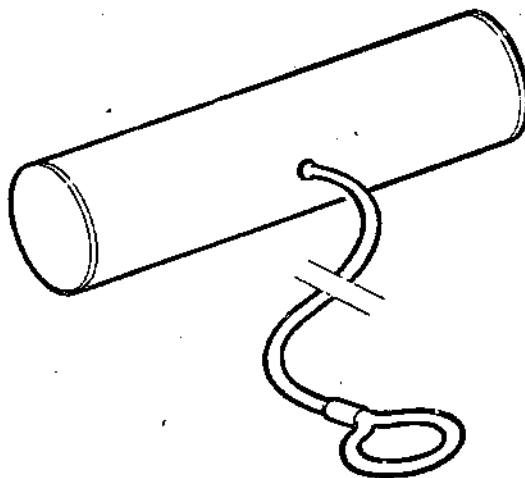
PULLER TOOL FOR FLEXIBLE SHAFTS INSTALLATION

SNECMA No. 852-500-044-0

Description..... This tool is used when installing the flexible shafts in the twin secondary nozzle flexible shaft guide-tubes.

Weight..... 0,050 Kg (0.11 lb)

Dimensions..... 2000 x 100 mm (78.74 x 3.94 in.)



Tool
SC 188

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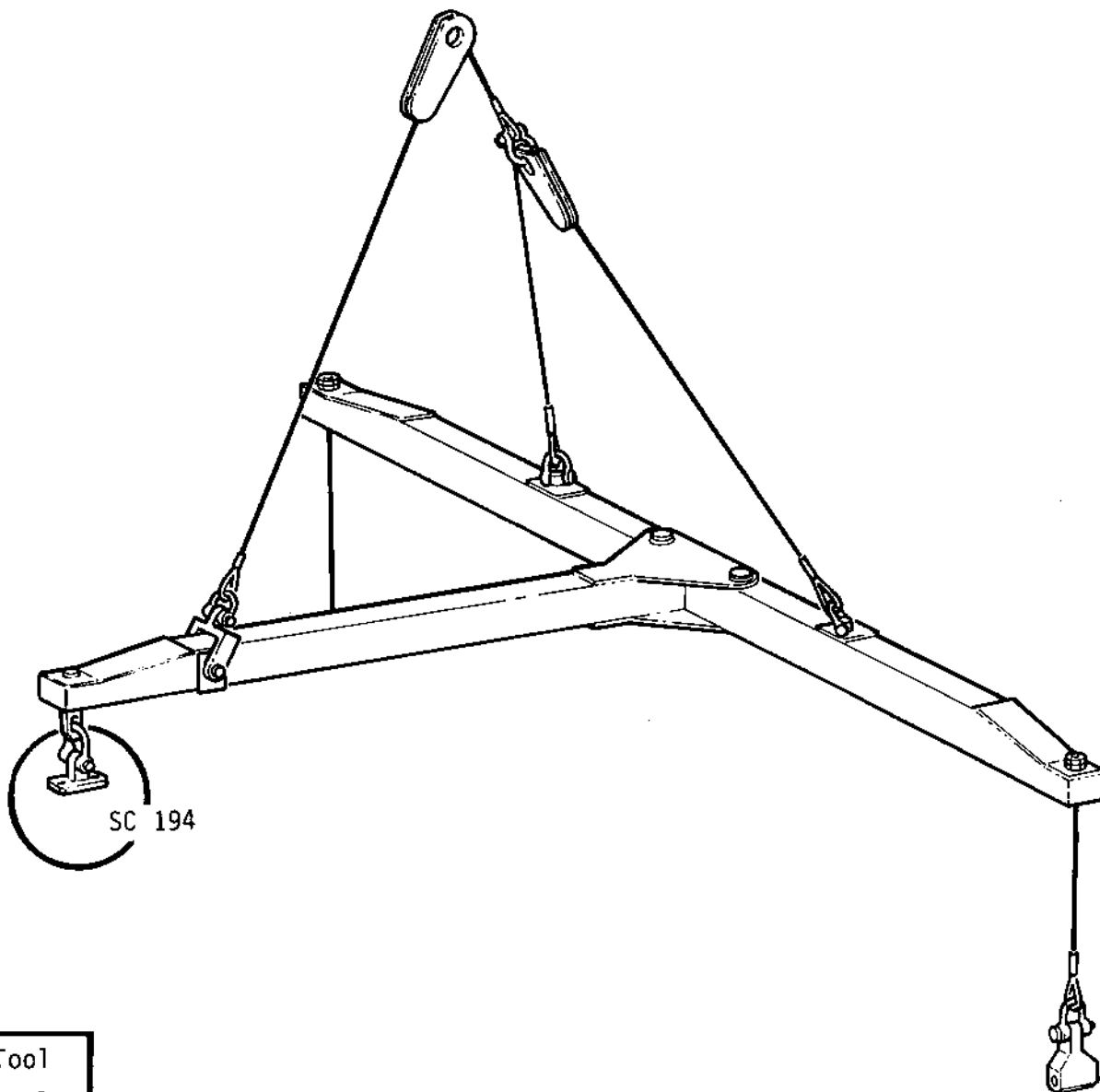
HOISTING "T" BEAM

SNECMA No. 852-500-135-0

Description..... This hoisting "T" beam consists of three slings and is used for handling of the twin secondary nozzle in the overhaul shop.

Weight..... 95 Kg (209 lb)

Dimensions..... 3070 x 1720 x 2770 mm (120.8 x 67.7 x 109 in.)



Tool
SC 195

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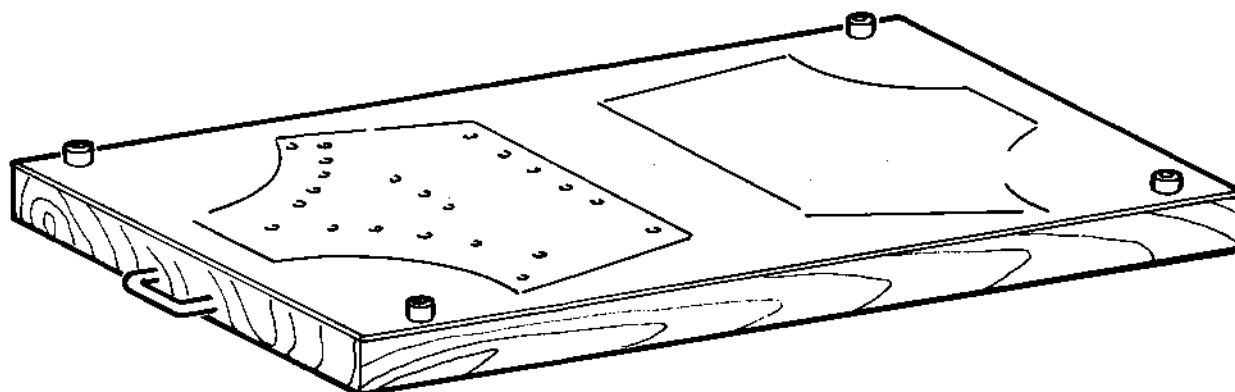
TEMPLATE FOR DIVERGENT LATERAL PANELS

SNECMA No. 852-500-136-0

Description..... This template, used for removal/installation of the panels, permits to identify the attachment elements of the divergent lateral panels. Tool SC 196 consists of two identical templates.

Weight..... 5,5 Kg (12 lb) per template

Dimensions..... 890 x 500 x 45 mm (35 x 19.7 x 1.8 in.)



Tool
SC 196

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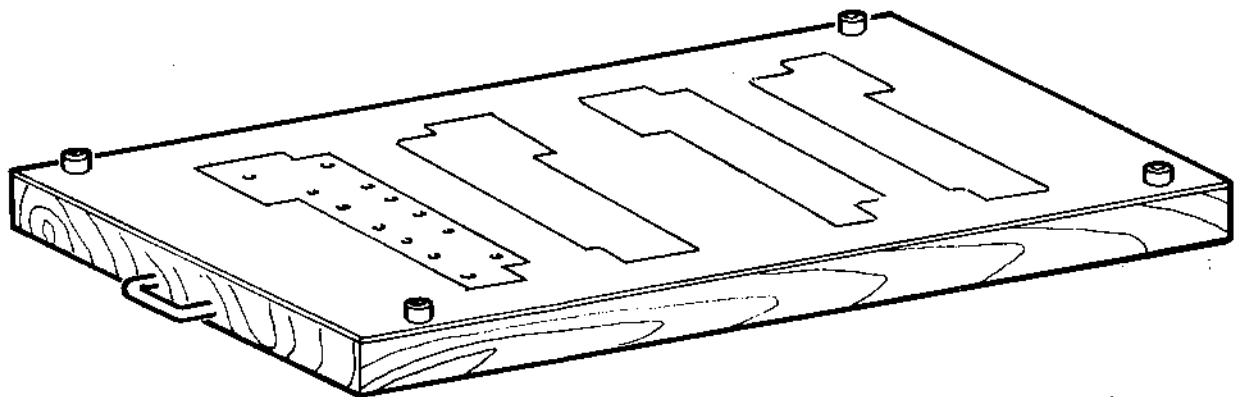
TEMPLATES FOR 45° DIVERGENT PANELS

SNECMA No. 852-500-137-0

Description..... This template, used for removal/installation of the panels, permits to identify the attachment elements of the 45° divergent panels.

Weight..... 5,5 Kg (12 lb) per template

Dimensions..... 890 x 500 x 45 mm (35 x 19.7 x 1.8 in.)



Tool
SC197

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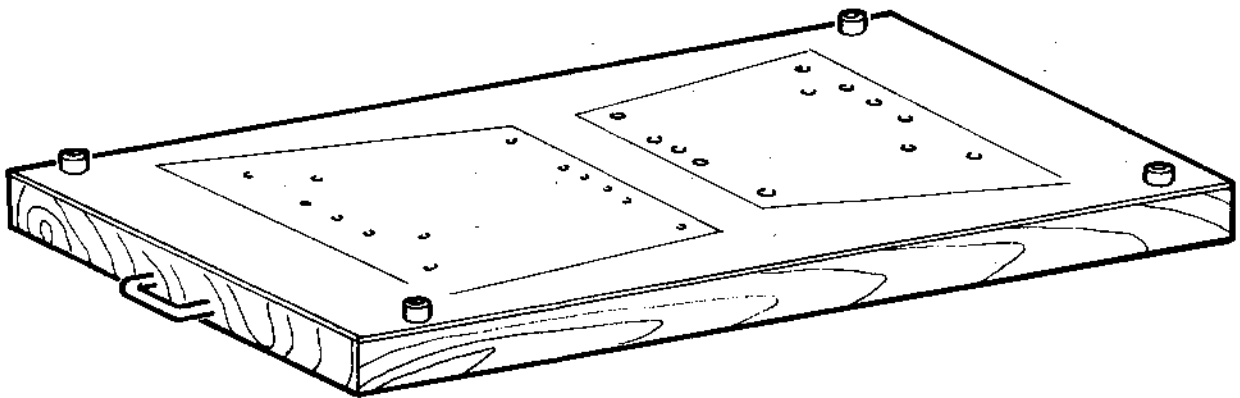
TEMPLATES FOR DIVERGENT VERTICAL PANELS

SNECMA No. 852-500-138-0

Description..... This template, used for removal/installation of the panels, permits to identify the attachment elements of the divergent vertical panels.
Tool SC 198 consists of two identical templates.

Weight..... 5,5 Kg (12 lb) per template

Dimensions..... 890 x 500 x 45 mm (35 x 19.7 x 1.8 in.)



Tool
SC 198

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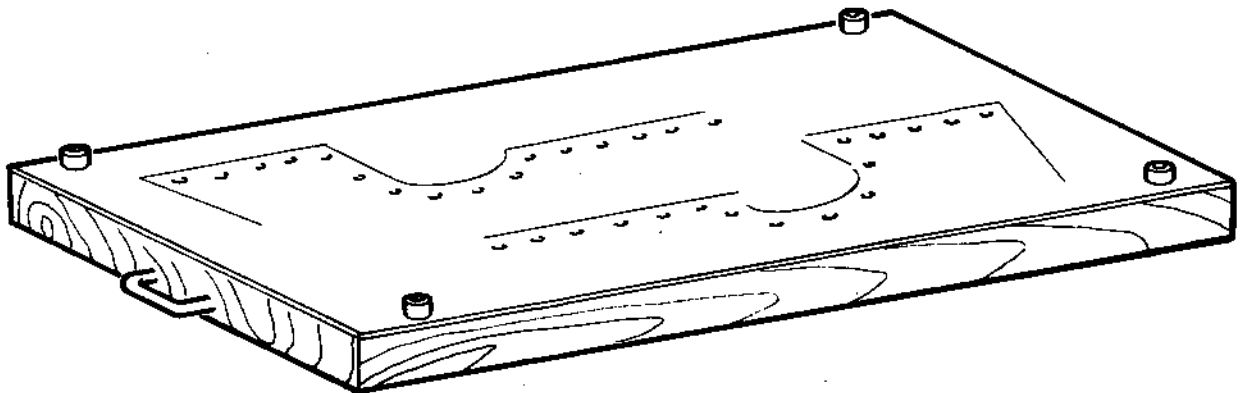
TEMPLATE FOR DIVERGENT REAR LATERAL PANELS

SNECMA No. 852-500-139-0

Description..... This template, used for removal/installation of panels, permits to identify the attachment elements of the lateral panels.
Tool SC 199 consists of two identical templates.

Weight..... 5,5 Kg (12 lb) per template

Dimensions..... 890 x 500 x 45 mm (35 x 19.7 x 1.8 in.)



Tool
SC 199

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OLYMPUS 593

MK.610-14-28
OVERHAUL



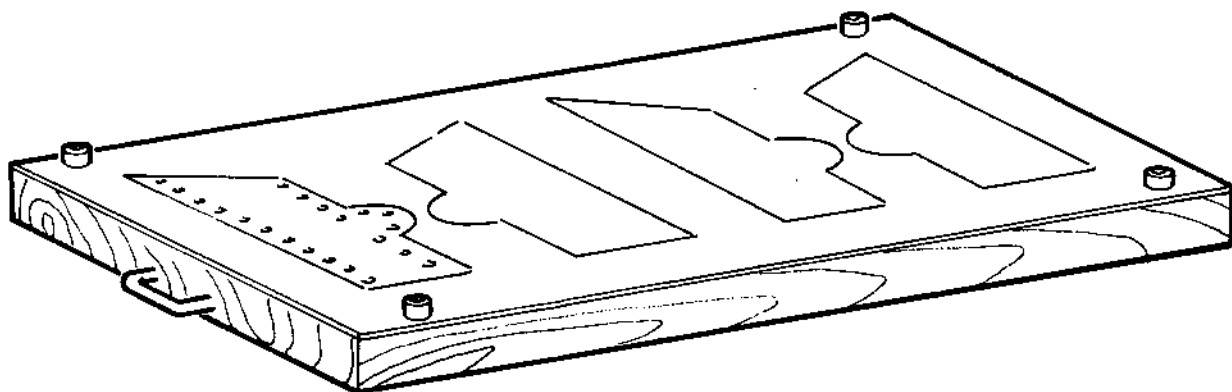
TEMPLATE FOR DEFLECTORS

SNECMA No. 852-500-140-0

Description..... This template, used for removal/installation of the deflectors, permits to identify the attachment elements of the bucket deflectors. Tool SC 200 consists of two identical templates.

Weight..... 5,5 Kg (12 lb) per template

Dimensions..... 890 x 500 x 45 mm (35 x 19.7 x 1.8 in.)



Tool
SC 200

78-13-01

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OLYMPUS 593

MK.610-14-28
OVERHAUL



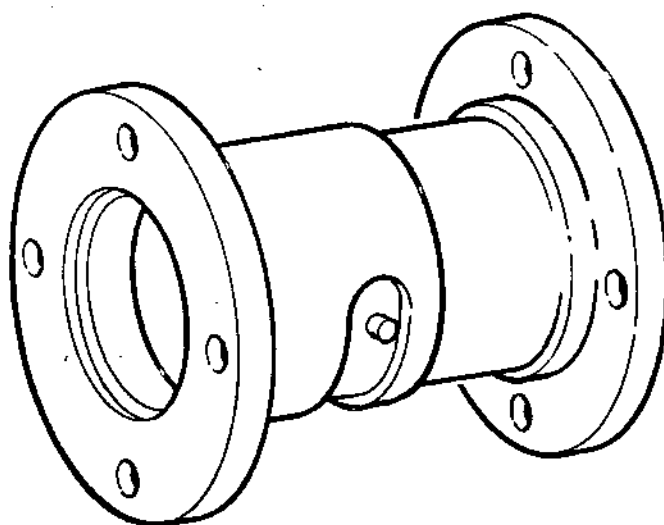
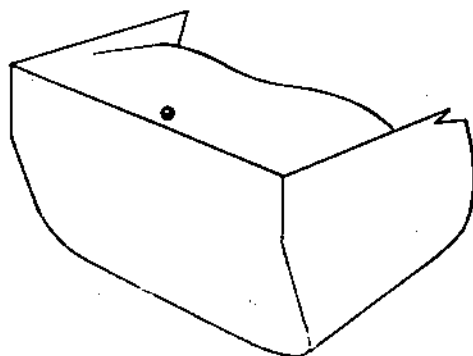
ADJUSTING TELESCOPIC TUBE

SNECMA No. 852-500-141-0

Description..... This tube is used to adjust the mechanical alignment between the P3 air inlet tube attached to the frame and the air intake tube attached to the bucket pneumatic drive actuator.

Weight..... 0,8 Kg (1.76 lb)

Dimensions..... D = 85 mm (3.4 in.), length = 110 mm (4.3 in.)



Tool
SC 201

78-13-01

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OLYMPUS 593

MK.610-14-28
OVERHAUL



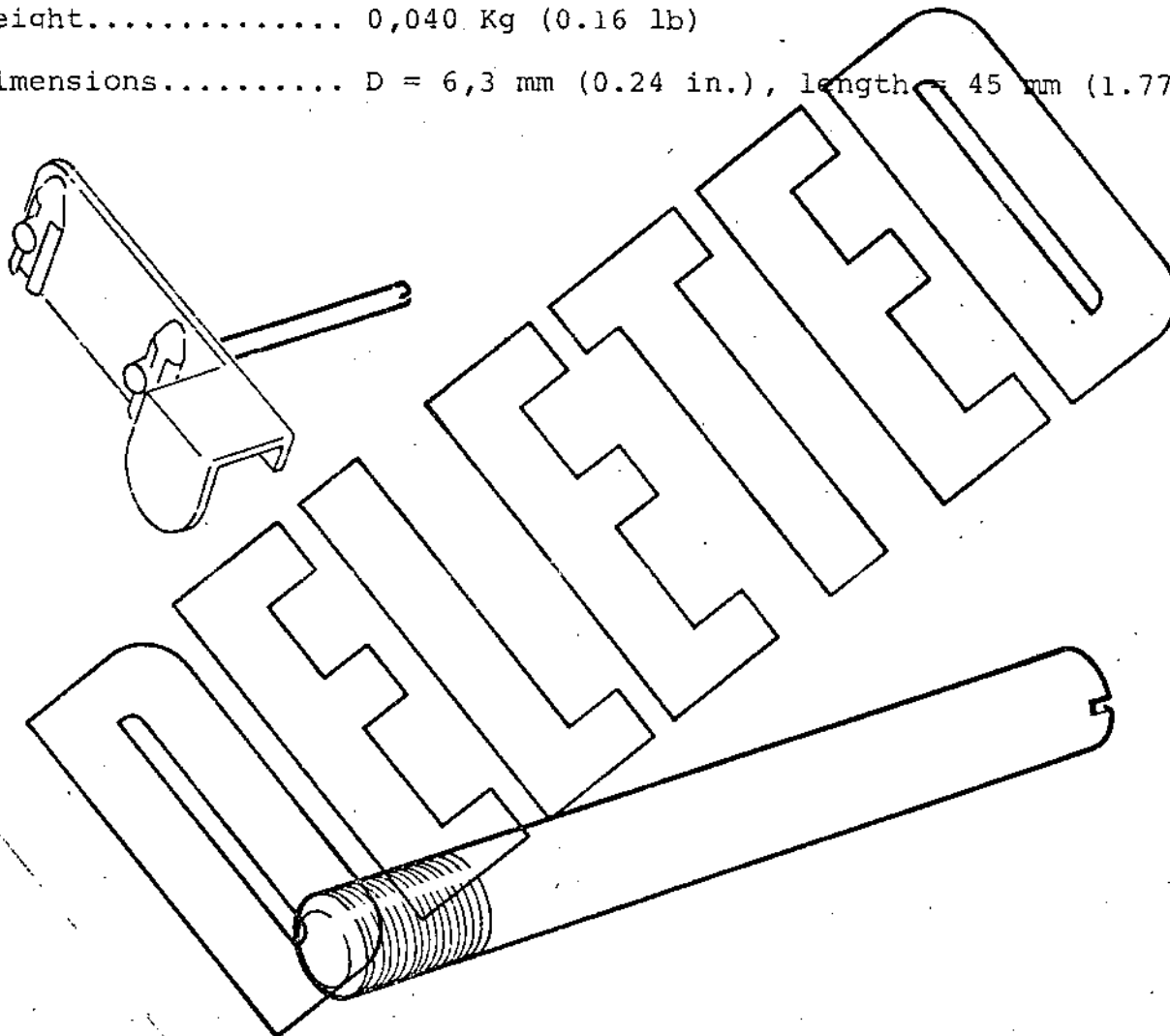
INSTALLATION PIN

SNECMA No. 852-500-142-0

Description..... This pin is used to ease the installation of the lower lateral nut plate assemblies providing for attachment of the ballscrew gearbox fitting supports.

Weight..... 0,040 Kg (0.16 lb)

Dimensions..... D = 6,3 mm (0.24 in.), length = 45 mm (1.77 in)



Tool
SC 202

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OLYMPUS 593

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OVERHAUL



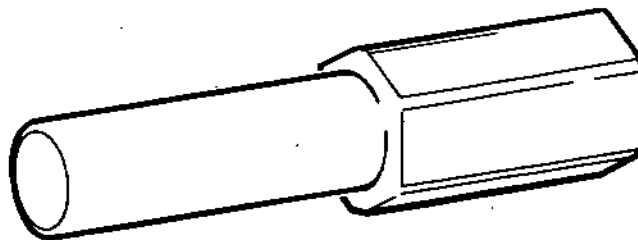
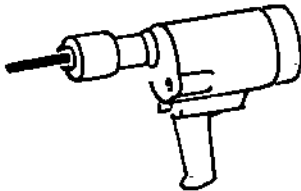
ADAPTOR FOR SCREWING POWER TOOL

SNECMA No. 852-500-143-0

Description..... The adaptor, fitted to a pneumatic screwing tool mandrel, enables to actuate the bucket ballscrew gearboxes through the socket hex. drives of the angle gear boxes.

Weight..... 0,015 Kg (0.033 lb)

Dimensions..... D = 8,4 mm (0.3 in.), length = 50 mm (2 in.)



Tool
SC 203

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OLYMPUS 593

MK.610-14-28

OVERHAUL



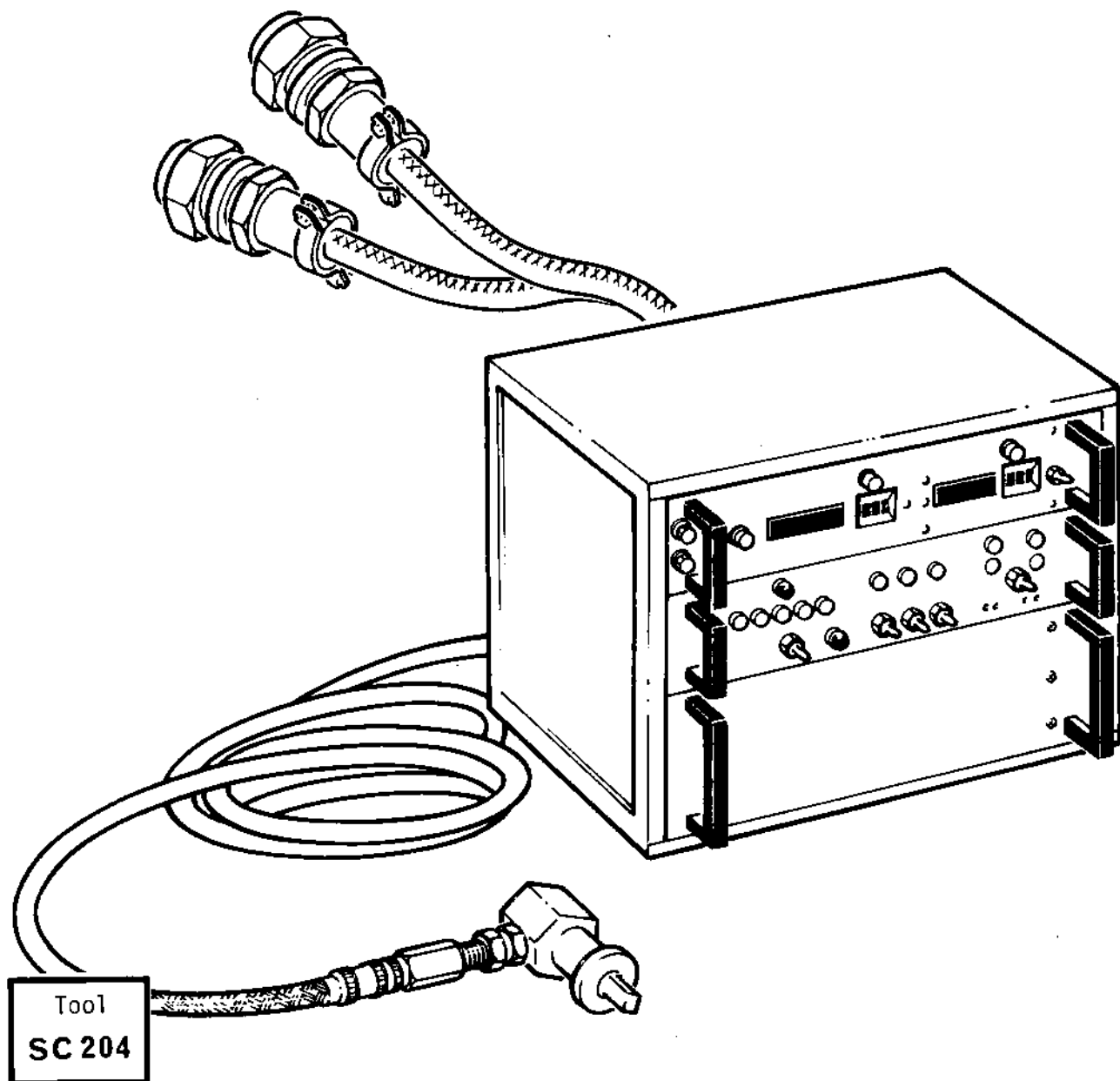
TEST BENCH - TWIN SECONDARY NOZZLE ASSEMBLY

SNECMA No. 852-750-005-0

Description..... This portable test bench is used for post-overhaul testing of the twin secondary nozzle assembly.

Weight..... 12 Kg (26.4 lb)

Dimensions..... 500 x 340 x 390 mm (19.7 x 13.38 x 15.35 in.)



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OLYMPUS 593

MK.610-14-28
OVERHAUL



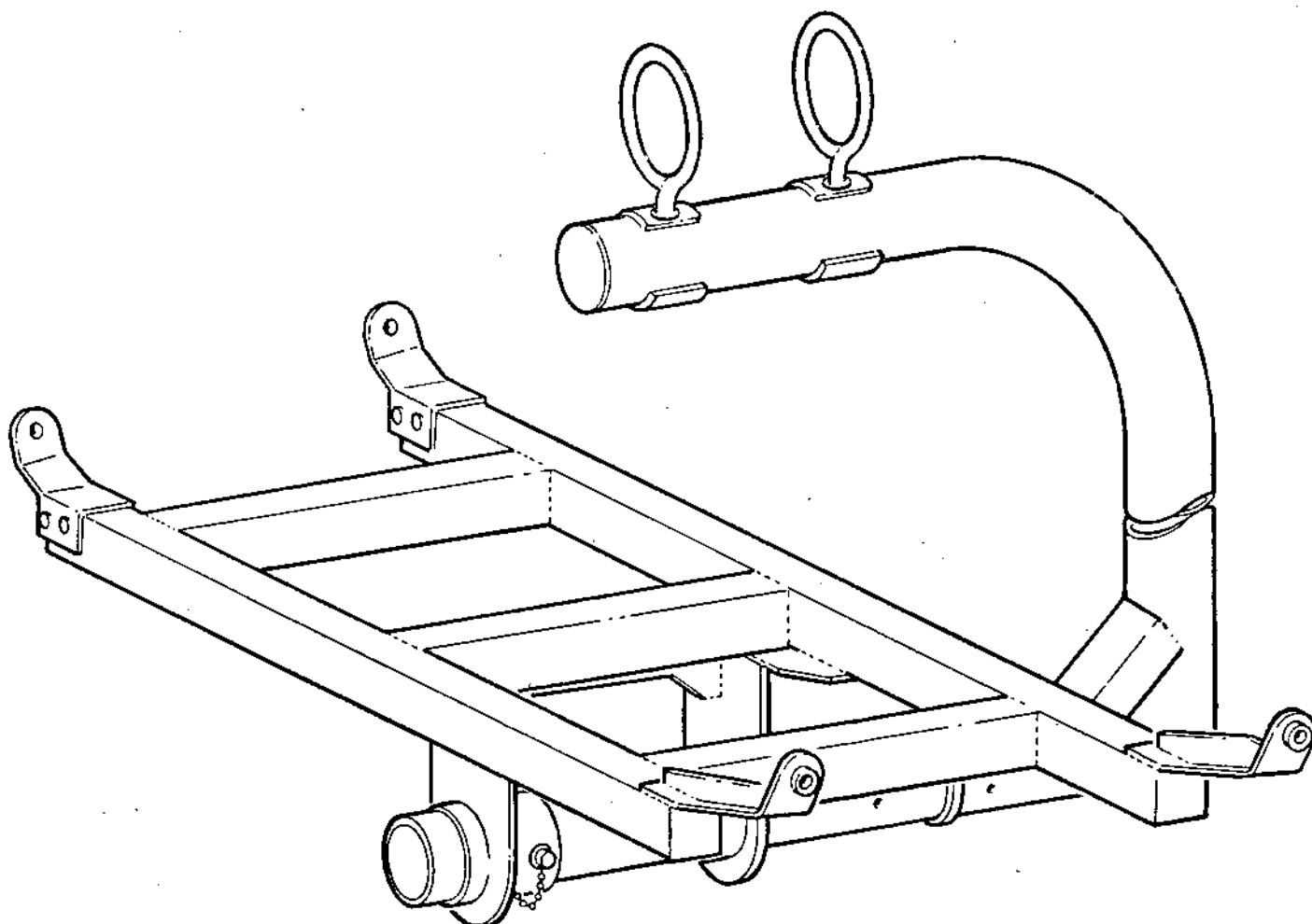
HOISTING BEAM

SNECMA No. 852-500-145-0

Description..... This beam is used for removal/installation
of the twin secondary nozzle reverse buckets.

Weight..... 30 Kg (66 lb)

Dimensions..... 1200 x 755 x 700 mm (47.24 x 29.72 x 29.53 in)



Tool
SC 205

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OLYMPUS 593

MK.610-14-28
OVERHAUL



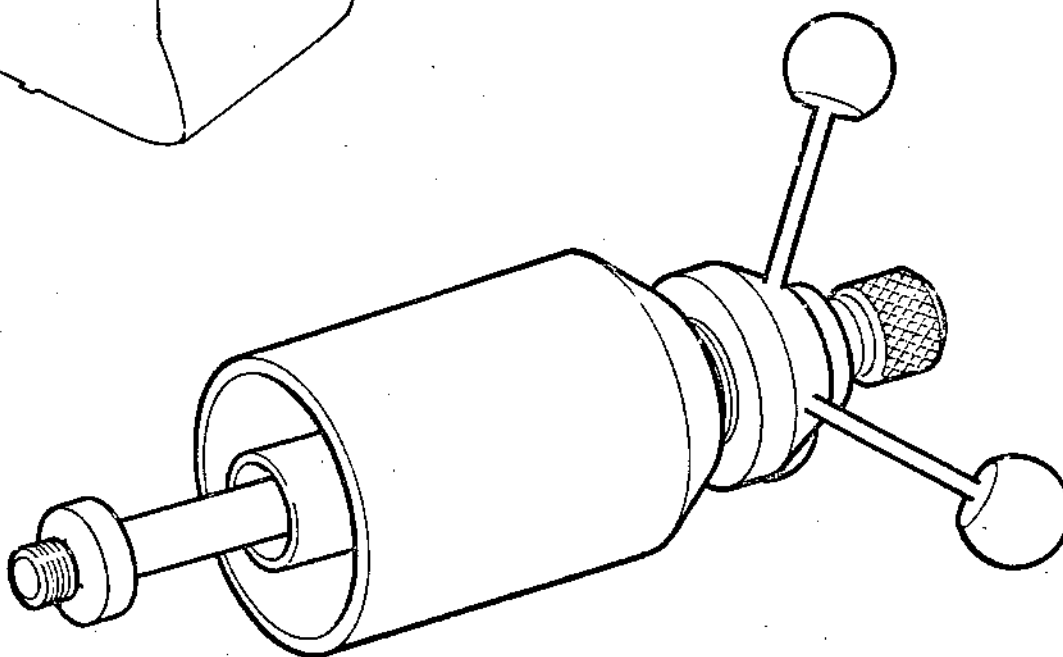
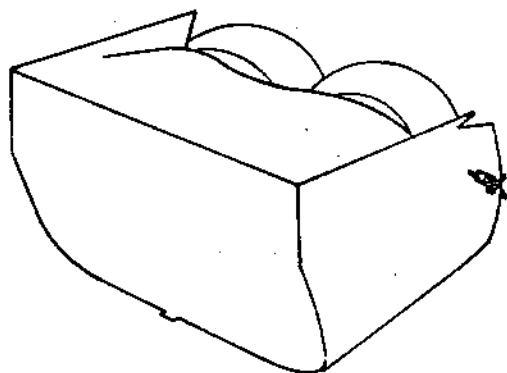
BUCKET TRUNNION EXTRACTOR

SNECMA No. 852-500-148-0

Description..... This extractor is used when removing the bucket trunnion bearings.

Weight..... 3 Kg (6.6 lb)

Dimensions..... D = 170 mm (6.69 in.), length = 227 mm (8.94 in)



Tool

SC 209

78-13-01

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OLYMPUS 593

MK.610-14-28
OVERHAUL



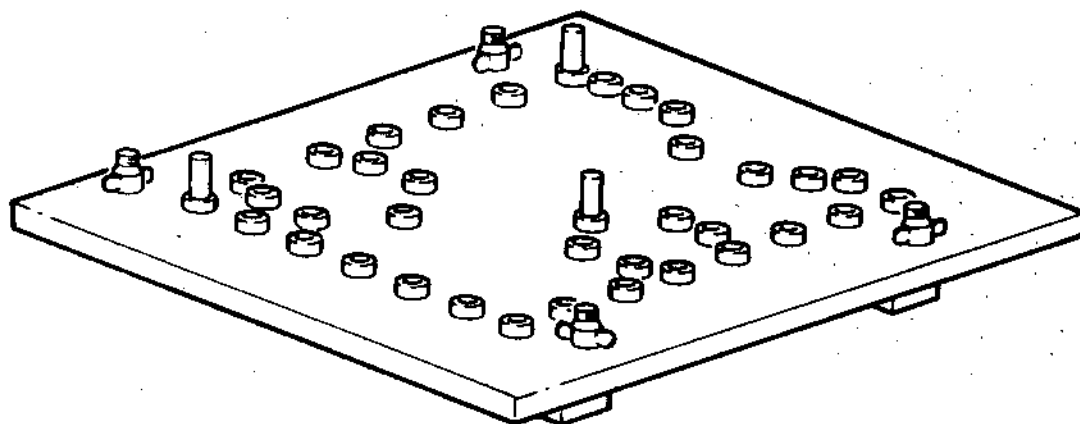
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-141

Description..... Template used for drilling the bay 1 L.H.
access door to the bucket pneumatic drive
actuator for the purpose of renewing inserts.

Weight.....

Dimensions..... 520 x 570 x 60 mm (20.5 x 22.5 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 219

78-13-01

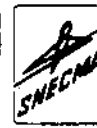
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OLYMPUS 593

MK.610-14-28
OVERHAUL



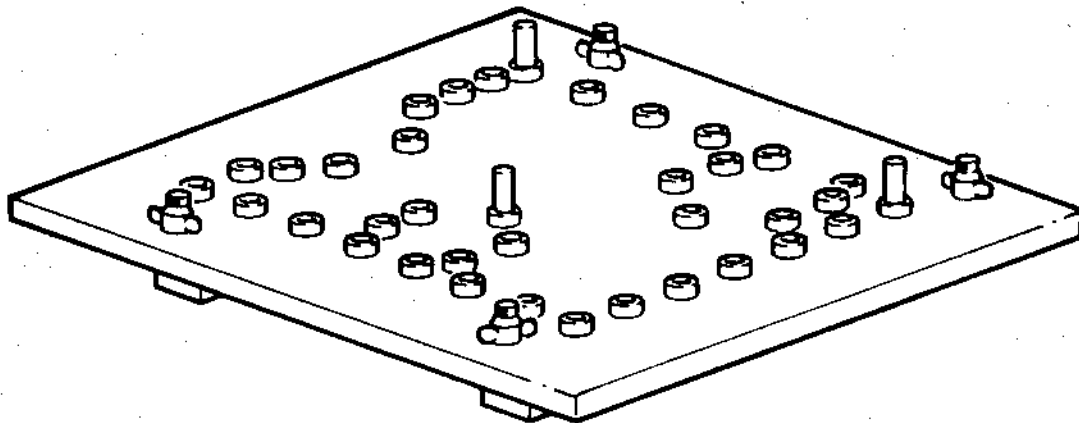
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-142

Description..... Template used for drilling the bay 4 R.H.
access door to the bucket pneumatic drive
actuator for the purpose of renewing inserts.

Weight.....

Dimensions..... 520 x 570 x 60 mm (20.5 x 22.5 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 220

78-13-01

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OLYMPUS 593

MK.610-14-28
OVERHAUL



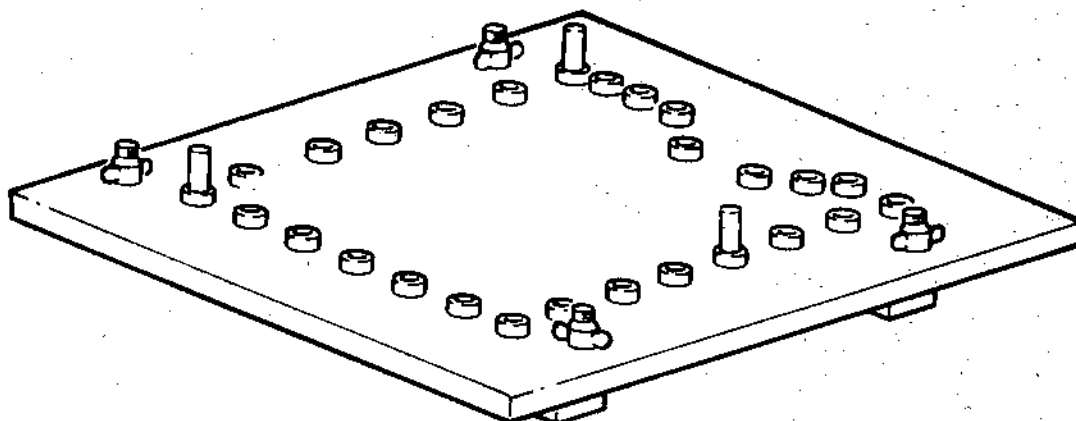
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-143

Description..... Template used for drilling the bay 2 L.H.
access door to the bucket pneumatic drive
actuator for the purpose of renewing inserts

Weight.....

Dimensions..... 580 x 520 x 60 mm (22.8 x 20.5 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 221

78-13-01

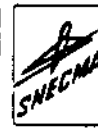
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OLYMPUS 593

MK.610-14-28

OVERHAUL



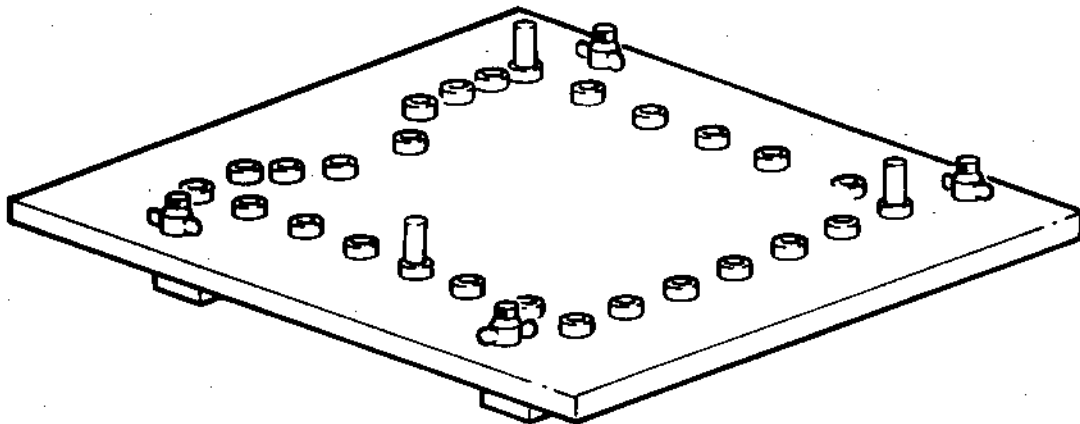
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-144

Description..... Template used for drilling the bay 3 R.H.
access door to the bucket pneumatic drive
actuator for the purpose of renewing inserts

Weight.....

Dimensions..... 580 x 520 x 60 mm (22.8 x 20.5 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 222

78-13-01

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OLYMPUS 593

MK.610-14-28
OVERHAUL



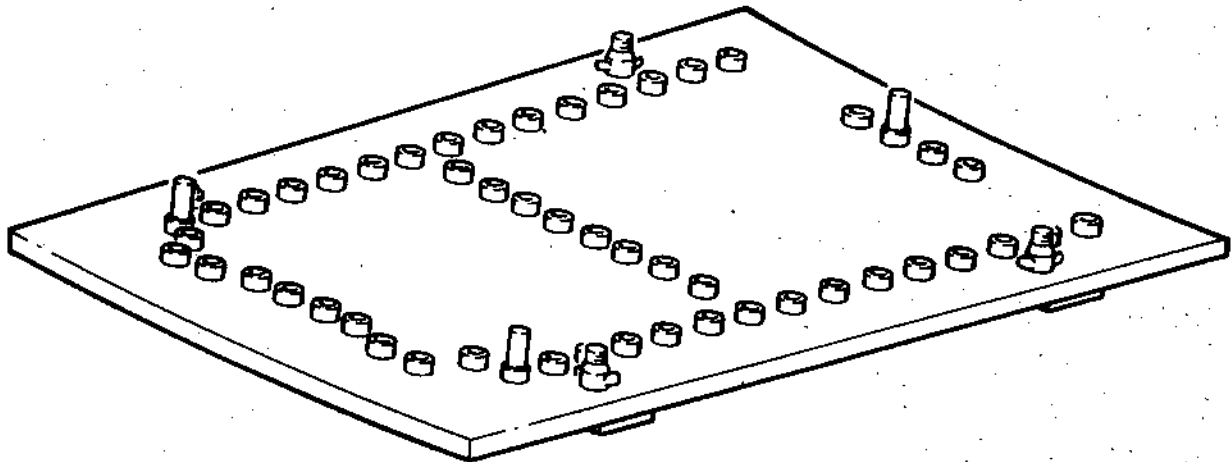
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-145

Description..... Template used for drilling the bays 1 and 2 upper L.H. upper access door to the bucket ballscrew gearboxes for the purpose of renewing inserts.

Weight.....

Dimensions..... 940 x 700 x 60 mm (37 x 27.6 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 223

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OLYMPUS 593

MK.610-14-28

OVERHAUL



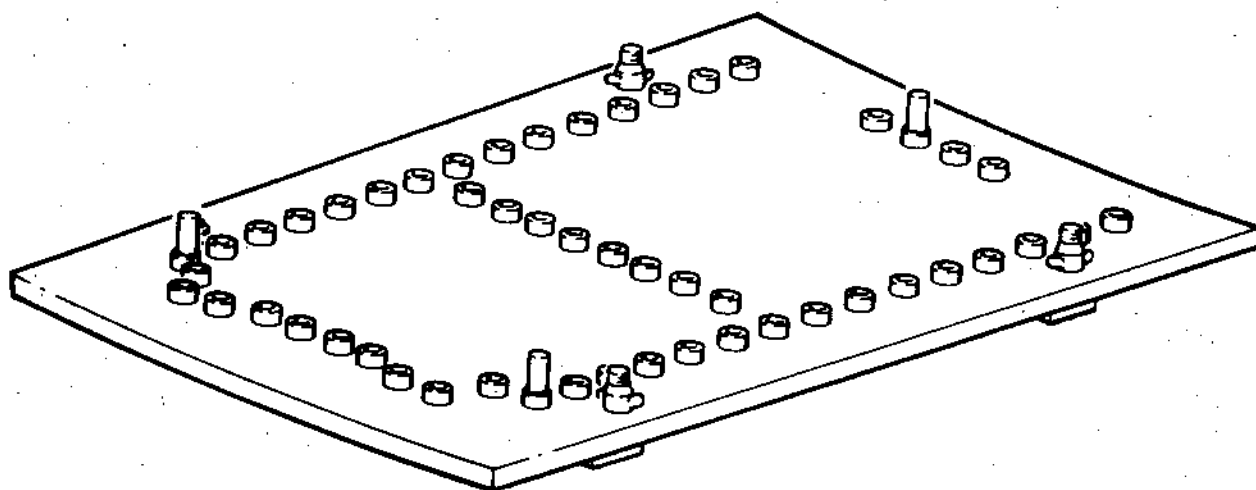
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-146

Description..... Template used for drilling the bays 3 and 4 upper L.H. access door to bucket ballscrew gearboxes for the purpose of renewing inserts.

Weight.....

Dimensions..... 940 x 700 x 60 mm (37 x 27.6 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 224

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OLYMPUS 593

MK.610-14-28

OVERHAUL



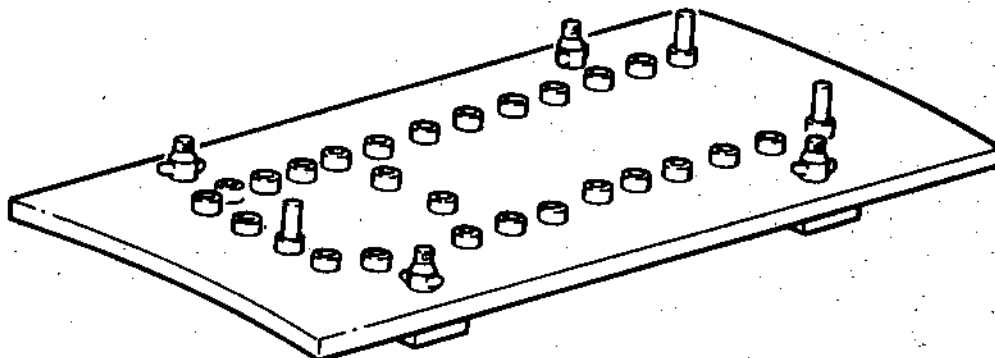
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-147

Description..... Template used for drilling the bay 1 upper
L.H. access door to bucket ballscrew gearbox
for the purpose of renewing inserts.

Weight.....

Dimensions..... 860 x 390 x 60 mm (33.8 x 15.3 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 225

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OLYMPUS 593

MK.610-14-28
OVERHAUL



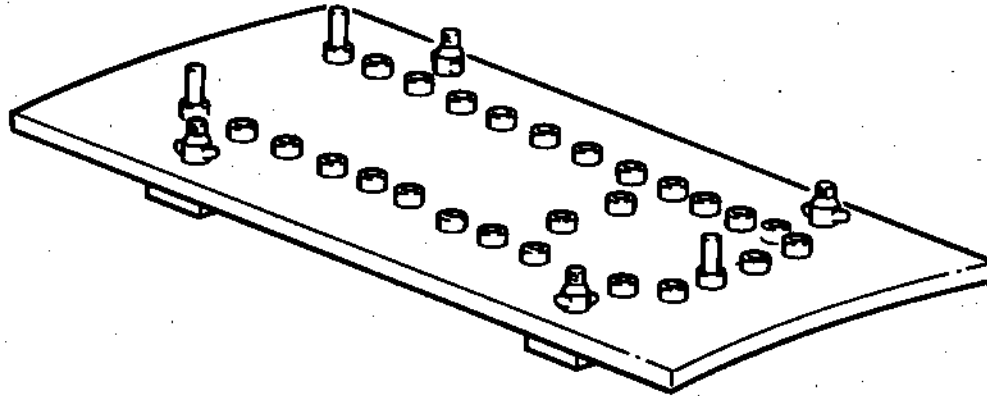
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-148

Description..... Template used for drilling the bay 4 upper
R.H. access door to bucket ballscrew gearbox
for the purpose of renewing inserts.

Weight.....

Dimensions..... 860 x 390 x 60 mm (33.8 x 15.3 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 226

78-13-01

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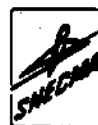
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OLYMPUS 593

MK.610-14-28

OVERHAUL



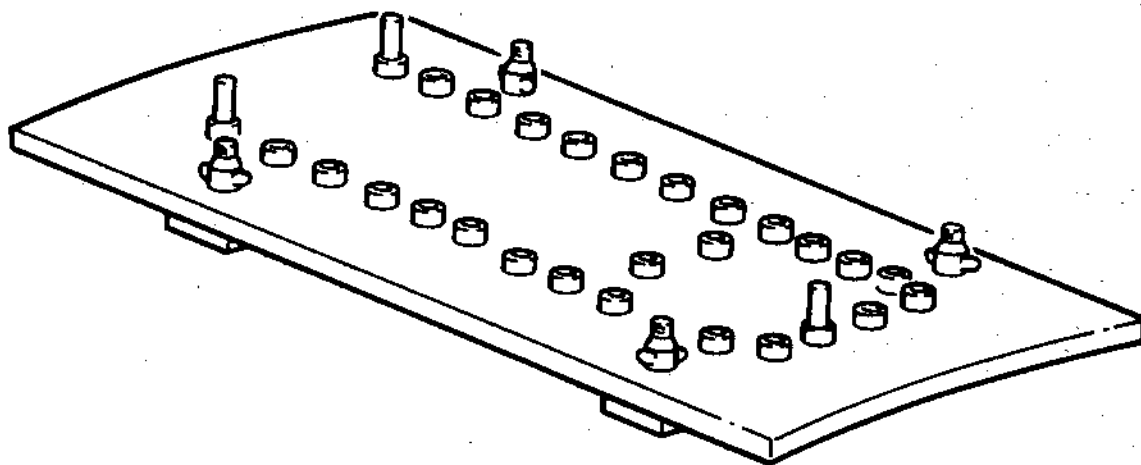
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-149

Description..... Template used for drilling the bay 2 L.H.
upper access door to bucket ballscrew gearbox
for the purpose of renewing inserts.

Weight.....

Dimensions..... 860 x 390 x 60 mm (33.8 x 15.3 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 227

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OLYMPUS 593

MK.610-14-28

OVERHAUL



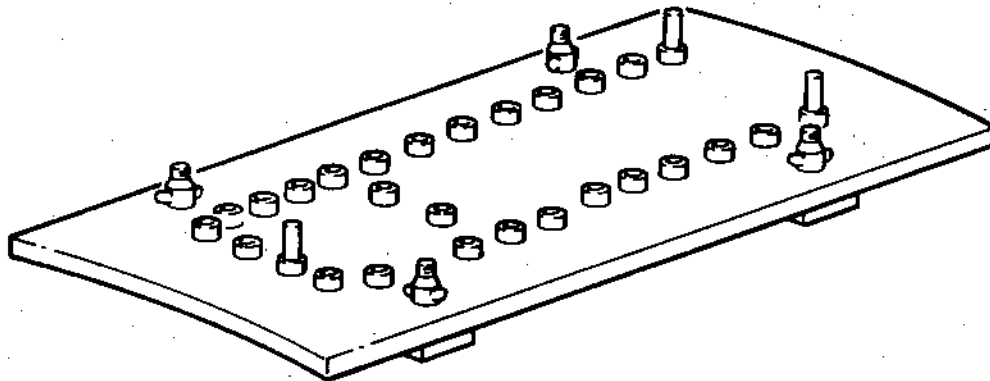
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-150

Description..... Template used for drilling the bay 3 R.H. upper access door to bucket ballscrew gearbox for the purpose of renewing inserts.

Weight.....

Dimensions..... 860 x 390 x 60 mm (33.8 x 15.3 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 228

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OLYMPUS 593

MK.610-14-28
OVERHAUL



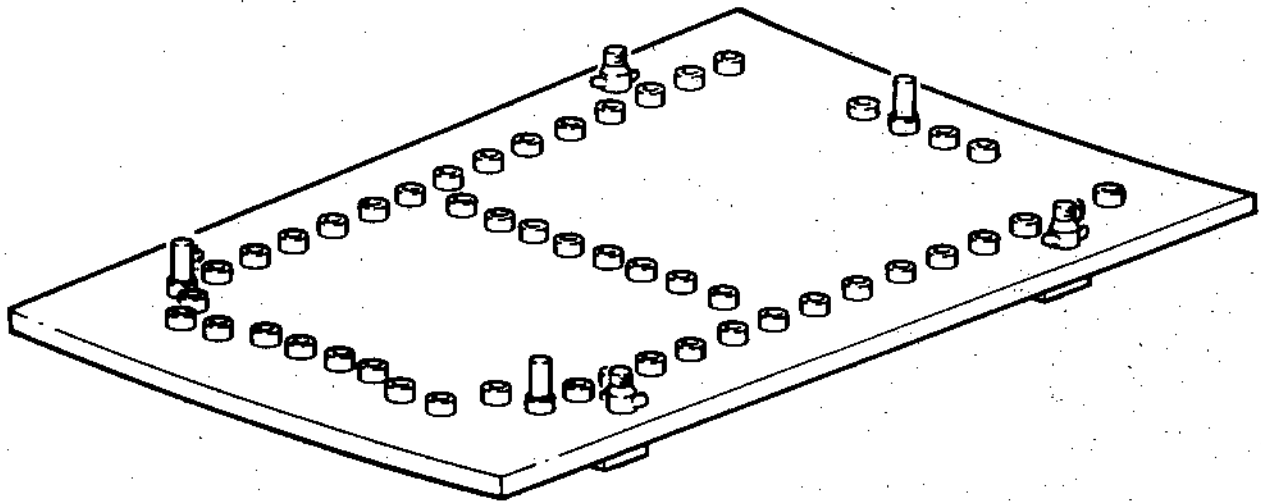
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-151

Description..... Template used for drilling the bays 1 and 2
lower access door to the bucket ballscrew
gearboxes for the purpose of renewing inserts

Weight.....

Dimensions..... 960 x 700 x 60 mm (37.8 x 27.6 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 229

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OLYMPUS 593

MK.610-14-28

OVERHAUL



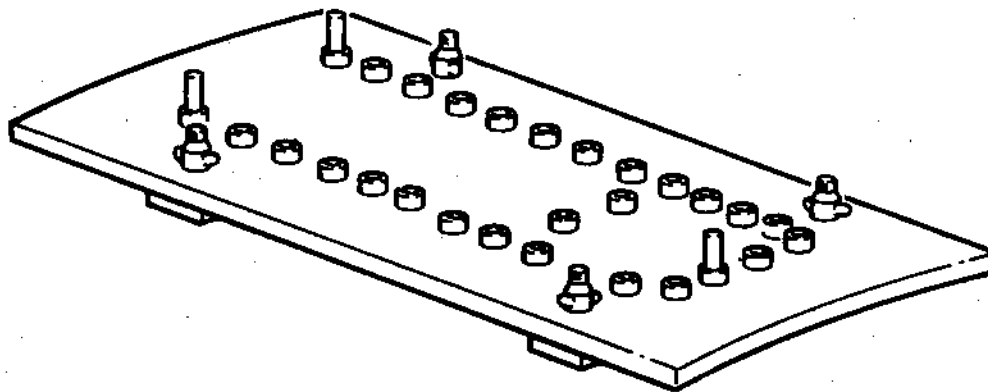
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-152

Description..... Template used for drilling the bays 1 and 4 lower R.H. and L.H. access doors to bucket ballscrew gearbox for the purpose of renewing inserts.

Weight.....

Dimensions..... 890 x 370 x 60 mm (35 x 14.6 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 230

78-13-01

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OLYMPUS 593

MK.610-14-28

OVERHAUL



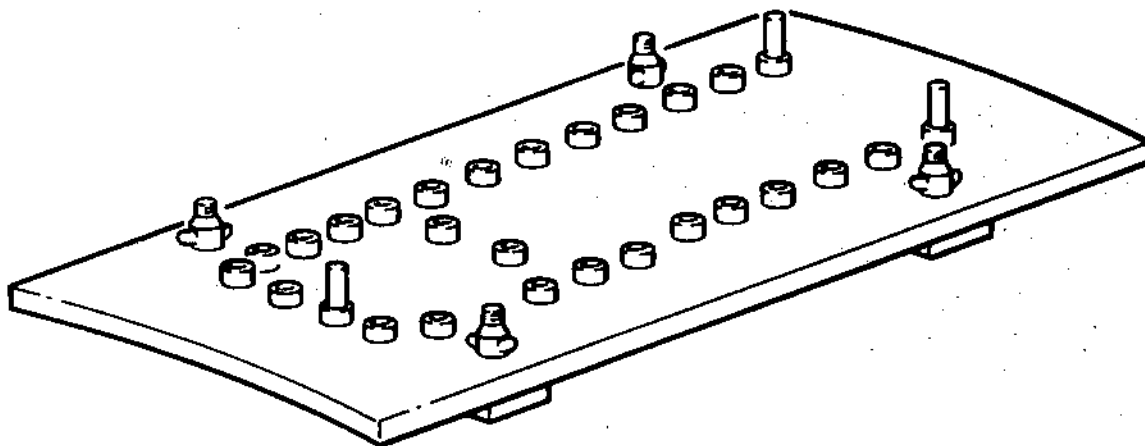
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-153

Description..... Template used for drilling the bays 2 or 3
R.H. and L.H. access doors to bucket ball-
screw gearbox for the purpose of renewing in-
serts.

Weight.....

Dimensions..... 890 x 370 x 60 mm (35 x 14.6 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 231

78-13-01

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OLYMPUS 593

MK.610-14-28
OVERHAUL



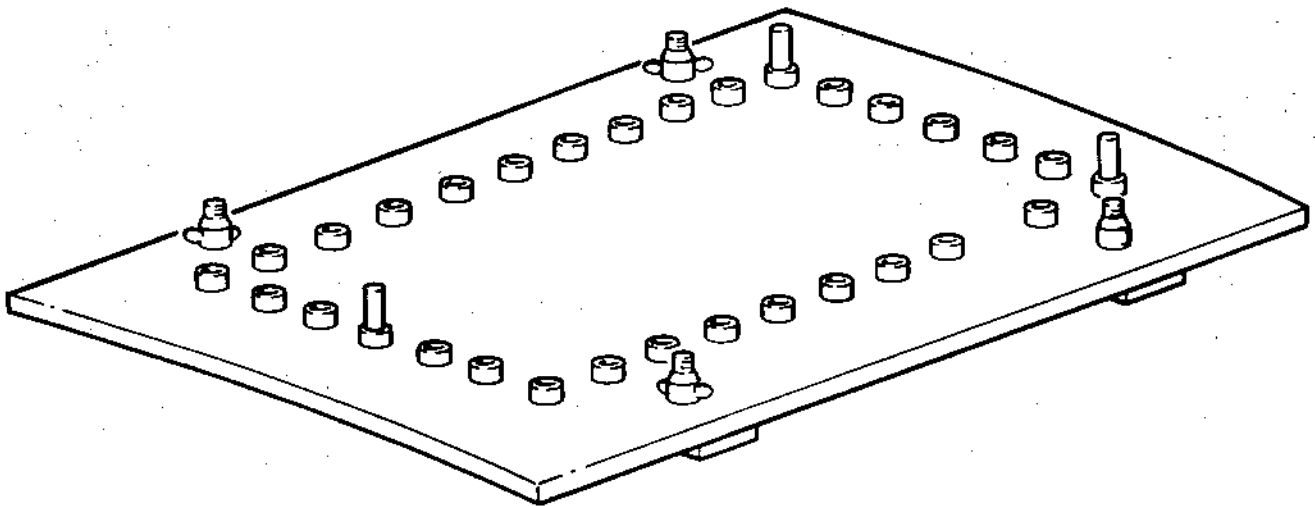
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-154

Description..... Template used for drilling the bays 2 or 3
L.H. and R.H. access doors to bucket position
transmitter (indicator) for the purpose of
renewing inserts.

Weight.....

Dimensions..... 650 x 450 x 60 mm (25.6 x 17.7 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 232

78-13-01

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OLYMPUS 593

MK.610-14-28
OVERHAUL



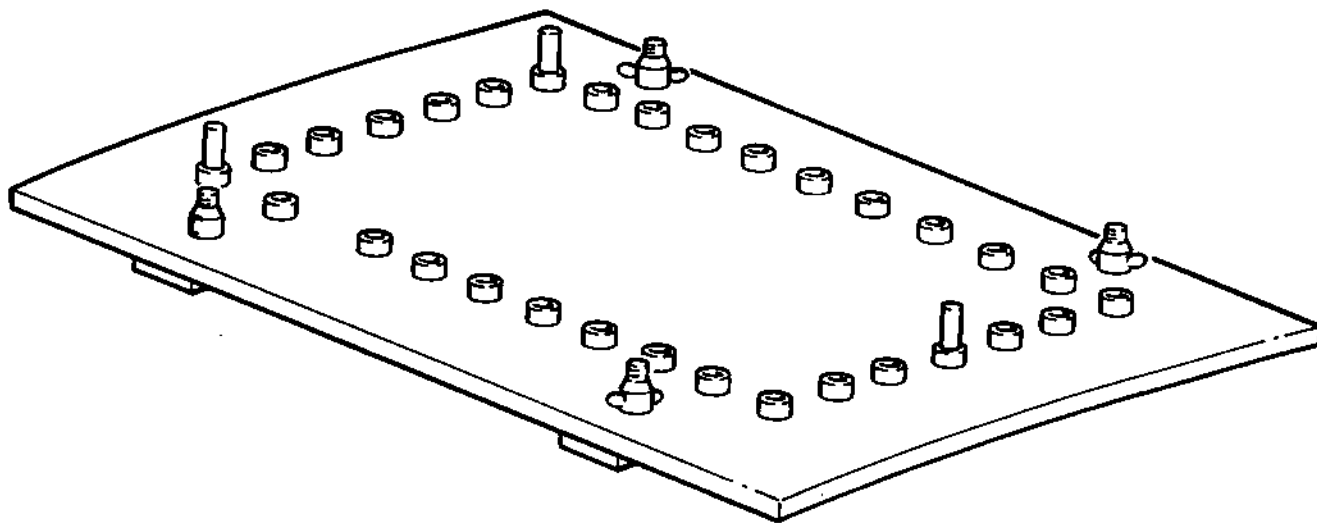
DRILLING TEMPLATE FOR ACCESS DOOR

SNECMA No. 852-630-155

Description..... Template used for drilling the bays 1 or 4
R.H. and L.H. access doors to bucket position
transmitter (indicator) for the purpose of
renewing inserts.

Weight.....

Dimensions..... 650 x 450 x 60 mm (25.6 x 17.7 x 2.4 in.)



To be manufactured by duplication of master tool.

Tool
SC 233

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OLYMPUS 593

MK.610-14-28
OVERHAUL



CRIMPING FIXTURE

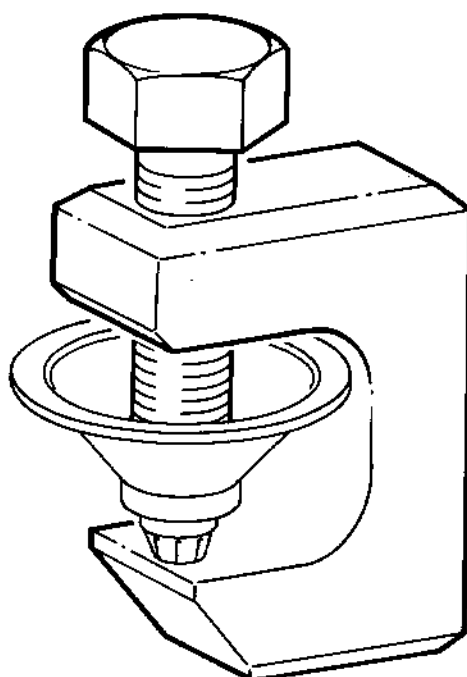
SNECMA N° 852-630-167-0

Description..... Fixture used for crimping the cup washer nuts

Weight..... 0,5 kg (1.1 lb)

Dimensions..... 135 x 70 x 24 mm (5.3 x 2.8 x 0.9 in.)

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Tool
SC 234

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OLYMPUS 593

MK.610-14-28

OVERHAUL



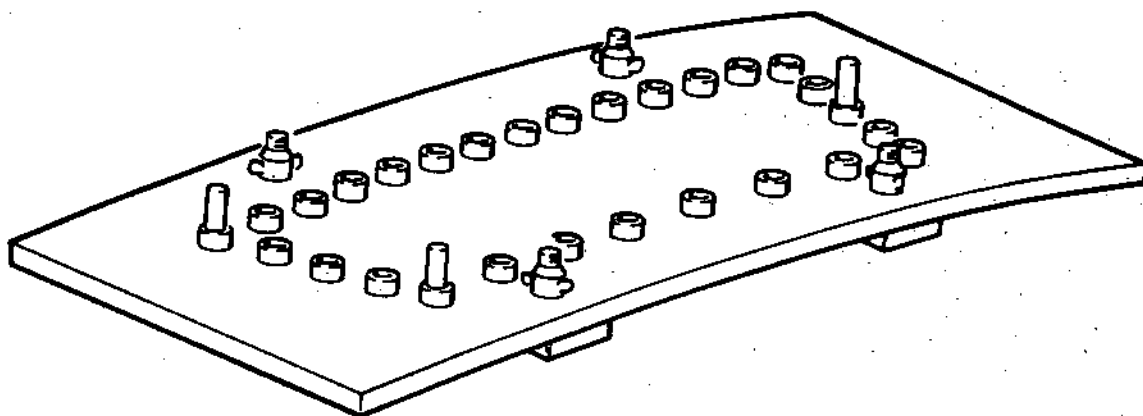
DRILLING TEMPLATE

SNECMA No. 852-630-156

Description..... Template used for drilling the convergent panel assy (IPL Fig. Item 11-10) for the purpose of renewing inserts.

Weight.....

Dimensions..... 610 x 340 x 100 mm (24 x 13.4 x 3.9 in.)



To be manufactured by duplication of master tool.

Tool
SC 240

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OLYMPUS 593

MK.610-14-28
OVERHAUL



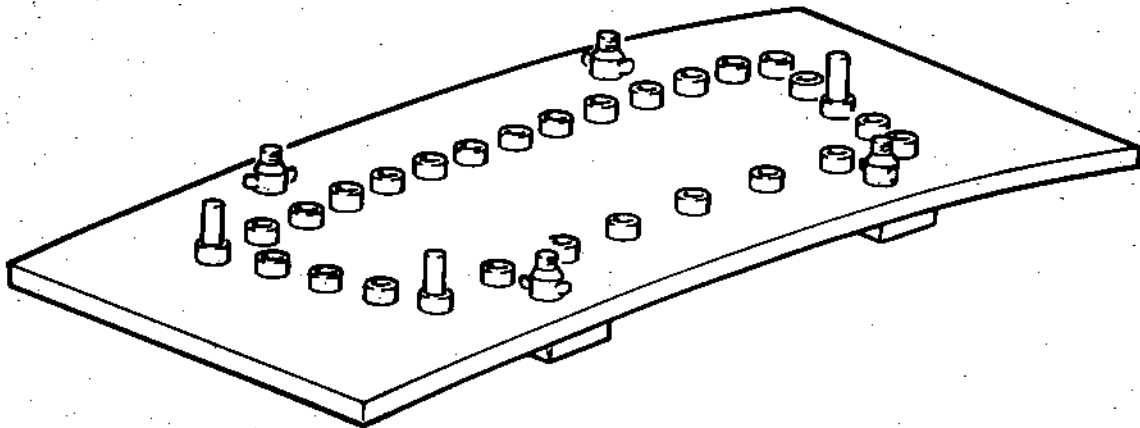
DRILLING TEMPLATE

SNECMA No. 852-630-157

Description..... Template used for drilling the convergent panel assy (IPL Fig. Item 11-40) for the purpose of renewing inserts.

Weight.....

Dimensions..... 620 x 340 x 100 mm (24.4 x 13.4 x 3.9 in.)



To be manufactured by duplication of master tool.

Tool
SC 241

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OLYMPUS 593

MK.610-14-28

OVERHAUL



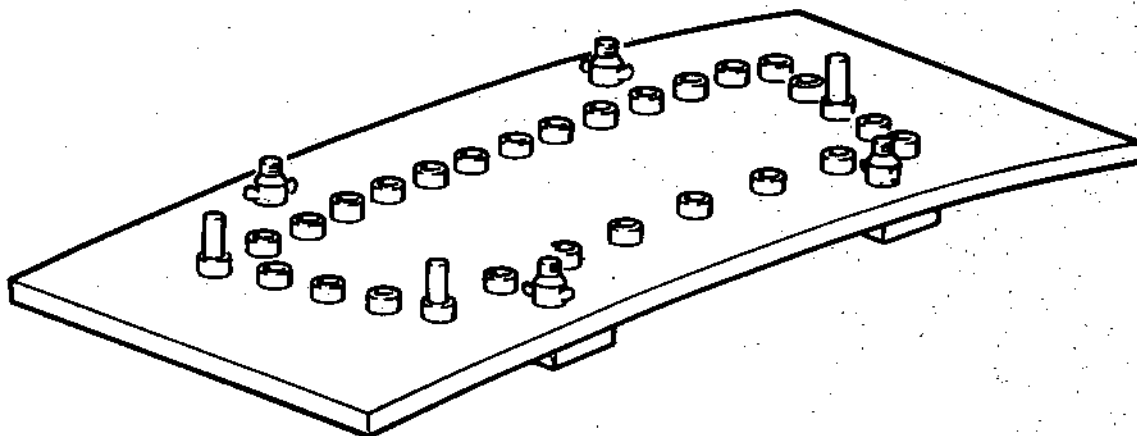
DRILLING TEMPLATE

SNECMA No. 852-630-158

Description..... Template used for drilling the convergent panel assy (IPL Fig. Item 11-70) for the purpose of renewing inserts.

Weight.....

Dimensions..... 600 x 340 x 100 mm (23.6 x 13.4 x 3.9 in.)



To be manufactured by duplication of master tool.

Tool
SC 242

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OLYMPUS 593

MK.610-14-28
OVERHAUL



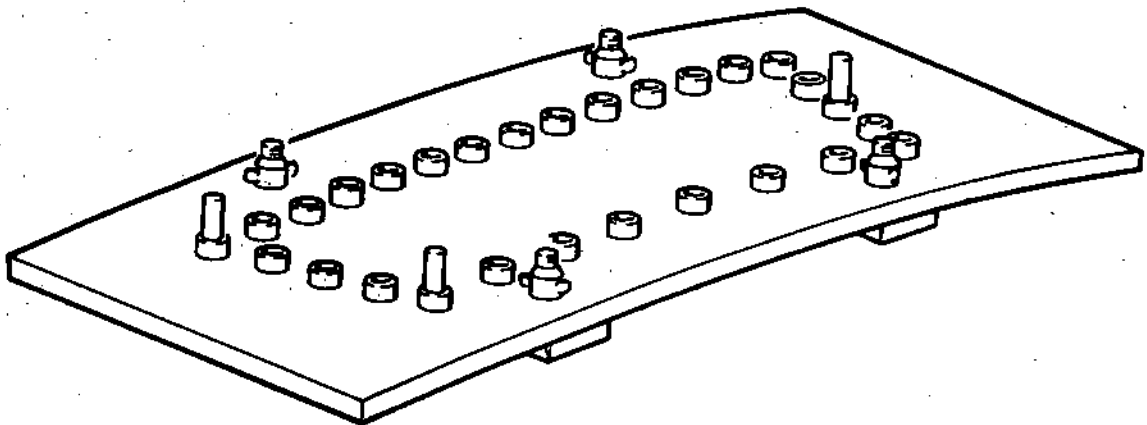
DRILLING TEMPLATE

SNECMA No. 852-630-159

Description..... Template used for drilling the convergent panel assy (IPL Fig. Item 11-100) for the purpose of renewing inserts.

Weight.....

Dimensions..... 600 x 340 x 100 mm (13.6 x 13.4 x 3.9 in.)



To be manufactured by duplication of master tool.

Tool
SC 243

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OLYMPUS 593

MK.610-14-28
OVERHAUL



FLEXIBLE SHAFT CORE HEX. DRIVE END POSITIONING WRENCH

SNECMA No. 852-500-149

Description..... This wrench, made of light alloy, is used for positioning (coupling) the flexible shafts core hex. drive ends during installation of the flexible shafts.

Weight..... 0,020 Kg (0.04 lb)

Dimensions..... 118 x 21 x 8 mm (4.64 x 0.82 x 0.31 in.)



Tool

SC249

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OLYMPUS 593

MK.610-14-28

OVERHAUL

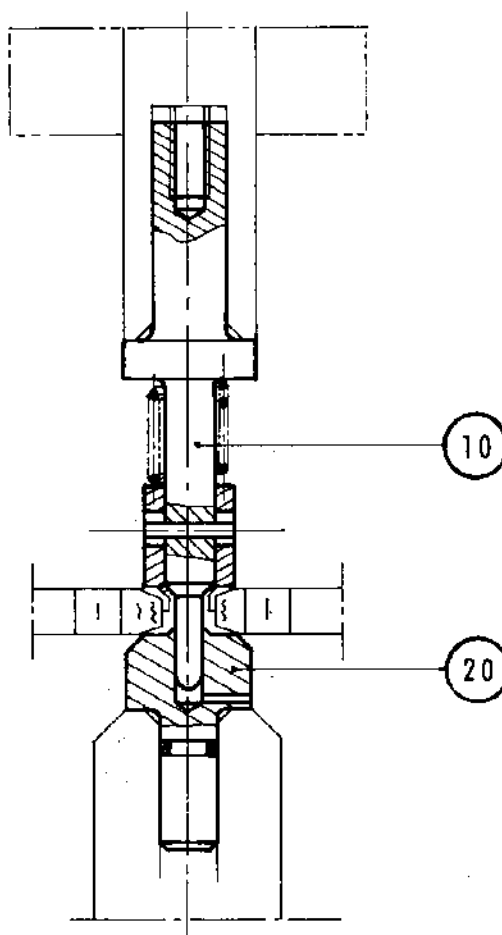


INSERT CRIMPING FIXTURE
SNECMA No. 852-630-138-0

Description..... This tool is used to crimp the inserts
on the Stressskin panels.

Weight.....

Dimensions..... 200 x 30 mm (7.87 x 1.18 in.)



Tool
SC253

FIG.ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	QTY
1 - 1 A	852-630-138-0	CRIMPING FIXTURE		RF
10 A	852-630-138-1	PUNCHES		16
20 A	852-630-138-2	DIES		19

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OLYMPUS 593

MK.610-14-28
OVERHAUL



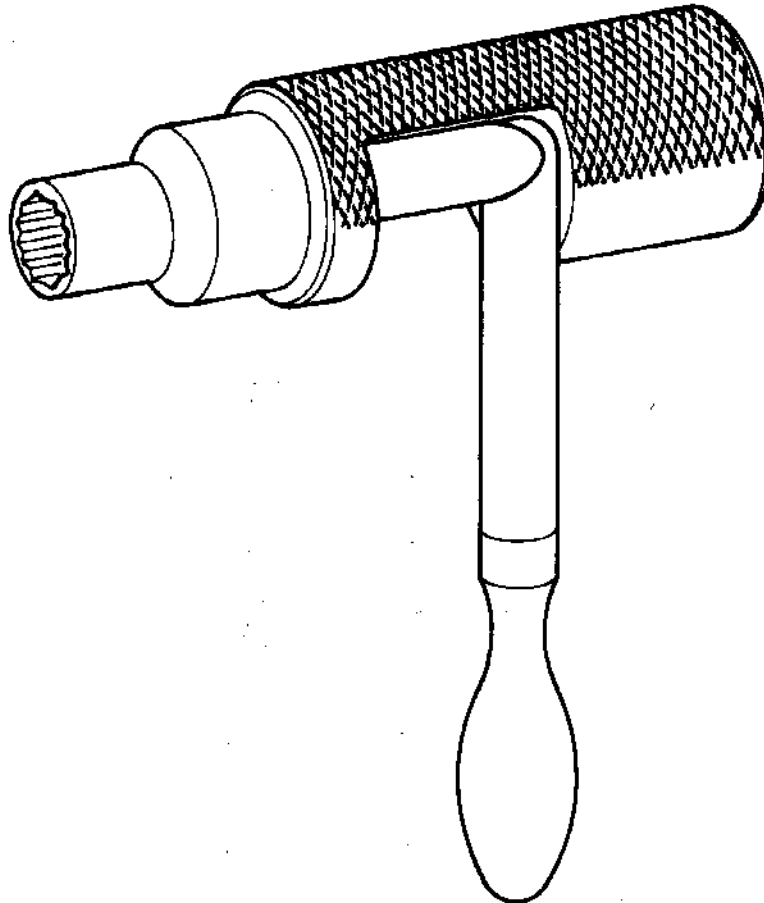
BUCKET SPECIAL WRENCH

SNECMA No. 852-500-083

Description..... Special wrench for bucket trunnion bearing
attaching bolts.

Weight.....

Dimensions..... 115 x 145 x 38 mm (4.53 x 5.70 x 1.50 in.)



Tool
SC 254

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OLYMPUS 593

MK.610-14-28
OVERHAUL



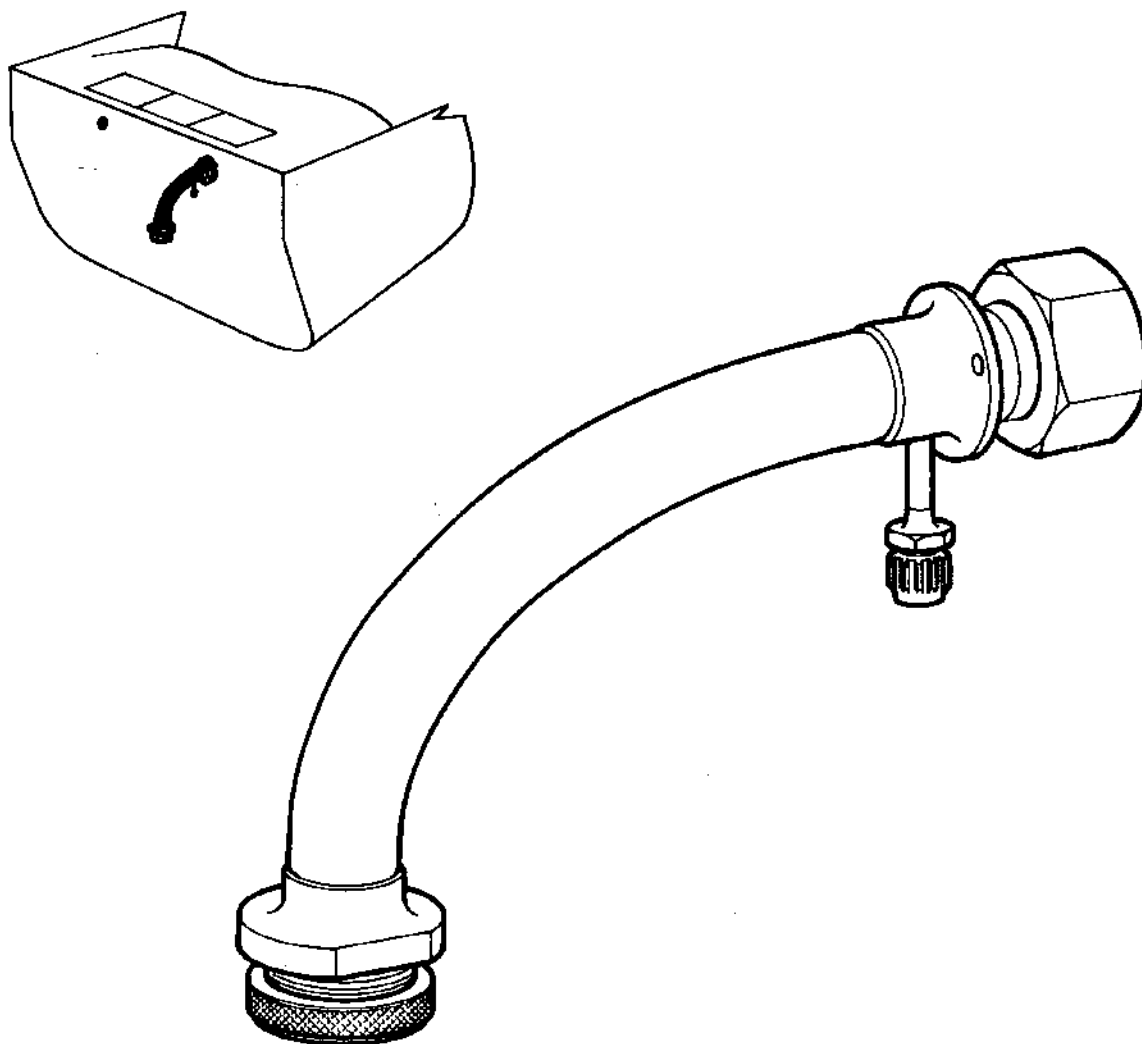
SUPPLY CONNECTION

SNECMA No. 9970-543-063

Description..... This air supply connection links the bucket control motor and the air supply tank.

Weight.....

Overall Dimensions.. 265 x 290 mm (10.433 x 11.417 in.)



Tool
SC 262

78-13-01

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OLYMPUS 593

MK.610-14-28

OVERHAUL



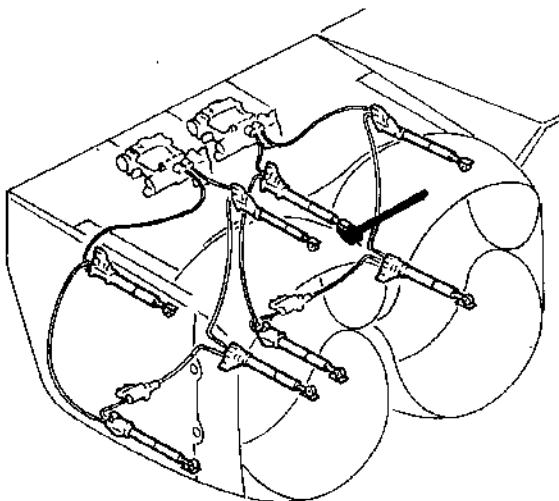
SPECIAL WRENCH FOR ROD END BEARING

SNECMA No. 9970-511-043

Description..... This wrench allows to restrain the ballscrew gearbox rod end bearing when the locknut is tightened.

Weight.....

Dimensions.....



Tool
SC 263

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**OLYMPUS 593**MK.610-14-28
OVERHAULWRENCHES FOR BALLSCREW GEARBOX FITTING SUPPORTSSNECMA No. 852-500-156-0

Description..... These wrenches allow to restrain the fitting support attaching bolt nuts during removal/ installation operations.

Weight.....

Dimensions.....

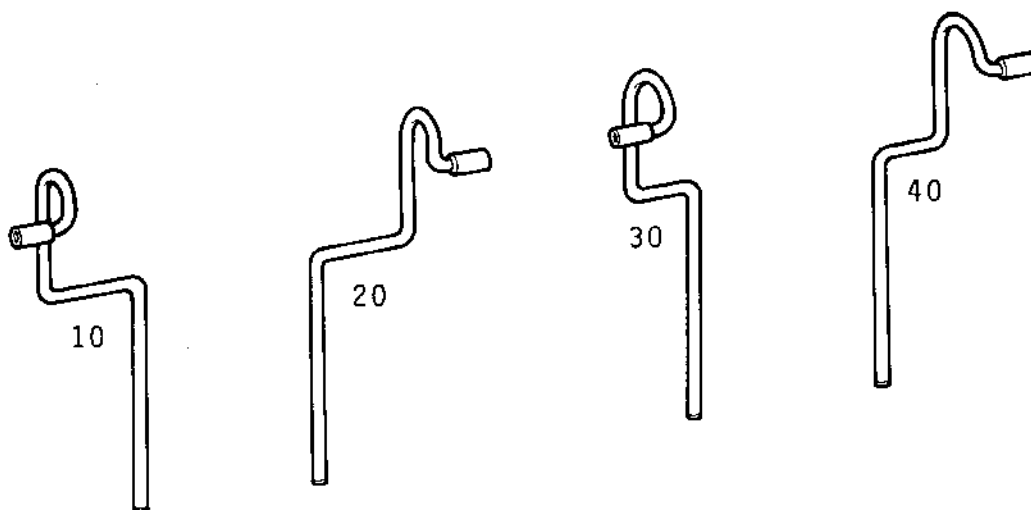
**Tool
SC 265**

FIG.ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	QTY
1- 1A	852-500-156-0	Wrenches, fitting support		RF
10A	852-500-156-1	Wrench, fitting support		1
20A	852-500-156-2	Wrench, fitting support		1
30A	852-500-156-3	Wrench, fitting support		1
40A	852-500-156-4	Wrench, fitting support		1

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OLYMPUS 593

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OVERHAUL

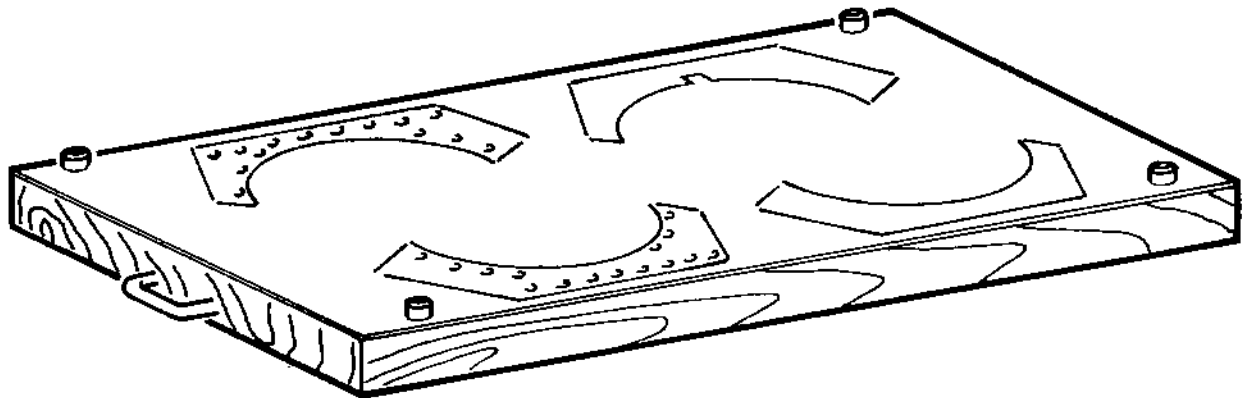


TEMPLATE FOR HEAT-SHIELDS
SNECMA No. 852-500-157-0

Description..... This template used during the removal/installation of the heat-shields, enables the identification of the attaching hardware.

Weight.....

Dimensions.....



Tool
SC 266

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OLYMPUS 593

MK.610-14-28
OVERHAUL



FLANGE FOR STRETCHING
FLEXIBLE SHAFT SHEATH

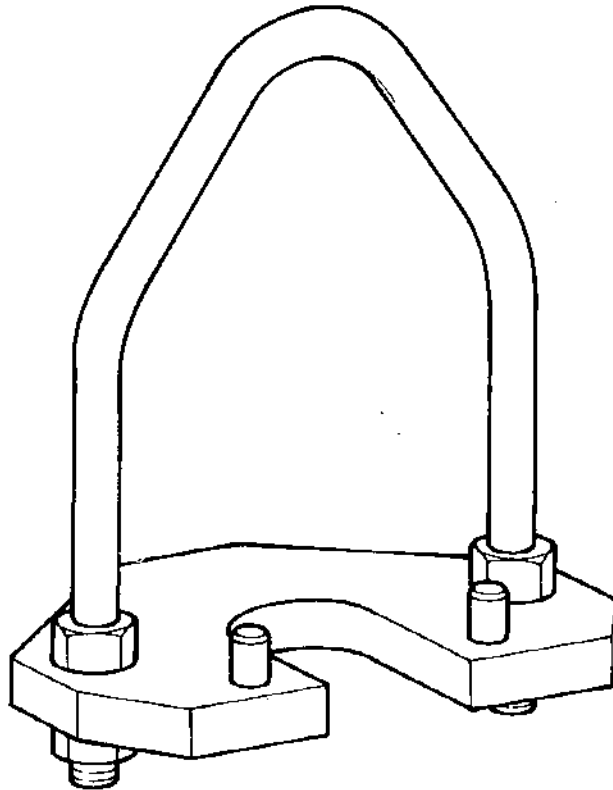
SNECMA No. 852-500-158-0

Description Stretches the bucket control system flexible shaft sheathes so that they can be adjusted to suitable length.

Weight 0,5 kg (1.1 lb)

Dimensions 124 x 90 x 43 mm (4.9 x 3.5 x 1.7 in.)

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TOOL
SC 267

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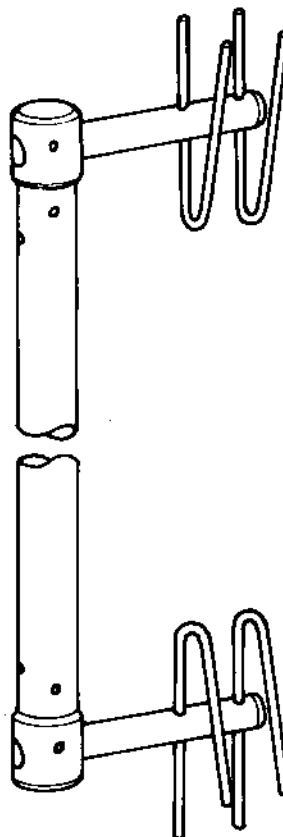
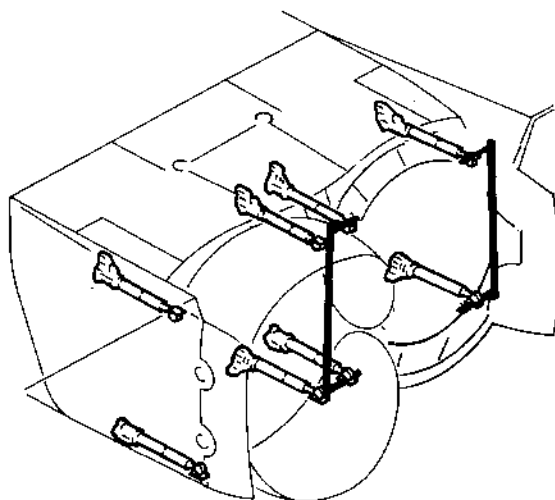
BUCKET BALLSCREW
GEARBOXES HOLDING FIXTURES

SNECMA No. 9970-511-044

Description Secures two ballscrew gearboxes of two buckets of the same bay following disassembly of these buckets.

Weight

Dimensions 930 x 90 x 26 mm (36.6 x 3.5 x 1 in.)



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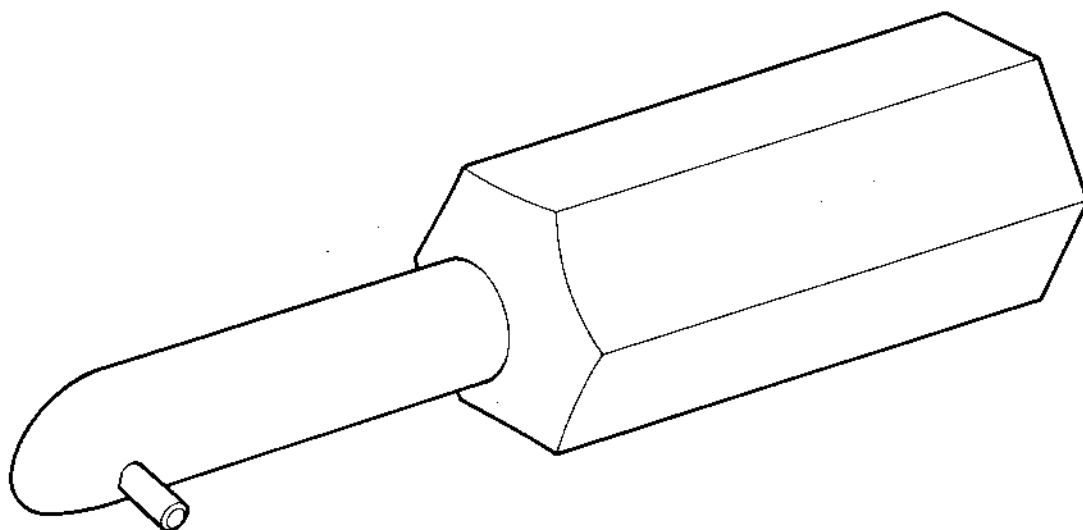
MK.610-14-28
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INSERT SECURING TOOL

SNECMA No. 852-500-170-0

Description Used to secure inserts in receptacles
Weight 0,5 kg (1.1 lb)
Dimensions 135 x 70 x 24 mm (5.3 x 2.8 x 0.9 in.)



Tool
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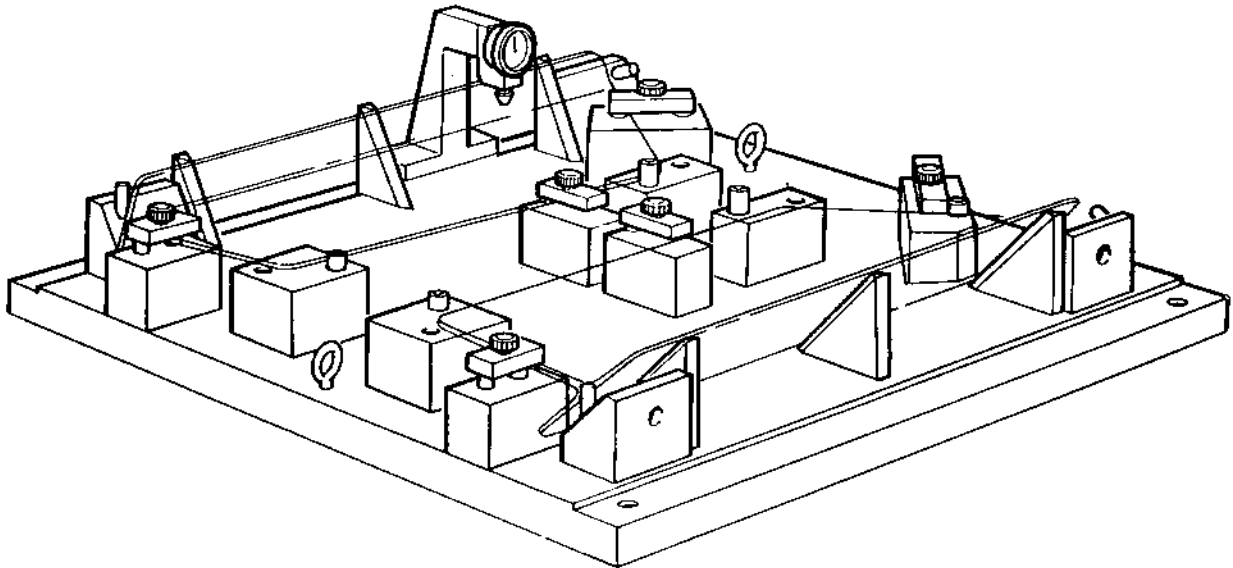
TEST APPARATUS FOR DEFLECTORS

SNECMA No. 852-630-182-0

Description This apparatus is used for dimensional
check of the deflector after repair,
REP 1-10-2.

Weight

Dimensions



Tool
SC 318



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ILLUSTRATED PARTS LIST

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INTRODUCTION

1. Purpose

This illustrated parts list gives a complete list of the components required for the overhaul of an equipment.

2. Illustrated parts list

The illustrated parts list is divided into three parts :

- Introduction
- Numerical index
- Detailed parts list

A. Numerical index :

For the sake of clearness, this repertory is divided into two parts :

- (1) Index of manufacturers references beginning with a letter.
- (2) Index of manufacturers references beginning with a figure.

These indexes include all the manufacturers references for the parts described in the detailed nomenclature in alphabetical or numerical order. Opposite each reference is given the chapter-section-subject-figure-item number and the quantity.

B. Detailed parts list.

The detailed parts list gives, in disassembly order, the list and illustrations of the parts making up the assembly concerned from the origin as shown in the example paragraph B6 effectivity.

- (1) Items index numbers.

To allow simple and speedy identification, each item is given a numerical item in 10 to 10 sequence, this item will not vary during the whole life of the item.

- (2) Original item.

To cater for systematic evolution due to modifications a "letter" variant is added to the numerical item. The letter variant "A" is given in the original document to identify all the items in original definition.

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It is given in the text part only.

(3) Modified item (Item variant).

After each modification concerning an item, the numerical item of this item is maintained but the "letter" variant progresses systematically to "B", then "C", "D" etc. (letters I, O and X are not used). This variant evolution is shown in the text and on the drawings only in the case of a change. The use of the "letter" variant added to the numerical item has been made necessary to make possible the rational use of the "effectivity Code" (usage code) such as it is presented paragraph 6 of this foreword.

(4) Indent

The detailed nomenclature is presented indented showing the relation between the various items, i.e :

1 2 3 4 5 6 7

Assembly

Assembly component parts

Sub-assembly

Sub-assembly attachment parts

* * *

Sub-assembly component parts

Sub sub-assembly

Sub sub-assembly attachment parts

* * *

Sub sub-assembly component parts

(5) Quantity per assembly

The quantity indicated in the "Quantity per assembly" column is that required by the next higher assembly.

(6) Effectivity

A coded method is used to indicate parts effectivity.

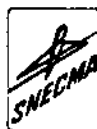
This alphanumerical code indicates the installation possibilities of sub-assemblies and primary parts in relation to the next higher sub-assembly or assembly. The validity column is left blank when installation is possible in all cases.

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This code corresponds to the next higher assembly or sub-assembly item.

Figure Item	Manufacturers Reference	Description							Effectivity
		1	2	3	4	5	6	7	
1A	123450	Assembly							
1B	123451	Assembly (SB 1)							
1C	123452	Assembly (SB 2)							
1D	123453	Assembly (SB 3)							
10A	234560	. PRIMARY PART							1A
10B	234561	. PRIMARY PART (BS 1)							1BAC
10C	234562	. PRIMARY PART (BS 3)							1D
20A	345670	. SUB-ASSEMBLY							1A
20B	345671	. SUB-ASSEMBLY (BS 1)							1BAC
20C	345672	. SUB-ASSEMBLY (BS 2)							
20D	345673	. SUB-ASSEMBLY (BS 3)							
		. ATTACHING PARTS							
30A	456780	. PRIMARY PART							
		* * *							
40A	567890	. . PRIMARY PART							20A
40B	567891	. . PRIMARY PART (BS 1)							20BA
40C	567892	. . PRIMARY PART (BS-2)							20CAB
40D	567893	. . PRIMARY PART (BS 3)							20D

The above example shows that :

- The primary part index 10A can only be installed in assembly indexed 1A.
- The primary part index 10B can be installed in assemblies indexed 1A, 1B, and 1C.
- The primary part index 10C can only be installed in assembly indexed 1D.
- The sub-assembly index 20A can only be installed in assembly indexed 1A.
- The sub-assembly index 20B can be installed in assemblies indexed 1A, 1B and 1C.
- The sub-assemblies indexes 20C and 20D and their attaching parts indexed 30A can be installed in all assemblies indexed 1 and thus do not have an "effectivity" code.
- The primary part index 40A can only be installed in sub-assembly indexed 20A.
- The primary part index 40B can be installed in sub-assemblies indexed 20A and 20B.

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- The primary part index 40C can be installed in sub-assemblies indexed 20A, 20B and 20C.
- The primary part index 40D can only be installed in the sub-assembly indexed 20D.

(7) Figure Variant

When it is not possible to illustrate the different variants of an assembly, resulting from modifications to the basic figure, one or several supplementary illustrations will describe these variants.

These supplementary illustrations will bear the same number as that of the basic figure, followed by a letter taken in the alphabetical order (except I and O).

Whatever the number of figure variants, they will be covered by only one nomenclature.

To ascertain quickly on which figure variant the item variant is to be found, the figure variant letter will be indicated in the nomenclature, in the "index reference figure item immediately in front of the item number.

3. Using the illustrated nomenclature

The identification of a component is possible taking the following elements in consideration :

A. Through the manufacturer's reference.

Search for the manufacturer's reference in the numerical index, note the chapter-section-subject-figure-item number and refer to the corresponding nomenclature.

B. At sight of the component, without knowing its references.

Look for the figure showing the component among the illustrations this will indicate the item permitting reference to the detailed nomenclature.

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**OLYMPUS 593**MK.610-14-28
OVERHAUL4. Manufacturer codes

<u>Code</u>	<u>Name and address</u>
F0215	H.B. TECHNIQUES SA 22 RUE DE CUREMBOURG BER 45400 FLEURY LES AUBRAIS X FRANCE
F0224	SIMMONDS SA 5, Rue MICHELET 92152 SURESNES FRANCE
F0313	MECANINDUS 8 Mail JOLIOT CURIE ZI VERT GALANT 95310 SAINT OUEN L'AUMONE FRANCE
F1983	CONNECTEURS ELECTRIQUES DEUTSCH 17, rue LAVOISIER BP117 27091 EVREUX CEDEX 9 FRANCE
F3195	PRECISAVIA SARL CARROS INDUSTRIE 06510 CARROS FRANCE
U1598	BRITISH AEROSPACE AIRCRAFT GROUP WEYBRIDGE-BRISTOL DIVISION FILTON HOUSE BRISTOL BS99 7AR ENGLAND
08524	DEUTSCH FASTENER CORPORATION 1315E GRAND AVE EL SECUNDO CALIFORNIA 90245-4323 U.S.A.
11815	CHERRY AEROSPACE FASTENERS CHERRY DIV OF TEXTRON INC 1224 E WARNER ST PO BOX 2157 SANTA ANA CA ETATS-UNIS

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<u>Code</u>	<u>Name and address</u>
80539	SPS TECHNOLOGIES INC AEROSPACE AND INDUSTRIAL PRODUCTS DIV 2701 S HARBOR BLVD PO BOX 1259 SANTA ANA CA ETATS-UNIS
56878	SPS TECHNOLOGIES INC AEROSPACE AND INDUSTRIAL PRODUCTS DIV HIGHLAND AVE JENKINTOWN PENNSYLVANIA 19046 U.S.A.
72962	ELASTIC STOP NUT A DIV OF HARVARD INDUSTRIES INC 2330 VAUXHALL RD UNION NJ ETATS-UNIS
73197	HI-SHEAR CORPORATION 2600 SKYPARK DRIVE TORRANCE CALIFORNIA 90505 U.S.A.
97393	SHUR-LOK CORP. P.O. Box 19584 2541 WHITE RD IRVINE CALIFORNIA 92713 U.S.A.
99193	GARRETT AUXILIARY POWER DIV ALLIED-SIGNAL INC DBA ALLIED-SIGNAL AEROSPACE CO 2739 E WASHINGTON ST PO BOX 5227 PHOENIX AZ ETATS-UNIS

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
AN960C10		7	130A	8
		7	280A	8
		10	15A	4
		10	255A	4
		21	30A	4
		21	70A	2
		21	130A	2
		21	190A	2
		21	230A	2
		21	280A	2
		21	340A	2
		22A	105A	2
		22A	115A	2
		22A	125A	2
		22B	305A	2
		22B	315A	2
		22B	325A	2
		22B	335A	2
		23	50A	4
		23	130A	4
		23	210A	4
		23	290A	4
AN960C10L		22A	190A	2
		22B	255A	2
		27	20A	
DELETED				
		27	40A	
DELETED				
		28	60A	8
		28	80A	16
		28	120A	4
		28	150A	8
		28	180A	8
		28	210A	8
		28	240A	4
		28	270A	4
		28	275A	4
AN960C416		5	-280B	4
SUP SDS 649-786-202-0				
		5	-650B	4
SUP SDS 649-786-202-0				
		6	-280B	4
SUP SDS 649-786-202-0				
		6	-650B	4
SUP SDS 649-786-202-0				
AN960C416L		2	190A	8
		2	290A	8
		2	370A	8

- ITEM NOT ILLUSTRATED

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
AN960C416L		22	50A	16
AN960C516		7	90A	8
		7	240A	8
AN960C516L		24	40A	2
		24	90A	2
AS20624		26	20A	2
		26	40A	2
		26	60A	6
		26	90A	2
		26	110A	2
		26	140A	4
		26	160A	6
		26	220A	2
		27	70A	4
		27	100A	4
		27	120A	6
		27	140A	4
A11471-19-4		22	270A	2
		22A	140A	2
		22B	205A	2
A11471-22-4		22A	65A	2
BAS7094C3		10	5A	22
		10	12A	4
		10	25A	8
		10	45A	6
		10	65A	8
		10	85A	6
		10	105A	8
		10	125A	10
		10	145A	8
		10	165A	8
		10	185A	8
		10	205A	6
		10	225A	8
		10	245A	22
		10	252A	4
		10	265A	8
		10	285A	6
		10	305A	8
		10	325A	6
		10	345A	8
		10	365A	10
		10	385A	8
		10	405A	8
		10	425A	8
		10	445A	6
		10	465A	8
BAS7094C4		29	10A	8

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
BAS 72 16-4013		18	50A	4
BAS 7641-04		18	180A	1
BAS 7641-28		29	100A	4
		29	170A	2
BAS 7643-04		19	90A	2
		19	190A	2
BAS 7643-05		16	120A	4
		16	170A	2
BAS 7671-04RF		18	80A	1
		19	260A	1
		19	-340A	1
		19	460A	1
BAS 8424C5RW		18	90A	1
		19	270A	1
		19	-350A	1
		19	470A	1
		24	130A	1
BAS 8443-4-8		3	25A	RF
		3	-165A	RF
		3	185A	RF
		3	-205A	RF
BAS 8443C4-11		12	60A	56
		13	40A	8
		13	80A	40
		13	100A	8
		13	150A	8
		13	190A	40
		13	210A	8
		14	80A	24
BAS 8443C4-8		12	40A	32
		13	20A	32
		13	130A	32
		14	40A	32
		14	60A	16
		14	100A	32
		14	120A	56
BAS 8443C4-9		12	20A	16
		13	60A	16
		13	170A	16
		14	20A	16
BAS 8455C4		18	30A	4
BAS 8483-10		17	100A	2
		17	160A	2
BAS 9318C4		17	290A	4
		19	230A	1
		19	-310A	1
		19	430A	2
BAS 9318C6		17	250A	4

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
BAS 9318 C6		17	340A	4
CR2 653-3-2		20	30A	8
		20	50A	8
CR2 839-5-2		22A	150A	4
		22R	215A	4
DHT 5579-3		3	30A	5
OPT TO Z3874-02		3	90A	5
OPT TO Z3874-02		3	-210A	5
OPT TO Z3874-02		3	-270A	5
OPT TO Z3874-02		10	660A	6
DHT 5579-4		17	130A	4
OPT TO Z3874-048		17	190A	4
OPT TO Z3874-048		7	120A	8
DHT 579-3		7	270A	8
OPT TO Z1855-02		21	20A	4
OPT TO 119FW1032		21	60A	2
OPT TO Z1855-02		21	120A	2
OPT TO 119FW1032		21	180A	2
OPT TO Z1855-02		21	220A	2
OPT TO 119FW1032		21	270A	2
OPT TO Z1855-02		21	350A	2
OPT TO 119FW1032				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
DHT 579-3		21	390A	2
OPT TO Z1855-02				
OPT TO 119FW1032				
		23	40A	4
OPT TO Z1855-02				
OPT TO 119FW1032				
		23	120A	4
OPT TO Z1855-02				
OPT TO 119FW1032				
		23	200A	4
OPT TO Z1855-02				
OPT TO 119FW1032				
		23	280A	4
OPT TO Z1855-02				
OPT TO 119FW1032				
		27	190A	2
OPT TO Z1855-02				
OPT TO 119FW1032				
DHT 579-5		7	80A	8
OPT TO Z1855-054				
OPT TO 119FW524				
		7	230A	8
OPT TO Z1855-054				
OPT TO 119FW524				
DHT 579-7		2	40A	4
OPT TO Z1855-070				
OPT TO 119FW720				
		2	230A	4
OPT TO Z1855-070				
OPT TO 119FW720				
		2	320A	4
OPT TO Z1855-070				
OPT TO 119FW720				
D16105		8	110A	1
		8	240A	1
		8	370A	1
		8	500A	1
		8	610A	2
D51-4511-100		29	70A	4
		29	140A	2
D51-4512-100		29	90A	4
		29	160A	2
		29	120A	4
D51-4586-100				
SUPSD BY E51-1579-100				
D51-4587-100		29	110A	4
		29	180A	2
D57-4311-100		29	30A	4
D57-4312-100		29	20A	8

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
EWB 0420-4-16		25	20A	4
		25	50A	4
		25	100A	4
		25	130A	4
		25	180A	4
		25	210A	4
		25	260A	4
		25	290A	4
		25	340A	16
		25	400A	16
E1-5X8E MCD		20	160A	4
E51-1550-000		29	- 35A	4
E51-1551-100		29	50A	2
E51-1554-100		29	40A	2
E51-1569-100		10	520A	2
E51-1569-101		10	530A	2
E51-1569-102		10	560A	2
E51-1569-103		10	570A	2
E51-1569-104		10	600A	2
E51-1569-105		10	610A	2
E51-1569-106		10	640A	2
E51-1569-107		10	650A	2
E51-1570-100		10	510A	2
E51-1570-101		10	550A	2
E51-1570-102		10	590A	2
E51-1570-103		10	630A	2
E51-1571-100		10	690A	2
OPT TO E51-1571-102				
E51-1571-101		10	700A	2
OPT TO E51-1571-103				
E51-1579-100		29	-120B	4
SUP SOS D51-4586-100				
E57-1712-100		10	20A	1
OPT TO 301-128-300-0				
		10	-261A	1
OPT TO 301-128-300-0				
E57-1712-101		10	- 21A	1
OPT TO 301-128-350-0				
		10	260A	1
OPT TO 301-128-350-0				
E57-1713-000		10	40A	1
OPT TO 301-128-400-0				
		10	-281A	1
OPT TO 301-128-400-0				
E57-1713-001		10	- 41A	1
OPT TO 301-128-450-0				
		10	280A	1
OPT TO 301-128-450-0				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
E57-1714-000		10	60A	1
OPT TO 301-128-600-0				
		10	-301A	1
OPT TO 301-128-600-0				
E57-1714-001		10	- 61A	1
OPT TO 301-128-650-0				
		10	300A	1
OPT TO 301-128-650-0				
E57-1715-000		10	80A	1
OPT TO 301-128-800-0				
		10	-321A	1
OPT TO 301-128-800-0				
E57-1715-001		10	- 81A	1
OPT TO 301-128-850-0				
		10	320A	1
OPT TO 301-128-850-0				
E57-1716-000		10	100A	1
OPT TO 301-129-000-0				
		10	-341A	1
OPT TO 301-129-000-0				
E57-1716-001		10	-101A	1
OPT TO 301-129-050-0				
		10	340A	1
OPT TO 301-129-050-0				
E57-1717-000		10	120A	1
OPT TO 301-129-900-0				
		10	-361A	1
OPT TO 301-129-900-0				
E57-1717-001		10	-121A	1
OPT TO 301-129-950-0				
		10	360A	1
OPT TO 301-129-950-0				
E57-1718-000		10	140A	1
OPT TO 301-129-400-0				
		10	-381A	1
OPT TO 301-129-400-0				
E57-1718-001		10	-141A	1
OPT TO 301-129-450-0				
		10	380A	1
OPT TO 301-129-450-0				
E57-1719-000		10	160A	1
OPT TO 301-129-600-0				
		10	-401A	1
OPT TO 301-129-600-0				
E57-1719-001		10	-161A	1
OPT TO 301-129-650-0				
		10	400A	1
OPT TO 301-129-650-0				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
E57-1720-000		10	180A	1
OPT TO 301-129-800-0		10	-421A	1
OPT TO 301-129-800-0		10	-181A	1
E57-1720-001		10	420A	1
OPT TO 301-129-850-0		10	200A	1
OPT TO 301-129-850-0		10	-441A	1
E57-1721-000		10	-201A	1
OPT TO 301-130-000-0		10	440A	1
OPT TO 301-130-000-0		10	220A	1
E57-1721-001		10	-461A	1
OPT TO 301-130-050-0		10	-221A	1
OPT TO 301-130-050-0		10	460A	1
E57-1722-102		10	240A	2
OPT TO 301-130-200-0		10	480A	2
OPT TO 301-130-200-0		10	270A	4
E57-1722-103		10	640A	4
OPT TO 301-130-250-0		10	270A	4
OPT TO 301-130-250-0		10	640A	4
E57-1723-101		16	210A	24
OPT TO 301-130-400-0		16	240A	24
OPT TO 301-130-400-0		9	30A	4
HLN1D08		9	50A	20
		9	80A	4
		9	290A	4
		9	310A	20
		9	340A	4
HLN1G5		23	20A	2
		23	100A	2
		23	180A	2
		23	260A	2
HLN1G6		16	200A	24
		16	230A	24

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
HL169-6-11 SUPSD BY HL169-6-14 SEL FROM		9	- 42A	AR
SUPSD BY HL169-6-14 SEL FROM		9	-302A	AR
HL169-6-12 SUPSD BY HL169-6-13 SEL FROM		9	40A	20
SUPSD BY HL169-6-13 SEL FROM		9	300A	20
HL169-6-13 SUPSDS HL169-6-12 SEL FROM		9	- 40B	20
SUPSDS HL169-6-12 SEL FROM		9	-300B	20
HL169-6-14 SUPSDS HL169-6-11 SEL FROM		9	- 42B	AR
SUPSDS HL169-6-11 SEL FROM		9	-302B	AR
HL169-6-15 SEL FROM		9	- 23A	AR
SEL FROM		9	-282A	AR
HL169-6-16 SEL FROM		9	20A	4
SEL FROM		9	280A	4
HL169-6-17 SEL FROM		9	- 27A	AR
SEL FROM		9	-287A	AR
HL169-6-28 SEL FROM		9	- 73A	AR
SEL FROM		9	-333A	AR
HL169-6-29 SEL FROM		9	70A	4
SEL FROM		9	-113A	AR
SEL FROM		9	330A	4
SEL FROM		9	-373A	AR

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
HL1 69-6-30		9	- 77A	AR
SEL FROM		9	110A	4
SEL FROM		9	-337A	AR
SEL FROM		9	370A	4
SEL FROM		9	-117A	AR
HL1 69-6-31		9	-377A	AR
SEL FROM		9	-143A	AR
HL1 69-6-33		9	-403A	AR
SEL FROM		9	140A	4
HL1 69-6-34		9	400A	4
SEL FROM		9	-147A	AR
HL1 69-6-35		9	-407A	AR
SEL FROM		9	-173A	AR
HL1 69-6-39		9	-433A	AR
SEL FROM		9	170A	4
HL1 69-6-40		9	-203A	AR
SEL FROM		9	430A	4
SEL FROM		9	-463A	AR
SEL FROM		9	-177A	AR
HL1 69-6-41		9	200A	4
SEL FROM		9	-253A	AR
SEL FROM		9	-437A	AR
SEL FROM		9	460A	4
SEL FROM		9	-513A	AR

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EDC - 2306 - 10.78

**OLYMPUS 593**MK.610-14-28
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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
HL169-6-42		9	-207A	AR
SEL FROM		9	250A	16
SEL FROM		9	-467A	AR
SEL FROM		9	510A	16
SEL FROM		9	-257A	AR
HL169-6-43		9	-517A	AR
SEL FROM		9	-233A	AR
HL169-6-44		9	-493A	AR
SEL FROM		9	230A	8
HL169-6-45		9	490A	8
SEL FROM		9	-237A	AR
HL169-6-46		9	-497A	AR
SEL FROM		5	80A	4
HL40-5-1		5	110A	4
SEL FROM		5	450A	4
SEL FROM		5	480A	4
SEL FROM		6	80A	4
SEL FROM		6	110A	4
SEL FROM		6	450A	4
SEL FROM		6	480A	4
SEL FROM		5	- 83A	AR
HL40-5-2		5	-113A	AR
SEL FROM		5	-453A	AR
SEL FROM		5	-483A	AR
SEL FROM				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
HL40-5-2		6	- 83A	AR
SEL FROM		6	-113A	AR
SEL FROM		6	-453A	AR
SEL FROM		6	-483A	AR
SEL FROM		7	30A	16
HL40-5-8		7	60A	16
		7	180A	16
		7	210A	16
HL667-6-7		21	40A	4
		21	200A	2
HL668-10-12		7	100A	8
		7	250A	8
HL668-6-4		27	200A	2
HL668-6-5		21	240A	2
HL668-6-6		21	370A	2
HL668-6-7		23	60A	4
		23	140A	4
		23	220A	4
		23	300A	4
HL668-6-8		7	140A	8
		7	290A	8
		21	80A	2
		21	290A	2
		21	330A	2
HL668-6-9		21	140A	2
HL869-6-10		31	80A	24
		31	120A	24
HL869-6-11		31	60A	8
		31	100A	8
HL869-8-12		23	30A	2
		23	110A	2
		23	190A	2
		23	270A	2
HL97-5		7	20A	16
		7	50A	16
		7	170A	16
		7	200A	16
MS21043-3		15	17A	4
		15	27A	4
		15	32A	8
		15	35A	8
		15	42A	4
		15	45A	4
		15	56A	8

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
MS2 1043-3		15	157A	4
		15	167A	4
		15	172A	4
		15	175A	4
MS2 1043-4		2	180A	8
		2	270A	8
		2	360A	8
MS2 1279-06		15	52A	8
SEL FROM				
MS2 1279-09		15	- 53A	AR
SEL FROM				
MS2 1279-10		15	12A	4
SEL FROM				
		15	22A	4
SEL FROM				
		15	152A	4
SEL FROM				
		15	162A	4
SEL FROM				
MS2 1279-12		15	- 13A	AR
SEL FROM				
		15	- 23A	AR
SEL FROM				
		15	-153A	AR
SEL FROM				
		15	-163A	AR
SEL FROM				
MS2 1279-14		15	- 14A	AR
SEL FROM				
		15	- 24A	AR
SEL FROM				
		15	-154A	AR
SEL FROM				
		15	-164A	AR
SEL FROM				
MS2 4665-151		8	60A	4
		8	190A	4
		8	320A	4
		8	450A	4
		8	560A	8
MS2 4665-153		17	280A	4
		18	20A	4
		19	220A	1
		19	-300A	1
		19	420A	2
MS2 4665-155		24	20A	2
		24	70A	2
		29	60A	4

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
MS2 46 65 -155		29	80A	4
		29	130A	2
		29	150A	2
MS2 46 65 -229		3	400A	2
		3	450A	2
MS2 46 65 -300		2	390A	16
		16	20A	16
MS2 46 65 -302		17	240A	4
		17	330A	4
MS9 11 1-01		16	- 80B	24
SUP SDS NAS1134E4		16	-140B	12
SUP SDS NAS1134E4				
MS9 359-11		24	30A	2
		24	80A	2
MS9 500-06		9B	740A	8
		9B	810A	8
		9B	880A	8
		9B	950A	8
MS9 500-07		9A	540A	18
		9A	590A	18
		9A	640A	18
		9A	690A	18
		9B	760A	12
		9B	830A	12
		9B	900A	12
		9B	970A	12
MS9 500-08		9B	780A	12
		9B	850A	12
		9B	920A	12
		9B	990A	12
MS9 501-12		31	20A	4
NAS1102C08-10		26	190A	16
NAS1134E4		16	80A	24
SUP SD BY MS9111-01		16	140A	12
SUP SD BY MS9111-01				
NAS1153C4		8	20A	4
		8	150A	4
		8	280A	4
		8	410A	4
NAS1153E3		10	10A	22
		10	30A	8
		10	50A	6
		10	70A	8
		10	90A	6
		10	110A	8
		10	130A	10

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
NAS 1153 E3		10	150A	8
		10	170A	8
		10	190A	8
		10	210A	6
		10	230A	8
		10	250A	22
		10	270A	8
		10	290A	6
		10	310A	8
		10	330A	3
		10	350A	8
		10	370A	10
		10	390A	8
		10	410A	8
		10	430A	8
		10	450A	6
		10	470A	8
NAS 1153 E4		10	17A	4
NAS 1291 C08		10	257A	4
		5	70A	4
		5	100A	4
		5	140A	6
		5	160A	8
		5	180A	10
		5	210A	8
		5	230A	8
		5	250A	6
		5	440A	4
		5	470A	4
		5	510A	6
		5	530A	8
		5	550A	10
		5	580A	8
		5	600A	8
		5	620A	6
		6	70A	4
		6	100A	4
		6	140A	6
		6	160A	8
		6	180A	10
		6	210A	8
		6	230A	8
		6	250A	6
		6	440A	4
		6	470A	4
		6	510A	6
		6	530A	8
		6	550A	10

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
NAS1291C08		6	580A	8
		6	600A	8
		6	620A	6
		26	180A	16
NAS1291C3		20	70A	4
		20	100A	4
		28	50A	8
		28	110A	4
		28	140A	8
		28	170A	8
		28	200A	8
		28	230A	4
		28	260A	4
		28	273A	4
NAS1291C4		18	-120B	8
SUP SDS 649-261-011-0		18	-200B	8
SUP SDS 649-261-011-0		18	-350B	8
SUP SDS 649-261-011-0		18	-440B	6
NAS1291C5		18	472A	2
		2	20A	4
		2	210A	4
		2	300A	4
NAS1587-3		20	80A	4
		20	110A	4
NAS1587-3C		7	150A	8
		7	300A	8
		15	-130A	
DELETED		21	110A	2
		21	160A	2
		21	250A	2
		21	310A	2
		23	70A	4
		23	150A	4
		23	230A	4
		23	310A	4
		28	290A	16
NAS1587-4		25	80A	4
		25	160A	4
		25	240A	4
		25	320A	4
		25	370A	16
		25	430A	16
		25A	45A	4

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
NAS 1587-4		25A	125A	4
		25A	205A	4
		25A	285A	4
NAS 1587-4C		5	20A	4
SUP SD BY 649-341-011-0		5	50A	4
SUP SD BY 649-341-011-0		5	390A	4
SUP SD BY 649-341-011-0		5	420A	4
SUP SD BY 649-341-011-0		6	20A	4
SUP SD BY 649-341-011-0		6	50A	4
SUP SD BY 649-341-011-0		6	390A	4
SUP SD BY 649-341-011-0		6	420A	4
SUP SD BY 649-341-011-0		15	- 80A	
DELETED		16	90A	24
		16	150A	12
		17	40A	4
		17	80A	4
		18	55A	2
		19	80A	2
		19	180A	2
		22A	95A	2
		22A	175A	2
		22B	240A	2
		22B	295A	2
		22C	385A	16
		22C	425A	16
		22D	485A	16
		22D	525A	16
		25	30A	4
		25	60A	4
		25	110A	4
		25	140A	4
		25	190A	4
		25	220A	4
		25	270A	4
		25	300A	4
		25	350A	16
		25	410A	16
NAS 1587-4L		1	50A	AR
		1	240A	AR

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
NAS 1587-4L		17	300A	4
		18	40A	4
		19	240A	1
		19	-320A	1
		19	440A	2
		20	130A	4
		22C	370A	2
		22C	410A	2
		22D	470A	2
		22D	510A	2
NAS 1587-5C		7	110A	8
		7	260A	8
		24	60A	2
		24	110A	2
NAS 1587-6		17	260A	4
NAS 1587-6C		17	360A	4
NAS 1671-08L3		10	500A	12
		10	540A	12
		10	580A	14
		10	620A	6
NAS 560HK4P22		8	40A	2
		8	170A	2
		8	300A	2
		8	430A	2
		8	540A	4
NAS 6303U1		28	272A	4
NAS 6303U10		1	110A	8
SUP SD BY NAS6303U11				
SEL FROM		1	300A	8
SUP SD BY NAS6303U11				
SEL FROM		1	-110B	8
NAS 6303U11				
SUP SDS NAS6303U10		1	-300B	8
SEL FROM				
SUP SDS NAS6303U10		1	-112B	AR
SEL FROM		1	-302B	AR
SUP SDS NAS6303U9				
SEL FROM		19	10A	14
NAS 6303U2		19	110A	14
		27	10A	
DELETED				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
NAS 6303U2		28	40A	8
		28	100A	4
SEL FROM				
		28	130A	8
		28	190A	8
		28	220A	4
		28	250A	4
NAS 6303U3		15	-120A	
DELETED				
		27	30A	
DELETED				
		28	280A	16
NAS 6303U4		11	30A	104
		11	60A	104
		11	90A	104
		11	120A	104
		22A	120A	2
		22A	195A	2
		22B	250A	2
		22B	300A	2
		22B	330A	2
NAS 6303U5		20	120A	4
NAS 6303U6		28	-105A	AR
SEL FROM				
NAS 6303U7		22A	110A	2
		22A	180A	4
		22B	245A	4
		22B	320A	2
NAS 6303U8		28	70A	16
NAS 6303U9		1	-112A	AR
SUP SD BY NAS6303U12				
SEL FROM		1	-302A	AR
SUP SD BY NAS6303U12				
SEL FROM		22A	100A	2
		22B	310A	2
NAS 6304U10		1	-132A	AR
SEL FROM				
		1	-322A	AR
SEL FROM				
NAS 6304U11		1	-122A	AR
SEL FROM				
		1	130A	16
SEL FROM				
		1	-312A	AR
SEL FROM				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
NAS 6304U11		1	320A	16
SEL FROM				
NAS 6304U12		1	120A	16
SEL FROM				
		1	-134A	AR
SEL FROM				
		1	310A	16
SEL FROM				
		1	-324A	AR
SEL FROM				
NAS 6304U13		1	-124A	AR
SEL FROM				
		1	-314A	AR
SEL FROM				
NAS 6304U16		1	-143A	AR
SEL FROM				
		1	-333A	AR
SEL FROM				
NAS 6304U17		1	140A	48
SEL FROM				
		1	330A	48
SEL FROM				
NAS 6304U18		1	- 63A	AR
SEL FROM				
		1	-147A	AR
SEL FROM				
		1	-253A	AR
SEL FROM				
		1	-327A	AR
SEL FROM				
NAS 6304U19		1	60A	32
SEL FROM				
		1	250A	32
SEL FROM				
NAS 6304U20		1	- 67A	AR
SEL FROM				
		1	-257A	AR
SEL FROM				
NAS 6304U21		1	- 23A	AR
SEL FROM				
		1	-213A	AR
SEL FROM				
NAS 6304U22		1	20A	9
SEL FROM				
OPT TO 302-023-700-0				
		1	210A	8
SEL FROM				
OPT TO 302-023-700-0				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
NAS 6304 U23		1	- 27A	AR
SEL FROM		1	-217A	AR
SEL FROM		1	-183A	AR
NAS 6304 U3		1	-373A	AR
SEL FROM		15	- 70A	
DEL ETED		1	180A	40
NAS 6304 U4		1	370A	40
SEL FROM		22	40A	16
NAS 6304 U5		1	-187A	AR
SEL FROM		1	-377A	AR
SEL FROM		5	10A	4
		5	40A	4
		5	380A	4
		5	410A	4
		6	10A	4
		6	40A	4
		6	380A	4
		6	410A	4
		22C	380A	16
		22C	420A	16
		22D	480A	16
		22D	520A	16
NAS 6304 U8		17	30A	4
		17	70A	4
		19	70A	2
		19	170A	2
		22C	365A	2
		22C	405A	2
		22D	465A	2
		22D	505A	2
NAS 6304 U9		5	-290B	4
SUP SDS NAS6704U7		5	-360B	4
SUP SDS NAS6704U7		5	-660B	4
SUP SDS NAS6704U7		5	-730B	4
SUP SDS NAS6704U7				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
NAS 6304U9		6	-290B	4
SUP SDS NAS6704U7		6	-360B	4
SUP SD S NAS6704U7		6	-660B	4
SUP SDS NAS6704U7		6	-730B	4
SUP SD S NAS6704U7		19	250A	1
NAS 6704 DU14		19	-330A	1
SUP SD BY 301-154-200-0		19	450A	2
SUP SD BY 301-154-200-0		17	310A	4
NAS 6704 DU16		18	476A	2
SUP SD BY 301-154-300-0		22A	90A	2
NAS 6704 U19		22A	170A	2
NAS 6704 U5		22B	235A	2
		22B	290A	2
NAS 6704 U7		5	290A	4
SUP SD BY NAS6304U9		5	310A	4
		5	340A	4
		5	360A	24
SUP SD BY NAS6304U9		5	660A	4
SUP SD BY NAS6304U9		5	680A	4
		5	710A	4
		5	730A	24
SUP SD BY NAS6304U9		6	290A	4
SUP SD BY NAS6304U9		6	310A	4
		6	340A	4
		6	360A	24
SUP SD BY NAS6304U9		6	660A	4
SUP SD BY NAS6304U9		6	680A	4
		6	710A	4
		6	730A	24
SUP SD BY NAS6304U9		24	50A	2
NAS 6705 DU14		24	100A	2
NAS 6705 DU15				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
NAS 6706 DU14		17	270A	4
SUP SD BY 301-154-400-0				
NAS 6706 DU15		17	350A	4
NSA 8620-0021		17	120A	2
		17	180A	2
NSA 8620-0023		18	170A	2
		18	250A	2
SL3 134C 3		9	120A	4
		9	150A	4
		9	180A	4
		9	210A	4
		9	240A	8
		9	260A	16
		9	380A	4
		9	410A	4
		9	440A	4
		9	470A	4
		9	500A	8
		9	520A	16
SPI RATE MP3P		26	-250A	AR
		27	-220A	AR
SP9 OC5		2	80A	4
TE9925-6		2	400A	16
OPT TO BAS9317C6				
		16	30A	16
OPT TO BAS9317C6				
TLN1000C3		15	-110A	
DELETED				
TLN1000C4		15	- 60A	
DELETED				
		17	20A	4
		17	60A	4
		19	50A	2
		19	150A	2

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
121326-8-1		16	70A	4
121524-7-1		16	10A	16
SUPSD BY 121524-8-1				
121524-8-1		16	- 10B	16
SUPSD BY 121524-8-2				
SUPSDS 121524-7-1				
121524-8-2		16	- 10C	16
SUPSDS 121524-8-1				
121708-1		15	10A	2
121708-2		15	20A	2
121708-3		15	30A	4
121708-4		15	40A	2
121708-5		15	160A	2
121708-6		15	50A	4
121708-7		15	170A	2
121708-9		15	150A	2
126464-1-6		17	230A	2
SUPSD BY 126464-1-7				
126464-1-7		17	-230B	2
SUPSDS 126464-1-6				
126464-1-7				
SUPSDS BY 126464-1-8				
126464-1-8		17	-230C	2
SUPSDS 126464-1-7				
126464-1-8				
SUPSDS BY 126464-1-9				
126464-1-9		17	-230D	2
SUPSDS 126464-1-8				
126464-1-9				
SUPSDS BY 126464-1-10				
126464-1-10		17	-230E	2
SUPSDS 126464-1-9				
126464-1-10				
SUPSDS BY 126464-2				
126464-2		17	-230F	2
SUPSDS 126464-1-10				
15363-20		18	189A	1
OPT TO 9121A20				
		18	420A	2
OPT TO 9121A20				
		18	510A	2
OPT TO 9121A20				
15363-3		18	187A	1
OPT TO 9121A3				
		18	655A	1
OPT TO 9121A3				
21T10		27	180A	2
21T12		30	20A	4

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
21T4		18	597A	2
21T8		30	10A	28
21215TC3208		9A	572A	4
		9A	622A	4
		9A	672A	4
		9A	722A	4
21215TC4008		22	275A	14
		22A	75A	14
		22A	145A	10
		22B	210A	10
		22C	350A	10
		22C	390A	10
		22D	450A	10
		22D	490A	10
21217TC3207		22A	60A	8
		22A	135A	4
		22B	200A	4
		22B	265A	4
24540-150		18	160A	2
		18	240A	2
29-35976		30	- 50A	16
29-35979		30	-160A	16
300-851-600-0		2	260A	4
OPT TO 300-851-601-0				
300-851-650-0		2	350A	4
OPT TO 300-851-651-0				
300-852-204-0		8	630A	2
300-855-500-0		2	50A	4
		2	70A	4
		2	240A	4
		2	330A	4
300-855-600-0		17	320A	4
300-855-800-0		8	120A	1
		8	250A	1
		8	380A	1
		8	510A	1
		8	620A	2
300-855-902-0		2	200A	8
		2	290A	8
		2	380A	8
300-859-501-0		2	420A	16
300-859-601-0		16	50A	16
300-862-202-0		9	10A	1
		9	-271A	1
300-862-252-0		9	- 11A	1
		9	270A	1
300-864-700-0		2	30A	4
		2	220A	4
		2	310A	4

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
300-865-300-0		19	-210A	1
300-875-204-0		8	130A	1
		8	260A	1
		8	390A	1
		8	520A	1
300-879-401-0		19	480A	1
300-879-500-0		19	280A	1
300-879-600-0		19	-360A	1
300-879-702-0		19	-410A	2
300-879-800-0		19	-290A	1
300-886-000-0		2	60A	4
300-887-700-0		9	130A	4
		9	160A	4
		9	190A	4
		9	220A	4
		9	390A	4
		9	420A	4
		9	450A	4
		9	480A	4
300-887-800-0		9	100A	4
		9	360A	4
300-888-600-0		20	150A	4
300-888-701-0		20	170A	2
300-889-804-0		8	-530A	4
300-889-901-0		8	550A	4
300-890-610-0		23	90A	1
300-890-660-0		23	- 91A	1
300-892-800-0		18	100A	1
300-898-800-0		3	480A	2
SUPSD BY 300-898-801-0				
300-898-801-0		3	-480B	2
SUPSDS 300-898-800-0				
300-898-900-0		3	430A	2
SUPSD BY 300-898-901-0				
300-898-901-0		3	-430B	2
SUPSDS 300-898-900-0				
300-899-510-0		23	250A	1
300-899-560-0		23	-251A	1
300-899-600-0		18	60A	2
		18	600A	1
		19	400A	2
		19	520A	2
300-899-700-0		18	70A	2
		18	610A	1
		18	390A	2
		19	510A	2
300-900-200-0		11	70A	8
300-900-250-0		11	100A	8

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
300-900-300-0		11	10A	8
300-900-350-0		11	40A	8
300-900-600-0		11	130A	8
300-900-700-0		11	140A	16
300-900-800-0		11	150A	8
301-002-700-0		16	130A	4
		16	180A	2
301-002-800-0		16	-110A	8
		16	-160A	4
301-003-900-0		2	250A	4
		2	340A	4
301-004-000-0		3	350A	1
SUPSD BY 301-004-001-0				
301-004-001-0		3	-350B	1
SUPSD BY 301-004-002-0				
SUPSDS 301-004-000-0				
301-004-002-0		3	-350C	1
SUPSDS 301-004-001-0				
301-004-050-0		3	-351A	1
SUPSD BY 301-004-051-0				
301-004-051-0		3	-351B	1
SUPSD BY 301-004-052-0				
SUPSDS 301-004-050-0				
301-004-052-0		3	-351C	1
SUPSDS 301-004-051-0				
301-005-500-0		18	- 10A	2
301-006-100-0		17	370A	2
		17	390A	2
		19	380A	2
		19	500A	2
301-006-200-0		17	400A	2
301-006-300-0		19	370A	2
		19	490A	2
301-006-400-0		17	380A	2
301-006-601-0		8	30A	1
		8	-161A	1
301-006-651-0		8	- 31A	1
		8	160A	1
301-008-300-0		3	410A	2
		3	460A	2
301-009-810-0		23	10A	1
301-009-860-0		23	- 11A	1
301-011-110-0		23	170A	1
301-011-160-0		23	-171A	1
301-022-904-0		8	- 10A	2
		8	-140A	2
		8	-270A	2
		8	-400A	2

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-028-301-0		18	280A	1
OPT TO 301-028-300-0				
		18	-300A	1
OPT TO 301-028-300-0				
301-032-401-0		22	30A	4
301-037-511-0		18	550A	2
301-040-301-0		8	290A	1
		8	-421A	1
301-040-351-0		8	-291A	1
		8	420A	1
301-046-001-0		19	40A	2
		19	140A	2
301-046-202-0		17	50A	4
301-056-201-0		3	10A	1
SUPSD BY 301-056-203-0				
OPT TO 301-056-202-0				
301-056-203-0		3	- 10B	1
SUPSDS 301-056-201-0				
301-056-250-0		3	-150A	1
SUPSD BY 301-056-252-0				
OPT TO 301-056-251-0				
301-056-252-0		3	-150B	1
SUPSDS 301-056-250-0				
301-056-300-0		3	170A	1
SUPSD BY 301-056-302-0				
OPT TO 301-056-301-0				
301-056-302-0		3	-170B	1
SUPSDS 301-056-300-0				
301-056-351-0		3	-190A	1
SUPSD BY 301-056-353-0				
OPT TO 301-056-352-0				
301-056-353-0		3	-190B	1
SUPSDS 301-056-351-0				
301-057-800-0		3	-390A	4
SUPSD BY 301-057-801-0				
301-057-801-0		3	-390B	4
SUPSDS 301-057-800-0				
301-057-900-0		3	-440A	4
SUPSD BY 301-057-901-0				
301-057-901-0		3	-440B	4
SUPSDS 301-057-900-0				
301-058-400-0		4	30A	1
SUPSD BY 301-058-401-0				
		4	- 51A	1
SUPSD BY 301-058-401-0				
301-058-401-0		4	- 30B	1
SUPSDS 301-058-400-0				
		4	- 51B	1
SUPSDS 301-058-400-0				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-058-450-0		4	- 31A	1
SUPSD BY 301-058-451-0		4	50A	1
SUPSD BY 301-058-451-0		4	- 31B	1
301-058-451-0		4	- 50B	1
SUPSDS 301-058-450-0		3	370A	1
SUPSD BY 301-058-701-0		3	-370B	1
301-058-701-0		3	-370C	1
SUPSD BY 301-058-702-0		3	-371A	1
SUPSDS 301-058-700-0		3	-371B	1
301-058-702-0		3	-371C	1
SUPSDS 301-058-701-0		4	70A	1
301-058-750-0		4	-101A	1
SUPSD BY 301-058-751-0		4	- 70B	1
301-058-751-0		4	-101B	1
SUPSD BY 301-058-752-0		4	- 70C	1
SUPSDS 301-058-750-0		4	-101C	1
301-058-752-0		4	- 70D	1
SUPSDS 301-058-751-0		4	-101D	1
301-058-903-0		4	- 71A	1
SUPSD BY 301-058-905-0				
SUPSD BY 301-058-905-0				
301-058-905-0				
SUPSD BY 301-058-907-0				
SUPSDS 301-058-903-0				
OPT TO 301-058-906-0				
SUPSD BY 301-058-907-0				
SUPSDS 301-058-903-0				
OPT TO 301-058-906-0				
301-058-907-0				
SUPSD BY 301-058-909-0				
SUPSDS 301-058-905-0				
OPT TO 301-058-908-0				
SUPSD BY 301-058-909-0				
SUPSDS 301-058-905-0				
OPT TO 301-058-908-0				
301-058-909-0				
SUPSDS 301-058-907-0				
SUPSDS 301-058-907-0				
301-058-953-0				
SUPSD BY 301-058-955-0				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
SUPSD BY 301-058-955-0		4	100A	1
301-058-955-0		4	- 71B	1
SUPSD BY 301-058-957-0				
SUPSDS 301-058-953-0				
OPT TO 301-058-956-0		4	-100B	1
SUPSD BY 301-058-957-0				
SUPSDS 301-058-953-0				
OPT TO 301-058-956-0				
301-058-957-0		4	- 71C	1
SUPSD BY 301-058-959-0				
SUPSDS 301-058-955-0				
OPT TO 301-058-958-0		4	-100C	1
SUPSD BY 301-058-959-0				
SUPSDS 301-058-955-0				
OPT TO 301-058-958-0		4	- 71D	1
301-058-959-0				
SUPSDS 301-058-957-0		4	-100D	1
SUPSDS 301-058-957-0				
301-059-321-0		12	10A	8
SUPSD BY 301-059-324-0				
301-059-324-0		12	- 10B	8
SUPSDS 301-059-321-0				
OPT TO 301-059-323-0				
301-059-921-0		14	10A	8
SUPSD BY 301-059-926-0				
301-059-926-0		14	- 10B	8
SUPSDS 301-059-921-0				
OPT TO 301-059-925-0				
301-060-400-0		3	-331A	1
SUPSD BY 301-060-401-0				
301-060-401-0		3	-331B	1
SUPSD BY 301-060-402-0				
SUPSDS 301-060-400-0				
301-060-402-0		3	-331C	1
SUPSD BY 301-060-403-0				
SUPSDS 301-060-401-0				
301-060-403-0		3	-331D	1
SUPSDS 301-060-402-0				
301-060-600-0		31	- 2A	RF
SUPSD BY 301-060-601-0		3	330A	1
301-060-601-0				
SUPSD BY 301-060-602-0		3	-330B	1
SUPSDS 301-060-600-0				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-060-602-0		3	-330C	1
SUPSD BY 301-060-603-0				
SUPSDS 301-060-601-0				
301-060-603-0		3	-330D	1
SUPSDS 301-060-602-0				
301-061-101-0		31	- 1A	RF
DELETED		15	- 90A	
301-061-200-0				
DELETED		15	-100A	
301-063-612-0		5	260A	1
301-063-662-0		5	-261A	1
301-063-812-0		5	630A	1
301-063-862-0		5	-631A	1
301-064-114-0		5	30A	2
SUPSD BY 301-064-115-0				
301-064-115-0		5	400A	2
SUPSD BY 301-064-115-0				
301-064-115-0		6	30A	2
SUPSD BY 301-064-115-0				
301-064-115-0		6	400A	2
SUPSD BY 301-064-115-0				
301-064-115-0		5	- 30B	2
SUPSD BY 302-039-500-0				
SUPSDS 301-064-114-0		5	-400B	2
SUPSD BY 302-039-500-0				
SUPSDS 301-064-114-0		6	- 30B	2
SUPSD BY 302-039-500-0				
SUPSDS 301-064-114-0		6	-400B	2
SUPSD BY 302-039-500-0				
SUPSDS 301-064-114-0				
301-064-164-0		5	60A	2
SUPSD BY 301-064-165-0				
301-064-165-0		5	430A	2
SUPSD BY 301-064-165-0				
301-064-165-0		6	60A	2
SUPSD BY 301-064-165-0				
301-064-165-0		6	430A	2
SUPSD BY 301-064-165-0				
301-064-165-0		5	- 60B	2
SUPSD BY 302-039-550-0				
SUPSDS 301-064-164-0				
301-064-164-0		5	-430B	2
SUPSD BY 302-039-550-0				
SUPSDS 301-064-164-0				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-064-165-0		6	- 60B	2
SUPSD BY 302-039-550-0				
SUPSDS 301-064-164-0		6	-430B	2
SUPSD BY 302-039-550-0				
SUPSDS 301-064-164-0		16	220A	4
301-064-900-0		16	250A	4
301-065-001-0		6	260A	1
301-065-412-0		6	-631A	1
		6	-261A	1
301-065-462-0		6	630A	1
		13	10A	8
301-065-621-0				
SUPSD BY 301-065-624-0		13	- 10B	8
301-065-624-0				
SUPSDS 301-065-621-0		13	120A	8
OPT TO 301-065-623-0				
301-065-671-0		13	-120B	8
SUPSD BY 301-065-674-0				
301-065-674-0		8	310A	1
SUPSDS 301-065-671-0		8	-441A	1
OPT TO 301-065-673-0		8	-311A	1
301-068-201-0		8	440A	1
		8	180A	1
301-068-251-0		8	-181A	1
		8	50A	1
301-068-301-0		8	- 51A	1
301-068-351-0		3	420A	2
301-068-401-0				
301-068-451-0		3	470A	2
301-068-700-0		3	-420B	2
SUPSD BY 301-068-701-0		3	-470B	2
SUPSD BY 301-068-701-0		16	100A	AR
301-068-701-0		16	190A	AR
SUPSDS 301-068-700-0		17	170A	2
		17	110A	2
SUPSDS 301-068-700-0		20	20A	32
301-069-601-0		20	- 20B	32
		24	140A	1
301-074-802-0		24	- 10A	2
301-074-902-0				
301-076-201-0				
SUPSD BY 301-076-202-0				
301-076-202-0				
SUPSDS 301-076-201-0				
301-087-500-0				
301-087-800-0				

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-087-900-0		24	120A	1
301-088-000-0		24	160A	1
		24	170A	2
301-088-100-0		24	150A	1
		24	180A	2
301-090-900-0		15	-140A	
DELETED				
301-091-000-0		20	40A	2
301-091-200-0		20	10A	12
SUPSD BY 301-091-201-0				
301-091-201-0		20	- 10B	12
SUPSDS 301-091-200-0				
301-092-201-0		20	60A	2
301-093-911-0		5	190A	1
		5	560A	1
		6	190A	1
		6	560A	1
301-098-003-0		25	10A	2
301-098-053-0		25	90A	2
301-098-103-0		25	330A	4
301-098-153-0		25	390A	4
301-098-203-0		25	170A	2
301-098-253-0		25	250A	2
301-098-602-0		25	380A	4
		25	440A	4
301-106-200-0		19	30A	2
301-106-300-0		19	20A	2
301-106-400-0		19	120A	2
301-106-500-0		19	130A	2
301-114-100-0		8	90A	2
		8	220A	2
		8	350A	2
		8	480A	2
		8	590A	4
301-114-200-0		8	80A	2
		8	210A	2
		8	340A	2
		8	470A	2
		8	580A	4
301-114-600-0		8	70A	2
		8	200A	2
		8	330A	2
		8	460A	2
		8	570A	4
301-114-800-0		8	100A	2
		8	230A	2
		8	360A	2
		8	490A	2
		8	600A	4

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-122-801-0		19	200A	2
301-122-901-0		19	100A	2
301-138-100-0		17	90A	4
301-138-200-0		19	60A	2
		19	160A	2
301-138-700-0		25	120A	2
SUPSD BY 61170-428				
		25	280A	2
SUPSD BY 61170-428				
301-138-750-0		25	40A	2
SUPSD BY 61170-428				
		25	200A	2
SUPSD BY 61170-428				
301-142-100-0		2	140A	4
301-142-200-0		2	130A	8
301-142-300-0		2	120A	8
301-142-500-0		2	150A	4
301-142-800-0		27	50A	
DELETED				
301-146-602-0		13	90A	40
		13	200A	40
301-146-702-0		14	90A	24
301-146-803-0		12	30A	16
		12	50A	32
		12	70A	56
		13	30A	32
		13	50A	8
		13	70A	16
		13	110A	8
		13	140A	32
		13	160A	8
		13	180A	16
		13	220A	8
		14	30A	16
		14	50A	32
		14	70A	16
		14	110A	32
		14	130A	56
301-147-211-0		5	240A	2
		5	610A	2
		6	240A	2
		6	610A	2
301-147-261-0		5	130A	2
		5	500A	2
		6	130A	2
		6	500A	2
301-148-810-0		7	10A	8
301-148-860-0		7	160A	8

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-149-411-0		5	170A	2
		5	540A	2
		6	170A	2
		6	540A	2
301-149-511-0		5	200A	2
		5	570A	2
		6	200A	2
		6	570A	2
301-150-311-0		5	220A	2
		5	590A	2
		6	220A	2
		6	590A	2
301-150-361-0		5	150A	2
		5	520A	2
		6	150A	2
		6	520A	2
301-152-707-0		1	100A	8
OPT TO 301-152-708-0				
301-152-757-0		1	290A	8
OPT TO 301-152-758-0				
301-153-400-0		22	10A	8
301-153-500-0		22	20A	4
301-153-700-0		4	10A	2
SUPSD BY 301-153-701-0				
301-153-701-0		4	- 10B	2
SUPSD BY 301-153-702-0				
SUPSDS 301-153-700-0				
301-153-702-0		4	- 10C	2
SUPSDS 301-153-701-0				
301-153-800-0		1	80A	8
		1	270A	8
301-153-900-0		1	160A	8
		1	350A	8
301-154-200-0		19	250B	1
SUPSDS NAS6704DU14				
		19	-330B	1
SUPSDS NAS6704DU14				
		19	450B	2
SUPSDS NAS6704DU14				
301-154-300-0		17	310B	4
SUPSDS NAS6704DU16				
301-154-400-0		17	270B	4
SUPSDS NAS6706DU14				
301-156-400-0		2	160A	4
OPT TO 301-156-401-0				
301-156-450-0		2	170A	4
OPT TO 301-156-451-0				
301-157-101-0		28	90A	8

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-157-500-0		28	300A	4
301-157-600-0		7	40A	16
		7	190A	16
301-203-501-0		1	- 1A	RF
SUPSD BY 301-203-502-0		2	- 1A	RF
SUPSD BY 301-203-502-0		3	- 1A	RF
SUPSD BY 301-203-502-0		4	- 1A	RF
SUPSD BY 301-203-502-0		5	- 1A	RF
SUPSD BY 301-203-502-0		6	- 1A	RF
SUPSD BY 301-203-502-0		7	- 1A	RF
SUPSD BY 301-203-502-0		8	- 1A	RF
SUPSD BY 301-203-502-0		9	- 1A	RF
SUPSD BY 301-203-502-0		10	- 1A	RF
SUPSD BY 301-203-502-0		11	- 1A	RF
SUPSD BY 301-203-502-0		12	- 1A	RF
SUPSD BY 301-203-502-0		13	- 1A	RF
SUPSD BY 301-203-502-0		14	- 1A	RF
SUPSD BY 301-203-502-0		15	- 1A	RF
SUPSD BY 301-203-502-0		16	- 1A	RF
SUPSD BY 301-203-502-0		17	- 1A	RF
SUPSD BY 301-203-502-0		18	- 1A	RF
SUPSD BY 301-203-502-0		19	- 1A	RF
SUPSD BY 301-203-502-0		20	- 1A	RF
SUPSD BY 301-203-502-0		21	- 1A	RF
SUPSD BY 301-203-502-0		22	- 1A	RF

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**OLYMPUS 593****MK. 610-14-28
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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-501-0		23	- 1A	RF
SUPSD BY 301-203-502-0		24	- 1A	RF
SUPSD BY 301-203-502-0		25	- 1A	RF
SUPSD BY 301-203-502-0		26	- 1A	RF
SUPSD BY 301-203-502-0		27	- 1A	RF
SUPSD BY 301-203-502-0		28	- 1A	RF
SUPSD BY 301-203-502-0		29	- 1A	RF
SUPSD BY 301-203-502-0		1	- 1B	RF
301-203-502-0		2	- 1B	RF
SUPSD BY 301-203-503-0		3	- 1B	RF
SUPSDS 301-203-501-0		4	- 1B	RF
SUPSD BY 301-203-503-0		5	- 1B	RF
SUPSDS 301-203-501-0		6	- 1B	RF
SUPSD BY 301-203-503-0		7	- 1B	RF
SUPSDS 301-203-501-0		8	- 1B	RF
SUPSD BY 301-203-503-0		9	- 1B	RF
SUPSDS 301-203-501-0		10	- 1B	RF
SUPSD BY 301-203-503-0		11	- 1B	RF
SUPSDS 301-203-501-0				

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-502-0 SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		12	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		13	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		14	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		15	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		16	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		17	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		18	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		19	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		20	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		21	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		22	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		23	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		24	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		25	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		26	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		27	- 1B	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-502-0 SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0		28	- 1B	RF
SUPSD BY 301-203-503-0 SUPSDS 301-203-501-0 301-203-503-0		29	- 1B	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		1	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		2	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		3	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		4	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		5	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		6	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		7	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		8	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		9	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		10	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		11	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		12	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		13	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		14	- 1C	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-503-0 SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		15	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		16	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		17	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		18	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		19	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		20	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		21	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		22	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		23	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		24	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		25	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		26	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		27	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		28	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0		29	- 1C	RF
SUPSD BY 301-203-504-0 SUPSDS 301-203-502-0 301-203-504-0 SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		1	- 1D	RF

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**OLYMPUS 593****MK. 610-14-28
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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-504-0 SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		2	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		3	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		4	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		5	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		6	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		7	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		8	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		9	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		10	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		11	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		12	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		13	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		14	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		15	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		16	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		17	- 1D	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-504-0 SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		18	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		19	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		20	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		21	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		22	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		23	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		24	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		25	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		26	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		27	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		28	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0		29	- 1D	RF
SUPSD BY 301-203-505-0 SUPSDS 301-203-503-0 301-203-505-0 SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		1	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		2	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		3	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		4	- 1E	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-505-0 SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		5	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		6	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		7	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		8	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		9	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		10	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		11	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		12	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		13	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		14	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		15	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		16	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		17	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		18	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		19	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		20	- 1E	RF

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-505-0 SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		21	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		22	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		23	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		24	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		25	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		26	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		27	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		28	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0		29	- 1E	RF
SUPSD BY 301-203-506-0 SUPSDS 301-203-504-0 301-203-506-0 SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		1	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		2	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		3	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		4	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		5	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		6	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		7	- 1F	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-506-0 SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		8	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		9	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		10	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		11	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		12	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		13	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		14	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		15	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		16	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		17	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		18	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		19	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		20	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		21	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		22	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		23	- 1F	RF

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-506-0 SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		24	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		25	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		26	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		27	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		28	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0		29	- 1F	RF
SUPSD BY 301-203-507-0 SUPSDS 301-203-505-0 301-203-507-0		1	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		2	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		3	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		4	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		5	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		6	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		7	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		8	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		9	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		10	- 1G	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-507-0 SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		11	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		12	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		13	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		14	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		15	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		16	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		17	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		18	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		19	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		20	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		21	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		22	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		23	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		24	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		25	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		26	- 1G	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-507-0 SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		27	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		28	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0		29	- 1G	RF
SUPSD BY 301-203-508-0 SUPSDS 301-203-506-0 301-203-508-0 SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		1	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		2	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		3	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		4	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		5	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		6	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		7	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		8	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		9	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		10	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		11	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		12	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		13	- 1H	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-508-0 SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		14	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		15	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		16	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		17	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		18	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		19	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		20	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		21	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		22	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		23	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		24	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		25	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		26	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		27	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		28	- 1H	RF
SUPSD BY 301-203-509-0 SUPSDS 301-203-507-0		29	- 1H	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-509-0 SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		1	- 1J	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		2	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		3	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		4	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		5	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		6	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		7	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		8	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		9	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		10	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		11	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		12	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		13	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		14	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		15	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		16	- 1F	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-509-0 SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		17	- 1J	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		18	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		19	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		20	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		21	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		22	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		23	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		24	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		25	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		26	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		27	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		28	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0		29	- 1F	RF
SUPSD BY 301-203-510-0 SUPSDS 301-203-508-0 301-203-510-0 SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		1	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		2	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		3	- 1K	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-510-0 SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		4	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		5	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		6	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		7	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		8	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		9	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		10	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		11	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		12	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		13	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		14	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		15	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		16	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		17	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		18	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		19	- 1K	RF

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-510-0 SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		20	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		21	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		22	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		23	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		24	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		25	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		26	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		27	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		28	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0		29	- 1K	RF
SUPSD BY 301-203-511-0 SUPSDS 301-203-509-0 301-203-511-0 SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		1	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		2	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		3	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		4	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		5	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		6	- 1L	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL**

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-511-0 SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		7	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		8	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		9	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		10	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		11	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		12	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		13	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		14	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		15	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		16	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		17	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		18	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		19	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		20	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		21	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		22	- 1L	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-511-0 SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		23	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		24	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		25	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		26	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		27	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		28	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0		29	- 1L	RF
SUPSD BY 301-203-512-0 SUPSDS 301-203-510-0 301-203-512-0		1	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		2	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		3	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		4	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		5	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		6	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		7	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		8	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		9	- 1M	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-512-0 SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		10	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		11	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		12	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		13	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		14	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		15	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		16	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		17	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		18	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		19	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		20	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		21	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		22	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		23	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		24	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		25	- 1M	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28
OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-512-0 SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		26	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		27	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		28	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0		29	- 1M	RF
SUPSD BY 301-203-513-0 SUPSDS 301-203-511-0 301-203-513-0		1	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		2	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		3	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		4	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		5	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		6	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		7	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		8	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		9	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		10	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		11	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		12	- 1N	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-513-0 SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		13	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		14	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		15	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		16	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		17	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		18	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		19	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		20	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		21	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		22	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		23	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		24	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		25	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		26	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		27	- 1N	RF
SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0		28	- 1N	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-513-0 SUPSD BY 301-203-514-0 SUPSDS 301-203-512-0 301-203-514-0 SUPSDS 301-203-513-0		29	- 1N	RF
SUPSDS 301-203-513-0		1	- 1P	RF
SUPSDS 301-203-513-0		2	- 1P	RF
SUPSDS 301-203-513-0		3	- 1P	RF
SUPSDS 301-203-513-0		4	- 1P	RF
SUPSDS 301-203-513-0		5	- 1P	RF
SUPSDS 301-203-513-0		6	- 1P	RF
SUPSDS 301-203-513-0		7	- 1P	RF
SUPSDS 301-203-513-0		8	- 1P	RF
SUPSDS 301-203-513-0		9	- 1P	RF
SUPSDS 301-203-513-0		10	- 1P	RF
SUPSDS 301-203-513-0		11	- 1P	RF
SUPSDS 301-203-513-0		12	- 1P	RF
SUPSDS 301-203-513-0		13	- 1P	RF
SUPSDS 301-203-513-0		14	- 1P	RF
SUPSDS 301-203-513-0		15	- 1P	RF
SUPSDS 301-203-513-0		16	- 1P	RF
SUPSDS 301-203-513-0		17	- 1P	RF
SUPSDS 301-203-513-0		18	- 1P	RF
SUPSDS 301-203-513-0		19	- 1P	RF
SUPSDS 301-203-513-0		20	- 1P	RF
SUPSDS 301-203-513-0		21	- 1P	RF
SUPSDS 301-203-513-0		22	- 1P	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-514-0		23	- 1P	RF
SUPSDS 301-203-513-0		24	- 1P	RF
SUPSDS 301-203-513-0		25	- 1P	RF
SUPSDS 301-203-513-0		26	- 1P	RF
SUPSDS 301-203-513-0		27	- 1P	RF
SUPSDS 301-203-513-0		28	- 1P	RF
SUPSDS 301-203-513-0		29	- 1P	RF
SUPSDS 301-203-513-0		1	- 2A	RF
301-203-601-0		2	- 2A	RF
SUPSD BY 301-203-602-0		3	- 2A	RF
SUPSD BY 301-203-602-0		4	- 2A	RF
SUPSD BY 301-203-602-0		5	- 2A	RF
SUPSD BY 301-203-602-0		6	- 2A	RF
SUPSD BY 301-203-602-0		7	- 2A	RF
SUPSD BY 301-203-602-0		8	- 2A	RF
SUPSD BY 301-203-602-0		9	- 2A	RF
SUPSD BY 301-203-602-0		10	- 2A	RF
SUPSD BY 301-203-602-0		11	- 2A	RF
SUPSD BY 301-203-602-0		12	- 2A	RF
SUPSD BY 301-203-602-0		13	- 2A	RF
SUPSD BY 301-203-602-0		14	- 2A	RF
SUPSD BY 301-203-602-0		15	- 2A	RF
SUPSD BY 301-203-602-0		16	- 2A	RF
SUPSD BY 301-203-602-0		17	- 2A	RF
SUPSD BY 301-203-602-0				

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28
OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-601-0		18	- 2A	RF
SUPSD BY 301-203-602-0		19	- 2A	RF
SUPSD BY 301-203-602-0		20	- 2A	RF
SUPSD BY 301-203-602-0		21	- 2A	RF
SUPSD BY 301-203-602-0		22	- 2A	RF
SUPSD BY 301-203-602-0		23	- 2A	RF
SUPSD BY 301-203-602-0		24	- 2A	RF
SUPSD BY 301-203-602-0		25	- 2A	RF
SUPSD BY 301-203-602-0		26	- 2A	RF
SUPSD BY 301-203-602-0		27	- 2A	RF
SUPSD BY 301-203-602-0		28	- 2A	RF
SUPSD BY 301-203-602-0		29	- 2A	RF
SUPSD BY 301-203-602-0		1	- 2B	RF
SUPSD BY 301-203-603-0		2	- 2B	RF
SUPSDS 301-203-601-0		3	- 2B	RF
SUPSD BY 301-203-603-0		4	- 2B	RF
SUPSDS 301-203-601-0		5	- 2B	RF
SUPSD BY 301-203-603-0		6	- 2B	RF
SUPSDS 301-203-601-0		7	- 2B	RF
SUPSD BY 301-203-603-0		8	- 2B	RF
SUPSDS 301-203-601-0				

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-602-0 SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		9	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		10	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		11	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		12	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		13	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		14	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		15	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		16	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		17	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		18	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		19	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		20	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		21	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		22	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		23	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		24	- 2B	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28
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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-602-0 SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		25	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		26	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		27	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		28	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0		29	- 2B	RF
SUPSD BY 301-203-603-0 SUPSDS 301-203-601-0 301-203-603-0		1	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		2	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		3	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		4	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		5	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		6	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		7	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		8	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		9	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		10	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		11	- 2C	RF

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-603-0 SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		12	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		13	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		14	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		15	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		16	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		17	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		18	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		19	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		20	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		21	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		22	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		23	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		24	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		25	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		26	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		27	- 2C	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-603-0 SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0		28	- 2C	RF
SUPSD BY 301-203-604-0 SUPSDS 301-203-602-0 301-203-604-0		29	- 2C	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		1	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		2	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		3	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		4	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		5	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		6	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		7	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		8	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		9	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		10	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		11	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		12	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		13	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		14	- 2D	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-604-0 SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		15	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		16	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		17	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		18	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		19	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		20	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		21	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		22	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		23	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		24	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		25	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		26	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		27	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		28	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0		29	- 2D	RF
SUPSD BY 301-203-605-0 SUPSDS 301-203-603-0 301-203-605-0 SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		1	- 2E	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28
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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-605-0 SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		2	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		3	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		4	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		5	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		6	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		7	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		8	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		9	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		10	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		11	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		12	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		13	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		14	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		15	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		16	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		17	- 2E	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-605-0 SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		18	- 2E	RF
		19	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		20	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		21	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		22	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		23	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		24	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		25	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		26	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		27	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		28	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0		29	- 2E	RF
SUPSD BY 301-203-606-0 SUPSDS 301-203-604-0 301-203-606-0 SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		1	- 2F	RF
		2	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		3	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		4	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0				

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28
OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-606-0 SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		5	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		6	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		7	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		8	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		9	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		10	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		11	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		12	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		13	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		14	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		15	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		16	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		17	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		18	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		19	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		20	- 2F	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-606-0 SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		21	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		22	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		23	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		24	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		25	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		26	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		27	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		28	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0		29	- 2F	RF
SUPSD BY 301-203-607-0 SUPSDS 301-203-605-0 301-203-607-0		1	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		2	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		3	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		4	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		5	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		6	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		7	- 2G	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28
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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-607-0 SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		8	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		9	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		10	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		11	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		12	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		13	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		14	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		15	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		16	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		17	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		18	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		19	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		20	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		21	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		22	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		23	- 2G	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-607-0 SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		24	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		25	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		26	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		27	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		28	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0		29	- 2G	RF
SUPSD BY 301-203-608-0 SUPSDS 301-203-606-0 301-203-608-0 SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		1	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		2	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		3	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		4	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		5	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		6	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		7	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		8	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		9	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		10	- 2H	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-608-0 SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		11	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		12	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		13	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		14	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		15	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		16	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		17	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		18	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		19	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		20	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		21	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		22	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		23	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		24	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		25	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		26	- 2H	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-608-0 SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		27	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		28	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0		29	- 2H	RF
SUPSD BY 301-203-609-0 SUPSDS 301-203-607-0 301-203-609-0		1	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		2	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		3	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		4	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		5	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		6	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		7	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		8	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		9	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		10	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		11	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		12	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		13	- 2J	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-609-0 SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		14	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		15	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		16	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		17	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		18	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		19	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		20	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		21	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		22	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		23	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		24	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		25	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		26	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		27	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		28	- 2J	RF
SUPSD BY 301-203-610-0 SUPSDS 301-203-608-0		29	- 2J	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-610-0 SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		1	- 2K	RF
		2	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		3	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		4	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		5	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		6	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		7	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		8	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		9	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		10	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		11	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		12	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		13	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		14	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		15	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		16	- 2K	RF

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-610-0 SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		17	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		18	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		19	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		20	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		21	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		22	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		23	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		24	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		25	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		26	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		27	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		28	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0		29	- 2K	RF
SUPSD BY 301-203-611-0 SUPSDS 301-203-609-0 301-203-611-0		1	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		2	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		3	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0				

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-611-0 SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		4	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		5	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		6	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		7	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		8	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		9	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		10	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		11	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		12	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		13	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		14	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		15	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		16	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		17	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		18	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		19	- 2L	RF

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**OLYMPUS 593****MK. 610-14-28
OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-611-0 SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		20	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		21	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		22	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		23	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		24	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		25	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		26	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		27	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		28	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0		29	- 2L	RF
SUPSD BY 301-203-612-0 SUPSDS 301-203-610-0 301-203-612-0		1	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		2	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		3	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		4	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		5	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		6	- 2M	RF

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-612-0 SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		7	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		8	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		9	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		10	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		11	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		12	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		13	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		14	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		15	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		16	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		17	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		18	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		19	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		20	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		21	- 2M	RF
SUPSD BY 301-203-613-0 SUPSDS 301-203-611-0		22	- 2M	RF

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-612-0		23	- 2M	RF
SUPSD BY 301-203-613-0				
SUPSDS 301-203-611-0				
		24	- 2M	RF
SUPSD BY 301-203-613-0				
SUPSDS 301-203-611-0				
		25	- 2M	RF
SUPSD BY 301-203-613-0				
SUPSDS 301-203-611-0				
		26	- 2M	RF
SUPSD BY 301-203-613-0				
SUPSDS 301-203-611-0				
		27	- 2M	RF
SUPSD BY 301-203-613-0				
SUPSDS 301-203-611-0				
		28	- 2M	RF
SUPSD BY 301-203-613-0				
SUPSDS 301-203-611-0				
		29	- 2M	RF
SUPSD BY 301-203-613-0				
SUPSDS 301-203-611-0				
301-203-613-0		1	- 2N	RF
SUPSDS 301-203-612-0				
		2	- 2N	RF
SUPSDS 301-203-612-0				
		3	- 2N	RF
SUPSDS 301-203-612-0				
		4	- 2N	RF
SUPSDS 301-203-612-0				
		5	- 2N	RF
SUPSDS 301-203-612-0				
		6	- 2N	RF
SUPSDS 301-203-612-0				
		7	- 2N	RF
SUPSDS 301-203-612-0				
		8	- 2N	RF
SUPSDS 301-203-612-0				
		9	- 2N	RF
SUPSDS 301-203-612-0				
		10	- 2N	RF
SUPSDS 301-203-612-0				
		11	- 2N	RF
SUPSDS 301-203-612-0				
		12	- 2N	RF
SUPSDS 301-203-612-0				
		13	- 2N	RF
SUPSDS 301-203-612-0				

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
301-203-613-0		14	- 2N	RF
SUPSDS 301-203-612-0		15	- 2N	RF
SUPSDS 301-203-612-0		16	- 2N	RF
SUPSDS 301-203-612-0		17	- 2N	RF
SUPSDS 301-203-612-0		18	- 2N	RF
SUPSDS 301-203-612-0		19	- 2N	RF
SUPSDS 301-203-612-0		20	- 2N	RF
SUPSDS 301-203-612-0		21	- 2N	RF
SUPSDS 301-203-612-0		22	- 2N	RF
SUPSDS 301-203-612-0		23	- 2N	RF
SUPSDS 301-203-612-0		24	- 2N	RF
SUPSDS 301-203-612-0		25	- 2N	RF
SUPSDS 301-203-612-0		26	- 2N	RF
SUPSDS 301-203-612-0		27	- 2N	RF
SUPSDS 301-203-612-0		28	- 2N	RF
SUPSDS 301-203-612-0		29	- 2N	RF
SUPSDS 301-203-612-0		1	10A	8
301-209-701-0		1	200A	8
301-209-801-0		2	10A	8
301-216-002-0		17	10A	2
301-234-200-0				
SUPSDS BY 301-810-501-0		17	- 10B	2
301-810-501-0				
SUPSDS 301-234-200-0		20	180A	12
302-001-200-0		20	-180B	8
SUPSD BY 302-001-201-0		20	-180C	8
302-001-201-0				
SUPSDS 302-001-200-0		20	190A	4
302-001-300-0				
SUPSD BY 302-001-301-0		20	-190B	4
302-001-301-0				
SUPSDS 302-001-300-0				

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
302-002-500-0		7	70A	AR
		7	220A	AR
302-002-601-0		5	300A	4
SUPSD BY 302-047-700-0				
		5	350A	4
		5	670A	4
SUPSD BY 302-047-700-0				
		5	720A	4
		6	300A	4
SUPSD BY 302-047-700-0				
		6	350A	4
		6	670A	4
SUPSD BY 302-047-700-0				
		6	720A	4
302-002-701-0		5	330A	4
		5	700A	4
		6	330A	4
		6	700A	4
302-002-800-0		5	320A	4
		5	370A	24
SUPSD BY 302-047-800-0				
		5	690A	4
		5	740A	24
SUPSD BY 302-047-800-0				
		6	350A	4
		6	370A	24
SUPSD BY 302-047-800-0				
		6	690A	4
		6	740A	24
SUPSD BY 302-047-800-0				
302-003-100-0		28	30A	8
302-003-500-0		18	-290A	1
302-003-600-0		18	270A	1
302-003-700-0		18	-560A	2
302-004-000-0		18	190A	2
302-004-100-0		18	110A	2
302-004-200-0		18	340A	2
302-004-300-0		18	430A	2
302-004-401-0		18	660A	2
302-004-600-0		18	140A	8
		18	220A	8
		18	370A	8
		18	460A	6
		18	478A	2
302-004-700-0		18	130A	8
		18	210A	8
		18	360A	8
		18	450A	6

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
302-004-700-0		18	477A	2
302-005-101-0		18	620A	1
302-007-301-0		18	330A	2
302-008-400-0		10	490A	4
302-008-600-0		10	680A	6
OPT TO 302-008-601-0				
302-008-900-0		21	10A	2
SUPSD BY 302-008-901-0				
302-008-901-0		21	- 10B	2
SUPSD BY 302-008-902-0				
SUPSDS 302-008-900-0				
302-008-902-0		21	- 10C	2
SUPSDS 302-008-901-0				
302-009-030-0		29	190A	1
SUPSD BY 302-009-031-0				
302-009-031-0		29	-190B	1
SUPSD BY 302-009-032-0				
SUPSDS 302-009-030-0				
302-009-032-0		29	-190C	1
SUPSD BY 302-009-033-0				
SUPSDS 302-009-031-0				
302-009-033-0		29	-190D	1
SUPSD BY 302-009-034-0				
SUPSDS 302-009-032-0				
302-009-034-0		29	-190E	1
SUPSD BY 302-009-035-0				
SUPSDS 302-009-033-0				
302-009-035-0		29	-190F	1
SUPSD BY 302-009-036-0				
SUPSDS 302-009-034-0				
302-009-036-0		29	-190G	1
SUPSD BY 302-009-037-0				
SUPSDS 302-009-035-0				
302-009-037-0		29	-190H	1
SUPSD BY 302-009-038-0				
SUPSDS 302-009-036-0				
302-009-038-0		29	-190J	1
SUPSD BY 302-009-039-0				
SUPSDS 302-009-037-0				
302-009-039-0		29	-190K	1
SUPSD BY 302-009-040-0				
SUPSDS 302-009-038-0				
302-009-040-0		29	-190L	1
SUPSD BY 302-009-041-0				
SUPSDS 302-009-039-0				
302-009-041-0		29	-190M	1
SUPSD BY 302-009-042-0				
SUPSDS 302-009-040-0				

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
302-009-042-0		29	-190N	1
SUPSDS 302-009-041-0				
302-009-230-0		29	-191A	1
SUPSD BY 302-009-231-0				
302-009-231-0		29	-191B	1
SUPSD BY 302-009-232-0				
SUPSDS 302-009-230-0				
302-009-232-0		29	-191C	1
SUPSD BY 302-009-233-0				
SUPSDS 302-009-231-0				
302-009-233-0		29	-191D	1
SUPSD BY 302-009-234-0				
SUPSDS 302-009-232-0				
302-009-234-0		29	-191E	1
SUPSD BY 302-009-235-0				
SUPSDS 302-009-233-0				
302-009-235-0		29	-191F	1
SUPSD BY 302-009-236-0				
SUPSDS 302-009-234-0				
302-009-236-0		29	-191G	1
SUPSD BY 302-009-237-0				
SUPSDS 302-009-235-0				
302-009-237-0		29	-191H	1
SUPSD BY 302-009-238-0				
SUPSDS 302-009-236-0				
302-009-238-0		29	-191J	1
SUPSD BY 302-009-239-0				
SUPSDS 302-009-237-0				
302-009-239-0		29	-191K	1
SUPSD BY 302-009-240-0				
SUPSDS 302-009-238-0				
302-009-240-0		29	-191L	1
SUPSD BY 302-009-241-0				
SUPSDS 302-009-239-0				
302-009-241-0		29	-191M	1
SUPSD BY 302-009-242-0				
SUPSDS 302-009-240-0				
302-009-242-0		29	-191N	1
SUPSDS 302-009-241-0				
302-009-400-0		18	670A	2
302-009-500-0		3	130A	1
SUPSD BY 302-009-501-0				
302-009-501-0		3	-130B	1
SUPSDS 302-009-500-0				
302-009-600-0		3	70A	1
302-009-700-0		3	-310A	1
SUPSD BY 302-009-701-0				

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**OLYMPUS 593****MK. 610-14-28
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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
302-009-701-0		3	-310B	1
SUPSDS 302-009-700-0				
302-009-800-0		3	-250A	1
302-009-900-0		3	80A	1
		3	140A	1
		3	-260A	1
		3	-320A	1
302-010-000-0		3	60A	1
		3	120A	1
		3	-240A	1
		3	-300A	1
302-010-102-0		17	210A	2
302-010-203-0		17	150A	2
302-010-300-0		17	220A	8
302-014-000-0		21	170A	2
302-017-400-0		20	-155A	4
301-017-500-0		14	140A	128
302-017-703-0		9B	730A	1
		9B	-801A	1
		9B	870A	1
		9B	-941A	1
302-017-753-0		9B	-731A	1
		9B	800A	1
		9B	-871A	1
		9B	940A	1
302-018-900-0		19	5A	4
302-019-000-0		27	210A	2
302-022-000-0		18	474A	2
302-033-000-0		22A	165A	1
		22B	-231A	1
302-033-050-0		22A	-166A	1
		22B	230A	1
302-035-201-0		22C	360A	1
		22C	-401A	1
		22D	460A	1
		22D	-501A	1
302-035-251-0		22C	-361A	1
		22C	400A	1
		22D	-461A	1
		22D	500A	1
302-036-300-0		22A	85A	1
302-036-350-0		22A	- 86A	1
302-036-400-0		22B	285A	1
302-036-450-0		22B	-286A	1
302-039-500-0		5	- 30C	2
SUPSDS 301-064-115-0				
		5	-400C	2
SUPSDS 301-064-115-0				

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MK. 610-14-28

OVERHAUL



sneema

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
302-039-500-0		6	- 30C	2
SUPSDS 301-064-115-0		6	-400C	2
SUPSDS 301-064-115-0		5	- 60C	2
302-039-550-0		5	-430C	2
SUPSDS 301-064-165-0		6	- 60C	2
SUPSDS 301-064-165-0		6	-430C	2
SUPSDS 301-064-165-0		22A	70A	2
SUPSDS 301-064-165-0		22C	375A	2
302-040-100-0		22C	415A	2
302-042-701-0		22D	475A	2
		22D	515A	2
302-047-700-0		5	-300B	4
SUPSDS 302-002-601-0		5	-670B	4
SUPSDS 302-002-601-0		6	-300B	4
SUPSDS 302-002-601-0		6	670B	4
SUPSDS 302-002-601-0		5	-370B	4
302-047-800-0		5	-740B	4
SUPSDS 302-002-800-0		6	-370B	4
SUPSDS 302-002-800-0		6	-740B	4
SUPSDS 302-002-800-0		22B	340A	2
302-048-000-0		22B	345A	AR
302-048-200-0		22A	130A	AR
302-048-300-0		22A	195A	AR
302-048-400-0		22B	260A	AR
302-048-500-0		5	-305A	12
		5	375A	12
		5	675A	12
		5	745A	12
		6	-305A	12
		6	375A	12
		6	675A	12
		6	745A	12
302-056-500-0		4	90A	2
		4	120A	2

- ITEM NOT ILLUSTRATED

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sneema

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
302-056-700-0		1	125A	16
		1	135A	16
		1	315A	16
		1	325A	16
302-056-800-0		1	115A	8
		1	305A	8
		5	90A	2
302-057-100-0		5	460A	2
		6	90A	2
		6	460A	2
		5	120A	2
302-057-150-0		5	490A	2
		6	120A	2
		6	490A	2
		9A	-678A	1
302-058-000-0		9A	727A	1
302-058-050-0		9A	677A	1
302-058-100-0		9A	-728A	1
		9A	577A	1
302-058-150-0		9A	-628A	1
		9A	-578A	1
302-058-200-0		9A	627A	1
		9A	574A	1
		9A	-625A	1
		9A	674A	1
302-058-250-0		9A	-725A	1
		9A	-575A	1
		9A	624A	1
		9A	-675A	1
302-058-401-0		9A	724A	1
		9A	530A	1
		9A	-581A	1
		9A	630A	1
302-058-451-0		9A	-681A	1
		9A	-531A	1
		9A	580A	1
		9A	-631A	1
302-058-500-0		9A	680A	1
		9A	570A	2
		9A	620A	2
		9A	670A	2
302-058-800-0		28	720A	2
		28	278A	4
302-059-000-0		28	277A	4
302-059-300-0		3	65A	1
		3	125A	1
		3	-245A	1
		3	-305A	1

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL***sneema*

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
302-061-700-0		4	- 85A	1
SUPSD BY 302-061-701-0		4	-116A	1
SUPSD BY 302-061-701-0		4	- 85B	1
302-061-701-0		4	-116B	1
SUPSDS 302-061-700-0		4	- 86A	1
SUPSDS 302-061-700-0		4	-115A	1
302-061-750-0		4	- 86B	1
SUPSD BY 302-061-751-0		4	-115B	1
SUPSD BY 302-061-751-0		4	160A	1
302-061-751-0		22A	-226A	1
SUPSDS 302-061-750-0		22B	-161A	1
302-061-900-0		22A	225A	1
302-061-950-0		22B	355A	1
302-062-000-0		22C	-356A	1
302-062-050-0		22C	280A	1
302-062-100-0		22B	-281A	1
302-062-150-0		22B	80A	1
302-062-200-0		22A	- 81A	1
302-062-250-0		22A	495A	1
302-062-300-0		22D	-496A	1
302-062-350-0		22D	395A	1
302-062-400-0		22C	-456A	1
302-062-450-0		22D	-396A	1
302-067-700-0		22D	455A	1
302-067-800-0		31	50A	2
302-067-900-0		31	90A	2
302-068-000-0		31	- 91A	2
302-068-000-0		31	- 51A	2
302-068-400-0		31	70A	4
302-068-500-0		31	110A	4
302-068-600-0		31	30A	4
302-068-700-0		31	40A	4
3230655-1		31	10A	8
OPT TO 3229022-6		16	5A	2
3232727-1		15	15A	AR
SEL FROM		15	28A	AR
SEL FROM				

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
3232727-1		15	33A	AR
SEL FROM		15	46A	AR
SEL FROM		15	57A	AR
SEL FROM		15	158A	AR
SEL FROM		15	165A	AR
SEL FROM		15	173A	AR
SEL FROM		15	- 16A	AR
3232727-2		15	- 29A	AR
SEL FROM		15	- 34A	AR
SEL FROM		15	- 47A	AR
SEL FROM		15	- 58A	AR
SEL FROM		15	-159A	AR
SEL FROM		15	-166A	AR
SEL FROM		15	-174A	AR
SEL FROM		15	18A	AR
3232727-3		15	25A	AR
SEL FROM		15	36A	AR
SEL FROM		15	43A	AR
SEL FROM		15	54A	AR
SEL FROM		15	155A	AR
SEL FROM		15	168A	AR
SEL FROM		15	176A	AR
SEL FROM		15	- 19A	AR
3232727-4		15	- 26A	AR
SEL FROM				

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
3232727-4		15	- 37A	AR
SEL FROM		15	- 44A	AR
SEL FROM		15	- 55A	AR
SEL FROM		15	-156A	AR
SEL FROM		15	-169A	AR
SEL FROM		15	-177A	AR
SEL FROM		30	- 60A	4
35522		30	-170A	4
35524		30	-230A	4
36647		30	140A	4
48208		30	30A	4
48215		1	40A	8
31170-428		1	230A	8
		25	70A	4
		25	150A	4
		25	230A	4
		25	310A	4
		25	360A	16
		25	420A	16
		25A	40B	4
SUPSDS 301-138-750-0		25A	120B	4
SUPSDS 301-138-700-0		25A	200B	4
SUPSDS 301-138-750-0		25A	280B	4
SUPSDS 301-138-700-0		30	220A	4
620-847-937-0		30	- 90A	4
620-849-026-0		30	-180A	4
620-849-027-0		30	-100A	4
		30	-190A	4
620-849-028-0		30	-110A	4
		30	-200A	4
620-849-029-0		30	-120A	4
		30	-210A	4
620-849-098-0		26	-240A	2
620-849-150-0		30	- 80A	AR
620-849-313-0		30	70A	4
620-849-975-0		30	40A	4
620-850-536-0		30	130A	4
620-854-695-0		30	-240A	4

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OVERHAUL



sneema

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
620-854-999-0		30	15A	4
620-860-604-0		27	60A	2
620-860-704-0		26	10A	2
620-860-901-0		28	10A	4
		30	- 1A	RF
649-091-028-0		26	50A	2
		26	170A	6
		27	80A	4
		27	130A	6
649-091-029-0		26	70A	6
		26	80A	2
		26	130A	2
		26	150A	4
		26	200A	4
		26	230A	2
		27	90A	2
		27	110A	4
		27	160A	6
649-091-030-0		26	30A	2
		27	170A	2
649-091-033-0		18	185A	1
		26	100A	2
		26	120A	2
		27	150A	4
649-091-034-0		18	410A	2
		18	500A	2
649-091-036-0		18	540A	8
649-091-044-0		26	210A	2
649-091-077-0		18	590A	2
649-091-079-0		18	593A	2
		18	650A	8
649-091-101-0		18	320A	2
649-203-028-0		3	50A	5
		3	110A	5
		3	-230A	5
		3	-290A	5
649-212-043-0		28	20A	16
649-261-011-0		18	120A	8
SUPSD BY NAS129104		18	200A	8
SUPSD BY NAS129104		18	350A	8
SUPSD BY NAS129104		18	440A	6
SUPSD BY NAS129104		18	182A	1
649-292-030-0		18	390A	2
		18	480A	2

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28
OVERHAUL**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
649-292-030-0		18	520A	8
649-292-031-0		18	570A	6
		18	630A	8
649-341-010-0		3	40A	5
		3	100A	5
		3	-220A	5
		3	-280A	5
		9A	550A	18
		9A	600A	18
		9A	650A	18
		9A	700A	18
		9B	750A	8
		9B	770A	12
		9B	790A	12
		9B	820A	8
		9B	840A	12
		9B	860A	12
		9B	890A	8
		9B	910A	12
		9B	930A	12
		9B	960A	8
		9B	980A	12
		9B	995A	12
		18	183A	2
		18	400A	4
		18	490A	4
		18	530A	8
649-341-011-0		2	100A	4
		5	- 20B	4
SUPSDS NAS1587-40		5	- 50B	4
SUPSDS NAS1587-40		5	-390B	4
SUPSDS NAS1587-40		5	-420B	4
SUPSDS NAS1587-40		6	- 20B	4
SUPSDS NAS1587-40		6	- 50B	4
SUPSDS NAS1587-40		6	-390B	4
SUPSDS NAS1587-40		6	-420B	4
SUPSDS NAS1587-40		10	670A	6
		17	140A	4
		17	200A	4

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
649-341-012-0		1	90A	8
		1	170A	8
		1	280A	8
		1	630A	8
649-341-031-0		18	580A	6
		18	640A	8
649-774-191-0		2	110A	8
649-779-042-0		18	150A	8
		18	230A	8
		18	380A	8
		18	470A	6
649-781-008-0		9A	560A	10
		9A	610A	10
		9A	660A	10
		9A	710A	10
649-781-023-0		20	90A	4
649-781-027-0		11	20A	112
		11	50A	112
		11	80A	112
		11	110A	112
649-781-148-0		3	20A	21
SUPSD BY 649-781-217-0		3	-160A	22
SUPSD BY 649-781-217-0		3	180A	22
SUPSD BY 649-781-217-0		3	-200A	21
SUPSD BY 649-781-217-0		3	340A	100
SUPSD BY 649-781-217-0		3	360A	62
SUPSD BY 649-781-217-0		3	380A	58
SUPSD BY 649-781-217-0		4	20A	104
SUPSD BY 649-781-217-0		4	40A	60
SUPSD BY 649-781-217-0		4	60A	60
SUPSD BY 649-781-217-0		4	80A	62
SUPSD BY 649-781-217-0		4	110A	62
SUPSD BY 649-781-217-0		3	- 20B	21
649-781-217-0				
SUPSD BY 649-781-717-0				
SUPSDS 649-781-148-0				

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28
OVERHAUL**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
649-781-217-0		3	-160B	22
SUPSD BY 649-781-717-0				
SUPSDS 649-781-148-0		3	-180B	22
SUPSD BY 649-781-717-0				
SUPSDS 649-781-148-0		3	-200B	21
SUPSD BY 649-781-717-0				
SUPSDS 649-781-148-0		3	-340B	100
SUPSDS 649-781-148-0		3	-340C	108
SUPSDS 649-781-148-0		3	-360B	62
SUPSDS 649-781-148-0		3	-360C	68
SUPSD BY 649-781-717-0				
SUPSDS 649-781-148-0		3	-380B	58
SUPSDS 649-781-148-0		3	-380C	64
SUPSD BY 649-781-717-0				
SUPSDS 649-781-148-0		4	- 20B	104
SUPSDS 649-781-148-0		4	- 20C	112
SUPSDS 649-781-148-0		4	- 40B	60
SUPSDS 649-781-148-0		4	- 40C	66
SUPSDS 649-781-148-0		4	- 60B	60
SUPSDS 649-781-148-0		4	- 60C	66
SUPSDS 649-781-148-0		4	- 80B	62
SUPSDS 649-781-148-0		4	- 80C	36
SUPSD BY 649-781-717-0				
SUPSDS 649-781-148-0		4	-110B	62
SUPSDS 649-781-148-0		4	-110C	36
SUPSD BY 649-781-717-0				
649-781-224-0		28	160A	8
649-781-717-0		3	- 20C	17
SUPSDS 649-781-217-0		3	-160C	18
SUPSDS 649-781-217-0		3	-180C	18
SUPSDS 649-781-217-0		3	-200C	17
SUPSDS 649-781-217-0		3	-360D	68
SUPSDS 649-781-217-0				

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
649-781-717-0		3	-380D	64
SUPSDS 649-781-217-0		4	- 80D	36
SUPSDS 649-781-217-0		4	-110D	36
SUPSDS 649-781-217-0		2	90A	4
649-783-068-0		2	410A	16
649-786-094-0		16	40A	16
649-786-095-0		2	430A	16
649-786-169-0		16	60A	16
649-786-169-0		7	65A	16
649-786-189-0		7	215A	16
649-786-189-0		9	90A	4
649-786-197-0		9	350A	4
649-786-199-0		21	150A	2
649-786-199-0		21	90A	2
649-786-200-0		21	300A	2
649-786-200-0		23	80A	4
649-786-200-0		23	160A	4
649-786-200-0		23	240A	4
649-786-200-0		23	320A	4
649-786-202-0		28	115A	AR
SUPSD BY AN960C416		5	280A	4
SUPSD BY AN960C416		5	650A	4
SUPSD BY AN960C416		6	280A	4
SUPSD BY AN960C416		6	650A	4
SUPSD BY AN960C416		7	35A	16
649-786-229-0		7	55A	16
649-786-229-0		7	185A	16
649-786-229-0		7	205A	16
649-786-229-0		22A	155A	4
649-786-229-0		22B	220A	4
649-786-231-0		9	60A	20
649-786-231-0		9	320A	20
649-786-234-0		21	380A	2
649-786-444-0		21	400A	2
649-786-449-0		21	50A	2
649-786-449-0		21	210A	2
649-786-449-0		21	260A	2
649-786-449-0		21	320A	2
649-786-449-0		21	360A	2
649-786-469-0		21	100A	2

- ITEM NOT ILLUSTRATED

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MK. 610-14-28

OVERHAUL



sneema

PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
649-786-520-0		20	140A	4
650-341-014-0		1	30A	8
		1	70A	32
		1	150A	48
		1	190A	40
		1	220A	8
		1	260A	32
		1	340A	48
		1	380A	40
68069-08-10D		18	260A	RF
979064-1-2		18	310A	2
SUPSD BY 979064-1-3				
979064-1-3		18	-310B	2
SUPSD BY 979064-1-5				
SUPSDS 979064-1-2				
979064-1-5		18	-310C	2
SUPSDS 979064-1-3				

- ITEM NOT ILLUSTRATED

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**ATP
TEMPORARY
REVISION**

BRITISH AIRWAYS

OLYMPUS 593

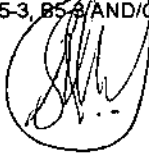
TR Page 1 of 1
26 February, 1998

OVERHAUL MANUAL

ATP: E6868

TEMPORARY REVISION No. 78-536

THIS TEMPORARY REVISION IS ISSUED BY BRITISH AIRWAYS ENGINEERING (TECHNICAL INFORMATION SERVICES, G2, TBA, S401, P. O. BOX 10, HEATHROW AIRPORT, HOUNSLOW, MIDDLESEX TW6 2JA) AND COMPLIES WITH BCAR'S CHAPTER A5-3, BS-3 AND/OR TSS No. 0-2 AS REQUIRED. CAA DESIGN APPROVAL No. DAI/8566/78.



For CHIEF ENGINEER QUALITY AND TRAINING

Manual Reference 78-13-01 Page 1101-0

REASON FOR REVISION

To specify alternative bolt part numbers.

ACTION

Figure 1

NOTE: On the thrust reverser vane deflector assembly bolts, as specified in Figure 1, the NAS6304U# series bolts may be replaced by the equivalent NAS6704U# or BACB30LJ4U# bolts of identical grip length. The grip length (#) is the number quoted after the 'U'.

e.g. NAS6304U19 may be replaced by NAS6704U19 or BACB30LJ4U19.

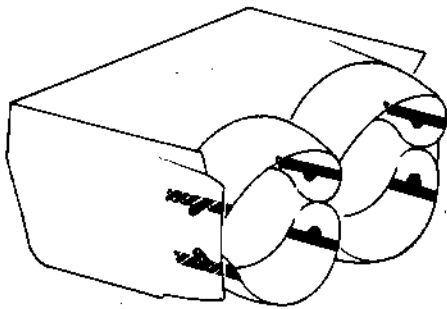
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Reference: EPA0041
Workbook: GE 78-52

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Page 1101-0

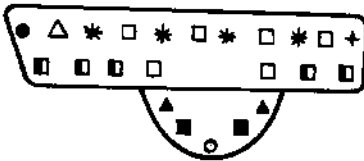


OLYMPUS 593

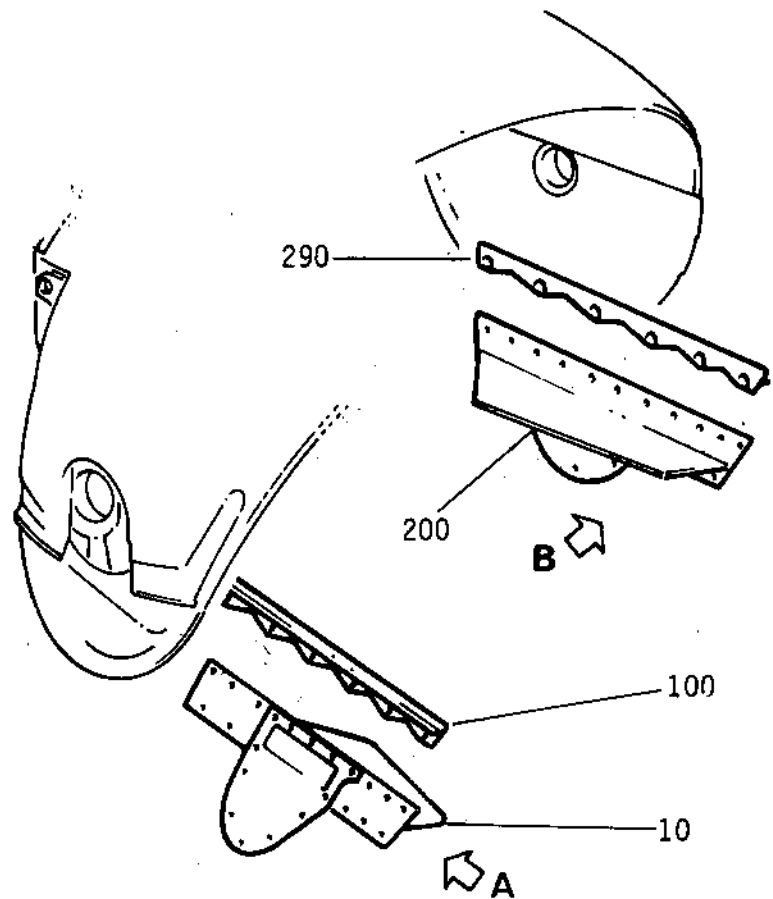
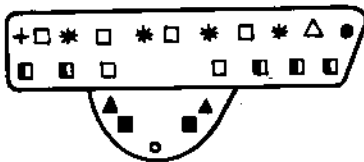
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OVERHAUL

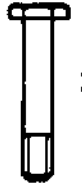
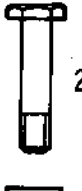
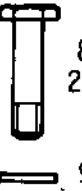
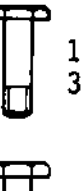
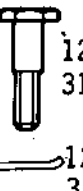
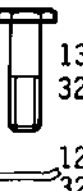
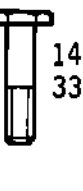
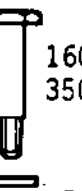
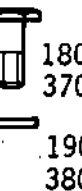














A



B



+	*	●	○	■	▲	□	△	▣
 20 210	 60 250	 80 270	 110 300	 120 310	 130 320	 140 330	 160 350	 180 370
 30 220	 70 260	 90 280	 110 B 300 B	 125 315	 125 325	 150 340	 170 360	 190 380
 50 240			 115 305					
 40 230								

Nozzle Assy, Twin Secondary
Figure 1

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OVERHAUL



FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
1 - 1A	301-203-501-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1B	301-203-502-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1C	301-203-503-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1D	301-203-504-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1E	301-203-505-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1F	301-203-506-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1G	301-203-507-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		POST	SB	OL-593-78-19					
		POST	SB	OL-593-78-20					
- 1H	301-203-508-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1J	301-203-509-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1K	301-203-510-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1L	301-203-511-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1M	301-203-512-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1N	301-203-513-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		POST	SB	OL-78-28217-35					
		POST	SB	OL-78-28218-36					
- 1P	301-203-514-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		POST	SB	OL-78-28220-16					
- 2A	301-203-601-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2B	301-203-602-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2C	301-203-603-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2D	301-203-604-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2E	301-203-605-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2F	301-203-606-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2G	301-203-607-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		POST	SB	OL-593-78-19					
		POST	SB	OL-593-78-20					
- 2H	301-203-608-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2J	301-203-609-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2K	301-203-610-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2L	301-203-611-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2M	301-203-612-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		POST	SB	OL-78-28217-35					
		POST	SB	OL-78-28218-36					
- 2N	301-203-613-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		POST	SB	OL-78-28220-16					
10A	301-209-701-0	.DEFLECTOR,ASSY							4
		ATTACHING PARTS							
20A	NAS6304U22	.BOLT,HEX HEAD							4
		LENGTH 44,3 MM (1.745 IN)							
		OPT TO 302-023-700-0							
		SEL FROM							
- 23A	NAS6304U21	.BOLT,HEX HEAD							AR
		LENGTH 42,7 MM (1.682 IN)							
		SEL FROM							

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593**MK.610-14-28
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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
1 - 27A	NAS6304U23	.	BOLT,HEX HEAD						AR R
			LENGTH 45,9 MM (1.808 IN)						
			SEL FROM						
30A	650-341-014-0	.	WASHER,PLAIN						4
40A	61170-428	.	NUT,SELF-LOCKING			V50393			4
50A	NAS1587-4L	.	WASHER,PLAIN						AR
60A	NAS6304U19	.	BOLT,HEX HEAD						16 R
			LENGTH 39,5 MM (1.558 IN)						
			SEL FROM						
- 63A	NAS6304U18	.	BOLT,HEX HEAD						AR R
			LENGTH 37,9 MM (1.495 IN)						
			SEL FROM						
- 67A	NAS6304U20	.	BOLT,HEX HEAD						AR R
			LENGTH 41,1 MM (1.620 IN)						
			SEL FROM						
70A	650-341-014-0	.	WASHER,PLAIN						16
80A	301-153-800-0	.	BOLT,HEX HEAD						4
90A	649-341-012-0	.	WASHER,PLAIN						4
100A	301-152-707-0	.	COVER,STRIP						4
			OPT TO 301-152-708-0						
110A	NAS6303U10	.	BOLT,HEX HEAD					1ABCDE	4 R
			LENGTH 24,1 MM (0.948 IN)					2ABC	
			SEL FROM						
-110B	NAS6303U11	.	BOLT,HEX HEAD						4 R
			LENGTH 25,6 MM (1.011 IN)						
			POST SB 0L-593-78-26						
			SEL FROM						
-112A	NAS6303U9	.	BOLT,HEX HEAD					1ABCDE	AR R
			LENGTH 22,4 MM (0.885 IN)					2ABC	
			SEL FROM						
-112B	NAS6303U12	.	BOLT,HEX HEAD						AR R
			LENGTH 27,2 MM (1.073 IN)						
			POST SB 0L-593-78-26						
			SEL FROM						
115A	302-056-800-0	.	WASHER PLAIN						4
			POST SB 0L-593-78-26						
120A	NAS6304U12	.	BOLT,HEX HEAD						8 R
			LENGTH 28,4 MM (1.120 IN)						
			SEL FROM						
-122A	NAS6304U11	.	BOLT,HEX HEAD						AR R
			LENGTH 25,6 MM (1.011 IN)						
			SEL FROM						
-124A	NAS6304U13	.	BOLT,HEX HEAD						AR R
			LENGTH 30,1 MM (1.182 IN)						
			SEL FROM						
125A	302-056-700-0	.	WASHER,PLAIN						8
			POST SB 0L-593-78-26						

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
1 130A	NAS6304U11	.	BOLT,HEX HEAD						8 R
			LENGTH 26,8 MM (1.058 IN)						
			SEL FROM						
-132A	NAS6304U10	.	BOLT,HEX HEAD						AR R
			LENGTH 25,2 MM (0.995 IN)						
			SEL FROM						
-134A	NAS6304U12	.	BOLT,HEX HEAD						AR R
			LENGTH 28,4 MM (1.120 IN)						
			SEL FROM						
135A	302-056-700-0	.	WASHER,PLAIN						8
			POST SB 0L-593-78-26						
140A	NAS6304U17	.	BOLT,HEX HEAD						24 R
			LENGTH 36,3 MM (1.432 IN)						
			SEL FROM						
-143A	NAS6304U16	.	BOLT,HEX HEAD						AR R
			LENGTH 34,7 MM (1.370 IN)						
			SEL FROM						
-147A	NAS6304U18	.	BOLT,HEX HEAD						AR R
			LENGTH 37,9 MM (1.495 IN)						
			SEL FROM						
150A	650-341-014-0	.	WASHER,PLAIN						24
160A	301-153-900-0	.	BOLT,HEX HEAD						4
170A	649-341-012-0	.	WASHER,PLAIN						4
180A	NAS6304U4	.	BOLT,HEX HEAD						20 R
			LENGTH 15,7 MM (0.620 IN)						
			SEL FROM						
-183A	NAS6304U3	.	BOLT,HEX HEAD						AR R
			LENGTH 14,1 MM (0.558 IN)						
			SEL FROM						
-187A	NAS6304U5	.	BOLT,HEX HEAD						AR R
			LENGTH 17,3 MM (0.682 IN)						
			SEL FROM						
190A	650-341-014-0	.	WASHER,PLAIN						20

200A	301-209-801-0	.	DEFLECTOR,ASSY						4
			ATTACHING PARTS						
210A	NAS6304U22	.	BOLT,HEX HEAD						4 R
			LENGTH 44,3 MM (1.745 IN)						
			OPT TO 302-023-700-0						
			SEL FROM						
-213A	NAS6304U21	.	BOLT,HEX HEAD						AR R
			LENGTH 42,7 MM (1.682 IN)						
			SEL FROM						
-217A	NAS6304U23	.	BOLT,HEX HEAD						AR R
			LENGTH 45,9 MM (1.808 IN)						
			SEL FROM						
220A	650-341-014-0	.	WASHER,PLAIN						4

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
1 230A	61170-428	.NUT,SELF-LOCKING					V50393		4
240A	NAS1587-4L	.WASHER,PLAIN							AR
250A	NAS6304U19	.BOLT,HEX HEAD							16 R
		LENGTH 39,5 MM (1.558 IN)							
		SEL FROM							
-253A	NAS6304U18	.BOLT,HEX HEAD							AR R
		LENGTH 37,9 MM (1.495 IN)							
		SEL FROM							
-257A	NAS6304U20	.BOLT,HEX HEAD							AR R
		LENGTH 41,1 MM (1.620 IN)							
		SEL FROM							
260A	650-341-014-0	.WASHER,PLAIN							16
270A	301-153-800-0	.BOLT,HEX HEAD							4
280A	649-341-012-0	.WASHER,PLAIN							4
290A	301-152-757-0	.COVER,STRIP							4
		OPT TO 301-152-758-0							
300A	NAS6303U10	.BOLT,HEX HEAD						1ABCDE	4 R
		LENGTH 24,1 MM (0.948 IN)						2ABC	
		SEL FROM							
300B	NAS6303U11	.BOLT,HEX HEAD							4 R
		LENGTH 25,6 MM (1.011 IN)							
		POST SB 0L-593-78-26							
		SEL FROM							
-302A	NAS6303U9	.BOLT,HEX HEAD						1ABCDE	AR R
		LENGTH 22,4 MM (0.885 IN)							
		SEL FROM							
-302B	NAS6303U12	.BOLT,HEX HEAD							AR R
		LENGTH 27,2 MM (1.073 IN)							
		POST SB 0L-593-78-26							
		SEL FROM							
305A	302-056-800-0	.WASHER,PLAIN							4
		POST SB 0L-593-78-26							
310A	NAS6304U12	.BOLT,HEX HEAD							8 R
		LENGTH 24,8 MM (1.120 IN)							
		SEL FROM							
-312A	NAS6304U11	.BOLT,HEX HEAD							AR R
		LENGTH 25,6 MM (1.011 IN)							
		SEL FROM							
-314A	NAS6304U13	.BOLT,HEX HEAD							AR R
		LENGTH 30,1 MM (1.182 IN)							
		SEL FROM							
315A	302-056-700-0	.WASHER,PLAIN							8
		POST SB 0L-593-78-26							
-320A	NAS6304U11	.BOLT,HEX HEAD							8 R
		LENGTH 26,8 MM (1.058 IN)							
		SEL FROM							
-322A	NAS6304U10	.BOLT,HEX HEAD							AR R
		LENGTH 25,2 MM (0.995 IN)							
		SEL FROM							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
1 -324A	NAS6304U12	.	BOLT,HEX HEAD						AR R
			LENGTH 28,4 MM (1.120 IN)						
			SEL FROM						
325A	302-056-700-0	.	WASHER,PLAIN						8
			POST SB 0L-593-78-26						
-330A	NAS6304U17	.	BOLT,HEX HEAD						24 R
			LENGTH 36,3 MM (1.432 IN)						
			SEL FROM						
-333A	NAS6304U16	.	BOLT,HEX HEAD						AR R
			LENGTH 34,7 MM (1.370 IN)						
			SEL FROM						
-337A	NAS6304U18	.	BOLT,HEX HEAD						AR R
			LENGTH 37,9 MM (1.495 IN)						
			SEL FROM						
340A	650-341-014-0	.	WASHER,PLAIN						24
350A	301-153-900-0	.	BOLT,HEX HEAD						4
360A	649-341-012-0	.	WASHER,PLAIN						4
370A	NAS6304U4	.	BOLT,HEX HEAD						20 R
			LENGTH 15,7 MM (0.620 IN)						
			SEL FROM						
-373A	NAS6304U3	.	BOLT,HEX HEAD						AR R
			LENGTH 14,1 MM (0.558 IN)						
			SEL FROM						
-377A	NAS6304U5	.	BOLT,HEX HEAD						AR R
			LENGTH 17,3 MM (0.682 IN)						
			SEL FROM						
380A	650-341-014-0	.	WASHER,PLAIN						20

- ITEM NOT ILLUSTRATED

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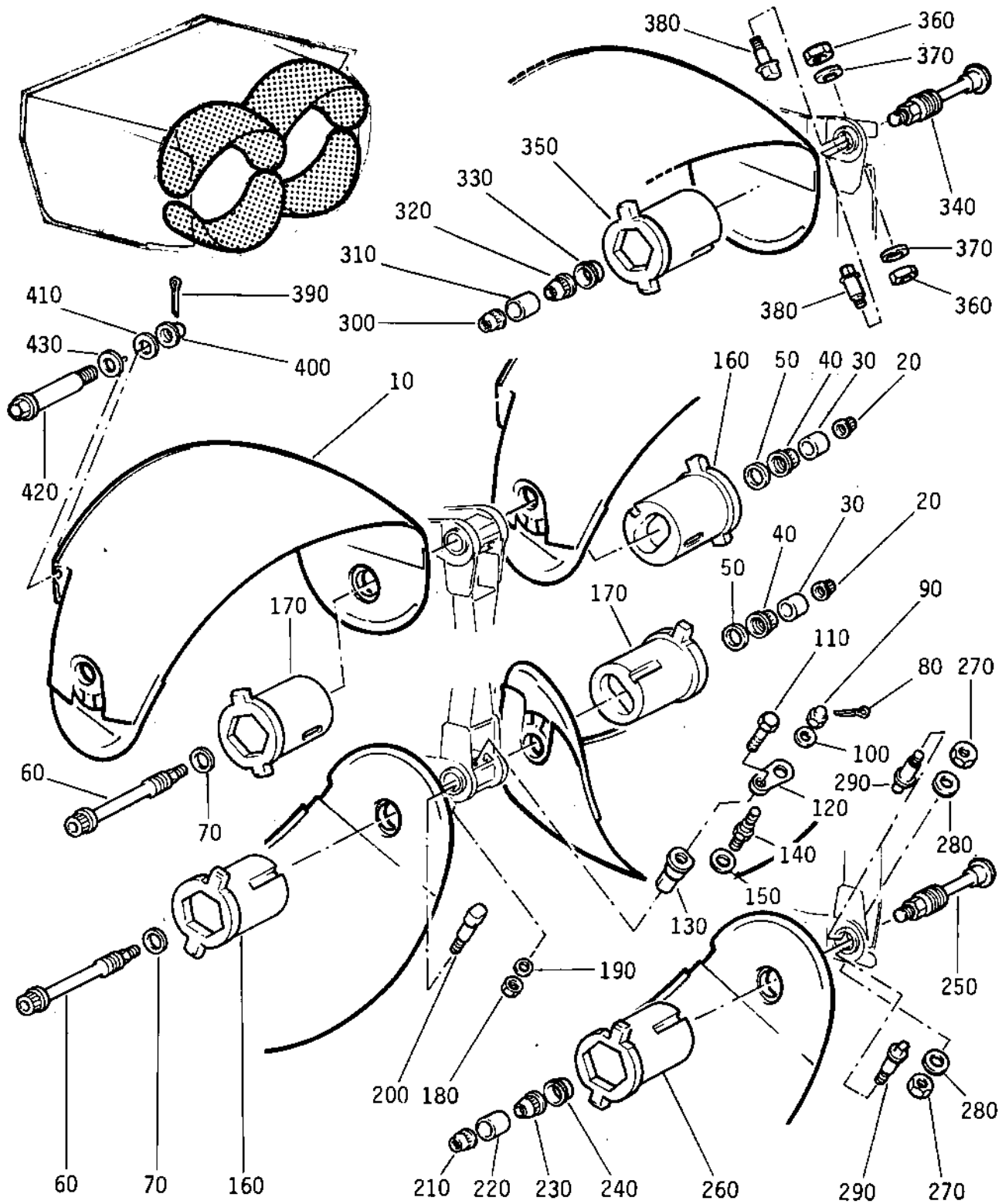
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OVERHAUL



Nozzle Assy, Twin Secondary
Figure 2

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OVERHAUL



FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
2 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
2 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB 0L-78-28220-16							
10A	301-216-002-0	.BUCKET,ASSY REVERSER COMPLETE							4
		SEE 78-31-01 FOR DET							
		POST SB 0L-593-78-17							
		ATTACHING PARTS							
20A	NAS1291C5	.LOCKNUT							2
30A	300-864-700-0	.SLEEVE,ANTI-ROTATION							2
40A	DHT579-7	.NUT,SELF LOCKING					VF0224		2
		OPT TO Z1855-070					V72962		
		OPT TO 119FW720					V50393		
50A	300-855-500-0	.WASHER,BOLT ATTACH TRUNNION							2
60A	300-886-000-0	.BOLT,ATTACH TRUNNION							2
70A	300-855-500-0	.WASHER,BOLT ATTACH TRUNNION							2
80A	SP90C5	.PIN,SPLIT							2
90A	649-783-068-0	.NUT,CASTELLATED							2
100A	649-341-011-0	.WASHER,PLAIN							2
110A	649-774-191-0	.BOLT,HEX HEAD							4
120A	301-142-300-0	.PAD,LOCKING							4
130A	301-142-200-0	.PIN,SAFETY							4
140A	301-142-100-0	.BOLT,DOUBLE ENDED							2
150A	301-142-500-0	.SHIM,ADJUSTING							2
160A	301-156-400-0	.BEARING,TRUNNION BUCKET							2
		OPT TO 301-156-401-0							
170A	301-156-450-0	.BEARING,TRUNNION BUCKET							2
		OPT TO 301-156-451-0							
180A	MS21043-4	.NUT,HEX							4
190A	AN960C416L	.WASHER,PLAIN							4
200A	300-855-902-0	.PIN,LOCKING TRUNNION							4
210A	NAS1291C5	.LOCKNUT							2
220A	300-864-700-0	.SLEEVE,ANTI-ROTATION							2
230A	DHT579-7	.NUT,SELF LOCKING					VF0224		2
		OPT TO Z1855-070					V72962		
		OPT TO 119FW720					V50393		

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
2	240A	300-855-500-0	.WASHER,BOLT ATTACH TRUNNION						2
	250A	301-003-900-0	.BOLT,ATTACH TRUNNION BEARING						2
	260A	300-851-600-0	.BEARING,TRUNNION BUCKET						2
			OPT TO 300-851-601-0						
	270A	MS21043-4	.NUT,HEX						4
	280A	AN960C416L	.WASHER,PLAIN						4
	290A	300-855-902-0	.PIN,LOCKING TRUNNION						4
	300A	NAS1291C5	.LOCKNUT						2
	310A	300-864-700-0	.SLEEVE,ANTI-ROTATION						2
	320A	DHT579-7	.NUT,SELF LOCKING				VF0224		2
			OPT TO Z1855-070				V72962		
			OPT TO 119FW720				V50393		
	330A	300-855-500-0	.WASHER,BOLT ATTACH TRUNNION						2
	340A	301-003-900-0	.BOLT,ATTACH TRUNNION BEARING						2
	350A	300-851-650-0	.BEARING,TRUNNION BUCKET						2
			OPT TO 300-851-651-0						
	360A	MS21043-4	.NUT,HEX						4
	370A	AN960C416L	.WASHER,PLAIN						4
	380A	300-855-902-0	.PIN,LOCKING TRUNNION						4
	390A	MS24665-300	.PIN,SPLIT						8
	400A	TE9925-6	.NUT,CASTELLATED				V72962		8
	410A	649-786-094-0	.WASHER,PLAIN						8
	420A	300-859-501-0	.BOLT,ATTACH BALLSCREW GEARBOX						8
	430A	649-786-095-0	.WASHER,PLAIN						8

- ITEM NOT ILLUSTRATED

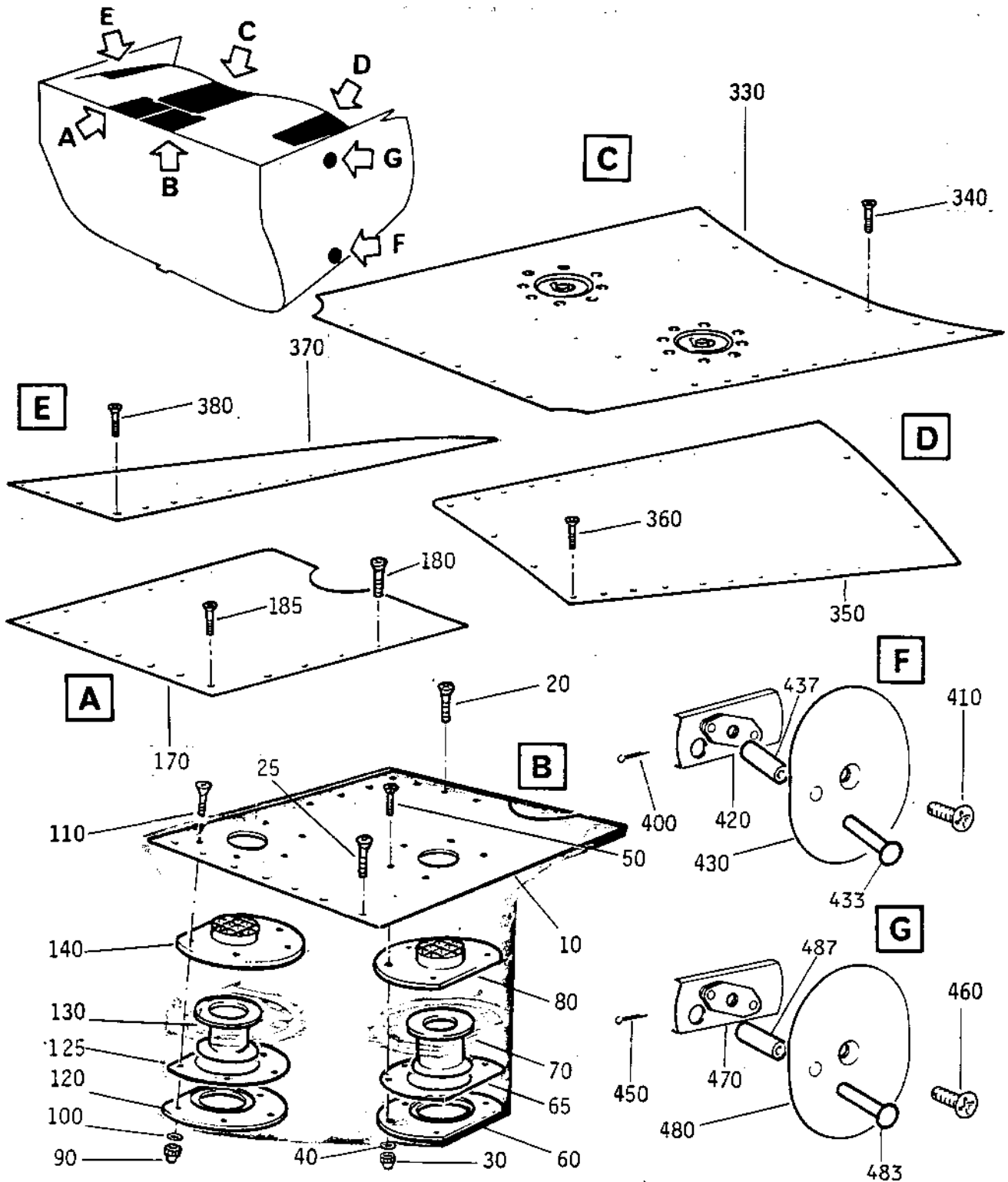
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OLYMPUS 593

MK.610-14-28
OVERHAUL



Nozzle Assy, Twin Secondary
Figure 3

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
3 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB OL-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
3 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
10A	301-056-201-0	.DOOR,ACCESS LH ONLY OPT TO 301-056-202-0						1ABCDE FGHJKL MN 1P	1
- 10B	301-056-203-0	.DOOR,ACCESS LH ONLY POST SB 0L-78-28220-16 ATTACHING PARTS							1
20A	649-781-148-0	.SCREW,CSK HEAD LH ONLY						1ABC	21
20B	649-781-217-0	.SCREW,CSK HEAD LH ONLY POST SB 0L-593-78-10						1ABCDE FGHJKL MN 1P	21
- 20C	649-781-717-0	.SCREW,CSK HEAK LH ONLY POST SB 0L-78-28220-16 OPT TO NAS1154C6 OPT TO BAS8443C4-6							17
25A	BAS8443-4-8	.SCREW,CSK HEAD LH ONLY ***							RF
30A	DHT5579-3	.NUT,SELF LOCKING LH ONLY OPT TO Z3874-02						VF0224 V72962	5
40A	649-341-010-0	.WASHER,PLAIN LH ONLY							5
50A	649-203-038-0	.SCREW,CSK HEAD LH ONLY							5
60A	302-010-000-0	.PLATE,SLEEVE SUPPORT LH ONLY							1
65A	302-059-300-0	.SHIM							1
70A	302-009-600-0	.SLEEVE ASSY LH ONLY							1
80A	302-009-900-0	.SUPPORT,SLEEVE LH ONLY							1
90A	DHT5579-3	.NUT,SELF LOCKING LH ONLY OPT TO Z3874-02						VF0224 V72962	5
100A	649-341-010-0	.WASHER,PLAIN LH ONLY							5
110A	649-203-038-0	.SCREW,CSK HEAD LH ONLY							5
120A	302-010-000-0	.PLATE,SLEEVE SUPPORT LH ONLY							1
125A	302-059-300-0	.SHIM							1
130A	302-009-500-0	.SLEEVE ASSY LH ONLY						1ABC	1
-130B	302-009-501-0	.SLEEVE ASSY LH ONLY							1

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R

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7		
3 140A	302-009-900-0	.SUPPORT, SLEEVE LH ONLY		1
-150A	301-056-250-0	.DOOR, ACCESS RH ONLY OPT TO 301-056-251-0	2ABCDE FGHJKL M	1
-150B	301-056-252-0	.DOOR, ACCESS RH ONLY POST SB OL-78-28220-16 ATTACHING PARTS	2N	1
-160A	649-781-148-0	.SCREW, CSK HEAD RH ONLY	2AB	22
-160B	649-781-217-0	.SCREW, CSK HEAD RH ONLY POST SB OL-593-78-10	2ABCDE FGHJKL M	22
-160C	649-781-717-0	.SCREW, CSK HEAD RH ONLY POST SB OL-78-28220-16 OPT TO NAS1154C6 OPT TO BAS8443C4-6	2N	18
-165A	BAS8443-4-8	.SCREW, CSK HEAD RH ONLY ***		RF
170A	301-056-300-0	.DOOR, ACCESS RH ONLY OPT TO 301-056-301-0	1ABCDE FGHJKL MN	1
-170B	301-056-302-0	.DOOR, ACCESS RH ONLY POST SB OL-78-28220-16 ATTACHING PARTS	1P	1
-180A	649-781-148-0	.SCREW, CSK HEAD LH ONLY	1ABC	22
-180B	649-781-217-0	.SCREW, CSK HEAD LH ONLY POST SB OL-593-78-10	2ABCDE FGHJKL MN	22
-180C	649-781-717-0	.SCREW, CSK HEAD LH ONLY POST SB OL-78-28220-16 OPT TO NAS1154C6 OPT TO BAS8443C4-6	1P	18
-185C	BAS8443-4-8	.SCREW, CSK HEAD LH ONLY ***		RF
-190A	301-056-351-0	.DOOR, ACCESS LH ONLY OPT TO 301-056-352-0	2ABCDE FGHJKL M	1
-190B	301-056-353-0	.DOOR, ACCESS LH ONLY POST SB OL-78-28220-16 ATTACHING PARTS	2N	1
-200A	649-781-148-0	.SCREW, CSK HEAD RH ONLY	2AB	21
-200B	649-781-217-0	.SCREW, CSK HEAD RH ONLY POST SB OL-593-78-10	2ABCDE FGHJKL M	21
-200C	649-781-717-0	.SCREW, CSK HEAD RH ONLY POST SB OL-78-28220-16 OPT TO NAS1154C6 OPT TO BAS8443C4-6	2N	17

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
3 -205C	BAS8443-4-8	.SCREW,CSK HEAD RH ONLY							RF

-210A	DHT5579-3	.NUT,SELF LOCKING RH				VF0224			5
		ONLY							
		OPT TO Z3874-02				V72962			
-220A	649-341-010-0	.WASHER,PLAIN RH ONLY							5
-230A	649-203-038-0	.SCREW,CSK HEAD RH ONLY							5
-240A	302-010-000-0	.PLATE,SLEEVE SUPPORT RH ONLY							1
-245A	302-059-300-0	.SHIM							1
-250A	302-009-800-0	.SLEEVE ASSY RH ONLY							1
-260A	302-009-900-0	.SUPPORT,SLEEVE RH ONLY							1
-270A	DHT5579-3	.NUT,SELF LOCKING RH				VF0224			5
		ONLY							
		OPT TO Z3874-02				V72962			
-280A	649-341-010-0	.WASHER,PLAIN RH ONLY							5
-290A	649-203-038-0	.SCREW,CSK HEAD RH ONLY							5
-300A	302-010-000-0	.PLATE,SLEEVE SUPPORT RH ONLY							1
-305A	302-059-300-0	.SHIM							1
-310A	302-009-700-0	.SLEEVE ASSY RH ONLY						2ABC	1
-310B	302-009-701-0	.SLEEVE ASSY RH ONLY							1
-320A	302-009-900-0	.SUPPORT,SLEEVE RH ONLY							1
330A	301-060-600-0	.DOOR,ACCESS LH						1ABCDE	1
-330B	301-060-601-0	.DOOR,ACCESS LH					NP		1
		POST SB OL-593-78-11							
-330C	301-060-602-0	.DOOR,ACCESS LH							1
		POST SB OL-593-78-11							
-330D	301-060-603-6	.DOOR,ACCESS LH							1
		SEE 78-13-01 FIG 31 FOR DET							R
		POST SB OL-78-28224-40							
-331A	301-060-400-0	.DOOR,ACCESS RH						2ABCD	1
-331B	301-060-401-0	.DOOR,ACCESS RH					NP		1
		POST SB OL-593-78-11							
-331C	301-060-402-0	.DOOR,ACCESS RH							1
		POST SB OL-593-78-11							
-331D	301-060-403-6	.DOOR,ACCESS RH							1
		SEE 78-13-01 FIG 31 FOR DET							R
		POST SB OL-78-28224-40							
		ATTACHING PARTS							
340A	649-781-148-0	.SCREW,CSK HEAD						1ABC	50
								2AB	
-340B	649-781-217-0	.SCREW,CSK HEAD						1ABCDE	50
								FGHJKL	
								M	
								2ABCDE	
								FGHJKL	
-340C	649-781-217-0	.SCREW,CSK HEAD						1NP	54
		POST SB OL-78-28218-36						2MN	

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7 1 1 1 1 1 1 1		
3 350A	301-004-000-0	.DOOR, ACCESS LH	1ABCDE	1
-350B	301-004-001-0	.DOOR, ACCESS LH POST SB OL-593-78-11	1ABCDE FGHJKL MN	1
-350C	301-004-002-6	.DOOR, ACCESS LH POST SB OL-78-28220-16	1P	1
-351A	301-004-050-0	.DOOR, ACCESS RH	2ABCD	1
-351B	301-004-051-0	.DOOR, ACCESS LH POST SB OL-593-78-11	2ABCDE FGHJKL M	1
-351C	301-004-052-6	.DOOR, ACCESS RH POST SB OL-78-28220-16 ATTACHING PARTS	2N	1
360A	649-781-148-0	.SCREW, CSK HEAD	1ABC FGHJKL M	31
-360B	649-781-217-0	.SCREW, CSK HEAD POST SB OL-593-78-10	1ABCDE FGHJKL M	31
-360C	649-781-217-0	.SCREW, CSK HEAD POST SB OL-78-28218-36	2ABCDE FGHJKL 1N	34
-360D	649-781-717-0	.SCREW, CSK HEAD POST SB OL-78-28220-16 OPT TO NAS1154C6 OPT TO BAS8443C4-6 ***	2M 1P 2N	34
370A	301-058-700-0	.DOOR, ACCESS RH	1ABCDE	1
-370B	301-058-701-0	.DOOR, ACCESS RH POST SB OL-593-78-11	1ABCDE FGHJKL MN	1
-370C	301-058-702-6	.DOOR, ACCESS RH POST SB OL-78-28220-16	1P	1
-371A	301-058-750-0	.DOOR, ACCESS LH	2ABCD	1
-371B	301-058-751-0	.DOOR, ACCESS LH POST SB OL-593-78-11	2ABCDE FGHJKL M	1
-371C	301-058-752-6	.DOOR, ACCESS LH POST SB OL-78-28220-16 ATTACHING PARTS	2N	1
380A	649-781-148-0	.SCREW, CSK HEAD	1ABC 2AB	29
-380B	649-781-217-0	.SCREW, CSK HEAD POST SB OL-593-78-10	1ABCDE FGHJKL M 2ABCDE FGHJKL	29

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
3 -380C	649-781-217-0	.SCREW,CSK HEAD POST SB OL-78-28218-36							1N 2M	32
-380D	649-781-717-0	.SCREW,CSK HEAD POST SB OL-78-28220-16 OPT TO NAS1154C6 OPT TO BAS8443C4-6 ***							2N 2N	34
-390A	301-058-800-0	.DOOR,ACCESS							1ABCDE FGH 2ABCDE FG	2
-390B	301-057-801-0	.DOOR,ACCESS POST SB OL-593-78-29								2
400A	MS24665-229	..PIN,SPLIT								1
410A	301-008-300-0	..SCREW,CSK HEAD								1
420A	301-068-700-0	..NUT PLATE,ASSY OF							390A	1
-420B	301-068-701-0	..NUT PLATE,ASSY OF POST SB OL-593-78-29								1
430A	300-898-900-0	..PLATE,COVER							390A	1
-430B	300-898-901-0	..PLATE,COVER POST SB OL-593-78-29								1
433A	MS20427M5-12	..RIVET								1
437A	NAS1056C5-041	..SPACER								1
-440A	301-057-900-0	.DOOR,ACCESS							1ABCDE FGH 2ABCDE FG	2
-440B	301-057-901-0	.DOOR,ACCESS POST SB OL-593-78-29								2
450A	MS24665-229	..PIN,SPLIT								1
460A	301-008-300-0	..SCREW,CSK HEAD								1
470A	301-068-700-0	..NUT PLATE,ASSY OF							440A	1
-470B	301-068-701-0	..NUT PLATE,ASSY OF POST SB OL-593-78-29								1
480A	300-898-800-0	..PLATE,COVER							440A	1
-480B	300-898-801-0	..PLATE,COVER POST SB OL-593-78-29								1
483A	MS20427M5-12	..RIVET								1
487A	NAS1056C5-041	..SPACER								1

- ITEM NOT ILLUSTRATED

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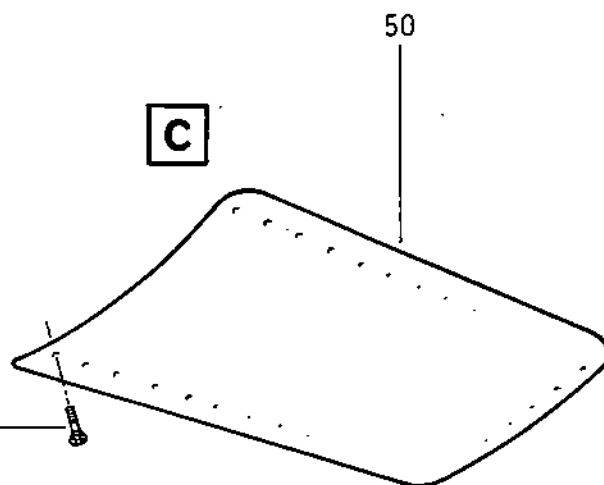
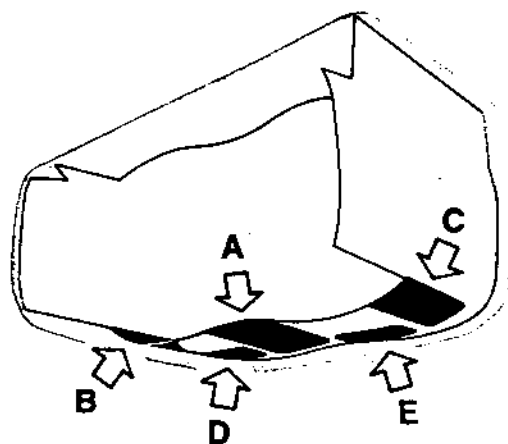
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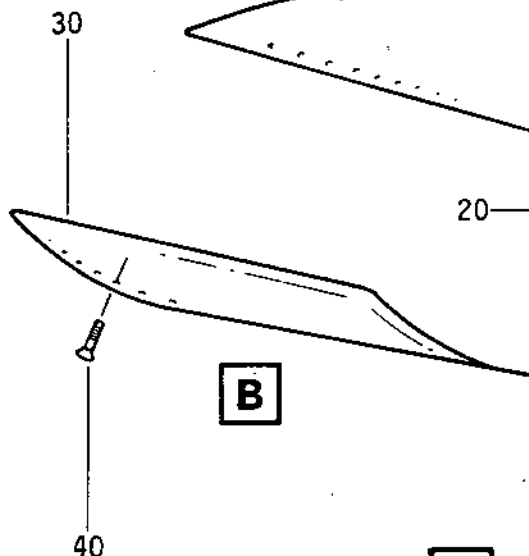
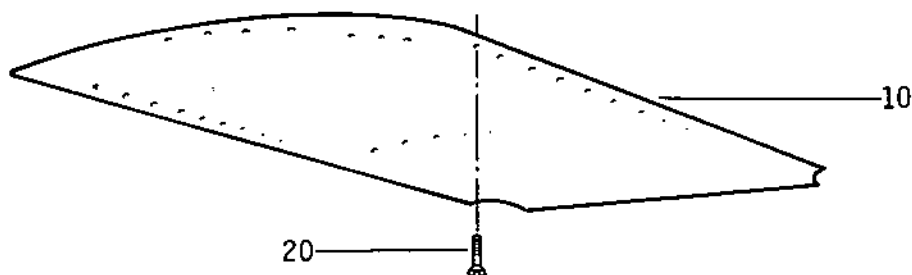


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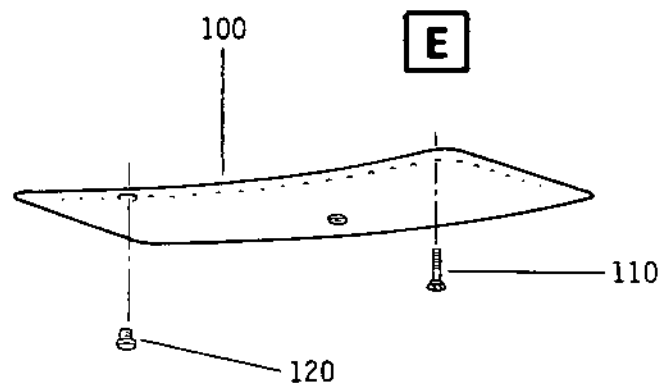
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A

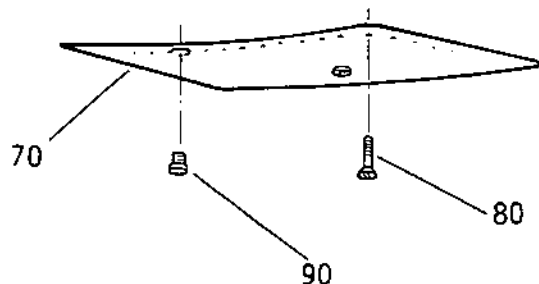


B



E

D



Nozzle Assy, Twin Secondary
Figure 4

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**OLYMPUS 593**MK. 610-14-28
OVERHAUL

FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
4 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1B	301-203-502-0	(CTD)							
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1D	301-203-504-0	(CTD)							
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1F	301-203-506-0	(CTD)							
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
		(CTD)							
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1J	301-203-509-0	(CTD)							
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1L	301-203-511-0	(CTD)							
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1N	301-203-513-0	(CTD)							
		NOZZLE ASSY,TWIN SECONDARY LH							RF R
		(CTD)							
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH							RF R
		(CTD)							
		POST SB 0L-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2B	301-203-602-0	(CTD)							
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2D	301-203-604-0	(CTD)							
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2F	301-203-606-0	(CTD)							
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7 1 1 1 1 1 1 1		
4 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)		RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)		RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)		RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)		RF
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)		RF
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD) POST SB OL-78-28217-35 POST SB OL-78-28218-36		RF
10A	301-153-700-0	.DOOR,ACCESS	1ABCDE 2ABCD	1
- 10B	301-153-701-0	.DOOR,ACCESS POST SB OL-593-78-11	NP	1
- 10C	301-153-702-6	.DOOR,ACCESS POST SB OL-593-78-11 ATTACHING PARTS		1 R
20A	649-781-148-0	.SCREW,CSK HEAD	1ABC 2AB	52
- 20B	649-781-217-0	.SCREW,CSK HEAD POST SB OL-593-78-10	1ABCDE FGHJKL M	52
- 20C	649-781-217-0	.SCREW,CSK HEAD POST SB OL-78-28218-36 ***	2ABCDE FGHJKL 1NP 2MN	56
30A	301-058-400-0	.DOOR,ACCESS LH	1ABCDE	1
- 30B	301-058-401-6	.DOOR,ACCESS LH POST SB OL-593-78-11		1 R
- 31A	301-058-450-0	.DOOR,ACCESS RH	2ABCD	1
- 31B	301-058-451-6	.DOOR,ACCESS RH POST SB OL-593-78-11 ATTACHING PARTS		1 R
40A	649-781-148-0	.SCREW,CSK HEAD	1ABC 2AB	30
- 40B	649-781-217-0	.SCREW,CSK HEAD POST SB OL-593-78-10	1ABCDE FGHJKL M	30
- 40C	649-781-217-0	.SCREW,CSK HEAD POST SB OL-78-28218-36 ***	2ABCDE FGHJKL 1NP 2MN	33

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY	
		1	2	3	4	5	6			
4	50A	301-058-450-0	.DOOR,ACCESS RH					1ABCDE	1	R
-	50B	301-058-451-0	.DOOR,ACCESS RH						1	R
			POST SB 0L-593-78-11							
-	51A	301-058-400-0	.DOOR,ACCESS LH					2ABCD	1	R
-	51B	301-058-401-0	.DOOR,ACCESS LH						1	R
			POST SB 0L-593-78-11							
			ATTACHING PARTS							
	60A	649-781-148-0	.SCREW,CSK HEAD					1ABC	30	
								2AB		
-	60B	649-781-217-0	.SCREW,CSK HEAD					1ABCDE	30	
			POST SB 0L-593-78-10					FGHJKL		
								M		
								2ABCDE		
								FGHJKL		
-	60C	649-781-217-0	.SCREW,CSK HEAD					1NP	33	
			POST SB 0L-78-28218-36					2MN		

	70A	301-058-903-0	.DOOR,ACCESS LH					1ABCDE	1	
								F		
-	70B	301-058-905-0	.DOOR,ACCESS LH					1ABCDE	1	
			OPT TO 301-058-906-0					FGHJKL		
			POST SB 0L-593-78-22							
-	70C	301-058-907-0	.DOOR,ACCESS LH					1ABCDE	1	
			OPT TO 301-058-908-0					FGHJKL		
			POST SB 0L-593-78-32					MN		
-	70D	301-058-909-0	.DOOR,ACCESS LH					1P	1	
			POST SB 0L-78-28220-16							
-	71A	301-058-953-0	.DOOR,ACCESS RH					2ABCDE	1	
								F		
-	71B	301-058-955-0	.DOOR,ACCESS RH					2ABCDE	1	
			OPT TO 301-058-956-0					FGHJK		
			POST SB 0L-593-78-22							
-	71C	301-058-957-0	.DOOR,ACCESS RH					2ABCDE	1	
			OPT TO 301-058-958-0					FGHJKL		
			POST SB 0L-593-78-32					M		
-	71D	301-058-959-0	.DOOR,ACCESS RH					2N	1	
			POST SB 0L-78-28220-16							
			ATTACHING PARTS							
	80A	649-781-148-0	.SCREW,CSK HEAD					1ABC	31	
								2AB		
-	80B	649-781-217-0	.SCREW,CSK HEAD					1ABCDE	31	
			POST SB 0L-593-78-10					FGHJKL		
								2ABCDE		
								FGHJK		

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7		
4 - 80C	649-781-217-0	.SCREW,CSK HEAD POST SB 0L-593-78-32	1ABCDE FGHJKL MN 2ABCDE FGHJKL M	18
- 80D	649-781-717-0	.SCREW,CSK HEAD POST SB 0L-78-28220-16 OPT TO NAS1154C6 OPT TO BAS8443C4-6 ***	1P	18
- 85A	302-061-700-0	..DOOR,LH POST SB 0L-593-078-32	70ABCD	1
- 85B	302-061-701-0	..DOOR,LH POST SB 0L-78-28220-16	70ABCD	1
- 86A	302-061-750-0	..DOOR,RH POST SB 0L-593-078-32	71ABCD	1
- 86B	302-061-751-0	..DOOR,RH POST SB 0L-78-28220-16	71ABCD	1
90A	302-056-500-0	.SCREW		1
100A	301-058-953-0	.DOOR,ACCESS RH	1ABCDE F	1 R
-100B	301-058-955-0	.DOOR,ACCESS RH OPT TO 301-058-956-0 POST SB 0L-593-78-22		1 R
-100C	301-058-957-0	.DOOR,ACCESS RH OPT TO 301-058-958-0 POST SB 0L-593-78-32	1ABCDE FGHJKL MN	1 R
-100D	301-058-959-0	.DOOR,ACCESS RH POST SB 0L-78-28220-16	1P	1 R
-101A	301-058-903-0	.DOOR,ACCESS LH	2ABCDE F	1 R
-101B	301-058-905-0	.DOOR,ACCESS LH OPT TO 301-058-906-0 POST SB 0L-593-78-22		1 R
-101C	301-058-907-0	.DOOR,ACCESS LH OPT TO 301-058-908-0 POST SB 0L-593-78-32	1ABCDE FGHJKL MN 2ABCDE FGHJKL MN	1 R
-101D	301-058-909-0	.DOOR,ACCESS LH POST SB 0L-78-28220-16 ATTACHING PARTS	2N	1 R
110A	649-781-148-0	.SCREW,CSK HEAD POST SB 0L-593-78-10	1ABC 2AB	31

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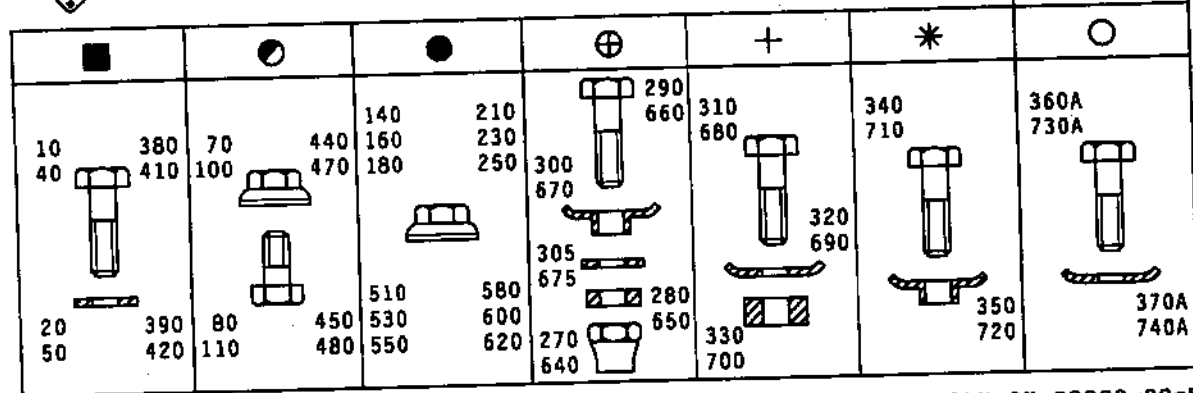
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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
4 -110B	649-781-217-0	.	SCREW,SCK	HEAD				1ABCDE FGHJKL 2ABCDE FGHJK	31
			POST	SB	OL-593-78-10				
-110C	649-781-217-0	.	SCREW,CSK	HEAD				1ABCDE FGHJKL MN 2ABCDE FGHJKL M	18
			POST	SB	OL-593-78-32				
-110D	649-781-717-0	.	SCREW,CSK	HEAD				1P	18
			POST	SB	OL-78-28220-16				
			OPT	TO	NAS1154C6				
			OPT	TO	BAS8443C4-6				

-115A	302-061-750-0	..	DOOR,LH					100ABC	1
			POST	SB	OL-593-078-32				
-115B	302-061-751-0	..	DOOR,LH					100ABC	1
			POST	SB	OL-78-28220-16				D
-116A	302-061-700-0	..	DOOR,RH					101ABC	1
			POST	SB	OL-593-078-32				
-116B	301-061-701-0	..	DOOR,RH					101ABC	1
			POST	SB	OL-78-28220-16			D	
120A	302-056-500-0	.	SCREW						1

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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
5 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
		POST SB OL-593-78-19								
		POST SB OL-593-78-20								
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF R
		POST SB OL-78-28217-35								
		POST SB PL-78-28218-36								
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF R
		POST SB OL-78-28220-16								
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
		POST SB OL-593-78-19								
		POST SB OL-593-78-20								

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
5 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
		POST SB OL-78-28220-16							
10A	NAS6304U5	.BOLT,HEX HEAD							2
20A	NAS1587-4C	.WASHER,PLAIN						1ABCDE F	2
- 20B	649-341-011-0	.WASHER,PLAIN						2ABCDE F	2
30A	301-064-114-0	.STIFFENER						1ABCDE F	1
- 30B	301-064-115-0	.STIFFENER						1FABCD EGHJKL M	1 R
- 30C	302-039-500-0	.STIFFENER						2FABCD EGHJKL 1NP	1 R
		POST SB OL-78-28218-36						2MN	
40A	NAS6304U5	.BOLT,HEX HEAD							2
50A	NAS1587-4C	.WASHER,PLAIN						1ABCDE F	2
- 50B	649-341-011-0	.WASHER,PLAIN						2ABCDE F	2 R
60A	301-064-164-0	.STIFFENER						1ABCDE F	1
- 60B	301-064-165-0	.STIFFENER						2ABCDE F	
								1FABCD EGHJKL M	1 R
								2FABCD EGHJKL	

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
5 - 60C	302-039-550-0	.STIFFENER						1NP	1 R
		POST SB 0L-78-28218-36						2MN	
70A	NAS1291C08	.NUT,HEX							2
80A	HL40-5-1	.BOLT,HI-LOCK				V73197			2 R
		LENGTH 9,5 MM (0.374 IN)							
		SEL FROM							
- 83A	HL40-5-2	.BOLT,HI-LOCK				V73197			AR R
		LENGTH 11,1 MM (0.433 IN)							
		SEL FROM							
90A	302-057-100-0	.PLATE,RETAINING							1
100A	NAS1291C08	.NUT,HEX							2
110A	HL40-5-1	.BOLT,HI-LOCK				V73197			2 R
		LENGTH 9,5 MM (0.374 IN)							
		SEL FROM							
-113A	HL40-5-2	.BOLT,HI-LOCK				V73197			AR R
		LENGTH 11,1 MM (0.433 IN)							
		SEL FROM							
120A	302-057-150-0	.PLATE,RETAINING							1
130A	301-147-261-0	.SEAL,ASSY							1
		ATTACHING PARTS							
140A	NAS1291C08	.NUT,HEX							3

150A	301-150-361-0	.SEAL,ASSY							1
		ATTACHING PARTS							
160A	NAS1291C08	.NUT,HEX							4

170A	301-149-411-0	.SEAL,ASSY							1
		ATTACHING PARTS							
180A	NAS1291C08	.NUT,HEX							5

190A	301-093-911-0	..SEAL,ELEMENT,LOWER							1
200A	301-149-511-0	.SEAL,ASSY							1
		ATTACHING PARTS							
210A	NAS1291C08	.NUT,HEX							4

220A	301-150-311-0	.SEAL,ASSY							1
		ATTACHING PARTS							
230A	NAS1291C08	.NUT,HEX							4

240A	301-147-211-0	.SEAL,ASSY							1
		ATTACHING PARTS							
250A	NAS1291C08	.NUT,HEX							3

260A	301-063-612-0	.HEAT SHIELD,ASSY LH							1
-261A	301-063-662-0	.HEAT SHIELD,ASSY RH							1
		ATTACHING PARTS							
270A	HLN1DU8	.NUT,SELF LOCKING				V73197			2

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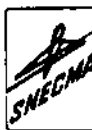
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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
5 280A	649-786-202-0	.	W	A	S	H	E	R, S	1ABCDE F	2
-280B	AN960C416	.	W	A	S	H	E	R, S	2ABCDE F	2
290A	NAS6704U7	.	B	O	L	T, H	E	X H	1ABCDE FGHJKL M	2 R
-290B	NAS6304U9	.	B	O	L	T, H	E	X H	2ABCDE FGHJKL	2 R
300A	302-002-601-0	.	W	A	S	H	E	R, P	1NP 2MN	2 R
-300B	302-047-700-0	.	W	A	S	H	E	R, P	1ABCDE FGHJKL M	2 R
-305A	302-048-500-0	.	W	A	S	H	E	R, P	1NP 2MN	6 R
310A	NAS6704U7	.	B	O	L	T, H	E	X H	2MN	2
320A	302-002-800-0	.	W	A	S	H	E	R, P		2
330A	302-002-701-0	.	B	U	S	H				2
340A	NAS6704U7	.	B	O	L	T, H	E	X H		2
350A	302-002-601-0	.	W	A	S	H	E	R, P		2
360A	NAS6704U7	.	B	O	L	T, H	E	X H	1ABCDE FGHJKL M	12 R
360B	NAS6304U9	.	B	O	L	T, H	E	X H	2ABCDE FGHJKL	2 R
370A	302-002-800-0	.	W	A	S	H	E	R, P	1NP 2MN	12 R
370B	302-047-800-0	.	W	A	S	H	E	R, P	1ABCDE FGHJKL M	2 R
375A	302-048-500-0	.	W	A	S	H	E	R, P	1NP 2MN	6 R
380A	NAS6304U5	.	B	O	L	T, H	E	X H		2
390A	NAS1587-4C	.	W	A	S	H	E	R, P	1ABCDE F	2
		.	W	A	S	H	E	R, P	2ABCDE F	

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
5 -390B	649-341-011-0	.WASHER,PLAIN	1ABCDE	2
400A	301-064-114-0	.STIFFENER	F	1
			2ABCDE	
			F	
-400B	301-064-115-0	.STIFFENER	1FABCD	1 R
			EGHJKL	
			M	
			2FABCD	
			EGHJKL	
-400C	302-039-500-0	.STIFFENER	1NP	1 R
		POST SB 0L-78-28218-36	2MN	
410A	NAS6304U5	.BOLT,HEX HEAD		2
420A	NAS1587-4C	.WASHER,PLAIN	1ABCDE	2
			F	
			2ABCDE	
			F	
-420B	649-341-011-0	.WASHER,PLAIN		2 R
430A	301-064-164-0	.STIFFENER	1ABCDE	1
			F	
			2ABCDE	
			F	
-430B	301-064-165-0	.STIFFENER	1FABCD	1 R
			EGHJKL	
			M	
			2FABCD	
			EGHJKL	
-430C	302-039-550-0	.STIFFENER	1NP	1 R
		POST SB 0L-78-28218-36	2MN	
440A	NAS1291C08	.NUT,HEX		2
450A	HL40-5-1	.BOLT,HI-LOCK V73197		2 R
		LENGTH 9,5 MM (0.374 IN)		
		SEL FROM		
-453A	HL40-5-2	.BOLT,HI-LOCK V73197		AR R
		LENGTH 11,1 MM (0.433 IN)		
		SEL FROM		
460A	302-057-100-0	.PLATE,RETAINING		1
470A	NAS1291C08	.NUT,HEX		2
480A	HL40-5-1	.BOLT,HI-LOCK V73197		2 R
		LENGTH 9,5 MM (0.374 IN)		
		SEL FROM		
-483A	HL40-5-2	.BOLT,HI-LOCK V73197		AR R
		LENGTH 11,1 MM (0.433 IN)		
		SEL FROM		
490A	302-057-150-0	.PLATE,RETAINING		1
500A	301-147-261-0	.SEAL,ASSY		1
		ATTACHING PARTS		

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
5 510A	NAS1291C08	.	NUT,HEX						3

520A	301-150-361-0	.	SEAL,ASSY						1
			ATTACHING PARTS						
530A	NAS1291C08	.	NUT,HEX						4

540A	301-149-411-0	.	SEAL,ASSY						1
			ATTACHING PARTS						
550A	NAS1291C08	.	NUT,HEX						5

560A	301-093-911-0	.	SEAL ELEMENT,LOWER						1
570A	301-149-511-0	.	SEAL,ASSY						1
			ATTACHING PARTS						
580A	NAS1291C08	.	NUT,HEX						4

590A	301-150-311-0	.	SEAL,ASSY						1
			ATTACHING PARTS						
600A	NAS1291C08	.	NUT,HEX						4

610A	301-147-211-0	.	SEAL,ASSY						1
			ATTACHING PARTS						
620A	NAS1291C08	.	NUT,HEX						3

630A	301-063-812-0	.	HEAT SHIELD,ASSY LH						1
-631A	301-063-862-0	.	HEAT SHIELD,ASSY RH						1
			ATTACHING PARTS						
640A	HLN1DU8	.	NUT,SELF LOCKING				V73197		2
650A	649-786-202-0	.	WASHER,SPACER					1ABCDE F 2ABCDE F	2
-650B	AN960C416	.	WASHER,PLAIN						2
660A	NAS6704U7	.	BOLT,HEX HEAD					1ABCDE FGHJKL M 2ABCDE FGHJKL	2 R
-660B	NAS6304U9	.	BOLT,HEX HEAD					1NP	2 R
			POST SB OL-78-28218-36					2MN	
670A	302-002-601-0	.	WASHER,PLAIN					1ABCDE FGHJKL M 2ABCDE FGHJKL	2 R
-670B	302-047-700-0	.	WASHER,PLAIN					1NP	2 R
			POST SB OL-78-28218-36					2MN	
675A	302-048-500-0	.	WASHER,PLAIN					1NP	6 R
			POST SB OL-78-28218-36					2MN	

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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
5	680A	NAS6704U7	.BOLT, HEX HEAD							2
	690A	302-002-800-0	.WASHER, PLAIN							2
	700A	302-002-701-0	.BUSH							2
	710A	NAS6704U7	.BOLT, HEX HEAD							2
	720A	302-002-601-0	.WASHER, PLAIN							2
	730A	NAS6704U7	.BOLT, HEX HEAD						1ABCDE FGHJKL M 2ABCDE FGHJKL 1NP 2MN 1ABCDE FGHJKL M 2ABCDE FGHJKL 1NP 2MN 1NP 2MN	12 R
-730B	NAS6304U9		.BOLT, HEX HEAD POST SB 0L-78-28218-36							2 R
740A	302-002-800-0		.WASHER, PLAIN							12 R
-740B	302-047-800-0		.WASHER, PLAIN POST SB 0L-78-28218-36							2 R
745A	302-048-500-0		.WASHER, PLAIN POST SB 0L-78-28218-36 ***							6 R

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
6 - 1A	301-203-501-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1B	301-203-502-0	(CTD)							
- 1C	301-203-503-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1D	301-203-504-0	(CTD)							
- 1E	301-203-505-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1F	301-203-506-0	(CTD)							
- 1G	301-203-507-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1H	301-203-508-0	(CTD)							
- 1I	301-203-509-0	POST SB 0L-593-78-19							
- 1J	301-203-509-0	POST SB 0L-593-78-20							
- 1K	301-203-510-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
- 1L	301-203-511-0	(CTD)							
- 1M	301-203-512-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF R
- 1N	301-203-513-0	(CTD)							
- 1P	301-203-514-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF R
- 2A	301-203-601-0	(CTD)							
- 2B	301-203-602-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2C	301-203-603-0	(CTD)							
- 2D	301-203-604-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2E	301-203-605-0	(CTD)							
- 2F	301-203-606-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
- 2G	301-203-607-0	(CTD)							
		NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							

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OLYMPUS 593

MK.610-14-28
OVERHAUL

FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
6 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
		NOZZLE ASSY,TWIN SECONDARY RH (CTD)							
		POST SB 0L-78-28220-16							
10A	NAS6304U5	.BOLT,HEX HEAD							2
20A	NAS1587-4C	.WASHER,PLAIN						1ABCDE F	2
- 20B	649-341-011-0	.WASHER,PLAIN						2ABCDE F	2
30A	301-064-114-0	.STIFFENER						1ABCDE F	1
- 30B	301-064-115-0	.STIFFENER						1FABCD EGHJKL M	1 R
- 30C	302-039-500-0	.STIFFENER						2FABCD EGHJKL	
		POST SB 0L-78-28218-36						1NP	1 R
40A	NAS6304U5	.BOLT,HEX HEAD						2MN	
50A	NAS1587-4C	.WASHER,PLAIN						1ABCDE F	2
- 50B	649-341-011-0	.WASHER,PLAIN						2ABCDE F	2
60A	301-064-164-0	.STIFFENER						1ABCDE F	1
- 60B	301-064-165-0	.STIFFENER						2ABCDE F	
		.STIFFENER						1FABCD EGHJKL M	1 R
								2FABCD EGHJKL	

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593**MK.610-14-28
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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY	
				1 2 3 4 5 6 7	
6 - 60C	302-039-550-0	.STIFFENER POST SB 0L-78-28218-36	1NP 2MN	1	R
70A	NAS1291C08	.NUT,HEX		2	
80A	HL40-5-1	.BOLT,HI-LOCK V73197 LENGTH 9,5 MM (0.374 IN) SEL FROM		2	R
- 83A	HL40-5-2	.BOLT,HI-LOCK V73197 LENGTH 11,1 MM (0.433 IN) SEL FROM		AR	R
90A	302-057-100-0	.PLATE,RETAINING		1	
100A	NAS1291C08	.NUT,HEX		2	
110A	HL40-5-1	.BOLT,HI-LOCK V73197 LENGTH 9,5 MM (0.374 IN) SEL FROM		2	R
-113A	HL-40-5-2	.BOLT,HI-LOCK V73197 LENGTH 11,1 MM (0.433 IN) SEL FROM		AR	R
120A	302-057-150-0	.PLATE,RETAINING		1	
130A	301-147-261-0	.SEAL,ASSY ATTACHING PARTS		1	
140A	NAS1291C08	.NUT,HEX ****		3	
150A	301-150-361-0	.SEAL,ASSY ATTACHING PARTS		1	
160A	NAS1291C08	.NUT,HEX ****		4	
170A	301-149-411-0	.SEAL,ASSY ATTACHING PARTS		1	
180A	NAS1291C08	.NUT,HEX ****		5	
190A	301-093-911-0	..SEAL ELEMENT,LOWER		1	
200A	301-149-511-0	.SEAL,ASSY ATTACHING PARTS		1	
210A	NAS1291C08	.NUT,HEX ****		4	
220A	301-150-311-0	.SEAL,ASSY ATTACHING PARTS		1	
230A	NAS1291C08	.NUT,HEX ****		4	
240A	301-147-211-0	.SEAL,ASSY ATTACHING PARTS		1	
250A	NAS1291C08	.NUT,HEX ****		3	
260A	301-065-412-0	.HEAT SHIELD,ASSY LH		1	
-261A	301-065-462-0	.HEAT SHIELD,ASSY RH ATTACHING PARTS		1	
270A	HLN1DU8	.NUT,SELF LOCKING V73197		2	

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**OLYMPUS 593**MK.610-14-28
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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
6 280A	649-786-202-0	.	W	A	S	H	E	1ABCDE F	2
-280B	AN960C416	.	W	A	S	H	E	2ABCDE F	2
290A	NAS6704U7	.	B	O	L	T	, H	1ABCDE FGHJKL M	2 R
		.	B	O	L	T	, H	2ABCDE FGHJKL	2
-290B	NAS6304U9	.	B	O	L	T	, H	1NP	2 R
			P	O	S	T	S	2MN	
300A	302-002-601-0	.	W	A	S	H	E	1ABCDE FGHJKL M	2 R
		.	W	A	S	H	E	2ABCDE FGHJKL	
-300B	302-047-700-0	.	W	A	S	H	E	1NP	2 R
			P	O	S	T	S	2MN	
-305A	302-048-500-0	.	W	A	S	H	E	1NP	6 R
			P	O	S	T	S	2MN	
310A	NAS6704U7	.	B	O	L	T	, H		2
320A	302-002-800-0	.	W	A	S	H	E		2
330A	302-002-701-0	.	B	U	S	H			2
340A	NAS6704U7	.	B	O	L	T	, H		2
350A	302-002-601-0	.	W	A	S	H	E		2
360A	NAS6704U7	.	B	O	L	T	, H	1ABCDE FGHJKL M	12 R
		.	B	O	L	T	, H	2ABCDE FGHJKL	
360B	NAS6304U9	.	B	O	L	T	, H	1NP	2 R
			P	O	S	T	S	2MN	
370A	302-002-800-0	.	W	A	S	H	E	1ABCDE FGHJKL M	12 R
		.	W	A	S	H	E	2ABCDE FGHJKL	
370B	302-047-800-0	.	W	A	S	H	E	1NP	2 R
			P	O	S	T	S	2MN	
375A	302-048-500-0	.	W	A	S	H	E	1NP	6 R
			P	O	S	T	S	2MN	

380A	NAS6304U5	.	B	O	L	T	, H		2
390A	NAS1587-4C	.	W	A	S	H	E	1ABCDE F	2
		.	W	A	S	H	E	2ABCDE F	

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**OLYMPUS 593**MK.610-14-28
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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7 1 1 1 1 1 1 1		
6 -390B	649-341-011-0	.WASHER,PLAIN	1ABCDE	2
400A	301-064-114-0	.STIFFENER	F	1
			2ABCDE	
			F	
-400B	301-064-115-0	.STIFFENER	1FABCD	1 R
			EGHJKL	
			M	
			2FABCD	
			EGHJKL	
-400C	302-039-500-0	.STIFFENER	1NP	1 R
		POST SB 0L-78-28218-36	2MN	
410A	NAS6304U5	.BOLT,HEX HEAD		2
420A	NAS1587-4C	.WASHER,PLAIN	1ABCDE	2
			F	
			2ABCDE	
			F	
-420B	649-341-011-0	.WASHER,PLAIN		2
430A	301-064-164-0	.STIFFENER	1ABCDE	1
			F	
			2ABCDE	
			F	
-430B	301-064-165-0	.STIFFENER	1FABCD	1 R
			EGHJKL	
			M	
			2FABCD	
			EGHJKL	
-430C	302-039-550-0	.STIFFENER	1NP	1 R
		POST SB 0L-78-28218-36	2MN	
440A	NAS1291C08	.NUT,HEX		2
450A	HL40-5-1	.BOLT,HI-LOCK V73197		2 R
		LENGTH 9,5 MM (0.374 IN)		
		SEL FROM		
-453A	HL40-5-2	.BOLT,HI-LOCK V73197		AR R
		LENGTH 11,1 MM (0.433 IN)		
		SEL FROM		
460A	302-057-100-0	.PLATE,RETAINING		1
470A	NAS1291C08	.NUT,HEX		2
480A	HL40-5-1	.BOLT,HI-LOCK V73197		2 R
		LENGTH 9,5 MM (0.374 IN)		
		SEL FROM		
-483A	HL40-5-2	.BOLT,HI-LOCK V73197		AR R
		LENGTH 11,1 MM (0.433 IN)		
		SEL FROM		
490A	302-057-150-0	.PLATE,RETAINING		1
500A	301-147-261-0	.SEAL,ASSY		1
		ATTACHING PARTS		

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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
6 510A	NAS1291C08	.	NUT	,	HEX					3

520A	301-150-361-0	.	SEAL	,	ASSY					1
			ATTACHING		PARTS					
530A	NAS1291C08	.	NUT	,	HEX					4

540A	301-149-411-0	.	SEAL	,	ASSY					1
			ATTACHING		PARTS					
550A	NAS1291C08	.	NUT	,	HEX					5

560A	301-093-911-0	..	SEAL		ELEMENT	,	LOWER			1
570A	301-149-511-0	.	SEAL	,	ASSY					1
			ATTACHING		PARTS					
580A	NAS1291C08	.	NUT	,	HEX					4

590A	301-150-311-0	.	SEAL	,	ASSY					1
			ATTACHING		PARTS					
600A	NAS1291C08	.	NUT	,	HEX					4

610A	301-147-211-0	.	SEAL	,	ASSY					1
			ATTACHING		PARTS					
620A	NAS1291C08	.	NUT	,	HEX					3

630A	301-065-462-0	.	HEAT		SHIELD	,	ASSY	LH		1
-631A	301-065-412-0	.	HEAT		SHIELD	,	ASSY	RH		1
			ATTACHING		PARTS					
640A	HLN1DU8	.	NUT	,	SELF		LOCKING			2
650A	649-786-202-0	.	WASHER	,	SPACER				V73197	2
									1ABCDE	
									F	
									2ABCDE	
									F	
-650B	AN960C416	.	WASHER	,	SPACER					2
660A	NAS6704U7	.	BOLT	,	HEX		HEAD			2
									1ABCDE	
									FGHJKL	
									M	
									2ABCDE	
									FGHJKL	
-660B	NAS6304U9	.	BOLT	,	HEX		HEAD			2
							POST	SB	OL-78-28218-36	
670A	302-002-601-0	.	WASHER	,	PLAIN					2
									1ABCDE	
									FGHJKL	
									M	
									2ABCDE	
									FGHJKL	
-670B	302-047-700-0	.	WASHER	,	PLAIN					2
							POST	SB	OL-78-28218-36	
675A	302-048-500-0	.	WASHER	,	PLAIN					6
							POST	SB	OL-78-28218-36	
									1NP	
									2MN	

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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
6	680A	NAS6704U7	.	BOLT,HEX HEAD						2
	690A	302-002-800-0	.	WASHER,PLAIN						2
	700A	302-002-701-0	.	BUSH						2
	710A	NAS6704U7	.	BOLT,HEX HEAD						2
	720A	302-002-601-0	.	WASHER,PLAIN						2
	730A	NAS6704U7	.	BOLT,HEX HEAD					1ABCDE FGHJKL M	12 R
	730B	NAS6304U9	.	BOLT,HEX HEAD					2ABCDE FGHJKL 1NP	2 R
	740A	302-002-800-0	.	WASHER,PLAIN					2MN 1ABCDE FGHJKL M	12 R
	740B	302-047-800-0	.	WASHER,PLAIN					2ABCDE FGHJKL 1NP	2 R
	745A	302-048-500-0	.	WASHER,PLAIN					2MN 1NP	6 R
				POST SB 0L-78-28218-36					2MN	

- ITEM NOT ILLUSTRATED

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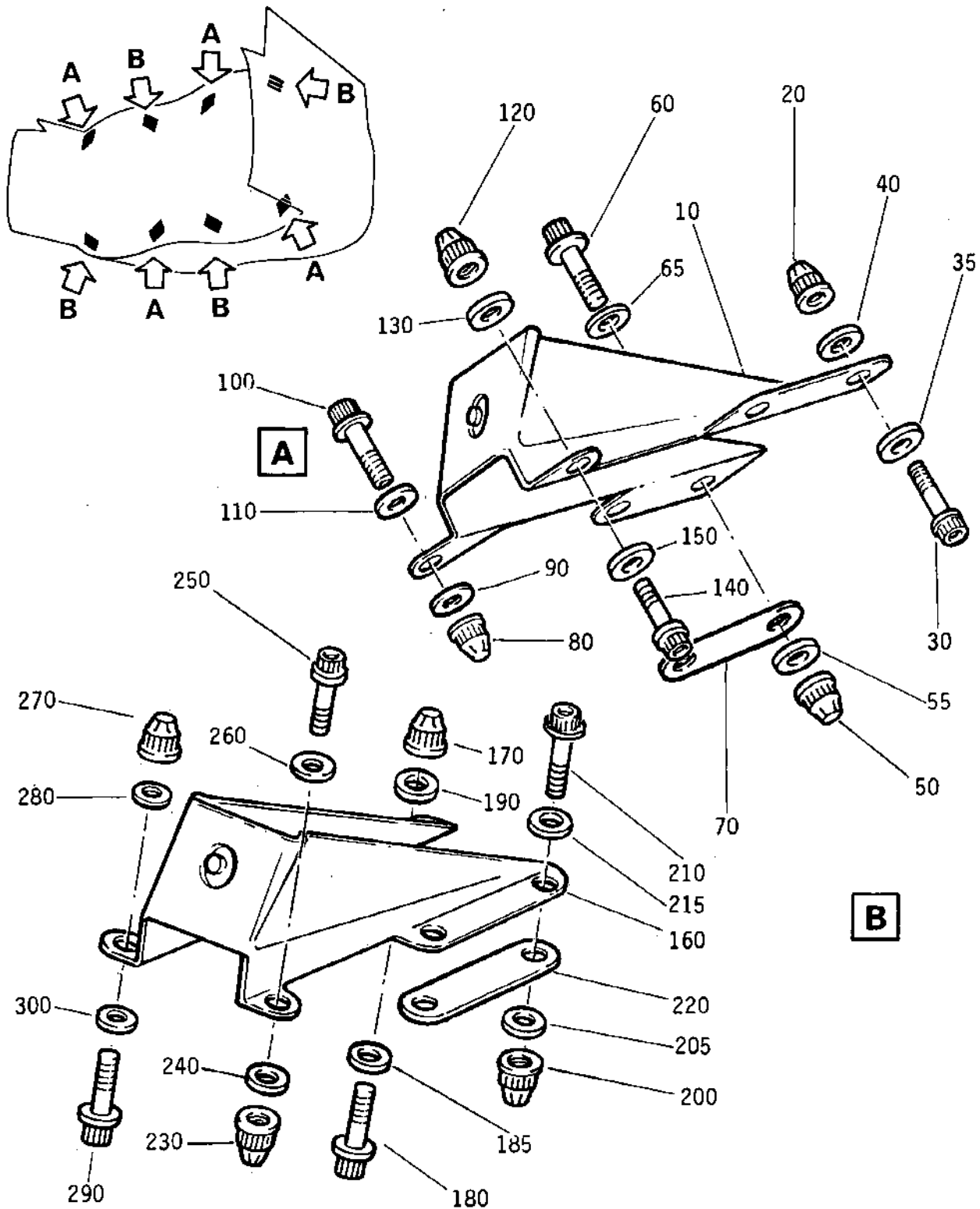
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OVERHAUL



Nozzle Assy, Twin Secondary
Figure 7

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
7 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1B	301-203-502-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1C	301-203-503-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1D	301-203-504-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1E	301-203-505-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1F	301-203-506-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1G	301-203-507-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1H	301-203-508-0	(CTD) POST SB 0L-593-78-19 POST SB 0L-593-78-20 NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1J	301-203-509-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1K	301-203-510-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1L	301-203-511-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1M	301-203-512-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1N	301-203-513-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1P	301-203-514-0	(CTD) POST SB 0L-78-28217-35 POST SB 0L-78-28218-36 NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 2A	301-203-601-0	(CTD) POST SB 0L-78-28220-16 NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2B	301-203-602-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2C	301-203-603-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2D	301-203-604-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2E	301-203-605-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2F	301-203-606-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2G	301-203-607-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD) POST SB 0L-593-78-19 POST SB 0L-593-78-20							

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
7 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
10A	301-148-810-0	.SUPPORT ASSY ATTACHING PARTS							4
20A	HL97-5	.NUT,SELF LOCKING				V73197			8
30A	HL40-5-8	.BOLT,12 POINT HEAD				V73197			8
35A	649-786-229-0	.WASHER				V73197			8
40A	301-157-600-0	.WASHER,PLAIN							8
50A	HL97-5	.NUT,SELF LOCKING				V73197			8
55A	649-786-229-0	.WASHER							8
60A	HL40-5-8	.BOLT,12 POINT HEAD				V73197			8
65A	649-786-169-0	.WASHER							8
70A	302-002-500-0	.SPACER							AR
80A	DHT579-5	.NUT,SELF LOCKING				VF0224			4
		OPT TO Z1855-054				V72962			
		OPT TO 119FW524				V50393			
90A	AN960C516	.WASHER,PLAIN							4
100A	HL668-10-12	.BOLT,12 POINT HEAD				V73197			4
110A	NAS1587-5C	.WASHER,PLAIN							4
120A	DHT579-3	.NUT,SELF LOCKING				VF0224			4
		OPT TO Z1855-02				V72962			
		OPT TO 119FW1032				V50393			
130A	AN960C10	.WASHER,PLAIN							4
140A	HL668-6-8	.BOLT,12 POINT HEAD				V73197			4
150A	NAS1587-3C	.WASHER,PLAIN							4
160A	301-148-860-0	.SUPPORT ASSY ATTACHING PARTS							4
170A	HL97-5	.NUT,SELF LOCKING				V73197			8
180A	HL40-5-8	.BOLT,12 POINT HEAD				V73197			8
185A	649-786-229-0	.WASHER							8
190A	301-157-600-0	.WASHER,PLAIN							8
200A	HL97-5	.NUT,SELF LOCKING				V73197			8
205A	649-786-229-0	.WASHER							8

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
7	210A	HL40-5-8	.	BOLT,12	POINT	HEAD	V73197		8
	215A	649-786-169-0	.	WASHER					8
	220A	302-002-500-0	.	SPACER					AR
	230A	DHT579-5	.	NUT,SELF	LOCKING		VF0224		4
				OPT TO	Z1855-054		V72962		
				OPT TO	119FW524		V50393		
	240A	AN960C516	.	WASHER,PLAIN					4
	250A	HL668-10-12	.	BOLT,12	POINT	HEAD	V73197		4
	260A	NAS1587-5C	.	WASHER,PLAIN					4
	270A	DHT579-3	.	NUT,SELF	LOCKING		VF0224		4
				OPT TO	Z1855-02		V72962		
				OPT TO	119FW1032		V50393		
	280A	AN960C10	.	WASHER,PLAIN					4
	290A	HL668-6-8	.	BOLT,12	POINT	HEAD			4
	300A	NAS1587-3C	.	WASHER,PLAIN					4

- ITEM NOT ILLUSTRATED

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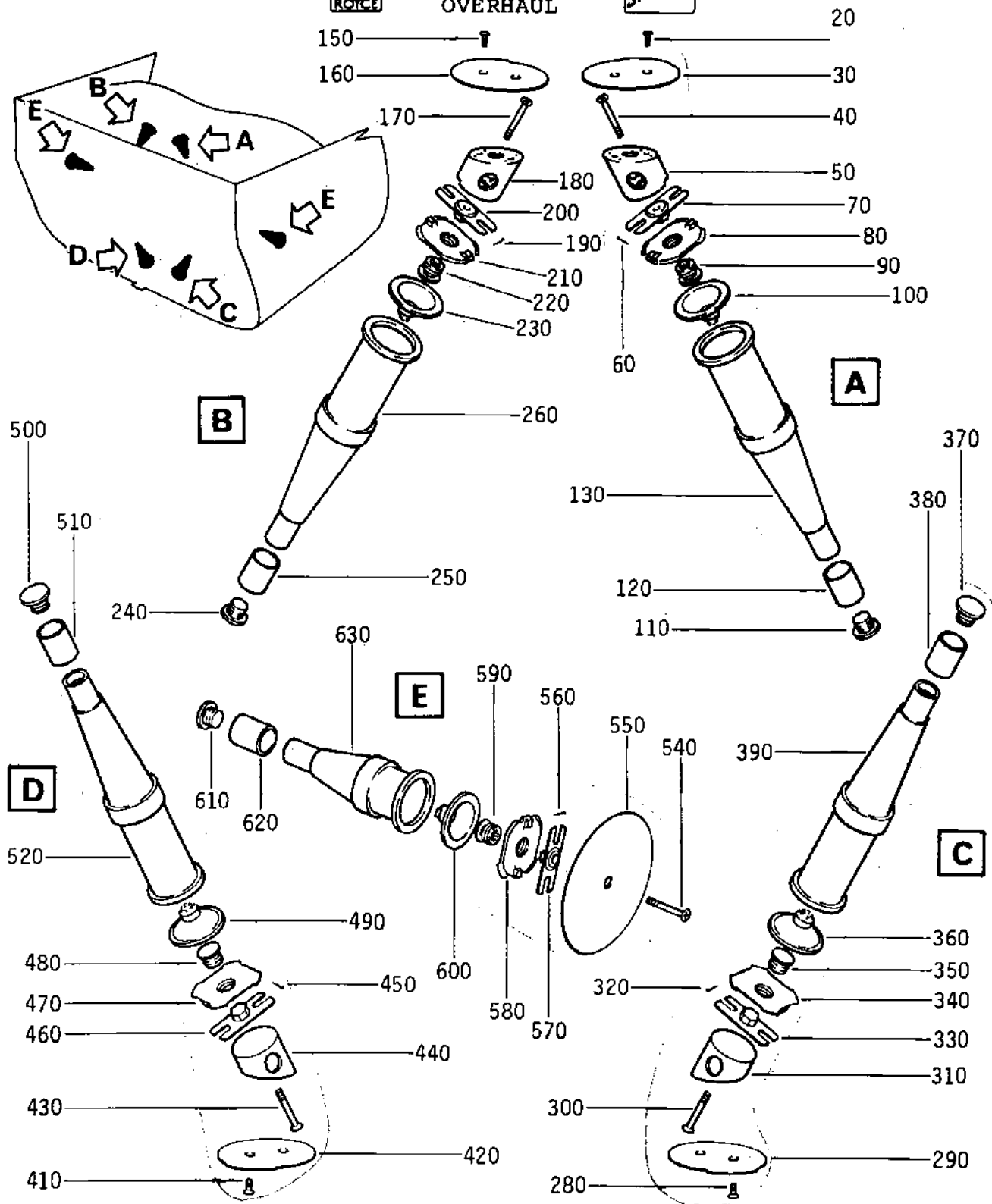
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Nozzle Assy, Twin Secondary
Figure 8

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
8 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1H	301-203-508-0	POST SB OL-593-78-19 POST SB OL-593-78-20 NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1P	301-203-514-0	POST SB OL-78-28217-35 POST SB OL-78-28218-36 NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 2A	301-203-601-0	POST SB OL-78-28220-16 NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB OL-593-78-19 POST SB OL-593-78-20							

- ITEM NOT ILLUSTRATED

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OLYMPUS 593

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OVERHAUL

FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7 1 1 1 1 1 1 1		
8 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)		RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)		RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)		RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)		RF
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)		RF
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD) POST SB 0L-78-28217-35 POST SB 0L-78-28218-36		RF
- 10A	301-022-904-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD) POST SB 0L-78-28220-16 .PIN ASSY,MOUNTING ATTACHING PARTS		1
20A	NAS1153C4	.SCREW,CSK HEAD		2
30A	301-006-601-0	.COVER LH		1
- 31A	301-006-651-0	.COVER RH		1
40A	NAS560HK4P22	.SCREW,CSK HEAD		1
50A	301-068-401-0	.SPACER LH		1
- 51A	301-068-451-0	.SPACER RH		1
60A	MS24665-151	.PIN,SPLIT		2
70A	301-114-600-0	.PLATE,LOCK		1
80A	301-114-200-0	.WASHER,DOGGED		1
90A	301-114-100-0	.STOP,SPHERICAL		1
100A	301-114-800-0	.WASHER,CUP ***		1
110A	D16105	..BOLT,RETAINING BUSHING V08524		1
120A	300-855-800-6	..BUSHING		1 R
130A	300-875-204-0	..PIN,MOUNTING		1
-140A	301-022-904-0	.PIN ASSY,MOUNTING ATTACHING PARTS		1
150A	NAS1153C4	.SCREW,CSK HEAD		2
160A	301-006-651-0	.COVER LH		1
-161A	301-006-601-0	.COVER RH		1
170A	NAS560HK4P22	.SCREW,CSK HEAD		1
180A	301-068-301-0	.SPACER LH		1
-181A	301-068-351-0	.SPACER RH		1
190A	MS24665-151	.PIN,SPLIT		2
200A	301-114-600-0	.PLATE,LOCK		1
210A	301-114-200-0	.WASHER,DOGGED		1
220A	301-114-100-0	.STOP,SPHERICAL		1
230A	301-114-800-0	.WASHER,CUP ***		1
240A	D16105	..BOLT,RETAINING BUSHING V08524		1
250A	300-855-800-6	..BUSHING		1 R

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7 1 2 3 4 5 6 7		
8 260A	300-875-204-0	..PIN,MOUNTING		1
-270A	301-022-904-0	.PIN ASSY,MOUNTING		1
		ATTACHING PARTS		
280A	NAS1153C4	.SCREW,CSK HEAD		2
290A	301-040-301-0	.COVER LH		1
-291A	301-040-351-0	.COVER RH		1
300A	NAS560HK4P22	.SCREW,CSK HEAD		1
310A	301-068-201-0	.SPACER LH		1
-311A	301-068-251-0	.SPACER RH		1
320A	MS24665-151	.PIN,SPLIT		2
330A	301-114-600-0	.PLATE,LOCK		1
340A	301-114-200-0	.WASHER,DOOGED		1
350A	301-114-100-0	.STOP,SPHERICAL		1
360A	301-114-800-0	.WASHER,CUP		1

370A	D16105	..BOLT,RETAINING BUSHING V08524		1
380A	300-855-800-6	..BUSHING		1
390A	300-875-204-0	..PIN,MOUNTING		1
-400A	301-022-904-0	.PIN ASSY,MOUNTING		1
		ATTACHING PARTS		
410A	NAS1153C4	.SCREW,CSK HEAD		2
420A	301-040-351-0	.COVER LH		1
-421A	301-040-301-0	.COVER RH		1
430A	NAS560HK4P22	.SCREW,CSK HEAD		1
440A	301-068-251-0	.SPACER LH		1
-441A	301-068-201-0	.SPACER RH		1
450A	MS24665-151	.PIN,SPLIT		2
460A	301-114-600-0	.PLATE,LOCK		1
470A	301-114-200-0	.WASHER,DOGGED		1
480A	301-114-100-0	.STOP,SPHERICAL		1
490A	301-114-800-0	.WASHER,CUP		1

500A	D16105	..BOLT,RETAINING BUSHING V08524		1
510A	300-855-800-6	..BUSHING		1
520A	300-875-204-0	..PIN,MOUNTING		1
-530A	300-889-804-0	.PIN ASSY,MOUNTING		2
		ATTACHING PARTS		
540A	NAS560HK4P22	.SCREW,CSK HEAD		2
550A	300-889-901-0	.PLATE,COVER		2
560A	MS24665-151	.PIN,SPLIT		4
570A	301-114-600-0	.PLATE,LOCK		2
580A	301-114-200-0	.WASHER,DOGGED		2
590A	301-114-100-0	.STOP,SPHERICAL		2
600A	301-114-800-0	.WASHER,CUP		2

610A	D16105	..BOLT,RETAINING BUSHING V08524		1
620A	300-855-800-0	..BUSHING		1
630A	300-852-204-0	..PIN,MOUNTING		1

- ITEM NOT ILLUSTRATED

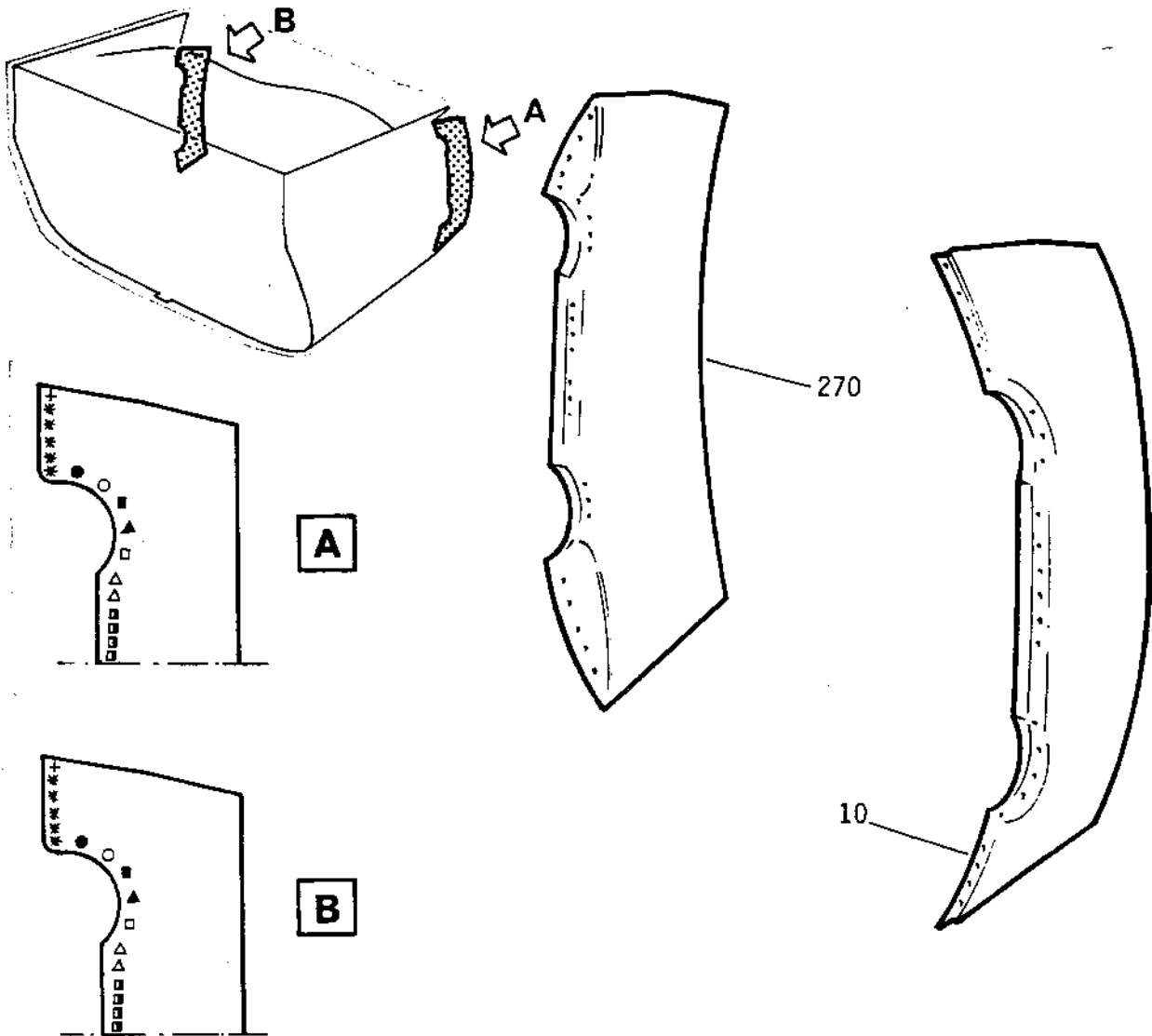
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


















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 20 280	 40 300	 70 330	 110 370	 140 400	 170 430	 200 460	 230 490	 250 510
 30 290	 60 320  50 310	 100 360  90 350  80 340	 130 390  120 380	 160 420  150 410	 190 450  180 440	 220 480  210 470	 240 500	 260 520

Nozzle Assy, Twin Secondary
Figure 9

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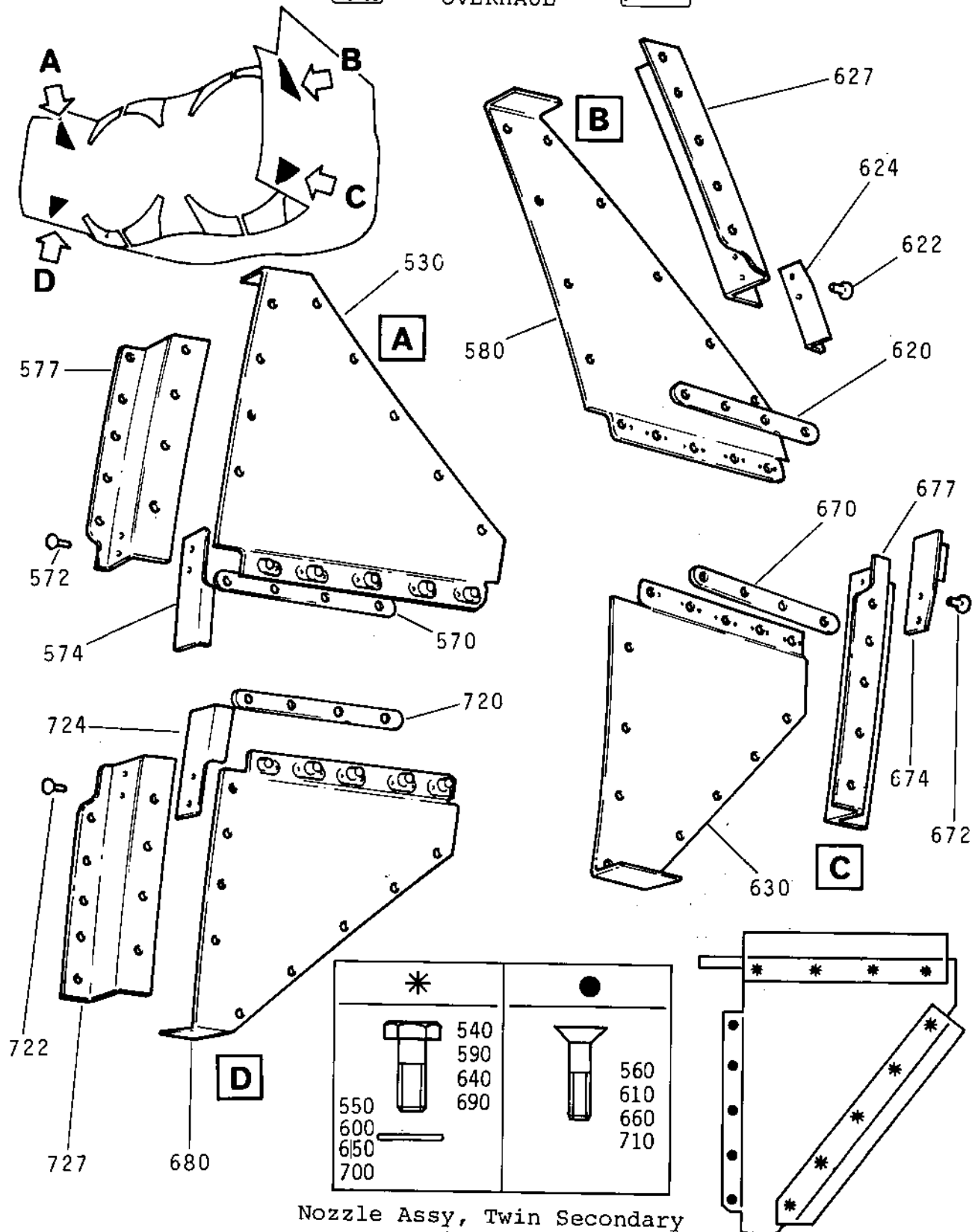
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Nozzle Assy, Twin Secondary
Figure 9A

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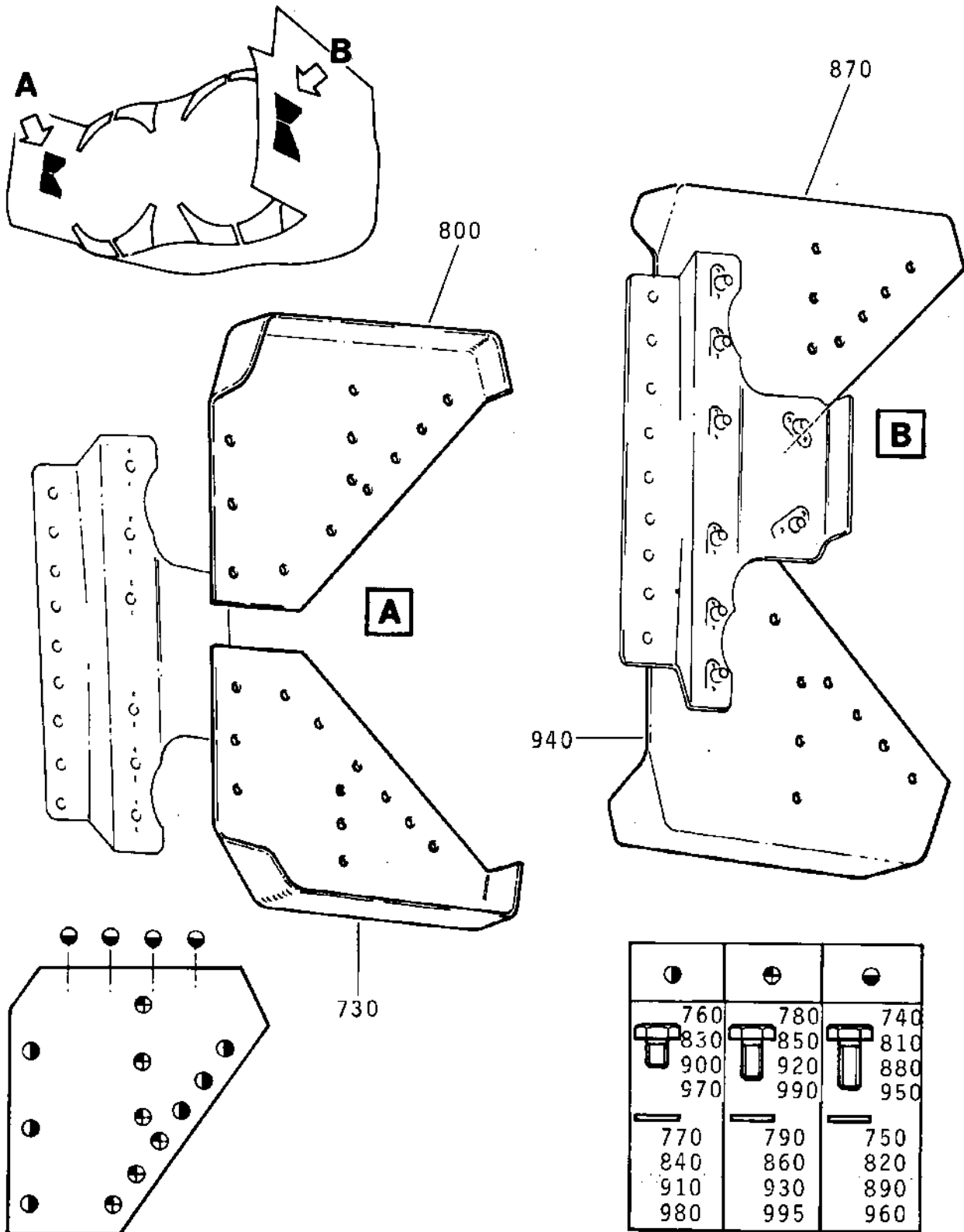
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Nozzle Assy, Twin Secondary
Figure 9B

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
9 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1B	301-203-502-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1C	301-203-503-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1D	301-203-504-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1E	301-203-505-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1F	301-203-506-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1G	301-203-507-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1H	301-203-508-0	(CTD) POST SB 0L-593-78-19 POST SB 0L-593-78-20 NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1J	301-203-509-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1K	301-203-510-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1L	301-203-511-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1M	301-203-512-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1N	301-203-513-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1P	301-203-514-0	(CTD) POST SB 0L-78-28217-35 POST SB 0L-78-28218-36 NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 2A	301-203-601-0	(CTD) POST SB 0L-78-28220-16 NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2B	301-203-602-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2C	301-203-603-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2D	301-203-604-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2E	301-203-605-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2F	301-203-606-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2G	301-203-607-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD) POST SB 0L-593-78-19 POST SB 0L-593-78-20							

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
9 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
10A	300-862-202-0	.FAIRING ASSY LH							1
- 11A	300-862-252-0	.FAIRING ASSY,RH							1
20A	HL169-6-16	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 21,1 MM (0.832 IN) SEL FROM							2 R
- 23A	HL169-6-15	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 20,3 MM (0.801 IN) SEL FROM							AR R
- 27A	HL169-6-17	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 21,9 MM (0.864 IN) SEL FROM							AR R
30A	HLN1G6	.NUT,SELF LOCKING V73197							2
40A	HL169-6-12	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 17,9 MM (0.707 IN) SEL FROM						1ABCDE F	10 R
- 42A	HL169-6-11	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 17,1 MM (0.676 IN) SEL FROM						2ABCDE F	AR R
- 40B	HL169-6-13	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 18,7 MM (0.739 IN) POST SB 0L-593-78-20 SEL FROM						1ABCDE F	10 R
- 42B	HL169-6-14	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 19,5 MM (0.770 IN) POST SB 0L-593-78-20 SEL FROM						2ABCDE F	AR R
50A	HLN1G6	.NUT,SELF LOCKING V73197							10
60A	649-786-231-0	.WASHER,PLAIN							10
70A	HL169-6-29	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 31,4 MM (1.239 IN) SEL FROM							2 R

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
9 - 73A	HL169-6-28	.	SCREW,CSK HEAD SPECIAL	V73197					AR R
			LENGTH 30,6 MM (1.207 IN)						
			SEL FROM						
- 77A	HL169-6-30	.	SCREW,CSK HEAD SPECIAL	V73197					AR R
			LENGTH 32,2 MM (1.270 IN)						
			SEL FROM						
80A	HLN1G6	.	NUT,SELF LOCKING	V73197					2
90A	649-786-189-0	.	WASHER,PLAIN						2
100A	300-887-800-0	.	SPACER						2
110A	HL169-6-30	.	SCREW,CSK HEAD SPECIAL	V73197					2 R
			LENGTH 32,2 MM (1.270 IN)						
			SEL FROM						
-113A	HL169-6-29	.	SCREW,CSK HEAD SPECIAL	V73197					AR R
			LENGTH 31,4 PM (1.239 IN)						
			SEL FROM						
-117A	HL169-6-31	.	SCREW,CSK HEAD SPECIAL	V73197					AR R
			LENGTH 33,1 MM (1.301 IN)						
			SEL FROM						
120A	SL3134C3	.	NUT,SELF LOCKING	V97393					2
130A	300-887-700-0	.	WASHER,PLAIN						2
140A	HL169-6-34	.	SCREW,CSK HEAD SPECIAL	V73197					2 R
			LENGTH 35,4 MM (1.395 IN)						
			SEL FROM						
-143A	HL169-6-33	.	SCREW,CSK HEAD SPECIAL	V73197					AR R
			LENGTH 34,6 MM (1.364 IN)						
			SEL FROM						
-147A	HL169-6-35	.	SCREW,CSK HEAD SPECIAL	V73197					AR R
			LENGTH 36,2 MM (1.426 IN)						
			SEL FROM						
150A	SL3134C3	.	NUT,SELF LOCKING	V97393					2
160A	300-887-700-0	.	WASHER,PLAIN						2
170A	HL169-6-40	.	SCREW,CSK HEAD SPECIAL	V73197					2 R
			LENGTH 40,2 MM (1.582 IN)						
			SEL FROM						
-173A	HL169-6-39	.	SCREW,CSK HEAD SPECIAL	V73197					AR R
			LENGTH 39,4 MM (1.551 IN)						
			SEL FROM						
-177A	HL169-6-41	.	SCREW,CSK HEAD SPECIAL	V73197					AR R
			LENGTH 40,9 MM (1.614 IN)						
			SEL FROM						
180A	SL3134C3	.	NUT,SELF LOCKING	V97393					2
190A	300-887-700-0	.	WASHER,PLAIN						2
200A	HL169-6-41	.	SCREW,CSK HEAD SPECIAL	V73197					2 R
			LENGTH 40,9 MM (1.614 IN)						
			SEL FROM						
-203A	HL169-6-40	.	SCREW,CSK HEAD SPECIAL	V73197					AR R
			LENGTH 40,2 MM (1.582 IN)						
			SEL FROM						

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7 1 1 1 1 1 1 1		
9 -207A	HL169-6-42	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 41,7 MM (1.645 IN) SEL FROM		AR R
210A	SL3134C3	.NUT,SELF LOCKING V97393		2
220A	300-887-700-0	.WASHER,PLAIN		2
230A	HL169-6-45	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 44,1 MM (1.739 IN) SEL FROM		4 R
-233A	HL169-6-44	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 43,3 MM (1.707 IN) SEL FROM		AR R
-237A	HL169-6-46	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 44,9 MM (1.770 IN) SEL FROM		AR R
240A	SL3134C3	.NUT,SELF LOCKING V97393		4
250A	HL169-6-42	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 41,7 MM (1.645 IN) SEL FROM		8 R
-253A	HL169-6-41	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 40,9 MM (1.614 IN) SEL FROM		AR R
-257A	HL169-6-43	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 42,5 MM (1.676 IN) SEL FROM		AR R
260A	SL3134C3	.NUT,SELF LOCKING V97393 ***		8
270A	300-862-252-0	.FAIRING ASSY LH		1
-271A	300-862-202-0	.FAIRING ASSY RH ATTACHING PARTS		1
280A	HL169-6-16	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 21,1 MM (0.832 IN) SEL FROM		2 R
-283A	HL169-6-15	.SCREW,CSK HEAD SPECIAL V72197 LENGTH 20,3 MM (0.801 IN) SEL FROM		AR R
-287A	HL169-6-17	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 21,9 MM (0.864 IN) SEL FROM		AR R
290A	HLN1G6	.NUT,SELF LOCKING V73197		2
300A	HL169-6-12	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 17,9 MM (0.707 IN) SEL FROM	1ABCDE F 2ABCDE F	10 R
-300B	HL169-6-13	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 18,7 MM (0.739 IN) POST SB OL-593-78-20 SEL FROM		10 R

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
9 -302A	HL169-6-11	.	S	C	R	E	W	1ABCDE F	AR R
								2ABCDE F	
-302B	HL169-6-14	.	S	C	R	E	W		AR R
310A	HLN1G6	.	N	U	T	,	S		10
320A	649-786-231-0	.	W	A	S	H	E		10
330A	HL169-6-29	.	S	C	R	E	W		2 R
-333A	HL169-6-28	.	S	C	R	E	W		AR R
-337A	HL169-6-30	.	S	C	R	E	W		AR R
340A	HLN1G6	.	N	U	T	,	S		2
350A	649-786-189-0	.	W	A	S	H	E		2
360A	300-887-800-0	.	S	P	A	C	E		2
370A	HL169-6-30	.	S	C	R	E	W		2 R
-373A	HL169-6-29	.	S	C	R	E	W		AR R
-377A	HL169-6-31	.	S	C	R	E	W		AR R
380A	SL3134C3	.	N	U	T	,	S		2
390A	300-887-700-0	.	W	A	S	H	E		2
400A	HL169-6-34	.	S	C	R	E	W		2 R
-403A	HL169-6-33	.	S	C	R	E	W		AR R
-407A	HL169-6-35	.	S	C	R	E	W		AR R
410A	SL3134C3	.	N	U	T	,	S		2
420A	300-887-700-0	.	W	A	S	H	E		2
430A	HL169-6-40	.	S	C	R	E	W		2 R

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY	
				1 2 3 4 5 6 7	
9 -433A	HL169-6-39	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 40,9 MM (1.614 IN) SEL FROM		AR	R
-437A	HL169-6-41	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 40,9 MM (1.614 IN) SEL FROM		AR	R
440A	SL3134C3	.NUT,SELF LOCKING V97393		2	
450A	300-887-700-0	.WASHER,PLAIN		2	
460A	HL169-6-41	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 40,9 MM (1.614 IN) SEL FROM		2	R
-463A	HL169-6-40	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 40,2 MM (1.582 IN) SEL FROM		AR	R
-467A	HL169-6-42	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 41,7 MM (1.645 IN) SEL FROM		AR	R
470A	SL3134C3	.NUT,SELF LOCKING V97393		2	
480A	300-887-700-0	.WASHER,PLAIN		2	
490A	HL169-6-45	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 44,1 MM (1.739 IN) SEL FROM		4	R
-493A	HL169-6-44	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 43,3 MM (1.707 IN) SEL FROM		AR	R
-497A	HL169-6-46	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 44,9 MM (1.770 IN) SEL FROM		AR	R
500A	SL3134C3	.NUT,SELF LOCKING V97393		4	
510A	HL169-6-42	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 41,7 MM (1.645 IN) SEL FROM		8	R
-513A	HL169-6-41	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 40,9 MM (1.614 IN) SEL FROM		AR	R
-517A	HL169-6-43	.SCREW,CSK HEAD SPECIAL V73197 LENGTH 42,5 MM (1.676 IN) SEL FROM		AR	R
520A	SL3134C3	.NUT,SELF LOCKING V97393 ***		8	
A 530A	302-058-401-0	.HEAT SHIELD LH POST SB 0L-593-78-20		1	
A-531A	302-058-451-0	.HEAT SHIELD RH POST SB 0L-593-78-20		1	
A 540A	MS9500-07	ATTACHING PARTS .BOLT,HEX HEAD POST SB 0L-593-78-20		9	

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7 1 1 1 1 1 1 1		
9A 550A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20		9
A 560A	649-781-008-0	.SCREW, CSK HEAD POST SB OL-593-78-20		5
A 570A	302-058-500-0	.SHIM POST SB OL-593-78-20 ****		1
A 572A	21215TC3208	.RIVET POST SB OL-593-78-20		2
A 574A	302-058-200-0	.PLATE, BLANKING LH POST SB OL-593-78-20		1
A-575A	302-058-250-0	.PLATE, BLANKING RH POST SB OL-593-78-20		1
A 577A	302-058-100-0	.BRACKET LH POST SB OL-593-78-20		1
A-578A	302-058-150-0	.BRACKET RH POST SB OL-593-78-20		1
A 580A	302-058-451-0	.HEAT SHIELD LH POST SB OL-593-78-20		1
A-581A	302-058-401-0	.HEAT SHIELD RH POST SB OL-593-78-20		1
A 590A	MS9500-07	ATTACHING PARTS .BOLT, HEX HEAD POST SB OL-593-78-20		9
A 600A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20		9
A 610A	649-781-008-0	.SCREW, CSK HEAD POST SB OL-593-78-20		5
A 620A	302-058-500-0	.SHIM POST SB OL-593-78-20 ****		1
A 622A	21215TC3208	.RIVET POST SB OL-593-78-20		2
A 624A	302-058-250-0	.PLATE, BLANKING LH POST SB OL-593-78-20		1
A-625A	302-058-200-0	.PLATE, BLANKING RH POST SB OL-593-78-20		1
A 627A	302-058-150-0	.BRACKET LH POST SB OL-593-78-20		1
A-628A	302-058-100-0	.BRACKET RH POST SB OL-593-78-20		1
A 630A	302-058-401-0	.HEAT SHIELD LH POST SB OL-593-78-20		1
A-631A	302-058-451-0	.HEAT SHIELD RH POST SB OL-593-78-20		1
A 640A	MS9500-07	ATTACHING PARTS .BOLT, HEX HEAD POST SB OL-593-78-20		9

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
9 A 650A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20		9
A 660A	649-781-008-0	.SCREW, CSK HEAD POST SB OL-593-78-20		5
A 670A	302-058-500-0	.SHIM POST SB OL-593-78-20 ****		1
A 672A	21215TC3208	.RIVET POST SB OL-593-78-20		2
A 674A	302-058-200-0	.PLATE, BLANKING LH POST SB OL-593-78-20		1
A-675A	302-058-250-0	.PLATE, BLANKING RH POST SB OL-593-78-20		1
A 677A	302-058-050-0	.BRACKET LH POST SB OL-593-78-20		1
A-678A	302-058-000-0	.BRACKET RH POST SB OL-593-78-20		1
A 680A	302-058-451-0	.HEAT, SHIELD LH POST SB OL-593-78-20		1
A-681A	302-058-401-0	.HEAT, SHIELD RH POST SB OL-593-78-20 ATTACHING PARTS		1
A 690A	MS9500-07	.BOLT, HEX HEAD POST SB OL-593-78-20		9
A 700A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20		9
A 710A	649-781-008-0	.SCREW, CSK HEAD POST SB OL-593-78-20		5
A 720A	302-058-500-0	.SHIM POST SB OL-593-78-20 ***		1
A 722A	21215TC3208	.RIVET POST SB OL-593-78-20		2
A 724A	302-058-250-0	.PLATE, BLANKING LH POST SB OL-593-78-20		1
A-725A	302-058-200-0	.PLATE, BLANKING RH POST SB OL-593-78-20		1
A 727A	302-058-000-0	.BRACKET LH POST SB OL-593-78-20		1
A-728A	302-058-050-0	.BRACKET RH POST SB OL-593-78-20		1
B 730A	302-017-703-0	.HEAT SHIELD LH POST SB OL-593-78-20		1
B-731A	302-017-753-0	.HEAT SHIELD RH POST SB OL-593-78-20 ATTACHING PARTS		1
B 740A	MS9500-06	.BOLT, HEX HEAD POST SB OL-593-78-20		4

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
9B 750A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20		4
B 760A	MS9500-07	.BOLT, HEX HEAD POST SB OL-593-78-20		6
B 770A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20		6
B 780A	MS9500-08	.BOLT, HEX HEAD POST SB OL-593-78-20		6
B 790A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20 ***		6
B 800A	302-017-753-0	.HEAT SHIELD LH POST SB OL-593-78-20		1
B-801A	302-017-703-0	.HEAT SHIELD RH POST SB OL-593-78-20 ATTACHING PARTS		1
B 810A	MS9500-06	.BOLT, HEX HEAD POST SB OL-593-78-20		4
B 820A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20		4
B 830A	MS9500-07	.BOLT, HEX HEAD POST SB OL-593-78-20		6
B 840A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20		6
B 850A	MS9500-08	.BOLT, HEX HEAD POST SB OL-593-78-20		6
B 860A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20 ***		6
B 870A	302-017-703-0	.HEAT SHIELD LH POST SB OL-593-78-20		1
B-871A	302-017-753-0	.HEAT SHIELD RH POST SB OL-593-78-20 ATTACHING PARTS		1
B 880A	MS9500-06	.BOLT, HEX HEAD POST SB OL-593-78-20		4
B 890A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20		4
B 900A	MS9500-07	.BOLT, HEX HEAD POST SB OL-593-78-20		6
B 910A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20		6
B 920A	MS9500-08	.BOLT, HEX HEAD POST SB OL-593-78-20		6
B 930A	649-341-010-0	.WASHER, PLAIN POST SB OL-593-78-20 ***		6

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
9B 940A	302-017-753-0	.HEAT SHIELD LH POST SB OL-593-78-20		1
B-941A	302-017-703-0	.HEAT SHIELD RH POST SB OL-593-78-20		1
B 950A	MS9500-06	ATTACHING PARTS .BOLT,HEX HEAD POST SB OL-593-78-20		4
B 960A	649-341-010-0	.WASHER,PLAIN POST SB OL-593-78-20		4
B 970A	MS9500-07	.BOLT,HEX HEAD POST SB OL-593-78-20		6
B 980A	649-341-010-0	.WASHER,PLAIN POST SB OL-593-78-20		6
B 990A	MS9500-08	.BOLT,HEX HEAD POST SB OL-593-78-20		6
B 995A	649-341-010-0	.WASHER,PLAIN POST SB OL-593-78-20 ***		6

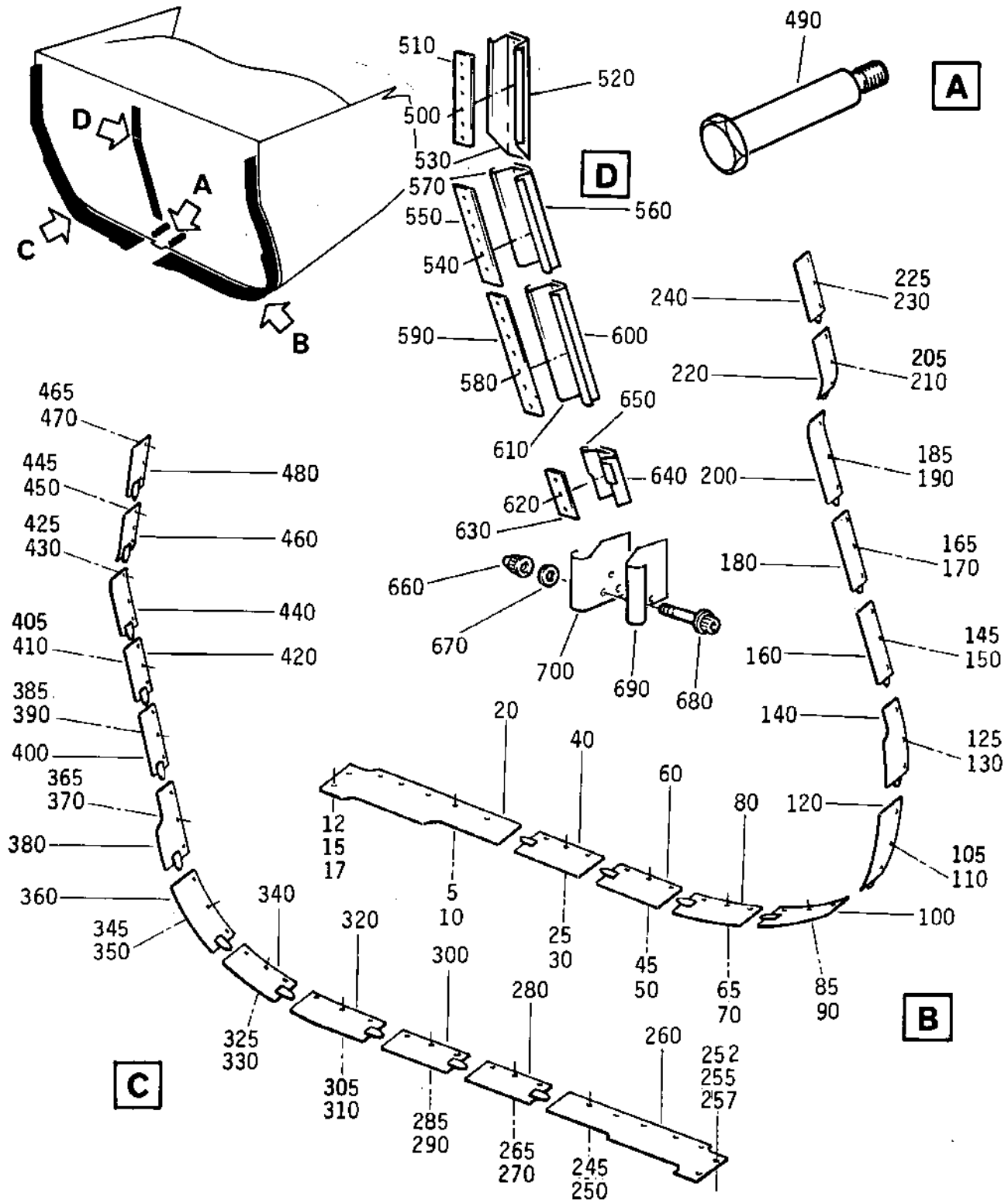
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Nozzle Assy, Twin Secondary
Figure 10

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
10 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB OL-593-78-19 POST SB OL-593-78-20							

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
10 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
		NOZZLE ASSY,TWIN SECONDARY RH (CTD)							
		POST SB 0L-78-28220-16							
5A	BAS7094C3	.NUT,HEX				VU1598			11
10A	NAS1153E3	.SCREW,CSK HEAD							11
12A	BAS7094C3	.NUT,HEX				VU1598			2
15A	AN960C10	.WASHER,PLAIN							2
17A	NAS1153E4	.SCREW,CSK HEAD							2
20A	E57-1712-100	.SEAL,PLATE LH				VU1598			1 R
		OPT TO 301-128-300-0							
- 21A	E57-1712-101	.SEAL,PLATE RH				VU1598			1 R
		OPT TO 301-128-350-0							
25A	BAS7094C3	.NUT,HEX				VU1598			4
30A	NAS1153E3	.SCREW,CSK HEAD							4
40A	E57-1713-000	.SEAL,PLATE ASSY LH				VU1598			1 R
		OPT TO 301-128-400-0							
- 41A	E57-1713-001	.SEAL,PLATE ASSY RH				VU1598			1 R
		OPT TO 301-128-450-0							
45A	BAS7094C3	.NUT,HEX				VU1598			3
50A	NAS1153E3	.SCREW,CSK HEAD							3
60A	E57-1714-000	.SEAL,PLATE ASSY LH				VU1598			1 R
		OPT TO 301-128-600-0							
- 61A	E57-1714-001	.SEAL,PLATE ASSY RH				VU1598			1 R
		OPT TO 301-128-650-0							
65A	BAS7094C3	.NUT,HEX				VU1598			4
70A	NAS1153E3	.SCREW,CSK HEAD							4
80A	E57-1715-000	.SEAL,PLATE ASSY LH				VU1598			1 R
		OPT TO 301-128-800-0							
- 81A	E57-1715-001	.SEAL,PLATE ASSY RH				VU1598			1 R
		OPT TO 301-128-850-0							
85A	BAS7094C3	.NUT,HEX				VU1598			3
90A	NAS1153E3	.SCREW,CSK HEAD							3
100A	E57-1716-000	.SEAL,PLATE ASSY LH				VU1598			1 R
		OPT TO 301-129-000-0							
-101A	E57-1716-001	.SEAL,PLATE ASSY RH				VU1598			1 R
		OPT TO 301-129-050-0							

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
10	105A	BAS7094C3	.NUT,HEX				VU1598		4
	110A	NAS1153E3	.SCREW,CSK HEAD						4
	120A	E57-1717-000	.SEAL,PLATE ASSY LH				VU1598		1 R
			OPT TO 301-129-900-0						
	-121A	E57-1717-001	.SEAL,PLATE ASSY RH				VU1598		1 R
			OPT TO 301-129-950-0						
	125A	BAS7094C3	.NUT,HEX				VU1598		5
	130A	NAS1153E3	.SCREW,CSK HEAD						5
	140A	E57-1718-000	.SEAL,PLATE ASSY LH				VU1598		1 R
			OPT TO 301-129-400-0						
	-141A	E57-1718-001	.SEAL,PLATE ASSY RH				VU1598		1 R
			OPT TO 301-129-450-0						
	145A	BAS7094C3	.NUT,HEX				VU1598		4
	150A	NAS1153E3	.SCREW,CSK HEAD						4
	160A	E57-1719-000	.SEAL,PLATE ASSY LH				VU1598		1 R
			OPT TO 301-129-600-0						
	-161A	E57-1719-001	.SEAL,PLATE ASSY RH				VU1598		1 R
			OPT TO 301-129-650-0						
	165A	BAS7094C3	.NUT,HEX				VU1598		4
	170A	NAS1153E3	.SCREW,CSK HEAD						4
	180A	E57-1720-000	.SEAL,PLATE ASSY LH				VU1598		1 R
			OPT TO 301-129-800-0						
	-181A	E57-1720-001	.SEAL,PLATE ASSY RH				VU1598		1 R
			OPT TO 301-129-850-0						
	185A	BAS7094C3	.NUT,HEX				VU1598		4
	190A	NAS1153E3	.SCREW,CSK HEAD						4
	200A	E57-1721-000	.SEAL,PLATE ASSY LH				VU1598		1 R
			OPT TO 301-130-000-0						
	-201A	E57-1721-001	.SEAL,PLATE ASSY RH				VU1598		1 R
			OPT TO 301-130-050-0						
	205A	BAS7094C3	.NUT,HEX				VU1598		3
	210A	NAS1153E3	.SCREW,CSK HEAD						3
	220A	E57-1722-102	.SEAL,PLATE LH				VU1598		1 R
			OPT TO 301-130-200-0						
	-221A	E57-1722-103	.SEAL,PLATE RH				VU1598		1 R
			OPT TO 301-130-250-0						
	225A	BAS7094C3	.NUT,HEX				VU1598		4
	230A	NAS1153E3	.SCREW,CSK HEAD						4
	240A	E57-1723-101	.SEAL,PLATE				VU1598		1 R
			OPT TO 301-130-400-0						
	245A	BAS7094C3	.NUT,HEX				VU1598		11
	250A	NAS1153E3	.SCREW,CSK HEAD						11
	252A	BAS7094C3	.NUT,HEX				VU1598		2
	255A	AN960C10	.WASHER,PLAIN						2
	257A	NAS1153E4	.SCREW,CSK HEAD						2
	260A	E57-1712-101	.SEAL,PLATE LH				VU1598		1 R
			OPT TO 301-128-350-0						

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FIG-ITEM	PART NUMBER	NOMENCLATURE		USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7			
10 -261A	E57-1712-100	.SEAL,PLATE RH	VU1598		1 R
	265A	OPT TO 301-128-300-0			
	270A	.NUT,HEX	VU1598		4
	280A	.SCREW,CSK HEAD			4
	E57-1713-001	.SEAL,PLATE ASSY LH	VU1598		1 R
		OPT TO 301-128-450-0			
-281A	E57-1713-000	.SEAL,PLATE ASSY RH	VU1598		1 R
		OPT TO 301-128-400-0			
	285A	.NUT,HEX	VU1598		3
	290A	.SCREW,CSK HEAD			3
	300A	.SEAL,PLATE ASSY LH			1 R
		OPT TO 301-128-650-0			
-301A	E57-1714-000	.SEAL,PLATE ASSY RH			1 R
		OPT TO 301-128-600-0			
	305A	.NUT,HEX	VU1598		4
	310A	.SCREW,CSK HEAD			4
	320A	.SEAL,PLATE ASSY LH	VU1598		1 R
		OPT TO 301-128-850-0			
-321A	E57-1715-000	.SEAL,PLATE ASSY RH	VU1598		1 R
		OPT TO 301-128-800-0			
	325A	.NUT,HEX	VU1598		3
	330A	.SCREW,CSK HEAD			3
	340A	.SEAL,PLATE ASSY LH	VU1598		1 R
		OPT TO 301-129-050-0			
-341A	E57-1716-000	.SEAL,PLATE ASSY RH	VU1598		1 R
		OPT TO 301-129-000-0			
	345A	.NUT,HEX	VU1598		4
	350A	.SCREW,CSK HEAD			4
	360A	.SEAL,PLATE ASSY LH	VU1598		1 R
		OPT TO 301-129-950-0			
-361A	E57-1717-000	.SEAL,PLATE ASSY RH	VU1598		1 R
		OPT TO 301-129-900-0			
	365A	.NUT,HEX	VU1598		5
	370A	.SCREW,CSK HEAD			5
	380A	.SEAL,PLATE ASSY LH	VU1598		1 R
		OPT TO 301-129-450-0			
-381A	E57-1718-000	.SEAL,PLATE ASSY RH	VU1598		1 R
		OPT TO 301-129-400-0			
	385A	.NUT,HEX	VU1598		4
	390A	.SCREW,CSK HEAD			4
	400A	.SEAL,PLATE ASSY LH	VU1598		1 R
		OPT TO 301-129-650-0			
-401A	E57-1719-000	.SEAL,PLATE ASSY RH	VU1598		1 R
		OPT TO 301-129-600-0			
	405A	.NUT,HEX	VU1598		4
	410A	.SCREW,CSK HEAD			4
	420A	.SEAL,PLATE ASSY LH	VU1598		1 R
		OPT TO 301-129-850-0			

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FIG-ITEM	PART NUMBER	NOMENCLATURE		USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7			
10 -421A	E57-1720-000	.SEAL,PLATE ASSY RH	VU1598		1 R
		OPT TO 301-129-800-0			
425A	BAS7094C3	.NUT,HEX	VU1598		4
430A	NAS1153E3	.SCREW,CSK HEAD			4
440A	E57-1721-001	.SEAL,PLATE ASSY LH	VU1598		1 R
		OPT TO 301-130-050-0			
-441A	E57-1721-000	.SEAL,PLATE ASSY RH	VU1598		1 R
		OPT TO 301-130-000-0			
445A	BAS7094C3	.NUT,HEX	VU1598		3
450A	NAS1153E3	.SCREW,CSK HEAD			3
460A	E57-1722-103	.SEAL,PLATE LH	VU1598		1 R
		OPT TO 301-130-250-0			
-461A	E57-1722-102	.SEAL,PLATE RH	VU1598		1 R
		OPT TO 301-130-200-0			
465A	BAS7094C3	.NUT,HEX	VU1598		4
470A	NAS1153E3	.SCREW,CSK HEAD			4
480A	E57-1723-101	.SEAL,PLATE	VU1598		1 R
		OPT TO 301-130-400-0			
490A	302-008-400-0	.PIN,THREADED			2
500A	NAS1671-08L3	.BOLT,BLIND			6
510A	E51-1570-100	.WASHER,THROAT	VU1598		1
520A	E51-1569-100	.STRIP,ANTI-FRET	VU1598		1
530A	E51-1569-101	.STRIP,ANTI-FRET	VU1598		1
540A	NAS1671-08L3	.BOLT,BLIND			6
550A	E51-1570-101	.WASHER,THROAT	VU1598		1
560A	E51-1569-102	.STRIP,ANTI-FRET	VU1598		1
570A	E51-1569-103	.STRIP,ANTI-FRET	VU1598		1
580A	NAS1671-08L3	.BOLT,BLIND			7
590A	E51-1570-102	.WASHER,THROAT	VU1598		1
600A	E51-1569-104	.STRIP,ANTI-FRET	VU1598		1
610A	E51-1569-105	.STRIP,ANTI-FRET	VU1598		1
620A	NAS1671-08L3	.BOLT,BLIND			3
630A	E51-1570-103	.WASHER,THROAT	VU1598		1
640A	E51-1569-106	.STRIP,ANTI-FRET	VU1598		1
650A	E51-1569-107	.STRIP,ANTI-FRET	VU1598		1
660A	DHT5579-4	.NUT,SELF LOCKING	VF0224		3
		OPT TO Z3874-048	V72962		
670A	649-341-011-0	.WASHER			3
680A	302-008-600-0	.BOLT,12 POINT HEAD			3
		OPT TO 302-008-601-0			
690A	E51-1571-100	.STRIP,ANTI-FRET	VU1598		1
		OPT TO E51-1571-102	VU1598		
700A	E51-1571-101	.STRIP,ANTI-FRET	VU1598		1
		OPT TO E51-1571-103	VU1598		

- ITEM NOT ILLUSTRATED

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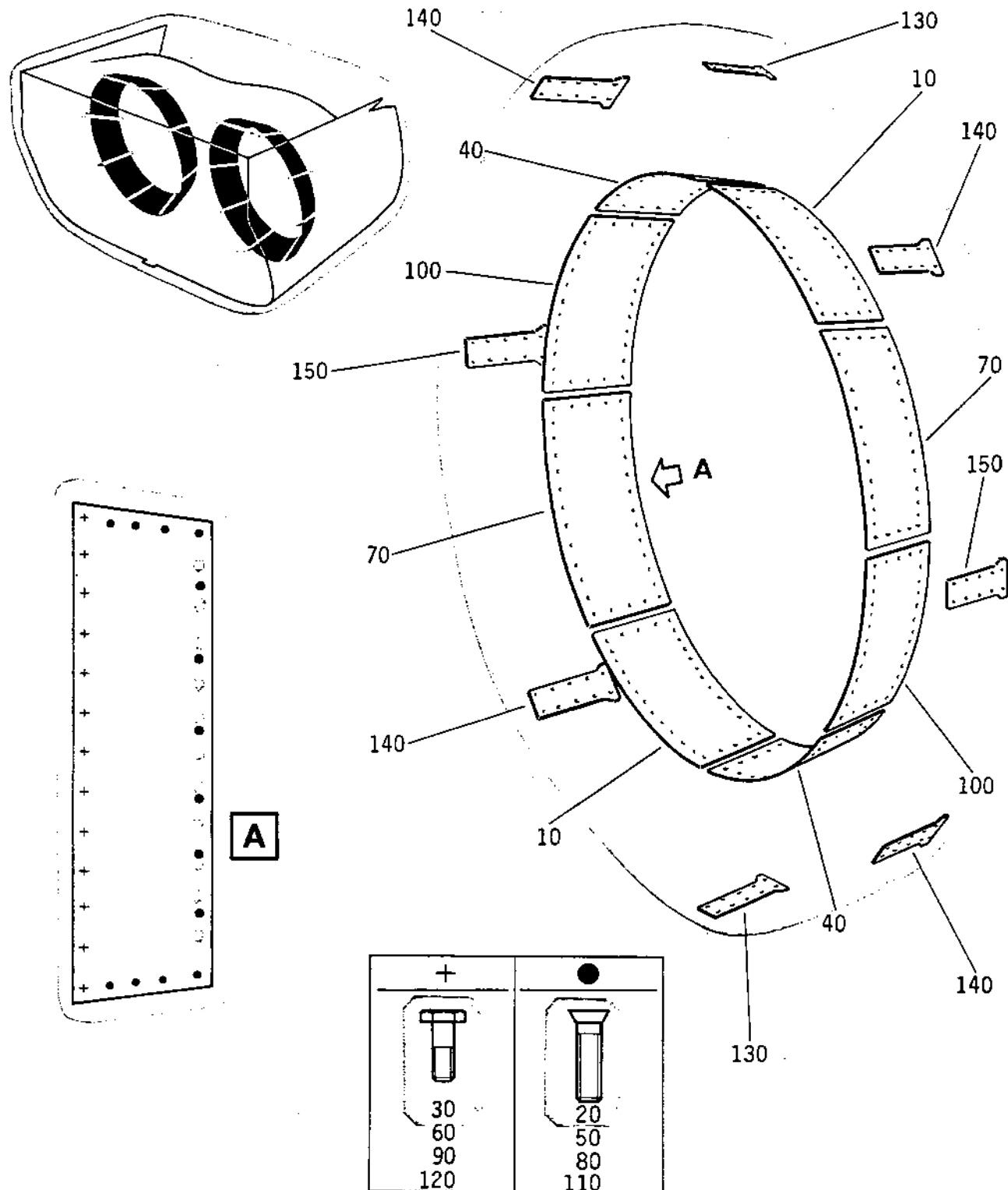
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OLYMPUS 593

MK.610-14-28

OVERHAUL



Nozzle Assy, Twin Secondary
Figure 11

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OLYMPUS 593

MK.610-14-28
OVERHAUL

FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
11 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
11 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
		POST SB 0L-78-28220-16							
10A	300-900-300-6	.PANEL ASSY,CONVERGENT ATTACHING PARTS							4 R
20A	649-781-027-0	.SCREW,CSK HEAD							56
30A	NAS6303U4	.BOLT,HEX HEAD							52

40A	300-900-350-6	.PANEL ASSY,CONVERGENT ATTACHING PARTS							4 R
50A	649-781-027-0	.SCREW,CSK HEAD							56
60A	NAS6303U4	.BOLT,HEX HEAD							52

70A	300-900-200-6	.PANEL ASSY,CONVERGENT ATTACHING PARTS							4 R
80A	649-781-027-0	.SCREW,CSK HEAD							56
90A	NAS6303U4	.BOLT,HEX HEAD							52

100A	300-900-250-6	.PANEL ASSY,CONVERGENT ATTACHING PARTS							4 R
110A	649-781-027-0	.SCREW,CSK HEAD							56
120A	NAS6303U4	.BOLT,HEX HEAD							52

130A	300-900-600-0	.PLATE,JOINT							4
140A	300-900-700-0	.PLATE,JOINT							8
150A	300-900-800-0	.PLATE,JOINT							4

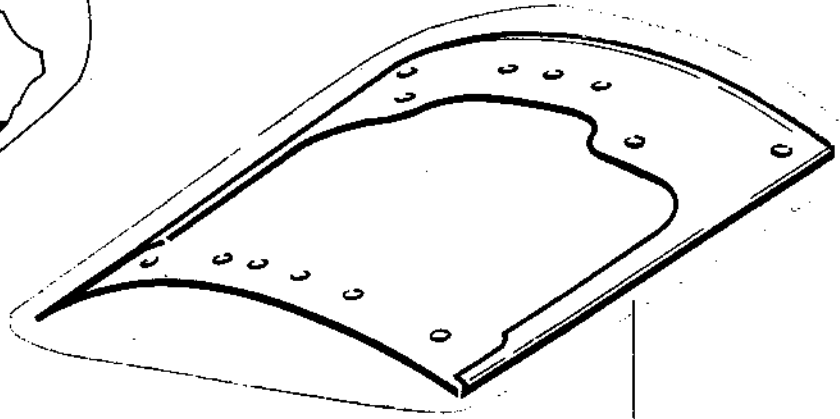
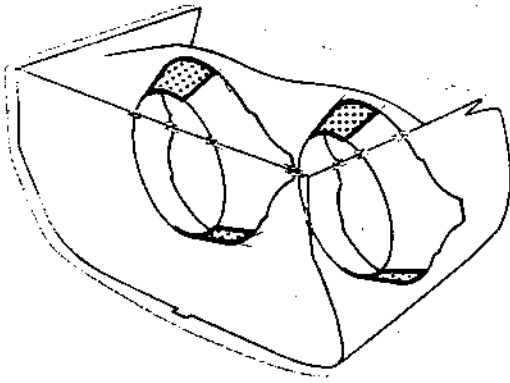
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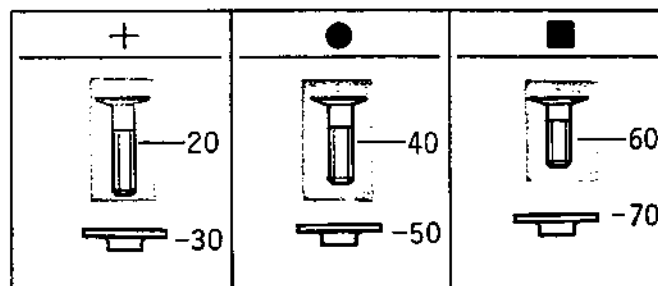
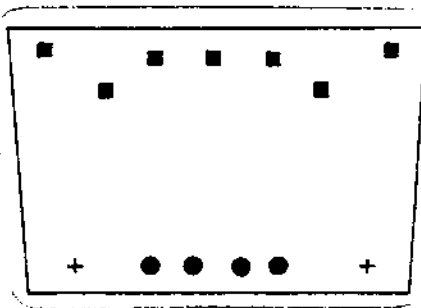


OLYMPUS 593

MK.610-14-28
OVERHAUL



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Nozzle Assy, Twin Secondary
Figure 12

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
12 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB OL-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593**MK.610-14-28
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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
12 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF R
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF R
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF R
10A	301-059-321-0	.PANEL,DIVERGENT VERTICAL							1A 2A	4
- 10B	301-059-324-0	.PANEL,DIVERGENT VERTICAL OPT TO 301-059-323-0								4
20A	BAS8443C4-9	.SCREW,CSK HEAD								8
30A	301-146-803-0	.WASHER,SPECIAL							1A 2A	8
40A	BAS8443C4-8	.SCREW,CSK HEAD								16
50A	301-146-803-0	.WASHER,SPECIAL							1A 2A	16
60A	BAS8443C4-11	.SCREW,CSK HEAD								28
70A	301-146-803-0	.WASHER,SPECIAL								28

- ITEM NOT ILLUSTRATED

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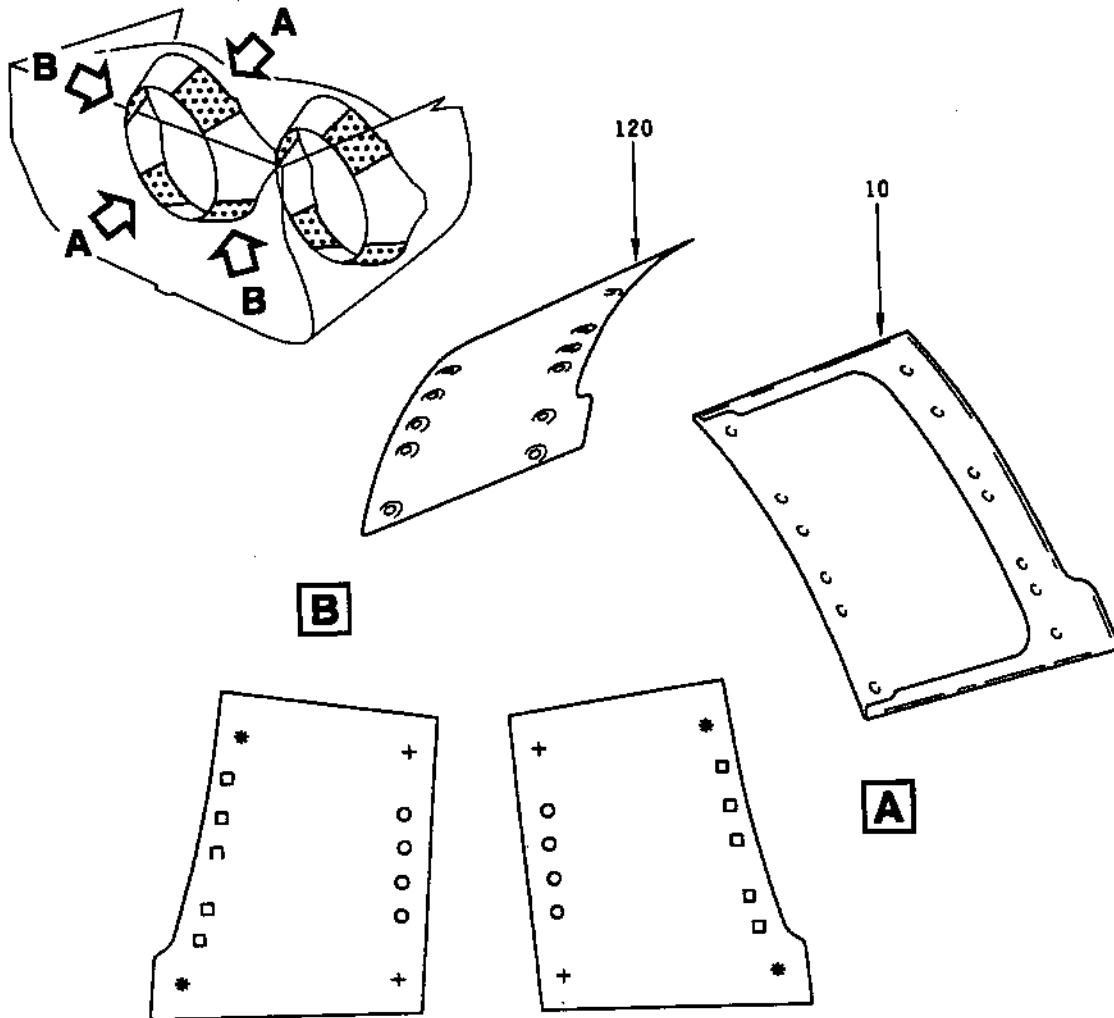


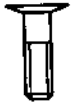







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**MK. 610-14-28
OVERHAUL**



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60		170	40		150	20	
			100		210		
70		180	50		160	30	
			110		220		
						80	
						90	

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Nozzle Assy, Twin Secondary
Figure 13

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
13 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							

- ITEM NOT ILLUSTRATED

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OLYMPUS 593

MK.610-14-28
OVERHAUL

FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
13 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB 0L-78-28220-16							
10A	301-065-621-0	.PANEL,DIVERGENT 45 DEG						1A	4
		POSITION						2A	
- 10B	301-065-624-0	.PANEL,DIVERGENT 45 DEG							4
		POSITION							
		OPT TO 301-065-623-0							
		ATTACHING PARTS							
20A	BAS8443C4-8	.SCREW,CSK HEAD					VU1598		16
30A	301-146-803-0	.WASHER,SPECIAL						1A	16
								2A	
40A	BAS8443C4-11	.SCREW,CSK HEAD					VU1598		4
50A	301-146-803-0	.WASHER,SPECIAL							4
60A	BAS8443C4-9	.SCREW,CSK HEAD					VU1598		8
70A	301-146-803-0	.WASHER,SPECIAL						1A	8
								2A	
80A	BAS8443C4-11	.SCREW,CSK HEAD					VU1598		20
90A	301-146-602-0	.WASHER,SPECIAL							20
100A	BAS8443C4-11	.SCREW,CSK HEAD					VU1598		4
110A	301-146-803-0	.WASHER,SPECIAL							4

120A	301-065-671-0	.PANEL,DIVERGENT 45 DEG						1A	4
		POSITION						2A	
-120B	301-065-674-0	.PANEL,DIVERGENT 45 DEG							4
		POSITION							
		OPT TO 301-065-673-0							
		ATTACHING PARTS							
130A	BAS8443C4-8	.SCREW,CSK HEAD					VU1598		16
140A	301-146-803-0	.WASHER,SPECIAL						1A	16
								2A	
150A	BAS8443C4-11	.SCREW,CSK HEAD					VU1598		4
160A	301-146-803-0	.WASHER,SPECIAL							4
170A	BAS8443C4-9	.SCREW,CSK HEAD					VU1598		8
180A	301-146-803-0	.WASHER,SPECIAL						1A	8
								2A	

- ITEM NOT ILLUSTRATED

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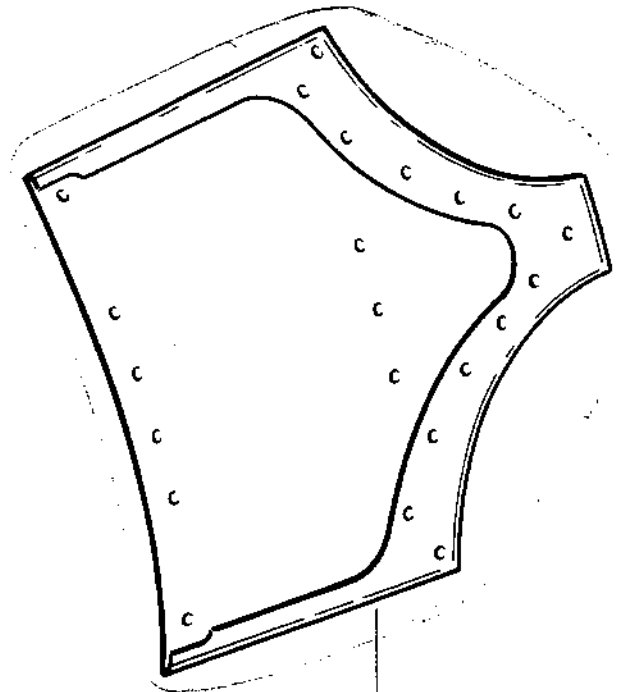
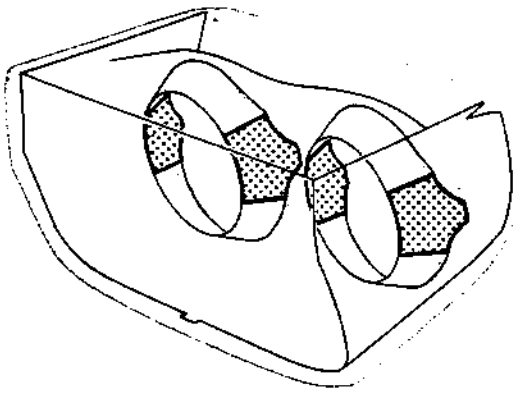


FIG-ITEM	PART NUMBER	NOMENCLATURE		USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7			
13 190A	BAS8443C4-11	.SCREW,CSK HEAD	VU1598		20
200A	301-146-602-0	.WASHER,SPECIAL			20
210A	BAS8443C4-11	.SCREW,CSK HEAD	VU1598		4
220A	301-146-803-0	.WASHER,SPECIAL			4

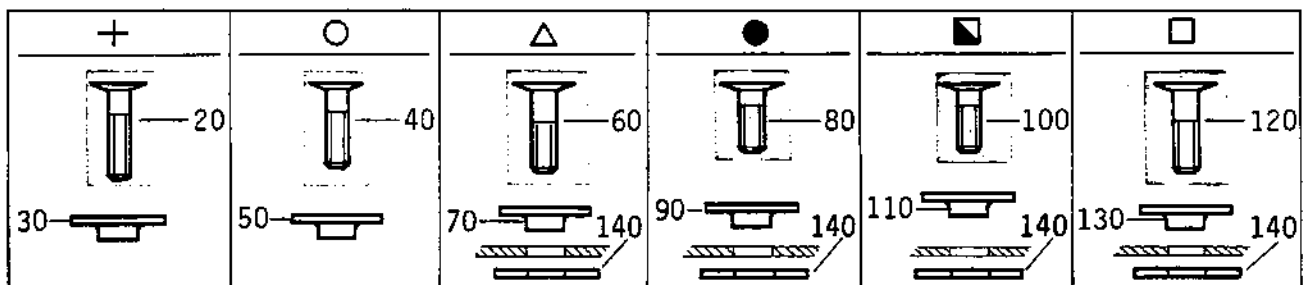
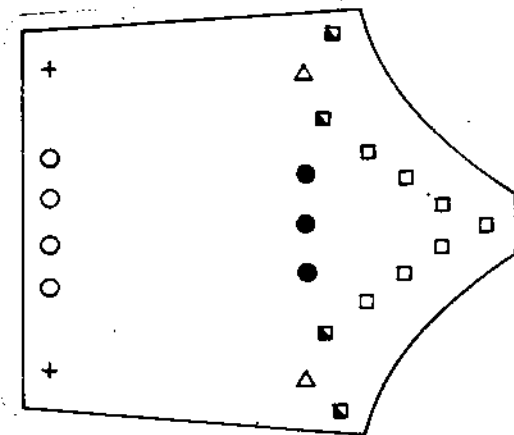
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Nozzle Assy, Twin Secondary
Figure 14

**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
14 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1B	301-203-502-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1C	301-203-503-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1D	301-203-504-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1E	301-203-505-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1F	301-203-506-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1G	301-203-507-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1H	301-203-508-0	POST SB OL-593-78-19 POST SB OL-593-78-20 NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1J	301-203-509-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1K	301-203-510-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1L	301-203-511-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1M	301-203-512-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1N	301-203-513-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1P	301-203-514-0	POST SB OL-78-28217-35 POST SB OL-78-28218-36 NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 2A	301-203-601-0	(CTD) POST SB OL-78-28220-16 NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2B	301-203-602-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2C	301-203-603-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2D	301-203-604-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2E	301-203-605-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2F	301-203-606-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2G	301-203-607-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
		POST SB OL-593-78-19 POST SB OL-593-78-20							

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593**

MK.610-14-28

OVERHAUL



FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
14 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2J	301-203-609-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2K	301-203-610-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2L	301-203-611-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF R
- 2M	301-203-612-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF R
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
- 2N	301-203-613-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF R
		POST SB OL-78-28220-16							
10A	301-059-921-0	.PANEL,DIVERGENT LATERAL						1A 2A	4
- 10B	301-059-926-0	.PANEL,DIVERGENT LATERAL							4
		OPT TO 301-059-925-0							
		ATTACHING PARTS							
20A	BAS8443C4-9	.SCREW,CSK HEAD				VU1598			8
30A	301-146-803-0	.WASHER,SPECIAL						1A 2A	8
40A	BAS8443C4-8	.SCREW,CSK HEAD				VU1598			16
50A	301-146-803-0	.WASHER,SPECIAL						1A 2A	16
60A	BAS8443C4-8	.SCREW,CSK HEAD				VU1598			8
70A	301-146-803-0	.WASHER,SPECIAL						1A 2A	8
80A	BAS8443C4-11	.SCREW,CSK HEAD				VU1598			12
90A	301-146-702-0	.WASHER,SPECIAL						1A 2A	12
100A	BAS8443C4-8	.SCREW,CSK HEAD				VU1598			16
110A	301-146-803-0	.WASHER,SPECIAL						1A 2A	16
120A	BAS8443C4-8	.SCREW,CSK HEAD				VU1598			28
130A	301-146-803-0	.WASHER,SPECIAL						1A 2A	28
140A	302-017-500-0	.WASHER,PLAIN						1A 2A	64
		XXXX							

- ITEM NOT ILLUSTRATED

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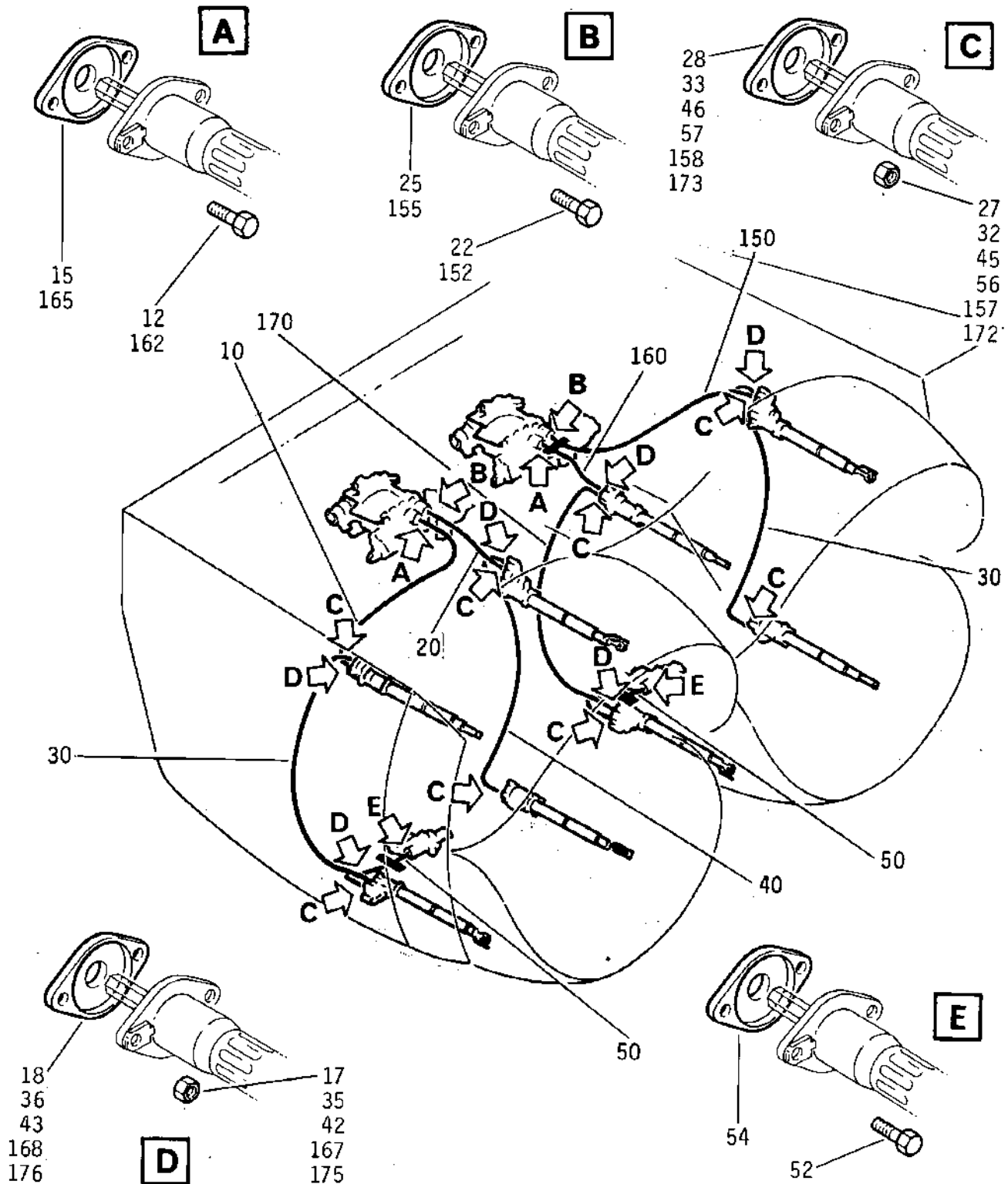
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OLYMPUS 593

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OVERHAUL



Nozzle Assy, Twin Secondary
Figure 15

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OVERHAUL



FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
15 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
15 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB OL-78-28220-16							
10A	121708-1	.SHAFT,FLEXIBLE					V99193		1
		SEE 78-34-01 FOR DET							
		ATTACHING PARTS							
12A	MS21279-10	.BOLT							2
		POST SB OL-593-78-24							
		SEL FROM							
- 13A	MS21279-12	.BOLT							AR
		POST SB OL-593-78-24							
		SEL FROM							
- 14A	MS21279-14	.BOLT							AR
		POST SB OL-593-78-24							
		SEL FROM							
15A	3232727-1	.SHIM 4 MM THICK					V99193		AR
		(0.1575 IN)							
		POST SB OL-593-78-24							
		SEL FROM							
- 16A	3232727-2	.SHIM 6 MM THICK					V99193		AR
		(0.2362 IN)							
		POST SB OL-503-78-24							
		SEL FROM							
17A	MS21043-3	.NUT							2
		POST SB OL-593-78-24							
18A	3232727-3	.SHIM 4 MM THICK					V99193		AR
		(0.1575 IN)							
		POST SB OL-593-78-24							
		SEL FROM							
- 19A	3232727-4	.SHIM 6 MM THICK					V99193		AR
		(0.2362 IN)							
		POST SB OL-593-78-24							
		SEL FROM							

20A	121708-2	.SHAFT,FLEXIBLE					V99193		1
		SEE 78-34-01 FOR DET							

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593**MK.610-14-28
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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
15									
	22A	MS21279-10	ATTACHING PARTS						2
			.BOLT						
			POST SB OL-593-78-24						
			SEL FROM						
-	23A	MS21279-12	.BOLT						AR
			POST SB OL-593-78-24						
			SEL FROM						
-	24A	MS21279-14	.BOLT						AR
			POST SB OL-593-78-24						
			SEL FROM						
	25A	3232727-3	.SHIM 4 MM THICK				V99193		AR
			(0.1575 IN)						
			POST SB OL-593-78-24						
			SEL FROM						
-	26A	3232727-4	.SHIM 6 MM THICK				V99193		AR
			(0.2362 IN)						
			POST SB OL-593-78-24						
			SEL FROM						
	27A	MS21043-3	.NUT						2
			POST SB OL-593-78-24						
	28A	3232727-1	.SHIM 4 MM THICK				V99193		AR
			(0.1575 IN)						
			POST SB OL-593-78-24						
			SEL FROM						
-	29A	3232727-2	.SHIM 6 MM THICK				V99193		AR
			(0.2362 IN)						
			POST SB OL-593-78-24						
			SEL FROM						

	30A	121708-3	.SHAFT,FLEXIBLE				V99193		2
			SEE 78-34-01 FOR DET						
			ATTACHING PARTS						
	32A	MS21043-3	.NUT						4
			POST SB OL-593-78-24						
	33A	3232727-1	.SHIM 4 MM THICK				V99193		AR
			(0.1575 IN)						
			POST SB OL-593-78-24						
			SEL FROM						
-	34A	3232727-2	.SHIM 6 MM THICK				V99193		AR
			(0.2362 IN)						
			POST SB OL-593-78-24						
			SEL FROM						
	35A	MS21043-3	.NUT						4
			POST SB OL-593-78-24						
	36A	3232727-3	.SHIM 4 MM THICK				V99193		AR
			(0.1575 IN)						
			POST SB OL-593-78-24						
			SEL FROM						

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593**MK. 610-14-28
OVERHAUL

FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
15 - 37A	3232727-4	.	S	H	I	M	6 MM THICK (0.2362 IN) POST SB OL-593-78-24 SEL FROM ****	V99193	AR
40A	121708-4	.	S	H	A	F	T, FLEXIBLE ATTACHING PARTS	V99193	1
42A	MS21043-3	.	N	U	T				2
43A	3232727-3	.	S	H	I	M	4 MM THICK (0.1575 IN) POST SB OL-593-78-24 SEL FROM	V99193	AR
- 44A	3232727-4	.	S	H	I	M	6 MM THICK (0.2362 IN) POST SB OL-593-78-24 SEL FROM	V99193	AR
45A	MS21043-3	.	N	U	T				2
46A	3232727-1	.	S	H	I	M	4 MM THICK (0.1575 IN) POST SB OL-593-78-24 SEL FROM	V99193	AR
- 47A	3232727-2	.	S	H	I	M	6 MM THICK (0.2362 IN) POST SB OL-593-78-24 SEL FROM ***	V99193	AR
50A	121708-6	.	S	H	A	F	T, FLEXIBLE SEE 78-34-01 FOR DET ATTACHING PARTS	V99193	2
52A	MS21279-06	.	B	O	L	T			4
- 53A	MS21279-09	.	B	O	L	T			AR
54A	3232727-3	.	S	H	I	M	4 MM THICK (0.1575 IN) POST SB OL-593-78-24 SEL FROM	V99193	AR
- 55A	3232727-4	.	S	H	I	M	6 MM THICK (0.2362 IN) POST SB OL-593-78-24 SEL FROM	V99193	AR
56A	MS21043-3	.	N	U	T				4

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**OLYMPUS 593**MK.610-14-28
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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
15 57A	3232727-1	.	S	H	I	M	4 MM THICK	V99193	AR
							(0.1575 IN)		
							POST SB 0L-593-78-24		
							SEL FROM		
- 58A	3232727-2	.	S	H	I	M	6 MM THICK	V99193	AR
							(0.2362 IN)		
							POST SB 0L-593-78-24		
							SEL FROM		
- 60A	TLN1000C4	.	D	E	L	E	T	E	
- 70A	NAS6304U3	.	D	E	L	E	T	E	
- 80A	NAS1587-4C	.	D	E	L	E	T	E	
- 90A	301-061-101-0	.	D	E	L	E	T	E	
-100A	301-061-200-0	.	D	E	L	E	T	E	

-110A	TLN1000C3	.	D	E	L	E	T	E	
-120A	NAS6303U3	.	D	E	L	E	T	E	
-130A	NAS1587-3C	.	D	E	L	E	T	E	
-140A	301-090-900-0	.	D	E	L	E	T	E	
150A	121708-9	.	S	H	A	F	T, FLEXIBLE	V99193	1
							SEE 78-34-01 FOR DET		
							ATTACHING PARTS		
152A	MS21279-10	.	B	O	L	T			2
							POST SB 0L-593-78-24		
							SEL FROM		
-153A	MS21279-12	.	B	O	L	T			AR
							POST SB 0L-593-78-24		
							SEL FROM		
-154A	MS21279-14	.	B	O	L	T			AR
							POST SB 0L-593-78-24		
							SEL FROM		
155A	3232727-3	.	S	H	I	M	4 MM THICK	V99193	AR
							(0.1575 IN)		
							POST SB 0L-593-78-24		
							SEL FROM		
-156A	3232727-4	.	S	H	I	M	6 MM THICK	V99193	AR
							(0.2362 IN)		
							POST SB 0L-593-78-24		
							SEL FROM		
157A	MS21043-3	.	N	U	T				2
							POST SB 0L-593-78-24		
158A	3232727-1	.	S	H	I	M	4 MM THICK	V99193	AR
							(0.1575 IN)		
							POST SB 0L-593-78-24		
							SEL FROM		
-159A	3232727-2	.	S	H	I	M	6 MM THICK	V99193	AR
							(0.2362 IN)		
							POST SB 0L-593-78-24		
							SEL FROM		

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593**MK.610-14-28
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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
15 160A	121708-5	.SHAFT,FLEXIBLE					V99193		1
		SEE 78-34-01 FOR DET							
		ATTACHING PARTS							
162A	MS21279-10	.BOLT							2
		POST SB OL-593-78-24							
		SEL FROM							
-163A	MS21279-12	.BOLT							AR
		POST SB OL-593-78-24							
		SEL FROM							
-164A	MS21279-14	.BOLT							AR
		POST SB OL-593-78-24							
		SEL FROM							
165A	3232727-1	.SHIM 4 MM THICK					V99193		AR
		(0.1575 IN)							
		POST SB OL-593-78-24							
		SEL FROM							
-166A	3232727-2	.SHIM 6 MM THICK					V99193		AR
		(0.2362 IN)							
		POST SB OL-593-78-24							
		SEL FROM							
167A	MS21043-3	.NUT							2
		POST SB OL-593-78-24							
168A	3232727-3	.SHIM 4 MM THICK					V99193		AR
		(0.1575 IN)							
		POST SB OL-593-78-24							
		SEL FROM							
169A	3232727-4	.SHIM 6 MM THICK					V99193		AR
		(0.2362 IN)							
		POST SB OL-593-78-24							
		SEL FROM							
		xxxx							
170A	121708-7	.SHAFT,FLEXIBLE					V99193		1
		SEE 78-34-01 FOR DET							
		ATTACHING PARTS							
172A	MS21043-3	.NUT							2
		POST SB OL-593-78-24							
173A	3232727-1	.SHIM 4 MM THICK					V99193		AR
		(0.1575 IN)							
		POST SB OL-593-78-24							
		SEL FROM							
-174A	3232727-2	.SHIM 6 MM THICK					V99193		AR
		(0.2362 IN)							
		POST SB OL-593-78-24							
		SEL FROM							
175A	MS21043-3	.NUT							2
		POST SB OL-593-78-24							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
15 176A	3232727-3	.	S	H	I	M	4 MM THICK	V99193	AR
							(0.1575 IN)		
							POST SB OL-593-78-24		
							SEL FROM		
-177A	3232727-4	.	S	H	I	M	6 MM THICK	V99193	AR
							(0.2362 IN)		
							POST SB OL-593-78-24		
							SEL FROM		

- ITEM NOT ILLUSTRATED

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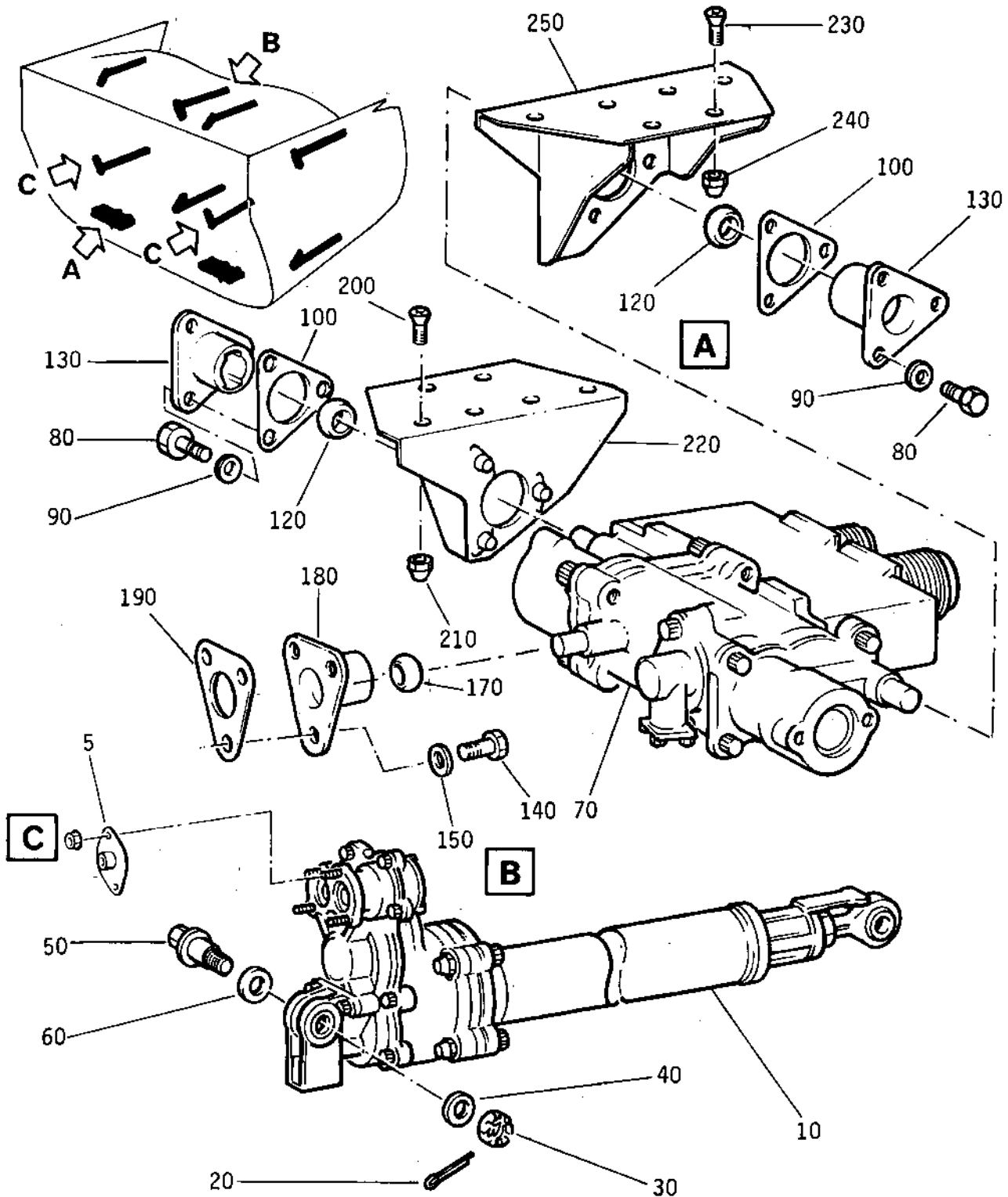
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Nozzle Assy, Twin Secondary
Figure 16

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
16 - 1A	301-203-501-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1B	301-203-502-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1C	301-203-503-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1D	301-203-504-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1E	301-203-505-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1F	301-203-506-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1G	301-203-507-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							
- 1H	301-203-508-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1J	301-203-509-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1K	301-203-510-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1L	301-203-511-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1M	301-203-512-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF R
		(CTD)							
- 1N	301-203-513-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF R
		(CTD)							
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
- 1P	301-203-514-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF R
		(CTD)							
		POST SB OL-78-28220-16							
- 2A	301-203-601-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2B	301-203-602-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2C	301-203-603-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2D	301-203-604-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2E	301-203-605-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2F	301-203-606-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2G	301-203-607-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
16 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2N	301-203-613-0	POST SB OL-78-28217-35 POST SB OL-78-28218-36							
		NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
5A	3230655-1	.BLANKING PART V99193							2
10A	121524-7-1	OPT TO 3229022-6 V99193 .BALLSCREW GEARBOX V99193 BUCKET SEE 78-32-19 FOR DET						1ABCDE FGHJK 2ABCDE FGHJ	8
10B	121524-8-1	.BALLSCREW GEARBOX V99193 BUCKET SEE 78-32-19 FOR DET POST SB OL-593-78-24						1ABCDE FGHJKL 2ABCDE FGHJK	8
- 10C	121524-8-2	.BALLSCREW GEARBOX V99193 BUCKET SEE 78-32-19 FOR DET POST SB OL-593-78-31							8
20A	MS24665-300	ATTACHING PARTS .PIN,SPLIT							8
30A	TE9925-6	.NUT,CASTELLATED V72962							8
40A	649-786-094-0	.WASHER,PLAIN							8
50A	300-859-601-0	.BOLT,ATTACH BALLSCREW GEARBOX							8
60A	649-786-095-0	.WASHER,PLAIN							8
70A	121326-8-1	.INDICATOR,POSITION V99193 BUCKET SEE 78-35-01 FOR DET							2
80A	NAS1134E4	ATTACHING PARTS .BOLT,HEX HEAD						1ABCD 2ABC	12
- 80B	MS9111-01	.BOLT,HEX HEAD							12
90A	NAS1587-4C	.WASHER,PLAIN							12
100A	301-069-601-0	.SHIM							AR
-110A	301-002-800-0	.MOUNT ASSY,SPHERICAL BEARING							4

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593**

MK.610-14-28

OVERHAUL



FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY	
		1	2	3	4	5	6	7			
16	120A	BAS7643-05	..BEARING,SPHERICAL VU1598							1ABCD 2ABC	1
	130A	301-002-700-0	..HOUSING,SPHERICAL BEARING								1
	140A	NAS1134E4	.BOLT,HEX HEAD								6
	-140B	MS9111-01	.BOLT,HEX HEAD								6
	150A	NAS1587-4C	.WASHER,PLAIN								6
	-160A	301-002-800-0	.MOUNT ASSY,SPHERICAL BEARING								2
	170A	BAS7643-05	..BEARING,SPHERICAL VU1598								1
	180A	301-002-700-0	..HOUSING,SPHERICAL BEARING								1
	190A	301-069-601-0	.SHIM								AR
	200A	HL169-5-10	.SCREW,CSK HEAD V73197								12
	210A	HLN1G5	.NUT,SELF LOCKING V73197								12
	220A	301-064-900-0	.BRACKET ASSY,WELDED								2
	230A	HL169-5-10	.SCREW,CSK HEAD V73197								12
	240A	HLN1G5	.NUT,SELF LOCKING V73197								12
	250A	301-065-001-0	.BRACKET ASSY,WELDED								2

- ITEM NOT ILLUSTRATED

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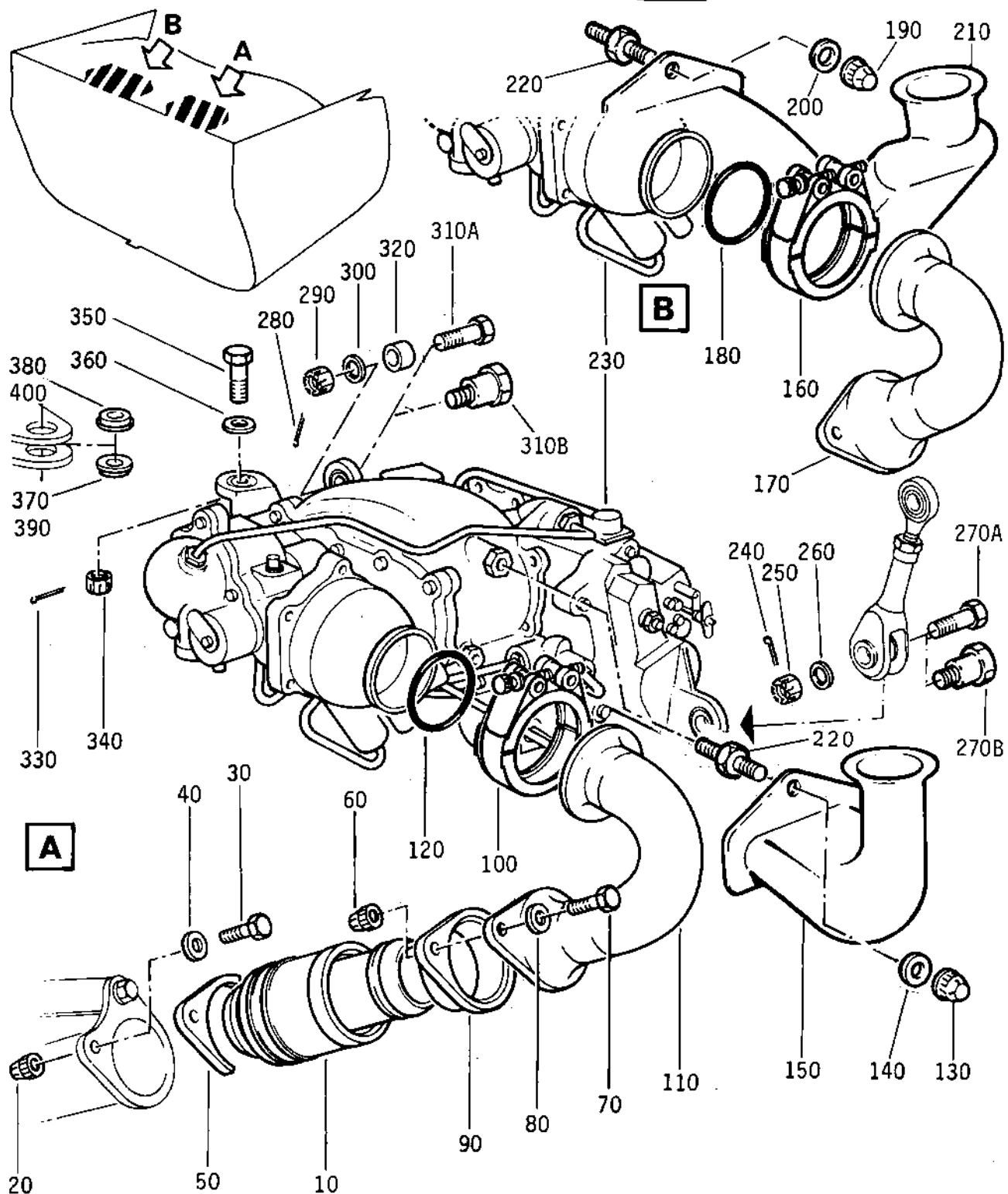
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OLYMPUS 593

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OVERHAUL



Nozzle Assy, Twin Secondary
Figure 17

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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
17 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
		POST SB OL-593-78-19 POST SB OL-593-78-20								
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF R
		POST SB OL-78-28218-35 POST SB OL-78-28218-36								
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF R
		POST SB OL-78-28220-16								
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
		POST SB OL-593-78-19 POST SB OL-593-78-20								

- ITEM NOT ILLUSTRATED

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sneema

FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
17 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
10A	301-234-200-0	.TUBE,TELESCOPIC SEE 78-31-12 FOR DET								2
- 10B	301-810-501-0	.TUBE,TELESCOPIC SEE 78-31-12 FOR DET POST SB OL-593-78-28235-47								2
		ATTACHING PARTS								
20A	TLN1000C4	.NUT,SELF LOCKING								2
30A	NAS6304U8	.BOLT,HEX HEAD								2
40A	NAS1587-4C	.WASHER,PLAIN								2
50A	301-046-202-0	.PLATE,RETAINING								2
60A	TLN1000C4	.NUT,SELF LOCKING								2
70A	NAS6304U8	.BOLT,HEX HEAD								2
80A	NAS1587-4C	.WASHER,PLAIN								2
90A	301-138-100-0	.RING,KEEP,TELESCOPIC ***								2
100A	BAS8483-10	.CLAMP,COLLAR								1
110A	301-074-902-0	.ELBOW ASSY OF,PIPE								1
120A	NSA8620-0021	.RING,SEALING								1
130A	DHT5579-4	.NUT,SELF LOCKING								2
		OPT TO Z3874-048								
140A	649-341-011-0	.WASHER,FLAT								2
150A	302-010-203-0	.ELBOW ASSY,EXHAUST								1
160A	BAS8483-10	.CLAMP,COLLAR								1
170A	301-074-802-0	.ELBOW ASSY OF,PIPE								1
180A	NSA8620-0021	.RING,SEALING								1
190A	DHT5579-4	.NUT,SELF LOCKING								2
		OPT TO Z3874-048								
200A	649-341-011-0	.WASHER,FLAT								2
210A	302-010-102-0	.ELBOW ASSY,EXHAUST								1
220A	302-010-300-0	.STUD								4

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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY	
		1	2	3	4	5	6	7			
17 -230A	126464-1-6	.ACTUATOR,PNEUMATIC BUCKET DRIVE SEE 78-33-06 FOR DET							V99193	1ABCDE FGHJK 2ABCDE FGHJ	2
-230B	126464-1-7	.ACTUATOR,PNEUMATIC BUCKET DRIVE SEE 78-33-06 FOR DET POST SB OL-593-78-30							V99193		2
-230C	126464-1-8	.ACTUATOR,PNEUMATIC BUCKET DRIVE SEE 78-33-06 FOR DET POST SB OL-78-14056-38							V99193		2
-230D	126464-1-9	.ACTUATOR,PNEUMATIC BUCKET DRIVE SEE 78-33-06 FOR DET POST SB OL-593-78-14066-42							V99193		2
-230E	126464-1-10	.ACTUATOR,PNEUMATIC BUCKET DRIVE SEE 78-33-06 FOR DET POST SB OL-593-78-14069-43							V99193		2
-230F	126464-2	.ACTUATOR,PNEUMATIC BUCKET DRIVE SEE 78-33-06 FOR DET POST SB OL-593-78-28236-48 SEE NOTE 1							V99193		2
240A	MS24665-302	.ATTACHING PARTS							VU1598	1ABCDE FGHJKL MN 2ABCDE FGHJKL M 1P 2N	2
250A	BAS9318C6	.PIN,SPLIT									2
260A	NAS1587-6	.NUT,CASTELLATED									2
270A	NAS6706DU14	.WASHER,PLAIN									2
		.BOLT,HEX HEAD									2
270B	301-154-400-0	.PIN,ASSY									2
280A	MS24665-153	.PIN,SPLIT							VU1598	1ABCDE FGHJKL MN 2ABCDE FGHJKL M 1P 2N	2
290A	BAS9318C4	.NUT,CASTELLATED									2
300A	NAS1587-4L	.WASHER,PLAIN									2
310A	NAS6704DU16	.BOLT,HEX HEAD									2
310B	301-154-300-0	.PIN,ASSY									
NOTE 1: BRITISH AIRWAYS ONLY											

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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
17 320A	300-855-600-0	.	B	U	S	H	I	N	1ABCDE FGHJKL MN 2ABCDE FGHJKL M	2
330A	MS24665-302	.	P	I	N	,	S	P		2
340A	BAS9318C6	.	N	U	T	,	C	A		2
350A	NAS6706DU15	.	B	O	L	T	,	H		2
360A	NAS1587-6C	.	W	A	S	H	E	R		2

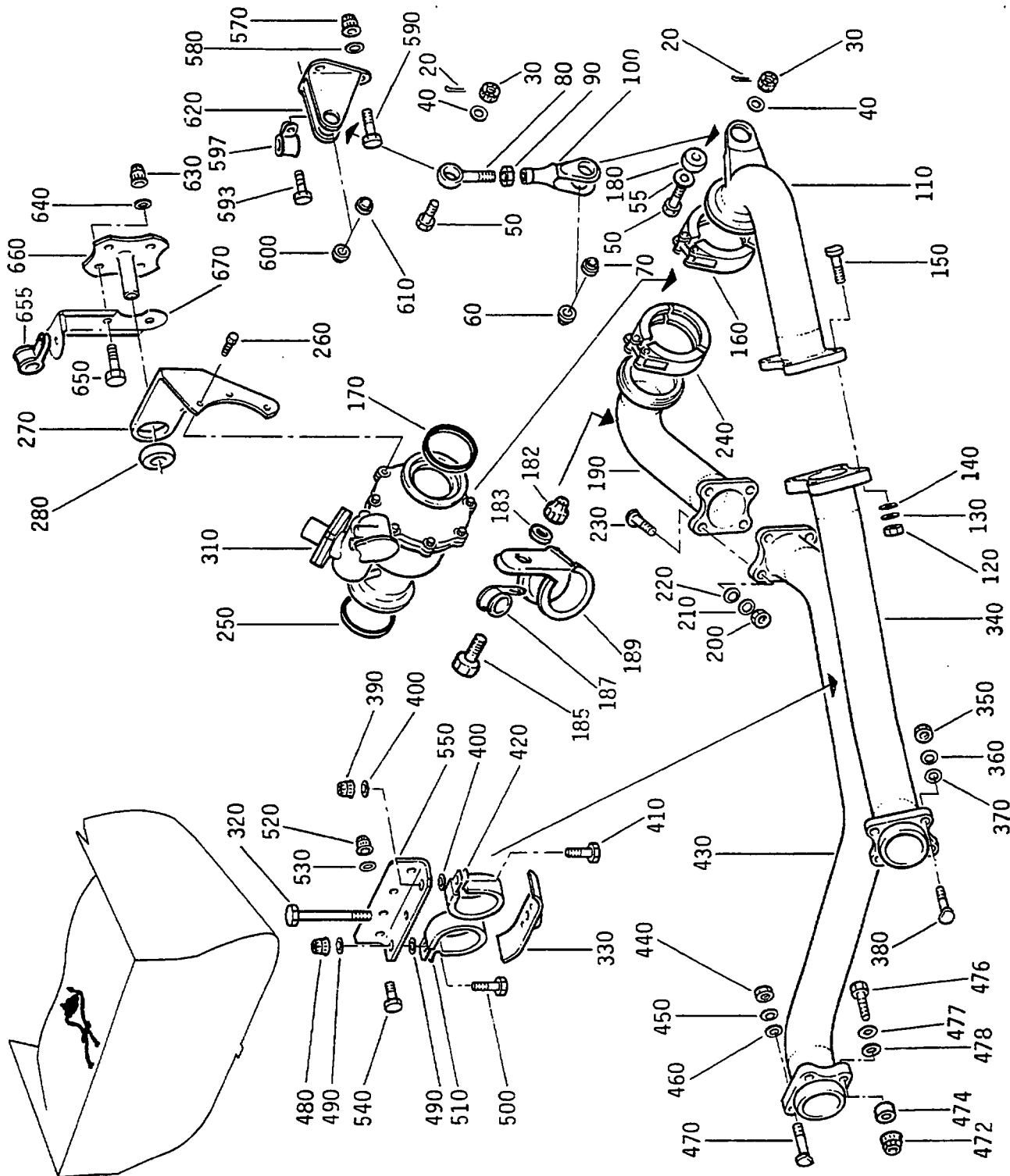
370A	301-006-100-0	.	B	U	S	H	I	N		1
380A	301-006-400-0	.	B	U	S	H	I	N		1
390A	301-006-100-0	.	B	U	S	H	I	N		1
400A	301-006-200-0	.	B	U	S	H	I	N		1

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Nozzle Assy, Twin Secondary
Figure 18

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
18 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB OL-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
18 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB 0L-78-28220-16							
- 10A	301-005-500-0	.LINK ASSY,MOUNTING							1
		ATTACHING PARTS							
20A	MS24665-153	.PIN,SPLIT							2
30A	BAS8455C4	.NUT,CASTELLATED				VU1598			2
40A	NAS1587-4L	.WASHER,PLAIN							2
50A	BAS7216-4D13	.BOLT,HEX HEAD				VU1598			2
55A	NAS1587-4C	.WASHER,PLAIN							1
60A	300-899-600-0	.BUSHING,FLANGED							1
70A	300-899-700-0	.BUSHING,FLANGED							1

80A	BAS7671-04RF	..ROD,END				VU1598			1
90A	BAS8424C5RW	..NUT,LOCKING				VU1598			1
100A	300-892-800-0	..CLEVIS,ROD END							1
110A	302-004-100-0	.ELBOW ASSY OF,TUBE							1
		ATTACHING PARTS							
120A	649-261-011-0	.NUT,HEX							4
-120B	NAS1291C4	.NUT,HEX							4 R
130A	302-004-700-0	.WASHER,SPHERICAL							4
140A	302-004-600-0	.WASHER,SPHERICAL							4
150A	649-779-042-0	.BOLT,DEE HEAD							4
160A	24540-150	.CLAMP,COLLAR				V00624			1
170A	NSA8620-0023	.RING,SEALING				VU1598			1

180A	BAS7641-04	..BEARING,SPHERICAL				VU1598			1
182A	649-292-030-0	.NUT LH ONLY					1GHJKL		1 R
							MNP		
183A	649-341-010-0	.WASHER LH ONLY					1GHJKL		2 R
							MNP		
185A	649-091-033-0	.BOLT,HEX HEAD LH ONLY					1GHJKL		1 R
							MNP		
187A	15363-3	.P CLIP LH ONLY				VF3195	1GHJKL		1 R
		OPT TO 9121A3				VF0215	MNP		

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY	
		1	2	3	4	5	6			
18 189A	15363-20	.P	CLIP	LH	ONLY	VF3195	1GHJKL	1	R	
			OPT TO	9121A20		VF0215	MNP			
190A	302-004-000-0	.ELBOW	ASSY	OF,	TUBE			1		
			ATTACHING	PARTS						
200A	649-261-011-0	.NUT,	HEX					4		
-200B	NAS1291C4	.NUT,	HEX					4	R	
210A	302-004-700-0	.WASHER,	SPHERICAL					4		
220A	302-004-600-0	.WASHER,	SPHERICAL					4		
230A	649-779-042-0	.BOLT,	DEE	HEAD				4		
240A	24540-150	.CLAMP,	COLLAR			V00624		1		
250A	NSA8620-0023	.RING,	SEALING			VU1598		1		

260A	68069-08-10D	.BOLT				V56878		RF		
270A	302-003-600-0	.BRACKET,	SUPPORT	ISOLATION				1		
			VALVE	LH	ONLY					
280A	301-028-301-0	..BEARING,	SPHERICAL					1		
			OPT TO	301-028-300-0						
-290A	302-003-500-0	.BRACKET,	SUPPORT	ISOLATION				1		
			VALVE	RH	ONLY					
-300A	301-028-301-0	..BEARING,	SPHERICAL					1		
			OPT TO	301-028-300-0						
310A	979064-1-2	.VALVE,	CROSSFEED			V99193	1ABCDE	1		
			ISOLATION				F			
			SEE 78-37-01	FOR	DET		2ABCDE			
			POST	SB	OL-593-78-23		F			
-310B	979064-1-3	.VALVE,	CROSSFEED			V99193		1		
			ISOLATION							
			SEE 78-37-01	FOR	DET					
-310C	979064-1-5	.VALVE,	CROSSFEED			V99193		1	R	
			ISOLATION							
			SEE 78-37-01	FOR	DET					
			POST	SB	OL-78-14052-37					
320A	649-091-101-0	.BOLT,	HEXAGONAL	HEAD				1		
330A	302-007-301-0	.HALF	CLAMP,	ASSY				1		
340A	302-004-200-0	.TUBE,	ASSY					1		
			ATTACHING	PARTS						
350A	649-261-011-0	.NUT,	HEXAGONAL					4		
-350B	NAS1291C4	.NUT,	HEX					4	R	
360A	302-004-700-0	.WASHER,	SPHERICAL					4		
370A	302-004-600-0	.WASHER,	SPHERICAL					4		
380A	649-779-042-0	.BOLT,	DEE	HEAD				4		
390A	649-292-030-0	.NUT,	SELF	LOCKING				1		
400A	649-341-010-0	.WASHER,	PLAIN					2		
410A	649-091-034-0	.BOLT,	HEXAGONAL	HEAD				1		
420A	15363-20	.P	CLIP			VF3195		1	R	
			OPT TO	9121A20		VF0215				

430A	302-004-300-0	.TUBE,	ASSY					1		

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
18									
	440A	649-261-011-0	.NUT,HEXAGONAL						3
	-440B	NAS1291C4	.NUT,HEX						3 R
	450A	302-004-700-0	.WASHER,SPHERICAL						3
	460A	302-004-600-0	.WASHER,SPHERICAL						3
	470A	649-779-042-0	.BOLT,DEE HEAD						3
	472A	NAS1292C4	.NUT,SELF LOCKING						1
	474A	302-022-000-0	.WASHER						1
	476A	NAS6704U19	.BOLT,HEXAGONAL HEAD						1
	477A	302-004-700-0	.WASHER,SPHERICAL						1
	478A	302-004-600-0	.WASHER,SPHERICAL						1
	480A	649-292-030-0	.NUT,SELF LOCKING						1
	490A	649-341-010-0	.WASHER,PLAIN						1
	500A	649-091-034-0	.BOLT,HEXAGONAL HEAD						1
	510A	15363-20	.P CLIP					VF3195	1 R
			OPT TO 9121A20					VF0215	

	520A	649-292-030-0	.NUT,SELF LOCKING						4
	530A	649-341-010-0	.WASHER,PLAIN						4
	540A	649-091-036-0	.BOLT,HEXAGONAL HEAD						4
	550A	301-037-511-0	.BRACKET,ANGLE						1
	-560A	302-003-700-0	.YOKE,ASSY						1
			ATTACHING PARTS						
	570A	649-292-031-0	.NUT,SELF LOCKING						3
	580A	649-341-031-0	.WASHER,PLAIN						3
	590A	649-091-077-0	.BOLT,HEXAGONAL HEAD						2
	593A	649-091-079-0	.BOLT,HEXAGONAL HEAD						1
	597A	21T4	.P CLIP,TEFLON LINED					VF6215	1

	600A	300-899-600-0	..BUSHING,FLANGED						1
	610A	300-899-700-0	..BUSHING,FLANGED						1
	620A	302-005-101-0	..YOKE,MOUNTING						1
	630A	649-292-031-0	.NUT,SELF LOCKING						4
	640A	649-341-031-0	.WASHER,PLAIN						4
	650A	649-091-079-0	.BOLT,HEXAGONAL HEAD						4
	655A	15363-3	.P CLIP LH ONLY					VF3195 1GHJKL	1 R
			OPT TO 9121A3					VF0215 MNP	
	660A	302-004-401-0	.PIVOT						1
	670A	302-009-400-0	.BRACKET						1

- ITEM NOT ILLUSTRATED

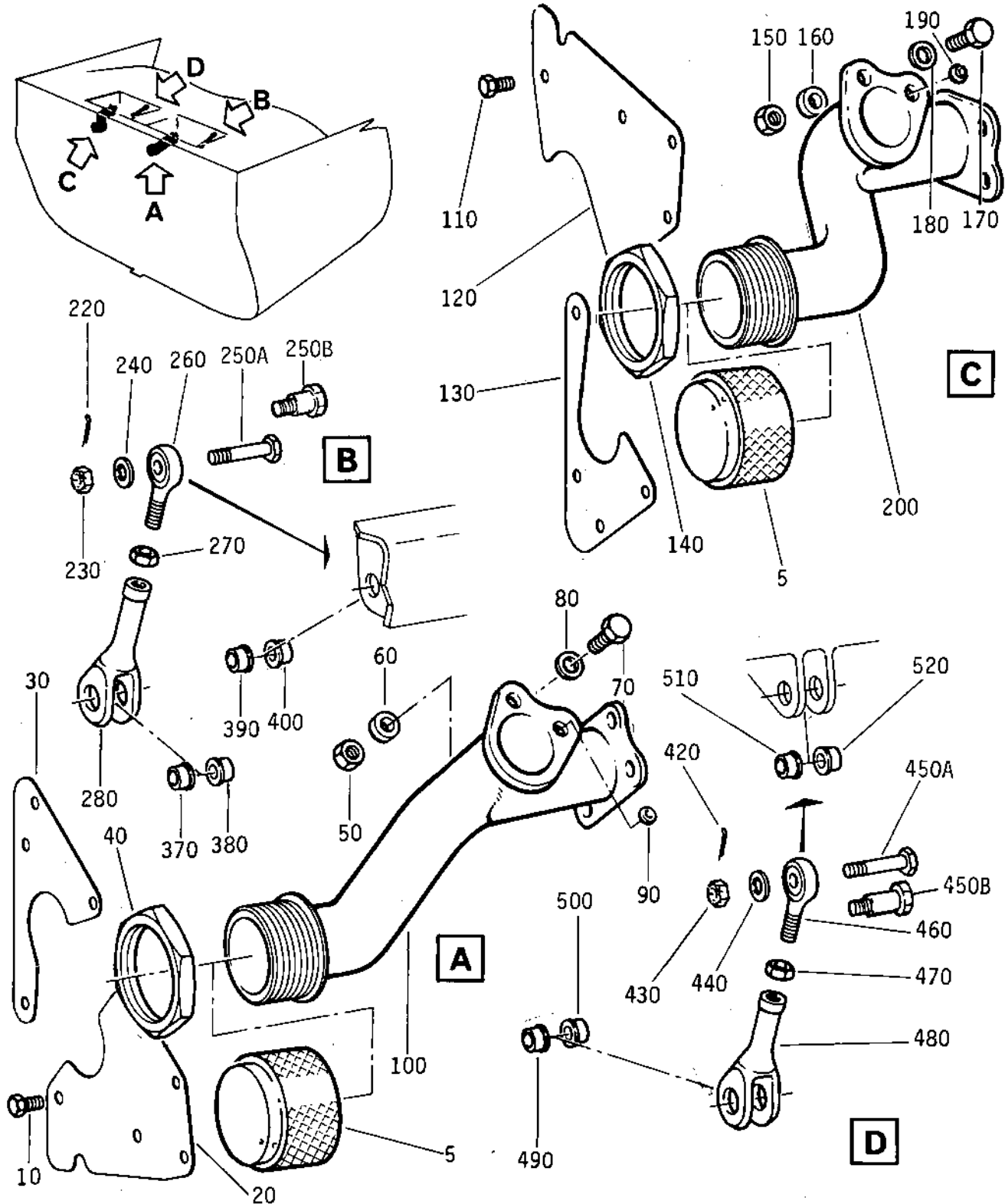
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Nozzle Assy, Twin Secondary
Figure 19

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
19 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1B	301-203-502-0	(CTD)							
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1D	301-203-504-0	(CTD)							
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1F	301-203-506-0	(CTD)							
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
		(CTD)							
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1J	301-203-509-0	(CTD)							
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1L	301-203-511-0	(CTD)							
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1N	301-203-513-0	(CTD)							
		NOZZLE ASSY,TWIN SECONDARY LH							RF R
		(CTD)							
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH							RF R
		(CTD)							
		POST SB 0L-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2B	301-203-602-0	(CTD)							
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2D	301-203-604-0	(CTD)							
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2F	301-203-606-0	(CTD)							
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
19 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
		NOZZLE ASSY,TWIN SECONDARY RH (CTD)							
		POST SB OL-78-28220-16							
5A	302-018-900-0	.PLUG,BLANKING							2
10A	NAS6303U2	.BOLT,HEX HEAD							7
20A	301-106-300-0	.COVER,PLATE							1
30A	301-106-200-0	.COVER,PLATE							1
40A	301-046-001-0	.NUT,PIPE END							1
50A	TLN1000C4	.NUT,HEX						V72962	1
60A	301-138-200-0	.WASHER,SPACER							1
70A	NAS6304U8	.BOLT,HEX HEAD							1
80A	NAS1587-4C	.WASHER,PLAIN							1
90A	BAS7643-04	.BEARING,SPHERICAL						VU1598	1
100A	301-122-901-0	.PIPE,ASSY							1
110A	NAS6303U2	.BOLT,HEX HEAD							7
120A	301-106-400-0	.COVER,PLATE							1
130A	301-106-500-0	.COVER,PLATE							1
140A	301-046-001-0	.NUT,PIPE END							1
150A	TLN1000C4	.NUT,HEX						V72962	1
160A	301-138-200-0	.WASHER,SPACER							1
170A	NAS6304U8	.BOLT,HEX HEAD							1
180A	NAS1587-4C	.WASHER,PLAIN							1
190A	BAS7643-04	.BEARING,SPHERICAL						VU1598	1
200A	301-122-801-0	.PIPE,ASSY							1
-210A	300-865-300-0	.ROD ASSY,LH ONLY							1
		ATTACHING PARTS							
220A	MS24665-153	.PIN,SPLIT LH ONLY							1
230A	BAS9318C4	.NUT,CASTELLATED LH ONLY						VU1598	1
240A	NAS1587-4L	.WASHER,PLAIN LH ONLY							1
250A	NAS6704DU14	.BOLT,HEX HEAD LH ONLY							1 R
								1ABCDE FGHJKL MN 2ABCDE FGHJKL M	

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY	
		1	2	3	4	5	6			
19 250B	301-154-200-0	.PIN, ASSY						1P 2N	2	R

260A	BAS7671-04RF	..ROD END						VU1598	1	
270A	BAS8424C5RW	..NUT, LOCK						VU1598	1	
280A	300-879-500-0	..FORK, END							1	
-290A	300-879-800-0	.ROD, ASSY RH ONLY							1	
		ATTACHING PARTS								
-300A	MS24665-153	.PIN, SPLIT RH ONLY							1	
-310A	BAS9318C4	.NUT, CASTELLATED RH ONLY						VU1598	1	
-320A	NAS1587-4L	.WASHER, PLAIN RH ONLY							1	
-330A	NAS6704DU14	.BOLT, HEX HEAD RH ONLY							1	

-340A	BAS7671-04RF	..ROD END						VU1598	1	
-350A	BAS8424C5RW	..NUT, LOCK						VU1598	1	
-360A	300-879-600-0	..FORK, END							1	
370A	301-006-300-0	.BUSHING, FLANGED							1	
380A	301-006-100-0	.BUSHING, FLANGED						1ABCDE FGHJKL MN 2ABCDE FGHJKL M	1	R
390A	301-899-700-0	.BUSHING, FLANGED							1	
400A	300-899-600-0	.BUSHING, FLANGED						1ABCDE FGHJKL MN 2ABCDE FGHJKL M	1	R
-410A	300-879-702-0	.ROD, ASSY							1	
		ATTACHING PARTS								
420A	MS24665-153	.PIN, SPLIT							1	
430A	BAS9318C4	.NUT, CASTELLATED						VU1598	1	
440A	NAS1587-4L	.WASHER, PLAIN							1	
450A	NAS6704DU14	.BOLT, HEX HEAD						1ABCDE FGHJKL MN 2ABCDE FGHJKL M	1	R
450B	301-154-200-0	.PIN, ASSY						1P 2N	2	R

460A	BAS7671-04RF	..ROD END						VU1598	1	
470A	BAS8424C5RW	..NUT, LOCK						VU1598	1	
480A	300-879-401-0	..FORK, END							1	

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FIG-ITEM		PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
			1 2 3 4 5 6 7 1 1 1 1 1 1 1		
19	490A	301-006-300-0	.BUSHING, FLANGED	1ABCDE FGHJKL MN 2ABCDE FGHJKL M	1
	500A	301-006-100-0	.BUSHING, FLANGED		1 R
	510A	300-899-700-0	.BUSHING, FLANGED	1ABCDE FGHJKL MN 2ABCDE FGHJKL M	1
	520A	300-899-600-0	.BUSHING, FLANGED		1 R

- ITEM NOT ILLUSTRATED

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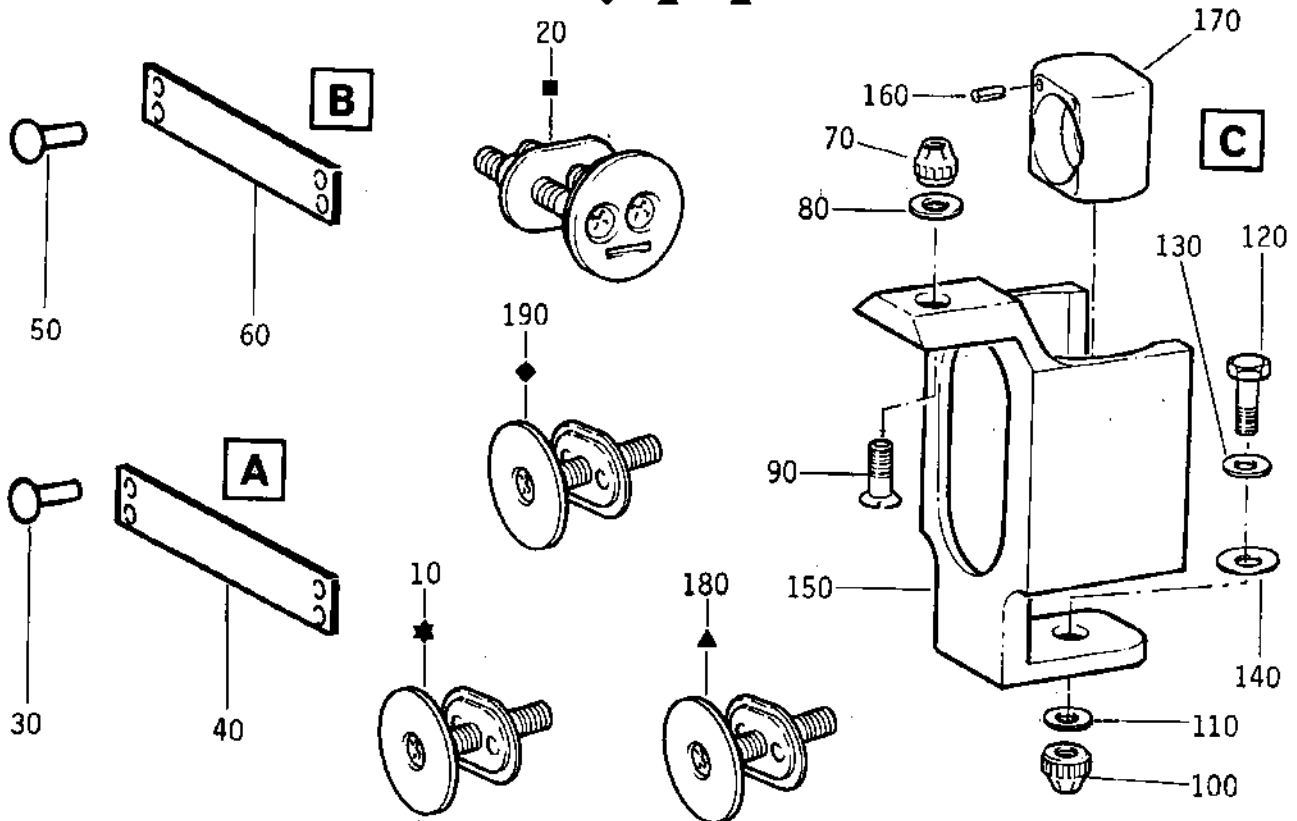
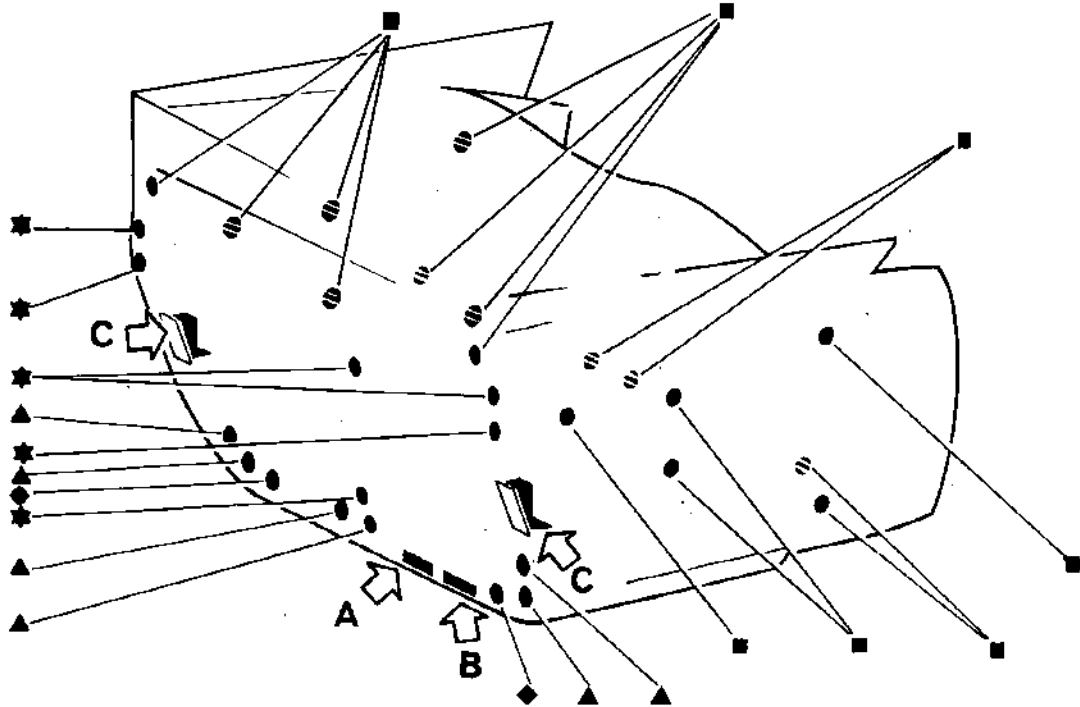
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Nozzle Assy, Twin Secondary
Figure 20

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
20 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
20 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2J	301-203-609-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2K	301-203-610-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2L	301-203-611-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2M	301-203-612-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2N	301-203-613-0	POST SB 0L-78-28217-35 POST SB 0L-78-28218-36 NOZZLE ASSY,TWIN SECONDARY RH							RF
10A	301-091-200-0	(CTD) POST SB 0L-78-28220-16 .COVER,ASSY						1ABCDE FGHJ 2ABCDE FGH	6
- 10B	301-091-201-0	.COVER,ASSY							6
20A	301-076-201-0	.COVER,ASSY						1ABCDE FGHJ 2ABCDE FGH	16
- 20B	301-076-202-0	.COVER,ASSY							16
40A	301-091-000-0	.NAMEPLATE							1
50A	CR2653-3-2	.RIVET					V11815		4
60A	301-092-201-0	.NAMEPLATE							1
70A	NAS1291C3	.NUT,SELF LOCKING							2
80A	NAS1587-3	.WASHER,PLAIN							2
90A	649-781-023-0	.DELETED							2
90B	649-781-022-0	.SCREW,CSK HEAD							2
100A	NAS1291C3	.NUT,SELF LOCKING							2
110A	NAS1587-3	.WASHER,PLAIN							2
120A	NAS6303U5	.BOLT,HEX HEAD							2
130A	NAS1587-4L	.WASHER,PLAIN							2
140A	649-786-520-0	.SHIM,LAMINATED							2
140B	334-010-100-0	.WASHER,ADJUSTING							2
150A	300-888-600-0	.SUPPORT							2
155A	302-017-400-0	.TRUNNION,ASSY							2
160A	E1-5X8EMCD	..PIN,SPRING					VF0313		2
170A	300-888-701-0	..TRUNNION							1
180A	302-001-200-0	.COVER,ASSY						1ABCDE 2ABCD	6
-180B	302-001-200-0	.COVER,ASSY						1FGHJ 2EFGH	4
-180C	302-001-201-0	.COVER,ASSY							4

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
20 190A	302-001-300-0	.	C	O	V	E	R	,A	1A B C D E F G H J	2
-190B	302-001-301-0	.	C	O	V	E	R	,A	2A B C D E F G H	2

- ITEM NOT ILLUSTRATED

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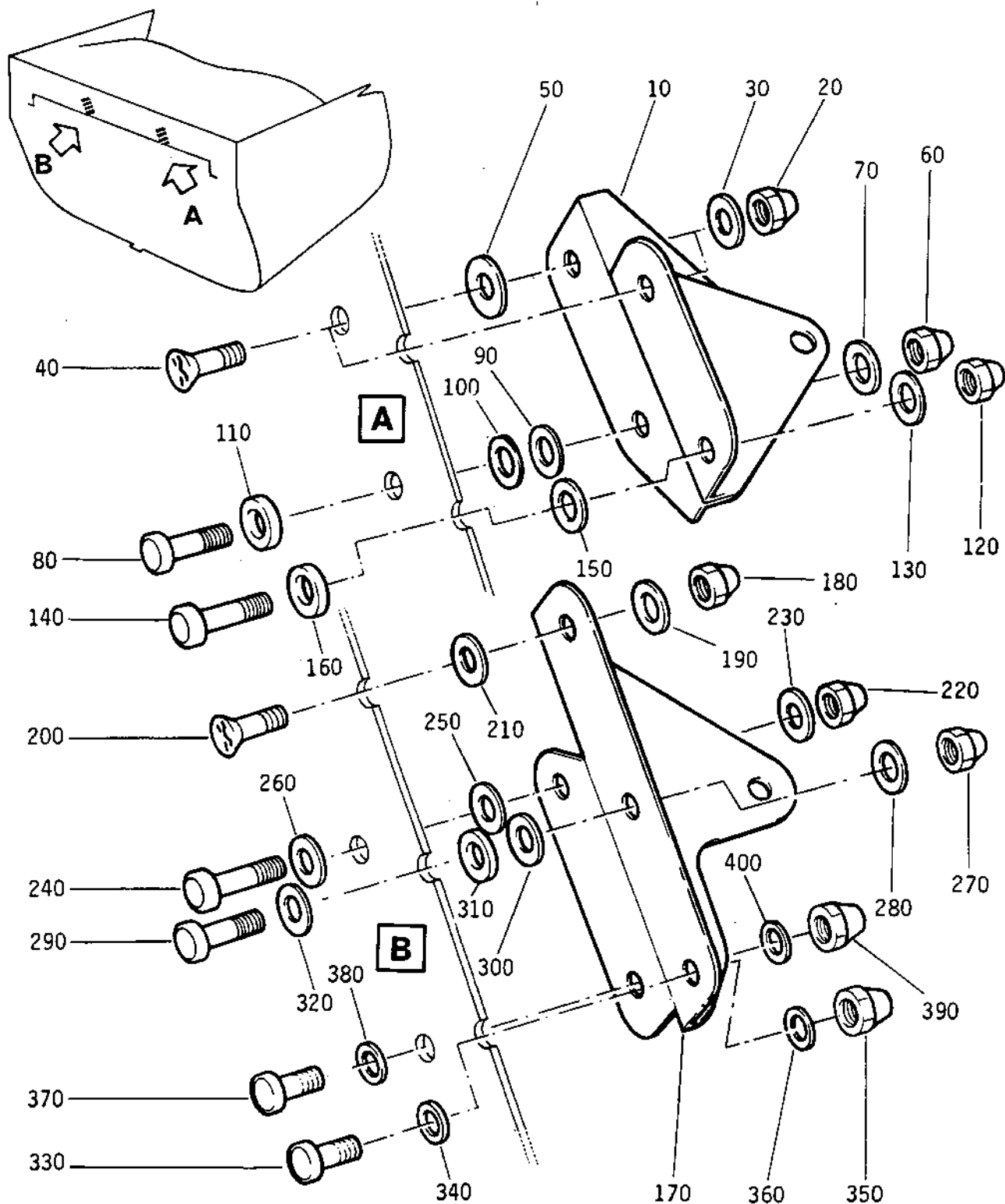
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Nozzle Assy, Twin Secondary
Figure 21

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
21 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB OL-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
21 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD) POST SB 0L-78-28217-35 POST SB 0L-78-28218-36							RF
10A	302-008-900-0	.SUPPORT,BRACKET						1AB	1
- 10B	302-008-901-0	.SUPPORT,BRACKET						2AB 1ABCDE FGHJ 2ABCDE FGH	1
- 10C	302-008-902-0	.SUPPORT,BRACKET ATTACHING PARTS							1
20A	DHT579-3	.NUT,SELF LOCKING OPT TO Z1855-02 OPT TO 119FW1032						VF0224 V72962 V50393	2
30A	AN960C10	.WASHER,PLAIN							2
40A	HL667-6-7	.SCREW,HI-LOCK						V73197	2
50A	649-786-449-0	.DELETED							2
60A	DHT579-3	.NUT,SELF LOCKING OPT TO Z1855-02 OPT TO 119FW1032						VF0224 V72962 V50393	1
70A	AN960C10	.WASHER,PLAIN							1
80A	HL668-6-8	.BOLT,HI-LOCK						V73197	1
90A	649-786-199-0	.WASHER,PLAIN							1
100A	649-786-469-0	.DELETED							1
110A	NAS1587-3C	.WASHER,SPACER							1
120A	DHT579-3	.NUT,SELF LOCKING OPT TO Z1855-02 OPT TO 119FW1032						VF0224 V72962 V50393	1
130A	AN960C10	.WASHER,PLAIN							1
140A	HL668-6-9	.BOLT,HI-LOCK						V73197	1
150A	649-786-197-0	.WASHER,PLAIN							1
160A	NAS1587-3C	.WASHER,SPACER ***							1
170A	302-014-000-0	.SUPPORT,BRACKET ATTACHING PARTS							1

- ITEM NOT ILLUSTRATED

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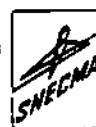


FIG-ITEM	PART NUMBER	NOMENCLATURE		USAGE CODE	UNITS PER ASSY	
		1 2 3 4 5 6 7				
21 180A	DHT579-3	.NUT,SELF LOCKING	VF0224		1	
		OPT TO Z1855-02	V72962			
		OPT TO 119FW1032	V50393			
190A	AN960C10	.WASHER,PLAIN			1	
200A	HL667-6-7	.SCREW,HI-LOCK	V73197		1	
210A	649-786-449-0	.DELETED				R
220A	DHT579-3	.NUT,SELF LOCKING	VF0224		1	
		OPT TO Z1855-02	V72962			
		OPT TO 119FW1032	V50393			
230A	AN960C10	.WASHER,PLAIN			1	
240A	HL668-6-5	.BOLT,HI-LOCK	V73197		1	
250A	NAS1587-3C	.WASHER,PLAIN			1	
260A	649-786-449-0	.SHIM,LAMINATED			1	
		OPT TO 334-010-101-0				R
270A	DHT579-3	.NUT,SELF LOCKING	VF0224		1	
		OPT TO Z1855-02	V72962			
		OPT TO 119FW1032	V50393			
280A	AN960C10	.WASHER,PLAIN			1	
290A	HL668-6-8	.BOLT,HI-LOCK	V73197		1	
300A	649-786-199-0	.WASHER,PLAIN			1	
310A	NAS1587-3C	.WASHER,SPACER			1	
320A	649-786-449-0	.DELETED			1	R
330A	HL668-6-8	.BOLT,HI-LOCK	V73197		1	
340A	AN960C10	.WASHER,SPACER			1	
350A	DHT579-3	.NUT,SELF LOCKING	VF0224		1	
		OPT TO Z1855-02	V72962			
		OPT TO 119FW1032	V50393			
360A	649-786-449-0	.SHIM,LAMINATED			1	
		OPT TO 334-010-102-0				R
370A	HL668-6-6	.BOLT,HI-LOCK	V73197		1	
380A	649-786-234-0	.WASHER,PLAIN			1	
390A	DHT579-3	.NUT,SELF LOCKING	VF0224		1	
		OPT TO Z1855-02	V72962			
		OPT TO 119FW1032	V50393			
400A	649-786-444-0	.SHIM,LAMINATED			1	
		OPT TO 334-010-103-0				R

- ITEM NOT ILLUSTRATED

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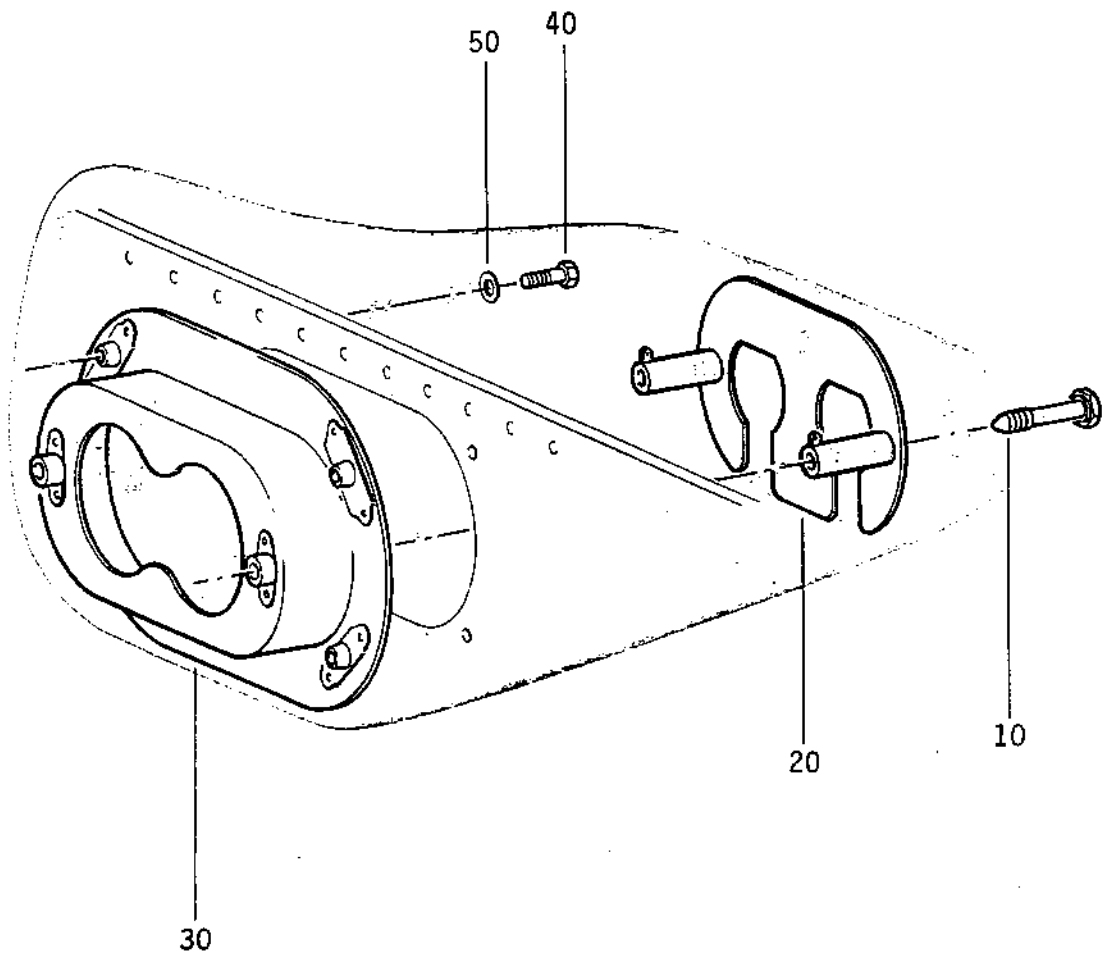
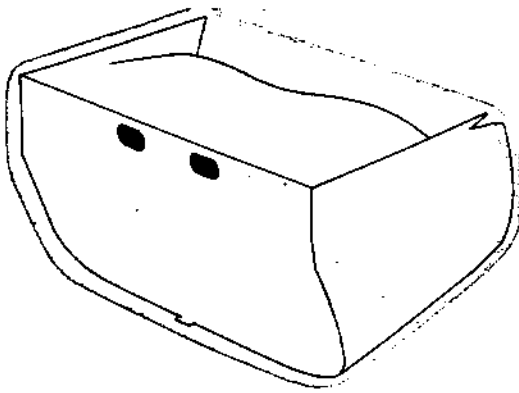
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OVERHAUL



Nozzle Assy, Twin Secondary
Figure 22

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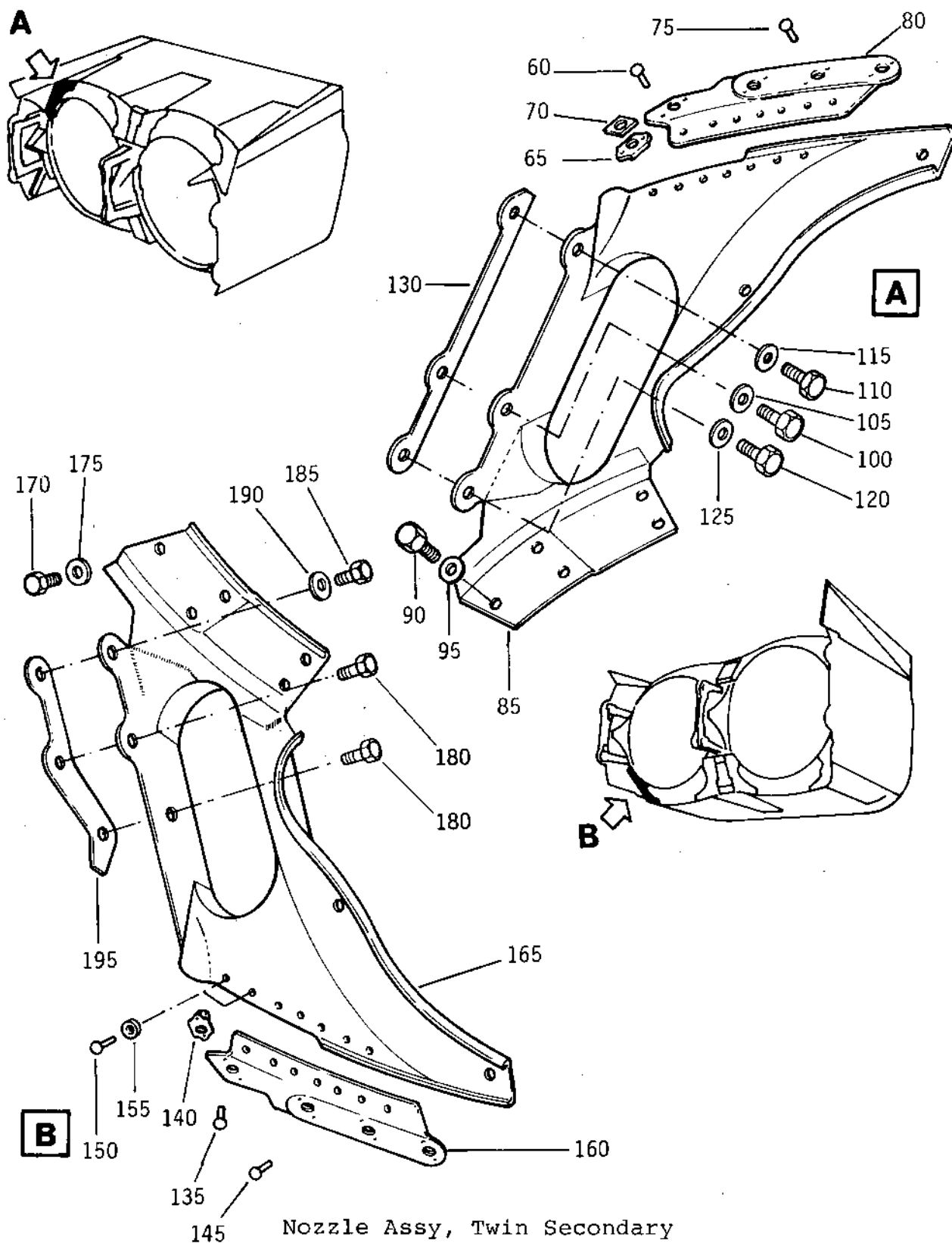
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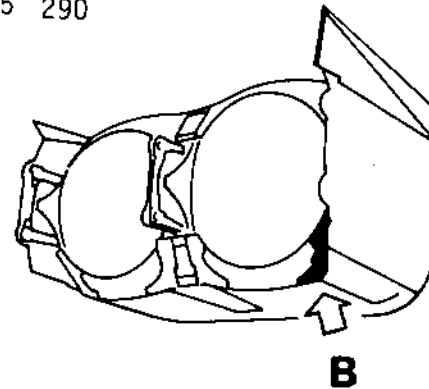
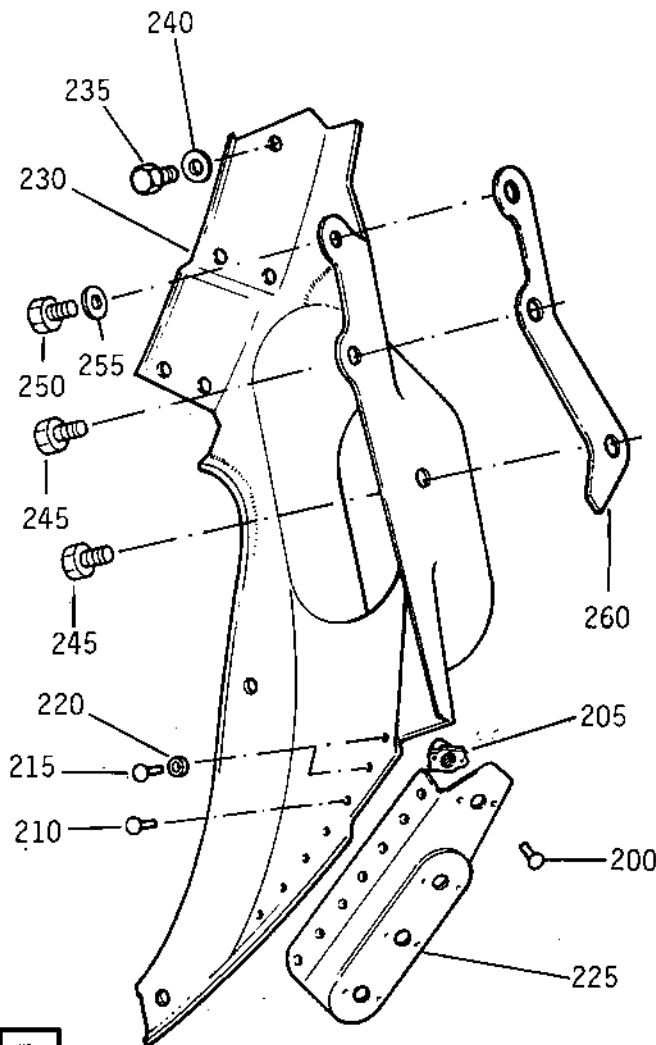
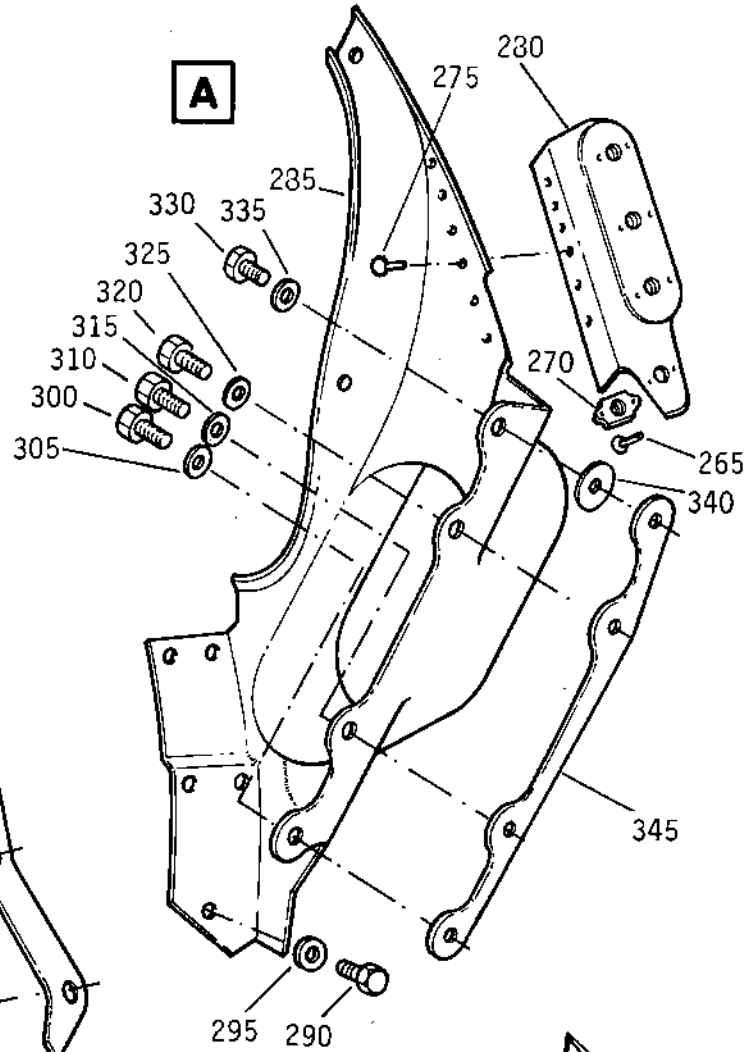
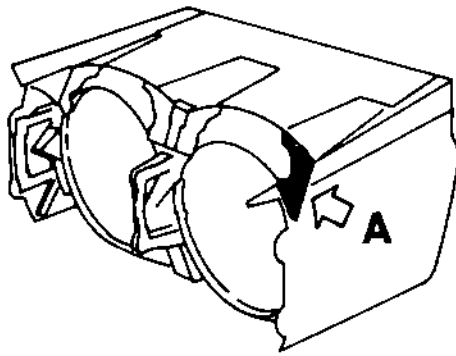


Nozzle Assy, Twin Secondary
Figure 22A

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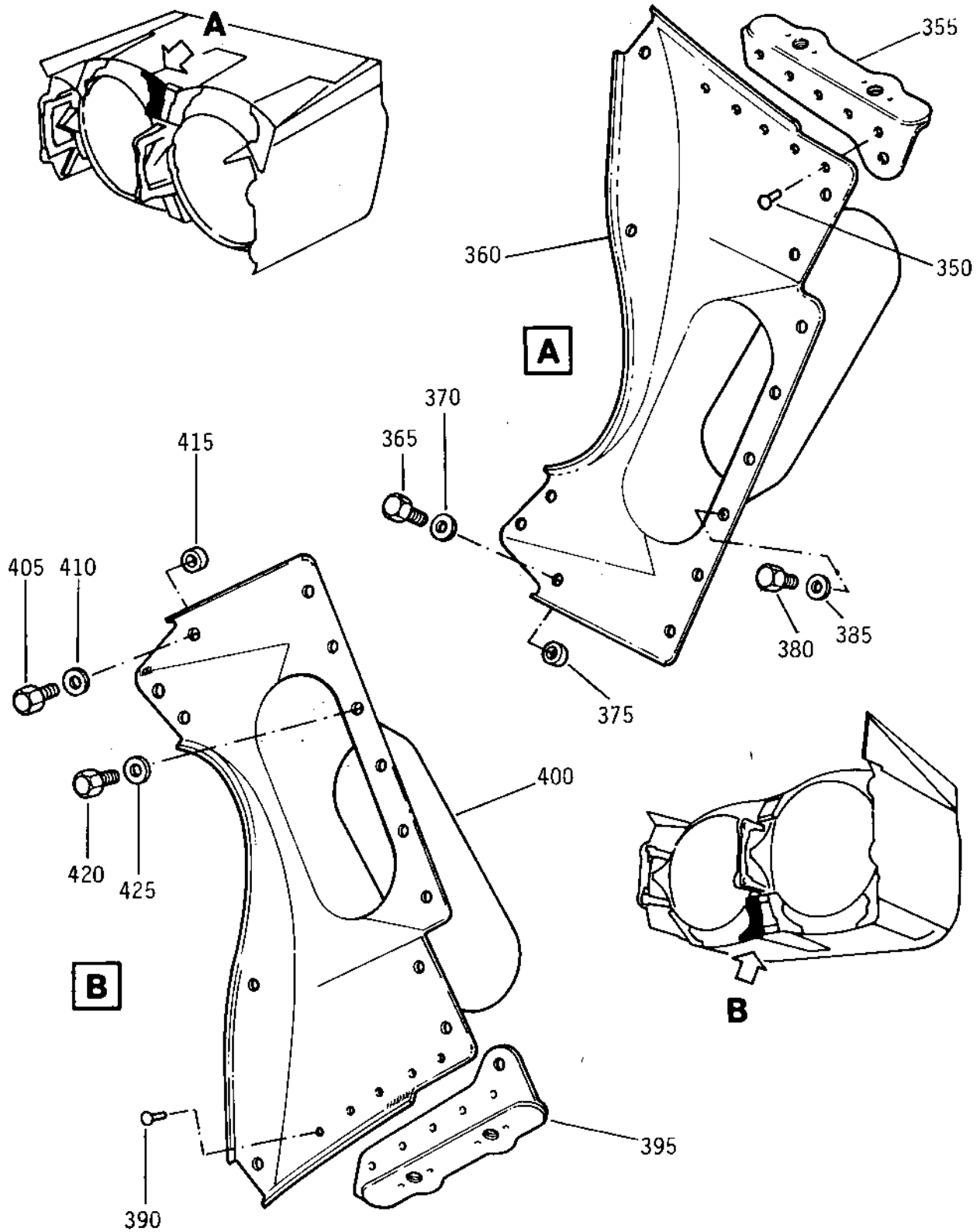
Nozzle Assy, Twin Secondary
Figure 22B

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Nozzle Assy, Twin Secondary
Figure 22C

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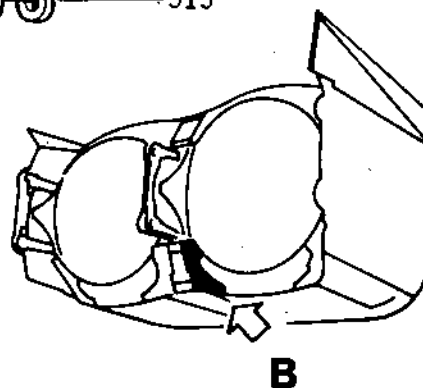
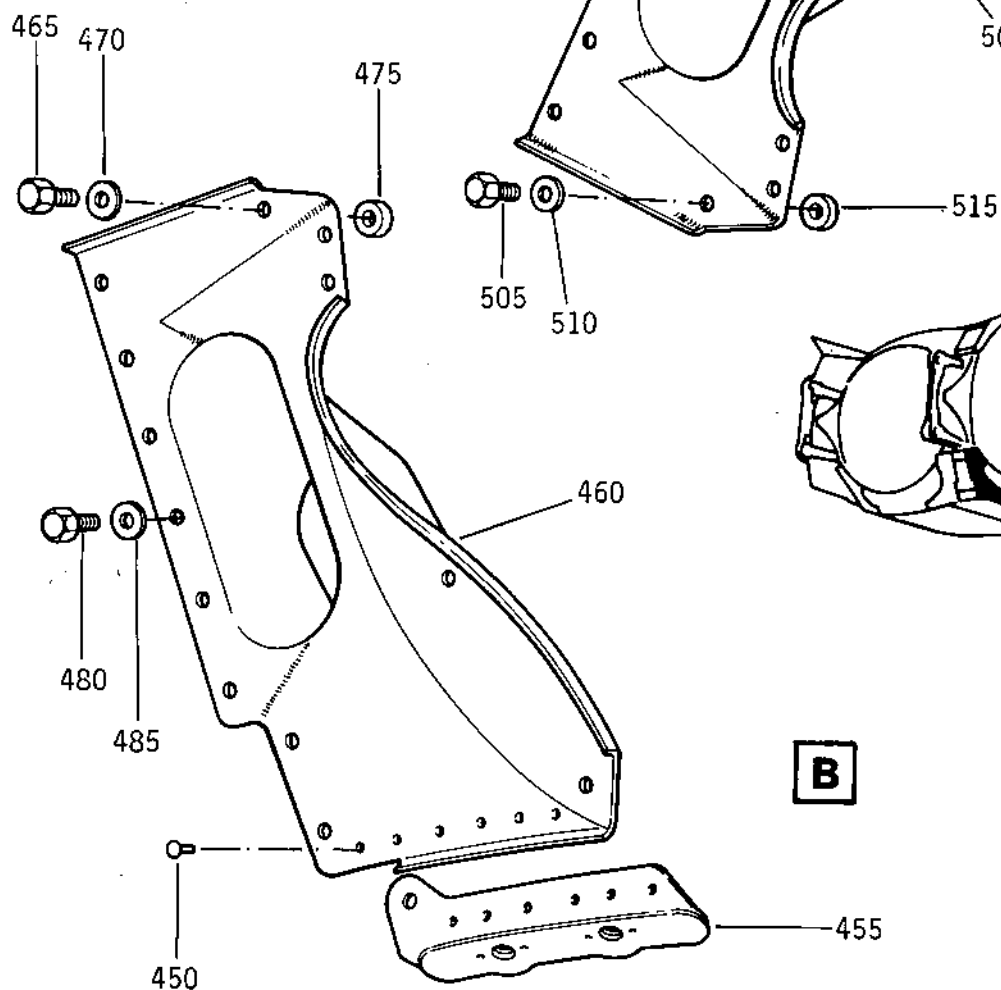
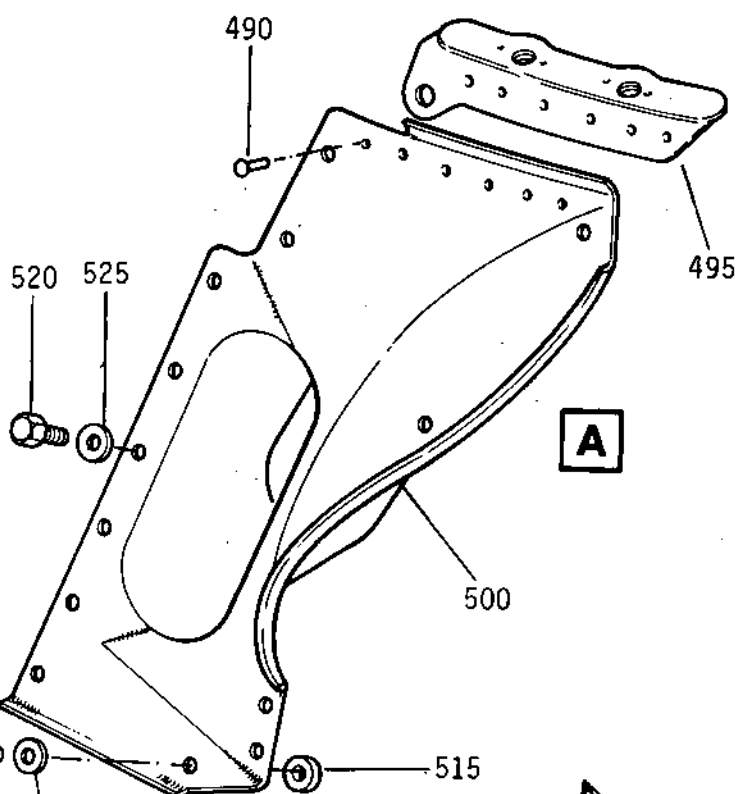
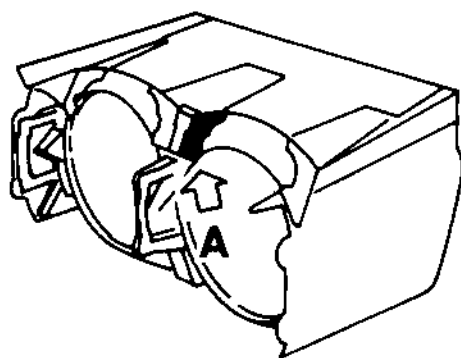
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OLYMPUS 593

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OVERHAUL



Nozzle Assy, Twin Secondary
Figure 22D

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**OLYMPUS 593**MK.610-14-28
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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
22 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1B	301-203-502-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1C	301-203-503-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1D	301-203-504-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1E	301-203-505-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1F	301-203-506-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1G	301-203-507-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1H	301-203-508-0	(CTD) POST SB OL-593-78-19 POST SB OL-593-78-20 NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1J	301-203-509-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1K	301-203-510-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1L	301-203-511-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1M	301-203-512-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1N	301-203-513-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1P	301-203-514-0	(CTD) POST SB OL-78-28217-35 POST SB OL-78-28218-36 NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 2A	301-203-601-0	(CTD) POST SB OL-78-28220-16 NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2B	301-203-602-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2C	301-203-603-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2D	301-203-604-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2E	301-203-605-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2F	301-203-606-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2G	301-203-607-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD) POST SB OL-593-78-19 POST SB OL-593-78-20							

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
22 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2J	301-203-609-0	(CTD)							
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2L	301-203-611-0	(CTD)							
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
- 2N	301-203-613-0	(CTD)							
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
		NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB OL-78-28220-16							
10A	301-153-400-0	.BOLT,HEX HEAD							4
20A	301-153-500-0	.PLATE ASSY,SLOTTED							2
30A	301-032-401-0	.HOUSING ASSY,WELDED							2
		ATTACHING PARTS							
40A	NAS6304U4	.BOLT,HEX HEAD							8
50A	AN960C416L	.WASHER,PLAIN							8

A 60A	21217TC3207	.RIVET						1NP	4 R
		POST SB OL-78-28218-36						2MN	
A 65A	A11471-22-4	.NUT,ANCHOR						1NP	1 R
		POST SB OL-78-28218-36						2MN	
A 70A	302-040-100-0	.SHIM						1NP	1 R
		POST SB OL-78-28218-36						2MN	
A 75A	21215TC4008	.RIVET						1NP	7 R
		POST SB OL-78-28218-36						2MN	
A 80A	302-062-200-0	.BRACING,ASSY LH						1NP	1 R
		POST SB OL-78-28218-36							
A- 81A	302-062-250-0	.BRACING,ASSY RH						2MN	1 R
		POST SB OL-78-28218-36							
A 85A	302-036-300-0	.PLATE,BLANKING ASSY LH						1NP	1 R
		POST SB OL-78-28218-36							
A- 86A	302-036-350-0	.PLATE,BLANKING ASSY RH						2MN	1 R
		POST SB OL-78-28218-36							
		ATTACHING PARTS							
A 90A	NAS6704U5	.BOLT,HEX HEAD						1NP	1 R
		POST SB OL-78-28218-36						2MN	
A 95A	NAS1587-4C	.WASHER						1NP	1 R
		POST SB OL-78-28218-36						2MN	
A 100A	NAS6303U9	.BOLT,HEX HEAD						1NP	1 R
		POST SB OL-78-28217-35						2MN	
A 105A	AN960C10	.WASHER						1NP	1 R
		POST SB OL-78-28217-35						2MN	

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
22A 110A	NAS6303U7	.BOLT,HEX HEAD						1NP	1 R
		POST SB OL-78-28217-35						2MN	
A 115A	AN960C10	.WASHER						1NP	1 R
		POST SB OL-78-28217-35						2MN	
A 120A	NAS6303U4	.BOLT,HEX HEAD						1NP	1 R
		POST SB OL-78-28217-35						2MN	
A 125A	AN960C10	.WASHER						1NP	1 R
		POST SB OL-78-28217-35						2MN	
A 130A	302-048-300-0	.SHIM						1NP	AR R
		POST SB OL-78-28218-36						2MN	

A 135A	21217TC3207	.RIVET						1NP	2 R
		POST SB OL-78-28218-36						2MN	
A 140A	A11471-19-4	.NUT,ANCHOR						1NP	1 R
		POST SB OL-78-28218-36						2MN	
A 145A	21215TC4008	.RIVET						1NP	5 R
		POST SB OL-78-28218-36						2MN	
A 150A	CR2839-5-2	.RIVET,BLIND						1NP	2 R
		POST SB OL-78-28218-36						2MN	
A 155A	649-786-229-0	.WASHER						1NP	2 R
		POST SB OL-78-28218-36						2MN	
A 160A	302-061-900-0	.BRACING,ASSY LH						1NP	1 R
		POST SB OL-78-28218-36							
A-161A	302-061-950-0	.BRACING,ASSY RH						2MN	1 R
		POST SB OL-78-28218-36							
A 165A	302-033-000-0	.PLATE,BLANKING ASSY LH						1NP	1 R
		POST SB OL-78-28218-36							
A-166A	302-033-050-0	.PLATE,BLANKING ASSY RH						2MN	1 R
		POST SB OL-78-28218-36							
		ATTACHING PARTS							
A 170A	NAS6704U5	.BOLT,HEX HEAD						1NP	1 R
		POST SB OL-78-28218-36						2MN	
A 175A	NAS1587-4C	.WASHER						1NP	1 R
		POST SB OL-78-28218-36						2MN	
A 180A	NAS6303U7	.BOLT,HEX HEAD						1NP	2 R
		POST SB OL-78-28217-35						2MN	
A 185A	NAS6303U4	.BOLT,HEX HEAD						1NP	1 R
		POST SB OL-78-28217-35						2MN	
A 190A	AN960C10L	.WASHER						1NP	1 R
		POST SB OL-78-28217-35						2MN	
A 195A	302-048-400-0	.SHIM						1NP	AR R
		POST SB OL-78-28218-36						2MN	

B 200A	21217TC3207	.RIVET						1NP	2 R
		POST SB OL-78-28218-36						2MN	
B 205A	A11471-19-4	.NUT,ANCHOR						1NP	1 R
		POST SB OL-78-28218-36						2MN	

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
22B 210A	21215TC4008	.RIVET						1NP	5 R
		POST SB OL-78-28218-36						2MN	
B 215A	CR2839-5-2	.RIVET,BLIND						1NP	2 R
		POST SB OL-78-28218-36						2MN	
B 220A	649-786-229-0	.WASHER						1NP	2 R
		POST SB OL-78-28218-36						2MN	
B 225A	302-061-950-0	.BRACING,ASSY LH						1NP	1 R
		POST SB OL-78-28218-36							
B-226A	302-061-900-0	.BRACING,ASSY RH						2MN	1 R
		POST SB OL-78-28218-36							
B 230A	302-033-050-0	.PLATE,BLANKING ASSY LH						1NP	1 R
		POST SB OL-78-28218-36							
B-231A	302-033-000-0	.PLATE,BLANKING ASSY RH						2MN	1 R
		POST SB OL-78-28218-36							
		ATTACHING PARTS							
B 235A	NAS6704U5	.BOLT,HEX HEAD						1NP	1 R
		POST SB OL-78-28218-36						2MN	
B 240A	NAS1587-4C	.WAHSER						1NP	1 R
		POST SB OL-78-28218-36						2MN	
B 245A	NAS6303U7	.BOLT,HEX HEAD						1NP	2 R
		POST SB OL-78-28217-35						2MN	
B 250A	NAS6303U4	.BOLT,HEX HEAD						1NP	1 R
		POST SB OL-78-28217-35						2MN	
B 255A	AN960C10L	.WASHER						1NP	1 R
		POST SB OL-78-28217-35						2MN	
B 260A	302-048-400-0	.SHIM						1NP	AR R
		POST SB OL-78-28218-36						2MN	

B 265A	21217TC3207	.RIVET						1NP	2 R
		POST SB OL-78-28218-36						2MN	
B 270A	A11471-19-4	.NUT,ANCHOR						1NP	1 R
		POST SB OL-78-28218-36						2MN	
B 275A	21215TC4008	.RIVET						1NP	7 R
		POST SB OL-78-28218-36						2MN	
B 280A	302-062-100-0	.BRACING,ASSY LH						1NP	1 R
		POST SB OL-78-28218-36							
B-281A	302-062-150-0	.BRACING,ASSY RH						2MN	1 R
		POST SB OL-78-28218-36							
B 285A	302-036-400-0	.PLATE,BLANKING ASSY LH						1NP	1 R
		POST SB OL-78-28218-36							
B-286A	302-036-450-0	.PLATE,BLANKING ASSY RH						2MN	1 R
		POST SB OL-78-28218-36							
		ATTACHING PARTS							
B 290A	NAS6704U5	.BOLT,HEX HEAD						1NP	1 R
		POST SB OL-78-28218-36						2MN	
B 295A	NAS1587-4C	.WASHER						1NP	1 R
		POST SB OL-78-28218-36							

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7 1 1 1 1 1 1 1		
22B 300A	NAS6303U4	.BOLT, HEX HEAD POST SB 0L-78-28217-35	1NP 2MN	1
B 305A	AN960C10	.WASHER POST SB 0L-78-28217-35	1NP 2MN	1
B 310A	NAS6303U9	.BOLT, HEX HEAD POST SB 0L-78-28217-35	1NP 2MN	1
B 315A	AN960C10	.WASHER POST SB 0L-78-28217-35	1NP 2MN	1
B 320A	NAS6303U7	.BOLT, HEX HEAD POST SB 0L-78-28217-35	1NP 2MN	1
B 325A	AN960C10	.WASHER POST SB 0L-78-28217-35	1NP 2MN	1
B 330A	NAS6303U4	.BOLT, HEX HEAD POST SB 0L-78-28217-35	1NP 2MN	1
B 335A	AN960C10	.WASHER POST SB 0L-78-28217-35	1NP 2MN	1
B 340A	302-048-000-0	.WASHER POST SB 0L-78-28217-35	1NP 2MN	1 R
B 345A	302-048-200-0	.SHIM POST SB 0L-78-28218-36 ****	1NP 2MN	AR
C 350A	21215TC4008	.RIVET POST SB 0L-78-28218-36	1NP 2MN	5
C 355A	302-062-000-0	.BRACING, ASSY LH POST SB 0L-78-28218-36	1NP	1
C-356A	302-062-050-0	.BRACING, ASSY RH POST SB 0L-78-28218-36	2MN	1
C 360A	302-035-201-0	.PLATE, BLANKING ASSY LH POST SB 0L-78-28218-36	1NP	1
C-361A	302-035-251-0	.PLATE, BLANKING ASSY RH POST SB 0L-78-28218-36 ATTACHING PARTS	2MN	1
C-365A	NAS6304U8	.BOLT, HEX HEAD POST SB 0L-78-28218-36	1NP 2MN	1
C 370A	NAS1587-4L	.WASHER POST SB 0L-78-28218-36	1NP 2MN	1
C 375A	302-042-701-0	.SPACER POST SB 0L-78-28218-36	1NP 2MN	1
C 380A	NAS6304U5	.BOLT, HEX HEAD POST SB 0L-78-28218-36	1NP 2MN	8
C 385A	NAS1587-4C	.WASHER POST SB 0L-78-28218-36 ****	1NP 2MN	8
C 390A	21215TC4008	.RIVET POST SB 0L-78-28218-36	1NP 2MN	5
C 395A	302-062-400-0	.BRACING, ASSY LH POST SB 0L-78-28218-36	1NP	1

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FIG-ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
22C-396A	302-062-450-0	.BRACING, ASSY RH POST SB 0L-78-28218-36	2MN	1 R
C 400A	302-035-251-0	.PLATE, BLANKING ASSY LH POST SB 0L-78-28218-36	1NP	1 R
C-401A	302-035-201-0	.PLATE, BLANKING ASSY RH POST SB 0L-78-28218-36	2MN	1 R
C 405A	NAS6304U8	ATTACHING PARTS .BOLT, HEX HEAD POST SB 0L-78-28218-36	1NP 2MN	1 R
C 410A	NAS1587-4L	.WASHER POST SB 0L-78-28218-36	1NP 2MN	1 R
C 415A	302-042-701-0	.SPACER POST SB 0L-78-28218-36	1NP 2MN	1 R
C 420A	NAS6304U5	.BOLT, HEX HEAD POST SB 0L-78-28218-36	1NP 2MN	8 R
C 425A	NAS1587-4C	.WASHER POST SB 0L-78-28218-36	1NP 2MN	8 R

D 450A	21215TC4008	.RIVET POST SB 0L-78-28218-36	1NP 2MN	5 R
D 455A	302-062-450-0	.BRACING, ASSY LH POST SB 0L-78-28218-36	1NP	1 R
D-456A	302-062-400-0	.BRACING, ASSY RH POST SB 0L-78-28218-36	2MN	1 R
D 460A	302-035-201-0	.PLATE, BLANKING ASSY LH POST SB 0L-78-28218-36	1NP	1 R
D-461A	302-035-251-0	.PLATE, BLANKING ASSY RH POST SB 0L-78-28218-36	2MN	1 R
		ATTACHING PARTS		
D 465A	NAS6304U8	.BOLT, HEX HEAD POST SB 0L-78-28218-36	1NP 2MN	1 R
D 470A	NAS1587-4L	.WASHER POST SB 0L-78-28218-36	1NP 2MN	1 R
D 475A	302-042-701-0	.SPACER POST SB 0L-78-28218-36	1NP 2MN	1 R
D 480A	NAS6304U5	.BOLT, HEX HEAD POST SB 0L-78-28218-36	1NP 2MN	8 R
D 485A	NAS1587-4C	.WASHER POST SB 0L-78-28218-36	1NP 2MN	8 R

D 490A	21215TC4008	.RIVET POST SB 0L-78-28218-36	1NP 2MN	5 R
D 495A	302-062-300-0	.BRACING, ASSY LH POST SB 0L-78-28218-36	1NP	1 R
D-496A	302-062-350-0	.BRACING, ASSY RH POST SB 0L-78-28218-36	2MN	1 R
D 500A	302-035-251-0	.PLATE, BLANKING ASSY LH POST SB 0L-78-28218-36	1NP	1 R

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY	
		1	2	3	4	5	6			
22D-501A	302-035-201-0	.	PLATE, BLANKING ASSY RH					2MN	1	R
			POST SB 0L-78-28218-36							
			ATTACHING PARTS							
D 505A	NAS6304U8	.	BOLT, HEX HEAD					1NP	1	R
			POST SB 0L-78-28218-36					2MN		
D 510A	NAS1587-4L	.	WASHER					1NP	1	R
			POST SB 0L-78-28218-36					2MN		
D 515A	302-042-701-0	.	SPACER					1NP	1	R
			POST SB 0L-78-28218-36					2MN		
D 520A	NAS6304U5	.	BOLT, HEX HEAD					1NP	8	R
			POST SB 0L-78-28218-36					2MN		
D 525A	NAS1587-4C	.	WASHER					1NP	8	R
			POST SB 0L-78-28218-36					2MN		

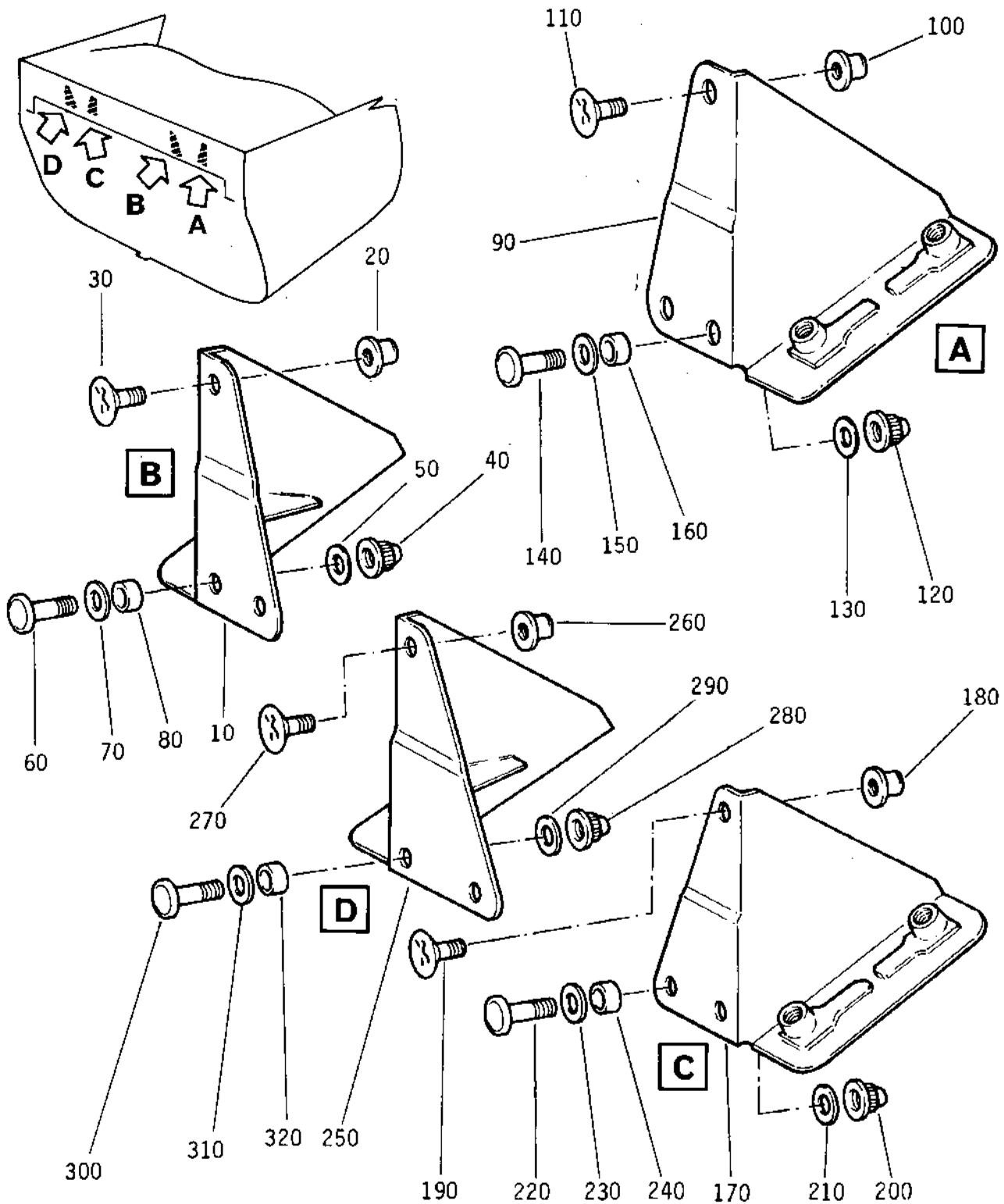
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Nozzle Assy, Twin Secondary
Figure 23

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OLYMPUS 593

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OVERHAUL



FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
23 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB 0L-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
23 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB 0L-78-28220-16							
10A	301-009-810-0	.BRACKET ASSY,SUPPORT LH							1
- 11A	301-009-860-0	.BRACKET ASSY,SUPPORT RH							1
		ATTACHING PARTS							
20A	HLN1G8	.NUT,TUBULAR				V73197			1
30A	HL869-8-12	.SCREW,HI-LOCK				V73197			1
40A	DHT579-3	.NUT,SELF LOCKING				VF0224			2
		OPT TO Z1855-02				V72962			
		OPT TO 119FW1032				V50393			
50A	AN960C10	.WASHER,PLAIN							2
60A	HL668-6-7	.BOLT,HI-LOCK				V73197			2
70A	NAS1587-3C	.WASHER,PLAIN							2
80A	649-786-200-0	.WASHER,SPACER							2

90A	300-890-610-0	.BRACKET ASSY,SUPPORT LH							1
- 91A	300-890-660-0	.BRACKET ASSY,SUPPORT RH							1
		ATTACHING PARTS							
100A	HLN1G8	.NUT,TUBULAR				V73197			1
110A	HL869-8-12	.SCREW,HI-LOCK				V73197			1
120A	DHT579-3	.NUT,SELF LOCKING				VF0224			2
		OPT TO Z1855-02				V72962			
		OPT TO 119FW1032				V50393			
130A	AN960C10	.WASHER,PLAIN							2
140A	HL668-6-7	.BOLT,HI-LOCK				V73197			2
150A	NAS1587-3C	.WASHER,PLAIN							2
160A	649-786-200-0	.WASHER,SPACER							2

170A	301-011-110-0	.BRACKET ASSY,SUPPORT LH							1
-171A	301-011-160-0	.BRACKET ASSY,SUPPORT RH							1
		ATTACHING PARTS							
180A	HLN1G8	.NUT,TUBULAR				V73197			1
190A	HL869-8-12	.SCREW,HI-LOCK				V73197			1
200A	DHT579-3	.NUT,SELF LOCKING				VF0224			2
		OPT TO Z1855-02				V72962			
		OPT TO 119FW1032				V50393			

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593**MK.610-14-28
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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
23	210A	AN960C10	.	W	A	S	H		2
	220A	HL668-6-7	.	B	O	L	T		2
	230A	NAS1587-3C	.	W	A	S	H	V73197	2
	240A	649-786-200-0	.	W	A	S	H		2
			.	W	A	S	H		2

	250A	300-899-510-0	.	B	R	A	C		1
	-251A	300-899-560-0	.	B	R	A	C		1
			.	A	T	T	A		
	260A	HLN1G8	.	N	U	T		V73197	1
	270A	HL869-8-12	.	S	C	R	E	V73197	1
	280A	DHT579-3	.	N	U	T		VF0224	2
			.	S	E	L	F		
			.	O	P	T		V72962	
			.	O	P	T		V50393	
			.	O	P	T			
	290A	AN960C10	.	W	A	S	H		2
	300A	HL668-6-7	.	B	O	L	T	V73197	2
	310A	NAS1587-3C	.	W	A	S	H		2
	320A	649-786-200-0	.	W	A	S	H		2
			.	W	A	S	H		2

- ITEM NOT ILLUSTRATED

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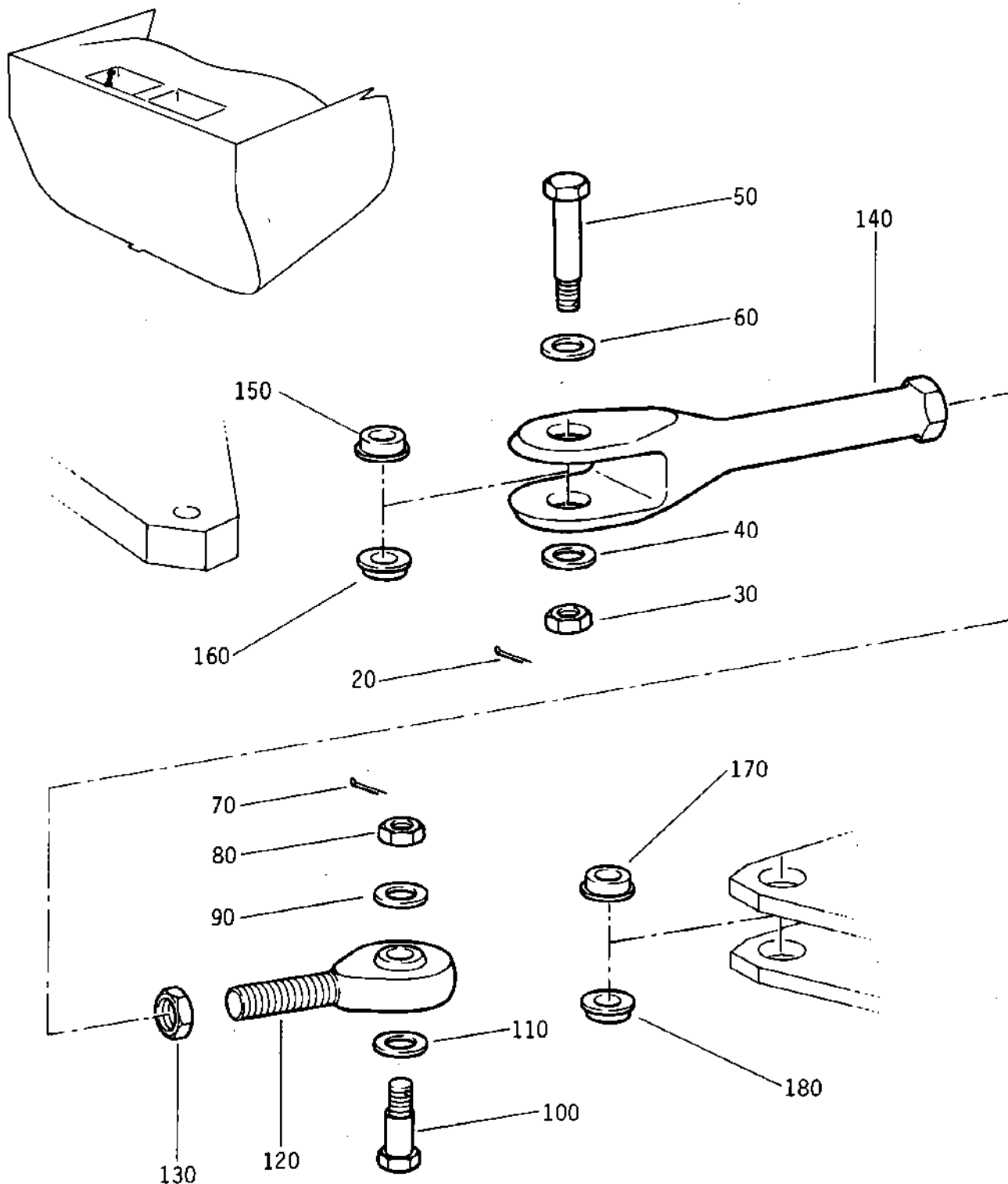
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Nozzle Assy, Twin Secondary
Figure 24

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
24 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1B	301-203-502-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1C	301-203-503-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1D	301-203-504-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1E	301-203-505-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1F	301-203-506-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1G	301-203-507-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1H	301-203-508-0	POST SB OL-593-78-19 POST SB OL-593-78-20 NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1J	301-203-509-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1K	301-203-510-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1L	301-203-511-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1M	301-203-512-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1N	301-203-513-0	(CTD) NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1P	301-203-514-0	POST SB OL-78-28217-35 POST SB OL-78-28218-36 NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 2A	301-203-601-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2B	301-203-602-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2C	301-203-603-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2D	301-203-604-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2E	301-203-605-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2F	301-203-606-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2G	301-203-607-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
		POST SB OL-593-78-19 POST SB OL-593-78-20							

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
24 - 2H	301-203-608-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2J	301-203-609-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2K	301-203-610-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2L	301-203-611-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF R
		(CTD)							
- 2M	301-203-612-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF R
		(CTD)							
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 2N	301-203-613-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF R
		(CTD)							
		POST SB 0L-78-28220-16							
- 10A	301-087-800-0	.LINK,ASSY							1
		ATTACHING PARTS							
20A	MS24665-155	.PIN,SPLIT							1
30A	MS9359-11	.NUT,HEX							1
40A	AN960C516L	.WASHER,PLAIN							1
50A	NAS6705DU14	.BOLT,HEX HEAD,SHOULDERED							1
60A	NAS1587-5C	.WASHER,PLAIN							1
70A	MS24665-155	.PIN,SPLIT							1
80A	MS9359-11	.NUT,HEX							1
90A	AN960C516L	.WASHER,PLAIN							1
100A	NAS6705DU15	.BOLT,HEX HEAD,SHOULDERED							1
110A	NAS1587-5C	.WASHER,PLAIN							1

120A	301-087-900-0	..FITTING ASSY,END							1
130A	BAS8424C5RW	..NUT,LOCKING					VU1598		1
140A	301-087-500-0	..FORK,END							1
150A	301-088-100-0	..BUSHING,FLANGED							1
160A	301-088-000-0	..BUSHING,FLANGED							1
170A	301-088-000-0	..BUSHING,FLANGED							1
180A	301-088-100-0	..BUSHING,FLANGED							1

- ITEM NOT ILLUSTRATED

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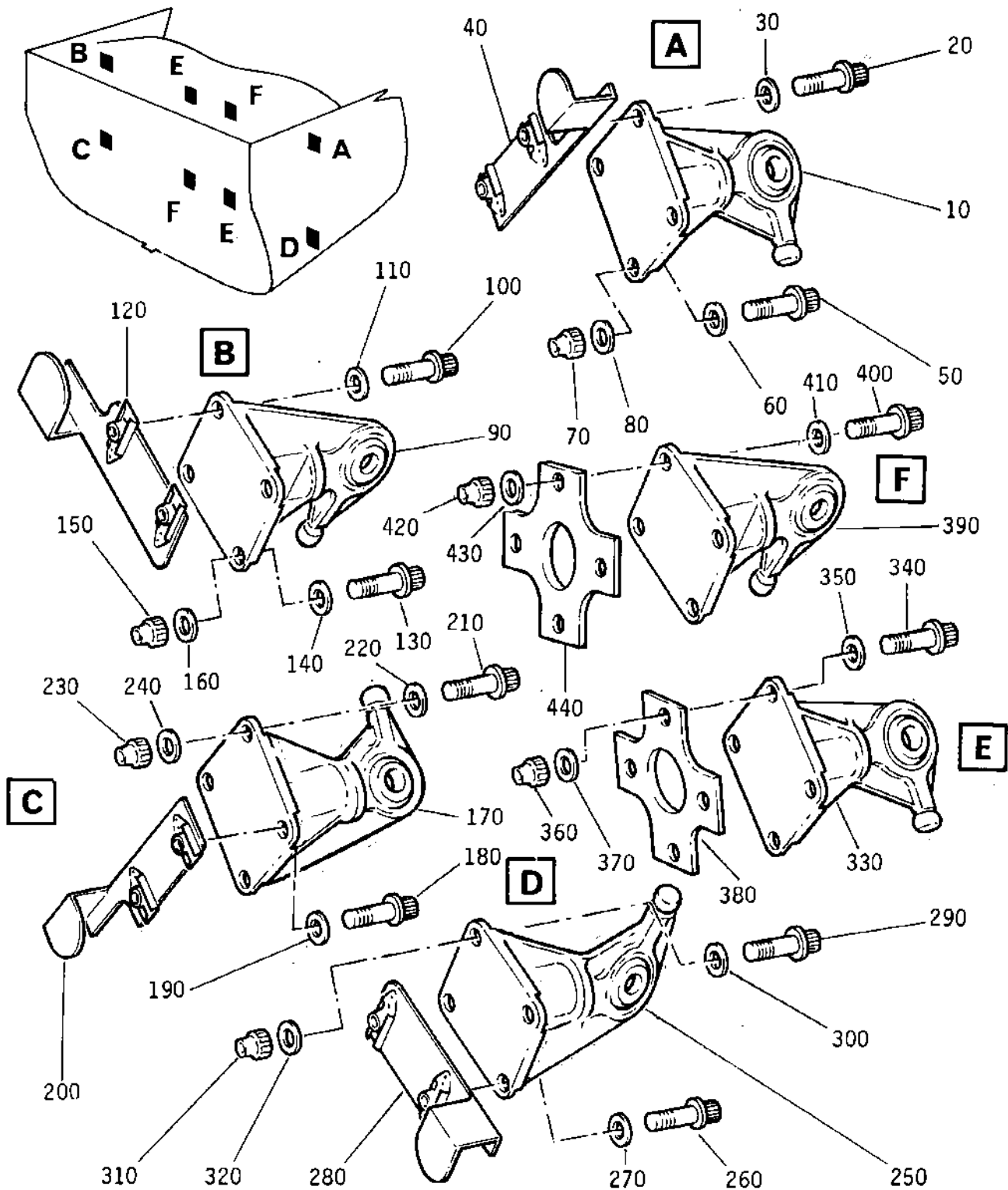
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Nozzle Assy, Twin Secondary
Figure 25

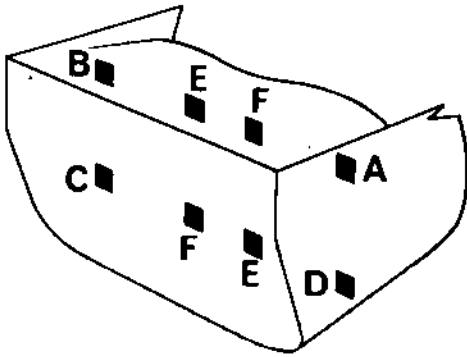
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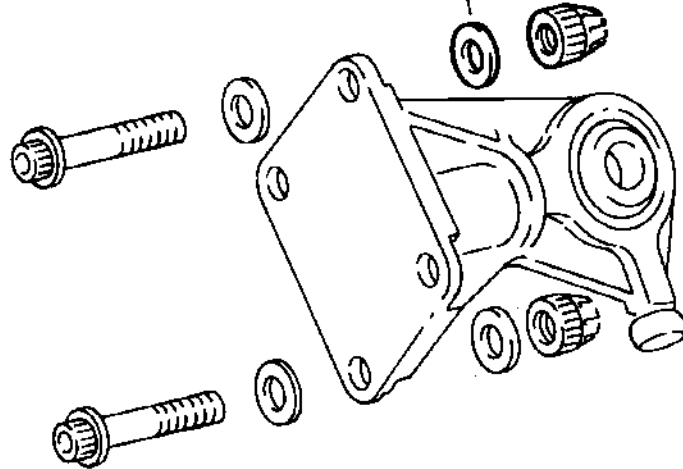
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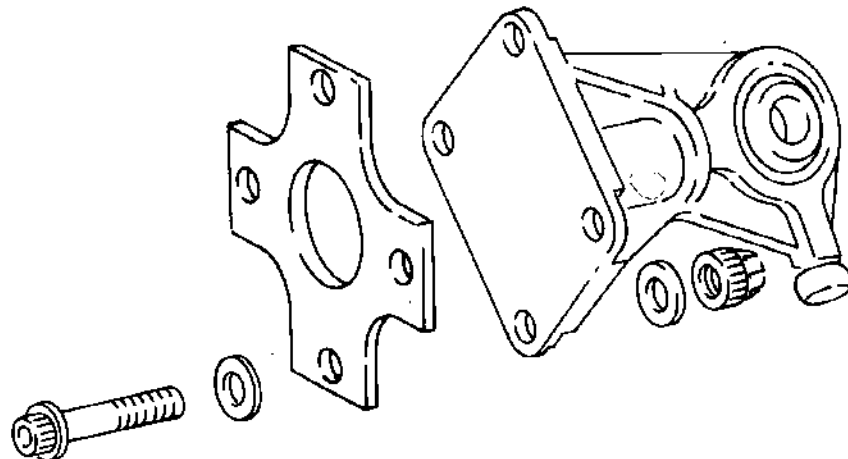
A B C D

45
125
205
285

40 B
120 B
200 B
280 B



E F



Nozzle Assy, Twin Secondary
Figure 25A

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
25 - 1A	301-203-501-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1B	301-203-502-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1C	301-203-503-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1D	301-203-504-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1E	301-203-505-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1F	301-203-506-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1G	301-203-507-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							
- 1H	301-203-508-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1J	301-203-509-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1K	301-203-510-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1L	301-203-511-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF
		(CTD)							
- 1M	301-203-512-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF R
		(CTD)							
- 1N	301-203-513-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF R
		(CTD)							
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 1P	301-203-514-0	NOZZLE	ASSY,	TWIN	SECONDARY	LH			RF R
		(CTD)							
		POST SB 0L-78-28220-16							
- 2A	301-203-601-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2B	301-203-602-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2C	301-203-603-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2D	301-203-604-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2E	301-203-605-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2F	301-203-606-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
- 2G	301-203-607-0	NOZZLE	ASSY,	TWIN	SECONDARY	RH			RF
		(CTD)							
		POST SB 0L-593-78-19							
		POST SB 0L-593-78-20							

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
25 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB 0L-78-28217-35							
		POST SB 0L-78-28218-36							
- 2N	301-203-613-0	NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD)							
		POST SB 0L-78-28220-16							
10A	301-098-003-0	.SUPPORT,FITTING BALLSCREW							1
		GEARBOX							
		ATTACHING PARTS							
20A	EWB0420-4-16	.BOLT,12 POINT HEAD				V50393			2
30A	NAS1587-4C	.WASHER,PLAIN							2
40A	301-138-750-0	.NUT PLATE,ASSY						1A	1
								2A	
A 40B	61170-428	.NUT,SELF LOCKING				V50393			2
A 45A	NAS1587-4	.WASHER,PLAIN							2
50A	EWB0420-4-16	.BOLT,12 POINT HEAD				V50393			2
60A	NAS1587-4C	.WASHER,PLAIN							2
70A	61170-428	.NUT,SELF LOCKING				V50393			2
80A	NAS1587-4	.WASHER,PLAIN							2

90A	301-098-053-0	.SUPPORT,FITTING BALLSCREW							1
		GEARBOX							
		ATTACHING PARTS							
100A	EWB0420-4-16	.BOLT,12 POINT HEAD				V50393			2
110A	NAS1587-4C	.WASHER,PLAIN							2
120A	301-138-700-0	.NUT PLATE,ASSY						1A	1 R
								2A	
A 120B	61170-428	.NUT,SELF LOCKING				V50393			2
A 125A	NAS1587-4	.WASHER,PLAIN							2
130A	EWB0420-4-16	.BOLT,12 POINT HEAD				V50393			2
140A	NAS1587-4C	.WASHER,PLAIN							2
150A	61170-428	.NUT,SELF LOCKING				V50393			2
160A	NAS1587-4	.WASHER,PLAIN							2

170A	301-098-203-0	.SUPPORT,FITTING BALLSCREW							1
		GEARBOX							
		ATTACHING PARTS							
180A	EWB0420-4-16	.BOLT,12 POINT HEAD				V50393			2
190A	NAS1587-4C	.WASHER,PLAIN							2

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
25 200A	301-138-750-0	.	NUT	PLATE,	ASSY			1A 2A	1
A 200B	61170-428	.	NUT,	SELF	LOCKING	V50393			2
A 205A	NAS1587-4	.	WASHER,	PLAIN					2
210A	EWB0420-4-16	.	BOLT,	12	POINT	HEAD	V50393		2
220A	NAS1587-4C	.	WASHER,	PLAIN					2
230A	61170-428	.	NUT,	SELF	LOCKING	V50393			2
240A	NAS1587-4	.	WASHER,	PLAIN					2

250A	301-098-253-0	.	SUPPORT,	FITTING	BALLSCREW				1
			GEARBOX						
			ATTACHING	PARTS					
260A	EWB0420-4-16	.	BOLT,	12	POINT	HEAD	V50393		2
270A	NAS1587-4C	.	WASHER,	PLAIN					2
280A	301-138-700-0	.	NUT	PLATE,	ASSY			1A 2A	1
A 280B	61170-428	.	NUT,	SELF	LOCKING	V50393			2
A 285A	NAS1587-4	.	WASHER,	PLAIN					2
290A	EWB0420-4-16	.	BOLT,	12	POINT	HEAD	V50393		2
300A	NAS1587-4C	.	WASHER,	PLAIN					2
310A	61170-428	.	NUT,	SELF	LOCKING	V50393			2
320A	NAS1587-4	.	WASHER,	PLAIN					2

330A	301-098-103-0	.	SUPPORT,	FITTING	BALLSCREW				2
			GEARBOX						
			ATTACHING	PARTS					
340A	EWB0420-4-16	.	BOLT,	12	POINT	HEAD	V50393		8
350A	NAS1587-4C	.	WASHER,	PLAIN					8
360A	61170-428	.	NUT,	SELF	LOCKING	V50393			8
370A	NAS1587-4	.	WASHER,	PLAIN					8
380A	301-098-602-0	.	SPACER,	CRUCIFORM					2

390A	301-098-153-0	.	SUPPORT,	FITTING	BALLSCREW				2
			GEARBOX						
			ATTACHING	PARTS					
400A	EWB0420-4-16	.	BOLT,	12	POINT	HEAD	V50393		8
410A	NAS1587-4C	.	WASHER,	PLAIN					8
420A	61170-428	.	NUT,	SELF	LOCKING	V50393			8
430A	NAS1587-4	.	WASHER,	PLAIN					8
440A	301-098-602-0	.	SPACER,	CRUCIFORM					2

- ITEM NOT ILLUSTRATED

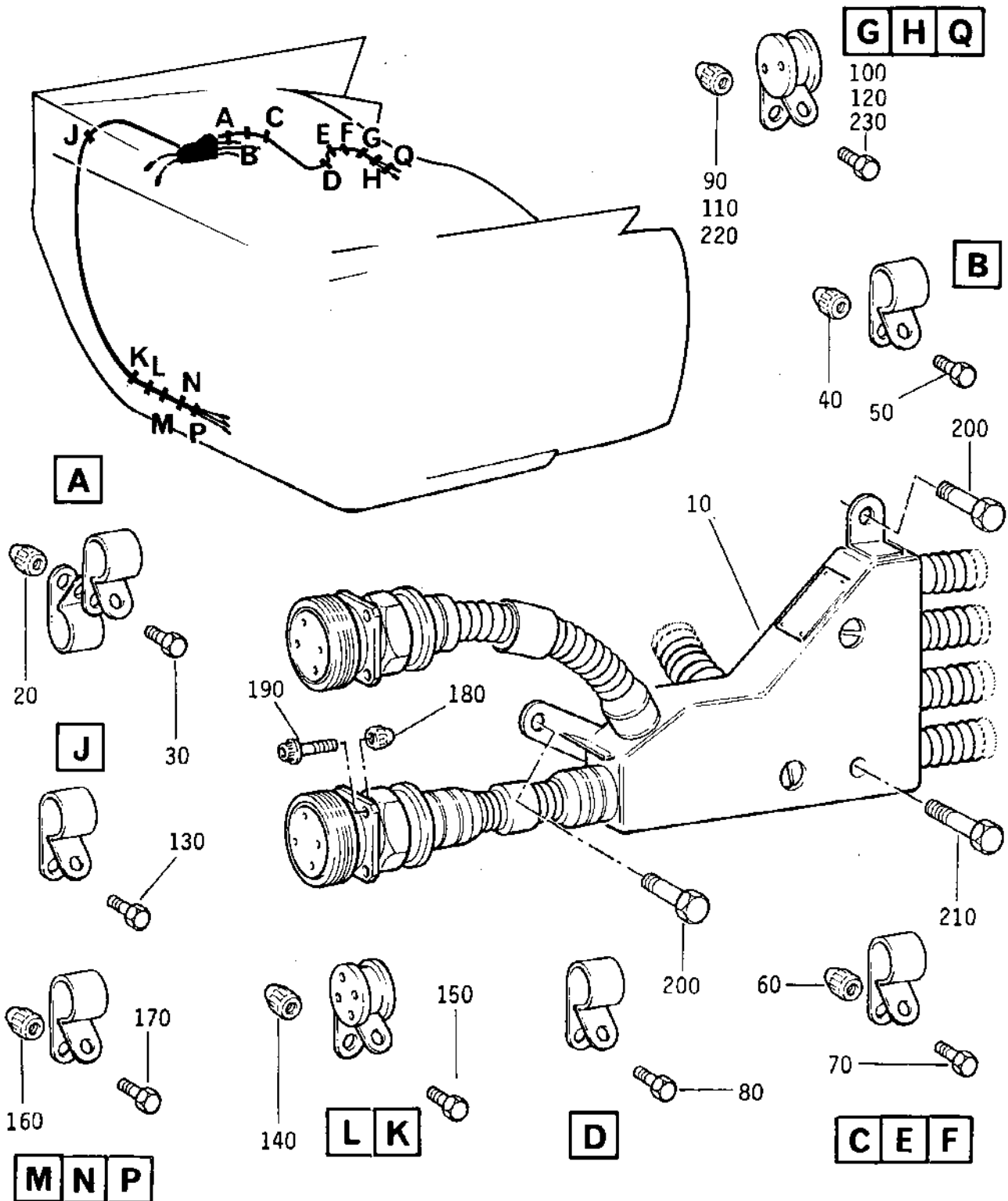
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Nozzle Assy, Twin Secondary
Figure 26

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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6	7		
26 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
		POST SB 0L-593-78-19 POST SB 0L-593-78-20								
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF R
		POST SB 0L-78-28217-35 POST SB 0L-78-28218-36								
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)								RF R
		POST SB 0L-78-28220-16								
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)								RF
		POST SB 0L-593-78-19 POST SB 0L-593-78-20								

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
26 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2J	301-203-609-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2K	301-203-610-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2L	301-203-611-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF R
- 2M	301-203-612-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF R
- 2N	301-203-613-0	(CTD) POST SB 0L-78-28217-35 POST SB 0L-78-28218-36 NOZZLE ASSY,TWIN SECONDARY RH							RF R
10A	620-860-704-0	(CTD) POST SB 0L-78-28220-16 .WIRING,ELECTRICAL BAYS VF6310 2 AND 4 SEE 78-13-12 FOR DET POST SB 0L-593-78-34 ATTACHING PARTS							1
20A	AS20624	.NUT,SELF LOCKING							1
30A	649-091-030-0	.BOLT,HEXAGONAL HEAD							1
40A	AS20624	.NUT,SELF LOCKING							1
50A	649-091-028-0	.BOLT,HEXAGONAL HEAD							1
60A	AS20624	.NUT,SELF LOCKING							3
70A	649-091-029-0	.BOLT,HEXAGONAL HEAD							3
80A	649-091-029-0	.BOLT,HEXAGONAL HEAD							1
90A	AS20624	.NUT,SELF LOCKING							1
100A	649-091-033-0	.BOLT,HEXAGONAL HEAD							1
110A	AS20624	.NUT,SELF LOCKING							1
120A	649-091-033-0	.BOLT,HEXAGONAL HEAD							1
130A	649-091-029-0	.BOLT,HEXAGONAL HEAD							1
140A	AS20624	.NUT,SELF LOCKING							2
150A	649-091-029-0	.BOLT,HEXAGONAL HEAD							2
160A	AS20624	.NUT,SELF LOCKING							3
170A	649-091-028-0	.BOLT,HEXAGONAL HEAD							3
180A	NAS1292C08	.NUT,SELF LOCKING							8
190A	NAS1102C08-10	.SCREW,CSK HEAD							8
200A	649-091-029-0	.BOLT,HEXAGONAL HEAD							2
210A	649-091-044-0	.BOLT,HEXAGONAL HEAD							1
220A	AS20624	.NUT,SELF LOCKING							1
230A	649-091-029-0	.BOLT,HEXAGONAL HEAD ****							1
-240A	620-849-098-0	.CLIP POST SB 0L-593-78-14							1
-250A	SPIRATEMP3P	.BAND,TEFLON VF3341 LENGTH = 350 MM POST SB 0L-593-78-14							AR

- ITEM NOT ILLUSTRATED

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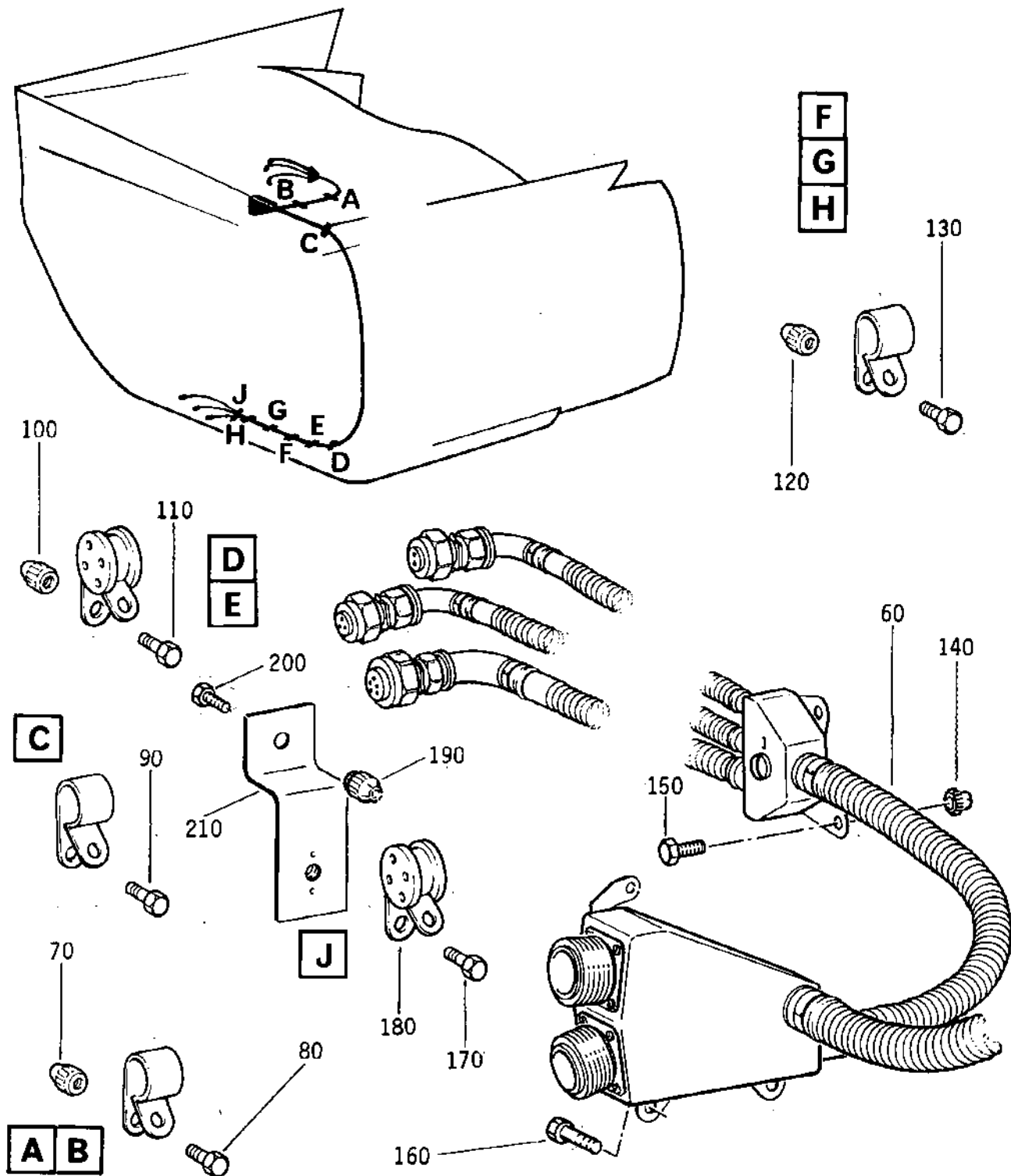
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Nozzle Assy, Twin Secondary
Figure 27

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
27 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1B	301-203-502-0	(CTD)							
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1D	301-203-504-0	(CTD)							
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1F	301-203-506-0	(CTD)							
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
		(CTD)							
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1J	301-203-509-0	(CTD)							
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH							RF
- 1L	301-203-511-0	(CTD)							
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH							RF R
- 1N	301-203-513-0	(CTD)							
		NOZZLE ASSY,TWIN SECONDARY LH							RF R
		(CTD)							
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH							RF R
		(CTD)							
		POST SB OL-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2B	301-203-602-0	(CTD)							
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2D	301-203-604-0	(CTD)							
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2F	301-203-606-0	(CTD)							
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
		(CTD)							
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
27 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2J	301-203-609-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2K	301-203-610-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF
- 2L	301-203-611-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF R
- 2M	301-203-612-0	(CTD) NOZZLE ASSY,TWIN SECONDARY RH							RF R
- 2N	301-203-613-0	(CTD) POST SB 0L-78-28217-35 POST SB 0L-78-28218-36 NOZZLE ASSY,TWIN SECONDARY RH							RF R
		(CTD) POST SB 0L-78-28220-16							
10A	NAS6303U2	.DELETED							
20A	AN960C10L	.DELETED							
30A	NAS6303U3	.DELETED							
40A	AN960C10L	.DELETED							
50A	301-142-800-0	.DELETED							
60A	620-860-604-0	.WIRING,ELECTRICAL BAYS VF6310 1 AND 3 SEE 78-13-11 FOR DET POST SB 0L-593-78-34							1
		ATTACHING PARTS							
70A	AS20624	.NUT,SELF LOCKING							2
80A	649-091-028-0	.BOLT,HEXAGONAL HEAD							2
90A	649-091-029-0	.BOLT,HEXAGONAL HEAD							1
100A	AS20624	.NUT,SELF LOCKING							2
110A	649-091-029-0	.BOLT,HEXAGONAL HEAD							2
120A	AS20624	.NUT,SELF LOCKING							3
130A	649-091-028-0	.BOLT,HEXAGONAL HEAD							3
140A	AS20624	.NUT,SELF LOCKING							2
150A	649-091-033-0	.BOLT,HEXAGONAL HEAD							2
160A	649-091-029-0	.BOLT,HEXAGONAL HEAD							3
170A	649-091-030-0	.BOLT,HEXAGONAL HEAD							1
180A	21T10	.P CLIP,TEFLON LINED VF0215 ***							1
190A	DHT579-3	.NUT,SELF LOCKING VF0224 OPT TO Z1855-02 V72962 OPT TO 119FW1032 V50393							1
200A	HL668-6-4	.BOLT,HI-LOCK V73197							1
210A	302-019-000-0	.SUPPORT							1
-220A	SPIRATEMP3P	.BAND,TEFLON VF3341 LENGTH = 460 MM POST SB 0L-593-78-14							AR

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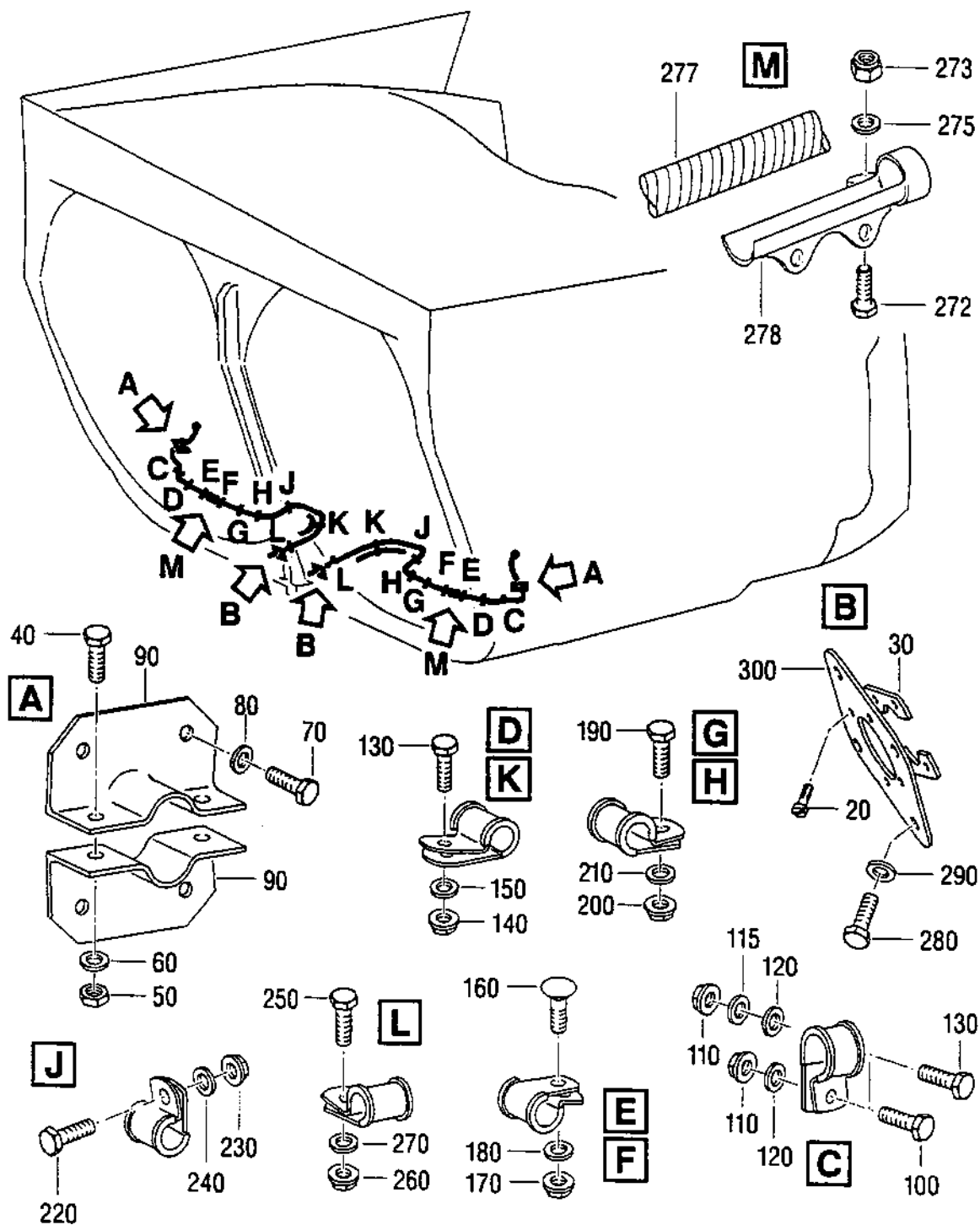
OLYMPUS 593

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Nozzle Assy, Twin Secondary
Figure 28

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
28 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1H	301-203-508-0	POST SB OL-593-78-19							
		POST SB OL-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1P	301-203-514-0	POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 2A	301-203-601-0	POST SB OL-78-28220-16							
		NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1234567		
28 - 2H	301-203-608-0	NOZZLE ASSY, TWIN SECONDARY RH (CTD)		RF
- 2J	301-203-609-0	NOZZLE ASSY, TWIN SECONDARY RH (CTD)		RF
- 2K	301-203-610-0	NOZZLE ASSY, TWIN SECONDARY RH (CTD)		RF
- 2L	301-203-611-0	NOZZLE ASSY, TWIN SECONDARY RH (CTD)		RF
- 2M	301-203-612-0	NOZZLE ASSY, TWIN SECONDARY RH (CTD)		RF
- 2N	301-203-613-0	POST SB OL-78-28217-35 POST SB OL-78-28218-36 NOZZLE ASSY, TWIN SECONDARY RH (CTD)		RF
10A	620-860-901-0	POST SB OL-78-28220-16 .HARNES, TRANSDUCER AREA VF 6310 PRIMARY NOZZLE SEE 78-13-01 FIG. 30 FOR DET POST SB OL-593-78-14		2
20A	649-212-043-0	ATTACHING PARTS .SCREW, CYLINDRICAL HEAD		8
30A	302-003-100-0	.STRIP		4
40A	NAS6303U2	.BOLT, HEX HEAD		4
50A	NAS1291C3	.NUT, SELF LOCKING		4
60A	AN960C10L	.WASHER, PLAIN		4
70A	NAS6303U8	.BOLT, HEX HEAD		8
80A	AN960C10L	.WASHER, PLAIN		8
90A	301-157-101-0	.CLAMP, HALF		4
100A	NAS6303U2	.BOLT, HEX HEAD SEL FROM POST SB OL-593-78-14		2
105A	NAS6303U6	.BOLT, HEX HEAD SEL FROM POST SB OL-593-78-14		AR
110A	NAS1291C3	.NUT, SELF LOCKING		2
115A	649-786-200-0	.WASHER POST SB OL-593-78-14		AR
120A	AN960C10L	.WASHER, PLAIN		2
130A	NAS6303U2	.BOLT, HEX HEAD		4
140A	NAS1291C3	.NUT, SELF LOCKING		4
150A	AN960C10L	.WASHER, PLAIN		4
160A	649-781-224-0	.BOLT, ROUND HEAD		4
170A	NAS1291C3	.NUT, SELF LOCKING		4
180A	AN960C10L	.WASHER, PLAIN		4
190A	NAS6303U2	.BOLT, HEX HEAD		4
200A	NAS1291C3	.NUT, SELF LOCKING		4
210A	AN960C10L	.WASHER, PLAIN		4

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
28	220A	NAS6303U2	.BOLT,HEX HEAD						2
	230A	NAS1291C3	.NUT,SELF LOCKING						2
	240A	AN960C10L	.WASHER,PLAIN						2
	250A	NAS6303U2	.BOLT,HEX HEAD						2
	260A	NAS1291C3	.NUT,SELF LOCKING						2
	270A	AN960C10L	.WASHER,PLAIN						2
	272A	NAS6303U1	.BOLT,HEX HEAD						2
			POST SB 0L-593-78-18						
	273A	NAS1291C3	.NUT,SELF LOCKING						2
			POST SB 0L-593-78-18						
	275A	AN960C10L	.WASHER,PLAIN						2
			POST SB 0L-593-78-18						

	277A	302-059-000-0	.SHEATH						2
			POST SB 0L-593-78-18						
	278A	302-058-800-0	.GUTTER,WELDMENT						2
			POST SB 0L-593-78-18						
	280A	NAS6303U3	.BOLT,HEX HEAD						8
	290A	NAS1587-3C	.WASHER,PLAIN						8
	300A	301-157-500-0	.PLATE,SQUARE						2

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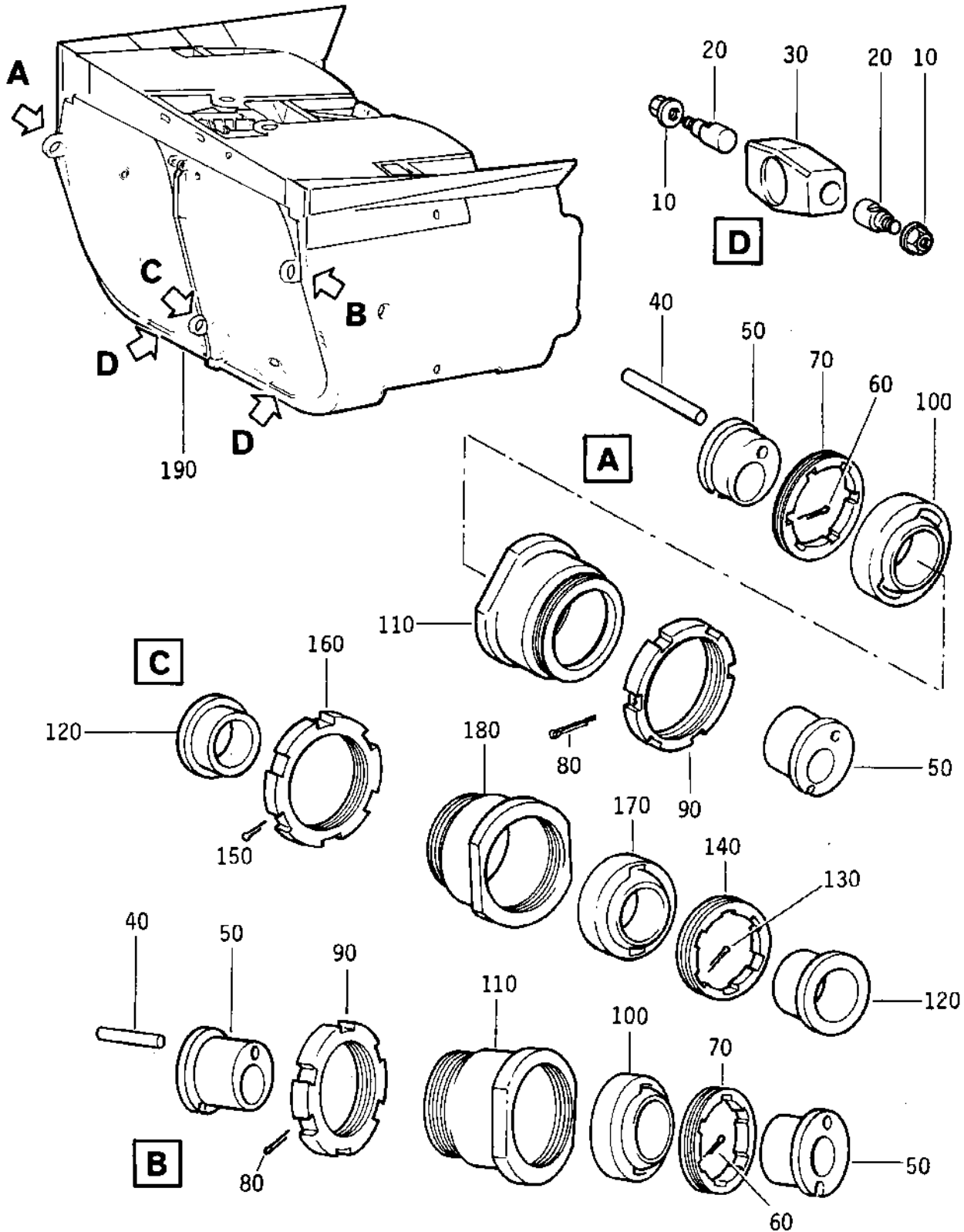
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Nozzle Assy, Twin Secondary
Figure 29

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6 7		
29 - 1A	301-203-501-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1B	301-203-502-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1C	301-203-503-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1D	301-203-504-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1E	301-203-505-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1F	301-203-506-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1G	301-203-507-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							
- 1H	301-203-508-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1J	301-203-509-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1K	301-203-510-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1L	301-203-511-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF
- 1M	301-203-512-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
- 1N	301-203-513-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB OL-78-28217-35							
		POST SB OL-78-28218-36							
- 1P	301-203-514-0	NOZZLE ASSY,TWIN SECONDARY LH (CTD)							RF R
		POST SB OL-78-28220-16							
- 2A	301-203-601-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2B	301-203-602-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2C	301-203-603-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2D	301-203-604-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2E	301-203-605-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2F	301-203-606-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2G	301-203-607-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
		POST SB OL-593-78-19							
		POST SB OL-593-78-20							

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
29 - 2H	301-203-608-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2J	301-203-609-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2K	301-203-610-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF
- 2L	301-203-611-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2M	301-203-612-0	NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
- 2N	301-203-613-0	POST SB OL-78-28217-35 POST SB OL-78-28218-36							
		NOZZLE ASSY,TWIN SECONDARY RH (CTD)							RF R
		POST SB OL-78-28220-16							
10A	BAS7094C4	.NUT,HEX							4
20A	D57-4312-100	.BOLT,PIVOT							4
30A	D57-4311-100	.TRUNNION,BODGE BOLT							2
- 35A	E51-1550-000	.BUSH,SUB ASSY							2
40A	E51-1554-100	.PIN							1
50A	E51-1551-100	.BUSH,SPHERICAL BEARING							1
60A	MS24665-155	.PIN,SPLIT							2
70A	D51-4511-100	.LOCKING,RING							2
80A	MS24665-155	.PIN,SPLIT							2
90A	D51-4512-100	.LOCKING,RING							2
100A	BAS7641-28	.BEARING							2
110A	D51-4587-100	.HOUSING,BEARING							2
120A	D51-4586-100	.BUSH,SPHERICAL BEARING							2
-120B	E51-1579-100	.BUSH,SPHERICAL BEARING							2
130A	MS24665-155	.PIN,SPLIT							1
140A	D51-4511-100	.LOCKING,RING							1
150A	MS24665-155	.PIN,SPLIT							1
160A	D51-4512-100	.LOCKING,RING							1
170A	BAS7641-28	.BEARING							1
180A	D51-4587-100	.HOUSING,BEARING							1
190A	302-009-030-0	.NOZZLE,TWIN SECONDARY LH							1
-190B	302-009-031-0	.NOZZLE,TWIN SECONDARY LH							1
-190C	302-009-032-0	.NOZZLE,TWIN SECONDARY LH							1
-190D	302-009-033-0	.NOZZLE,TWIN SECONDARY LH							1
-190E	302-009-034-0	.NOZZLE,TWIN SECONDARY LH							1
-190F	302-009-035-0	.NOZZLE,TWIN SECONDARY LH							1
		POST SB OL-593-78-19							
-190G	302-009-036-0	.NOZZLE,TWIN SECONDARY LH							1
-190H	302-009-037-0	.NOZZLE,TWIN SECONDARY LH							1
-190J	302-009-038-0	.NOZZLE,TWIN SECONDARY LH							1
-190K	302-009-039-0	.NOZZLE,TWIN SECONDARY LH							1
-190L	302-009-040-0	.NOZZLE,TWIN SECONDARY LH							1 R
-190M	302-009-041-0	.NOZZLE,TWIN SECONDARY LH							1 R

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FIG-ITEM	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASSY		
		1	2	3	4	5	6	7				
29	-190N	302-009-042-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY LH	1	R
	-191A	302-009-230-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	
	-191B	302-009-231-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	
	-191C	302-009-232-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	
	-191D	302-009-233-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	
	-191E	302-009-234-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	
	-191F	302-009-235-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	
	-191G	302-009-236-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	
				P	O	S	T	S	B O L-593-78-19			
	-191H	302-009-237-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	
	-191J	302-009-238-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	
	-191K	302-009-239-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	
	-191L	302-009-240-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	R
	-191M	302-009-241-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	R
	-191N	302-009-242-0	.	N	O	Z	Z	L	E	,TWIN SECONDARY RH	1	R

- ITEM NOT ILLUSTRATED

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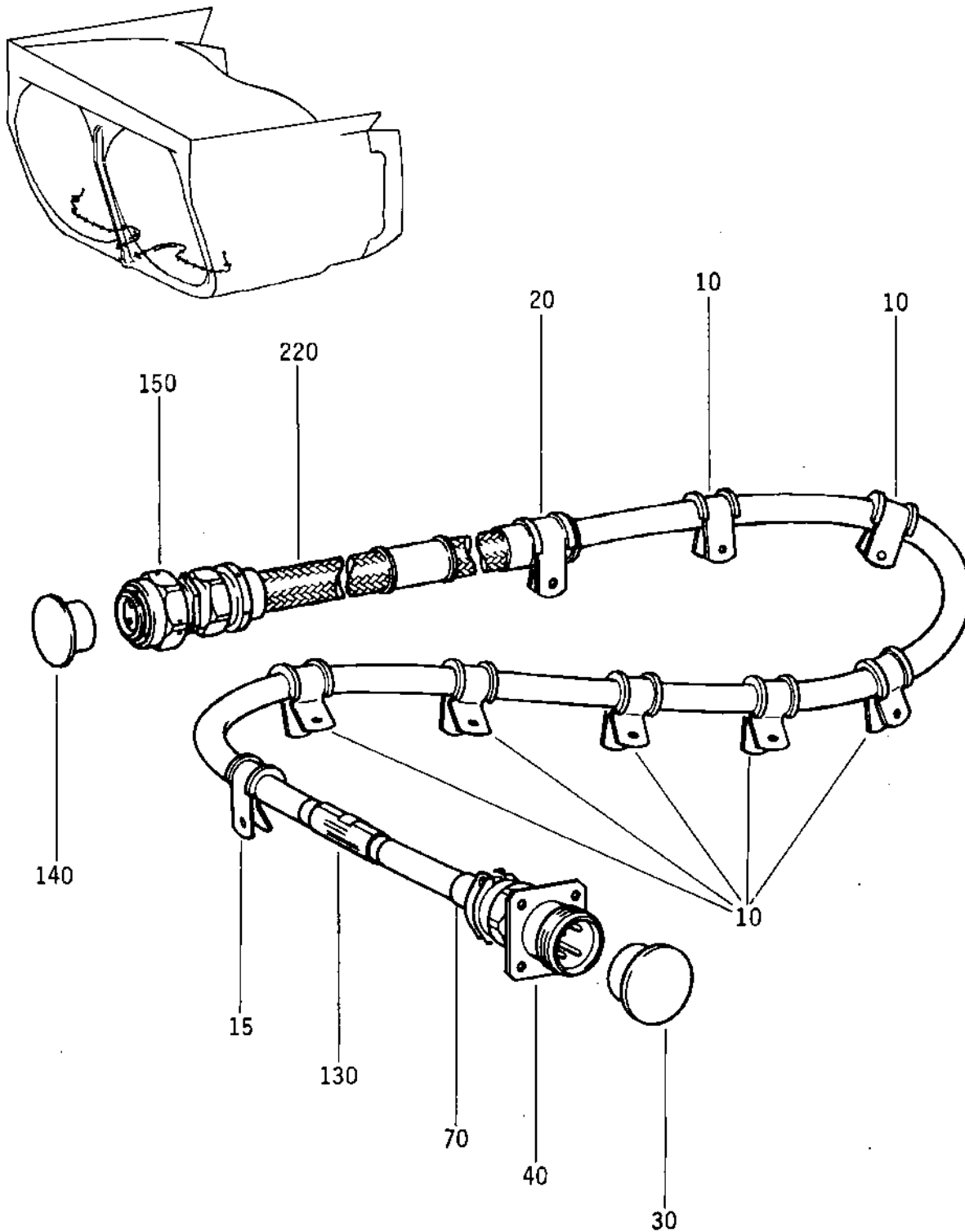
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Harness, Transducer Area Primary Nozzle
Figure 30

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
30 - 1A	620-860-901-0								RF R
		HARNESS, TRANSDUCER AREA VF6310							
		PRIMARY NOZZLE							
		SEE 78-13-01 FIG 28 FOR NHA							
		POST SB OL-593-78-14							
10A	21T8	.	P	CLIP, TEFLON LINED			VF0215		7 R
		POST SB OL-593-78-14							
15A	620-854-999-0	.	P	CLIP					1 R
		POST SB OL-593-78-14							
20A	21T12	.	P	CLIP, TEFLON LINED			VF0215		1
30A	48215	.	CAP, BLANKING				VF1983		1 R
40A	620-849-975-0	.	RECEPTABLE, FIXED				VF6310		1
		MODIFIED FROM							
		99300K14S2PN2RC MADE BY							
		F1983							
- 50A	29-35976	.	PIN, ELECTRICAL				VF1983		4
- 60A	35522	.	INSULATION				VF1983		1
70A	620-849-313-0	.	SLEEVE, PROTECTION				VF6310		1
- 80A	620-849-150-0	.	TAPE, ADHESIVE, GLASS				VF6310		AR
		FIBER							
- 90A	620-849-026-0	.	SLEEVE, IDENTIFICATION A				VF6310		1
- 100A	620-849-027-0	.	SLEEVE, IDENTIFICATION B				VF6310		1
- 110A	620-849-028-0	.	SLEEVE, IDENTIFICATION C				VF6310		1
- 120A	620-849-029-0	.	SLEEVE, IDENTIFICATION D				VF6310		1
130A	620-850-536-0	.	NAMEPLATE				VF6310		1
140A	48208	.	CAP, BLANKING				VF1983		1 R
150A	99306K14S2SN2	.	CONNECTOR, MOBILE				VF1983		1
- 160A	29-35979	.	SOCKET				VF1983		4
- 170A	35524	.	INSULATION				VF1983		1
- 180A	620-849-026-0	.	SLEEVE, IDENTIFICATION A				VF6310		1
- 190A	620-849-027-0	.	SLEEVE, IDENTIFICATION B				VF6310		1
- 200A	620-849-028-0	.	SLEEVE, IDENTIFICATION C				VF6310		1
- 210A	620-849-029-0	.	SLEEVE, IDENTIFICATION D				VF6310		1
220A	620-847-937-0	.	SHEATH, ASSY				VF6310		1
- 230A	36647	.	CLAMP, SHEATH				VF1983		1
- 240A	620-854-695-0	.	CABLE, ASSY				VF6310		1

- ITEM NOT ILLUSTRATED

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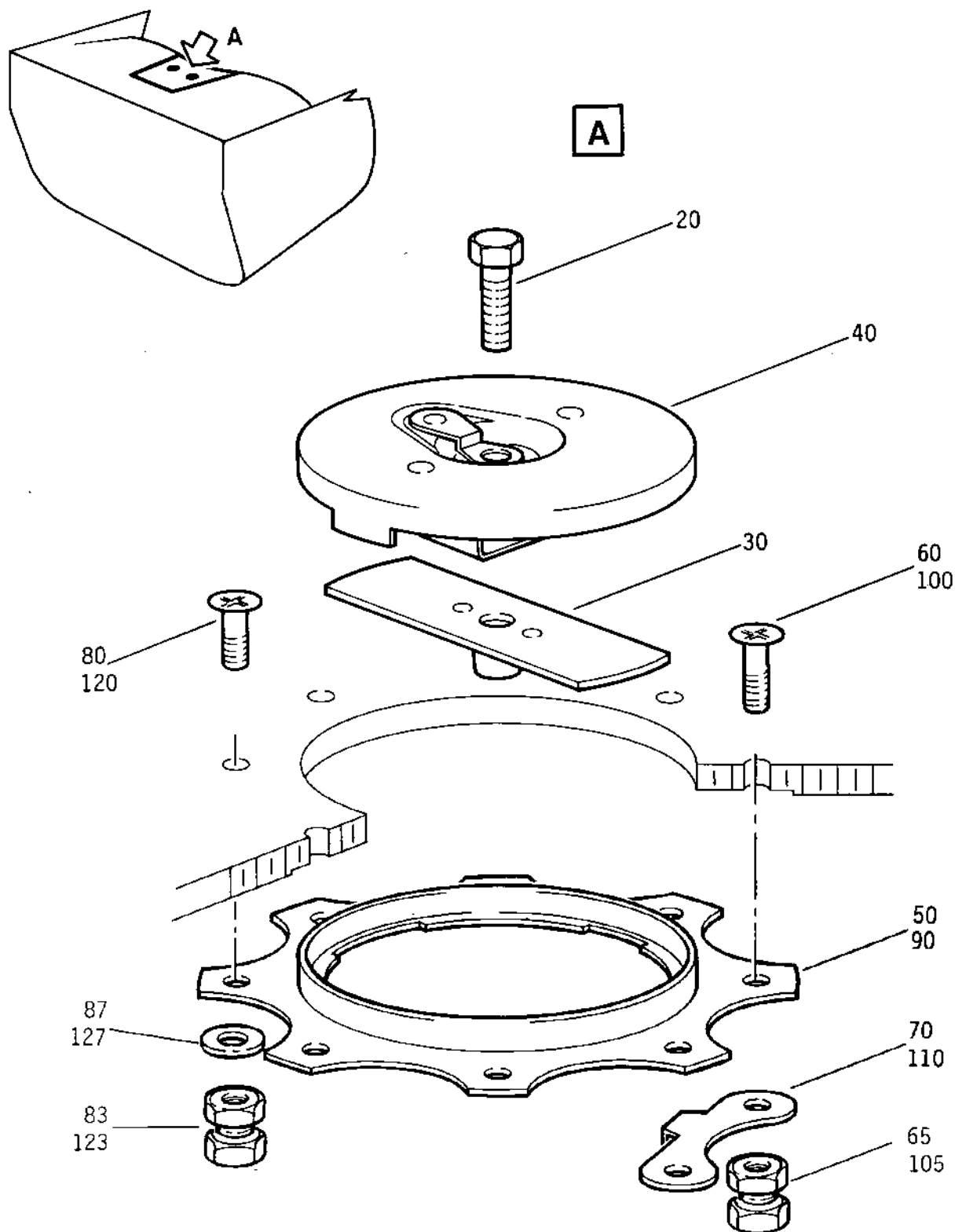
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Nozzle Assy, Twin Secondary
Figure 31

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USARE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
31 - 1A	301-060-603-0	DOOR,ACCESS LH SEE 78-13-01 FIG 3 FOR NHA POST SB OL-78-28224-40							RF
- 2A	301-060-403-0	DOOR,ACCESS RH SEE 78-13-01 FIG 1 FOR NHA POST SB OL-78-28224-40							RF
- 10A	302-068-700-0	COVER,BLANKING ASSY POST SB OL-78-28224-40							2
20A	MS9501-12	..BOLT POST SB OL-78-28224-40							1
30A	302-068-500-0	..STRIP,LOCKING POST SB OL-78-28224-40							1
40A	302-068-600-0	..COVER,BLANKING POST SB OL-78-28224-40							1
50A	302-067-700-6	COVER,SEAT LH POST SB OL-78-28224-40							1 R
- 51A	302-068-000-0	COVER,SEAT RH POST SB OL-78-28224-40							1
60A	HL869-6-12	ATTACHING PARTS SCREW,HI-LOCK V73197 POST SB OL-78-28224-40							2
65A	HL97-6	NUT,HI-LOCK V73197 OPT TO HLN1G6 POST SB OL-78-28224-40							2
70A	302-068-400-6	STOP POST SB OL-78-28224-40							1 R
80A	HL869-6-12	SCREW,HI-LOCK V73197 POST SB OL-78-28224-40 :::							6
83A	HL97-6	NUT,HI-LOCK V73197 OPT TO HLN1G6 POST SB OL-78-28224-40							6
87A	AN960C10	WASHER,PLAIN POST SB OL-78-28224-40							6
90A	302-067-800-0	COVER,SEAT LH POST SB OL-78-28224-40							1
- 91A	302-067-900-0	COVER,SEAT RH POST SB OL-78-28224-40							1
100A	HL869-6-12	ATTACHING PARTS SCREW,HI-LOCK V73197 POST SB OL-78-28224-40							2
105A	HL97-6	NUT,HI-LOCK V73197 OPT TO HLN1G6 POST SB OL-78-28224-40							2
110A	302-068-400-0	STOP POST SB OL-78-28224-40							1

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
31 120A	HL869-6-12	.	SCREW,HI-LOCK				V73197		6 R
			POST SB 0L-78-28224-40						

123A	HL97-6	.	NUT,HI-LOCK				V73197		6 R
			OPT TO HLN1G6						
			POST SB 0L-78-28224-40						
127A	AN960C10	.	WASHER,PLAIN						6 R
			POST SB 0L-78-28224-40						

- ITEM NOT ILLUSTRATED

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EXHAUST SYSTEM VOLUME 3

BUCKET 78-31-01



1975

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SNECMA
APRES VENTE CIVILE
SITE DE MELUN MONTEREAU
AERODROME DE VILLAROCHE
BP 1936 - 77019 MELUN CEDEX (FRANCE)



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OVERHAUL



LIST OF APPROVED REPAIR FACILITIES

TRADE NAME	ADDRESS
SNECMA	Après-Vente Civile Site de MELUN MONTEREAU Aérodrome de VILLAROCHE BP 1936 77019 MELUN CEDEX (FRANCE)

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LIST OF PRODUCTS AND COMPOUNDS

PRODUCT NAME	CODE	SUPPLIER	ADDRESS

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REP 1-330-1	Reconditioning of the thread silver plating
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REP 1-340-2	Reconditioning the silver plating in the spherical bore
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sneema

SPHERICAL BEARING

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REVERSER BUCKET

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DESCRIPTION - OPERATION

1. General

A. Introduction

The buckets (figure 1) fitted to the twin secondary nozzle have two functions :

- (1) They control the expansion of the gas issuing from the primary nozzle. Their variable position allows the achievement of optimum performance in all the various flight configurations,
- (2) They block and re-direct the gas flow in the reverse-thrust configuration.

B. General characteristics

Each assembled bucket weighs approximately 80 kg (176 lb). The major dimensions are :

- length..... 1300 mm (51.2 in)
- width..... 750 mm (29.5 in)
- height..... 700 mm (27.6 in).

2. Description of an assembled bucket

The assembled bucket (figure 2) comprises :

- a primary heat shield (2),
- a secondary heat shield (3),
- two side plates (4),
- a seal (5) in five segments,
- two spherical bearing housings (6),
- a basic bucket (1) to which the above parts are fitted.

A. The primary heat shield

The primary heat shield (2) is a panel in austenitic alloy. It is fixed to the basic bucket (1) and forms the contact surface with high temperature exhaust gases.

B. The secondary heat shield

The function of the secondary heat shield (3) is to protect the basic bucket (1) against the heat emitted by the exhaust gas.

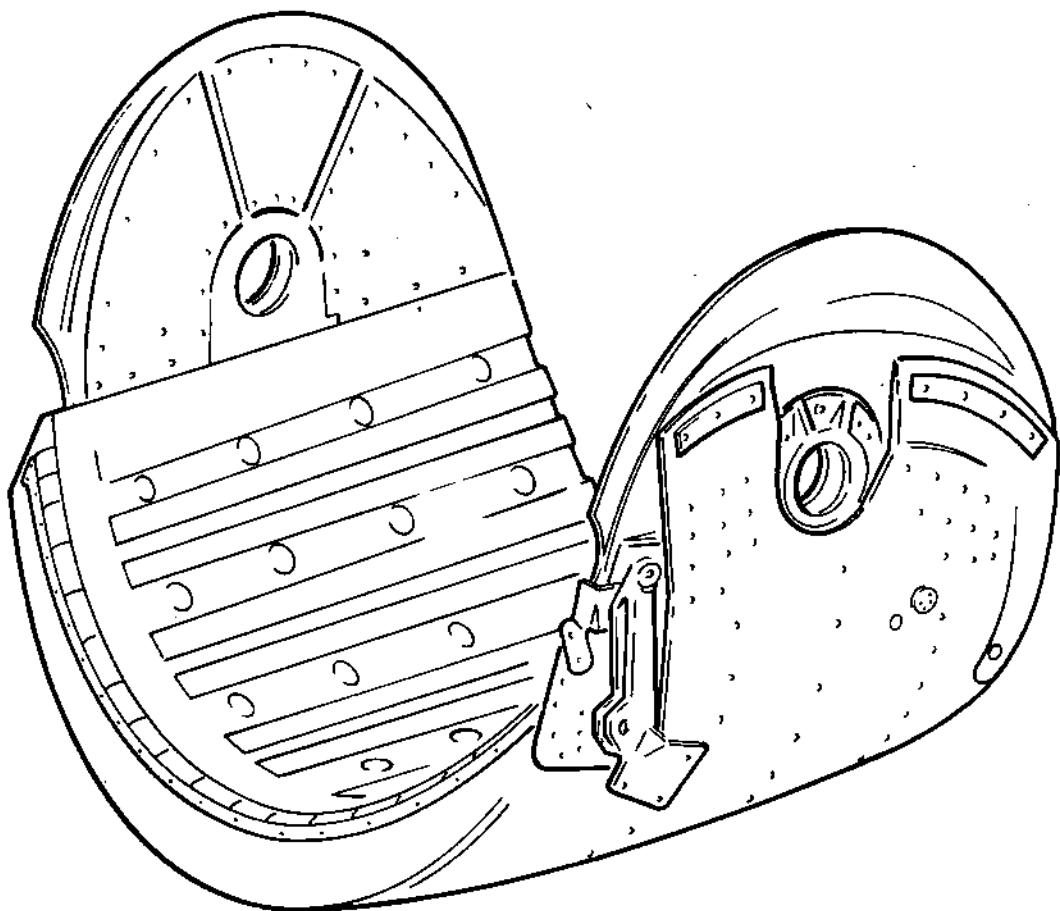
This shield-manufactured in Min-K material is a flexible shield composed of quartz-glass fiber sandwiched between

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Assembled Bucket
Figure 1

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two sheets of wafered stainless steel.

C. The side plates

Each bucket is fitted with two side-plates (4) in austenitic steel honeycomb structure, which are fixed to the basic bucket. They provide thermal protection for the bucket-to-structure hinge points, and ensure continuity of the shape of the nozzle in all bucket configurations.

D. The seal

The seal is manufactured in austenitic alloy and is located on the front section of the bucket. This seal (5) in 5 segments forms the profile of the leading edge of the bucket.

E. The spherical bearing housings

There are two spherical bearing housings (6) per bucket, fitted into bores in the basic bucket (1). They are prevented from rotating by a pin (7) and from axial movement by a nut (8). Each housing takes a spherical bearing (9).

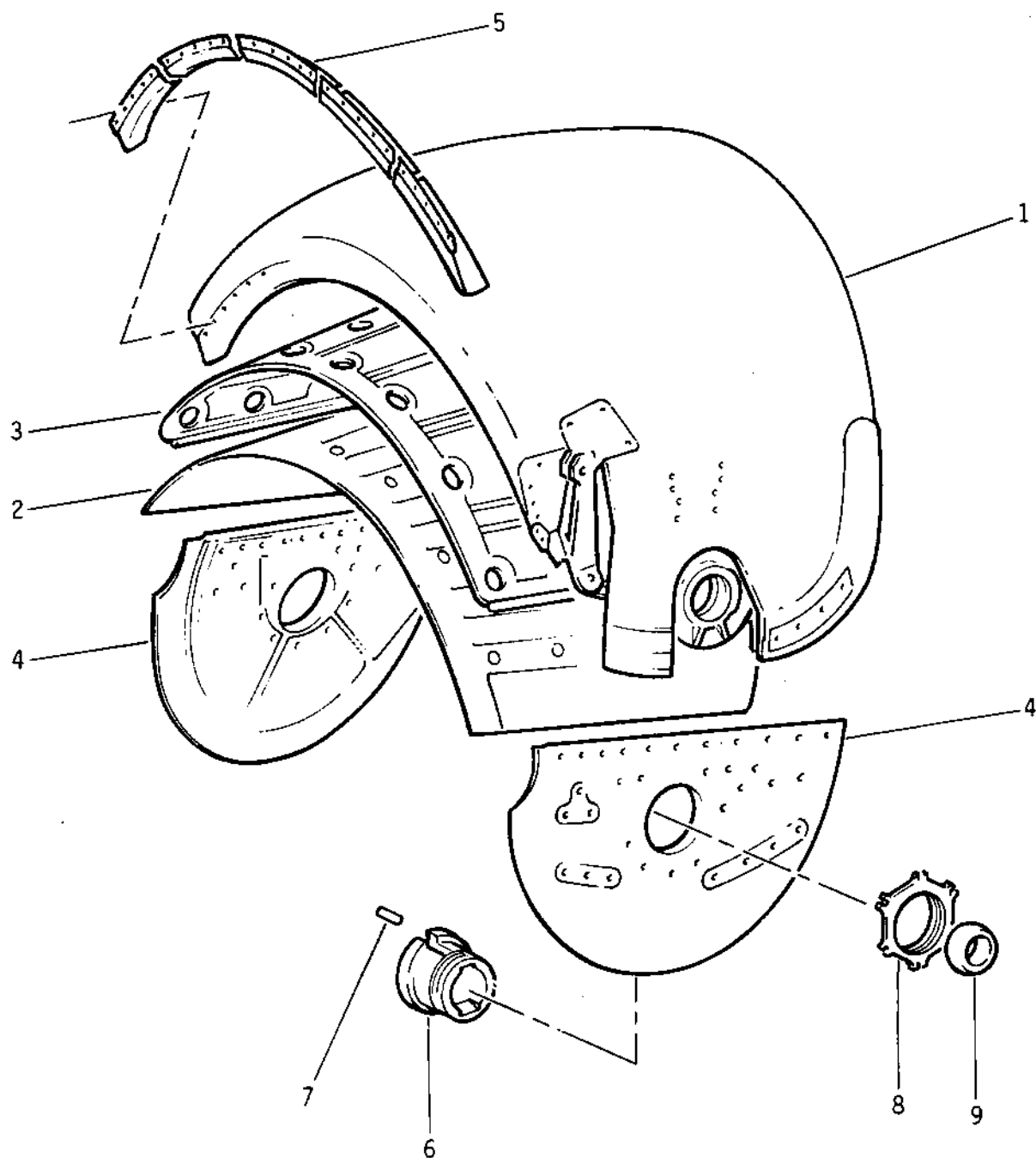
F. The basic bucket

The basic bucket (1) is the main working component, since it is the most heavily loaded part during the reverse thrust operation.

The basic bucket unit cannot be dis-assembled, and comprises

- (1) a structural frame-work and stringers, to which are fixed machined-from-solid parts such as :
 - the hinge-point supports which take the spherical bearing housings,
 - the yokes to which the bucket actuation ball-screw gear-boxes are attached.
- (2) internal and external skins in honeycomb structure rivetted to the frame-work.

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Bucket Assembly
Figure 2



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DISASSEMBLY

1. General

- A. During disassembly, follow the recommendations given in chapter 70-05-00 of the manual of standard practices and in the working procedures section of the Overhaul Manual.
- B. Use only tools and other special equipment nominated in the disassembly procedures, and identified by a number SC... The tools are shown in the illustrated tools and equipment manual (I.T.E.M.).
- C. During disassembly, visually inspect all parts removed and report to the inspection department, any defects found which could be obliterated by cleaning (scratches, burning, etc...) and which may result from incorrect operation. Also, report any broken parts or any missing locking devices.
- D. In the working procedures section of the manual, parts are referenced to the IPL by two numbers in brackets, the first of which is the figure number in the IPL in which the parts are shown, the second being the item number within that figure.

2. Disassembling the buckets

The operations hereafter are to be carried out for each bucket.

NOTE : The buckets are disassembled when set up on storage stand - tool SC 37.

A. Removing the seal segments

- (1) Remove screws (1-170), collect washers (1-180) and remove seal segment (1-190).
- (2) Remove screws (1-200), collect washers (1-210) and remove seal segment (1-220).
- (3) Remove screws (1-230), collect washers (1-240) and remove seal segment (1-250).
- (4) Remove screws (1-260), collect washers (1-270) and remove seal segment (1-280).
- (5) Remove screws (1-290), collect washers (1-300) and remove seal segment (1-310).

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B. Removing side plate (1-50)

- (1) Remove screws (1-60) and collect spacer plate (1-70).
- (2) Remove screws (1-80) and collect spacer plate (1-90).
- (3) Remove screws (1-100) and collect shims (1-105) and (1-107).
Identify the latter.
- (4) Remove side-plate (1-50).

C. Removing side plate (1-110)

- (1) Remove screws (1-120) and collect spacer plate (1-130).
- (2) Remove screws (1-140) and collect spacer plate (1-150).
- (3) Remove screws (1-160) and collect shims (1-165) and (1-167).
Identify the latter.
- (4) Remove side-plate (1-110).

D. Removing spherical bearing housings

The operations hereafter are to be carried out for each housing :

- (1) Rotate and remove spherical bearing (1-350).
- (2) Unlock nut (1-330) by grinding locking plate (1-320) attaching weld. Remove locking plates (1-320).
- (3) Unscrew nut (1-330), using wrench - tool SC 40.
- (4) Fit the extractor - tool SC 41 - and remove spherical bearing housing (1-340) ; collect anti-rotation pin (1-360).

E. Removing heat shields

- (1) Remove screws (1-10).
- (2) Remove primary heat shield (1-30).
- (3) Remove secondary heat shield (1-40).
- (4) Remove threaded sleeves (1-20), using the special wrench - tool SC 206.

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F. Removing cover assemblies

The operations hereafter are to be carried out for each cover.

- (1) Slightly loosen screws, rotate and remove cover (1-370).

G. Removing bushings

- (1) Remove bushings (1-380) and (1-390) together with bushings (1-400) and (1-410) located in the attaching yoke of bucket ball screw gear box end-pieces.

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CLEANING



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1. General

- A. After disassembly, clean all the parts of the bucket thoroughly in order to remove all the surface contamination such as oils, greases, carbon deposits, corrosion and oxidation marks.
- B. The purpose of cleaning is to :
 - (1) Allow thorough visual inspection of parts.
 - (2) Disclose cracks due to system operation through use of fluorescent penetrant inspection methods.
 - (3) Prepare the surfaces in view of future repair work.

2. Specific recommendations

- A. Any cleaning method selected by an operator shall comply with the following requirements to avoid penalization on the service life of parts.
 - (1) Do not degrease titanium parts, welded or not, using halogen products such as chlorinated solvents, trichlorethylene etc...
 - (2) Do not clean in acid baths parts having complex shapes or featuring blind holes i.e. parts on which rinsing or neutralization are difficult to carry out properly.
 - (3) Do not use cleaning agents the action of which may induce generalized or intergranular corrosion of materials, particularly on those materials showing aging due to operation on engine.
- B. Limitations related to electro-platings, chemical surface treatments, paints, varnishes, and hardface metal coatings.
 - (1) The cleaning methods recommended in this chapter are not harmful to the surface treatments applied on the bucket constitutive parts.

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- (2) To avoid deterioration to surface treatments of parts or to allow their future reconditioning, a list of the coated parts and their location (identification in regards of the Illustrated Parts List) is given here under.

(a) Silver coated parts nomenclature

<u>Description</u>	<u>IPL Fig.item</u>	<u>Coated part base metal</u>
Sleeve, threaded	1-20	Austenitic alloy
Nut, retaining housing		
spherical bearing	1-330	Austenitic alloy
Housing, spherical		
bearing	1-340	Martensitic alloy
Cover assy	1-370	Titanium alloy

(b) Chromium plated parts nomenclature

Bearing, spherical	1-350	Martensitic alloy
--------------------	-------	-------------------

(c) Metallized parts nomenclature

(i) Chromium carbide

Sleeve, threaded	1-20	Austenitic alloy
------------------	------	------------------

(ii) KC 25 NW plasma spraying, METCO 404 under coat.

Heat shield assy, primary,	1-30	Austenitic alloy
-------------------------------	------	------------------

3. Cleaning processes

- A. The following table gives the cleaning processes specified in chapter 70-15-20 of the "Standard Practices" manual and applicable to the parts described and itemized in relation to the I.P.L.

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<u>Description</u>	<u>IPL Fig.item</u>	<u>Process</u>	<u>Remarks</u>
Heat shield assy, primary,	1-30	M 100 C	
Heat shield assy, secondary	-40	M 116	
Plate, side	-50	M 116	
Plate, spacer	-70	M 101 A	
Plate, spacer	-90,130,150	M 101 A	
Plate, side	-110	M 116	
Segment, seal	-190,310	M 100 C	
Segment, seal	-220,280	M 100 C	
Segment, seal	-250	M 100 C	
Nut, retaining housing	-330	M 101 A or M 100 A	
Housing, spherical bearing	-340	M 101 A or M 100 A	
Bearing, spherical	-350	M 101 A or M 100 A	
Cover, assy	-370	KERDANE paraffin (P 163)	
Bushing	-380,400	M 101 A or M 100 A	
Bushing	-390,410	M 101 A or M 100 A	
Bucket, basic	-460	M 116	

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ATP TEMPORARY REVISION

BRITISH AIRWAYS

OLYMPUS 593 OVERHAUL MANUAL
EXHAUST SYSTEM THRUST REVERSER BUCKET

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No. 0-2.



for Chief Engineer (Technical & Quality Services) CAA Design Approval No.
DA1/8566/78

TEMPORARY REVISION 78-526

Insert in 78-31-01 facing page 301

REASON FOR ISSUE

To introduce a Refurbishment Specification to the Thrust Reverser Bucket Overhaul (MCR.EPO.453/MD).

ACTION

Concorde Exhaust System Refurbishment

Introduction

The exhaust system consists of four main components:-

- (a) The Reheat Jet Pipe
- (b) The Primary Nozzle
- (c) The Twin Secondary Nozzle
- (d) The Thrust Reverser Bucket

Their Refurbishment Specifications are as follows:-

Reheat Jet Pipe	CON 78.11.01.100 Issue 1
Primary Nozzle	CON 78.12.01.100 Issue 1
Twin Secondary Nozzle	CON 78.13.01.100 Issue 1
Thrust Reverser Bucket	CON 78.31.01.100 Issue 1

These refurbishment schedules fulfil the life development requirements of the Approved Maintenance Schedule (A.M.S.).

The work listed in the Refurbishment Schedule is to allow the unit to be considered as a "Condition Monitored" (C.M.) unit.

This means that such units are currently considered to have no known hidden "wear out" features that require planned time interval specific inspections. However, such units may be required to be stripped and inspected purely to gain experience of their condition, i.e. life samples when it is considered that opportunity arisings of strip and inspection are inadequate. Such life sampling requirements will be indicated by an A.M.S. revision.

Notes

Where the term "visual inspection" is used, it implies a visual inspection of all parts exposed arising either as a result of the minimum work content of the Refurbishment Schedule or to a greater depth of strip dictated by other reasons, i.e. repair of damage embodiment of modifications, etc.

When in the course of visual inspection evidence exists, e.g. wear witness, distortion, etc. that requires further stripping, it must be referred to Propulsion Engineering for a review of acceptance standards and agreement to further strip

BRITISH AIRWAYS

OLYMPUS 593 OVERHAUL MANUAL EXHAUST SYSTEM REHEAT JET PIPE

TEMPORARY REVISION No. 78-526 (Cont'd.)

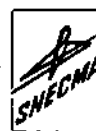
Concorde Exhaust System Refurbishment Thrust Reverser Bucket

Specification No. CON 78.31.01-100 Issue 1

1. The Bucket is to be disassembled IAW OHM 78-31-01 P/B 100.
2. At the completion of disassembly, clean thoroughly all the parts of the Bucket so as to remove all surface contamination such as oils, greases, carbon deposits, corrosion and oxidation marks IAW OHM 78-31-01 P/B 200.
3. Crack detect parts listed in OHM 78-31-01 Bucket assembly removable parts page 302 to 303 and 78-31-01 Basic Bucket inspection methods page 308. Parts failing to meet the required standard must be held for possible repair development.
4. Visually inspect all parts IAW OHM 78-31-01 P/B 300 and repair as required. Any part that is damaged beyond the repair limits must be held for possible repair development. Any part that is damaged and has no cleared repair scheme must be held for possible repair development.
5. Embody Modifications IAW the BA Modification call up list.
6. Inform Propulsion Engineering of any defects found during refurbishment.
7. Re-assemble the Bucket IAW OHM 78-31-01 P/B 500.
8. The Bucket inspection and release documentation is to state the specification number to which the unit has been refurbished.



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OVERHAUL**SEE TR**INSPECTION1. Breakdown of the Inspection Section

The "Estimate" inspection of the Bucket Assembly includes the following chapters :

- General
- Bucket Assy. - Removable parts
- Basic Bucket

This last chapter itself, is divided into paragraphs as follows :

- Introduction
- Identification
- Restricted areas
- Inspection methods
- Permissible damage

This breakdown of the Inspection section results in a different pagination for each chapter and paragraph, of the following kind :

Chapter "Removable parts"

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BUCKET ASSY. - REMOVABLE PARTS

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Chapter "Basic bucket"
Paragraph "Identification"

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BASIC BUCKET - IDENTIFICATION

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2. General

A. Inspection - General

- (1) The Estimate Inspection, prepared during overhaul on the modules or separate disassembled components, has the object of :

Eliminating worn or deteriorated components which are impossible or too costly to be repaired. However, these components can be kept because certain sound portions of them may be usable for the repair of an

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identical component.

Indicating the modifications to be applied to bring up to a new Standard.

Indicating the repairs to be carried out. If this repair has not been envisaged in the Repair Section of the Manual, make a request to SNECMA - Direction de l'Après-Vente, BP No. 83, 91003 EVRY CEDEX (FRANCE).

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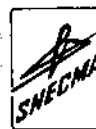
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B. Preparation to the "Estimate" Inspection

- (1) Following disassembly, suitable cleaning for each component is given in the "Cleaning" section of the Overhaul Manual.

NOTE : Take care that any assembly "awaiting inspection" be stored in the "bins" or containers for this purpose.

This inspection must be carried out on thoroughly clean parts.

Place all the parts, making up the sub-assemblies, on the inspection tables covered with anti-shock material (lino or similar material).

- (2) Make a list of the modifications to be applied for each sub-assembly.
- (3) Inspect the parts.

C. "Estimate" Inspection

CAUTION : THE COMPONENTS MUST BE HANDLED WITH THE GREATEST CARE DURING THE INSPECTION OPERATIONS SO AS TO AVOID SHOCKS, SCRATCHES, ETC ...

- (1) Personnel in charge of this inspection must have a thorough knowledge of the instructions given in the Inspection and Repair sections of this manual and in the corresponding chapter 70.

They must be conscious of the importance of their decisions and their consequences. A good technical and functional knowledge of the accessory will enable this personnel to carry out an efficient and intelligent inspection, particularly in vital zones.

- (2) The inspection methods to be used are as follows :

Visual inspection
Inspection for soundness
Dimensional inspection

NOTE : It is recommended that these inspection methods be followed as per the indicated order so that faulty, not repairable components detected during visual or soundness inspections can be scrapped prior to dimensional inspection.

If new types of defects are disclosed, the repairer shall request SNECMA to design a repair scheme.



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(3) Measuring instruments for dimensional inspection

Choice of the measuring instrument must be made in relation to the precision desired.

(a) Instrument classification

Two kinds of measuring instruments are to be distinguished :

Standard and universal inspection tools such as : slide gages, micrometers, depth gages, miscellaneous dial gages, etc ...

This equipment is part of the provisioning items commercially available and requires no particular comment provided that it is available in the required quantity and precision, and satisfies to the requirements for the work to be undertaken.

Special inspection equipment such as : bases, supports, rigs, jigs, etc ...

These tools are identified by a type number in the manual text at the exact place where they are used.

(b) Calibration

Measuring instruments used in overhaul are to be checked periodically according to a procedure defined in relation to master instruments (SNECMA to be informed of procedure), themselves checked in relation to the official master instruments of the country concerned.

The Official Control Authorities of the countries where repairs are carried out will have to take steps to ensure that the repairer has set up suitable facilities and equipment.

In the absence of a procedure in the countries concerned, the repairer will request from SNECMA the procedure applied in their own workshop.

(4) During the inspection, each component must be labelled (see chapter 70-10-00) so as to indicate :

If it is further serviceable

If it needs to be repaired

If it must be renewed.

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sneema

Labelling of components may also be used to note the value of certain measured dimensions which can affect a clearance or a tolerance. This makes it possible for the Inspection Dpt. to check the clearance or tolerance during final assembly.

D. Protection against corrosion after inspection

- (1) After inspection, when 3 months elapses before rebuild, carry out a temporary protection to carbon steel, alloy steel and martensitic alloy parts using a dessicant oil such as ENSIS Fluid 254 (P309) or ARDROX 396/1E8 (P373) or RUSTILO DW377 (P373).

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INSPECTION

BUCKET ASSY. - REMOVABLE PARTS

1. Introduction

This chapter gives all the data needed for the visual, soundness and dimensional inspections to be carried out on the removable parts of the bucket assy.

2. Visual inspection

A. Visual inspection is an operation which starts on reception of the buckets (inventory), continues during disassembly, on table inspection, re-assembly, testing and dispatching.

- (1) Visual inspection generally concerns the following points :

Each part is inspected to ascertain its general condition and make sure that it is fit for service. Refer to chapter 70-21-00.

Threads and tapped holes must not be deteriorated.

Rivets used to attach the various components on riveted assemblies must not be shaken loose, rotating or missing, otherwise change them.

Self-locking nuts must have a satisfactory locking torque. See chapter 70-21-00, otherwise change them.

Crimped self-locking nuts must be satisfactorily crimped. See chapter 70-21-00, otherwise change them.

Articulation parts must not show seizing marks or scratches, otherwise remove them using emery cloth.

Components made up of sheet metal elements and/or "STRESSKIN" material must not show nicks, tears, heavy distortions and/or, burns.

Parts featuring plated areas (metallization) must not show flaking conditions, otherwise renew the metallization as indicated in the "Repair" section of the Manual.



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Parts featuring a protective surface coating must not show bare or flaked areas, otherwise recondition coating as indicated in "Repair" section of the Manual.

- (2) Measures to be taken in relation to the damage affecting the parts are given in paragraph 5 "Parts Inspection".

3. Inspection for Soundness

- A. The object of the inspection for soundness is to ensure that the components are not cracked.

The inspection methods used are as follows :

Visual inspection :

Dye penetrant inspection : see chapter 70-20-10.

M 502 - Water-washable fluorescent penetrant inspection.

M 504 - Post-emulsification fluorescent penetrant inspection.

X-Ray radiographic inspection - See chapter 70-20-30.

- B. The following table gives the list of parts and their appropriate methods.

PARTS TO BE INSPECTED		INSPECTION METHODS	REMARKS AND ZONES REQUIRING CAREFUL EXAMINATION
IPL	DESCRIPTION		
1-10	Screw	M 504 B	(1)
1-20	Threaded sleeve	M 504 B	(1)
1-30	Primary heat shield	M 502 B	
1-40	Secondary heat shield	Visual	
1-50/110	Side plate	X-Ray	Method described in par. 5

- (1) If any crack is found, scrap the part.

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PARTS TO BE INSPECTED		INSPECTION METHODS	REMARK AND ZONES REQUIRING CAREFUL EXAMINATION
IPL	DESCRIPTION		
1-190/220 250/280/310	Seal segment	M 502 B	
1-330	Nut	M 504 B	(1)
1-340	Spherical bearing housing	M 504 B	(1)
1-350	Spherical bearing	M 504 B	(1)
1-360	Anti-rotation pin	M 504 B	(1)
1-370	Cover assy	Visual	(1)
1-380/390 400/410	Bushing	M 504 B	(1)

(1) If any crack is detected, scrap the part.

4. Dimensional Inspection

Details concerning the dimensional inspection and acceptance criteria are given in paragraph 5, "Parts Inspection".

5. Parts Inspection

A. Screw (1-10)

(1) Visual inspection

(a) Check screw thread silver plating.

Silver plating in poor condition is not acceptable and requires screw re-plating. REP 1-10-1.

(b) Check condition of the plasma protection below the screw head.

Protection flake or wear are not acceptable. Rework protection, if necessary.

B. Threaded sleeve (1-20)

(1) Visual inspection

(a) Check silver plating of sleeve external thread.

Silver plating in poor condition is not acceptable and requires thread re-plating. REP 1-20-2.

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PARTS TO BE INSPECTED		INSPECTION METHODS	REMARK AND ZONES REQUIRING CAREFUL EXAMINATION
IPL	DESCRIPTION		
1-190/220 250/280/310	Seal segment	M 502 B	
1-330	Nut	M 504 B	(1)
1-340	Spherical bearing housing	M 504 B	(1)
1-350	Spherical bearing	M 504 B	(1)
1-360	Anti-rotation pin	M 504 B	(1)
1-370	Cover assy	Visual	(1)
1-380/390 400/410	Bushing	M 504 B	(1)

(1) If any crack is detected, scrap the part.

4. Dimensional Inspection

Details concerning the dimensional inspection and acceptance criteria are given in paragraph 5, "Parts Inspection".

5. Parts Inspection

A. Screw (1-10)

(1) Visual inspection

(a) Check screw thread silver plating.

Silver plating in poor condition is not acceptable and requires screw re-plating.

(b) Check condition of the plasma protection below the screw head.

Protection flake or wear are not acceptable.
Rework protection, if necessary.

B. Threaded sleeve (1-20)

(1) Visual inspection

(a) Check silver plating of sleeve external thread.

Silver plating in poor condition is not acceptable and requires thread re-plating.

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BUCKET ASSY. - REMOVABLE PARTS

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2 December, 1997

OVERHAUL MANUAL

ATP: E6868

TEMPORARY REVISION No. 78-535

THIS TEMPORARY REVISION IS ISSUED BY BRITISH AIRWAYS ENGINEERING (TECHNICAL INFORMATION SERVICES, G2, TBA, S401, P. O. BOX 10, HEATHROW AIRPORT, HOUNSLOW, MIDDLESEX TW6 2JA) AND COMPLIES WITH BCAR'S CHAPTER A5-3, B5-3 AND/OR TSS No. 0-2 AS REQUIRED. CAA DESIGN APPROVAL No. DAI/8566/78.



For CHIEF ENGINEER QUALITY AND TRAINING

Manual Reference 78-31-01 BUCKET ASSY.-REMOVABLE PARTS Page 304

REASON FOR REVISION

British Airways information (BA Page 304) re-issued to align with manufacturers Revision No. 23.

ACTION

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BUCKET ASSY.-REMOVABLE PARTS

Disregard existing Page 304 and refer to Page 2 of this Temporary Revision.

Originator: TIS
Reference: -
Workbook: GE 78-51

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TEMPORARY REVISION No. 78-535 (Cont'd)

- (b) Check condition of the plasma protection located on the bearing face of screw (1-10).
Protection flake of wear are not acceptable. Rework protection, if required. REP 1-20-1.

BA

C. Primary heat shield (1-30)

(1) Visual inspection

- (a) Check condition of the plasma protection on side edges. Protection flake or wear are not acceptable. Rework protection, if required. REP 1-30-2.

BA

- (b) Repair fretting by direct welding in accordance with BOR 2.

BA
BA

- (c) Damaged shims and riveted inserts must be renewed. Repair in accordance with REP 1-30-1.

BA

- (d) Worn condition of heat shields:

- at their leading edge, as a result of mechanical interference with the bucket seal segments;
- at their trailing edge, as a result of interference with the heat shields back-up plates,

is acceptable if the remaining thickness is higher than 0,9 mm (0.035 in.).

Beyond this value, repair through metallization as per REP 1.30.2 or through welding as per REP 1.30.3.

Fretting adjacent to inserts repair in accordance with BOR 41.

BA
BA

(2) Inspection for soundness

- (a) Cracks developing inside heat shield metal sheet are not acceptable.
If any, store the part pending a possible repair, in quarantine.

BA
BA

(3) Dimensional inspection

- (a) Check accuracy of generatrices.

A distortion lower than or equal to 2 mm (0.079 in.) is acceptable.

Above this value, reshape heat shield.

D. Secondary heat shield (1-40)

(1) Visual inspection

- (a) Deterioration of the metal seal secured around heat shield is not acceptable. Repair in accordance with REP 1-40-1 (Seal Pt. No. 302-061-200-0).

BA
BA



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snecma

- (b) Check condition of the plasma protection located on the bearing face of screw (1-10).
Protection flake of wear are not acceptable.
Rework protection, if required.

C. Primary heat shield (1-30)

(1) Visual inspection

- (a) Check condition of the plasma protection on side edges.
Protection flake or wear are not acceptable.
Rework protection, if required.
- (b) Indent marks and nicks must be cleared out using emery cloth.
- (c) Damaged shims and riveted inserts must be renewed.
- (d) Worn condition of heat shields:
 - at their leading edge, as a result of mechanical interference with the bucket seal segments;
 - at their trailing edge, as a result of interference with the heat shields back-up plates,is acceptable if the remaining thickness is higher than 0,9 mm (0.035 in.).
Beyond this value, repair through metallization as per REP 1.30.2 or through welding as per REP 1.30.3.

(2) Inspection for soundness

- (a) Cracks developing inside heat shield metal sheet are not acceptable.
If any, store the part pending a possible repair.

(3) Dimensional inspection

- (a) Check accuracy of generatrices.

A distortion lower than or equal to 2 mm (0.079 in.) is acceptable.
Above this value, reshape heat shield.

D. Secondary heat shield (1-40)

(1) Visual inspection

- (a) Deterioration of the metal seal secured around heat shield is not acceptable.

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(b) Check by feel that "Sindanyo Blocks" sunk into "Min K" wafered steel sheet at the location of generatrices bearing on the primary heat shield are not crushed.

(c) Nicks in "Min K" sheet are not acceptable.

If any one of these defects is evidenced, repair the secondary heat shield by renewing the damaged components or installing resistance-welded patches

(d) Repair cracks in skin by direct welding in accordance with BOR 3.

(e) Repair drum flanges when chafed or cracked in accordance with BOR 13.

E. Side plate assy (1-50, 1-110)

(1) Visual inspection

(a) Shaken or damaged inserts must be renewed.

(b) Damaged helicoil inserts must be renewed.

(c) Loose or missing rivets on the doublers must be renewed.

(2) Inspection for soundness

(a) Method

Inspection for soundness of side plates is carried out through X-Ray inspection according to instructions given in chapter 70-20-30 and as shown in figure 301.

(b) Acceptance criteria

Cracks developing in reinforcement sheets involve repair in accordance with BOR 24.

Cracks developing in side plate stressskin panel involve repair in accordance with BOR 26.

Ribbon dislocation in stressskin panel entails scrapping of side plate.

F. Seal segment (1-190/220/250/280/310)

(1) Visual inspection

(a) Seal wear is acceptable if not associated with cracking and if the sheet metal remaining thickness is higher than 0,4 mm (0.016 in.).

(b) Repair slight wear in accordance with BOR 44. Plasma spray.

(c) Direct weld fretting in accordance with TR 78-1884.

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(b) Check by feel that "Sindanyo Blocks" sunk into "Min K" wafered steel sheet at the location of generatrices bearing on the primary heat shield are not crushed.

(c) Nicks in "Min K" sheet are not acceptable.

If any one of these defects is evidenced, repair the secondary heat shield by renewing the damaged components or installing resistance-welded patches.

E. Side plate assy (1-50, 1-110)

(1) Visual inspection

- (a) Shaken or damaged inserts must be renewed.
- (b) Damaged helicoil inserts must be renewed.
- (c) Loose or missing rivets on the doublers must be renewed.

(2) Inspection for soundness

(a) Method

Inspection for soundness of side plates is carried out through X-Ray inspection according to instructions given in chapter 70-20-30 and as shown in figure 301.

(b) Acceptance criteria

Cracks developing in reinforcement sheets involve renewal of said sheets. Refer to REP 1-50-2.

Cracks developing in stressskin panel under reinforcement sheets are serviceable, providing not from side to side of side plate edges.

Cracks developing in stressskin panel out of cover sheets are not serviceable and must be eliminated by weld filling-up. Refer to REP 1-50-3.

Ribbon dislocation in stressskin panel entails scrapping of side plate.

F. Seal segment (1-190/220/250/280/310)

(1) Visual inspection

- (a) Seal wear is acceptable if not associated with cracking and if the sheet metal remaining thickness is higher than 0,4 mm (0.016 in).

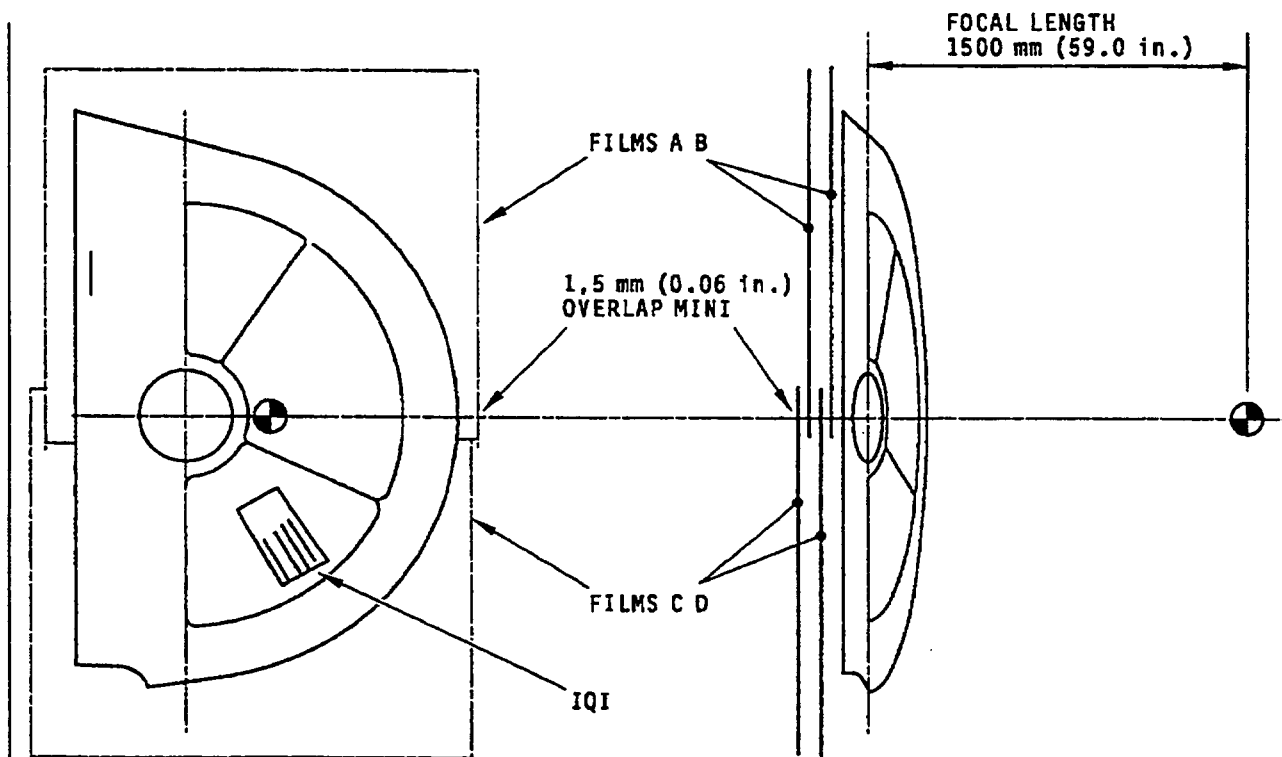
Otherwise, scrap the part.

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BUCKET ASSY. - REMOVABLE PARTS

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FILMS	MEMBERS CHECKED	QTY	PHOTOGRAPHIC DENSITY	IMAGE QUALITY (I.Q.I.)
A	STRESSKIN PANEL IN NON-REINFORCED ZONES (INNER AND OUTER SKINS + JUNCTION WITH RIBBON).	1 FILM	2,5 - 3,0	WIRE 0,16 mm (0.006 in.) DIA. (No. 14)
C		1 FILM		
B	STRESSKIN PANEL IN REINFORCED ZONES (INNER AND OUTER SKINS + JUNCTION WITH RIBBON).	1 FILM	2,5 - 3,0	WIRE 0,16 mm (0.006 in.) DIA. (No. 14)
D		1 FILM		

FILMS A AND C = KODAK TYPE READY PACK MX

FILMS B AND D = KODAK TYPE READY PACK AX

FILM DIMENSIONS 300 x 400 mm (11.811 x 15.748 in.)

S-OLY-SM-00002-00-B

Side Plate Inspection for soundness
Figure 301

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G. Nut (1-330)

(1) Visual inspection

(a) Check nut thread silver plating.

Poor condition of silver plating is not acceptable and requires reworking.

H. Spherical bearing housing (1-340)

(1) Visual inspection

(a) Check condition of spherical bore.

Poor condition of silver plating is not acceptable and requires reworking.

(2) Dimensional inspection

(a) Make sure that the spherical bore is within the following tolerances :

$\varnothing 73,025 \text{ H7 } + 0,03$
 $+ 0$ mm (2.8750 in.) dia.

Above this value, rework by silver plating per Repair 1-340-2.

(b) Make sure that the spherical bearing housing fit diameter is greater than or equal to 85,73 mm (3.3753 in.) dia.

Otherwise, rework by nickel plating per Repair 1-340-3.

I. Spherical bearing (1-350)

(1) Visual inspection

(a) Check condition of spherical diameter and bore. The presence of a fine hairline crack network due to the original machining (by grinding) is normal. The presence of pitting, major cracks, blisters, exfoliation or any other defect that may be detrimental to the part are not acceptable, rework by chrome plating per Repair 1-350-2.

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BUCKET ASSY. - REMOVABLE PARTS

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BRITISH AIRWAYS

CONCORDE OLYMPUS 593
OVERHAUL MANUAL

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21 September 1993

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FOR CHIEF ENGINEER TECHNICAL SERVICES

TEMPORARY REVISION NO. 78-531

Manual Reference 78-31-01 BUCKET ASSY - REMOVABLE PARTS Page 307

REASON FOR REVISION

British Airways information (BA Page 307) re-issued to align with manufacturers Revision No.22.

ACTION

1. Reference Para 5.G. (1) Visual inspection
For sub para (a) read as follows:

(a) Check nut thread silver plating.

Poor condition of silver plating is not acceptable and requires reworking.
REP 1-330-1.

2. Reference Para 5.H. (1) Visual inspection

For Sub Para (a) read as follows:

(a) Check condition of spherical bore.

Poor condition of silver plating is not acceptable and requires reworking.
REP 1-340-2.

(89A)

Originator: TIS
Work Record: 78-12

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BUCKET ASSY. - REMOVABLE PARTS

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FOR CHIEF ENGINEER TECHNICAL SERVICES

TEMPORARY REVISION NO. 78-532

Manual Reference 78-31-01 BUCKET ASSY - REMOVABLE PARTS Page 308

REASON FOR REVISION

British Airways information (BA Page 308) re-issued to align with manufacturers Revision No.22.

ACTION

Reference Para 5.J. (2) Dimensional inspection

Add to Sub Para (a) the following:

If found to be fretted on side face repair in accordance with BOR 38.

(89A)

Originator: TIS
Work Record: 78-12

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BUCKET ASSY. - REMOVABLE PARTS



(2) Dimensional inspection

- (a) Make sure that spherical diameter is within the following tolerances:

$72,962 + 0 \text{ mm (2.8725 - 2.8713 in.) dia.}$
 $- 0,03$

Above this value, rework by chromium plating, per Repair 1-350-2.

- (b) Check that the bore is within the following tolerances:

$47.625 \text{ H6} + 0.016 \text{ mm (1.8750 - 1.8756 in.) dia.}$
 $- 0$

Above this value, rework by chromium plating per Repair 1-350-3.

J. Bushings 1-380/390/400/410

(1) Visual inspection

- (a) Check bushing bore condition

Seizing marks must be removed using an emery cloth, within dimensional tolerances.

(2) Dimensional inspection

- (a) Check that the bushing bore is not greater than 12,70 mm (0.500 in.).

Otherwise, scrap the part.

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INSPECTION

BASIC BUCKET

1. Introduction

This chapter gives all the pertinent information to carry out the visual soundness and dimensional inspections of the basic bucket.

These information are arranged in the following order :

Paragraph 2 - Identification

This paragraph provides for identification of the bucket components and gives the material constituting each component as well as the thickness of parts manufactured from sheet metal material

Paragraph 3 - Restricted areas

This paragraph defines the structural areas for which the mechanical strength is the essential criterion and to which any damage and repair might affect the useful life of the bucket.

Paragraph 4 - Inspection methods

This paragraph defines the visual, aural and radiographic methods used for inspection of the bucket.

Paragraph 5 - Permissible damage

This paragraph specifies the damage extents beyond which it is necessary to apply a specific repair scheme.

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2. Identification

This paragraph defines the bucket basic components.

These are classed in two categories :

Bucket structure

Bucket inner and outer stresskin panels.

A. Bucket structure

The structural components are defined on Figure 302.

For each component is given :

the material identification (P xxxx type, refer to the
SNECMA's Products File, or
AFNOR type for forged and/
or cast parts)

the material thickness for the parts manufactured from
sheet metal.

B. Bucket inner and outer stresskin panels

These components are defined on Figure 303.

For each component is given :

the material identification (P xxxx type, refer to the
SNECMA's Products File).

the panel thickness

NOTE : In the case of a chemically milled panel, it is
illustrated separately so that to outline on a
diagram the thickness variations on both its
internal and external face sheets.

These information are necessary in order to
ensure correct assessment of damage.

C. Bucket effectivity

This paragraph "Identification" includes all the bucket va-
riants , as a result, the effectivity is indicated on all
the pages wherein differences between the buckets appear.

The effectivity is expressed as follows :

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(1) Summary of all the bucket variants.

- A

 Buckets No. 1 to 64
- B

 Buckets No. 65 and up Nos.

(2) On the illustrations :

- (a) In the case where any one page "Identification" is applicable to all the buckets, the effectivity is not indicated.
- (b) In the case where any one page "Identification" includes pieces of information relative to different bucket variants, the following cases are to be envisaged :

1st case : The concerned zone keeps the same graphic representation, but certain parts are manufactured from an other material or incorporate minor changes thus requiring complementary data in the identification table.

In this case, effectivity is indicated by :

- placing the framed letter near the part's identification index,
- adding, below the previously existing index, a new index followed by the framed letter corresponding to the variant.

Example :

20

A

 Part's old configuration corresponding to bucket variant

A

100

B

 Part's new configuration corresponding to variant

B

2nd case : In the concerned zone, a new component, specific to one bucket or a batch of buckets, is incorporated.

In this case, the effectivity is indicated by placing the framed letter after the new part's index.

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BASIC BUCKET - IDENTIFICATION

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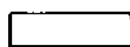
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Example :



New part.

120

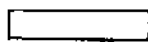


New index applicable
to the bucket va-
riants [B]

3rd case : In the concerned zone, one part changes in graphic representation and may embody new components.

In this case, a detail specific to the appropriate effectivity will be placed next to the modified part.

Example :

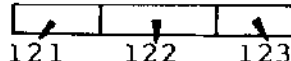


20



Old part

Detail



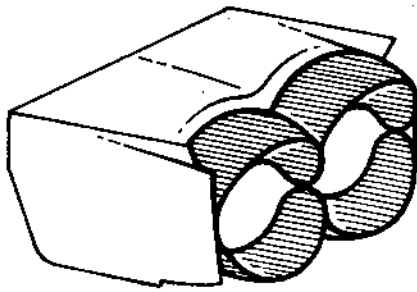
4th case : A major change in configuration which cannot be contained within a detailed view.

In this case, a complete sheet is provided for each variant, the effectivity being placed next to the illustration title.



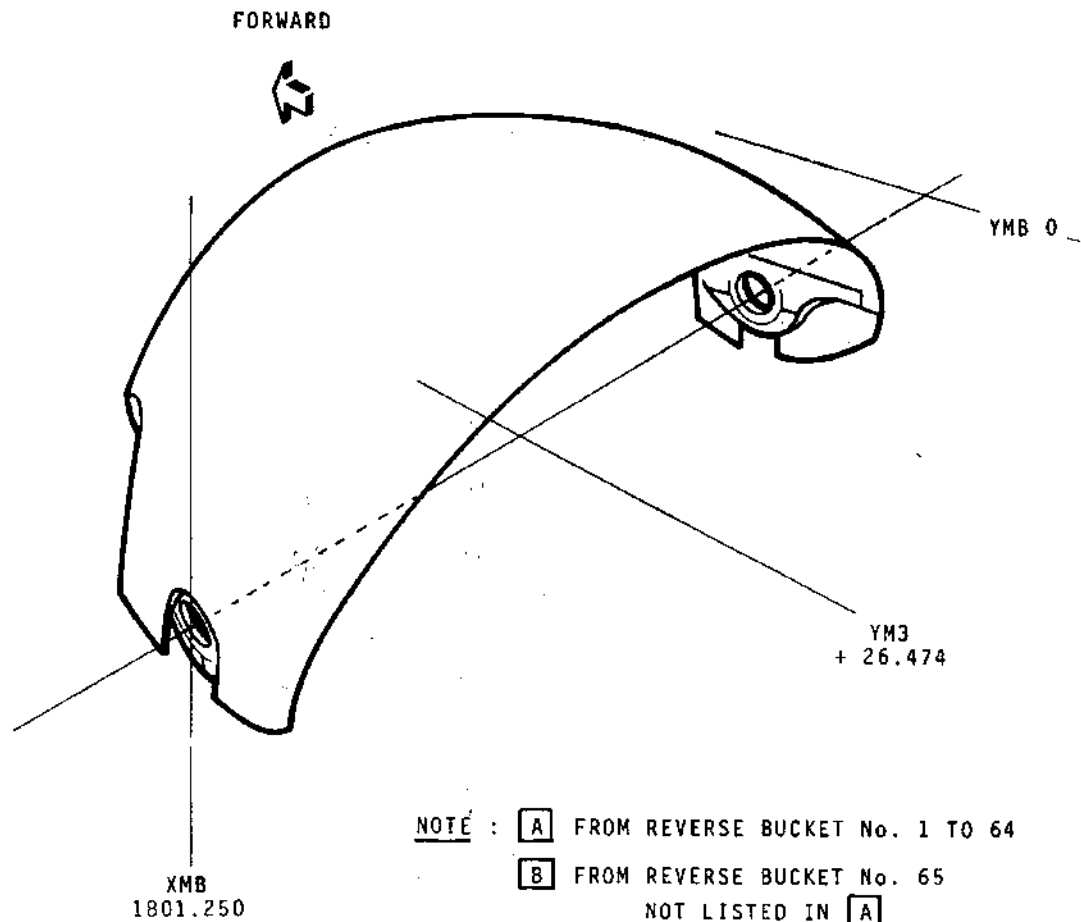
OLYMPUS 593

MK.610-14-28
OVERHAUL



NOTE : TYPICAL REVERSE BUCKET
SHOWN.
VALID AT ALL BUCKET LOCATIONS
ON A SINGLE AIRCRAFT.

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Reverse Bucket - Identification
Figure 301

78-31-01

BASIC BUCKET - IDENTIFICATION

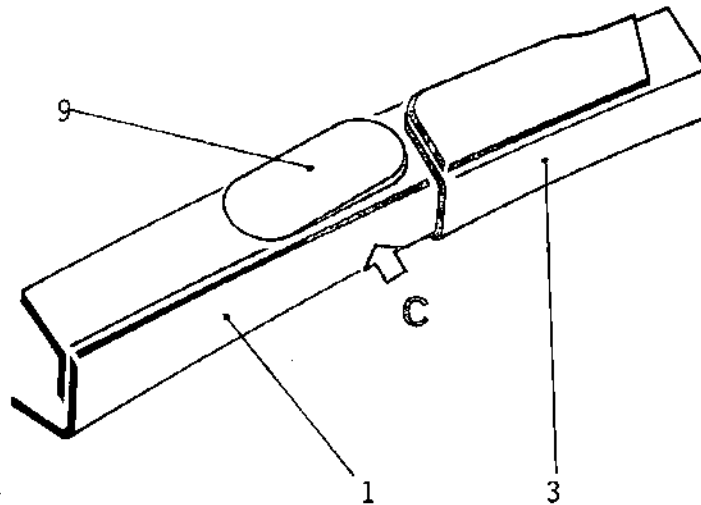
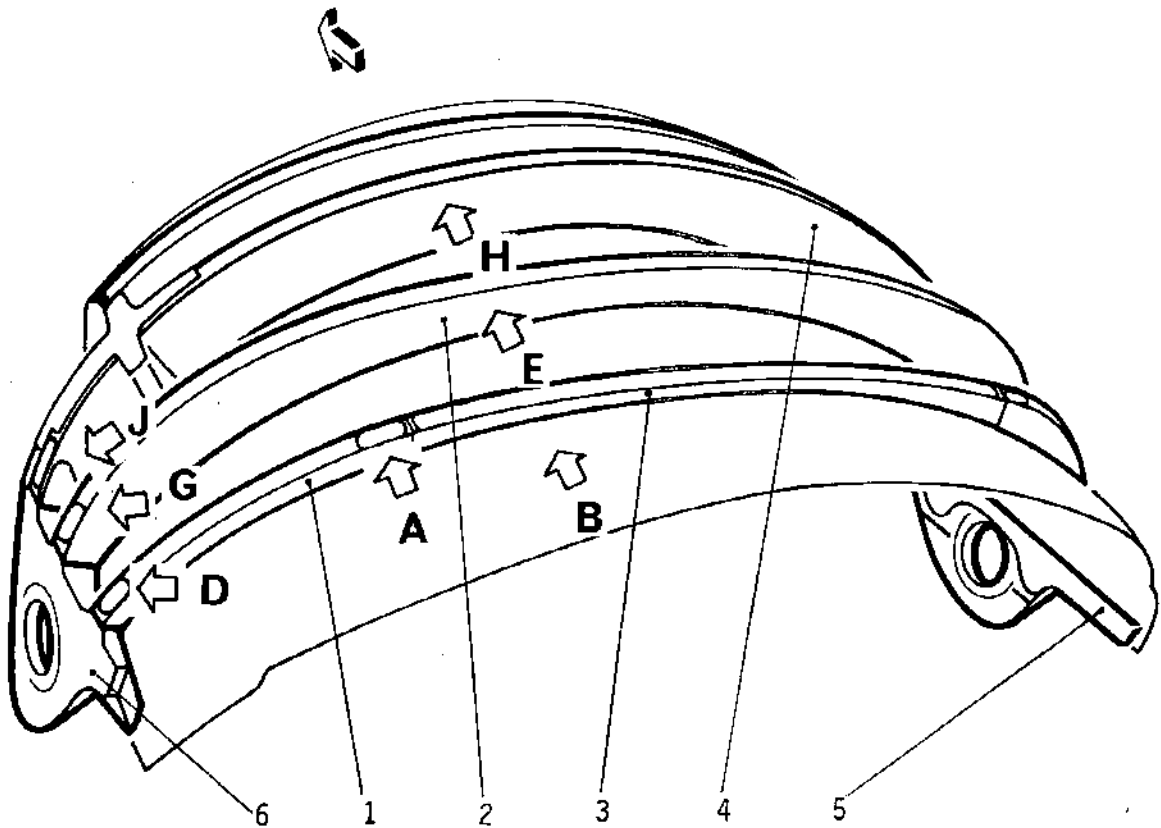
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OLYMPUS 593

MK. 610-14-28
OVERHAUL



Reverse Bucket - Identification
Figure 302 (Sheet 1 of 12)

78-31-01

BASIC BUCKET - IDENTIFICATION

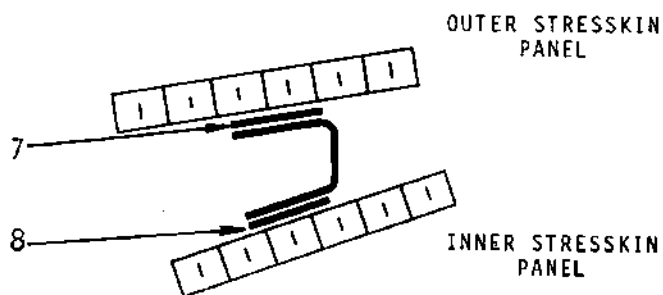
Page 305

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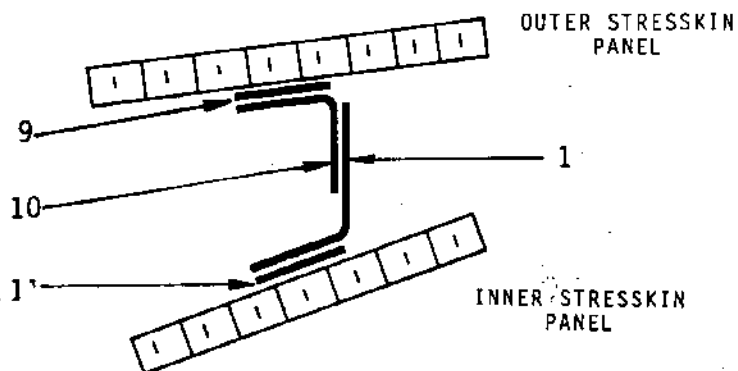


OLYMPUS 593

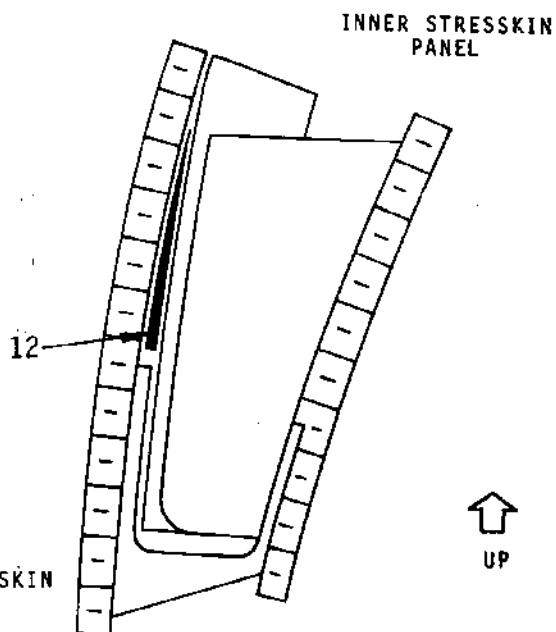
MK.610-14-28
OVERHAUL



DETAIL B



DETAIL C



DETAIL D

Reverse Bucket - Identification
Figure 302 (Sheet 2 of 12)

78-31-01

BUCKET - IDENTIFICATION

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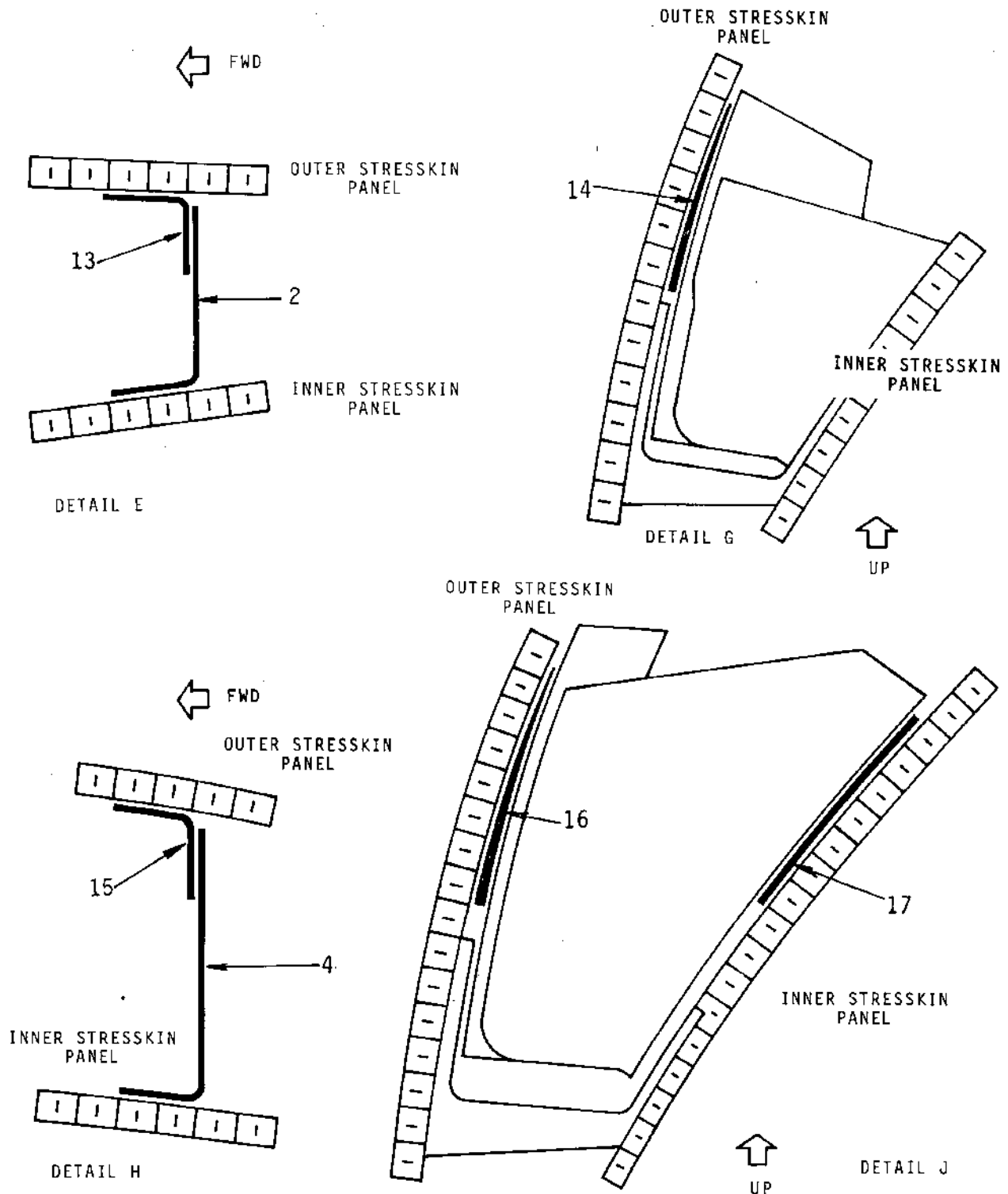


OLYMPUS 593

MK.610-14-28
OVERHAUL



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Reverse Bucket - Identification
Figure 302 (Sheet 3 of 12)

78-31-01

BASIC BUCKET - IDENTIFICATION

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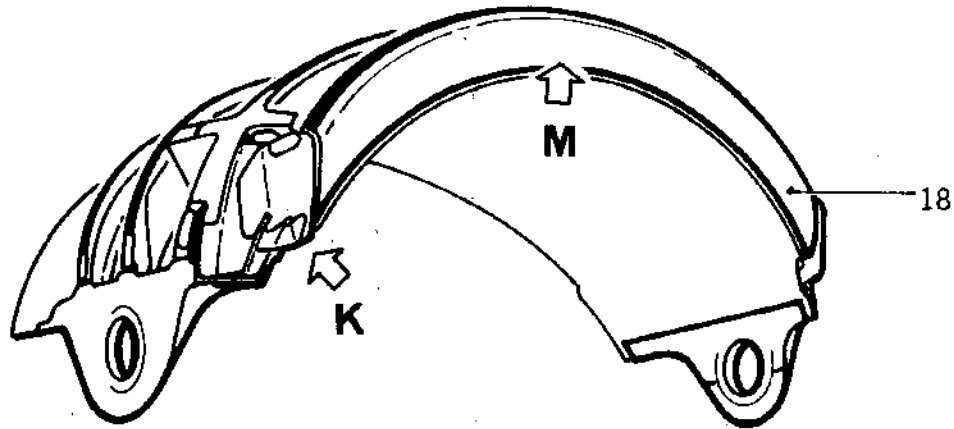


OLYMPUS 593

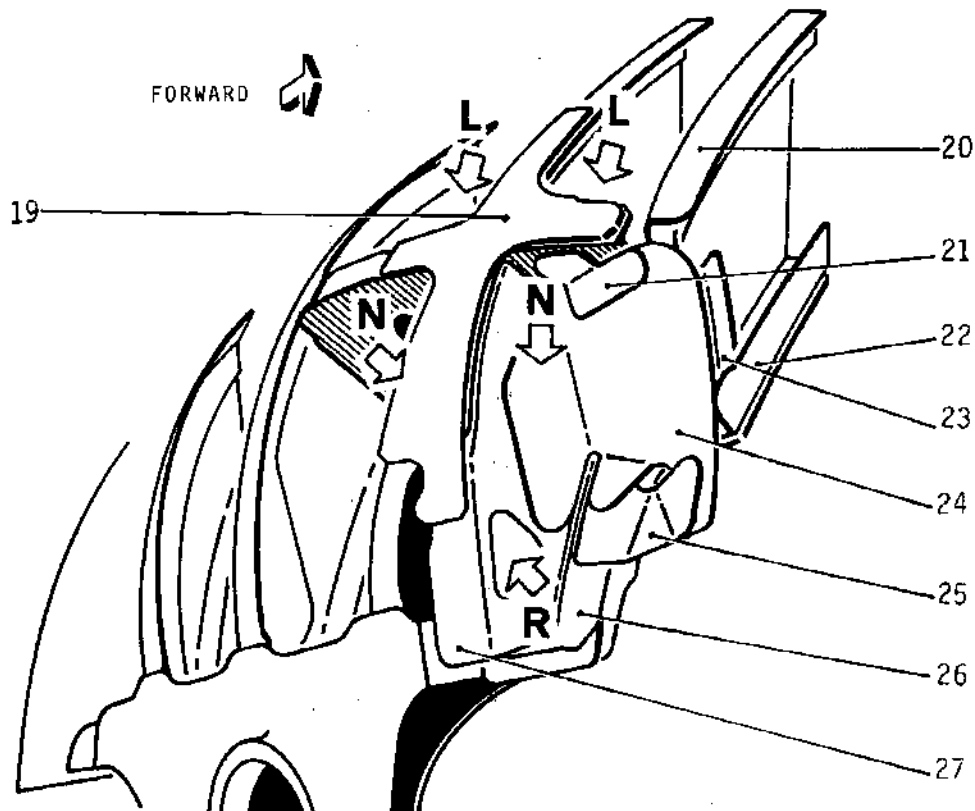
MK.610-14-28
OVERHAUL



FORWARD



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DETAIL K

Reverse Bucket - Identification
Figure 308 (Sheet 4 of 12)

78-31-01

BASIC BUCKET - IDENTIFICATION

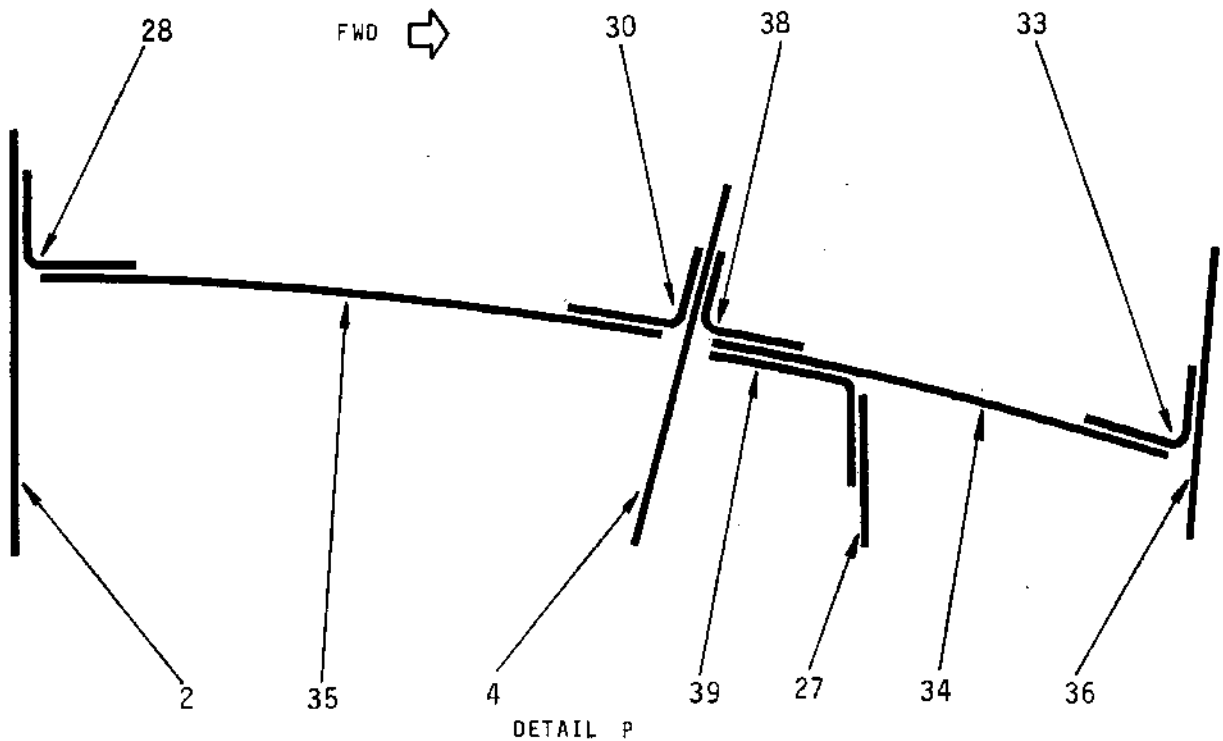
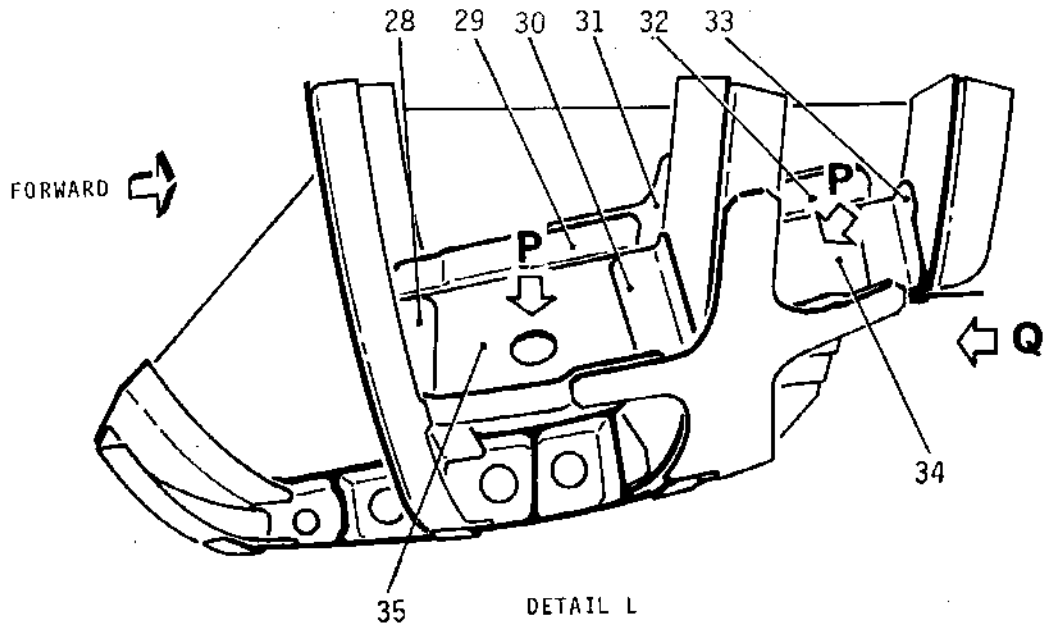
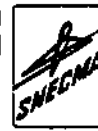
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OLYMPUS 593

MK.610-14-28
OVERHAUL



Reverse Bucket - Identification
Figure 302 (Sheet 5 of 12)

78-31-01

BASIC BUCKET - IDENTIFICATION

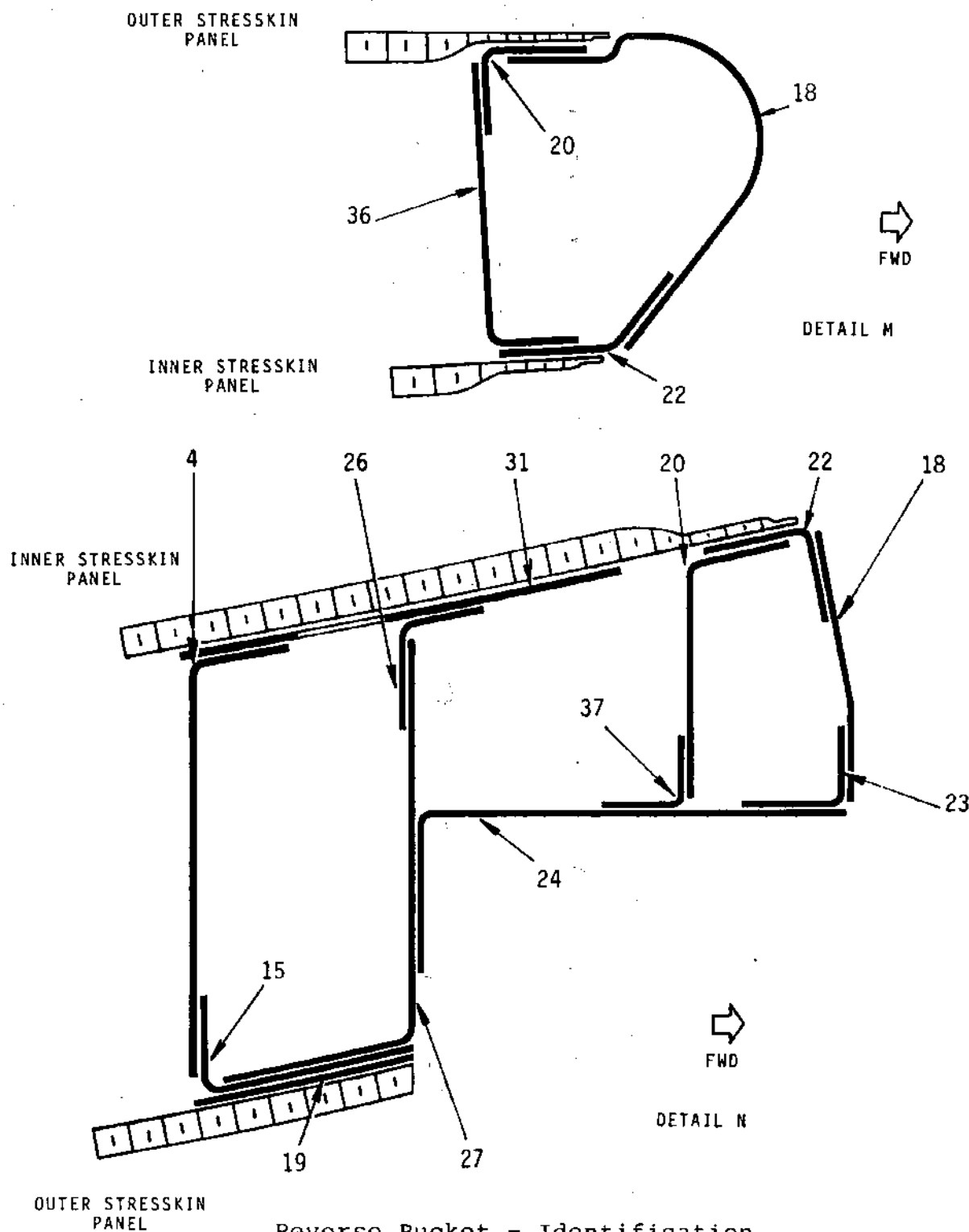
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OLYMPUS 593

MK.610-14-28
OVERHAUL



Reverse Bucket - Identification
Figure 302 (Sheet 6 of 12)

78-31-01

BASIC BUCKET - IDENTIFICATION

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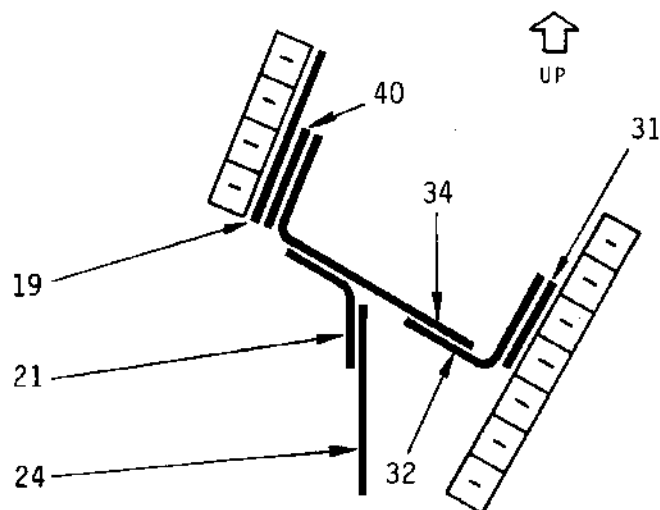
Dec 15/76



OLYMPUS 593
MK. 610-14-28
OVERHAUL



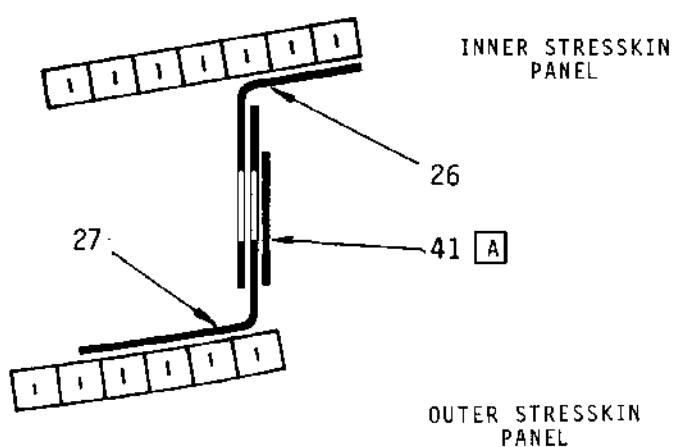
OUTER STRESSKIN
PANEL



INNER STRESSKIN
PANEL

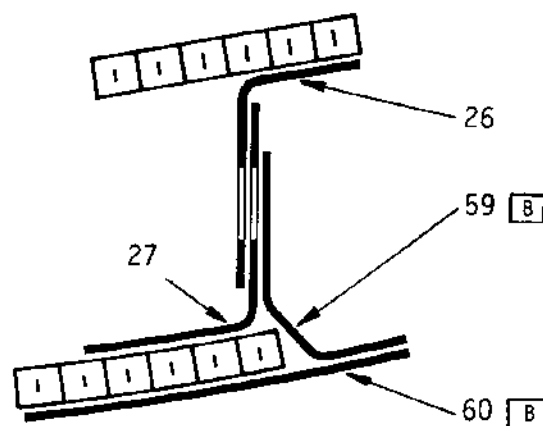
DETAIL Q

FWD →



DETAIL R [A]

FWD →



DETAIL R [B]

Reverse Bucket - Identification
Figure 302 (Sheet 7 of 12)

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BASIC BUCKET - IDENTIFICATION

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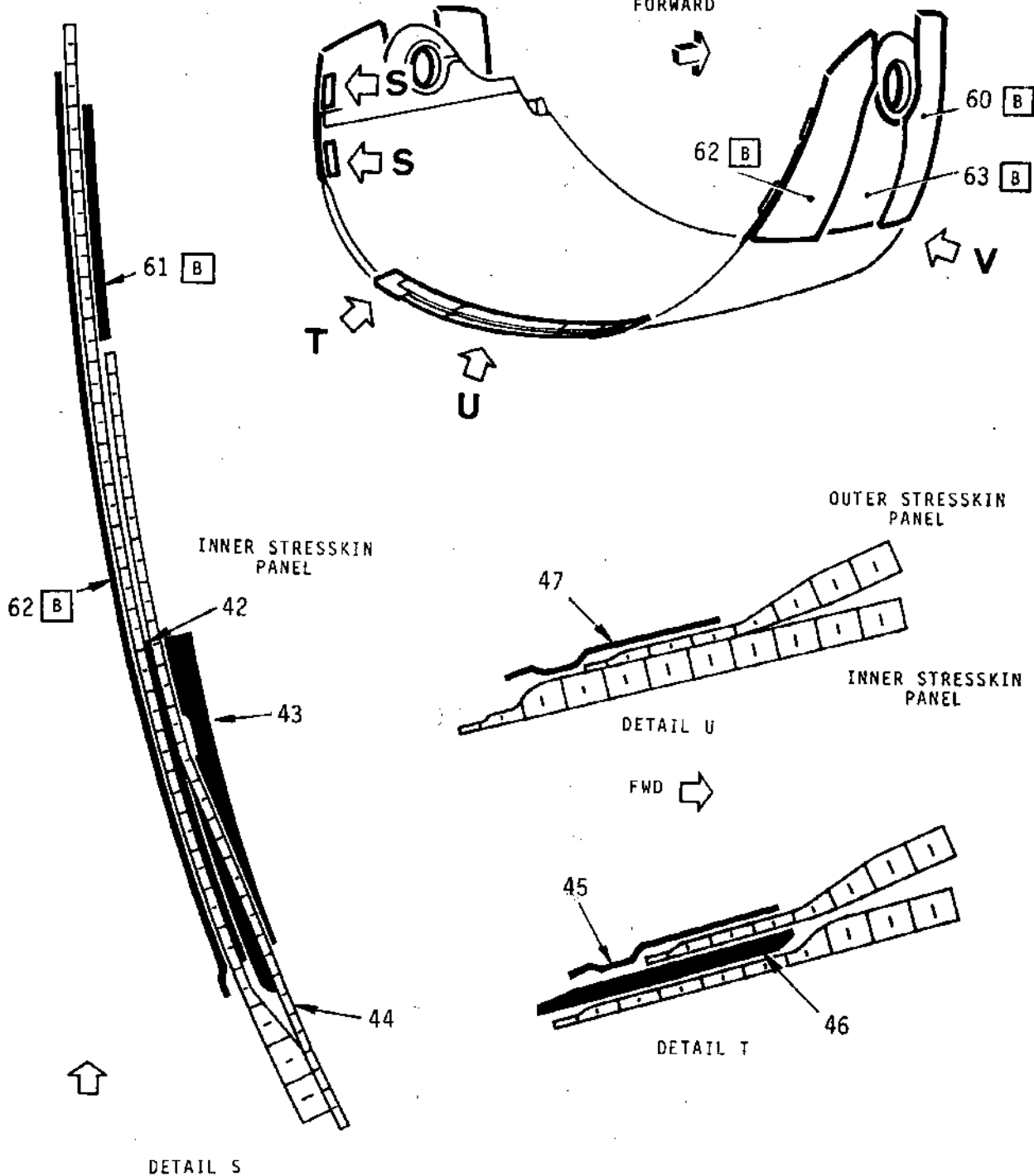
OLYMPUS 593

MK.610-14-28

OVERHAUL



OUTER STRESSKIN
PANEL



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Reverse Bucket - Identification
Figure 302 (Sheet 8 of 12)

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BASIC BUCKET - IDENTIFICATION

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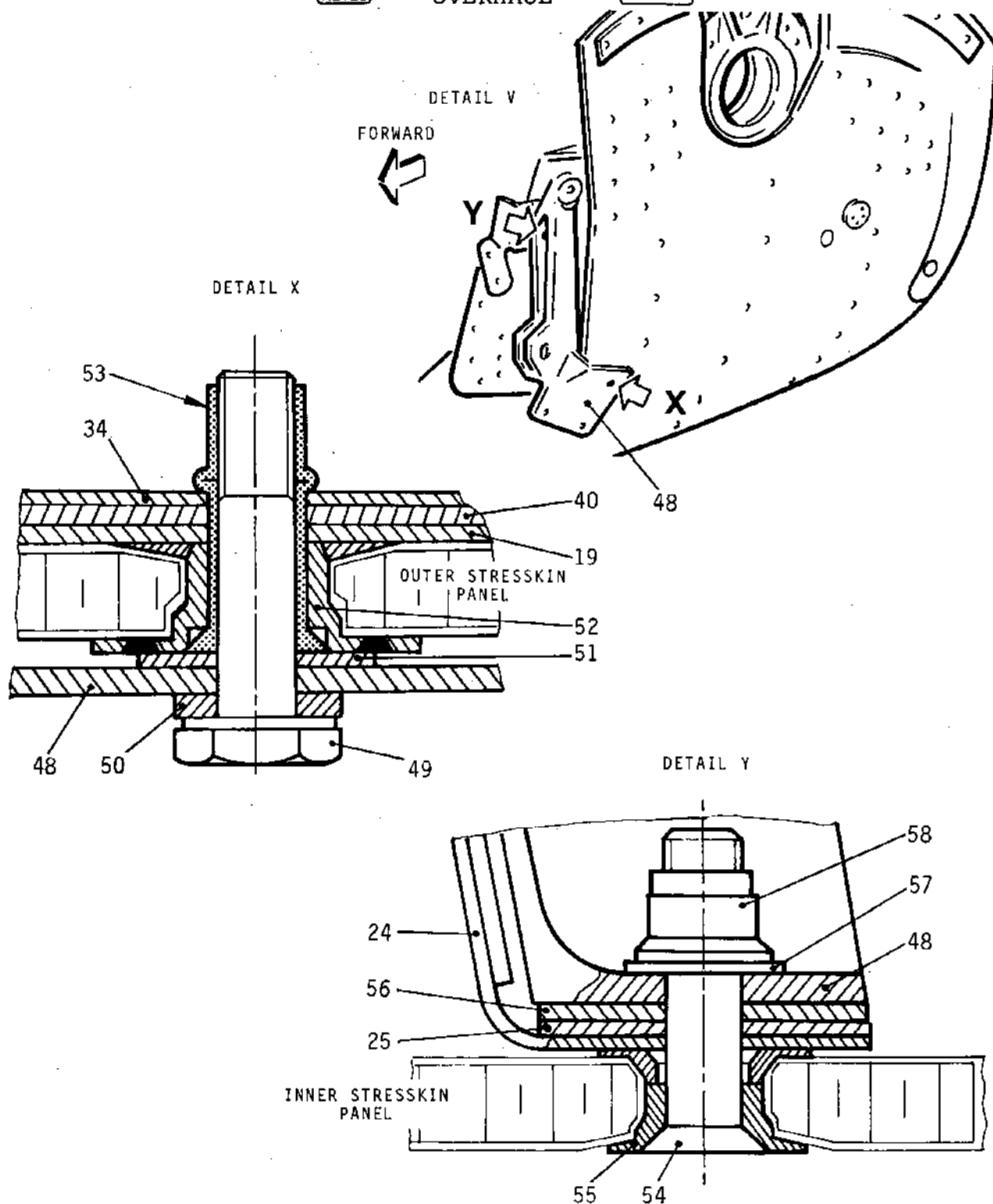
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OLYMPUS 593

MK.610-14-28

OVERHAUL



Reverse Bucket - Identification
Figure 302 (Sheet 9 of 12)

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BASIC BUCKET - IDENTIFICATION

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

ITEM No.	DESCRIPTION	MADE FROM	MATERIAL THICKNESS	
			IN.	MM
1	Frame	P 3305	0.050	1,3
2	Web	P 3305	0.063	1,6
3	Channel	P 3305	0.063	1,6
4	Frame	P 3305	0.071	1,8
5	Shim	P 3305	0.100	2,5
6	Pivot fitting	NC19FeNB		
7	Shim	P 3343	0.020	0,5
8	Shim	P 3343	0.020	0,5
9	Shim	P 3343	0.083	2,1
10	Angle	P 3305	0.050	1,3
11	Shim	P 3343	0.083	2,1
12	Shim	P 3343	0.140	3,6
13	Angle	P 3305	0.063	1,6
14	Shim	P 3343	0.140	3,6
15	Angle	P 3305	0.063	1,6
16	Shim	P 3343	0.188	4,8
17	Shim	P 3343	0.020	0,5
18	Cover	P 3305	0.040	1
19	Angle	P 3305	0.050	1,3
20	Frame	P 3305	0.050	1,3
21	Clip	P 3305	0.050	1,3

Reverse Bucket - Identification
Figure 302 (Sheet 10 of 12)**78-31-01**

BASIC BUCKET - IDENTIFICATION

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

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ITEM No.	DESCRIPTION	MADE FROM	MATERIAL THICKNESS	
			IN.	MM
22	Angle	P 3305	0.050	1,3
23	Angle	P 3305	0.040	1
24	Closeout	P 3305	0.040	1,3
25	Clip	P 3305	0.040	1
26	Angle	P 3305	0.050	1,3
27	Web	P 3305	0.050	1,3
28	Clip	P 3305	0.050	1,3
29	Angle	P 3305	0.050	1,3
30	Clip	P 3305	0.050	1,3
31	Clip	P 3305	0.050	1,3
32	Angle	P 3305	0.050	1,3
33	Clip	P 3305	0.050	1,3
34	Web	P 3305	0.050	1,3
35	Web	P 3305	0.050	1,3
36	Frame	P 3305	0.050	1,3
37	Angle	P 3305	0.040	1
38	Clip	P 3305	0.050	1,3
39	Clip	P 3305	0.050	1,3
40	Shim	P 3343	0.063	1,6
41	Plate	P 3305	0.030	0,8
42	Shim	P 3343	0.050	1,3

Reverse Bucket - Identification
Figure 302 (Sheet 11 of 12)**78-31-01**

BASIC BUCKET - IDENTIFICATION

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

ITEM No.	DESCRIPTION	MATERIAL		
		MADE FROM	THICKNESS	
			IN.	MM
43	Seal support	P 3301	0.500	12,7
44	Filler	P 3301	0.250	6,3
45	Heat shield back-up plate	P 3322	0.048	1,2
46	Fitting	NC 22 DNb		
46	Heat shield back-up plate	P 3322	0.048	1,2
48	Fitting	TA 6V		
49	Bolt NAS 6704 U II			
50	Washer NAS 1587 4C			
51	Shim	P 3343	As required	
52	Insert	Z5CNU17		
53	Torque Nut BTN 1LG 428-12			
54	Bolt 649-781-029-0			
55	Insert 649-773- 202-0			
56	Shim	P 3343	As required	
57	Washer NAS 1587 4L			
58	Nut 61-170-428			
59	Angle	P 3305	0.048	1,2
60	Doubler	P 3344	0.048	1,2
61	Shim	P 3324	0.078	2,0
62	Doubler	P 3344	0.048	1,2
63	Doubler	P 3344	0.048	1,2

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Reverse Bucket - Identification
Figure 302 (Sheet 11 of 12)**78-31-01**

BASIC BUCKET - IDENTIFICATION

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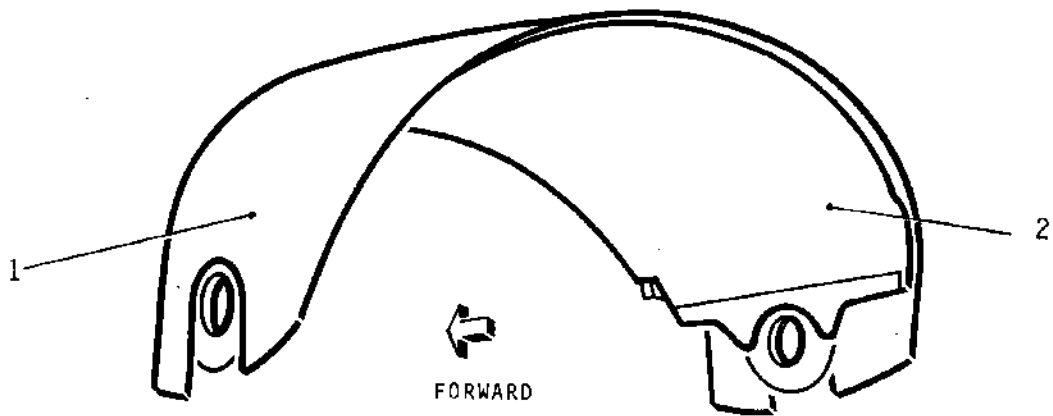
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OLYMPUS 593

MK.610-14-28

OVERHAUL



Reverse Bucket - Identification
Figure 303 (Sheet 1 of 5)

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BASIC BUCKET - IDENTIFICATION

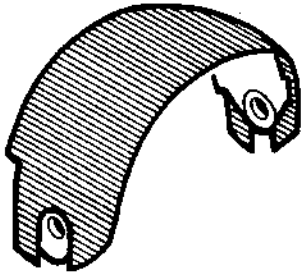
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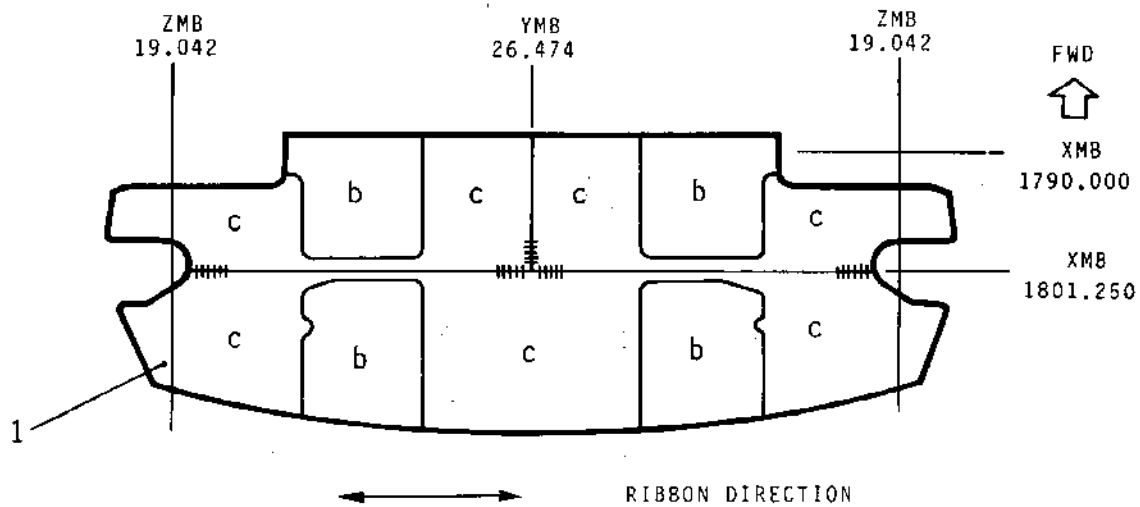
OLYMPUS 593

MK.610-14-28
OVERHAUL

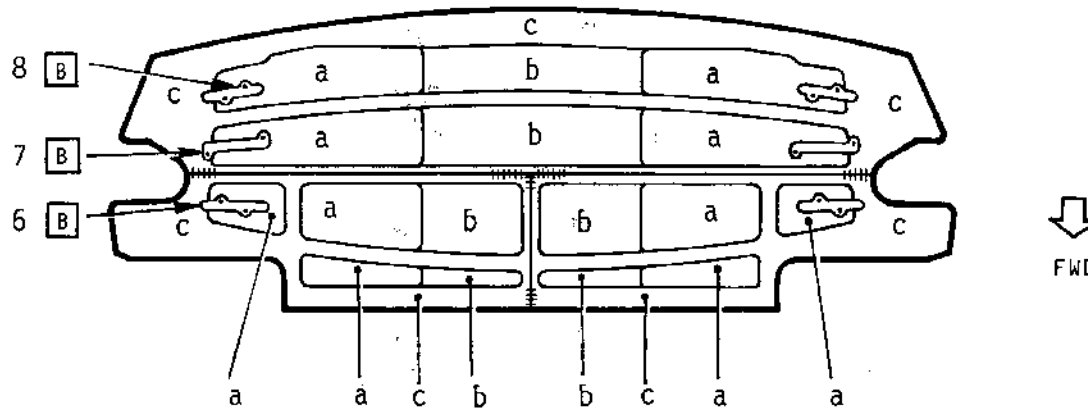


IDENT	THICKNESS	
	in.	mm.
a	0.013	0.330
b	0.016	0.406
c	0.024	0.610

EXTERNAL FACE



INTERNAL FACE



PANEL 1 (DRG.425.10.453)

Reverse Bucket - Identification
Figure 303 (Sheet 2 of 5)

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BASIC BUCKET - IDENTIFICATION

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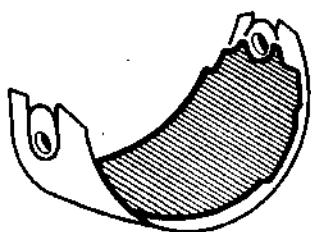
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OLYMPUS 593

MK.610-14-28

OVERHAUL



IDENT	THICKNESS	
	in.	mm.
a	0.013	0,33
b	0.016	0,41
c	0.024	0.61

INTERNAL FACE

ZMB
19.042

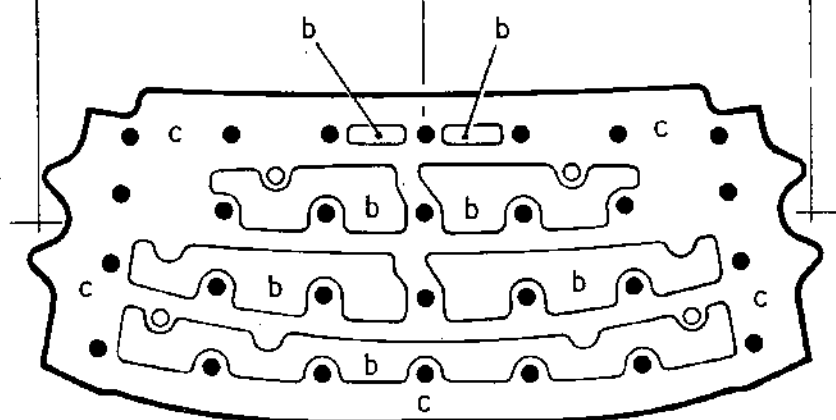
YMB
26.474

ZMB
19.042



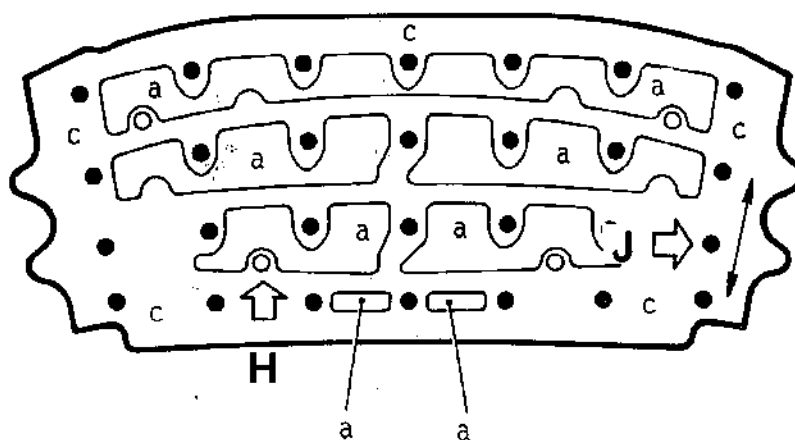
XMB
1790,000

XMB
1801,250



EXTERNAL FACE

RIBBON DIRECTION



PANEL 2 (DRG 301.139.102)

Reverse Bucket - Identification
Figure 303 (Sheet 3 of 5)

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BASIC BUCKET - IDENTIFICATION

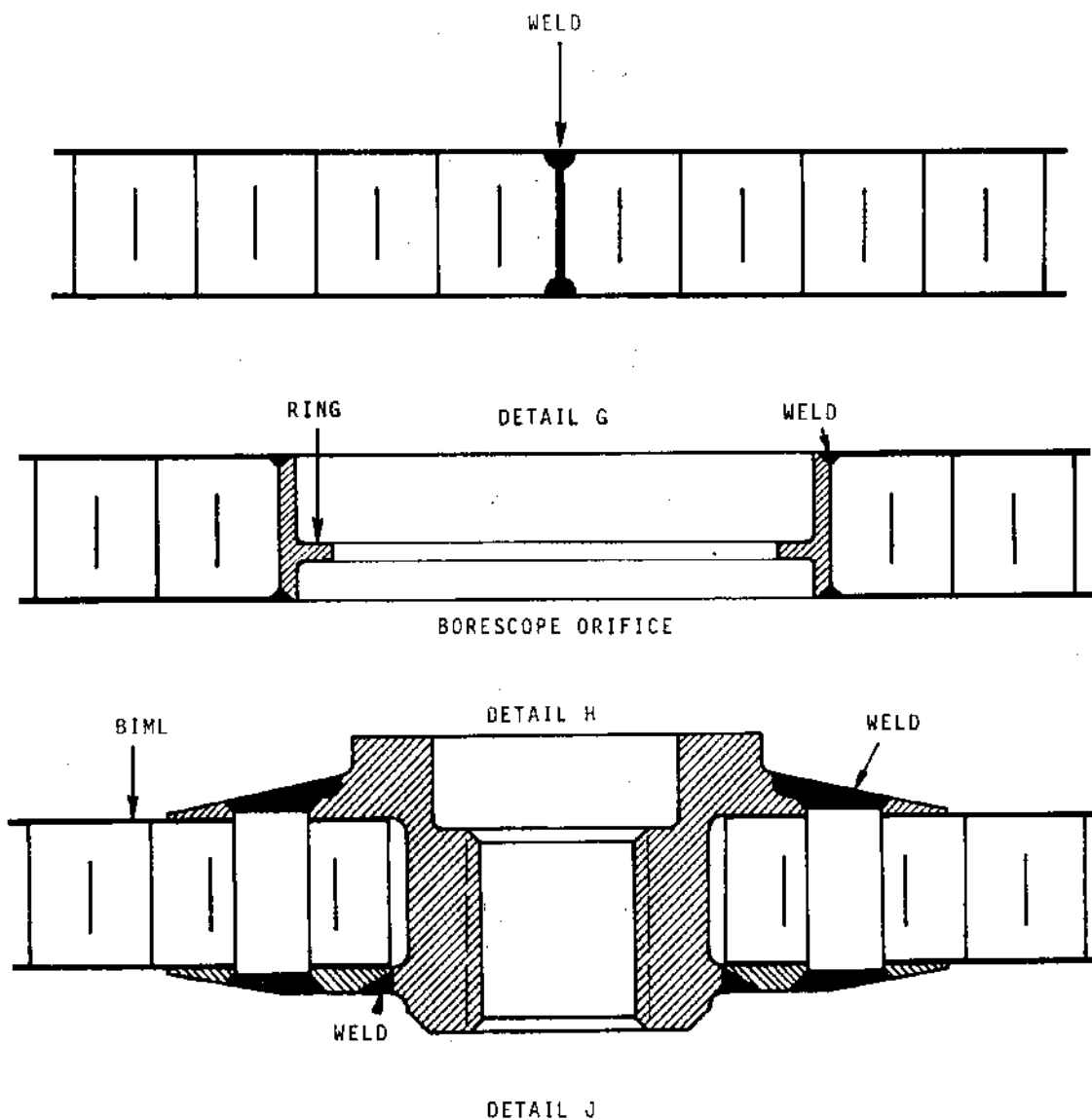
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MK.610-14-28
OVERHAUL



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Reverse Bucket - Identification
Figure 303 (Sheet 4 of 5)

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BASIC BUCKET - IDENTIFICATION

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ITEM No.	DESCRIPTION	MATERIAL		
		MADE FROM	THICKNESS IN	MM
1	Stresskin panel (Welded)	P 3703		
2	Stresskin panel (Welded)	P 3703		
3				
4				
5				
6	Shim forward	P 3305	0.048	1,2
7	Shim central	P 3305	0.048	1,2
8	Shim after	P 3305	0.048	1,2

Reverse Bucket - Identification
Figure 303 (Sheet 5 of 5)

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BASIC BUCKET - IDENTIFICATION

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OVERHAUL



3. Restricted Areas

This paragraph defines the structural areas for which the mechanical strength is critical and to which any damage and repair might affect the useful life of the reverse bucket.

Breakdown of this paragraph is as follows :

- Restricted areas of the bucket structure - Figure 302.
- Restricted areas in the bucket inner and outer stressskin panels : Figure 303.

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BASIC BUCKET - RESTRICTED AREAS

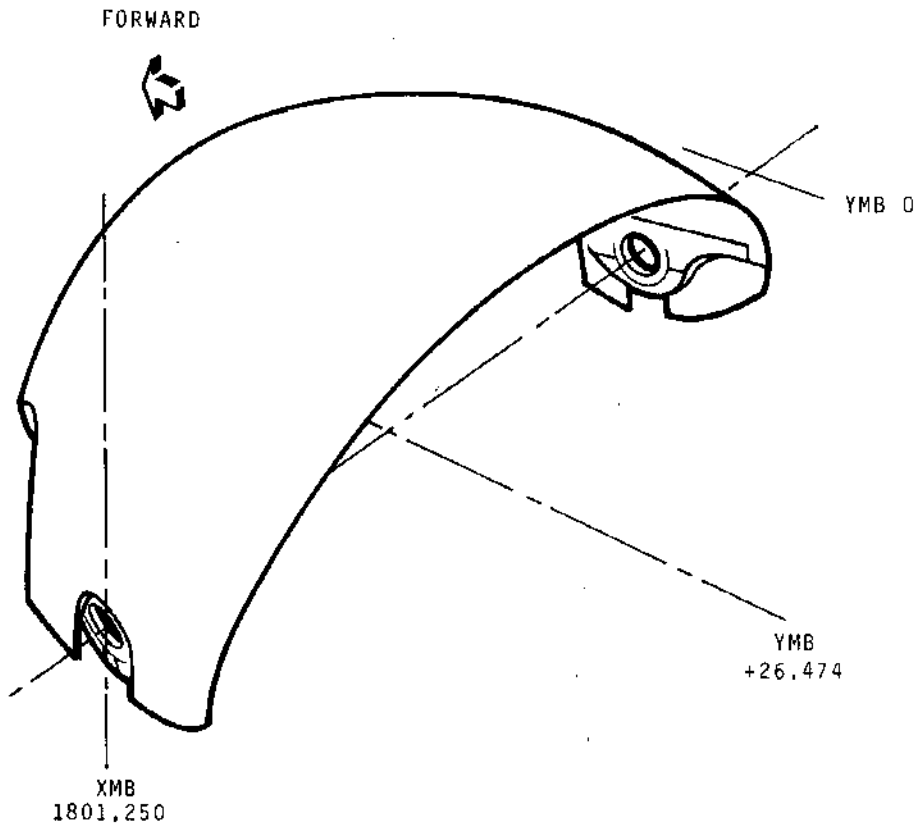
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Reverse Bucket - Restricted Areas
Figure 301

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BASIC BUCKET - RESTRICTED AREAS

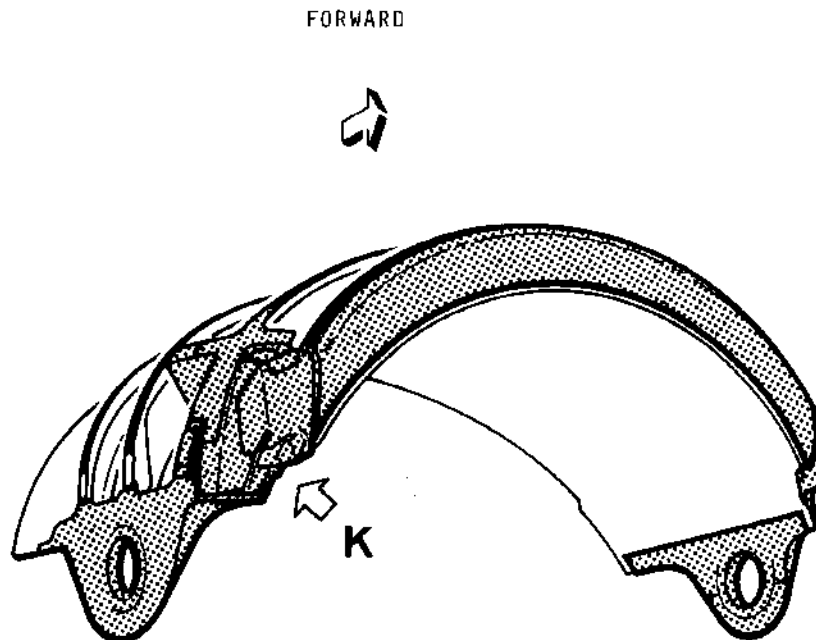
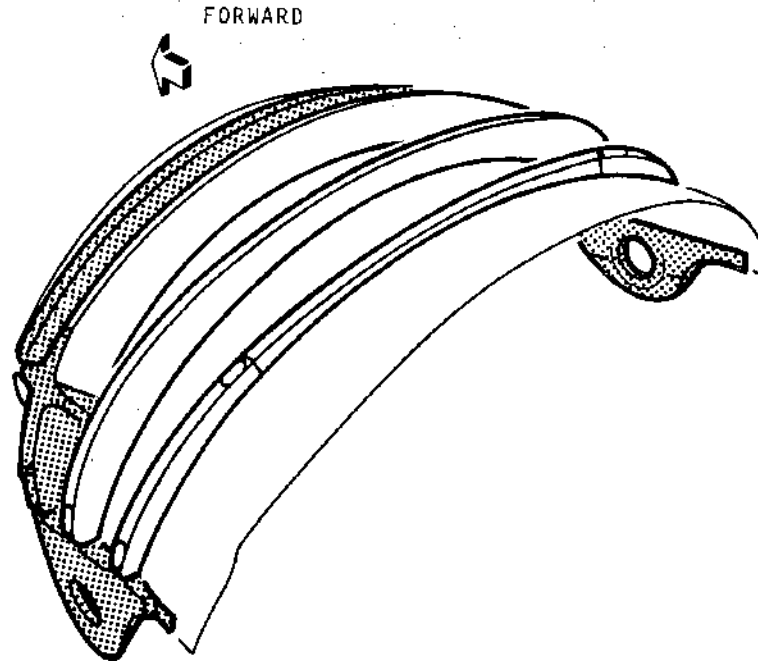
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Bucket Structure - Restricted Areas
Figure 302 (Sheet 1 of 3)

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BASIC BUCKET - RESTRICTED AREAS

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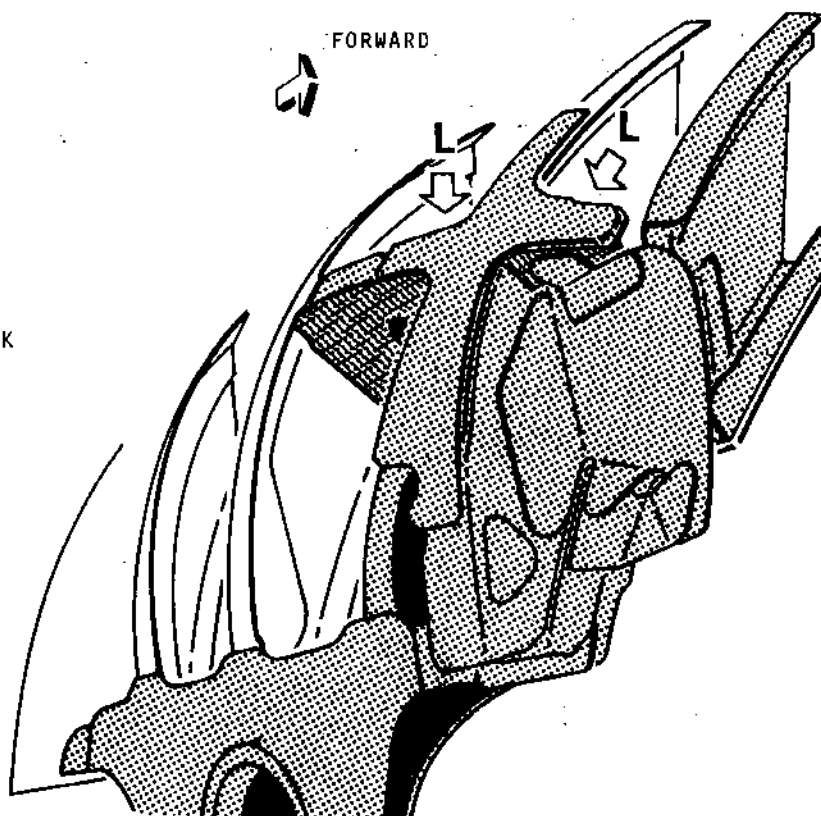


OLYMPUS 593

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OVERHAUL



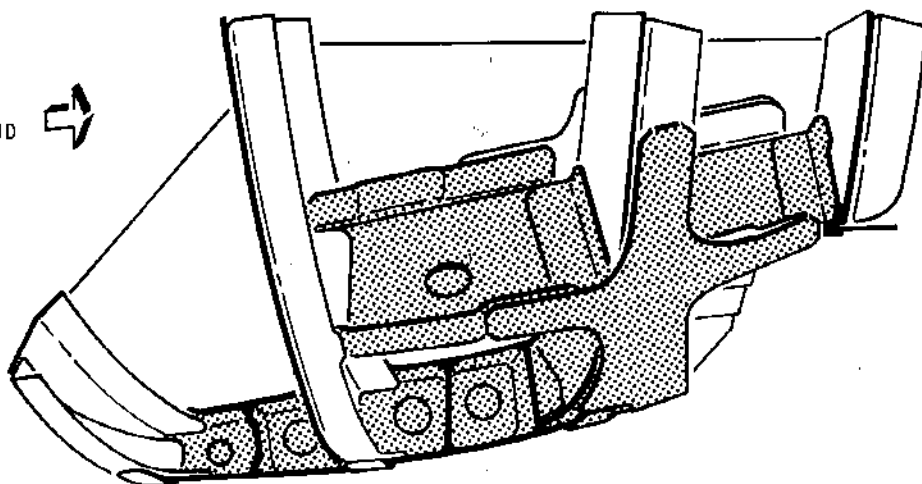
DETAIL K



(BUCKET BALL-SCREW GEAR BOX
ATTACHMENT FITTING NOT SHOWN)

FWD →

DETAIL L



Bucket Structure - Restricted Areas
Figure 302 (Sheet 2 of 3)

78-31-01

BASIC BUCKET - RESTRICTED AREAS

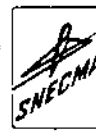
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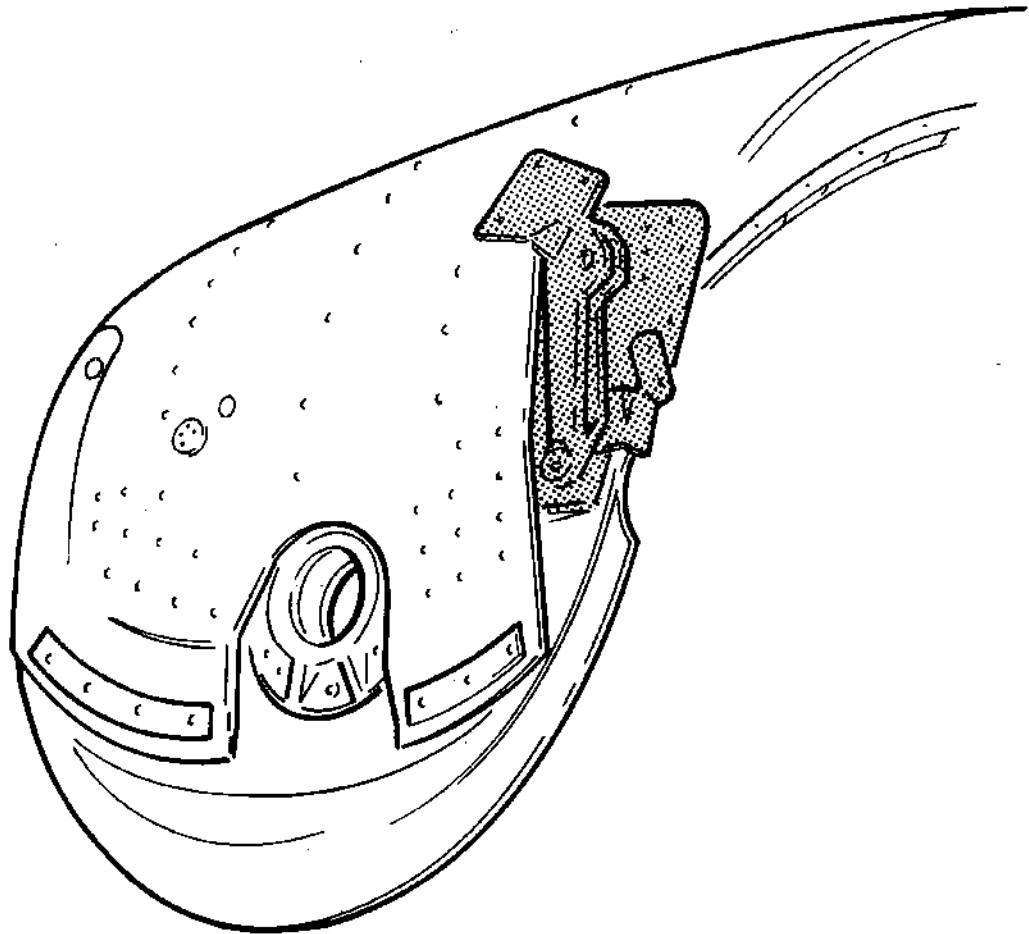


OLYMPUS 593

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OVERHAUL



FORWARD



DETAIL K

(BUCKET BALLSCREW GEAR-BOX ATTACHMENT FITTING SHOWN)

Bucket Structure - Restricted Areas
Figure 302 (Sheet 3 of 3)

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BASIC BUCKET - RESTRICTED AREAS

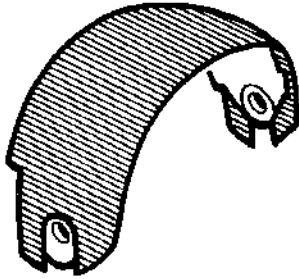
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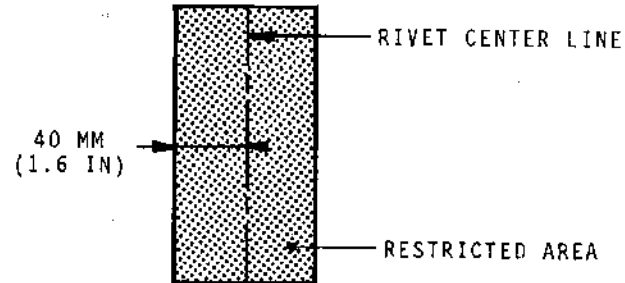
OLYMPUS 593

MK.610-14-28
OVERHAUL

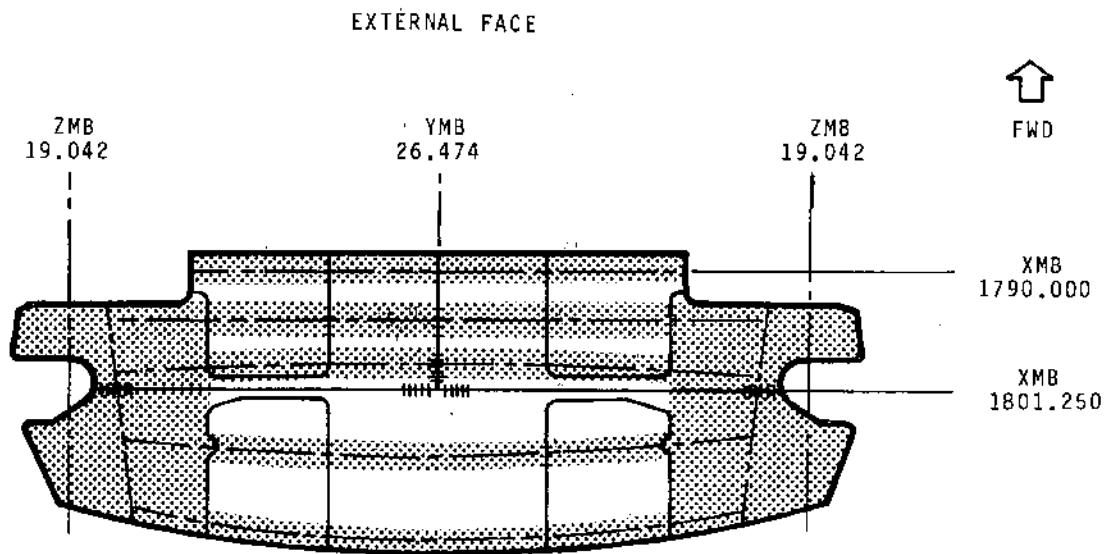


NOTE : THE NON-DIMENSIONED AREAS ARE
LOCATED WITHIN 40 MM (1.6 IN)
EACH SIDE OF THE RIVETS CENTER-
LINES..

EXAMPLE :



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Bucket Stressskin Panels - Restricted Areas
Figure 303 (Sheet 1 of 2)

78-31-01

BASIC BUCKET - RESTRICTED AREAS

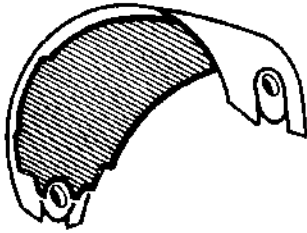
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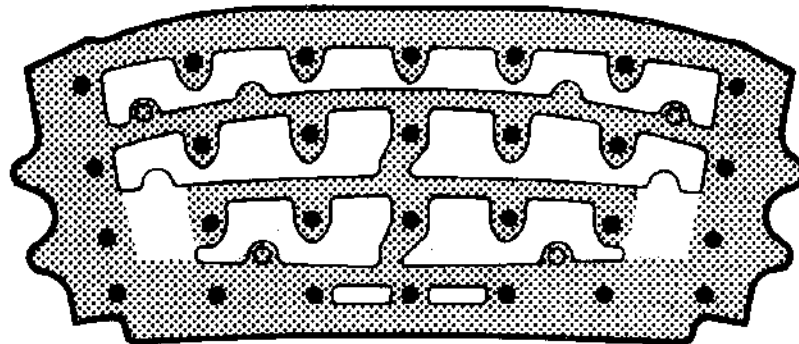


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MK.610-14-28
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EXTERNAL FACE



FWD
↓

Bucket Stressskin Panels - Restricted Areas
Figure 303 (Sheet 2 of 2)

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BASIC BUCKET - RESTRICTED AREAS

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MK. 610-14-28

OVERHAUL



sneema

4. Inspection Methods

The inspection methods used to assess the condition of the bucket are the following:

- Visual check
- Aural check
- Radiographic inspection
- Dimensional inspection

A. Visual check

It consists in:

- Viewing zones with straight - through access using, if required, a binocular (magnifying power: X 10).
- Viewing box-type zones via the orifices (borescope parts) provided using a borescope (see figure 301).

NOTE: The borescope instrumentation currently used by SNECMA for inspection of buckets consists in a flexible borescope "OLYMPUS" 11 mm (0.433 in) dia. and a direct view.

This visual check is intended for:

- (1) Check condition of riveted nut threads, helicoil thread inserts of crimped blind nuts attaching:
Seal segments at the location of the leading edge.
Heat shield on inner panel.
Side plates and deflectors at the location of bucket hubs.
- (2) Check condition of the various member attachments (rivets, bolts):
On the outside of the bucket, by sight.
On the inside of the bucket, using a flexible borescope (see figure 301).
- (3) Check condition of the stressskin panels mainly for evidence of damage such as: cracks, nicks/dents, tears, wrinkles, wear, etc.

NOTE: In case cracks are suspected on stressskin panels in cavities, perform the X-Ray radiographic inspection.

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BASIC BUCKET - INSPECTION METHODS

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OLYMPUS 593
MK. 610-14-28
OVERHAUL



B. Aural check

This check is carried out using a small metal part (coin) by striking the stressskin panel lightly.

The purpose of this check is to reveal any delamination (peeling-off) or deterioration of the inner ribbon.

A panel in good condition produces a clear sound.

A panel with a damaged ribbon produces a dull sound.

NOTE: This method of inspection is less efficient in zones where the panel is in contact with a bracket or a structural element, and also when the panel is crushed.

The aural check is carried out on the bucket internal and external skin panels, by tapping evenly at every 3 or 4 cells.

C. X - Ray radiographic inspection

This inspection is performed using an X-Ray unit fitted with a long anode, in accordance with the instructions of chapter 70-20-30, "RADIOGRAPHIC INSPECTION" and as indicated on Figure 302.

The purpose of this inspection is to reveal:

- cracks in stressskin panels,
- delamination (peeling-off) or deterioration of ribbon in stressskin panels.

NOTE: Perform this inspection only to clear about cracks on stressskin panels in cavities, revealed by visual check using a flexible borescope.

D. Dimensional inspection

The bucket dimensional inspection is performed using standard inspection tooling.

The checks to be carried out are the following:

- (1) Inspection of bucket hinge center-to-center distance:

The purpose of this inspection is to make sure that the buckets will be assembled within acceptable stress conditions.

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BASIC BUCKET - INSPECTION METHODS

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OLYMPUS 593

MK. 610-14-28

OVERHAUL



SNECMA

NOTE: The value taken (dimension "M") does not precisely correspond to the hinge centre-to-centre distance of the bucket but rather to the outer width perpendicular to the hinge ; the purpose has been to facilitate comparison with the value measured on the twin secondary nozzle.

(2) Inspection method (see figure 303)

Rig bucket on its external section.

Using a micrometer, measure the "L" value on each side of bucket hub to take into consideration a possible bearing inclination.

To obtain the "M" value, add 53,08 mm (2.090 in.) to the measured "L" value.

This 53,08 mm equals twice the nominal half-thickness of the inch fitting (hub) plus twice the nominal distance between the centreline and the outer surface of the spherical joint.

The value "M" must be included between 1254,1 and 1258,6 mm (49.374 and 49.551 in.).

Beyond these limits report to SNECMA Commercial Product Support.

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BASIC BUCKET - INSPECTION METHODS

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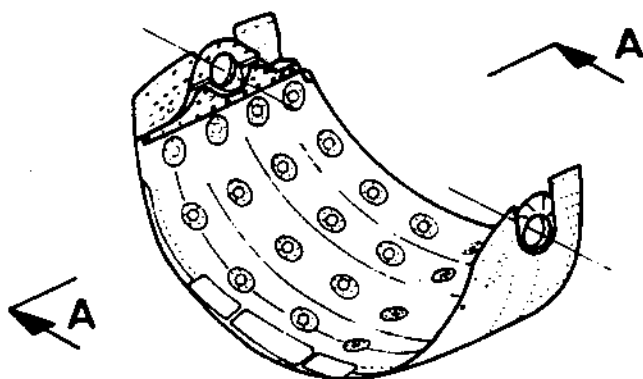
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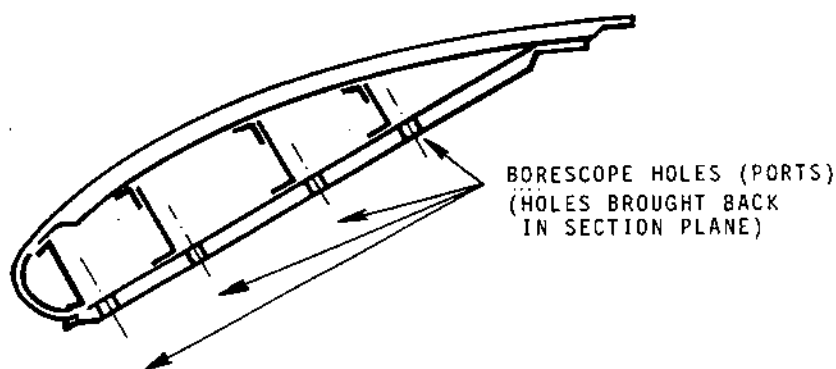
OLYMPUS 593

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SECTION AA



Reverse Bucket Borescope Inspection
Figure 301

78-31-01

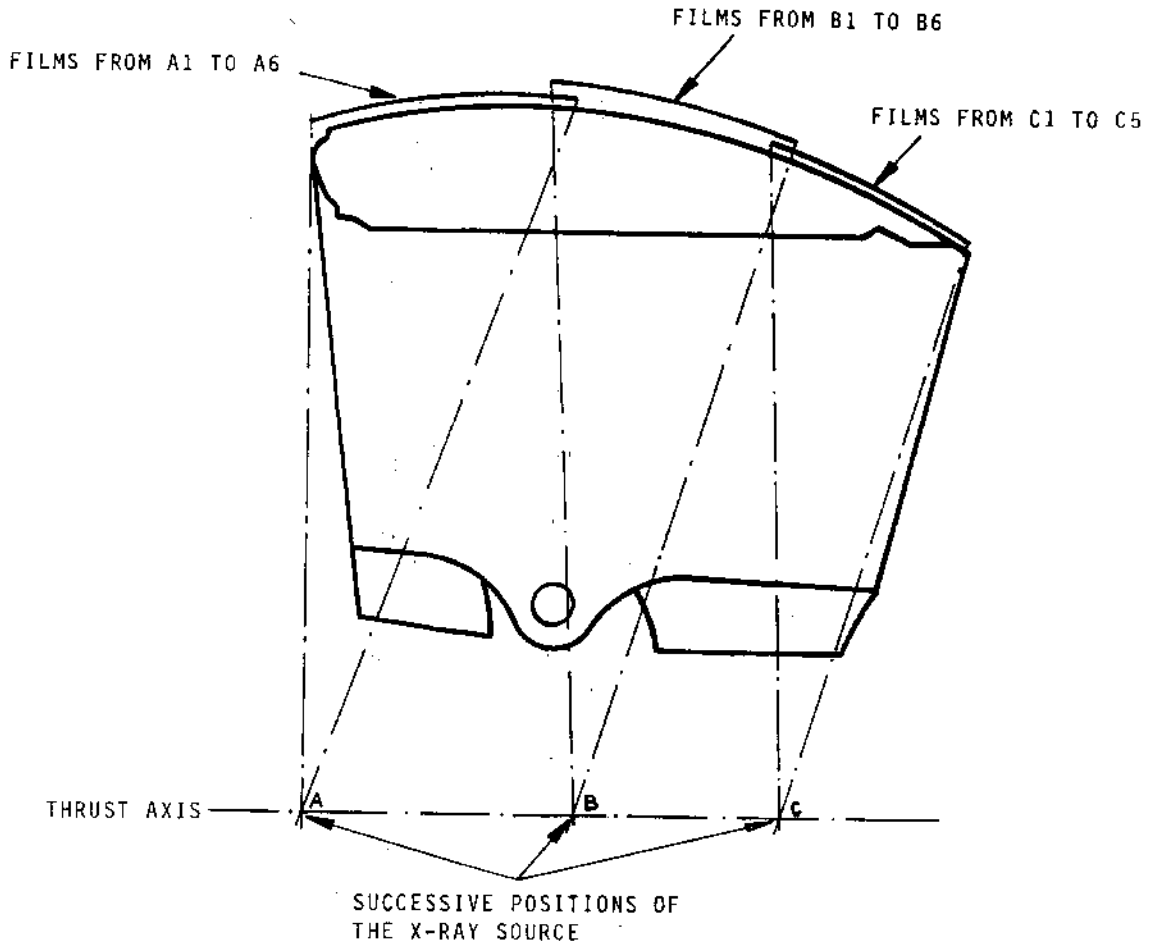
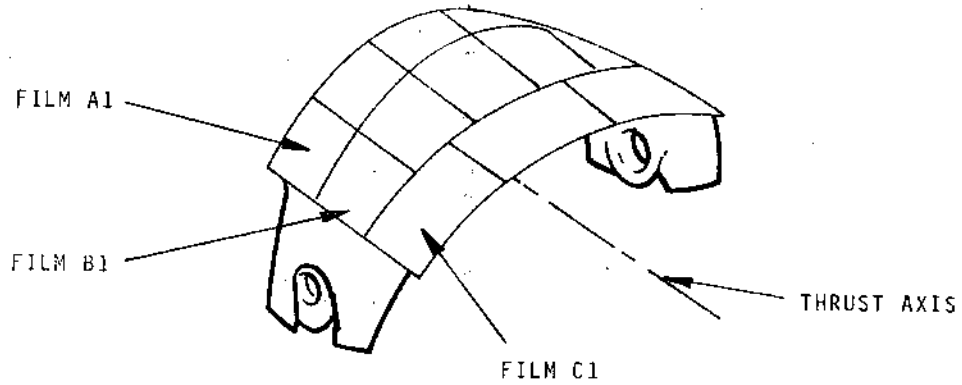
BASIC BUCKET - INSPECTION METHODS
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X-Ray Radiographic Inspection of Reverse Bucket
Figure 302 (sheet 1 of 4)

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BASIC BUCKET - INSPECTION METHODS

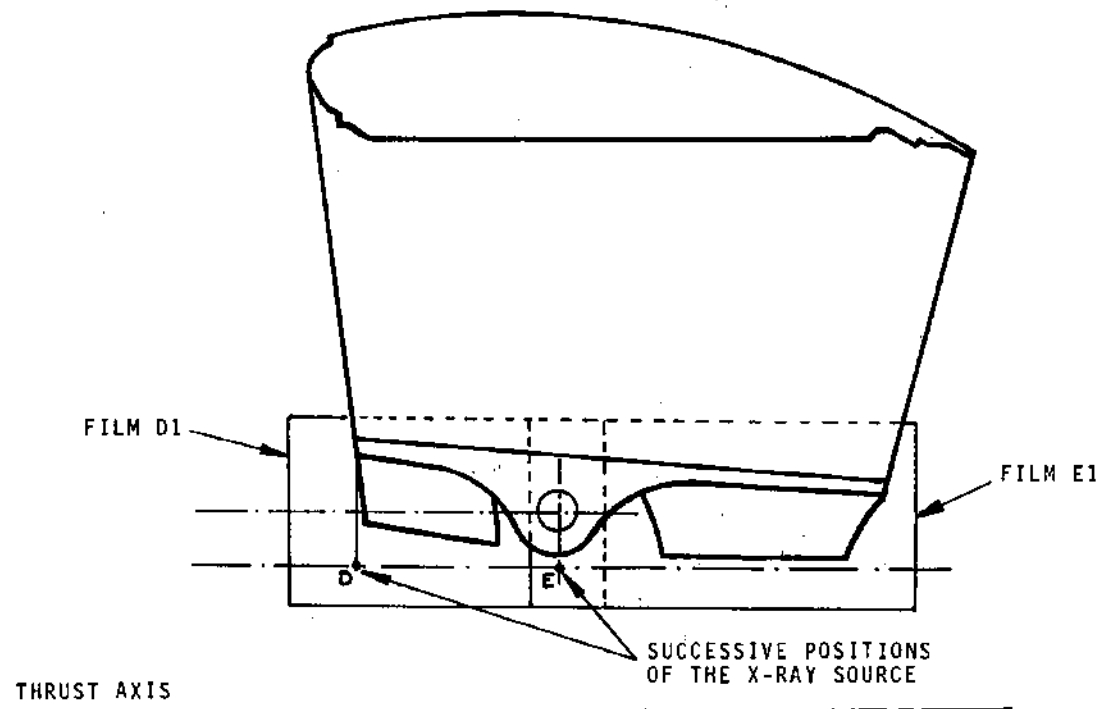
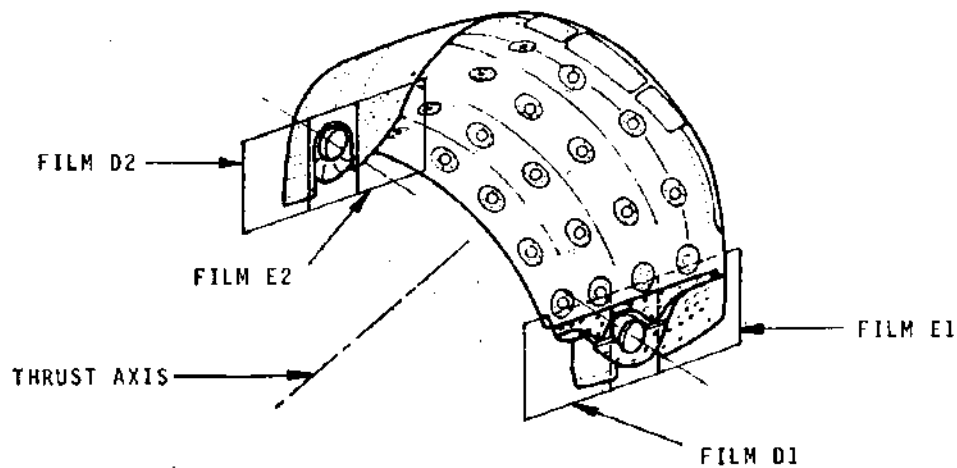
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X-Ray Radiographic Inspection Of Reverse Bucket
Figure 302 (Sheet 2 of 4)

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BASIC BUCKET - INSPECTION METHODS

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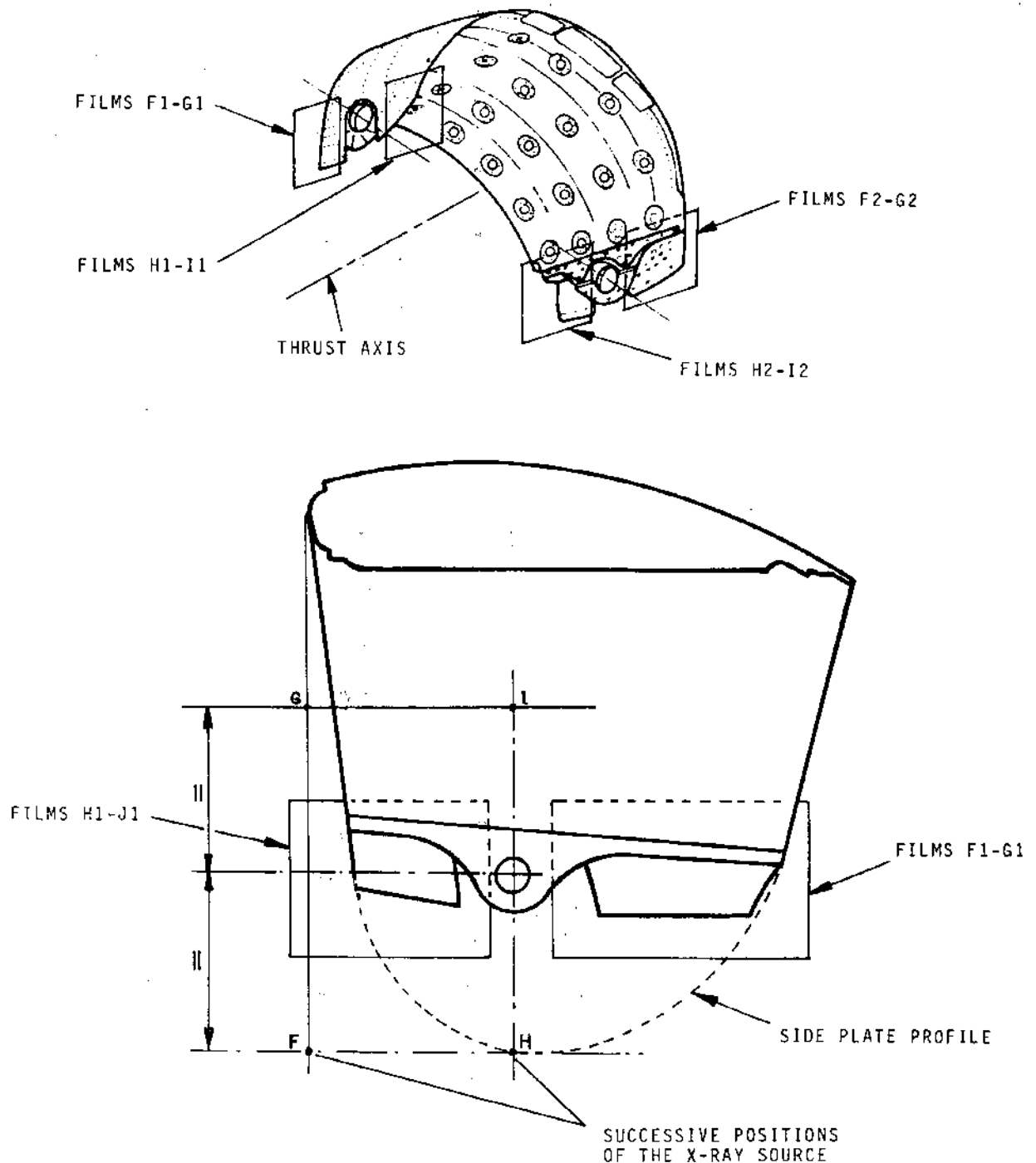
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X-Ray Radiographic Inspection of Reverse Bucket
Figure 302 (Sheet 3 of 4)

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BASIC BUCKET - INSPECTION METHODS

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SOURCE LOCATION	MEMBERS CHECKED	FILMS *	PHOTOGRAPHIC DENSITY	IMAGE QUALITY (I.Q.I.)
A B C	Inner and outer stresskin panel and relevant junction	6 films 0 6 films 0 5 films 0	2.2	Wire 0,15 mm (0.006 in) dia.
D E	Outer stresskin panels behind frames	2 films 0 2 films 0	2.2	Wire 0,15 mm (0.006 in) dia.
F G H I	Ends of panel at the location of side plates (Inclined shoo- tings to check the ribbon)	2 films △ 2 films △ 2 films △ 2 films △	2.2	Wire 0,15 mm (0.006 in) dia.

*Type M Kodak film without screen or similar

Film dimensions : 0 300 x 400 mm
(11.811 x 15.748 in.)

△ 180 x 240 mm
(7.097 x 9.449 in.)

X-Ray Radiographic Inspection Of Reverse Bucket
Figure 302 (Sheet 4 of 4)

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BASIC BUCKET - INSPECTION METHODS

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5. Permissible damage

This paragraph defines the maximum extent of acceptable defects beyond which a repair scheme must be applied.

These permissible damages are categorized as follows :

- Acceptable damage affecting the bucket inner and outer skin panels.
 - Acceptable damage affecting the bucket structure.
 - Acceptable damage affecting the bucket dimensional characteristics (distortion, wear...).
- A. Acceptable damage affecting the bucket inner and outer skin panels.
- (1) Introduction
- (a) Within the damage acceptance limits established for the skin panels, two cases are to be considered :
- General case :
Zones where the panel provides only for streamlining or carries minor loads
 - Case of the restricted areas :
Zones where the panel carries heavy loads and/or, wherein the mechanical strength is essential
- NOTE : The restricted areas are defined in paragraph 3.
- (b) Cumulative damage are permissible so long as, within an area designated "mesh" and delimited by the frames (Ref. Fig. 301), the sound area which separates two defects is, at least, equivalent to the most stringent criterion relevant to the said defects.
- (c) The damaged areas may be adjacent to one or more attachment points provided that acceptance limits for ineffective attachment points are not exceeded.

NOTE : Any damage adjacent to an attachment point is tantamount to the loss of its positive retention capacity (effectiveness).

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BASIC BUCKET - PERMISSIBLE DAMAGE

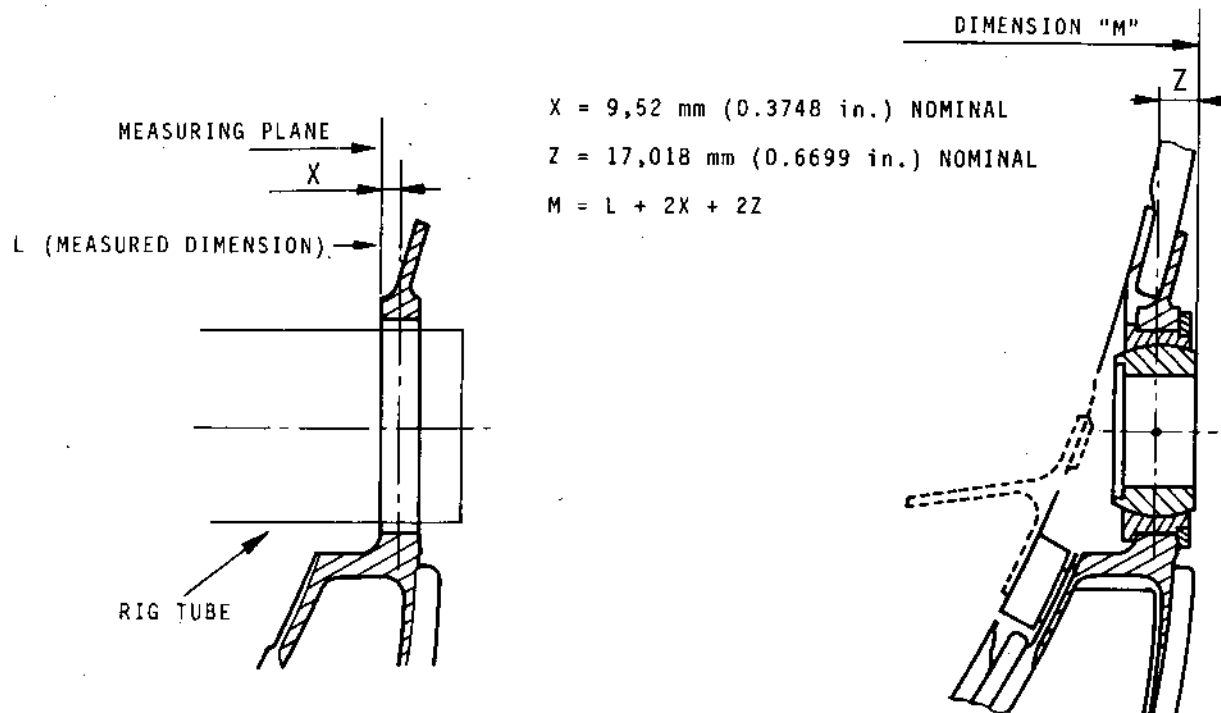
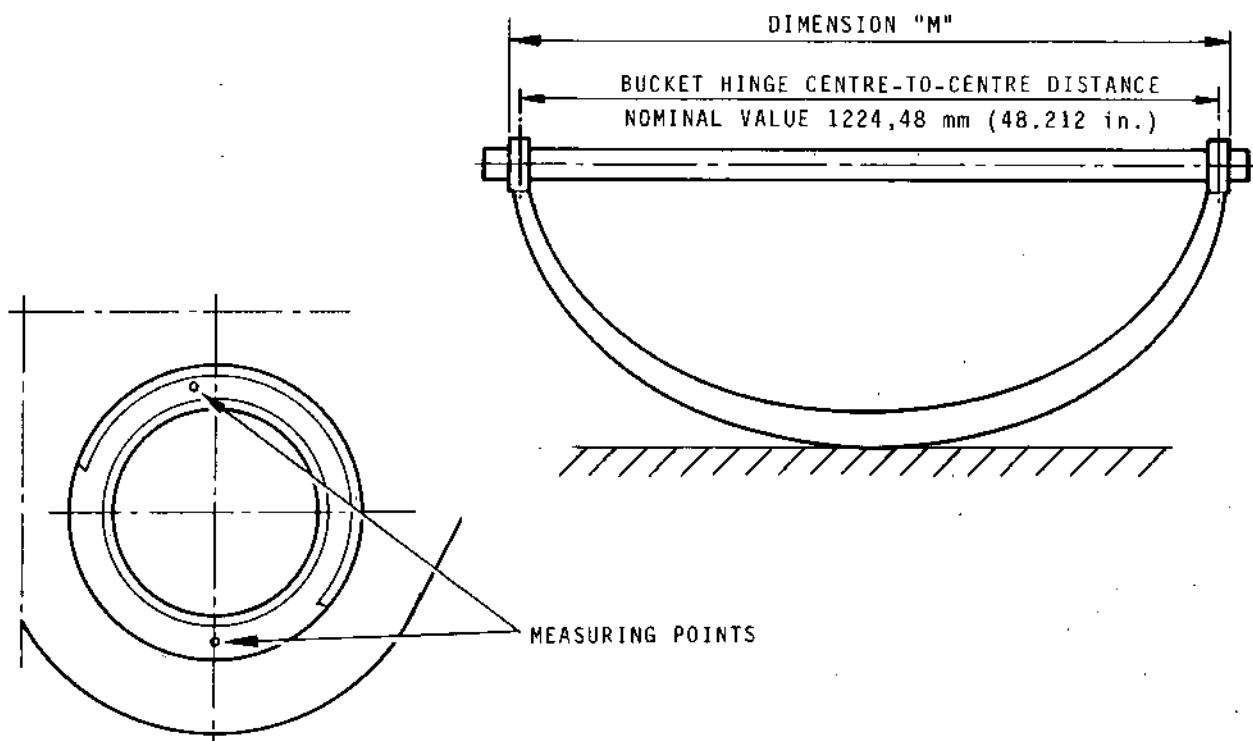
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Checking The Bucket Hinge Centre-to-Centre Distance
Figure 303

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BASIC BUCKET - INSPECTION METHODS

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(2) Acceptable damage

(a) Impact damage (Ref. Fig. 302)

CAUTION : IF IMPACT HAS CAUSED A CRACK OR A HOLE,
REFER TO THESE TYPES OF DAMAGE FOR THE
ACCEPTANCE LIMITS.

The acceptance limites for the three types of
impact damage considered are the following :

Case I : Dent contained within one cell without
crushing of the core ribbon (or cell
wall).

- . Max. depth of dent : 1 mm (0.04 in.) with a
width to be at least equal to 5 times the depth.
- . Sound area around such defect :
General case : 45 mm (1.77 in.)
Restricted areas : 75 mm (2.95 in.)
- . Max. acceptable number of such type of damage
affecting one mesh : 6

Case II : Dent contained within 3 or 4 cells at
maximum and associated with crushing of
the core ribbon.

- . Max. depth of dent : 1,5 mm (0.06 in.) with a
width to be at least equal to 10 times the
depth.
- . Sound area around such defect :
General case : 100 mm (3.94 in.)
Restricted areas : 200 mm (7.87 in.)
- . Max acceptable number of such type of damage
within one mesh : 3.

Case III : Impact affecting a large surface area.

Such impacts are unacceptable.

Impact damage beyond acceptance limits
necessitate the repair of the panel.
The type of repair is determined by
the damage extent and location. Refer
to chapter "REPAIR" of the Overhaul
Manual.

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BASIC BUCKET - PERMISSIBLE DAMAGE

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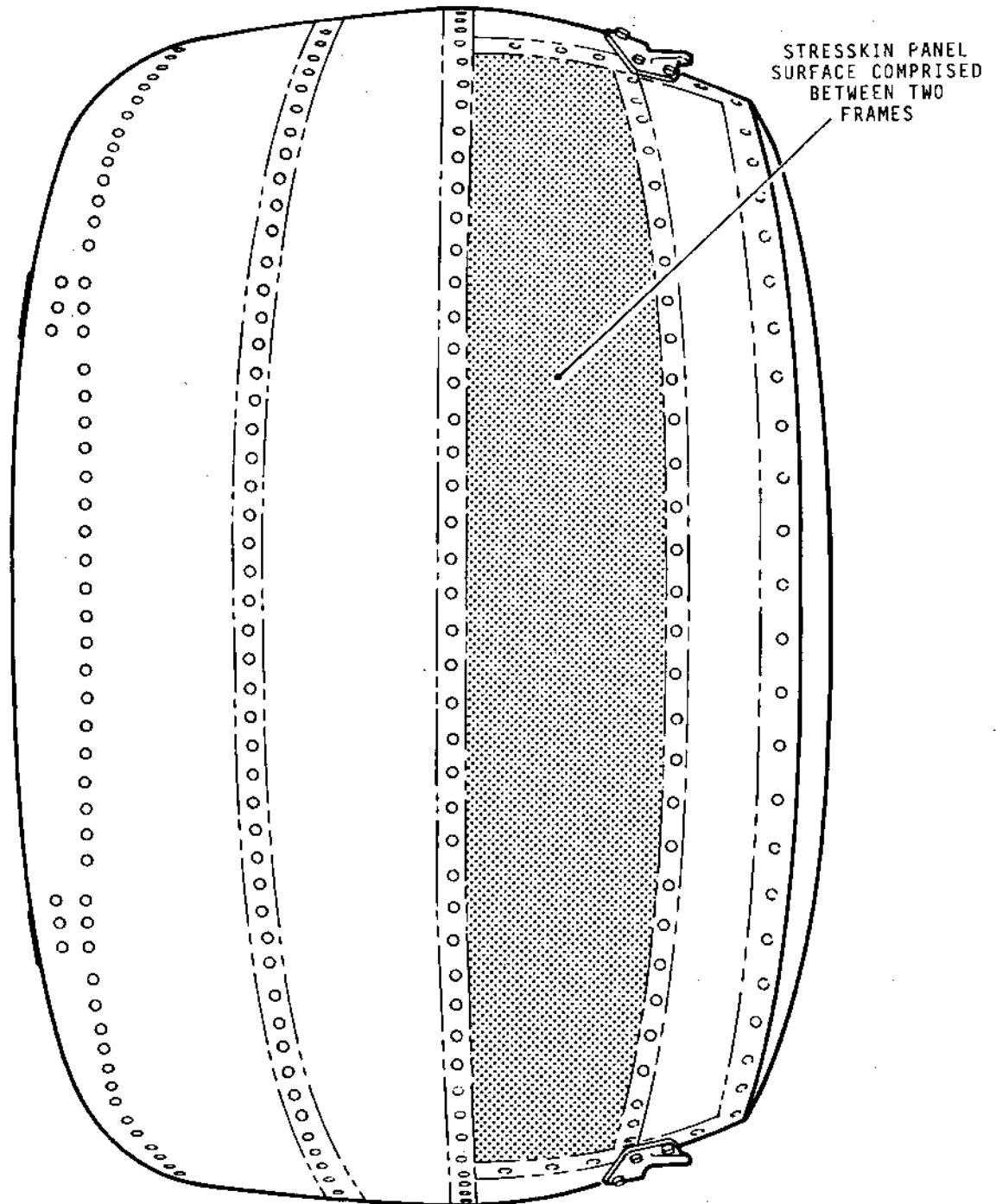


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Typical Mesh Definition
Figure 301

78-31-01

BASIC BUCKET - PERMISSIBLE DAMAGE

Pages 302A/302B

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- (b) Round bottomed crushing (crease).

CAUTION : IF THIS DEFECT SHOWS SHARP EDGES OR HAS INDUCED A CRACK, REFER TO THE ACCEPTANCE LIMITS FOR CRACKS.

This damage is unacceptable.

The type of repair is determined by the damage extent and location. Refer to chapter "REPAIR" of the Overhaul Manual.

- (c) Wrinkles on skin panel face sheets

CAUTION : IF THIS DEFECT HAS RESULTED IN CRACKING REFER TO THE ACCEPTANCE LIMITS FOR CRACKS.

This damage is unacceptable.

The type of repair is conditioned by the damage extent and location. Refer to chapter "REPAIR" in the Overhaul Manual.

- (d) Delamination (core-to-face sheet separation) or deterioration of core ribbon.

NOTE : Such defects may possibly cause the buckling or bubbling out of plane of the panel face sheet.

This damage is unacceptable.

The type of repair is conditioned by the damage extent and location. Refer to chapter "REPAIR" in the Overhaul Manual.

- (e) Cracking

This damage is unacceptable.

The type of repair is determined by the damage extent and location. See chapter "REPAIR" in the Overhaul Manual.

- (f) Loss of positive retention at the attachment points (see figure 303).

This condition may be caused by :
 - a missing fastener (rivet, bolt, etc...)
 - a loose fastener
 - a deteriorated panel in the area of attachment point.

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BASIC BUCKET - PERMISSIBLE DAMAGE

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In the case of a missing or loose fastener, re-install a new fastener.

In the case of panel deterioration next to the attachment point, the latter becomes ineffective and the following limits shall apply :

General case : Ref. Figure 303 (sheet 1 of 4)

- . Of the two first attachment points located at each end of a row of fasteners, at least one (1) must remain effective.
- . In same row, two ineffective attachment points must be separated by two effective ones at least.

Particular case :

The particular cases are defined on Figure 303 (sheets 2 thru 4).

B. Acceptable damage affecting the bucket structure.

(1) Introduction

The acceptable damage on the bucket structure are categorized depending on the type of parts affected and as follows :

- Acceptable damage on structural members, stringers, frames, yokes (forged, cast or machined-from-solid parts)
- Acceptable damage on sheet metal components
- Acceptable damage on the attaching hardware (fasteners).

Within the acceptance limits for damage affecting the bucket structure, two cases are to be considered :

General case

Zones where the structure carries minor loads

Restricted areas

Zones where the structure carries heavy loads and/or wherein the mechanical strength is essential.

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BASIC BUCKET - PERMISSIBLE DAMAGE

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NOTE : The restricted areas are defined in paragraph 3.

(2) Acceptable damage on structural members.

(a) Cracking

Cracks are unacceptable.

The type of repair is determined by the crack extent and location. See chapter "REPAIR" in the Overhaul Manual.

(3) Acceptable damage on sheet metal components

(a) Cracking

Cracks are unacceptable.

The type of repair is determined by the crack extent and location. Refer to chapter "Repair" in the Overhaul Manual.

(b) Rear back-up plates wear.

Worn condition of the bucket rear back-up plates due to interference with the bucket heat shield is acceptable if less than 0,3 mm (0.012 in.) in depth.

Beyond this tolerance, renew the back-up plates.

(c) Bucket leading edge wear.

1 If the bucket L.E. is worn as a result of a rough landing, renew leading edge element.

2 If the bucket L.E. is worn without cracks or holes and if the wear is caused by the contact with the seals of the T28, recondition the part. See chapter "REPAIR" in the Overhaul Manual.

(4) Acceptable damage on attaching hardware (fasteners)
The fasteners are classified into two categories :

- fasteners for retaining the removable parts
- fasteners used for structural assembly purposes.

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BASIC BUCKET - PERMISSIBLE DAMAGE

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(a) Fasteners for retaining removable parts :

The deterioration of this kind of fasteners is unacceptable.

Renew damaged fasteners by applying the following repair schemes :

REP 1-460-1-Renewal of Heli-coil thread inserts providing for retention of heat shields.

REP 1-460-2-Renewal of attachment hardware (mounting elements) providing for retention of side-plates and deflectionors, at bucket hub locations.

(b) Fasteners providing for structural assembly.

For these items, two cases should be considered :

. Accessible fastening items

. Inaccessible fastening items

Case of the accessible fastening items.

The deterioration of these items is unacceptable.

Renew them as instructed in chapter "REPAIR" of the Overhaul Manual.

Case of the inaccessible fastening items.

The acceptance limits concerning the loss of these items will be issued later.

C. Acceptable damage affecting the bucket dimensional characteristics.

The bucket dimensional characteristics must comply with the following :

(1) Bucket hinge center-to-center distance, (dimension "M")

This distance shall be comprised between 1256,6 and 1258,6 mm (49.473 - 49.552 in.).

Beyond these limits, report the Repair Engineering Dept. Product Support of SNECMA.

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BASIC BUCKET - PERMISSIBLE DAMAGE

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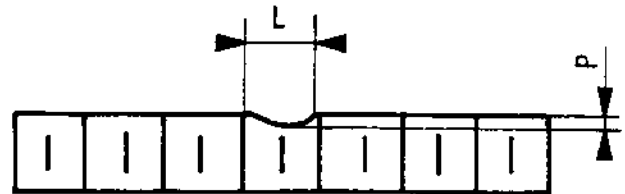
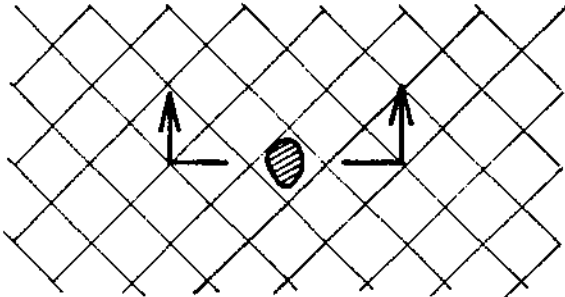
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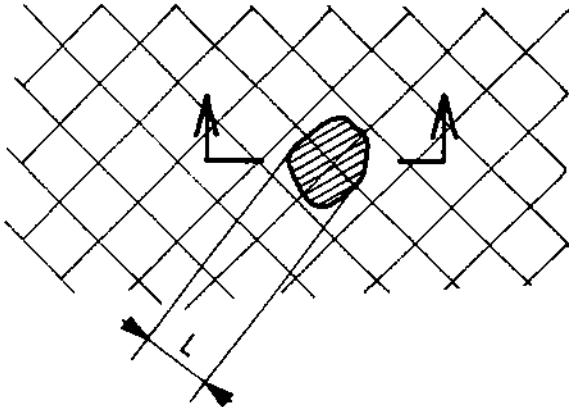


DENT

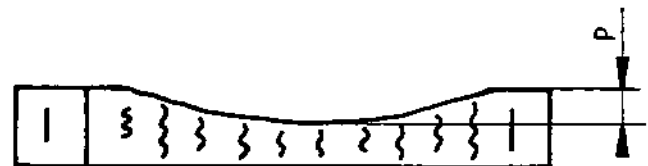
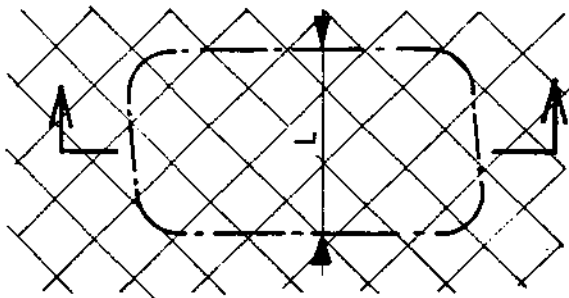
CASE I



CASE II



CASE III



Depiction Of Damage Affecting The Bucket Skin Panels
Figure 302 (sheet 1 of 3)

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BASIC BUCKET - PERMISSIBLE DAMAGE

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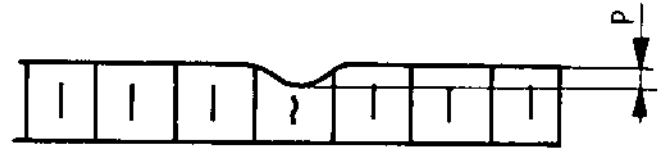
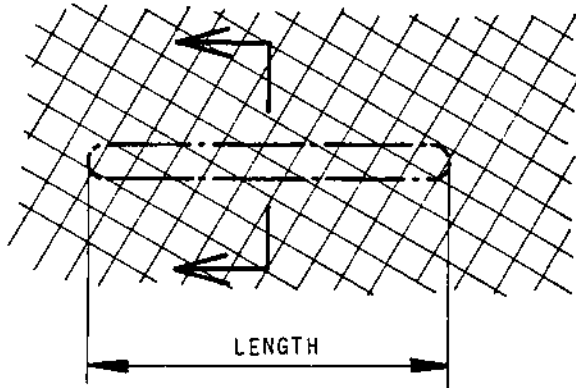


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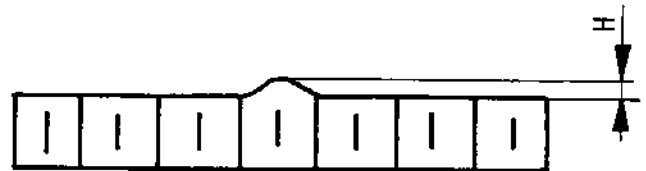
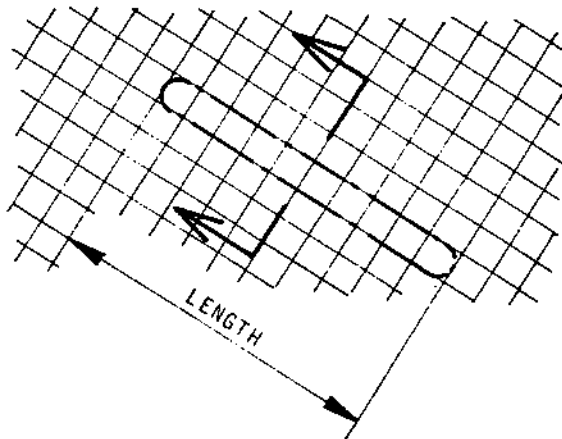
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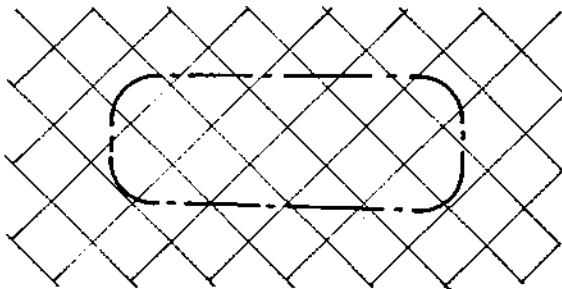
CREASE OR WRINKLE



BUCKLES



DELAMINATION (CORE-TO-FACE SHEET SEPARATION)



SEPARATION OF FACE SHEET
FROM CORE RIBBON MAY NOT
BE VISIBLE



Depiction Of Damage Affecting The Bucket Skin Panels
Figure 302 (sheet 2 of 3)

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BASIC BUCKET - PERMISSIBLE DAMAGE

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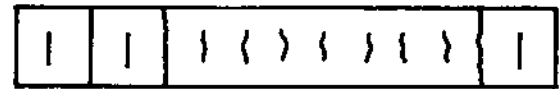
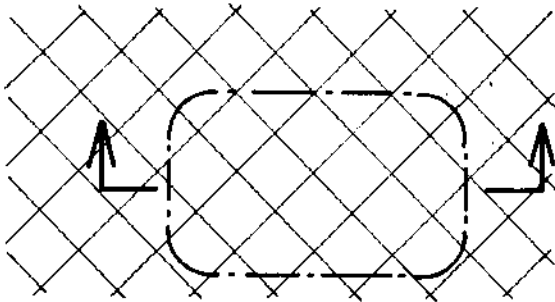
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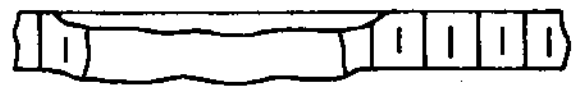
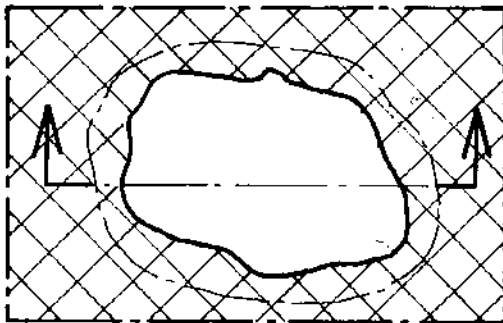
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CORE RIBBON DETERIORATION



HOLE THROUGH PANEL



Depiction Of Damage Affecting The Bucket Skin Panels
Figure 302 (sheet 3 of 3)

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BASIC BUCKET - PERMISSIBLE DAMAGE

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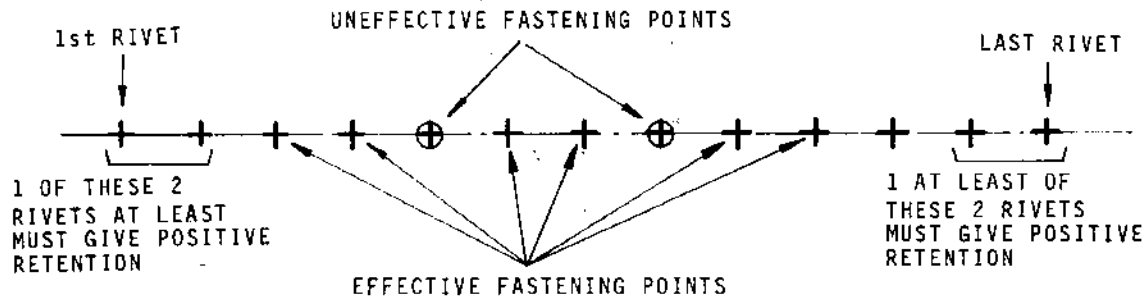
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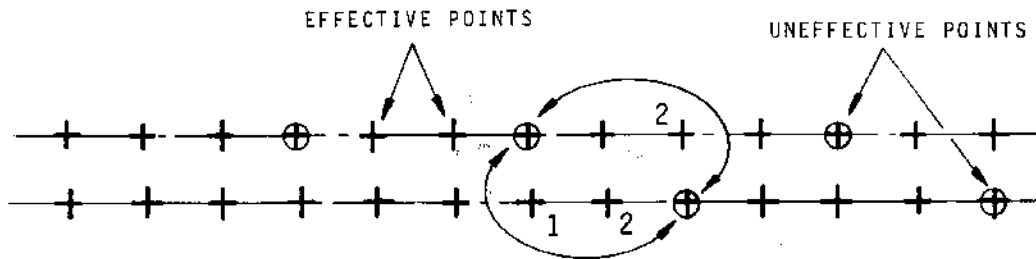


GENERAL ACCEPTANCE CRITERIA



2 UNEFFECTIVE POINTS TO BE SEPARATED BY 2 EFFECTIVE ONES AT LEAST

TYPICAL FOR ONE ROW OF FASTENERS



2 UNEFFECTIVE POINTS TO BE SEPARATED BY 2 EFFECTIVE ONES AT LEAST

TYPICAL FOR 2 ROWS OF FASTENERS

Loose Or Missing Fasteners Resulting In Uneffective Attachment Points On The Bucket Inner And Outer Skin Panels.

Figure 303 (Sheet 1 of 4)

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BASIC BUCKET - PERMISSIBLE DAMAGE

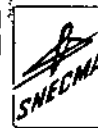
Page 310

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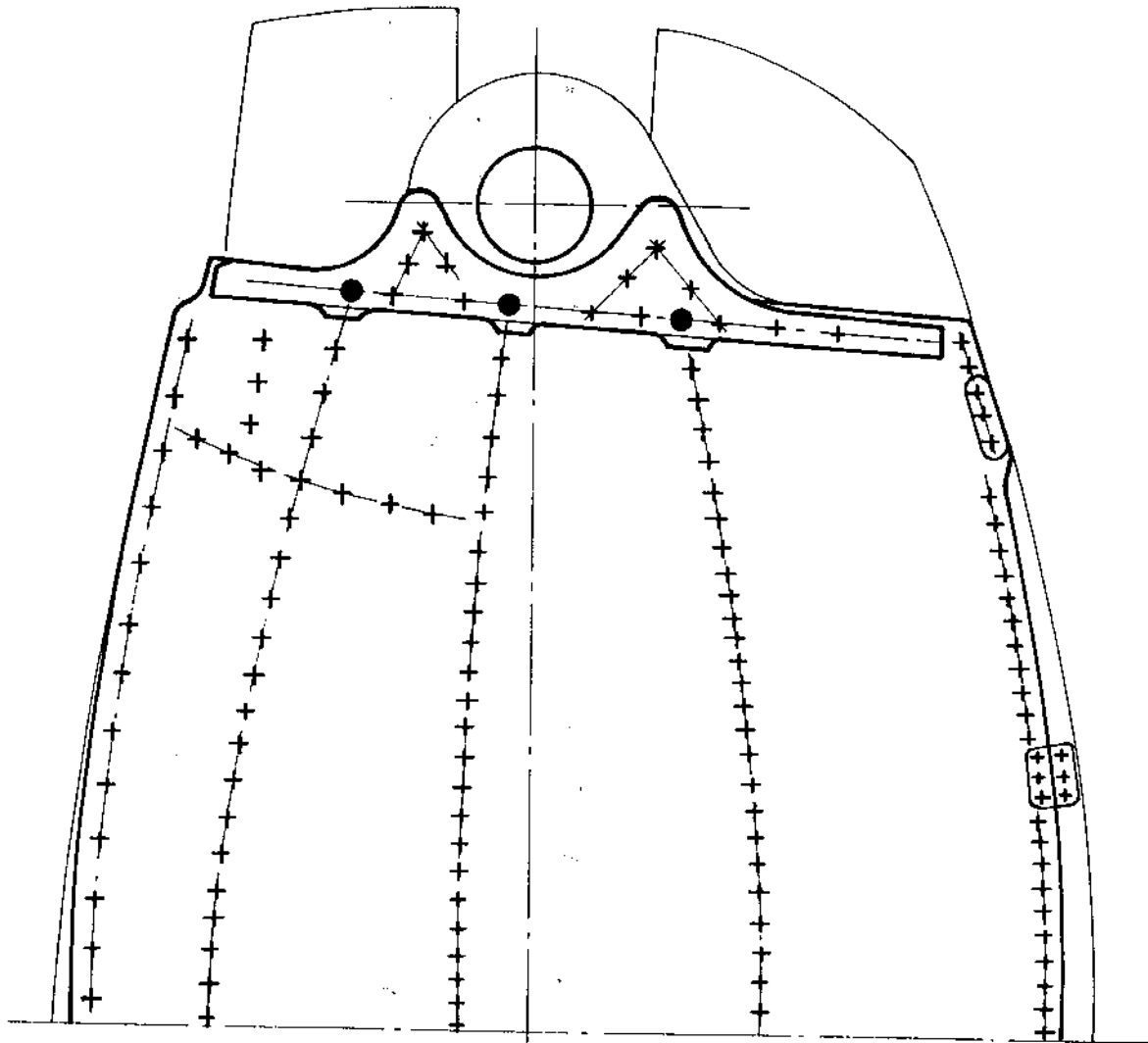
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PARTICULAR CASE

INNER SKIN PANEL



● UNEFFECTIVE FASTENING POINT - UNACCEPTABLE

+ GENERAL CASE - REF. TO SHEET 1

Loose Or Missing Fasteners Resulting In Uneffective Attachment
Points On The Bucket Inner And Outer Skin Panels.
Figure 303 (Sheet 2 of 4)

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BASIC BUCKET - PERMISSIBLE DAMAGE

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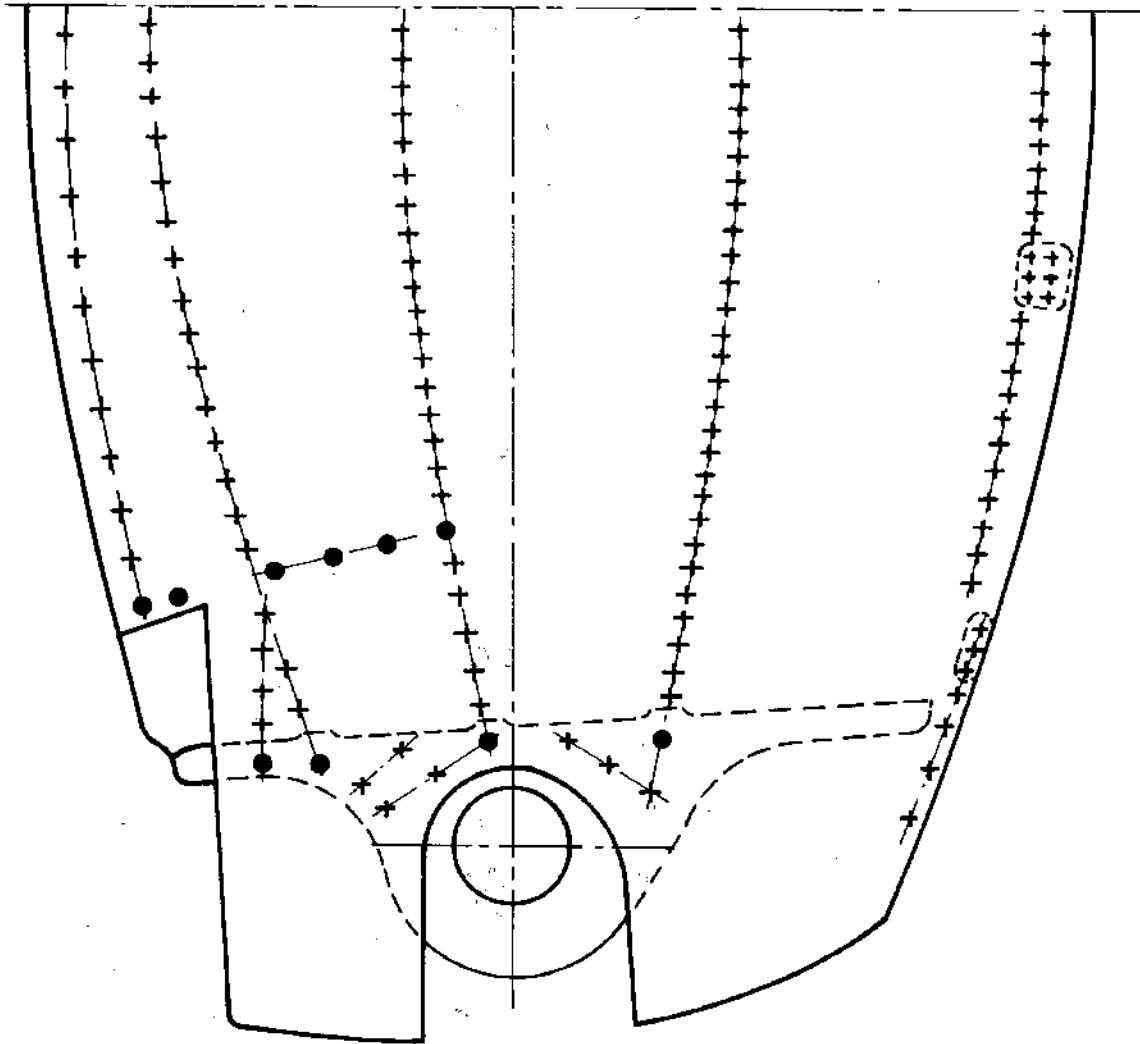
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PARTICULAR CASE

OUTER SKIN PANEL
(SHOWN WITHOUT DOUBLERS)



● UNEFFECTIVE FASTENING POINT - UNACCEPTABLE

+ GENERAL CASE - REF. TO SHEET 1

Loose Or Missing Fasteners Resulting In Uneffective Attachment
Points On The Bucket Inner And Outer Skin Panels.

Figure 303 (sheet 3 of 4)

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BASIC BUCKET - PERMISSIBLE DAMAGE

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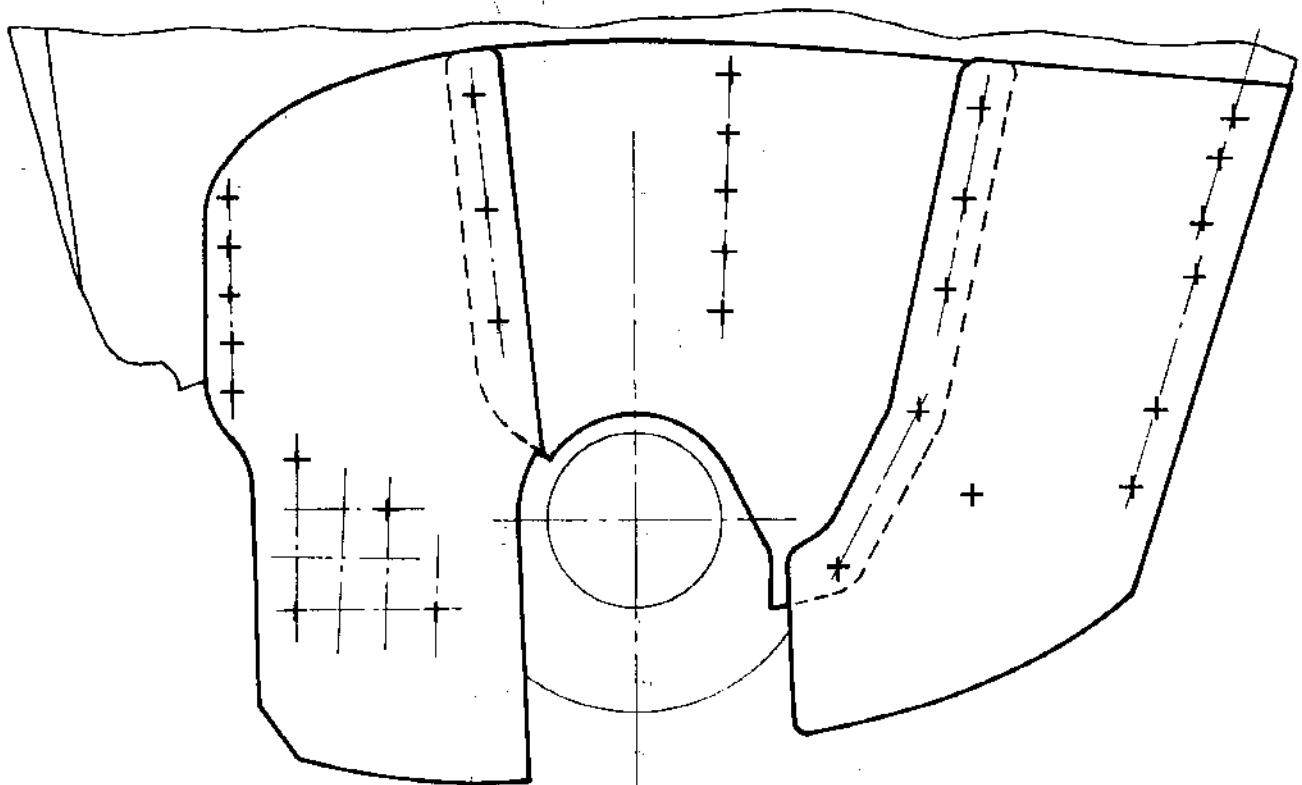
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PARTICULAR CASE

OUTER SKIN PANEL
(SHOWN WITH DOUBLERS)



+ GENERAL CASE - REF. TO SHEET 1

Loose Or Missing Fasteners Resulting In Uneffective Attachment
Points On The Bucket Inner And Outer Skin Panels.
Figure 303 (sheet 4 of 4)

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BASIC BUCKET - PERMISSIBLE DAMAGE

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REPAIR

1. Format of the repair schemes

Each repair scheme (REP) describes only one operation to be carried out on a single part.

A. Repair scheme identification and classification

Any one part is identified by :

- its nomenclature
- its classification in the Illustrated Parts List (Figure-Item)

A repair scheme is identified by :

- the part to which it relates
- the purpose of this repair

These various criteria have been used for identification and classification purposes.

(1) Identification

The identification of a repair scheme is given by :

- the nomenclature of the part with its IPL reference No. (Figure-Item)
- the purpose of the repair preceded by its numerical order

(2) Classification

The classification of a repair scheme is given by :

- the A.T.A. breakdown system
- the number of the repair scheme which is given by :
 - (a) The part IPL classification (Figure-Item) and the repair numerical order.
- the page number, proper to any repair scheme (re-starts from page 401 for each repair scheme)
- the date

(3) Sample of identification and classification

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FOREWORD

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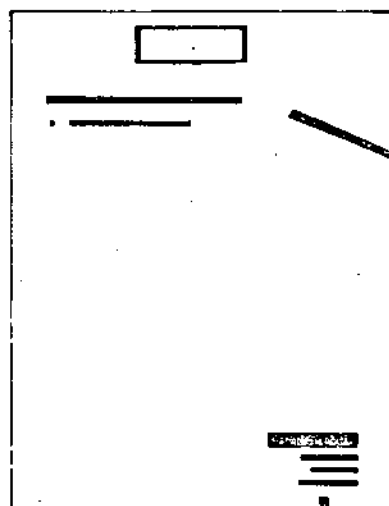
May 31/76



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NOMENCLATURE OF THE PART

IPL PART CLASSIFICATION

- 11 : FIGURE No.
- 320 : ITEM

MOBILE ASSEMBLY (11-320)

1. Renewal of the crimped nuts

PURPOSE OF THE REPAIR

REPAIR SCHEME No.

REP No. :

- REP = IPL FIGURE No. WHERE THE PART IS SHOWN
- 320 = PART ITEM No. ON FIGURE
- 1 = REPAIR SCHEME No.

ATA BREAKDOWN SYSTEM

78-10-01

REP 11-320-1

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PAGE NUMBERING

DATE

78-31-01

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NOTE : The REP numbering system uses the repair scheme identification criteria in order to establish the direct identification/classification relationship.

(4) Particular case

(a) Identical parts

When n identical parts are installed on a same assembly, the numbering of the REP will be made by using the IPL classification of the first part.

Example :

Identification of the
thrust reverser cascades : CASCADE (2-10, 11, 30, 31,
50, 51, 70, 90, 110, 111,
130, 150, 170, 190)

REP No. : REP. 2-10-1

(b) Optional parts

In the case of the I.P.L. making mention of optional parts (OPT TO ...) and should these parts require a special repair scheme, the said scheme shall be identified as follows :

- the nomenclature of the part with its IPL reference No. (Figure - Item) of the basic part (and, if required, the manufacturer's part number),
- the purpose of the repair preceded by its numerical order number,
and classified as follows :
- A.T.A., breakdown system,
- the number of the repair scheme which is given by the IPL classification of the basic part (Figure - Item) and the repair scheme numerical order number followed by an alphabetical variant,
- page numbered 401 and onward,
- the date.

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2. Updating

- A. The revisions, entailed by the technical evolution of the repair scheme, will affect its classification only as far as the date is concerned.

- B. Modification of the alternate part

An alpha variant is introduced in the IPL and modifies the figure-item No.

- (1) This modification has no effect on the repair scheme :
- the REP remains unchanged
- (2) This modification introduces a new REP :

Elaboration of a new repair scheme in which appears the alpha variant issue letter introducing this new REP.

Example : The modification introduces a REP with issue letter C, the previous REP is valid for the parts A and B.

REP 4-20-3 : valid for alpha variant A and B

REP 4-20C-3: valid from alpha variant C.

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FOREWORD

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**ATP
TEMPORARY
REVISION**

BRITISH AIRWAYS

CONCORDE OLYMPUS 593
OVERHAUL MANUAL

TR Page 1 of 1
21 September 1993

THIS TEMPORARY REVISION IS ISSUED BY BRITISH AIRWAYS TECHNICAL SERVICES AND COMPLIES WITH BCAR'S CHAPTER A5-3, B5-3 AND/OR TSS No. 0-2 AS REQUIRED. CAA DESIGN APPROVAL No. DAI/8566/78.



FOR CHIEF ENGINEER TECHNICAL SERVICES

TEMPORARY REVISION NO. 78-533

Manual Reference 78-31-01 REPAIR PARTS LIST Page 401

REASON FOR REVISION

1. To include List of British Airways Repair Schemes.
2. Re-issued to align with manufacturers Revision No. 22.

ACTION

The following B.A. Repair Schemes are applicable to this manual. Copies may be obtained from the Drawings Library, G.5, T.B.A.

CAUTION: IF MORE THAN ONE REPAIR IS APPLIED TO AN ASSEMBLY OR COMPONENT, THE COMBINED REPAIRS MAY CONSTITUTE AN UNACCEPTABLE STANDARD. WHERE DOUBT EXISTS THE APPROPRIATE TECHNICAL SERVICES SECTION MUST BE CONTACTED.

R.S. NO

DEFECT/TYPE OF REPAIR

78-41883

Seal segments, seal supports, shims
and bucket stops - wear - weld fill.

**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

PART NUMBER	DESCRIPTION	REPAIR NUMBER
BTN1LG428-12	BLIND NUT	REP 1-460 - 7
BTN1LG428-12	BLIND NUT	REP 1-460 - 8
BTN1LG428-12	BLIND NUT	REP 1-460 -12
BTN1LG428-12	BLIND NUT	REP 1-460 -13
BTN1LG428-12	BLIND NUT	REP 1-460 -14
BTN1LG428-2	BLIND NUT	REP 1-460 - 2
BTN1LG428-2	BLIND NUT	REP 1-460 - 8
BTN1LG428-7	BLIND NUT	REP 1-460 - 2
BTN1LG428-7	BLIND NUT	REP 1-460 - 8
BTN1LG428-7	BLIND NUT	REP 1-460 -17
CR2539-5-2	BLIND RIVET	REP 1-460 - 8
CR2662-3-3	BLIND RIVET	REP 1-460 - 4
CR2662-3-3	BLIND RIVET	REP 1-460 - 8
CR2663-5-2	BLIND RIVET	REP 1-460 - 3
CR2663-5-2	BLIND RIVET	REP 1-460 - 4
CR2663-5-2	BLIND RIVET	REP 1-460 - 6
CR2663-5-2	BLIND RIVET	REP 1-460 - 8
CR2837-6-6	BLIND RIVET	REP 1-460 - 9
CR2838-4-4	BLIND RIVET	REP 1-460 - 6
CR2838-5-3	BLIND RIVET	REP 1-460 - 6
CR2838-5-7	BLIND RIVET	REP 1-460 - 6
CR2838-5-8	BLIND RIVET	REP 1-460 - 3
CR2838-5-8	BLIND RIVET	REP 1-460 - 7
CR2838-5-8	BLIND RIVET	REP 1-460 - 8
CR2838-5-8	BLIND RIVET	REP 1-460 -12
CR2838-5-8	BLIND RIVET	REP 1-460 -14
CR2838-5-8	BLIND RIVET	REP 1-460 -16
CR2838-6-6	BLIND RIVET	REP 1-460 - 6
CR2838-6-7	BLIND RIVET	REP 1-460 - 9
CR2838-6-7	BLIND RIVET	REP 1-460 -17
CR2838-6-8	BLIND RIVET	REP 1-460 - 3
CR2838-6-8	BLIND RIVET	REP 1-460 - 6
CR2838-6-8	BLIND RIVET	REP 1-460 -17
CR2839-4-2	BLIND RIVET	REP 1- 40 - 1
CR2839-4-2	BLIND RIVET	REP 1-460 - 6
CR2839-4-3	BLIND RIVET	REP 1-460 - 6
CR2839-5-2	BLIND RIVET	REP 1-460 - 4
CR2839-5-2	BLIND RIVET	REP 1-460 - 8
CR2839-5-3	BLIND RIVET	REP 1-460 - 8
CR2839-5-4	BLIND RIVET	REP 1-460 - 8
CR2839-5-8	BLIND RIVET	REP 1-460 - 3
CR2839-5-8	BLIND RIVET	REP 1-460 - 7
CR2839-5-8	BLIND RIVET	REP 1-460 -12
CR2839-5-8	BLIND RIVET	REP 1-460 -14
CR2839-6-8	BLIND RIVET	REP 1-460 - 3

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PART NUMBER	DESCRIPTION	REPAIR NUMBER
CR2840-5-6	BLIND RIVET	REP 1-460 - 6
HL140-6-4	SCREW	REP 1-460 - 3
HL240-6-4	SCREW	REP 1-460 - 8
HL241-8-6	SCREW	REP 1-460 - 8
HL297-6A	NUT	REP 1-460 - 3
HL40-5-2	SCREW	REP 1-460 - 8
HL40-5-3	SCREW	REP 1-460 - 6
HL40-5-3	SCREW	REP 1-460 - 8
HL40-5-4	SCREW	REP 1-460 - 6
HL40-5-4	SCREW	REP 1-460 - 8
HL40-5-5	SCREW	REP 1-460 - 8
HL40-6-4	SCREW	REP 1-460 - 8
HL41-8-6	SCREW	REP 1-460 - 8
HL869-6-12	SCREW	REP 1-460 - 8
HL869-6-13	SCREW	REP 1-460 - 8
HL869-6-14	SCREW	REP 1-460 - 8
HL869-6-16	SCREW	REP 1-460 - 8
HL959-6-12	SCREW	REP 1-460 - 8
HL959-6-13	SCREW	REP 1-460 - 8
HL959-6-14	SCREW	REP 1-460 - 8
HL959-6-16	SCREW	REP 1-460 - 8
HL966-6-16	SCREW	REP 1-460 - 8
HL97-5	NUT	REP 1-460 - 6
HL97-5	NUT	REP 1-460 - 8
HL97-8	NUT	REP 1-460 - 8
HLN1G6	NUT	REP 1-460 - 8
MS20427M3-4	RIVET	REP 1-460 - 4
NAS1068C3	NUT	REP 1-460 - 4
NAS1068C3	NUT	REP 1-460 - 8
NAS1133C3	SCREW	REP 1-460 - 8
NAS1198-5-9	RIVET	REP 1-460 - 3
NAS1198-5-13	RIVET	REP 1-460 - 3
NAS1199-5-8	RIVET	REP 1-460 - 3
NAS1199-5-9	RIVET	REP 1-460 - 3
NAS1199-5-11	RIVET	REP 1-460 - 3
NAS1199-5-12	RIVET	REP 1-460 - 3
NAS1200-4-6	RIVET	REP 1- 50 - 2
NAS1200-5-7	RIVET	REP 1- 50 - 2
NAS1587-4C	WASHER	REP 1-460 - 8
NAS1587-4L	WASHER	REP 1-460 - 8
NAS670U11	SCREW	REP 1-460 - 8
NAS670U11	SCREW	REP 1-460 -12
NAS670U11	SCREW	REP 1-460 -14
NAS670U11	FLOATING NUT	REP 1-460 - 4

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PART NUMBER	DESCRIPTION	REPAIR NUMBER
NAS686C3	FLOATING NUT	REP 1-460 - 4
NAS686C3	FLOATING NUT	REP 1-460 - 8
NAS686C4	FLOATING NUT	REP 1-460 - 2
NAS686C4	FLOATING NUT	REP 1-460 - 8
PLT1004-5-5	BLIND BOLT	REP 1-460 - 8
PLT1004-6-3	BLIND BOLT	REP 1-460 - 3
PLT1004-6-3	BLIND BOLT	REP 1-460 - 4
PLT1004-6-3	BLIND BOLT	REP 1-460 - 6
PLT1004-6-3	BLIND BOLT	REP 1-460 - 7
PLT1004-6-3	BLIND BOLT	REP 1-460 - 8
PLT1004-6-3	BLIND BOLT	REP 1-460 -12
PLT1004-6-3	BLIND BOLT	REP 1-460 -14
PLT1004-6-4	BLIND BOLT	REP 1-460 - 8
PLT1004-6-5-5	BLIND BOLT	REP 1-460 - 3
PLT1004-6-5,5	BLIND BOLT	REP 1-460 - 7
PLT1004-6-5,5	BLIND BOLT	REP 1-460 - 8
PLT1004-6-5,5	BLIND BOLT	REP 1-460 -12
PLT1004-6-5,5	BLIND BOLT	REP 1-460 -14
PLT1004-6-6	BLIND BOLT	REP 1-460 - 3
PLT1004-6-6	BLIND BOLT	REP 1-460 - 7
PLT1004-6-6	BLIND BOLT	REP 1-460 - 8
PLT1004-6-6	BLIND BOLT	REP 1-460 -12
PLT1004-6-6	BLIND BOLT	REP 1-460 -14
PLT1004-6-6	BLIND BOLT	REP 1-460 -17
PLT1004-6-6-5	BLIND BOLT	REP 1-460 - 3
PLT1004-6-6,5	BLIND BOLT	REP 1-460 - 7
PLT1004-6-6,5	BLIND BOLT	REP 1-460 -12
PLT1004-6-6,5	BLIND BOLT	REP 1-460 -14
PLT1004-6-6,5	BLIND BOLT	REP 1-460 -17
PLT1004-6-7	BLIND BOLT	REP 1-460 - 3
PLT1004-6-7	BLIND BOLT	REP 1-460 - 7
PLT1004-6-7	BLIND BOLT	REP 1-460 - 8
PLT1004-6-7	BLIND BOLT	REP 1-460 -12
PLT1004-6-7	BLIND BOLT	REP 1-460 -14
PLT1004-6-7	BLIND BOLT	REP 1-460 -17
PLT1004-6-7,5	BLIND BOLT	REP 1-460 - 3
PLT1004-6-7,5	BLIND BOLT	REP 1-460 - 7
PLT1004-6-7,5	BLIND BOLT	REP 1-460 - 8
PLT1004-6-7,5	BLIND BOLT	REP 1-460 -12
PLT1004-6-7,5	BLIND BOLT	REP 1-460 -14
PLT1004-6-8	BLIND BOLT	REP 1-460 - 3
PLT1004-6-8	BLIND BOLT	REP 1-460 - 7
PLT1004-6-8	BLIND BOLT	REP 1-460 - 8
PLT1004-6-8	BLIND BOLT	REP 1-460 -12
PLT1004-6-8	BLIND BOLT	REP 1-460 -14

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PART NUMBER	DESCRIPTION	REPAIR NUMBER
PLT1004-6-8	BLIND BOLT	REP 1-460 -17
PLT1005-6-6,5	BLIND BOLT	REP 1-460 - 8
PLT1005-8-5,5	BLIND BOLT	REP 1-460 - 3
PLT1005-8-8,5	BLIND BOLT	REP 1-460 -17
PLT1011-6-3	BLIND BOLT	REP 1-460 - 3
PLT1011-6-3	BLIND BOLT	REP 1-460 - 4
PLT1011-6-3	BLIND BOLT	REP 1-460 - 8
PLT1011-6-4	BLIND BOLT	REP 1-460 - 8
PLT1011-6-5,5	BLIND BOLT	REP 1-460 - 3
PLT1011-6-5,5	BLIND BOLT	REP 1-460 - 8
PLT1011-6-6	BLIND BOLT	REP 1-460 - 3
PLT1011-6-6	BLIND BOLT	REP 1-460 - 8
PLT1011-6-6	BLIND BOLT	REP 1-460 -17
PLT1011-6-6,5	BLIND BOLT	REP 1-460 - 3
PLT1011-6-6,5	BLIND BOLT	REP 1-460 - 8
PLT1011-6-7	BLIND BOLT	REP 1-460 - 3
PLT1011-6-7	BLIND BOLT	REP 1-460 - 8
PLT1011-6-7,5	BLIND BOLT	REP 1-460 - 3
PLT1011-6-7,5	BLIND BOLT	REP 1-460 - 8
PLT1011-6-8	BLIND BOLT	REP 1-460 - 3
PLT1011-6-8	BLIND BOLT	REP 1-460 - 8
PLT1014-6-3	BLIND BOLT	REP 1-460 - 3
PLT1014-6-3	BLIND BOLT	REP 1-460 - 4
PLT1014-6-3	BLIND BOLT	REP 1-460 - 8
PLT1014-6-4	BLIND BOLT	REP 1-460 - 8
PLT1014-6-5-5	BLIND BOLT	REP 1-460 - 3
PLT1014-6-5,5	BLIND BOLT	REP 1-460 - 8
PLT1014-6-6	BLIND BOLT	REP 1-460 - 3
PLT1014-6-6	BLIND BOLT	REP 1-460 - 8
PLT1014-6-6-5	BLIND BOLT	REP 1-460 - 3
PLT1014-6-6,5	BLIND BOLT	REP 1-460 - 8
PLT1014-6-7	BLIND BOLT	REP 1-460 - 3
PLT1014-6-7	BLIND BOLT	REP 1-460 - 8
PLT1014-6-7-5	BLIND BOLT	REP 1-460 - 3
PLT1014-6-7,5	BLIND BOLT	REP 1-460 - 8
PLT1014-6-8	BLIND BOLT	REP 1-460 - 3
PLT1014-6-8	BLIND BOLT	REP 1-460 - 3
PLT1014-6-3	BLIND BOLT	REP 1-460 - 8
PLT220-6-3,5	BLIND BOLT	REP 1-460 - 3
PLT220-6-3,5	BLIND BOLT	REP 1-460 -17
PLT220-8-4	BLIND BOLT	REP 1-460 - 8
SPC9000-4-10	SCREW	REP 1-460 - 8
SPC9102C5R-GF	GROMMET	REP 1-460 - 8
SPC9102C5R-SFC290	INSERT	REP 1-460 - 8
SPC9102C5R-SFC298	INSERT	REP 1-460 - 8

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PART NUMBER	DESCRIPTION	REPAIR NUMBER
SPC9102N8BX-GP	GROMMET	REP 1- 50 - 3
SPC9102NA10B-GF	GROMMET	REP 1- 50 - 3
SPC9102NA10BSFC540	INSERT	REP 1- 50 - 3
SPC9102NA8BX-GF	GROMMET	REP 1- 50 - 3
SPC9102NA8BX-SF540	INSERT	REP 1- 50 - 3
SPC9102NA8BX-SF560	INSERT	REP 1- 50 - 3
SPC9102NA8CB-GF	GROMMET	REP 1- 50 - 3
SPC9102NA8CBSFC540	INSERT	REP 1- 50 - 3
SPC9106C5C-RF100	INSERT	REP 1-460 - 8
SPC9106C5C-RF100	INSERT	REP 1-460 - 9
SPC9106-CR5-FC092	INSERT	REP 1-460 - 8
SPC9106C5R-T100	INSERT	REP 1-460 - 8
SPC9400S5CB	WASHER	REP 1-460 - 8
SPC9400S8CB	WASHER	REP 1-460 - 8
SPC9401S5-040	WASHER	REP 1-460 - 3
SPC9401S5-040	WASHER	REP 1-460 - 8
SPC9401S5-040	WASHER	REP 1-460 -15
SPC9401S5-040	WASHER	REP 1-460 -16
SPC9401S6-040	WASHER	REP 1-460 - 3
SPC9405T0075-0075	SHIM	REP 1-460 - 8
SPC9405T0100-0100	SHIM	REP 1-460 - 8
SPC9405T0320-0076	SHIM	REP 1-460 - 8
SPC9407S5	WASHER	REP 1- 50 - 2
SPC9407S6	WASHER	REP 1-460 - 8
SPC9407S6X	WASHER	REP 1-460 - 3
002-004-010-0	SPACING WASHER	REP 1-460 - 6
093-780-031-0	FLANGE NUT	REP 1-460 -15
093-780-032-0	WASHER	REP 1-460 -15
1191-6TNV0562	SCREW THREAD INSERT	REP 1- 50 - 1
21215CM4008	RIVET	REP 1-460 - 3
21215CM4008	RIVET	REP 1-460 - 7
21215CM4008	RIVET	REP 1-460 -12
21215CM4008	RIVET	REP 1-460 -14
21215CM4008	RIVET	REP 1-460 -16
21215CM4012	RIVET	REP 1-460 - 8
21215CM4013	RIVET	REP 1- 50 - 2
21215CM4015	RIVET	REP 1- 50 - 2
21215CM4015	RIVET	REP 1-460 - 3
21215CM4015	RIVET	REP 1-460 - 5
21215CM4015	RIVET	REP 1-460 - 7
21215CM4015	RIVET	REP 1-460 - 8
21215CM4015	RIVET	REP 1-460 -12
21215CM4015	RIVET	REP 1-460 -14
21215CM4015	RIVET	REP 1-460 -15
21215CM4015	RIVET	REP 1-460 -16

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PART NUMBER	DESCRIPTION	REPAIR NUMBER
21215CM4016	RIVET	REP 1- 50 - 2
21215CM4016	RIVET	REP 1-460 - 9
21215CM4022	RIVET	REP 1-460 - 3
21215CM4022	RIVET	REP 1-460 - 5
21215CM4022	RIVET	REP 1-460 - 7
21215CM4022	RIVET	REP 1-460 - 8
21215CM4022	RIVET	REP 1-460 -12
21215CM4022	RIVET	REP 1-460 -14
21215CM4022	RIVET	REP 1-460 -15
21215CM4022	RIVET	REP 1-460 -16
21215CM4022	RIVET	REP 1-460 -17
21215CM4024	RIVET	REP 1-460 - 9
21215CM4813	RIVET	REP 1- 50 - 2
21215CM4814	RIVET	REP 1- 50 - 2
21215CM4816	RIVET	REP 1- 50 - 2
21215CM4816	RIVET	REP 1-460 - 3
21215CM4817	RIVET	REP 1- 50 - 2
21215CM4822	RIVET	REP 1-460 - 3
21215CM4822	RIVET	REP 1-460 -17
21215TB4008	RIVET	REP 1-460 - 7
21215TB4008	RIVET	REP 1-460 - 8
21215TB4010	RIVET	REP 1-460 - 8
21215TC4026	RIVET	REP 1-460 - 9
21215CM2407	RIVET	REP 1-460 - 8
21217CM4013	RIVET	REP 1-460 - 3
21217CM4013	RIVET	REP 1-460 - 5
21217CM4013	RIVET	REP 1-460 - 7
21217CM4013	RIVET	REP 1-460 - 8
21217CM4013	RIVET	REP 1-460 -12
21217CM4013	RIVET	REP 1-460 -14
21217CM4013	RIVET	REP 1-460 -17
21217CM4015	RIVET	REP 1-460 - 3
21217CM4015	RIVET	REP 1-460 - 5
21217CM4015	RIVET	REP 1-460 - 7
21217CM4015	RIVET	REP 1-460 - 8
21217CM4015	RIVET	REP 1-460 - 9
21217CM4015	RIVET	REP 1-460 -12
21217CM4015	RIVET	REP 1-460 -14
21217CM4015	RIVET	REP 1-460 -17
21217CM4016	RIVET	REP 1-460 - 9
21217CM4018	RIVET	REP 1-460 - 3
21217CM4018	RIVET	REP 1-460 - 5
21217CM4018	RIVET	REP 1-460 - 7
21217CM4018	RIVET	REP 1-460 -14
21217CM4020	RIVET	REP 1-460 - 3

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PART NUMBER	DESCRIPTION	REPAIR NUMBER
21217CM4020	RIVET	REP 1-460 - 5
21217CM4020	RIVET	REP 1-460 - 7
21217CM4020	RIVET	REP 1-460 - 8
21217CM4020	RIVET	REP 1-460 - 9
21217CM4020	RIVET	REP 1-460 -12
21217CM4020	RIVET	REP 1-460 -14
21217CM4020	RIVET	REP 1-460 -15
21217CM4020	RIVET	REP 1-460 -16
21217CM4020	RIVET	REP 1-460 -17
21217CM4022	RIVET	REP 1-460 - 9
21217CM4820	RIVET	REP 1-460 - 3
21217CM4820	RIVET	REP 1-465 -17
21217CM4822	RIVET	REP 1-460 - 3
21217TB2406	RIVET	REP 1-460 - 4
21217TB2406	RIVET	REP 1-460 - 8
21217TB2408	RIVET	REP 1-460 - 2
21217TB2408	RIVET	REP 1-460 - 8
21217TC3208	RIVET	REP 1- 30 - 1
2127TC4009	RIVET	REP 1- 30 - 1
2127TC4013	RIVET	REP 1- 30 - 1
21217TC4814	RIVET	REP 1- 30 - 1
21219CM4018	RIVET	REP 1-460 -12
300-864-200-0	INSERT	REP 1-460 - 8
300-864-802-0	BUCKET STOP	REP 1-460 - 5
300-864-802-0	BUCKET STOP	REP 1-460 - 8
300-864-852-0	BUCKET STOP	REP 1-460 - 5
300-864-852-0	BUCKET STOP	REP 1-460 - 8
300-879-901-0	FLANGED RING	REP 1-460 - 8
301-009-401-0	INSERT	REP 1- 50 - 3
301-051-300-0	INSERT	REP 1- 50 - 3
301-051-600-0	INSERT	REP 1- 50 - 3
301-051-700-0	SKEW SHIM	REP 1-460 - 8
301-051-750-0	SKEW SHIM	REP 1-460 - 8
301-051-800-0	SEAL SUPPORT	REP 1-460 - 5
301-051-800-0	SEAL SUPPORT	REP 1-460 - 8
301-051-850-0	SEAL SUPPORT	REP 1-460 - 5
301-051-850-0	SEAL SUPPORT	REP 1-460 - 8
301-084-500-0	INSERT	REP 1-460 - 8
301-084-600-0	NUT	REP 1-460 - 8
301-084-702-0	NUT	REP 1-460 - 2
301-084-702-0	NUT	REP 1-460 - 7
301-084-702-0	NUT	REP 1-460 - 8
301-084-702-0	NUT	REP 1-460 -12
301-084-702-0	NUT	REP 1-460 -14
301-084-800-0	NUT	REP 1-460 - 2

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PART NUMBER	DESCRIPTION	REPAIR NUMBER
301-084-800-0	NUT	REP 1-460 - 7
301-084-800-0	NUT	REP 1-460 -12
301-084-800-0	NUT	REP 1-460 -14
301-085-000-0	BUSH	REP 1-460 - 2
301-085-000-0	BUSH	REP 1-460 - 8
301-085-100-0	BUSH	REP 1- 50 - 1
301-085-100-0	BUSH	REP 1- 50 - 3
301-089-800-0	FLANGED RING	REP 1-460 - 8
301-093-201-0	ANGLE SUPPORT	REP 1-460 - 8
301-093-251-0	ANGLE SUPPORT	REP 1-460 - 8
301-094-201-0	LEADING EDGE COVER	REP 1-460 - 4
301-094-201-0	LEADING EDGE COVER	REP 1-460 - 8
301-094-300-0	INNER FRAME	REP 1-460 - 8
301-094-400-0	OUTER FRAME	REP 1-460 - 8
301-096-101-0	REINFORCING PLATE	REP 1- 50 - 3
301-096-151-0	REINFORCING PLATE	REP 1- 50 - 3
301-096-201-0	REINFORCING PLATE	REP 1- 50 - 3
301-096-251-0	REINFORCING PLATE	REP 1- 50 - 3
301-097-400-0	CAPTIVE NUT	REP 1-460 - 2
301-098-801-0	SHIM	REP 1-460 - 8
301-098-901-0	SHIM	REP 1-460 - 8
301-100-201-0	REINFORCING PLATE	REP 1-460 - 8
301-100-251-0	REINFORCING PLATE	REP 1-460 - 8
301-100-301-0	SHIM	REP 1-460 - 8
301-100-351-0	SHIM	REP 1-460 - 8
301-100-500-0	REINFORCING PLATE	REP 1-460 - 8
301-100-550-0	REINFORCING PLATE	REP 1-460 - 8
301-102-100-0	INNER FRAME	REP 1-460 - 8
301-102-201-0	OUTER FRAME	REP 1-460 - 8
301-102-301-0	SHIM	REP 1-460 - 8
301-102-401-0	SHIM	REP 1-460 - 8
301-103-801-0	EXTERNAL PANEL	REP 1-460 - 8
301-104-301-0	SHIM	REP 1-460 - 8
301-104-351-0	SHIM	REP 1-460 - 8
301-104-401-0	SHIM	REP 1-460 - 8
301-104-451-0	SHIM	REP 1-460 - 8
301-116-200-0	WASHER	REP 1- 50 - 2
301-140-400-0	REINFORCING PLATE	REP 1- 50 - 3
301-140-450-0	REINFORCING PLATE	REP 1- 50 - 3
301-140-500-0	REINFORCING PLATE	REP 1- 50 - 3
301-140-550-0	REINFORCING PLATE	REP 1- 50 - 3
301-140-600-0	REINFORCING PLATE	REP 1- 50 - 2
301-140-650-0	REINFORCING PLATE	REP 1- 50 - 2
301-140-700-0	REINFORCING PLATE	REP 1- 50 - 2
301-140-750-0	REINFORCING PLATE	REP 1- 50 - 2

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REPAIR PARTS LIST

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PART NUMBER	DESCRIPTION	REPAIR NUMBER
301-140-800-0	REINFORCING PLATE	REP 1- 50 - 2
301-140-850-0	REINFORCING PLATE	REP 1- 50 - 2
301-140-900-0	WASHER	REP 1- 50 - 2
301-147-600-0	BACK-UP PLATE	REP 1-460 - 5
301-147-600-0	BACK-UP PLATE	REP 1-460 - 8
301-147-600-0	BACK-UP PLATE	REP 1-460 - 8
301-147-650-0	BACK-UP PLATE	REP 1-460 - 5
301-147-650-0	BACK-UP PLATE	REP 1-460 - 8
301-147-700-0	BACK-UP PLATE	REP 1-460 - 5
301-147-700-0	BACK-UP PLATE	REP 1-460 - 8
301-150-500-0	ADJUSTING SHIM	REP 1-460 - 8
301-150-501-0	ADJUSTING SHIM	REP 1-460 - 8
301-150-510-0	ADJUSTING SHIM	REP 1-460 - 8
301-150-511-0	ADJUSTING SHIM	REP 1-460 - 8
301-150-702-0	INSERT	REP 1- 30 - 1
301-150-802-0	INSERT	REP 1- 30 - 1
301-150-902-0	INSERT	REP 1- 30 - 1
301-151-002-0	FILLER	REP 1- 30 - 1
301-151-102-0	FILLER	REP 1- 30 - 1
301-151-202-01	FILLER	REP 1- 30 - 1
302-020-400-0	INSERT	REP 1- 30 - 1
302-021-001-0	FRONT DOUBLER	REP 1-460 - 8
302-021-001-0	FRONT DOUBLER	REP 1-460 -16
302-021-051-0	FRONT DOUBLER	REP 1-460 - 8
302-021-051-0	FRONT DOUBLER	REP 1-460 -16
302-021-101-0	CENTRAL DOUBLER	REP 1-460 - 8
302-021-101-0	CENTRAL DOUBLER	REP 1-460 -16
302-021-151-0	CENTRAL DOUBLER	REP 1-460 - 8
302-021-151-0	CENTRAL DOUBLER	REP 1-460 -16
302-021-201-0	REAR DOUBLER	REP 1-460 - 8
302-021-201-0	REAR DOUBLER	REP 1-460 -16
302-021-251-0	REAR DOUBLER	REP 1-460 - 8
302-021-251-0	REAR DOUBLER	REP 1-460 -16
302-021-500-0	STEPPED WASHER	REP 1-460 - 8
302-021-500-0	STEPPED WASHER	REP 1-460 -16
302-021-600-0	STEPPED WASHER	REP 1-460 - 8
302-021-600-0	STEPPED WASHER	REP 1-460 -16
302-021-700-0	BUSH	REP 1-460 - 8
302-021-700-0	BUSH	REP 1-460 -16
302-021-800-0	WASHER	REP 1-460 - 8
302-021-800-0	WASHER	REP 1-460 -16
302-023-200-0	REAR SHIM	REP 1-460 - 8
302-023-300-0	CENTRAL SHIM	REP 1-460 - 8
302-023-400-0	FRONT SHIM	REP 1-460 - 8
302-023-500-0	SHIM	REP 1-460 - 5

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REPAIR PARTS LIST

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PART NUMBER	DESCRIPTION	REPAIR NUMBER
302-023-500-0	SHIM	REP 1-460 - 8
302-023-600-0	BUSH	REP 1-460 - 8
302-023-600-0	BUSH	REP 1-460 -16
302-023-801-0	SHIM	REP 1-460 - 5
302-023-801-0	SHIM	REP 1-460 - 8
302-061-500-0	INSULATION	REP 1- 40 - 2
302-900-000-6	SEAL	REP 1- 40 - 1
3591-3CNV0190	SCREW THREAD INSERT	REP 1-460 - 2
3591-3CNV0190	SCREW THREAD INSERT	REP 1-460 - 8
3591-4CNV0250	SCREW THREAD INSERT	REP 1-460 - 2
3591-4CNV0250	SCREW THREAD INSERT	REP 1-460 - 8
3591-4CNV0250	SCREW THREAD INSERT	REP 1-460 -15
3591-4TNV0250	SCREW THREAD INSERT	REP 1- 50 - 1
3591-6TNV0375	SCREW THREAD INSERT	REP 1-460 - 1
525-003-359-0	WASHER	REP 1-460 -14
525-003-859-0	WASHER	REP 1-460 - 7
525-003-859-0	WASHER	REP 1-460 -12
525-033-859-0	WASHER	REP 1-460- 13
525-600-128-0	INNER EDGING	REP 3-130 - 2
61170-428	SERRATED NUT	REP 1-460 - 8
649-772-310-0	RIVET	REP 1-460 - 9
649-772-311-0	WASHER	REP 1-460 - 9
650-355-013-0	WASHER	REP 1-460 - 8
650-355-014-0	WASHER	REP 1-460 - 9

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REPAIR PARTS LIST

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REPAIR

SCREW (1-10)

1. Restoring the silverplating

PARTS REQUIRED FOR REPAIR

- A. Restore the silverplating on the screw thread by Method M 303 B b) as described in Chapter 70-15-30 : "SURFACE TREATMENTS", as shown in figure 401, and additionally instructed in the following :
- (1) Remove the original plating by Method M 109 A described in Chapter 70-50-20 "CLEANING AND REMOVAL OF SURFACE COATINGS".
 - (2) Test for cracks by the post-emulsifying fluorescent penetrant procedure, Method M 504 B in Chapter 70-20-10 "DYE PENETRANT INSPECTION".

78-31-01

REP 1-10-1

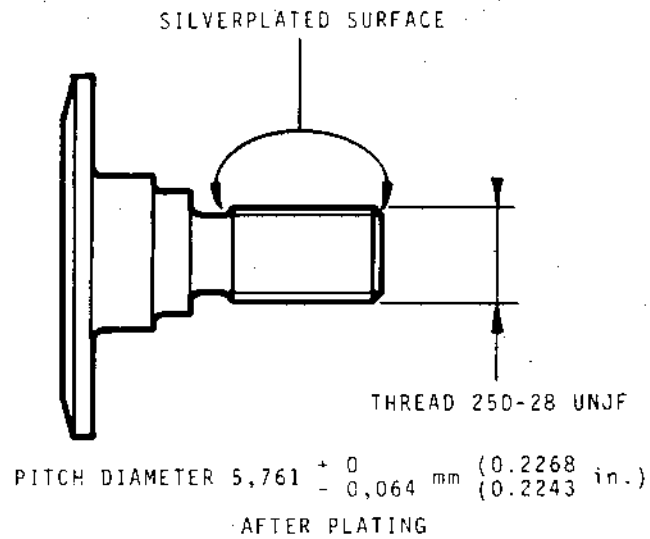
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Restoring the Silverplating
Figure 401

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REP 1-10-1
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REPAIR

SCREW (1-10)

1. Restoring the metallizing

PARTS REQUIRED FOR REPAIR

Chromium carbide powder (P 3202)

- A. Restore the metallizing as instructed in Chapter 70-65-20 "SPRAY-COATING BY PLASMA TORCH", in figure 401, and in the following :
- (1) Remove the existing metallic coat by sandblasting, as instructed in Chapter 70-65-20 "SPRAY-COATING BY PLASMA TORCH".
 - (2) Check for cracks by the post-emulsifying fluorescent penetrant procedure, Method 504 B, described in Chapter 70-20-10 "DYE PENETRANT INSPECTION".
 - (3) Spraying powder : P 3202.
 - (4) Test pieces for stamping tests and metallographic inspection are from sheeting P 3328, 1,2 mm (0.047 in.) in thickness, while control test-pieces from sheeting P 3328, 4 mm (0.157 in.) in thickness.
- B. Inspect the metal coating as instructed in Chapter 70-65-80 "INSPECTION OF COATINGS".

78-31-01

REP 1-10-2

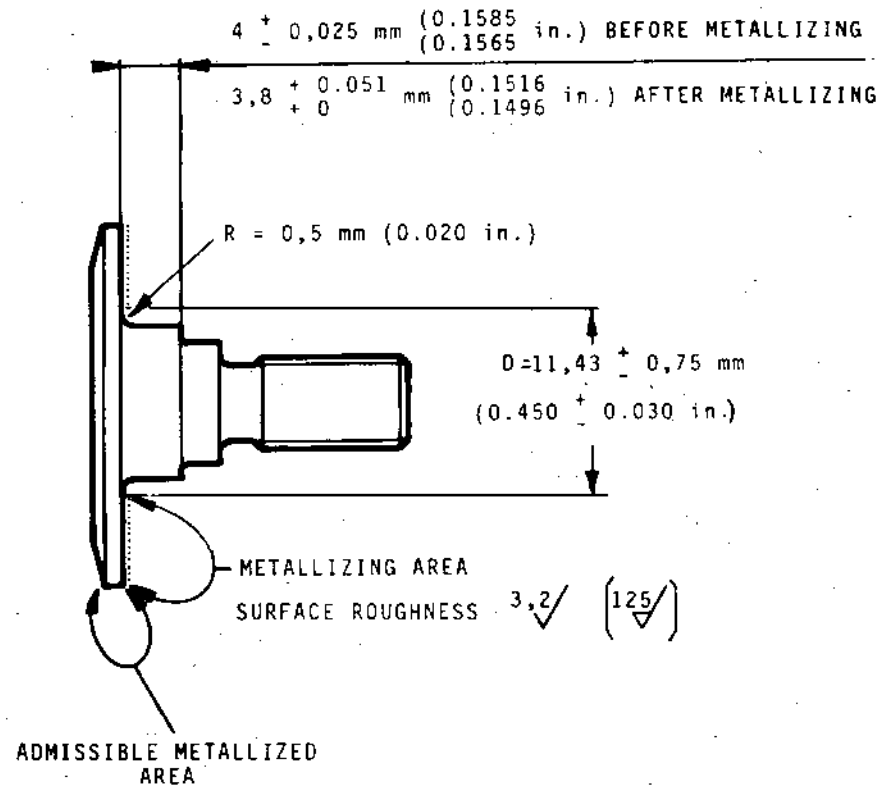
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Restoring the Metallizing
Figure 401

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REPAIR

THREADED SLEEVE (1-20)

1. Reconditioning of metallic plating

PARTS REQUIRED FOR REPAIR

Metallic powder P 3202

A. Removal of coating

Remove the existing defective coating by sand blasting as indicated in chapter 70-65-20.

B. Inspection

Carry out a soundness inspection with post-emulsification fluorescent dye penetrant, using method M 504 B of chapter 70-20-10.

If cracked, scrap the part.

C. Reconditioning the coating

(1) Plug the 2-off 3,175 mm (0.125 in) dia. holes, and the 7,938 mm (0.3125 in) dia. bore to avoid any possible metallization in these areas.

(2) Apply the metallic coating as per instructions in chapter 70-65-20 and figure 401.

Metallic powder : P 3202

Coating thickness : 0,1 to 0,2 mm (0.004 to 0.008 in)

D. Inspection

(1) Check the coating quality as per instructions in chapter 70-65-80 and figure 401.

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REPAIR

THREADED SLEEVE (1-20)

2. Reconditioning of silver plating

PARTS REQUIRED FOR REPAIR

A. Recondition the silver plating, as indicated below, and using process M 303 B (b) of chapter 70-15-30, as indicated on figure 401.

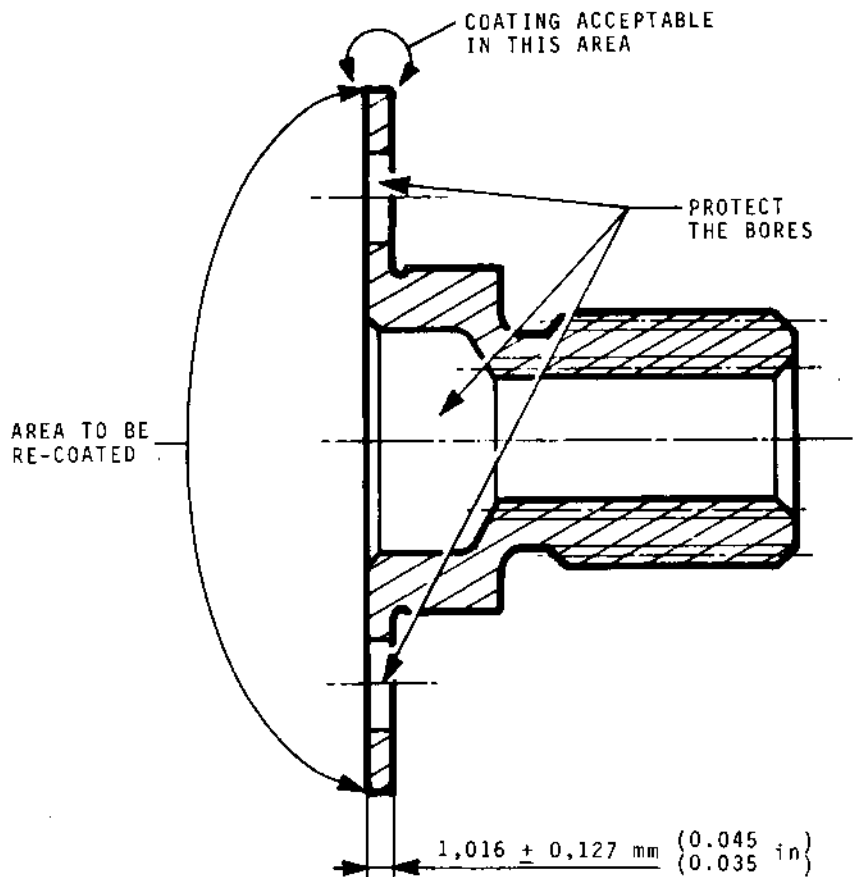
- (1) Remove the existing plating using process M 109 B.
- (2) Crack-test with post-emulsification fluorescent-dye penetrant using process M 504 B of chapter 70-20-10.
If cracked, scrap the part.
- (3) Plating thickness : 0,007 to 0,015 mm (0.0003 to 0.0006 in).

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Reconditioning the Metallic Coating
Figure 401

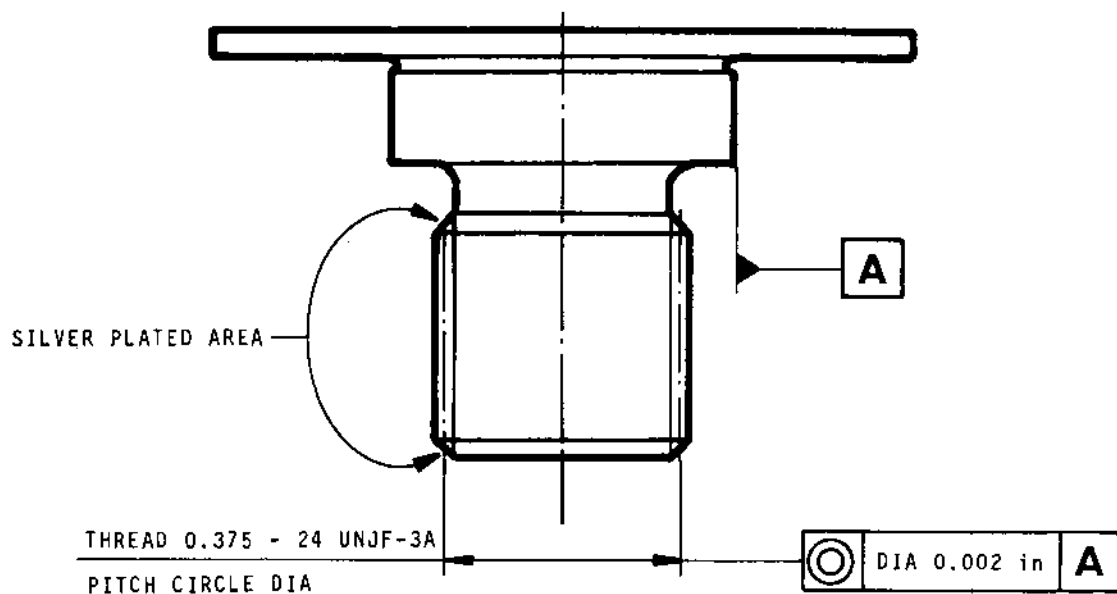
78-31-01

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BEFORE SILVER PLATING 8,811 $\begin{smallmatrix} - 0 \\ - 0,074 \end{smallmatrix}$ mm $\begin{smallmatrix} (0.3469 \\ (0.3440 \end{smallmatrix}$ in)

AFTER SILVER PLATING 8,837 $\begin{smallmatrix} - 0 \\ - 0,074 \end{smallmatrix}$ mm $\begin{smallmatrix} (0.3479 \\ (0.3450 \end{smallmatrix}$ in)

Reconditioning of Silver Plating
Figure 401

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REP 1-20-2

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REPAIR

PRIMARY HEAT SHIELD ASSY (1-30)

1. Renewal of riveted parts or of the retaining rivets

PARTS REQUIRED FOR REPAIR

Insert No.	301.150.702.0
Insert No.	301.150.802.0
Insert No.	301.150.902.0
Insert No.	302.020.400.0
Filler No.	301.151.002.0
Filler No.	301.151.102.0
Filler No.	301.151.202.0
Rivet No.	BNAE 21 215 TC 3208 (650.015.074.0)
	or BNAE 21 215 TC 4009 (650.015.102.0)
Rivet No.	BNAE 21 217 TC 4013 (650.025.106.0)
	or BNAE 21 217 TC 4814 (650.025.137.0)

- A. Remove the rivets retaining the Filler or the insert by grinding away the head.
- B. Inspect the rivet holes as per instructions in chapter 70-50-10.
- C. If necessary, ream the rivet holes to the next largest diameter, as indicated on figure 401 and in chapter 70-50-10.
- D. If necessary fit a new Filler or insert. Fit new rivets as per instructions in chapter 70-50-10 and figure 401.
- E. Inspect the riveting as per instructions in chapter 70-50-80.

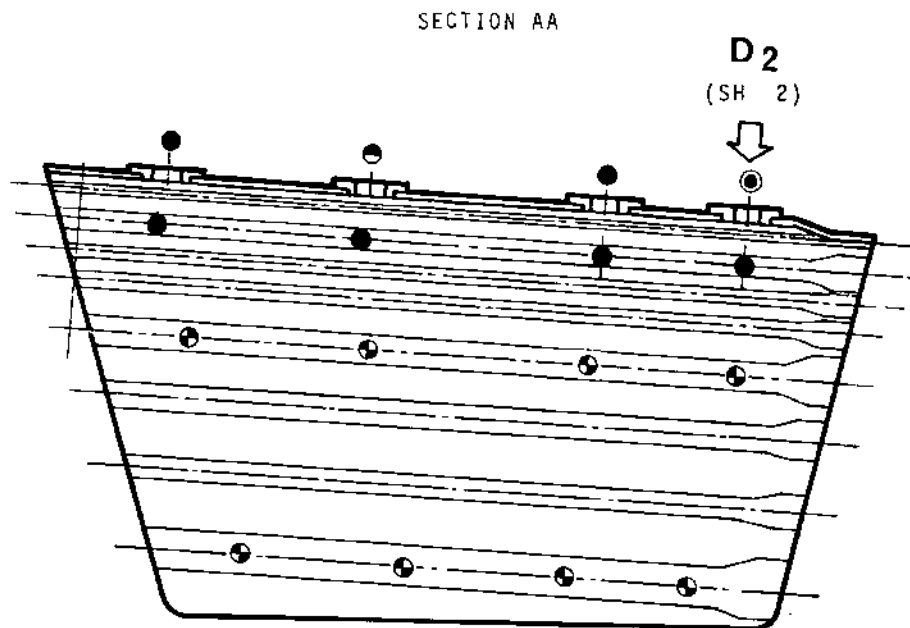
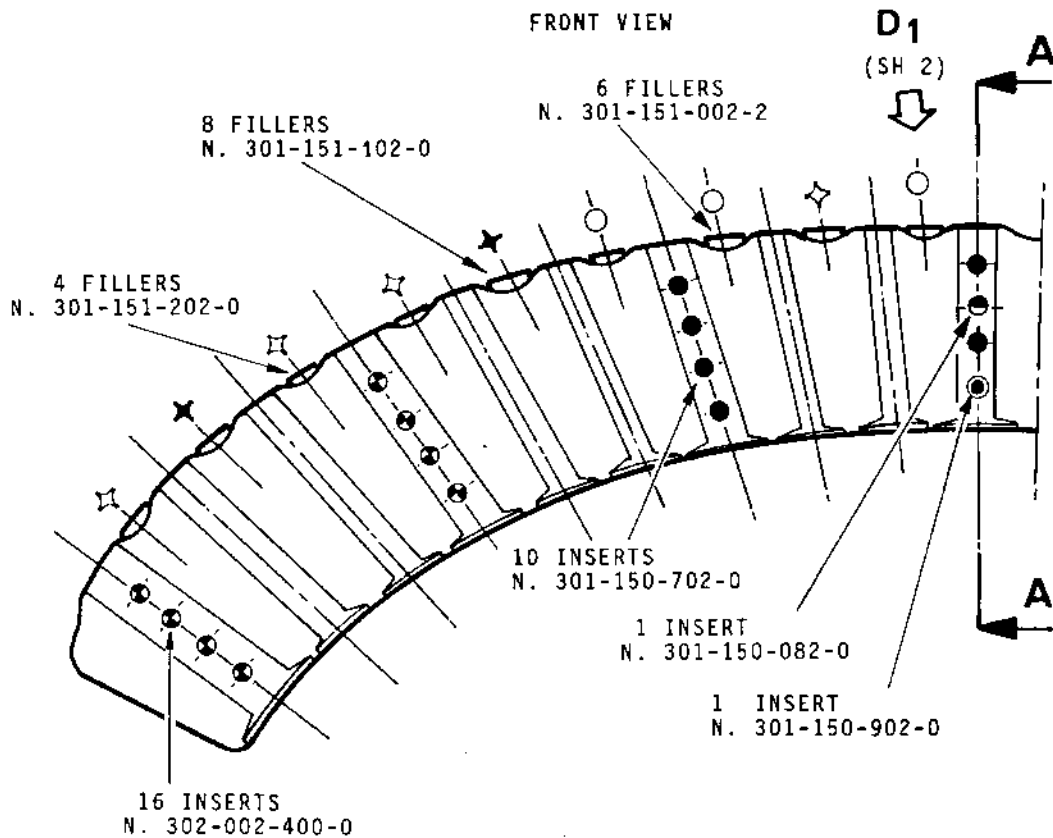
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Renewal of Riveted Parts
Figure 401 (Sheet 1 of 4)

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REP 1-30-1

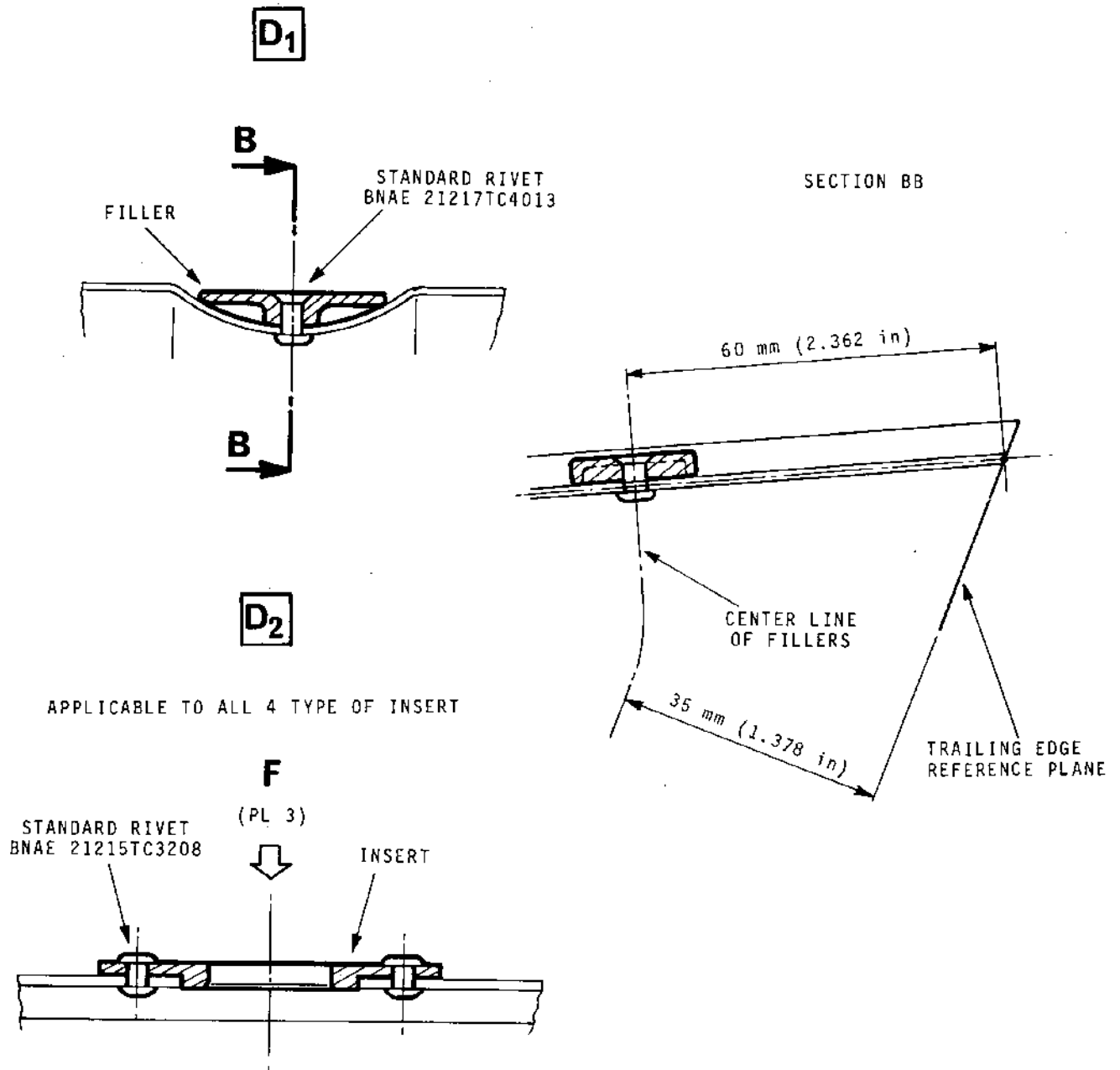
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Renewal of Riveted Parts
Figure 401 (Sheet 2 of 4)

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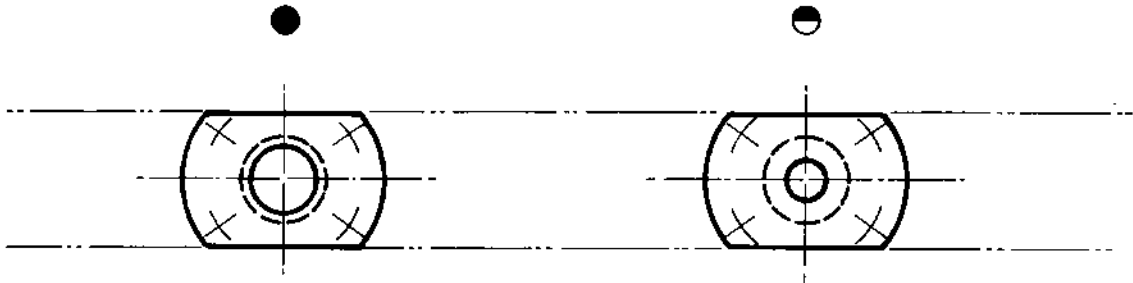
MK.610-14-28
OVERHAUL



F

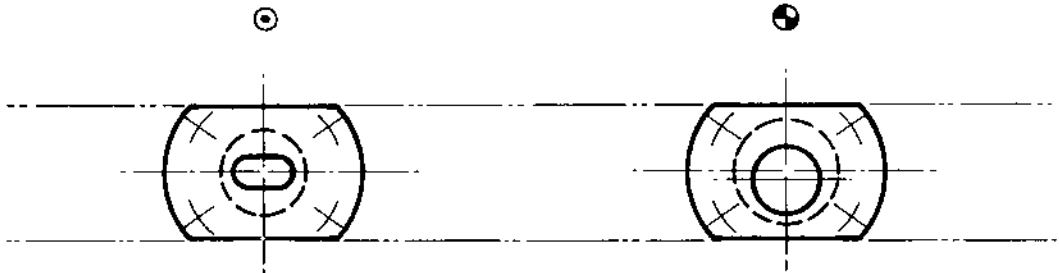
INSERT
N° 301-150-702-0

INSERT
N° 301-150-802-0



INSERT
N° 301-150-902-0

INSERT
N° 302-020-400-0



Renewal of Riveted Parts
Figure 401 (Sheet 3 of 4)

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RIVET DETAILS

STANDARD RIVET REPAIR RIVET	DIAMETER mm (in)	LENGTH mm (in)	MATERIAL	HEAD SHAPE
BNAE 21215 TC 3208	3,2 (0.126)	8 (0.315)	NC 15 Fe	U
BNAE 21215 TC 4009	4 (0.157)	9 (0.354)	NC 15 Fe	U
BNAE 21217 TC 4013	4 (0.157)	13 (0.512)	NC 15 Fe	F 100
BNAE 21217 TC 4814	4,8 (0.189)	14 (0.551)	NC 15 Fe	F 100

Renewal of Riveted Parts
Figure 401 (Sheet 4 of 4)

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REPAIR

PRIMARY HEAT SHIELD (1-30)

2. Plasma-Spray repair of leading, trailing and side edges

PARTS REQUIRED FOR REPAIR

Metal powder	P	3203
Metal powder	P	3205

A. Removal of the coating

Remove the existing metal coating by sand blasting, as instructed in Chapter 70-65-20.

B. Soundness inspection

Crack test the blasted area with water washable fluorescent dye penetrant using method M 502 B in Chapter 70-20-10. If cracks are found, lay the part on one side, pending a switable repair scheme.

C. Reconditioning of the coating

NOTE : Prior to sandblasting, smooth out the contours with a fine emery cloth near the worm surfaces.

Spray the coating using a plasma torch as per instructions in chapter 70-65-20, and as indicated on figure 401 and below.

- (1) Spray a primer coat : P 3203
Coat thickness : 0,05 to 0,1 mm (0.0020 - 0.0040 in)
- (2) Spray a metal coat : P 3205
Coat thickness : 0,1 to 0,15 mm (0.0040 - 0.0060 in)

NOTE : The coating is left as sprayed.

D. Inspection of the metal coating

Check the adhesion and condition of the coating as per Chapter 70-65-80.



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Check that the thickness of the coating is correct.

If the coating is not satisfactory, recommence reconditioning.

E. Marking

- (1) Inscribe "REP 2" next after the part number, by Method M 28 described in Chapter 70-10-10.

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REP 1-30-2
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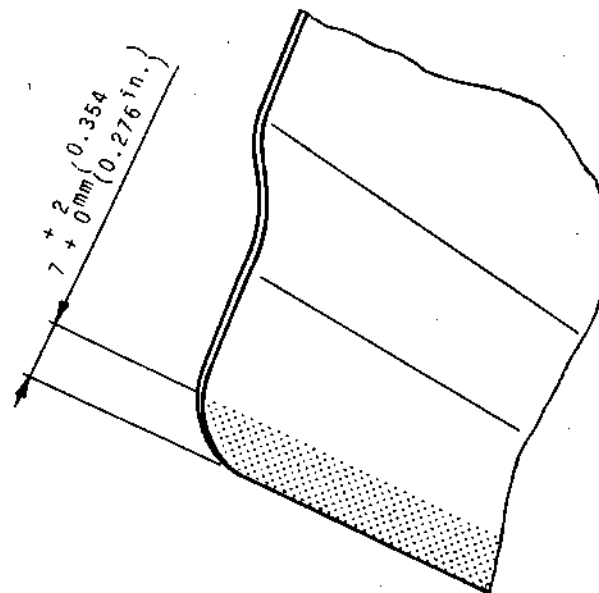
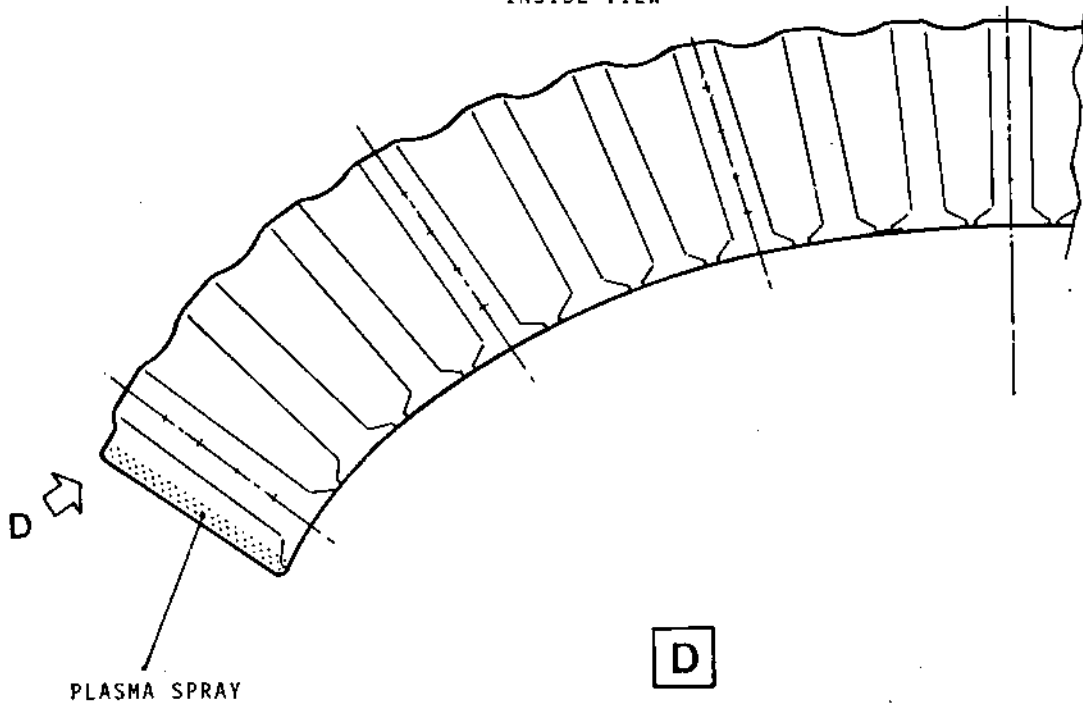
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INSIDE VIEW



Plasma-Spray Repair of Side Edges
Figure 401

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REP 1-30-2

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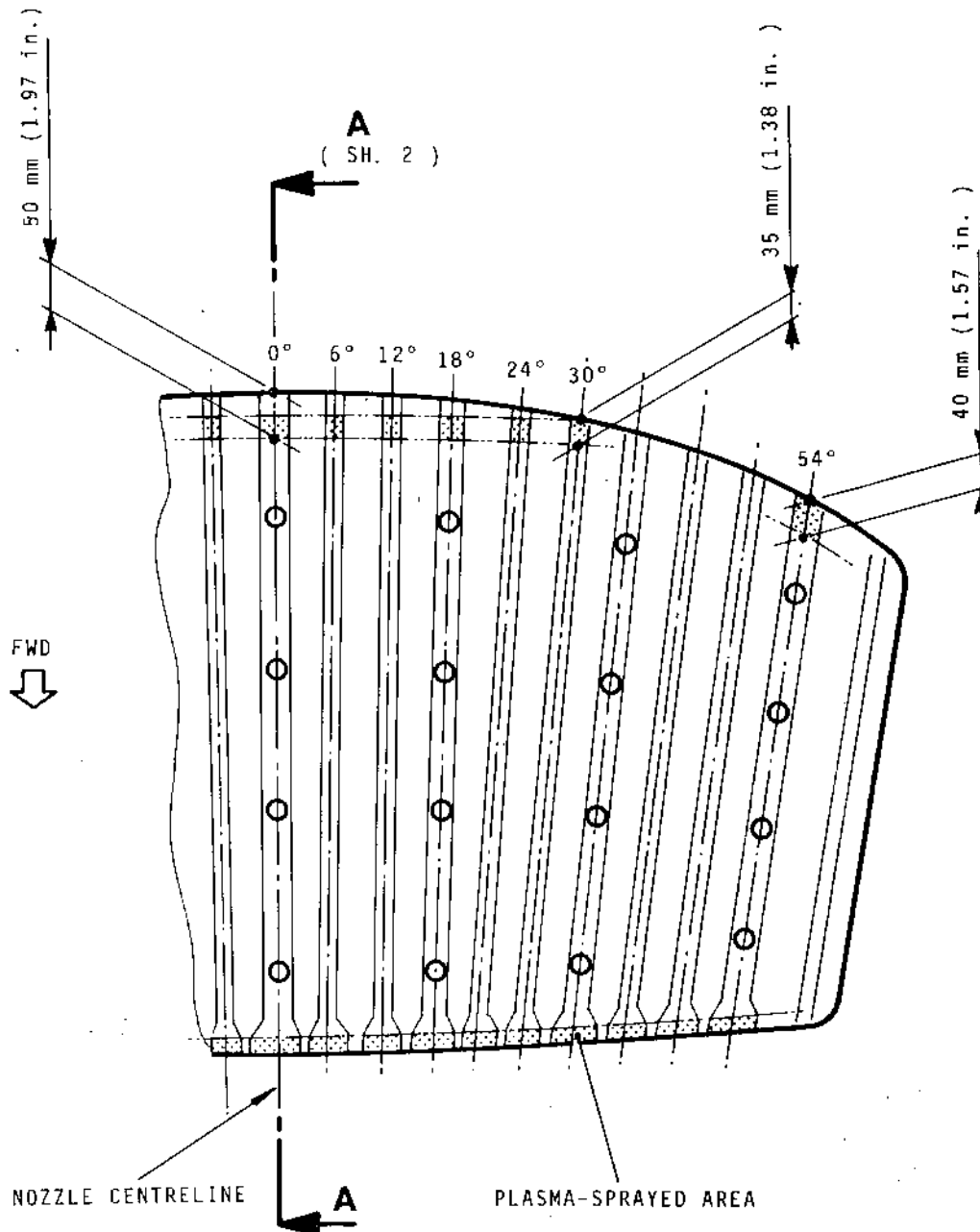


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VIEW OF HEAT SHIELD
FROM ABOVE



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Plasma-Spray Repair of Leading and Trailing Edges
Figure 402 (Sheet 1 of 3)

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REP 1-30-2

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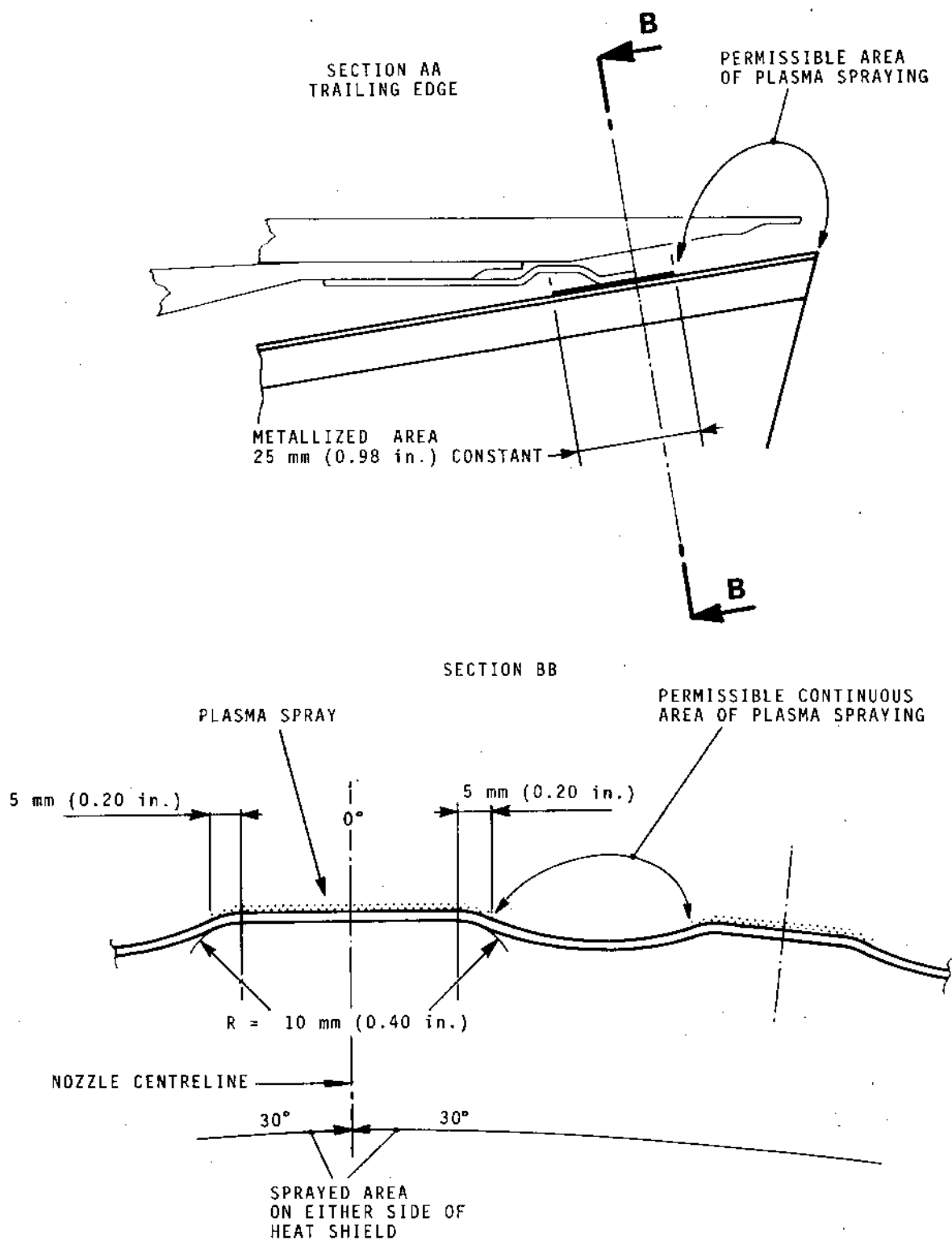


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Plasma-Spray Repair of Leading and Trailing Edges
Figure 402 (Sheet 2 of 3)

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REP 1-30-2

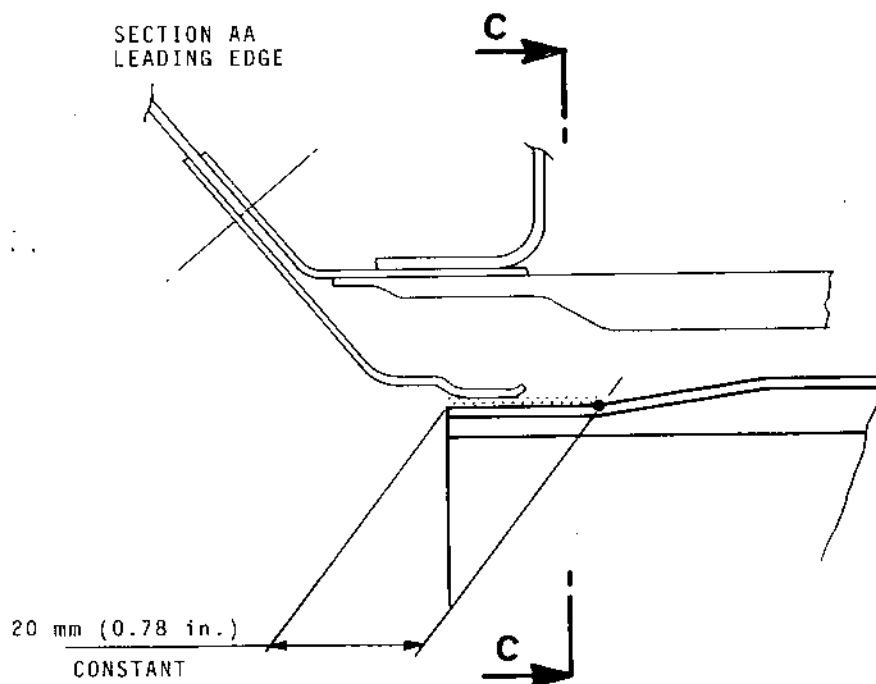
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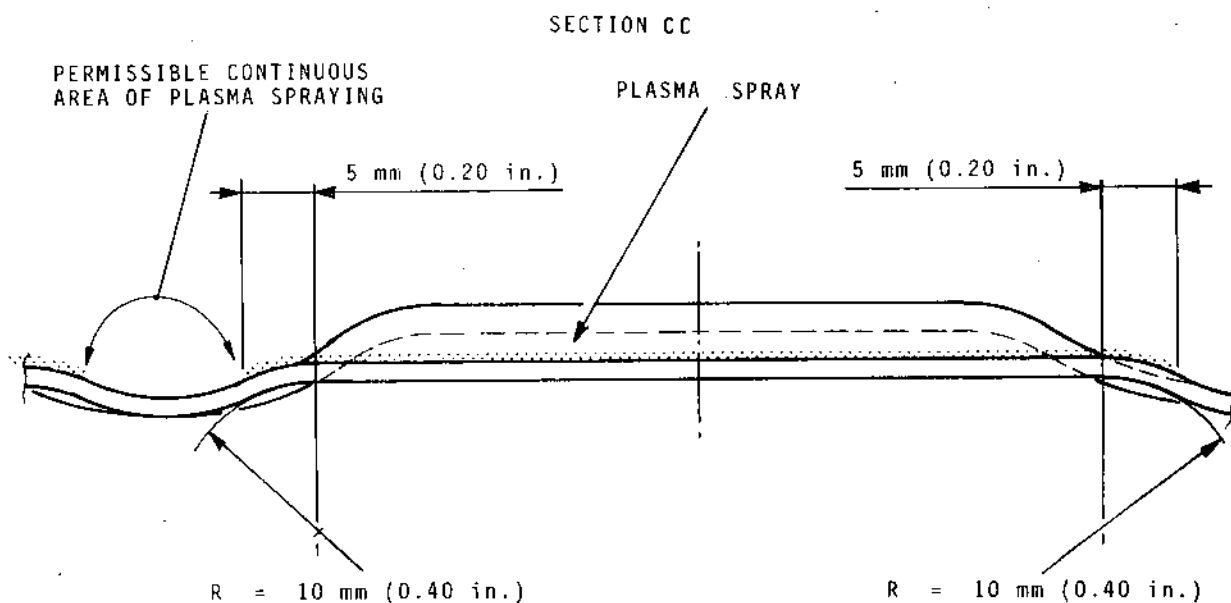


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Plasma-Spray Repair of Leading and Trailing Edges
Figure 402 (Sheet 3 of 3)

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REP 1-30-2

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REPAIR

PRIMARY HEAT SHIELD (1-30)

3. Weld Build-up of Worm Surfaces at the Leading and Trailing Edges.

PARTS REQUIRED FOR REPAIR

A. Preparing the Part.

- (1) Smooth out worm surfaces with a fine emery cloth.
- (2) Clean the smoothed areas by wet sand-blasting as per method M103A in chapter 70-15-20.

B. Weld Build-up of Worm Areas.

- (1) Install copper heat dissipators on the face opposite the area to weld build-up.
- (2) Weld build-up the worm areas by argon arc-welding, using method described in chapter 70-35-10. Let the part cool down to ambient temperature between two runs.
 - (a) Filler metal: P3024 (NC20K14).
 - (b) Weld class: B2.

C. Honing of Weld Built-up Areas.

- (1) Straighten up distortions, if required.
- (2) Hone the weld built-up areas to the profile of the adjacent areas per figure 401.

D. Inspection of Welding.

- (1) Inspect B2 class welding on the weld built-up areas, as per chapter 70-35-80.
 - (a) Crack test with water washable fluorescent dye penetrant using method M502B in chapter 70-20-10.

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REP 1-30-3

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(b) X-ray inspection as per chapter 70-35-80.

(c) Defect criteria are given in chapter 70-35-80.

E. Metal Coating.

- (1) Spray a metal coating on weld built-up areas at the leading and trailing edges, as per REP 1-30-2 in Overhaul Manual 78-31-01.

F. Marking.

Inscribe "REP 3" in the part identification area, as per Method M28 described in CHAPTER 70-10-10.

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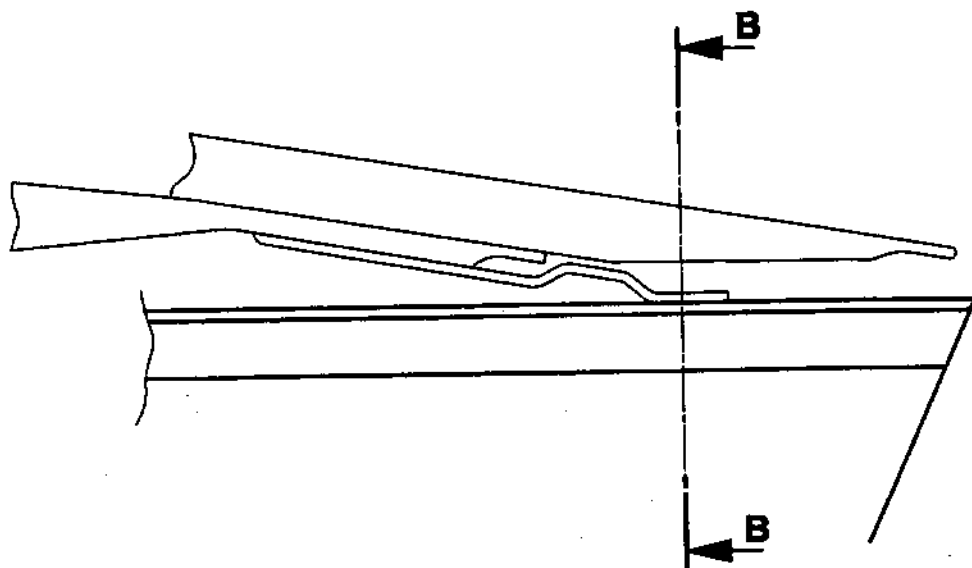
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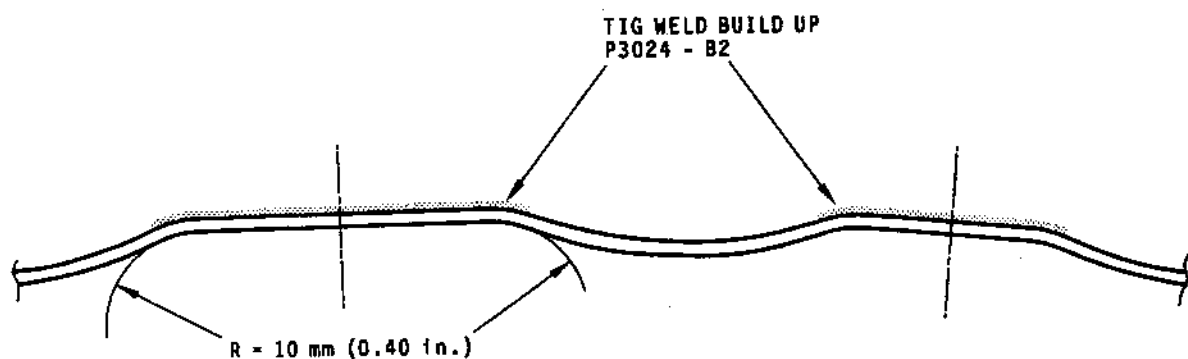
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TRAILING EDGE PROFILE



SECTION BB



S-OLY-SM-00040-00-B

Weld Build-Up of worms areas
Figure 401 (Sheet 1 of 2)

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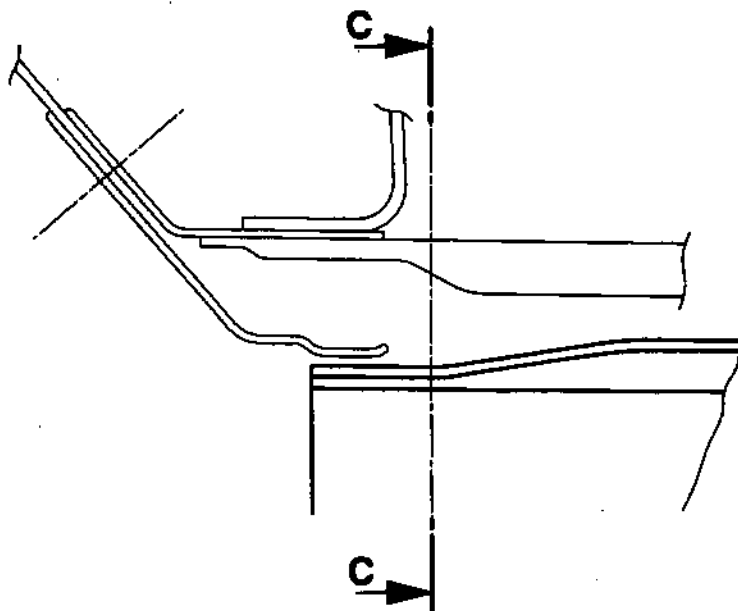
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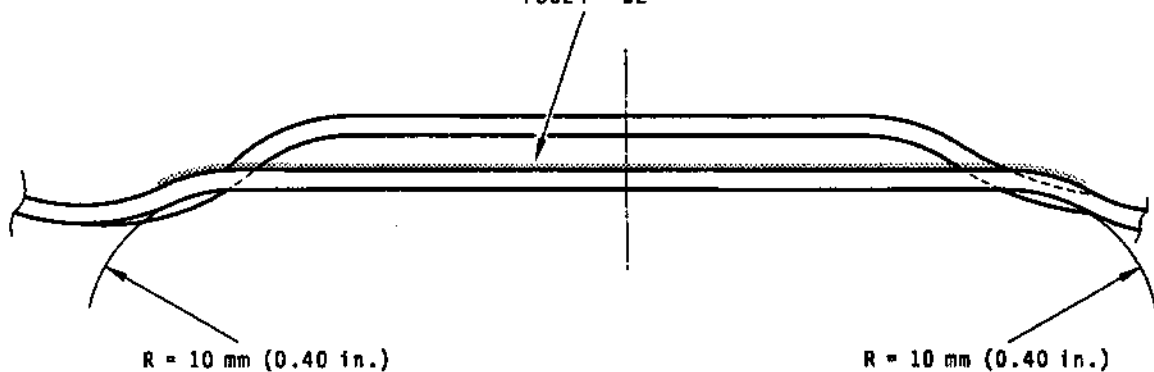
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LEADING EDGE PROFILE



SECTION CC

TIG WELD BUILD UP
P3024 - B2



S-OLY-SM-00041-00-B

Weld Build-Up of Worms Areas
Figure 401 (Sheet 2 of 2)

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REP 1-30-3

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REPAIR

SECONDARY HEAT SHIELD ASSEMBLY (1-40)

1. Replacement of the seal and/or the rivets

PARTS REQUIRED FOR REPAIR

Seal	No. 302-900-000-6	
Pop blind rivet	CR 2839-4-2	(649-772-192-0)

- A. Drill the original rivets out using a 2.8 mm drill bit (0.11 in. Dia.).
- B. Remove the damaged seal and recover the angle-irons and the riveting plate.
- C. Prepare the new seal as per figure 401.
- D. Position, then rebores the rivets passage holes in the angle-irons, the riveting plate and in the heat shield to 3.63-3.71 mm diameter (0.143-0.146 in. Dia.).
- E. Position the seal, the angle-irons and the riveting plate on the heat shield as per figure 401, then fasten the assembly using clamps.

NOTE: Spread the mesh of the metallic braid using a scribe so as to facilitate the installation of the attachment elements.

- F. Install the pop blind rivets as per chapter 70-50-50 of the Standard Practices Manual and figure 401, starting with the median axis of the heat shield and working toward the sides.
- G. Check the riveting as per chapter 70-50-85 of the Standard Practices Manual.

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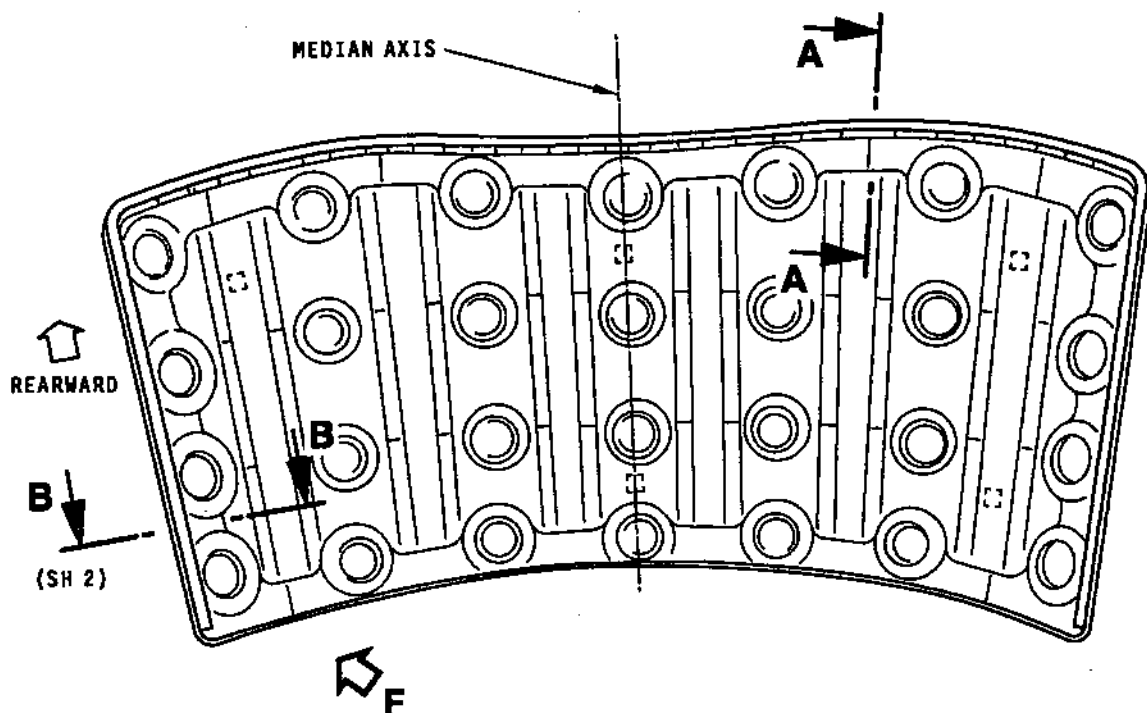
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OVERHAUL

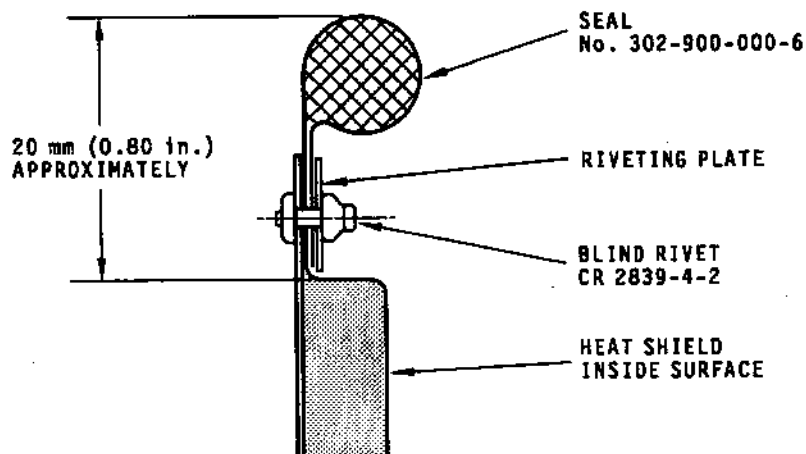


sneema

INSIDE VIEW



SECTION AA



S-OLY-SM-00060-00-8

Replacement of the Seal
Figure 401 - sheet 1 of 2

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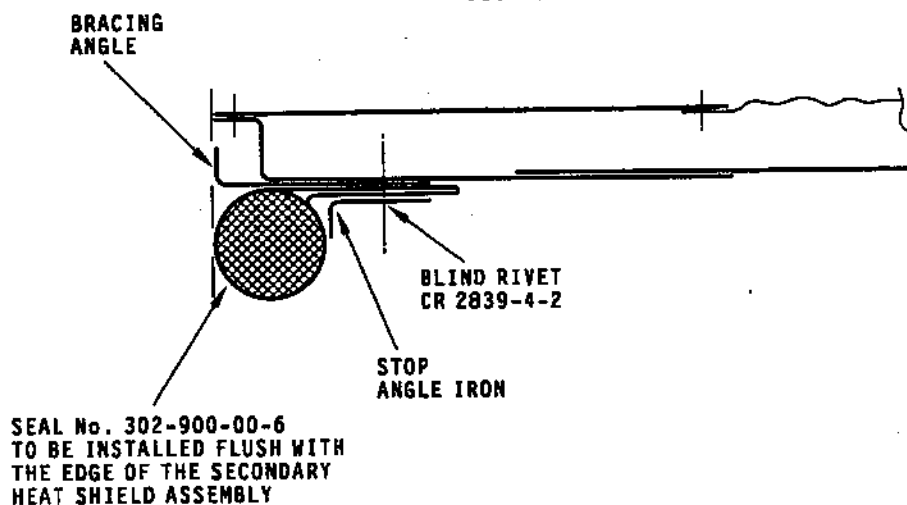
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OVERHAUL



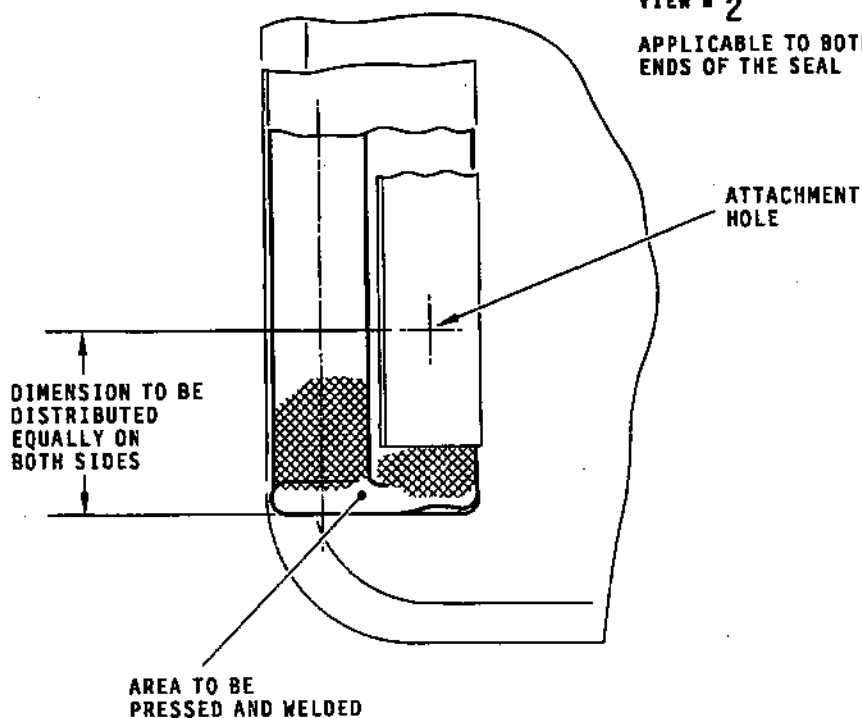
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SECTION BB



VIEW F₂

APPLICABLE TO BOTH
ENDS OF THE SEAL



S-OLY-SM-00042-00-B

Replacement of the Seal
Figure 401 (sheet 2 of 2)

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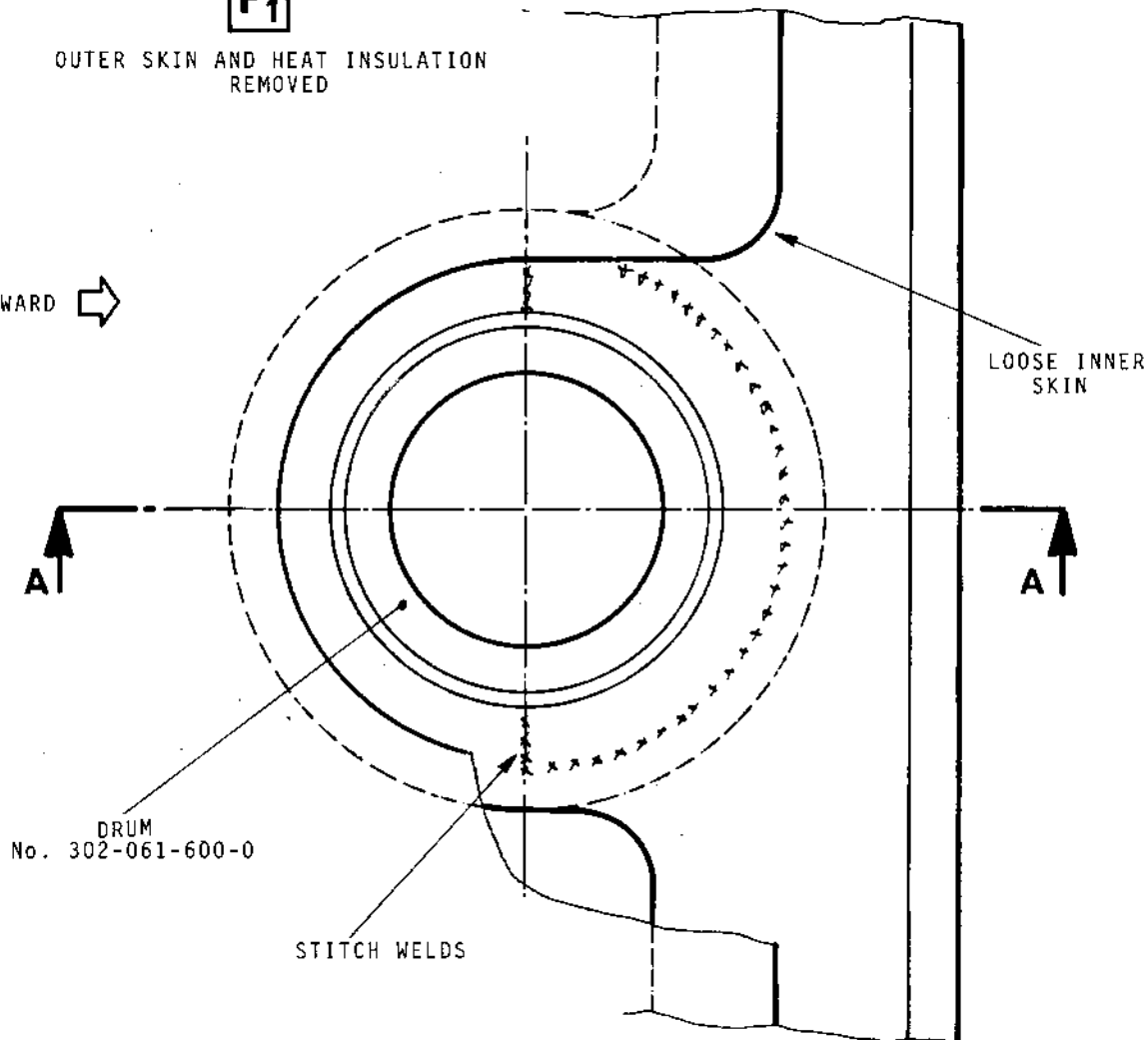
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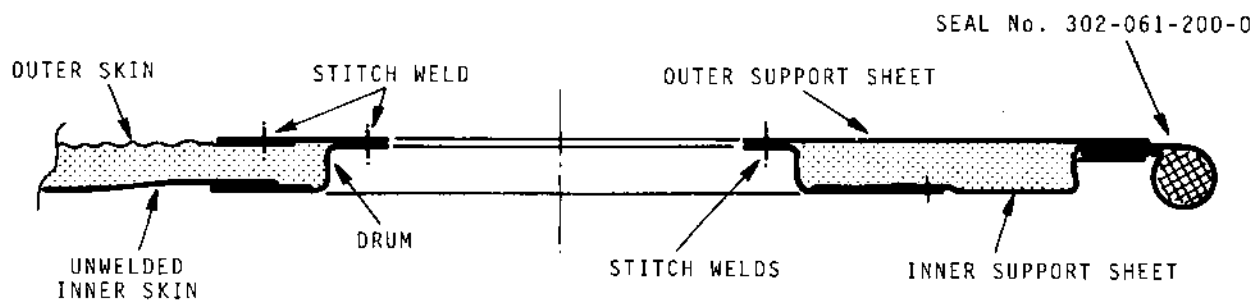
F₁

OUTER SKIN AND HEAT INSULATION
REMOVED

REARWARD →



SECTION A-A
APPLICABLE TO 17 PERIPHERAL OPENINGS



Replacing Welded or Riveted Elements
Figure 401 (Sheet 2 of 6)

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Page 404
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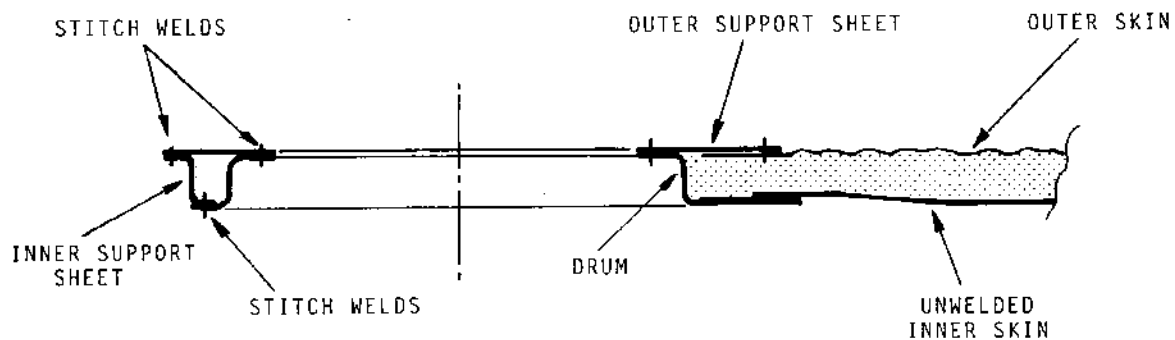
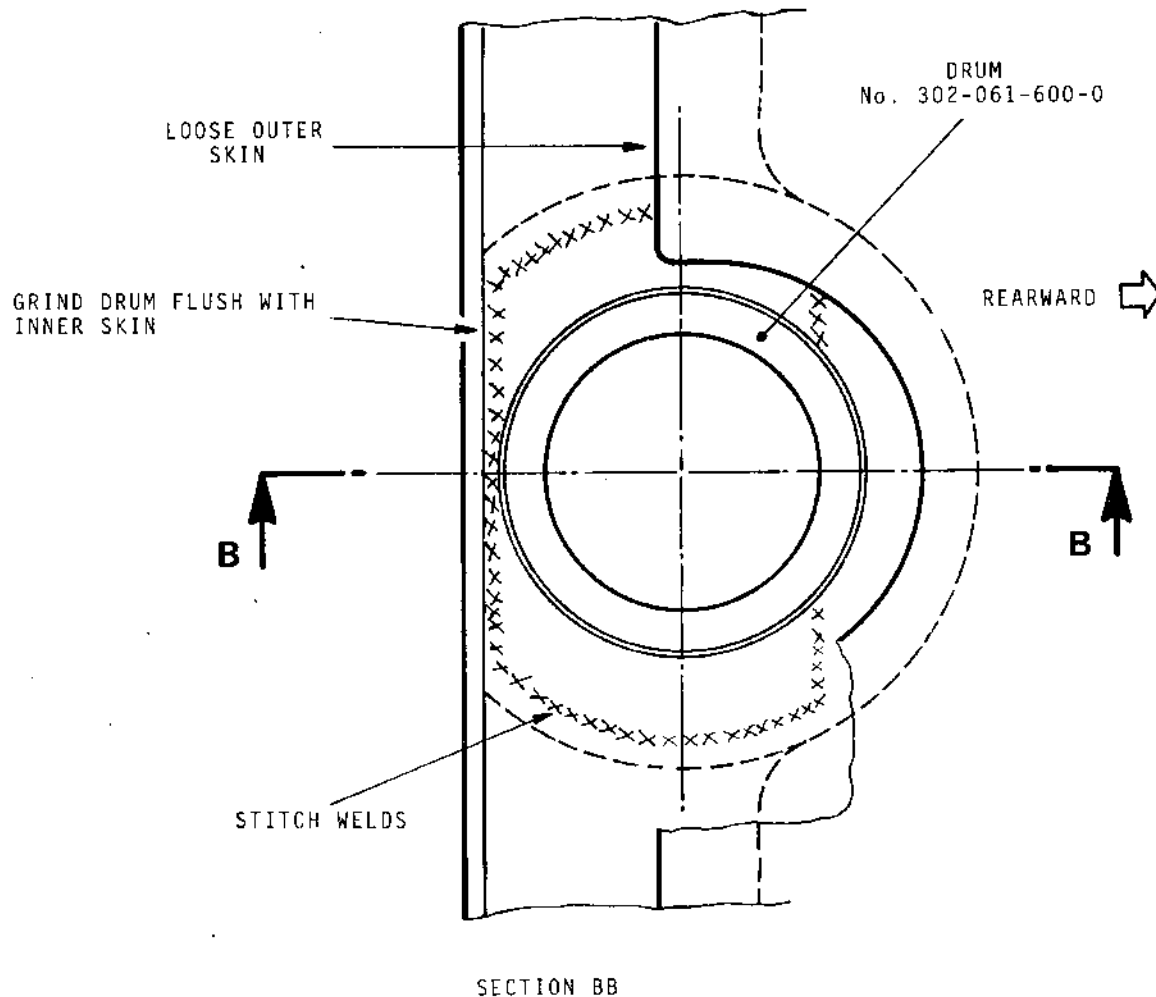
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SUPPORT SHEET/OUTER SKIN AND HEAT INSULATION REMOVED



Replacing Welded or Riveting Elements
Figure 401 (Sheet 3 of 6)

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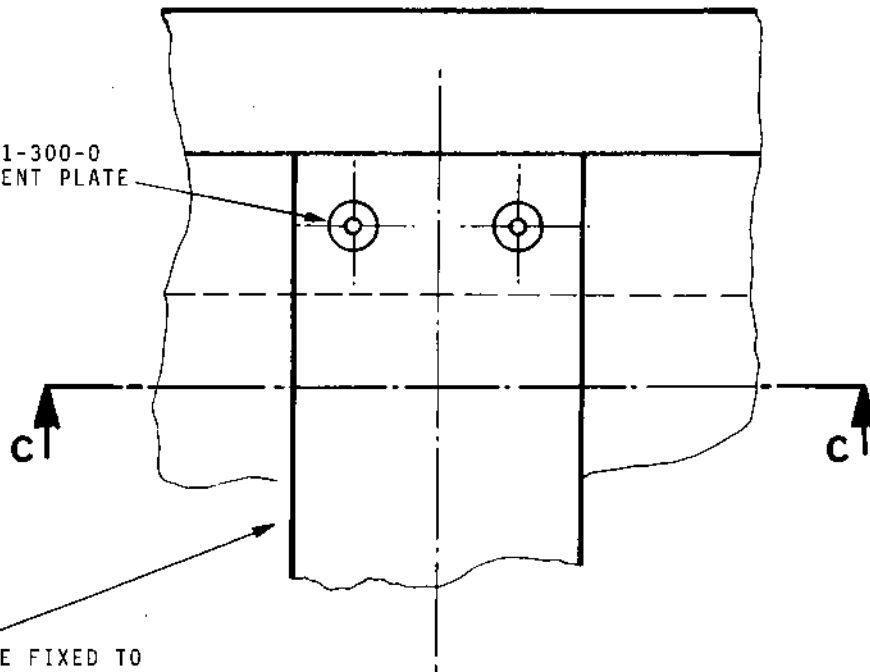
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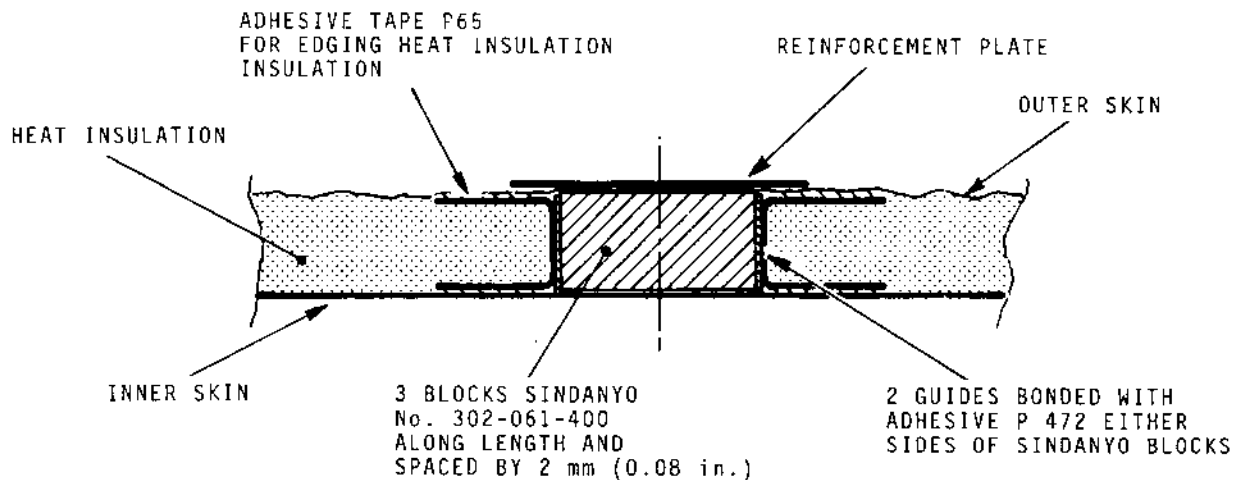
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2 RIVETS No. 302-061-300-0
PER EACH REINFORCEMENT PLATE



REINFORCEMENT PLATE FIXED TO
OUTER SKIN BY MEANS OF 3 STRIPS
OF ADHESIVE TAPE P65

SECTION CC



Replacing Welded or Riveted Elements
Figure 401 (Sheet 4 of 6)

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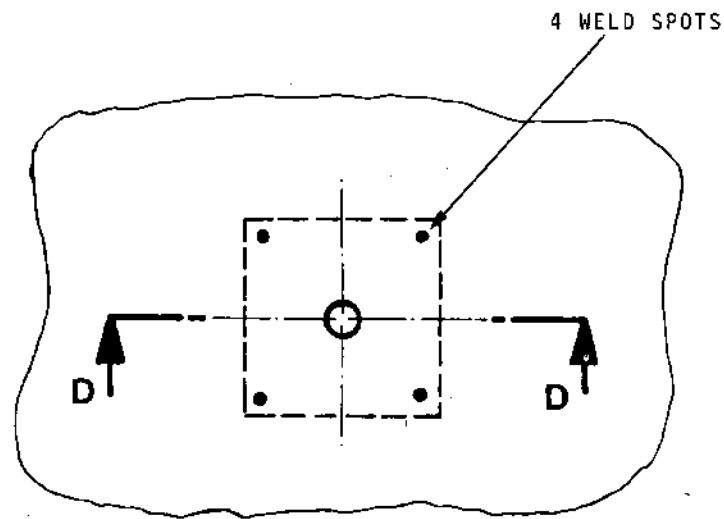
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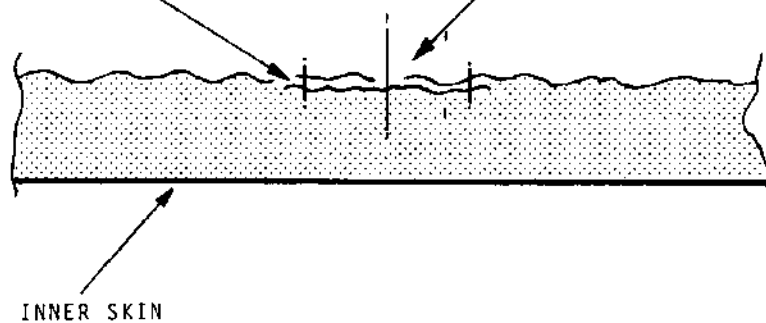
TYPICAL FOR 6 LOCATIONS



SECTION DD

WAFERED REINFORCING SHEET TO BE
CENTERED RELATIVE TO HOLE

HOLE D = 2,5 mm (0.10 in.)
THROUGH OUTER SKIN ONLY



Replacing Welded or Riveted Elements
Figure 401 (Sheet 5 of 6)

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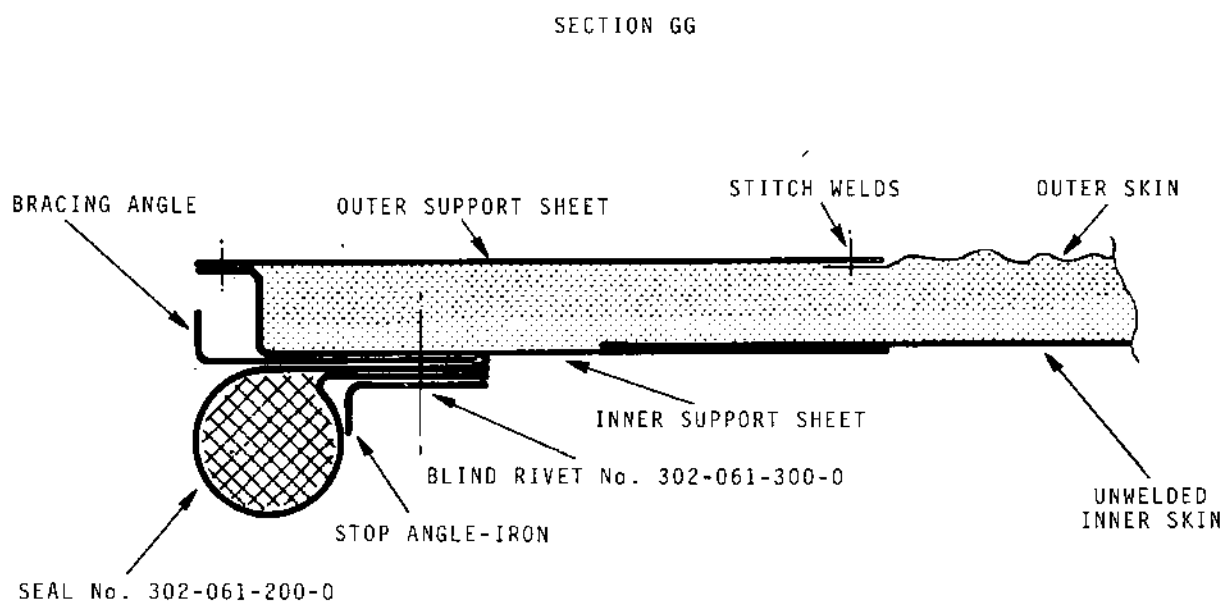
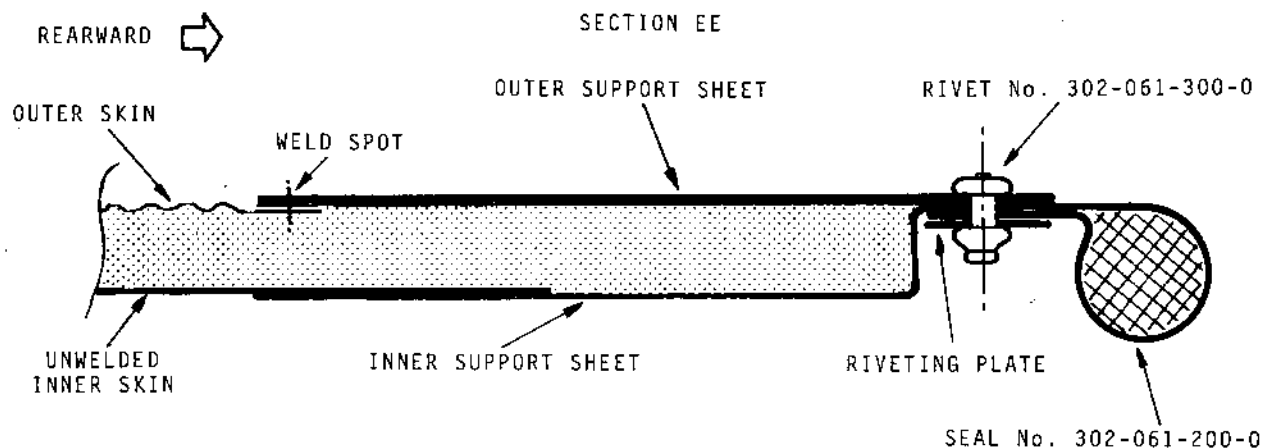
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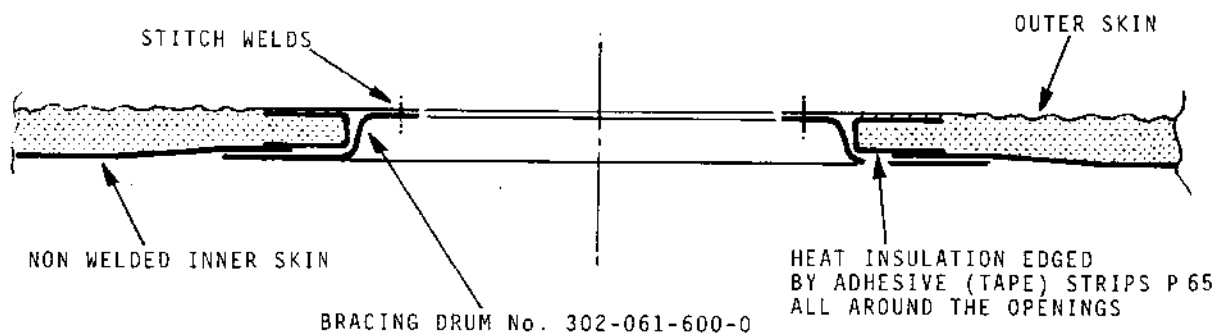


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TYPICAL SECTION FOR THE
10 HEAT SHIELD CENTRAL OPENINGS



Replacing Welded or Riveted Elements
Figure 401 (Sheet 6 of 6)

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REPAIR

SECONDARY HEAT SHIELD ASSEMBLY (1-40)

2. Repair of Heat Insulation Sheeting by Means of Resistance Welded Patches

PARTS REQUIRED FOR REPAIR

Wafered sheet metal NC 15 Fe P3502 ; thickness 0,1 mm
(0.004 in.)
Plain sheet metal NC 15 Fe P3324 ; thickness 0,3 mm
(0.012 in.)
MIN "K" heat insulation material No. 302-061-500-0

A. General

Repair of local defects affecting the heat insulation metal sheeting is performed by cutting out the impaired areas and installing resistance welded patches. The design features of heat shields are such they necessitate that the patches be welded without removing the heat insulation. This can be performed using a welding equipment such as :

M10DZ010

BRONZAVIA AERONAUTIQUE
2, rue Jean Perrin
92000 NANTERRE - FRANCE

B. Conditions for installing patches

- (1) They are those specified in Chapter 70-35-20, "RESISTANCE WELDING".

C. Cutting-out item to be required.

- (1) This operation is to be carried out as instructed in Chapter 70-35-20, "RESISTANCE WELDING".

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- (2) Check the condition of MIN "K" heat insulation for any damage. The impaired portion must be replaced.

D. Producing the patches

- (1) These may be cut out of a sound section of heat insulation sheet salvaged from a discarded heat shield or out of a wafered sheet P3503.
- (2) Patch dimensions are dependent on the extent of damage. Their shapes must comply with the requirements stated in Chapter 70-35-20, "RESISTANCE WELDING".
- (3) Patches are to be cut out in such a way that they provide for a 10 mm (0.41 in.) min. overlap and that the corrugated pattern of patch fully matches that of heat shields.
- (4) If applicable, cut out a piece of MIN"K" heat insulation material so that it fits snugly in its recess.

E. Welding the patches

- (1) Fitting out and setting the welding equipment
 - (a) The welding gun must be fitted with an electrode whose tip is shaped as shown in Fig. 401. This shape prevents puncturing of the sheet during welding.
 - (b) Set the welding equipment using the manufacturer's "Instruction for Use" ; then check the settings by welding test-pieces.
- (2) Welding test on test-pieces.
 - (a) Prior to weld the patches it is necessary to weld a test-piece to "qualify" the selected settings.
 - (b) The welding test-piece is made of two 100 X 30 mm (3.95 X 1.20 in.) strips of wafered sheet P3503. Cleaning and welding of test-piece to be carried out in the same way as on part to be repaired. The test-piece must feature at least 5 spot welds.

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- (c) Test-piece inspection is carried out by peeling off the spot welds.

The test-piece is deemed satisfactory when all spot welds are peeled off.

(3) Preparing the parts before welding

CAUTION : INSTALL A PROTECTIVE DEVICE TO PREVENT DAMAGE TO MIN"K" HEAT INSULATION DURING THE BUFFING OPERATION.

- (a) Perform a fine buffing of overlapping zones on both patch and heat shield.
- (b) Clean areas to be welded as instructed in Chapter 70-35-20 "RESISTANCE WELDING".

(4) Welding the patches

- (a) Sandwich the quartz wool neatly if required.

CAUTION : A POOR CONTACT RESULTS IN EXCESSIVE WELDING PRESSURE WHICH, IN TURN, CAUSES PUNCTURING OF SHEETS.

- (b) Ensure perfect contact of areas to be welded.
- (c) Stitch weld the patch (Ref. Fig. 401).

NOTE : Work with the flat at the tip of electrode. Connect the current return clamp as close as possible the welding zone.

F. Inspection

- (1) Check the part visually for freedom from burn or sheet puncturing.

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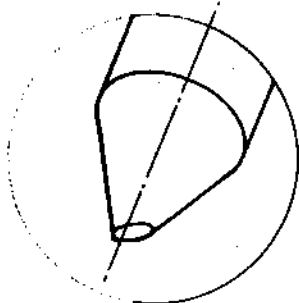


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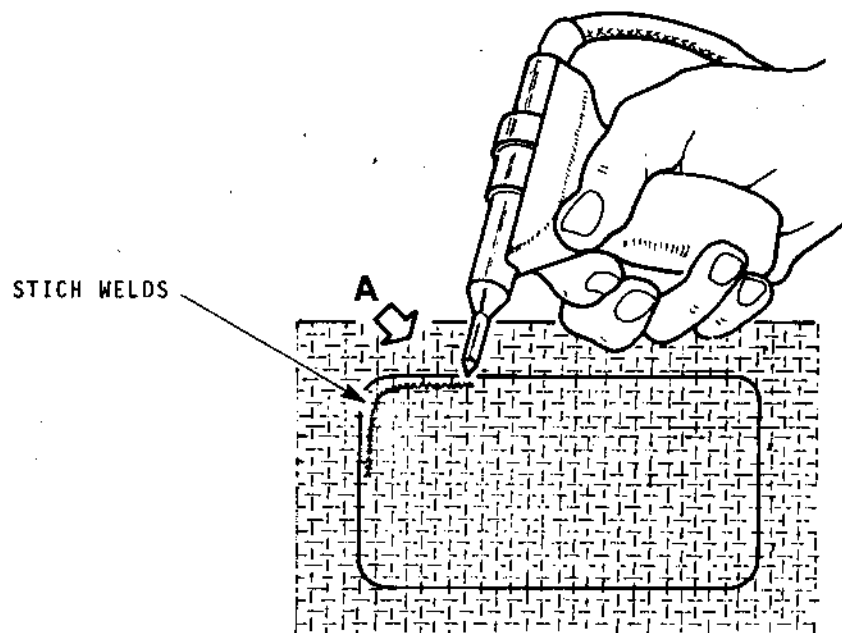
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A



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Welding the Heat Insulation Sheet
Figure 401

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**ATP
TEMPORARY
REVISION**

British airways
OLYMPUS 539 ENGINE OVERHAUL MANUAL
THRUST REVERSER

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

P. Munn

for Chief Engineer (Technical & Quality Services) CAA Design Approval No. DA1/8566/78

TEMPORARY REVISION 78-510

Insert in 78-31-01 facing page 401, REP 1-50-1

REASON FOR ISSUE

REVISED REPAIR INSTRUCTIONS. (MCR EPO/136/1839P/RE)

ACTION

Reference "Repair 1-50-1" after paragraph C. (3) add the following.

NOTE: Where the mounting washers on inserts are found to rotate, it is permissible to tack weld the washers to the side plate using Weld Rod BS.290 INA 38"

30 July 1987

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REPAIR

SIDE PLATE ASSY (1-50) and (1-110)1. Renewal of "Heli-Coil" thread inserts

PARTS REQUIRED FOR REPAIR

or	Heli-coil insert	No. 3591-4 TNV0250	(649-773-189-0)
	OTALU insert	No. 01324747004	(649-061-611-0)
	Heli-coil insert	No. 1191-6 TNV0562	(649-773-255-0)
	Bush	No. 301-085-100-0	

A. Removal

- (1) Extract the damaged inserts using the manufacturers extractor.

NOTE : For inserts identified "O" (Section AA), the bushes must be removed by machining, before removing the inserts.

B. Inspection

- (1) Check the condition and cleanliness of the thread insert housing holes.

If any burrs are found, remove these using the manufacturers "finishing" tap.

C. Assembly

- (1) Fit a new thread insert using the manufacturers threaded mandrel, as shown on figure 401.
- (2) Break the driver using the manufacturers special tool.
- (3) Refit the bushes, with a press, at positions marked O (see section AA).

D. Inspection

- (1) Check that the thread insert is correctly fitted.

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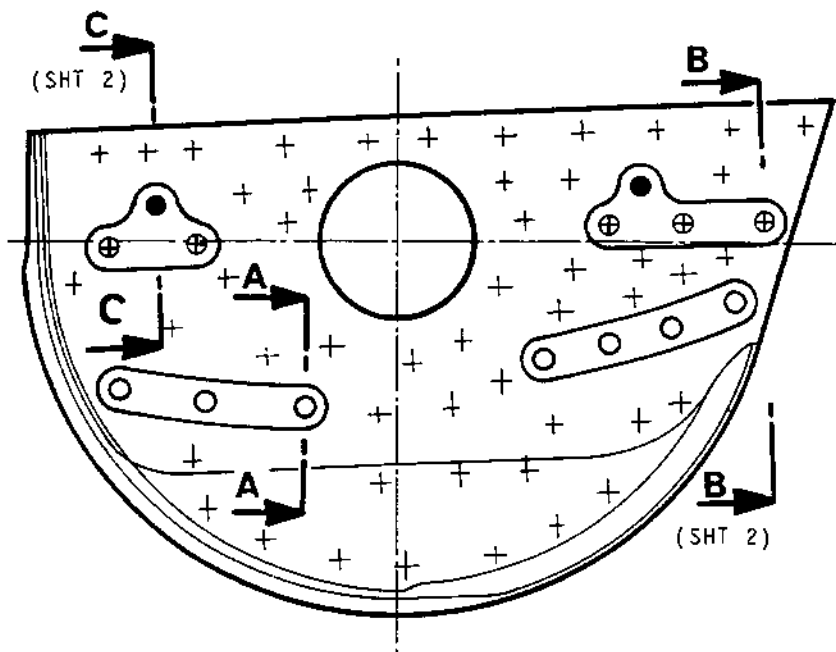
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EXTERNAL VIEW

SIDE PLATE (1-50) SHOWN

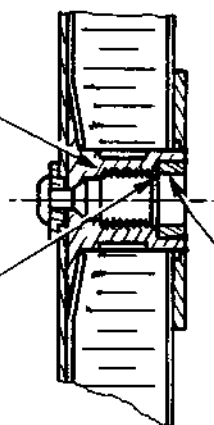
SIDE PLATE (1-110) SYMMETRIC



SECTION AA FOR INSERTS MARKED ○

THREAD INSERT
No. 3591-4TNV0250
or No. 01324747004

FIT THE INSERT $3/4 - 1\ 1/2$
TURNS BELOW THE SURFACE



BUSH
No. 301-085-100-0

Renewal of Heli-Coil Inserts
Figure 401 (Sheet 1 of 2)

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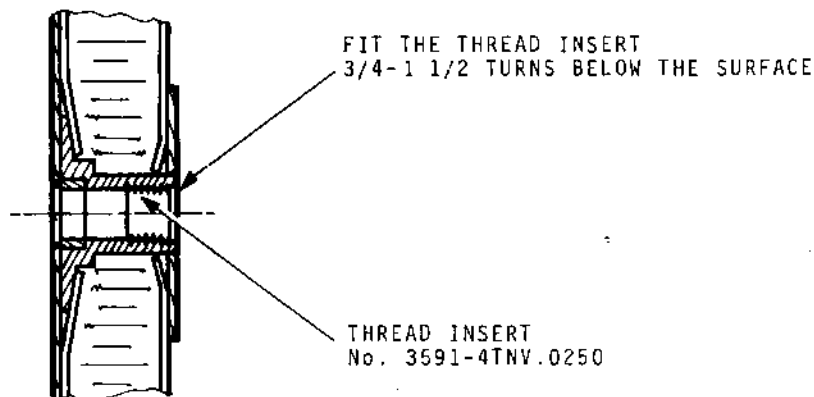
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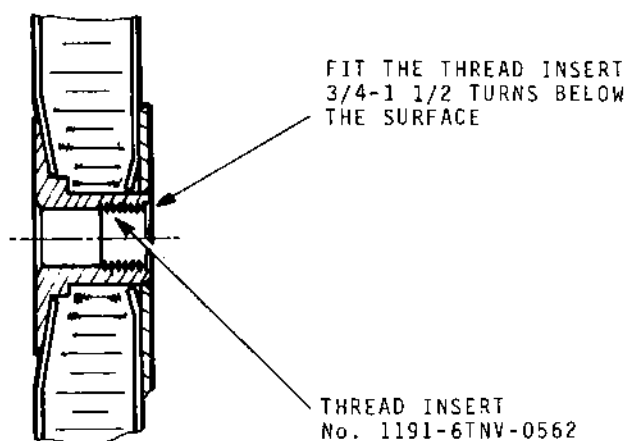
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SECTION BB
FOR INSERTS MARKED ⊕



SECTION CC
FOR INSERTS MARKED ●



Renewal of Heli-Coil Thread Inserts
Figure 401 - Sheet 2 of 2

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REPAIRSIDE PLATE ASSY (1-50) and (1-110)2. Renewal of the reinforcing plates or their retaining rivets

PARTS REQUIRED FOR REPAIR

Reinforcing plate	No. 301-140-600-0	
Reinforcing plate	No. 301-140-650-0	
Reinforcing plate	No. 301-140-700-0	
Reinforcing plate	No. 301-140-750-0	
Reinforcing plate	No. 301-140-800-0	
Reinforcing plate	No. 301-140-850-0	
Washer	No. 301-140-900-0	
Washer	No. 301-116-200-0	
Washer	No. 649-786-227-0	
Rivet	No. NAS 1198-5-7	(650-014-105-0)
	or NAS 1198-6-8	(650-014-136-0)
Rivet	No. NAS 1198-5-8	(650-014-106-0)
	or NAS 1198-6-9	(650-014-137-0)
Rivet	No. NAS 1198-5-9	(650-014-108-0)
	or NAS 1196-6-10	(650-014-139-0)
Rivet	No. NAS 1198-5-10	(650-014-109-0)
	or NAS 1198-6-11	(650-014-140-0)
Rivet	No. NAS 1200-4-6	(649-772-117-0)
	or NAS 1200-5-7	(649-772-247-0)
Weld filler wire P 3030 (ND24 FeC)		

A. Renewal of the reinforcing plate retaining rivets**(1) Removal of defective rivets**

- (a) Remove defective or loose rivets by grinding away the heads ⊙ and/or by drilling the other rivets, on the welded washer side.
- (b) Inspect the rivet holes as per instructions in chapter 70-50-80.

NOTE: The rivet hole diameters must be measured in the reinforcing plates, and not in the stressskin panels.

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- (c) If necessary, ream the rivet holes in the washers and in the reinforcing plates to the next greater diameter as indicated in figure 401.

(2) Fitting rivets

- (a) Fit the new rivets, with diameters appropriate to the holes, as indicated on figure 401 and in chapter 70-50-10.
- (b) Fit load spreading washers to all rivets, except those marked (O), and proceed as follows :
- (i) Apply a force of 45 daN.m (100 lbf) to the washer, and weld it to the rivet as indicated on figure 401, and as per instructions in chapter 70-35-10
- Weld filler wire P 3030
Weld class B1
- (ii) Flush the welds off level with the load spreading washer
- (iii) Inspect the welds as per instructions in chapter 70-35-80

NOTE : The crack test is to be carried out with water-washable fluorescent dye penetrant using process M 502 B in chapter 70-20-10.

- (c) Inspect the rivetting as per chapter 70-50-80 and figure 401.

B. Renewal of reinforcing plates

(1) Removal of defective plates

- (a) Remove the reinforcing plates by grinding away the retaining rivet heads (O) and by drilling the other rivets, on the welded washer side.
- (b) Check that the rivet holes in the stressskin panels are not oval.
- If they are oval, round off the edges of the holes.

(2) Fitting the reinforcing plate

- (a) Position the new reinforcing plate on the side plate such that the radiused face is against the stressskin panel, as shown on figure 401. Mark the

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positions of the bolt and rivet holes.

- (b) Remove the reinforcing plate from the side plate assembly. Drill the bolt and rivet holes as shown on figure 401 and as per instructions in chapter 70-50-10.

NOTE : The holes are to be drilled perpendicular to the inner face of the side plate.

- (c) Position the reinforcing plate, and rivet it as indicated on figure 401, and as per instructions in paragraph A of this repair scheme (REP).

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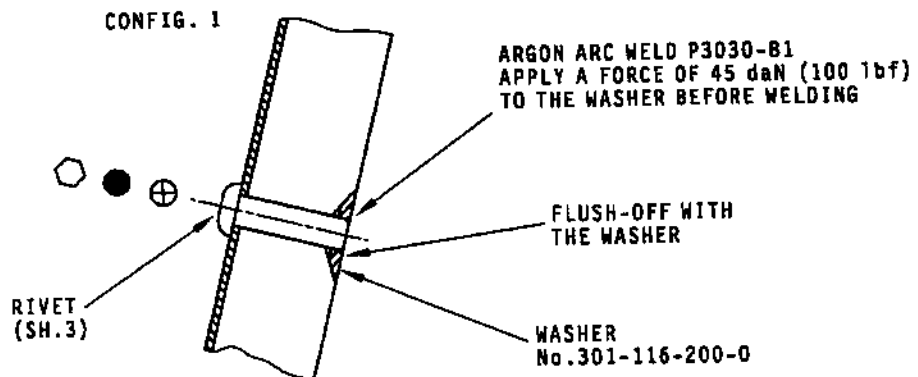
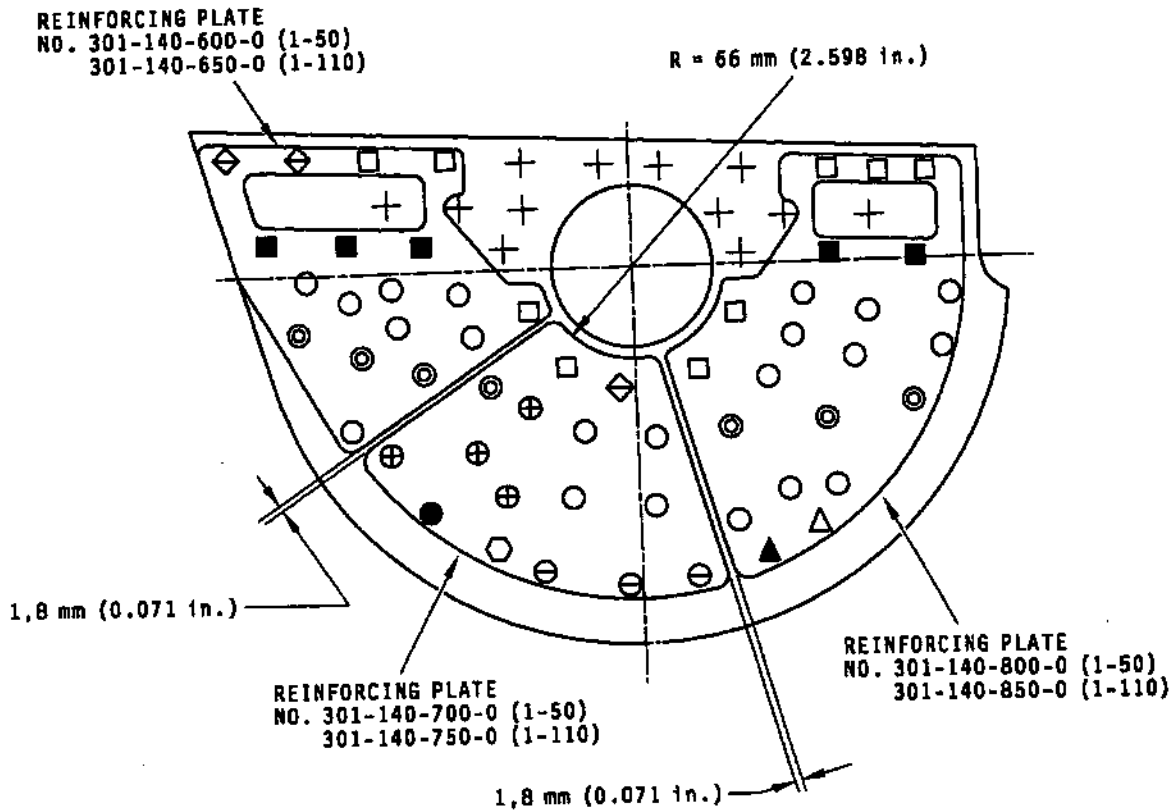
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VIEW FROM INTERIOR
SIDE PLATE (1-50) SHOWN - SIDE PLATE (1-110) SYMMETRIC



S-OLY-SM-00043-00-B

Figure 401 (Sheet 1 of 4)

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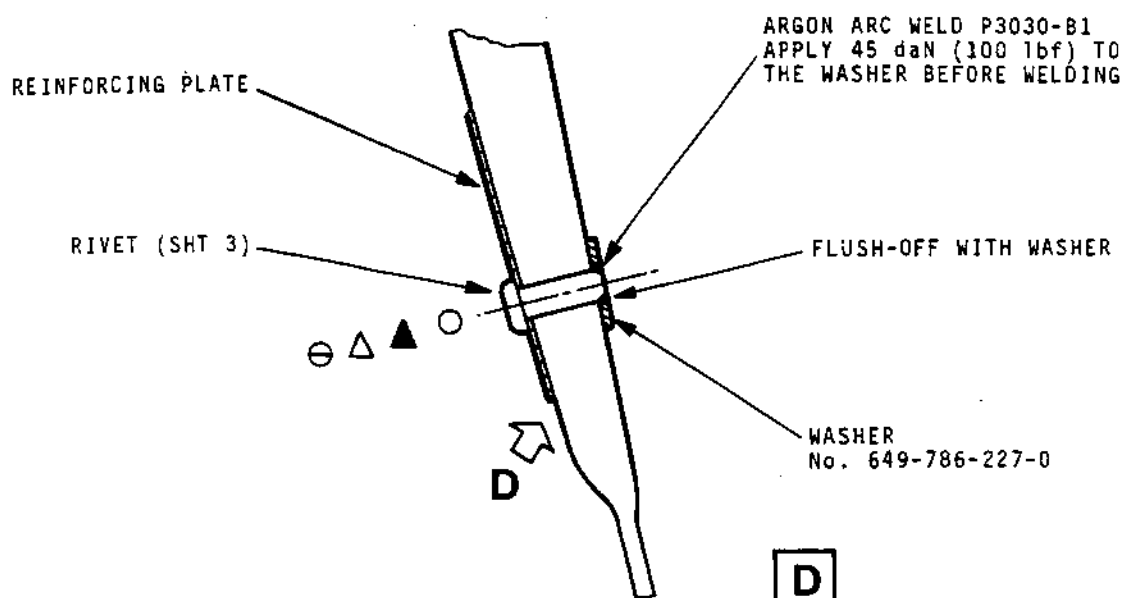
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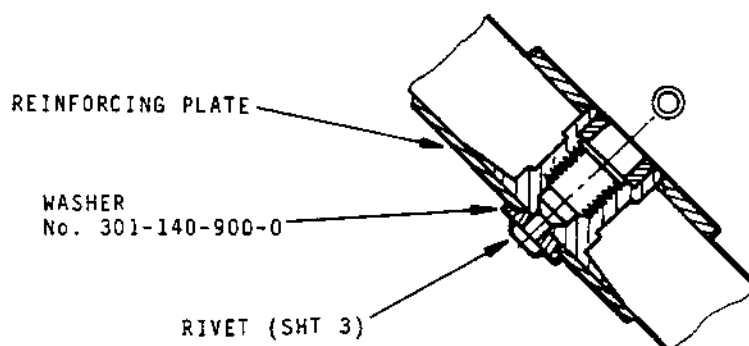
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CONFIG. II



CONFIG. III



Renewal of Reinforcing Plates Or
Their Retaining Rivets
Figure 401 - Sheet 2 of 4

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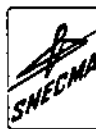
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RIVET DETAILS

STANDARD RIVET REPAIR RIVET	DIAMETER mm (in)	LENGTH mm* (in)	MATERIAL	HEADSHAPE	IDENTITY MARK (AS- SY CONFIG.)
NAS 1198-5-7 NAS 1198-6-8	4 (0.156) 4,8 (0.187)	11,1 (0.438) 12,7 (0.500)	Z6NCT25 (AMS5737)	U	⊖ ⬡
NAS 1198-5-8 NAS 1198-6-9	4 (0.156) 4,8 (0.187)	12,7 (0.500) 14,3 (0.563)	Z6NCT25 (AMS5737)	U	● ▲
NAS 1198-5-9 NAS 1198-6-10	4 (0.156) 4,8 (0.187)	14,3 (0.563) 15,9 (0.625)	Z6NCT25 (AMS5737)	U	⊕ △
NAS 1198-5-10 NAS 1198-6-11	4 (0.156) 4,8 (0.187)	15,9 (0.625) 17,5 (0.688)	Z6NCT25 (AMS5737)	U	○
NAS 1200-4-6 NAS 1200-5-7	3,2 (0.125) 4 (0.156)	9,5 (0.375) 11,1 (0.438)	Z6NCT25 (AMS5737)	F100	⊙

* NOTE: For metric dimensioned rivets, round-off to the next highest millimeter

WASHER DETAILS

WASHER	STANDARD DIAMETER REPAIR DIAMETER mm (in)	MATERIAL	IDENTITY MARK (ASSY CONFIG)
301.116.200.0	4,3 +0,1 (0.169) +0 (0.173) 5,1 +0,1 (0.201) +0 (0.205)	Z10CNT18 (AMS 5510)	⬡ ● ⊕
301.140.900.0	3,3 +0,125 (0.130) +0 (0.135) 4,1 +0,125 (0.161) +0 (0.166)	Z10CNT18 (AMS 5510)	⊙
649.786.227.0	4,2 +0,1 (0.165) +0 (0.168) 4,9 +0,1 (0.192) +0 (0.198)	Z10CNT18 (AMS 5510)	○ ⊖ △ ▲

Renewal of Reinforcing Plates or Their
Retaining Rivets

Figure 401 (Sheet 3 of 4)

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


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DETAILS OF BOLT HOLE SIZES

IDENTITY MARK	BOLT HOLE DIAMETER mm (in)
	$\emptyset 6,35 \pm 0,127 (0.250 \pm 0,005)$
	$\emptyset 7,925 \pm 0,127 (0.312 \pm 0.005)$
	$\emptyset 9,525 \pm 0,127 (0.375 \pm 0.005)$
	$\emptyset 11,1 \pm 0,127 (0.437 \pm 0.005)$

Renewal of Reinforcing Plates or Their
Retaining Rivets
Figure 401 - Sheet 4 of 4

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REPAIR

SIDE PLATE ASSEMBLY (1-50/110)

3. Renewal of Inserts.

PARTS REQUIRED FOR REPAIR

Insert	No. 649-773-212-0
Insert	No. 649-773-233-0
Insert	No. 649-773-262-0
Insert	No. 649-773-264-0
Insert	No. 301-009-401-0
Insert	No. 301-051-600-0
Insert	No. 301-051-300-0
Sleeve	No. 301-085-100-0
Crimping washer	No. 649-773-206-0
Crimping washer	No. 649-773-234-0
Crimping washer	No. 649-773-263-0
Crimping washer	No. 649-773-265-0
Reinforcement plates	No. 301-096-101-0 and No. 301-096-151-0
Reinforcement plates	No. 301-096-201-0 and No. 301-096-251-0
Reinforcement plates	No. 301-140-400-0 and No. 301-140-450-0
Reinforcement plates	No. 301-140-500-0 and No. 301-140-550-0
Bar for bushing	: P3621
Weld filler wire	: P3026

A. Introduction.

- (1) This repair scheme gives the information required to renew the inserts.
- (2) For heli-coil inserts renewal, refer to REP 1-50-1.
- (3) To renew inserts which require removal of the reinforcing plates, refer to REP 1-50-2 for the methods of removal and reinstallation.

B. Working Procedure.

- (1) Removal of the damaged insert

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- (a) If required, remove the internal reinforcing plates from the side plate, as per instructions in REP 1-50-2 in the chapter 78-31-01.
- (b) Remove the insert by grinding the flared section for crimped inserts or the weld bead if the inserts are welded, as indicated on figure 401.

CAUTION: PROTECT THE STRESSKIN PANEL, TO AVOID ANY DAMAGE OR BURNING DURING GRINDING.

(2) Preparation of the parts

- (a) Dependent on the type of insert to renew, produce a sleeve as per instructions on figure 402.
- (b) Rework the inserts and washers 649-773-XXX-0 as indicated on figure 403.

(3) Fitting the insert

- (a) In the location at which the inserts is to be fitted, drill a hole to install the sleeve.
 - 1) The hole is drilled by mean of a spot-facing milling cutter complete with pilot tip, as described in chapter 70-30-10, and shown in figure 404.
- (b) After machining, carry out a water-washable fluorescent dye penetrant check for cracks, using method M 502 B given in the "DYE PENETRANT CHECK" chapter, para. 70-20-10.

No cracks are acceptable. If cracks are found, place the part aside pending a repair scheme.

- (c) Mount the bush as follows:

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1 Fit the bush, ascertaining that its centreline is perpendicular to the tangent plane of the sideplate.

2 Tack-weld, then argon arc-weld the bushing onto the sideplate, as instructed in chapters 70-30-10 and 70-35-10.

a Weld filler wire : P3026

b Weld class : B1

NOTE : The sideplate should be purged with argon for 1 hour prior to welding.
Use cooling blocks to protect the panel about the bush.

3 Carry out a Class B1 soundness test as described in chapter 70-35-80.

NOTE : Localized water-washable dye penetrant inspection as per M 501 B in chapter 70-20-10.

4 Machine-flush the weld bead to the contour of the dimpling.

(d) Install the insert, and depending on the type, either crimp it using tool SC 253 or weld it as indicated on figure 405.

For the welded insert : B1 class weld. Weld filler wire : P3026.

(e) Check the installation of the insert.

1 Make sure that the crimped inserts do not go round or swing to and fro in their recesses.

2 Perform a Class B1 weld soundness test on the welded inserts, following instructions in chapter 70-35-80.

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NOTE : Localized water-washable dye penetrant inspection as per M 501B in chapter 70-20-10.

(4) Reassembly of the various elements

- (a) If required, refit the internal reinforcing plates to the side plate as per instructions in REP 1-50-2.
- (b) If required, refit the heli-coil inserts, as per instructions in REP 1-50-1.
- (c) Press fit sleeves at locations marked " + " (See section D-D, figure 405).

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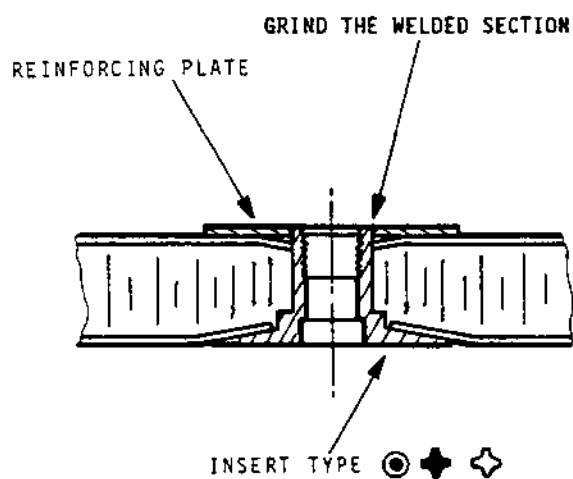
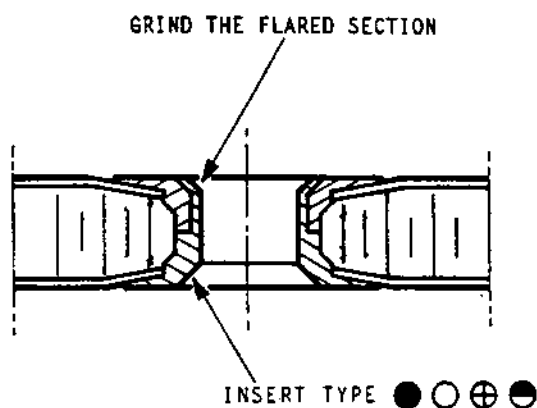
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Removal of an Insert
Figure 401

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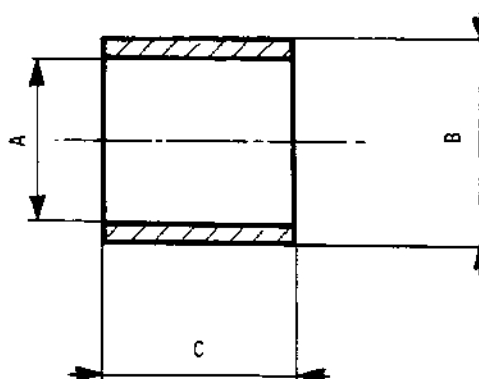
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GENERAL TOLERANCES : SEE CHAPTER 70-21-10

SURFACE FINISH = $12,5 \sqrt{[500]}$

MATERIAL : P 3621

INSERT	$D=A + \begin{smallmatrix} 0,05 \\ 0 \end{smallmatrix} \text{ mm } (\begin{smallmatrix} + 0.002 \\ 0 \end{smallmatrix} \text{ in.})$	$D=B \pm 0,05 \text{ mm } (\pm 0.002 \text{ in.})$	C
	11,07 mm (0.436 in.)	13 mm (0.512 in.)	12,5 mm (0.500 in.)
	11,07 mm (0.436 in.)	13 mm (0.512 in.)	13,5 mm (0.517 in.)
	14,25 mm (0.561 in.)	16,5 mm (0.650 in.)	12,5 mm (0.500 in.)
	12,70 mm (0.500 in.)	15 mm (0.590 in.)	13 mm (0.512 in.)
	14,25 mm (0.561 in.)	16,5 mm (0.650 in.)	13 mm (0.512 in.)

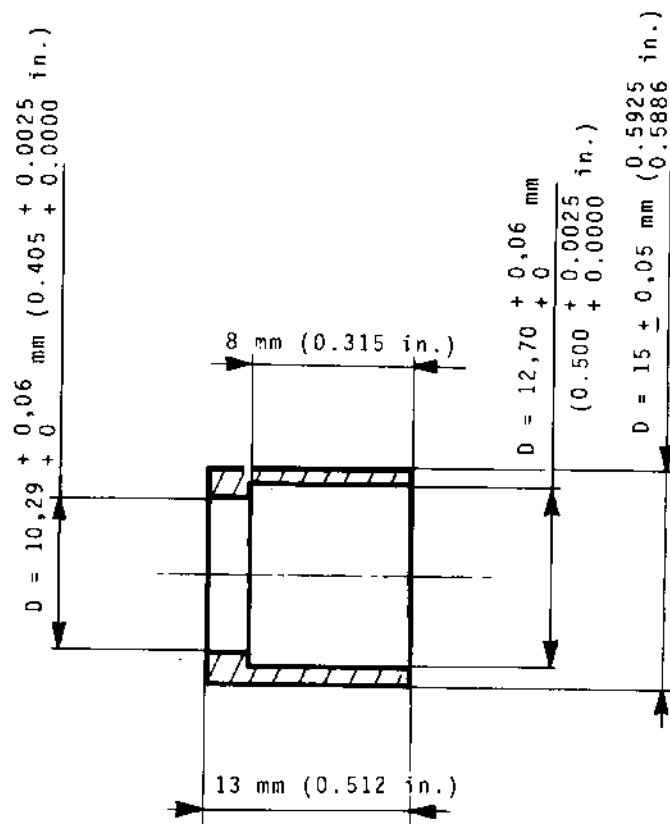
Machining of Sleeves
Figure 402 (Sheet 1 of 2)

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SLEEVE FOR TYPE \diamond INSERTS

GENERAL TOLERANCES : SEE CHAPTER 70-21-10

SURFACE FINISH. = $12,5 \sqrt{[500]}$

MATERIAL : P 3621

Machining of Sleeves
Figure 402 (Sheet 2 of 2)

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BEFORE MODIFICATION

AFTER MODIFICATION

CRIMPING
WASHER

10°

D

R = 0,25 A 0,38 mm
(0.010 - 0.015 in.)

INSERT

10°

D

R = 0,25 A 0,38 mm
(0.010 - 0.015 in.)

INSERTS AND WASHERS

D + 0
- 0,05 mm (+ 0
- 0.002 in.)

649-773-233-0
649-773-234-0
649-773-262-0
649-773-263-0
649-773-264-0
649-773-265-0

11,05 mm (0.435 in.)

649-773-212-0
649-773-206-0

14,22 mm (0.560 in.)

Re-machining of Inserts
Figure 403

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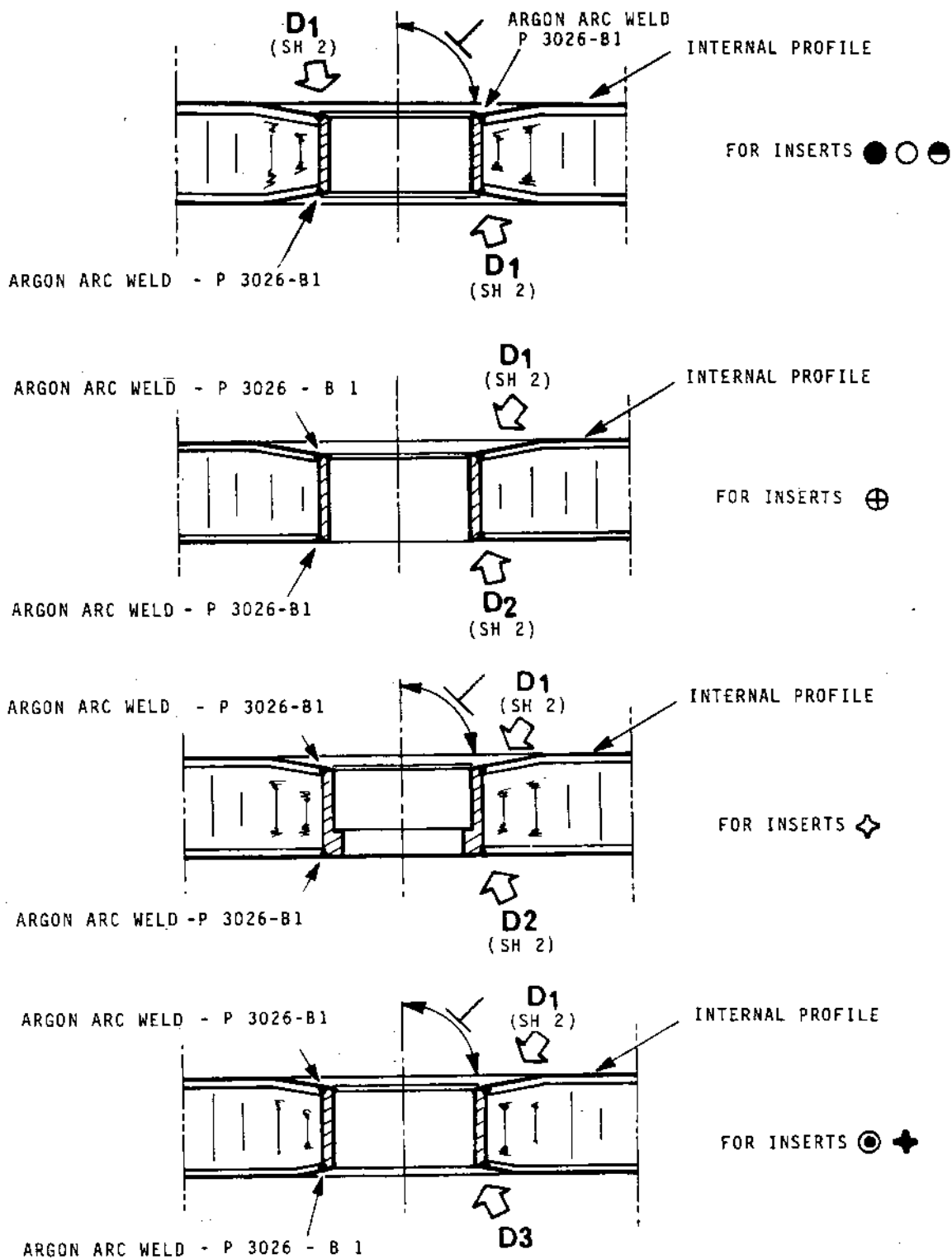
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Installation of Sleeves
Figure 404 (Sheet 1 of 2)

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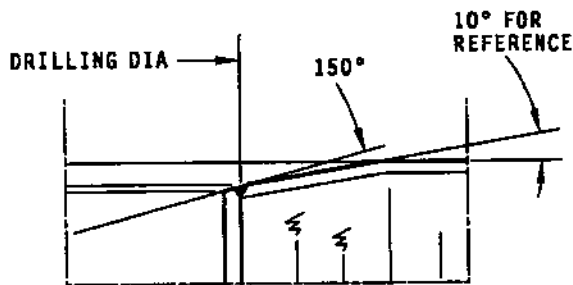
OLYMPUS 593

**MK. 610-14-28
OVERHAUL**

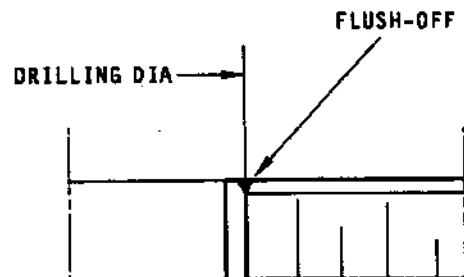


sneema

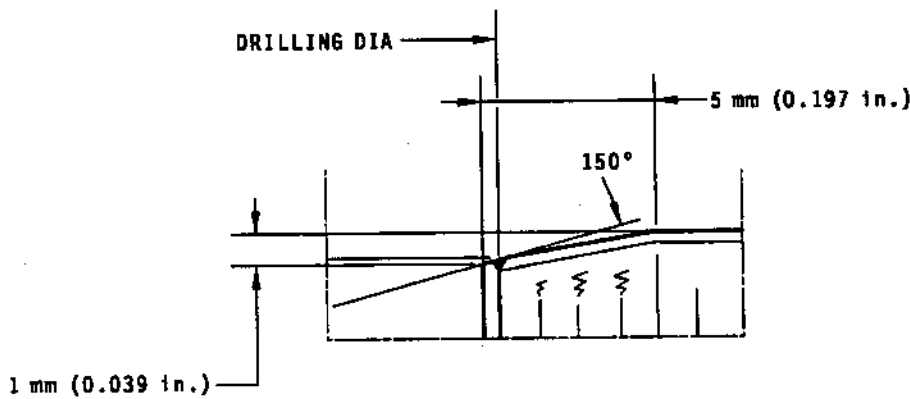
D₁



D₂



D₃



INSERT	DRILLING DIA 0 ± 0,005 mm (± 0.002 in.)	PILOT DIA ⁺⁰ _{-0,05 mm (-0.002 in.)} ⁽⁺⁰⁾
	13 mm (0.0512 in.)	11,05 mm (0.435 in.)
	16,5 mm (0.650 in.)	14,22 mm (0.0560 in.)
	15 mm (0.590 in.)	12,675 mm (0.499 in.)
	15 mm (0.590 in.)	10,262 mm (0.404 in.)

S-OLY-SM-00044-00-B

Installation of Sleeves
Figure 404 (Sheet 2 of 2)

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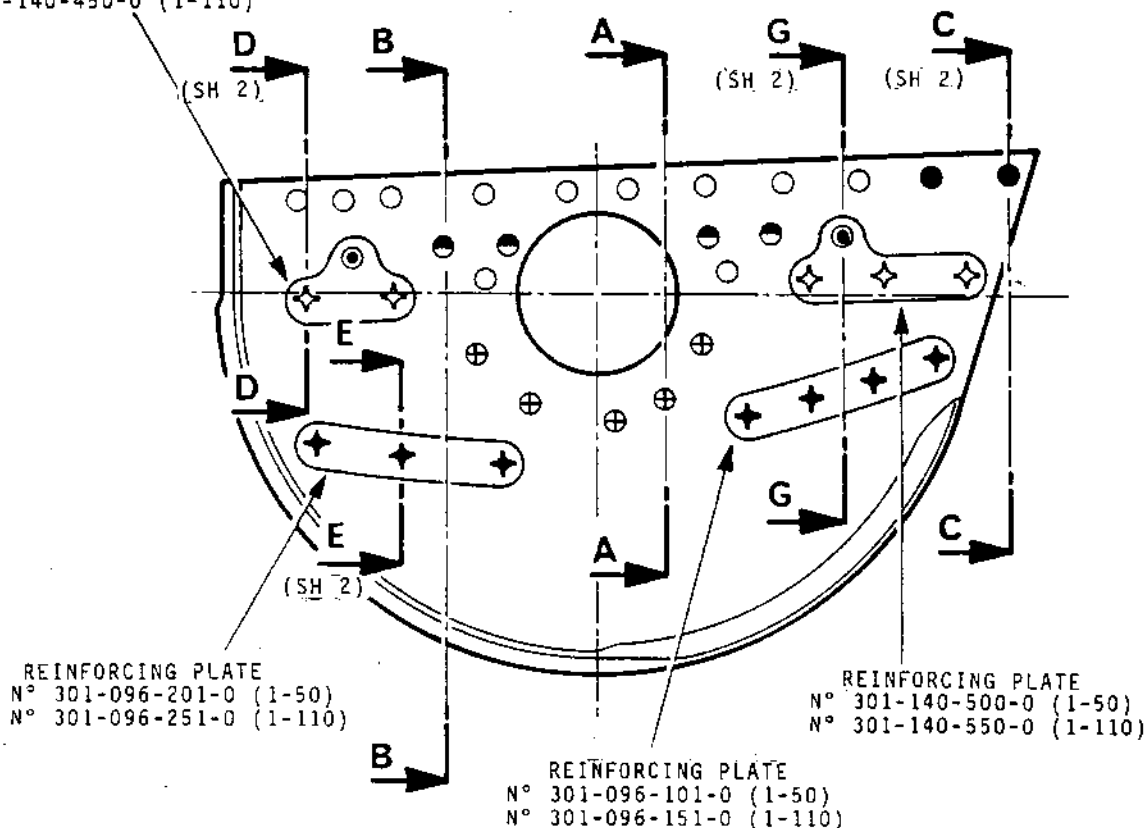
OLYMPUS 593

MK.610-14-28
OVERHAUL



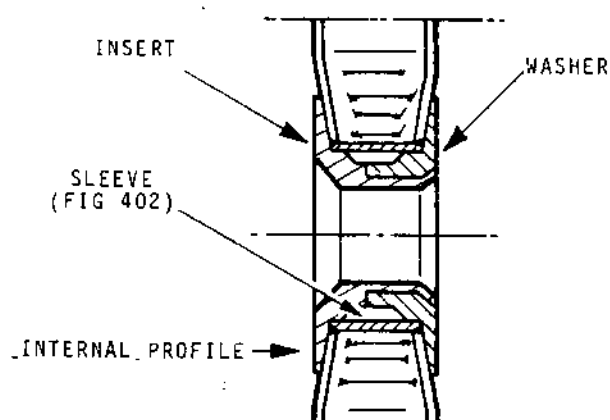
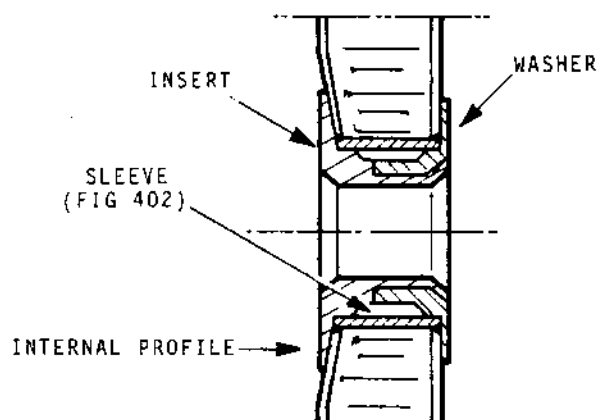
REINFORCING PLATE
N° 301-140-400-0 (1-50)
N° 301-140-450-0 (1-110)

VIEW FROM OUTSIDE
SIDE PLATE SHOWN (1-50), SIDE PLATE (1-110) SYMMETRICAL



SECTION AA FOR \oplus INSERTS

SECTION BB FOR \ominus INSERTS



Fitting of Inserts
Figure 405 (Sheet 1 of 4)

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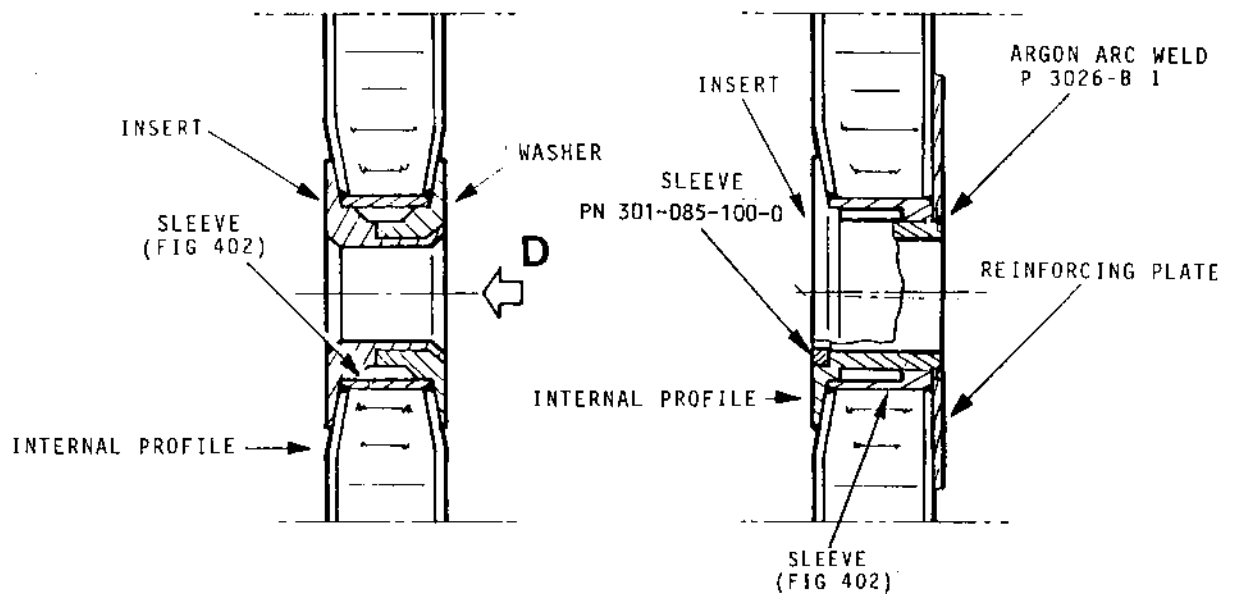
OLYMPUS 593

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OVERHAUL



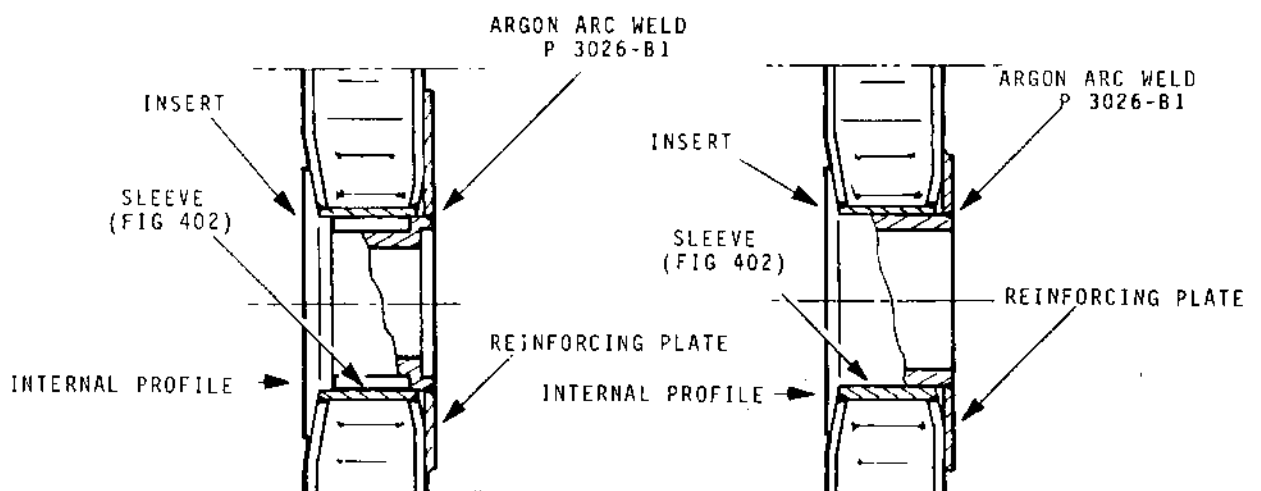
SECTION CC FOR ○ ● INSERTS

SECTION DD FOR ✦ INSERTS



SECTION EE FOR ✦ INSERTS

SECTION GG FOR ⊙ INSERTS










Fitting of Inserts
Figure 405 (Sheet 2 of 4)

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**OLYMPUS 593****MK. 610-14-28
OVERHAUL****DEFINITION OF INSERTS**

IDENTIFICATION	INSERTS AND WASHER	
	INSERT	649-773-264-0
	WASHER	649-773-265-0
	INSERT	649-773-233-0
	WASHER	649-773-234-0
	INSERT	649-773-262-0
	WASHER	649-773-263-0
	INSERT	649-773-212-0
	WASHER	649-773-206-0
	INSERT	301-009-401-0
	WASHER	301-009-401-0
	INSERT	301-051-300-0
	WASHER	301-051-300-0
	INSERT	301-051-600-0
	WASHER	301-085-100-0

S-OLY-SM-00045-DD-B

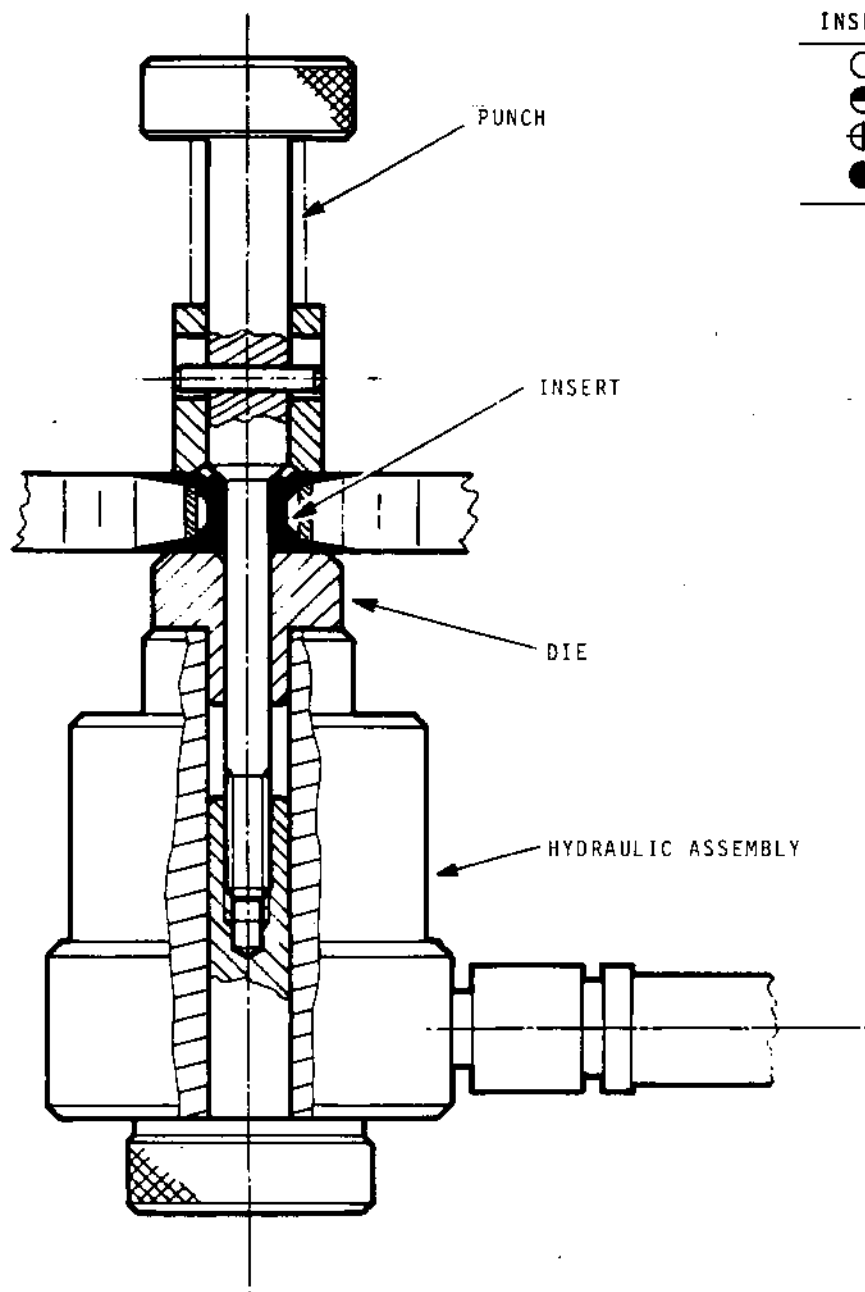
Fitting of Inserts
Figure 405 (Sheet 3 of 4)

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D

CRIMPING FIXTURE



INSERT	PUNCH	DIE
○	15	11
◐	15	2
⊕	15	11
●	09	12

Fitting of Inserts
Figure 405 (Sheet 4 of 4)

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OVERHAUL



REPAIR

SIDE PLATE ASSEMBLY (1-50/110)

4. Repair of Cracks by Weld-Filling

PARTS REQUIRED FOR REPAIR

Weld filler wire P3026
Silicone elastomer CAF4 (P 474)

A. Repair of cracks developing in the parent metal, or in existing weld beads.

- (1) Monitor the condition of the crack surround, ascertaining by a sound test made with a metal object, that there is no delamination. If there is, this repair scheme is unsuitable for use.
- (2) Accurately demarcate the crack on careful scrutiny with a X 20 twin-lens magnifier, then drill a 1 mm (0.039 in.) dia. hole at its either end.
- (3) Weld-fill the crack by the argon arc process adhering to the instructions in Chapter "PRINCIPLE OF REPAIRING COMPONENTS MADE FROM WELDED HONEYCOMB STRUCTURE" Section 70-30-10, and in Chapter "WELDING", Section 70-35-10.

Filler metal: P3026
Weld Class B1

NOTE: It is essential in welding to apply copper cooling (heat sink) blocks as close to the weld as possible.

- (4) Check the Class B1 weld as instructed in Chapter "WELDING", Section 70-35-80, and in the following:

Perform a water-washable dye penetrant test by Method M501B as described in Chapter 70-20-10.

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CAUTION: THE PENETRANT IS TO BE CLEARED OUT USING A CLOTH SOAKED WITH ISOPROPYL ALCOHOL (P442).

- (5) Ascertain that the segment under repair is free from delamination by a sound test made with a metal object.
- B. Repair of cracks developing from an attachment hole or propagating under a reinforcement plate.
- (1) Remove reinforcement plates under which cracks have propagated, per REP 1-50-2 or, when inserts are concerned, per REP 1-50-3.
 - (2) Prior to repair, ascertain, by a sound test made with a metal object, that the area surrounding the crack is free from delamination.
 - (3) The instructions for weld-filling the crack are the same as those under A.
 - (4) Seal the hole edges with elastomer CAF4 by Method M701 described in Chapter "APPLICATION OF RESINS AND ELASTOMERS", Section 70-31-20.

NOTE: While elastomer is polymerizing, insert a pin of the same diameter as the insert or rivet to be replaced, previously coated with tetrafluorethylene, so as to hold the elastomer in position.

- (5) Reinstall parts removed in step B.(1) per REP 1-50-2 and/or REP 1-50-3.



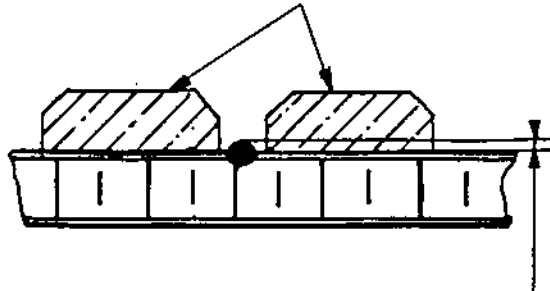
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SECTION AA

COPPER COOLING BLOCK

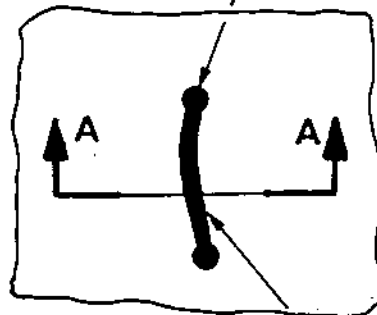


OUT-OF-FLUSHNESS

MAX. 0,5 mm (0.02 in.) OVER 75% OF THE
TOTAL LENGTH

MAX. 1 mm (0.04 in.) ADMISSIBLE LOCALLY

HOLE $\varnothing = 1 \text{ mm (0.039 in.)}$



WELD-FILLING

Repair of Cracks by Weld-Filling
Figure 401

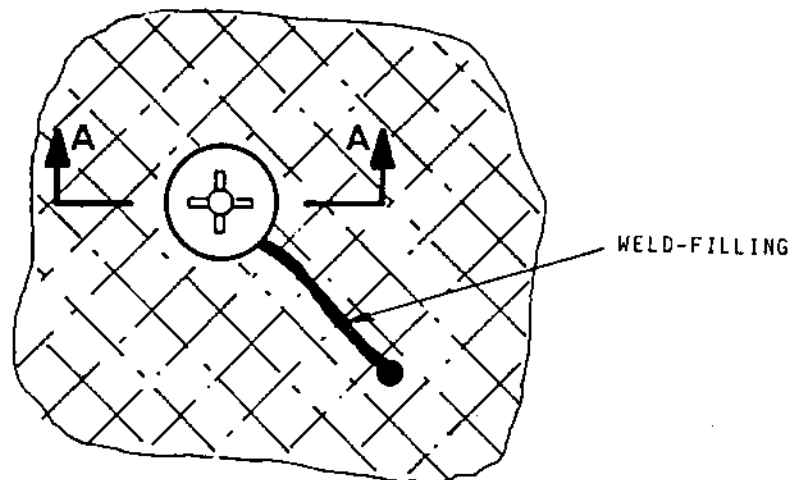
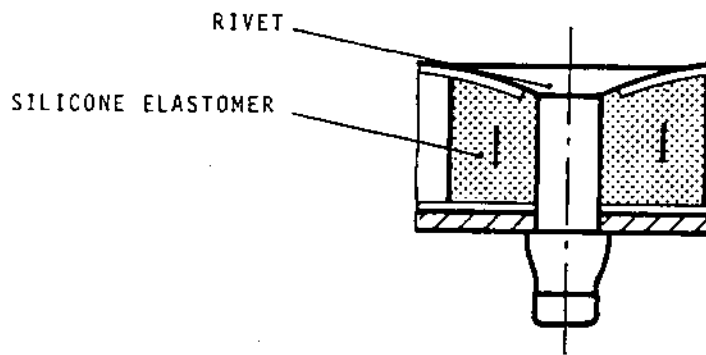


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OVERHAUL



SECTION AA



Repair of Cracks Originating from an Attachment Hole
by Weld-Filling
Figure 402



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MK.610-14-28

OVERHAUL



REPAIR

RETAINING NUT (1-330)

1. Reconditioning of the thread silver plating

PARTS REQUIRED FOR REPAIR

- A. Recondition the silver plating using process M 303 B (b) in chapter 70-15-30, as per figure 401, and the instructions given below.
- (1) Remove the existing plating using process M 109 B
 - (2) Crack test with post emulsification fluorescent dye penetrant as per process M 504 B in chapter 70-20-10.
If cracked, scrap the part.
 - (3) Plating thickness 0,003 to 0,007 mm (0.0001 to 0.0003 in).

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REP 1-330-1

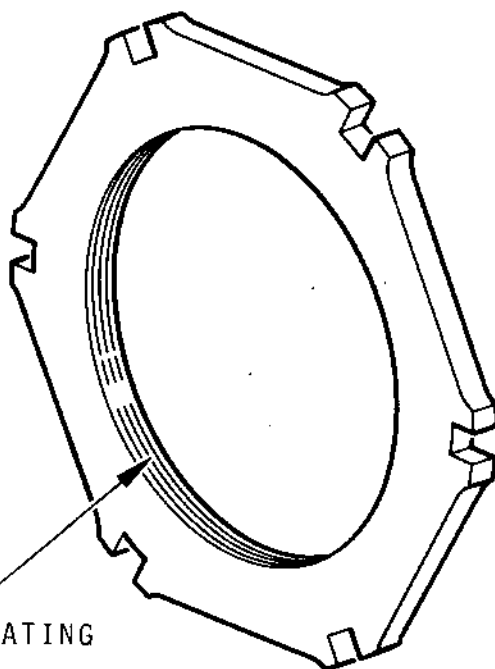
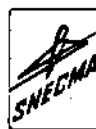
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OVERHAUL



SILVER PLATING
OF THREAD
3.250-28 UNF-3B

Reconditioning the Thread Silver Plating
Figure 401

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REP 1-330-1
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OVERHAUL



REPAIR

SPHERICAL BEARING HOUSING (1-340)

1. Reconditioning of anti-seize varnish

PARTS REQUIRED FOR REPAIR

Anti-seize varnish P 209

A. Apply anti-seize varnish P 209 using process M 322 B in chapter 70-15-30 in the areas shown on figure 401.

- (1) Having removed existing varnish, crack test with post emulsification fluorescent dye penetrant using process M 504 B in chapter 70-20-10.

If cracked, scrap the part.

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REP 1-340-1

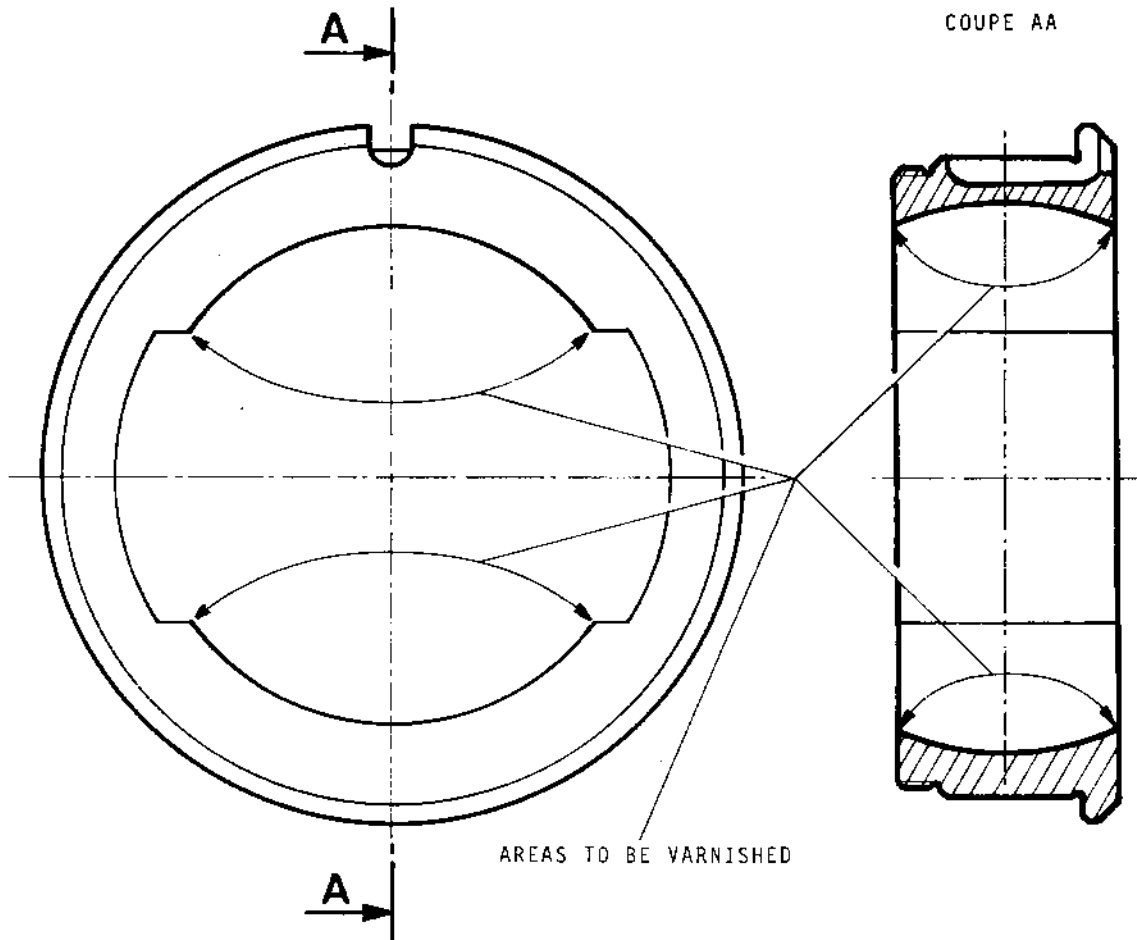
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Reconditioning of Anti-Seize Varnish
Figure 401

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OVERHAUL



REPAIR

SPHERICAL BEARING HOUSING (1-340)

2. Reconditioning the silver plating in the spherical bore

PARTS REQUIRED FOR REPAIR

- A. Remove the original silver plating using process M 109 A in chapter 70-15-20.
- B. Crack test with post emulsification fluorescent dye penetrant, using process M 504 B in chapter 70-20-10.

If cracked, scrap the part.
- C. Perform a dimensional inspection of the spherical bore per figure 401.

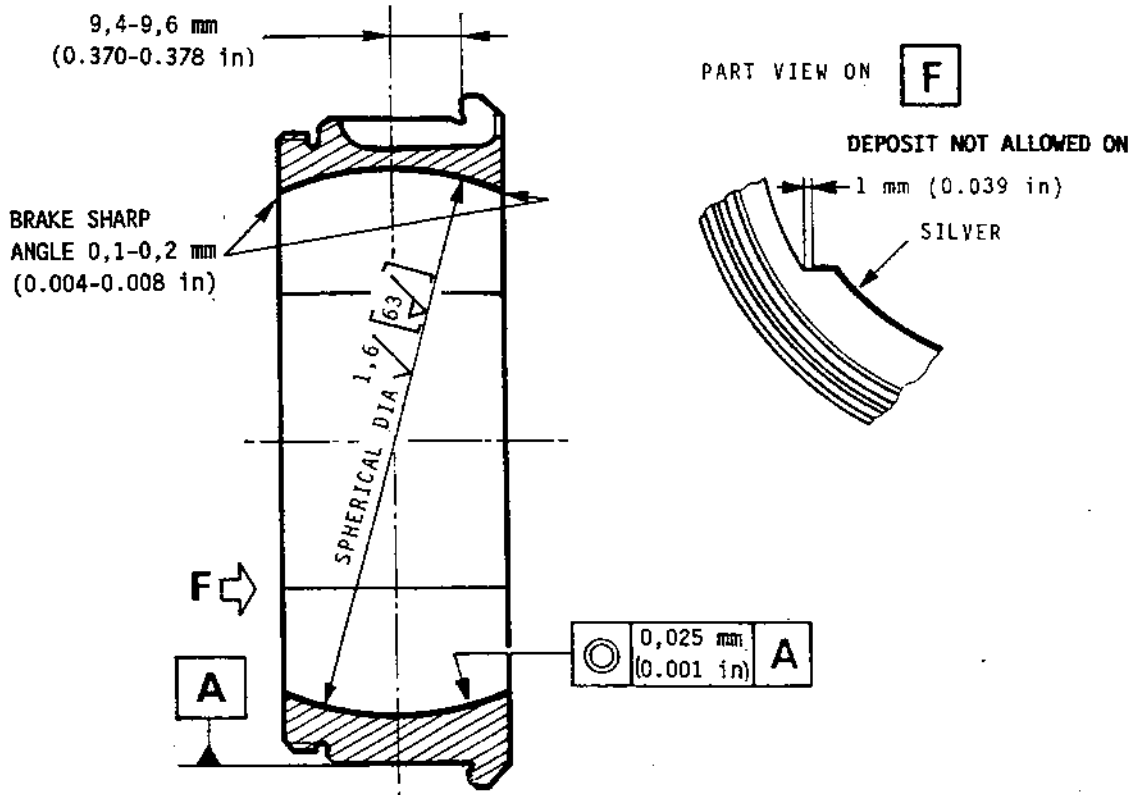
If out of limits, scrap the part.
- D. Recondition the silver plating using process M 303 B (b) in chapter 70-15-30, as shown on figure 401 and as per instructions given below.
 - (1) Plating thickness: 0,25 mm min. (0.010 in. min.).
 - (2) Remove excess of silver at the edges of the bore by smoothing to lateral faces.
- E. Re-machine the spherical bore to obtain the dimension given in Table I.

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REP 1-340-2

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

SPHERICAL DIAMETER	DIMENSIONS mm (in)
After removal of plating	DIA 73,355 to 73,446 (2.8880 to 2.8916)
After silver plating	DIA 72,86 MAX. (2.8685)
After re-machining of plating	DIA 73,025 H7 + 0,030 (2.8762) + 0 (2.8750)

NOTE: Roughness: 3,2 μ m (125 μ in) otherwise specified.

Reconditioning Silver Plating
Figure 401

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REP 1-340-2

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OVERHAUL



REPAIR

SPHERICAL BEARING HOUSING (1-340)

3. Refurbishing the location diameter by nickel plating

PARTS REQUIRED FOR REPAIR

-
- A. Smoothen the location diameter by machining. This machining to be the minimum necessary to just remove any defects, and to give a minimum re-plating thickness of 0,05 mm (0.0020 in.).
 - B. Carry out a crack test with post emulsification fluorescent dye penetrant, using process M 504 B in chapter 70-20-10.
If cracked, scrap the part.
 - C. Nickel-plate the locating diameter using process M 301 B (b) in chapter 70-15-30, as indicated below and in figure 401.

(1) Plating thickness: 0,127 mm (0.005 in.) minimum
 - D. Rework the location diameter by machining to the dimensions of figure 401.

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REP 1-340-3

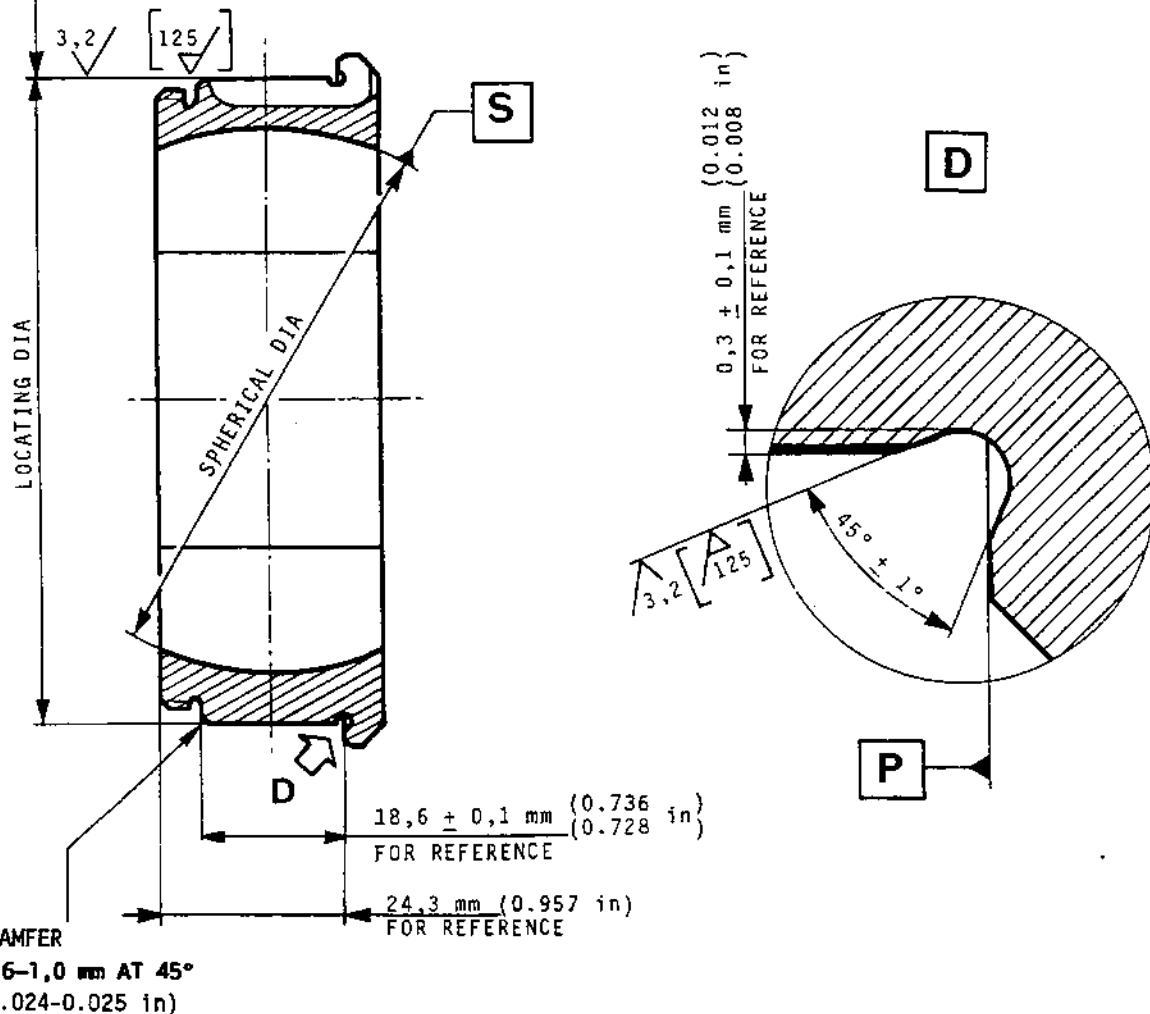
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**OLYMPUS 593**MK.610-14-28
OVERHAUL

	0,051 mm (0.002 in)	P
--	------------------------	----------

	0,025 mm (0.001 in)	S
--	------------------------	----------



LOCATING DIAMETER	DIMENSIONS mm (in)	
After smoothening	DIA 85,586	(3.3713)
	DIA 85,632	(3.3695)
After nickel-plating	DIA 85,89 MIN.	(3.3813)
After machining of plating	DIA 85,745	(3.3758)
	DIA 85,732	(3.3753)

Reconditioning Locating Diameter
Figure 401**78-31-01**

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REPAIR

SPHERICAL BEARING (1-350)

2. Reconditioning the spherical diameter chrome plating

PARTS REQUIRED FOR REPAIR

- A. Remove the existing plating and any damage marks by grinding, taking care, however, not to exceed the limits given on figure 401.
- B. Crack test with post emulsification fluorescent dye penetrant using process M 504 B in chapter 70-20-10.

If cracked, scrap the part.
- C. Recondition the spherical diameter chrome plating using process M 300 B (b) in chapter 70-15-30, as indicated below and on figure 401.

(1) Plating thickness: 0,25 mm (0.010 in.) minimum.
- D. Correct, by grinding, the spherical diameter to obtain the value given on figure 401.
- E. Carry out a crack test with post emulsification fluorescent dye penetrant using process M 504 B in chapter 70-20-10.

(1) The presence of a fine hairline cracks network caused by the original machining (by grinding) is normal.

(2) The presence of pits, excessive cracks, blisters or flaking or all other detrimental defects is not acceptable and involves re-application of the repair.

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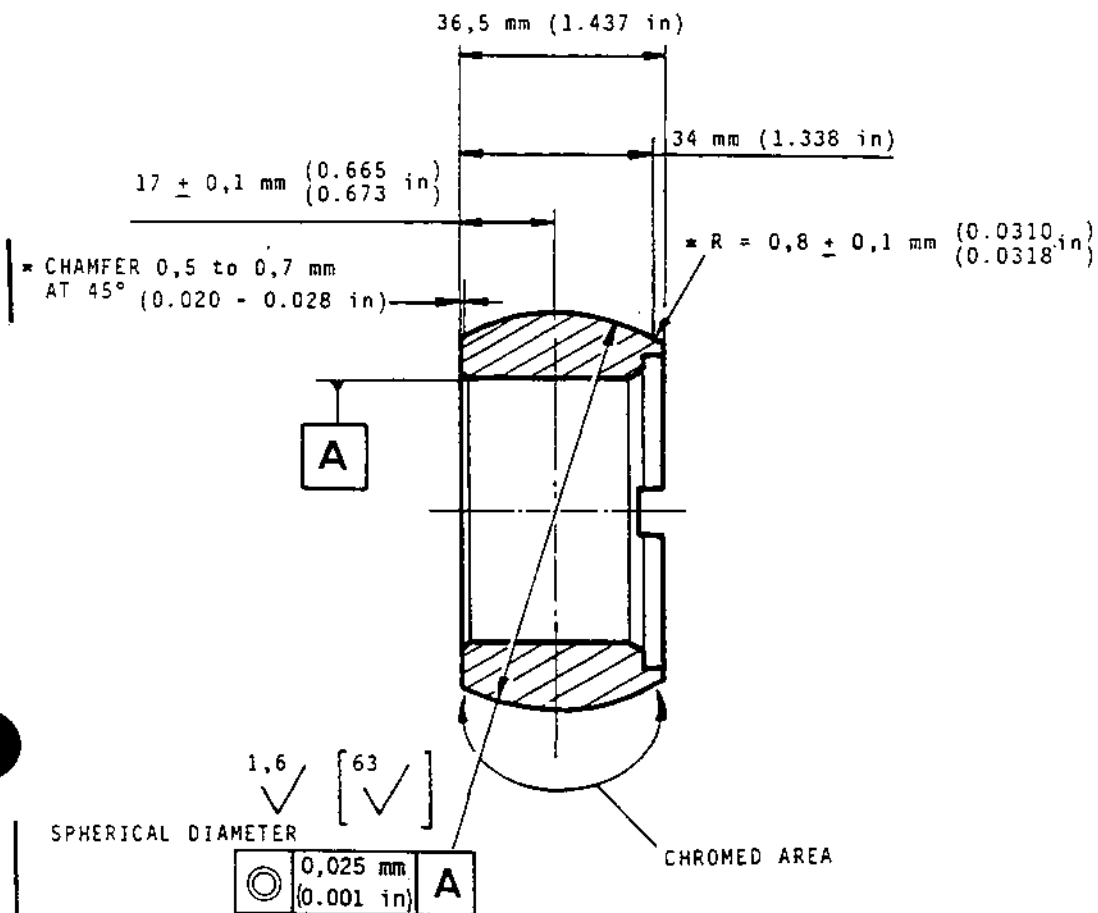
REP 1-350-2

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SPHERICAL DIAMETER	DIMENSIONS mm (in)	
After removal of plating	DIA 72,632	(2.8595)
	DIA 72,552	(2.8564)
After chrome plating	DIA 73,13 MIN.	(2.8791)
After final grinding	DIA 72,962	(2.8725)
	DIA 72,932	(2.8719)

NOTE: Roughness 3,2 μm (125 μin) otherwise specified

NOTE: Minimum thickness of chrome plating permissible 0-0,2 mm (0-0.008 in.) on dimensions marked*.

Reconditioning of Spherical Diameter Chrome Plating
Figure 401



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OVERHAUL



REPAIR

SPHERICAL BEARING (1-350)

2. Reconditioning of the bore chrome plating

PARTS REQUIRED FOR REPAIR

- A. Remove the existing plating and any damage marks by grinding, taking care, however, not to exceed the limits given on figure 401.
- B. Crack test with post emulsification fluorescent dye penetrant using process M 504 B in chapter 70-20-10.

If cracked, scrap the part.
- C. Recondition the bore chrome plating using process M 300 B (b) in chapter 70-15-30, as indicated below and on figure 401.

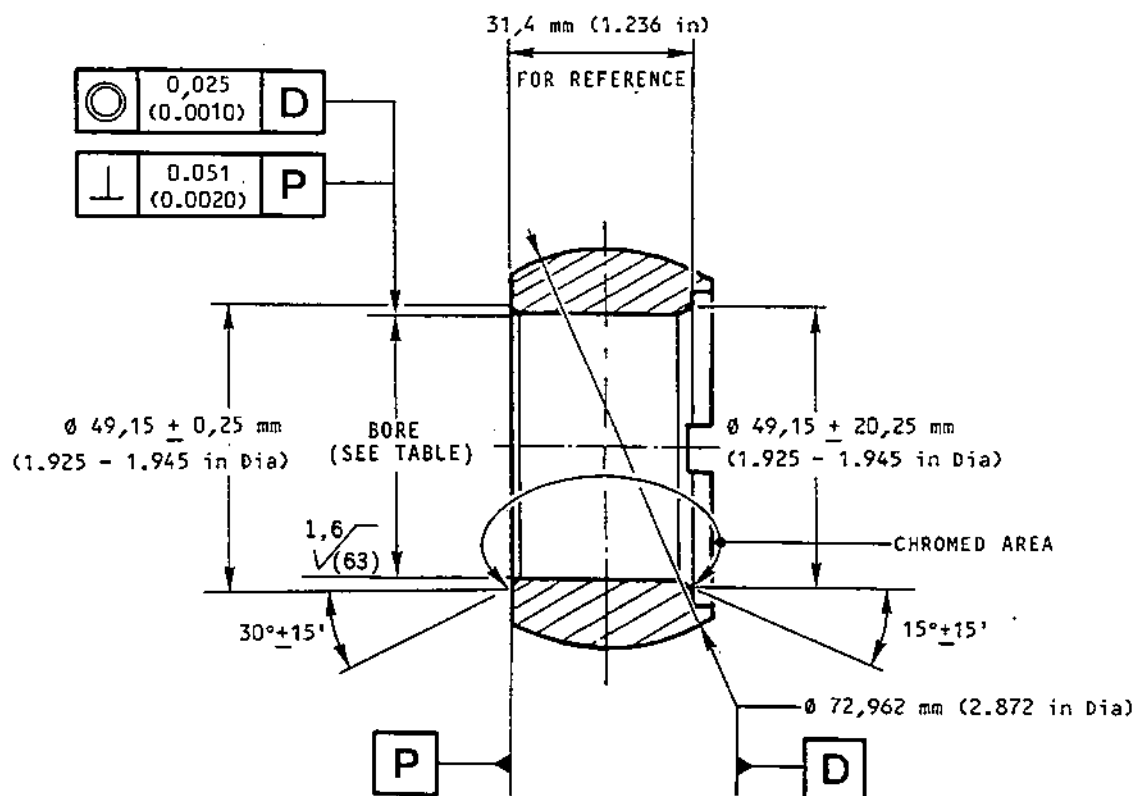
(1) Plating thickness: 0,25 mm (0.010 in.) minimum.
- D. Correct, by grinding, the bore to obtain the value given on figure 401.
- E. Carry out a crack test with post emulsification fluorescent dye penetrant using process M 504 B in chapter 70-20-10.
 - (1) The presence of a fine hairline cracks network caused by the original machining (by grinding) is normal.
 - (2) The presence of pits, excessive cracks, blisters or flaking or all other detrimental defects is not acceptable and involves re-application of the repair.

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NOTE: Surface roughness of machining: $3,2 \mu\text{m}$ (125 μin) otherwise specified.
Minimum thickness of chrome plating permissible 0-0,2 mm (0-0.008 in) on the chamfers.

Bore	Dimensions mm (in.)	
After removal of plating	DIA $47,941 \pm 0,09$ - 0	(1.8910) (1.8874)
After chrome plating	DIA 47,44 MAX.	(1.8677)
After final grinding	DIA $47,625 \pm 0,016$ - 0	(1.8756) (1.8750)

Reconditioning of the Bore Chrome Plating
Figure 401



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REPAIR

BASIC BUCKET UNIT (1-460)

1. Renewal of Heli-coil thread inserts fitted in the primary heat shield attachment points :

PARTS REQUIRED FOR REPAIR

Heli-coil thread insert No. 3591-6TNV-0375

A. Removal of the existing thread insert

- (1) Remove the damaged thread insert using the manufacturers extractor.

B. Inspection

- (1) Check the condition and cleanliness of the Heli-coil insert housing thread.

If any burrs are present, rework the thread using the manufacturers "finishing" tap (thread 3/8 - 24 Heli-coil, class 3B).

C. Fitting the new thread insert

- (1) Fit the thread insert using the manufacturers threaded mandrel as indicated on figure 401.
- (2) Break off the drive with the special tool.

D. Inspection

- (1) Check that the thread insert is correctly fitted.

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REP 1-460-1

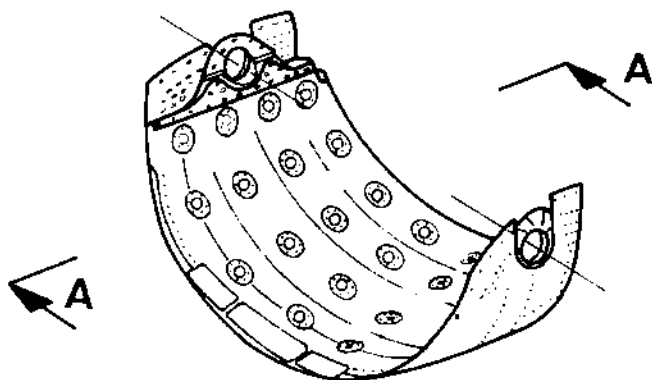
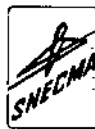
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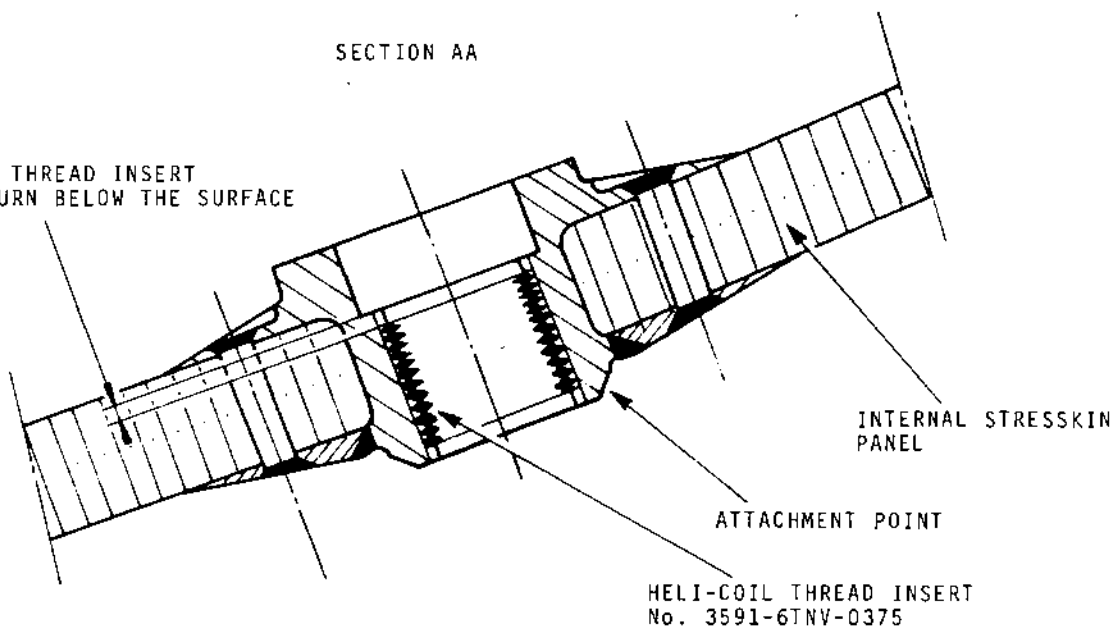
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SECTION AA

FIT THE THREAD INSERT
1/2-1 TURN BELOW THE SURFACE



INTERNAL STRESSKIN
PANEL

ATTACHMENT POINT

HELI-COIL THREAD INSERT
No. 3591-6TNV-0375

Renewal of Thread Inserts
Figure 401

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REP 1-460-1

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**OLYMPUS 593**

MK.610-14-28

OVERHAUL

REPAIRBASIC BUCKET (1-460)2. Renewal of Mounting Elements Around the Bucket Hub

PARTS REQUIRED FOR REPAIR

Captive nut assembly	No. 301-097-400-0
Captive nut	No. NAS 686-C4 (649-785-095-0)
Nut	No. 301-084-702-0
Nut	No. 301-084-800-0
Sleeve	No. 301-085-000-0
Thread insert	No. 3591-3CNV-0190 (649-773-223-0)
Thread insert	No. 3591-4CNV-0250 (649-773-219-0)
Blind nut	No. BTN1LG-428-2 (649-783-069-0)
Blind nut	No. BTN1LG-428-7 (649-783-070-0)
Rivet	No. MS 20427 M3-5 (650-022-044-0)

A. Renewal of Blind Nuts(1) Removal of defective blind nuts

Remove the nut by drilling with a 7.5 mm (0.295 in) dia. bit.

NOTE : As far as possible, remove any swarf which falls into the cell.

(2) Fitting a new nut

Fit the blind nut using the manufacturer's assembly tool as indicated on figure 401, and the manufacturer's instructions.

NOTE : Carefully respect the position of the anti-rotation lug.

(3) Inspection

- (a) Check that the nut is correctly crimped and that the thread has not been damaged in any way during assembly.
Otherwise, replace the nut.

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**ATP
TEMPORARY
REVISION**

BRITISH AIRWAYS

CONCORDE
OLYMPUS 593
OVERHAUL MANUAL

TR Page 1 of 1
3 April 1992

This Temporary Revision complies with BCAR Chapter A5-3,85-3 and/or TSS No.0-2 as appropriate.



for Chief Engineer (Technical & Quality Services) CAA Design Approval No.
DAI/8566/78

TEMPORARY REVISION NO 78-527

Manual Reference 78-31-01 REP 1-460-2 Page 402

REASON FOR REVISION

Ground Occurrence Report (E1022) - Anchor Nut part number 301-084-800-0 fell out during transit from Workshops, via Stores to Hangar.

ACTION

Reference Para 2.C. Renewal of Thread Inserts

Sub Para. (3) is REVISED to read as follows:-

- (3) Fit a new thread insert using the manufacturers threaded mandril as shown in figure 402 - Sections AA, DD, EE.

NOTE: Nut Pt.No. 301-084-800-0 (Section EE) should be press fitted using Loctite 640, in accordance with the relevant Standard Practices Manual.

In the case of nut Pt. No. 301-084-600-0 (Section CC), it is necessary to use an installation sleeve to enable the new thread insert to be fitted.

Originator: S. LINCOLN
Ref: EPA/014/SL
Work Record: 78-4

78-31-01 REP 1-460-2



OLYMPUS 593

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- (b) Check that the adjustment washers are flush with the bucket hub over their full width.

- Gap to be filled = 0.25 mm (0.010 in).

B. Renewal of Captive Nuts

(1) Removal of damaged nuts

Remove the nut by grinding away the heads of the retaining rivets.

(2) Fitting a new nut

Fit a new nut by rivetting as per instructions in "RIVETING" chapter 70-50-10, and as indicated on figure 402 - sections AA and BB.

(3) Inspection

Check that the nut is correctly rivetted as per chapter 70-50-80 "RIVETING".

C. Renewal of Thread Inserts

NOTE : In the case of thread insert fitted in nut No. 301-084-800-0 (figure 402 - section EE), it is necessary to remove the nut from the hub to renew the thread insert.

- (1) Remove the existing thread insert using the manufacturer's extractor.

- (2) Check the cleanliness and condition of the tapping for the thread insert.
If any burrs are found, remove them using the manufacturer's "finishing" tap.

- (3) Fit a new thread insert using the manufacturer's threaded mandril as shown in figure 402 - Sections AA, DD, EE.

NOTE : In the case of nut 301-084-600-0 (section CC), it is necessary to use an installation sleeve to enable the new thread insert to be fitted.

- (4) Break off the drive using the manufacturer's special tool.

← SEE TEMP. REV. OR SUPPLEMENT

← SEE TEMP. REV. OR SUPPLEMENT

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- (4) Disengage the drive using the manufacturer's special tool.

D. Renewal of Interference-Fitted Nuts

- (1) Push out the damaged nut using a press.
- (2) Fit a new nut and, if necessary, a sleeve using the press as indicated on figure 402 - sections DD and EE.

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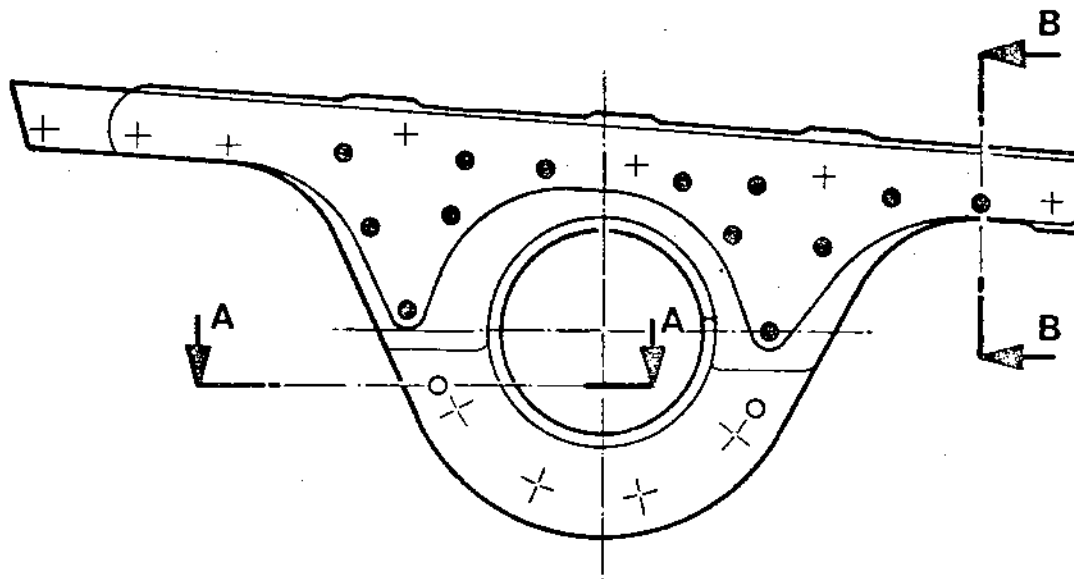


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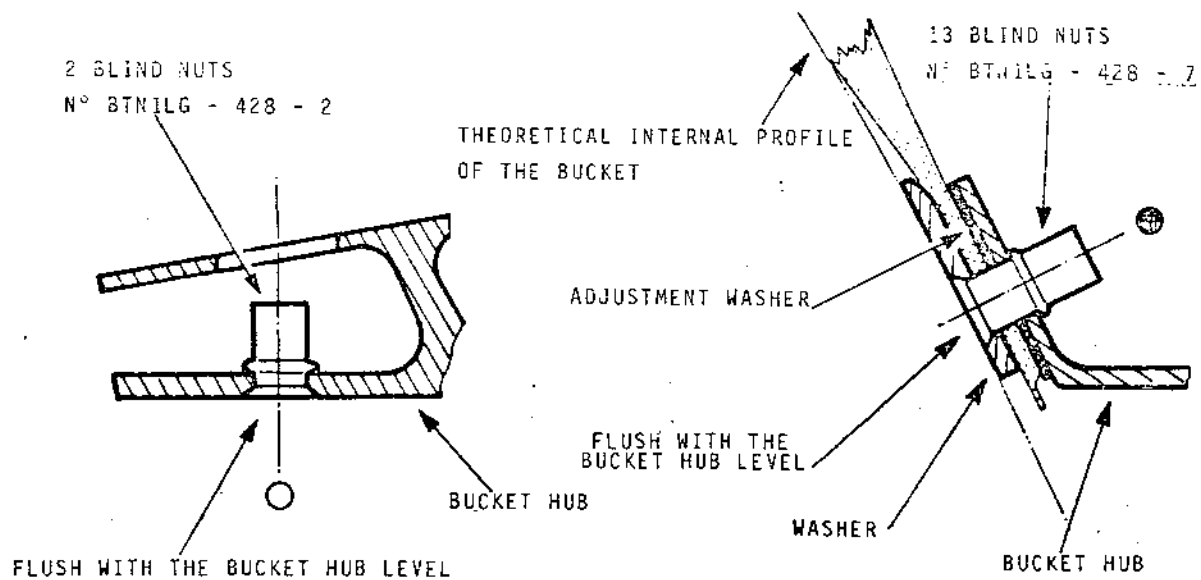


INTERNAL VIEW OF BUCKET HUB



SECTION AA

SECTION BB



Renewal of Blind Nuts
Figure 401

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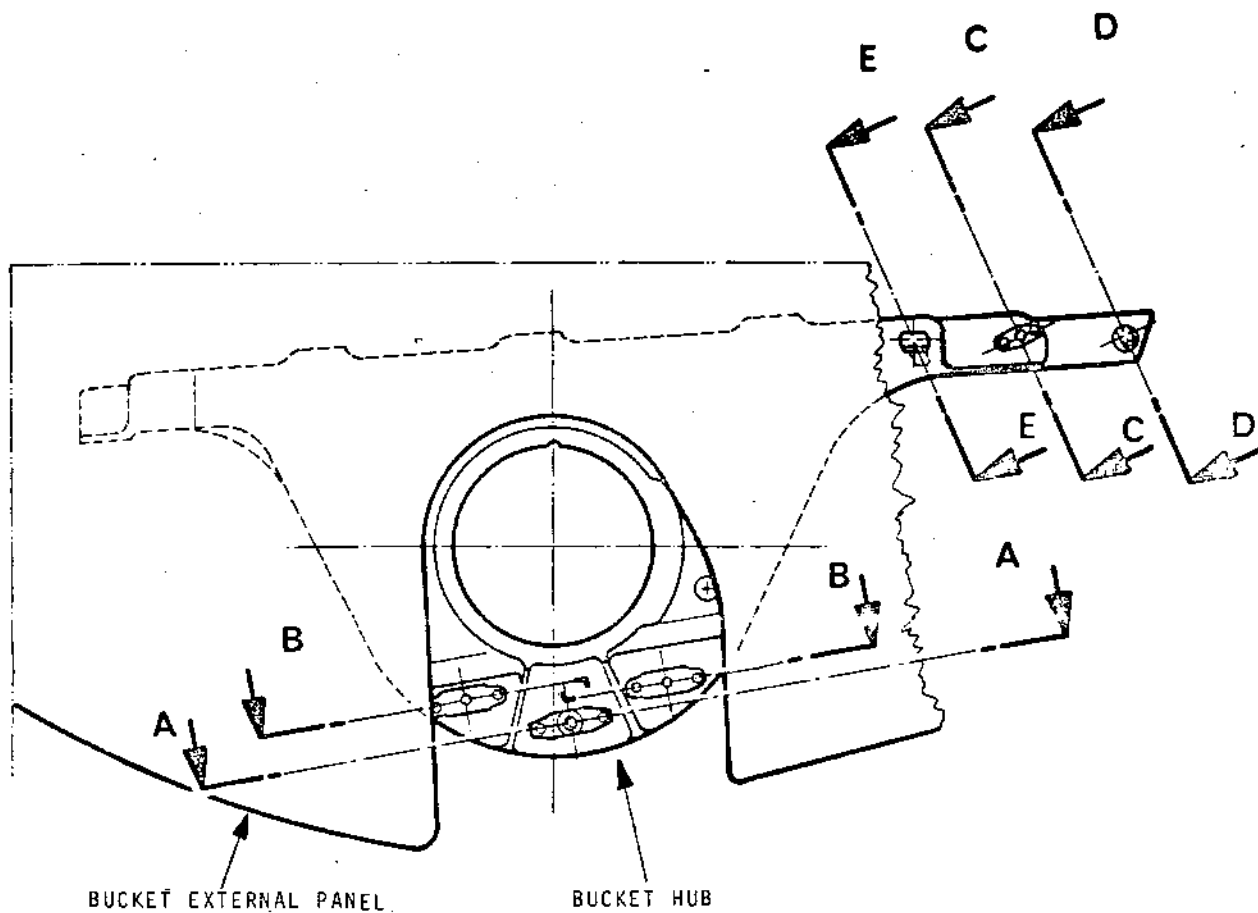
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EXTERNAL VIEW OF BUCKET HUB



Renewal of Mounting Elements
Figure 402 - Sheet 1 of 4

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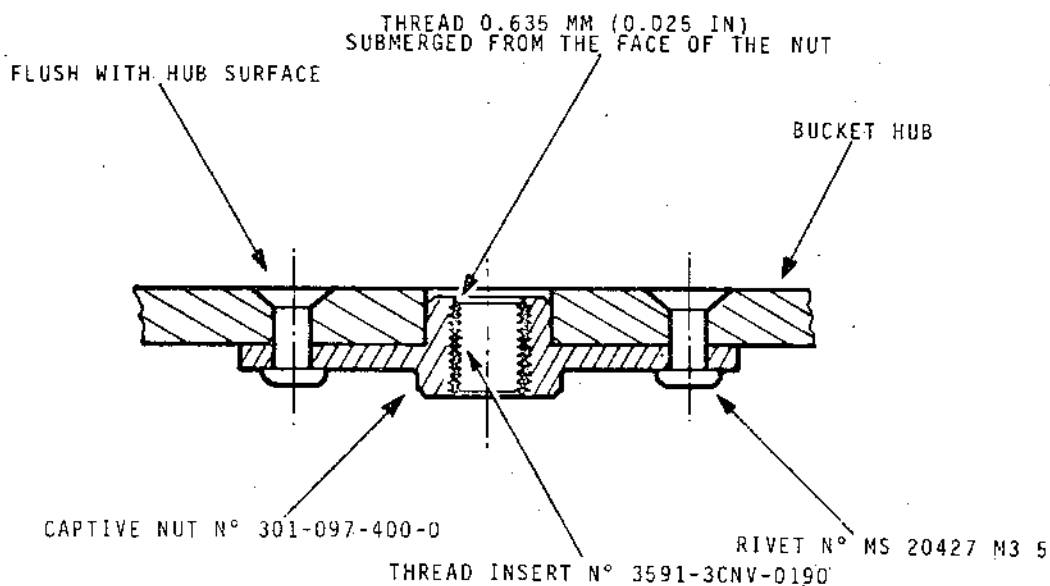
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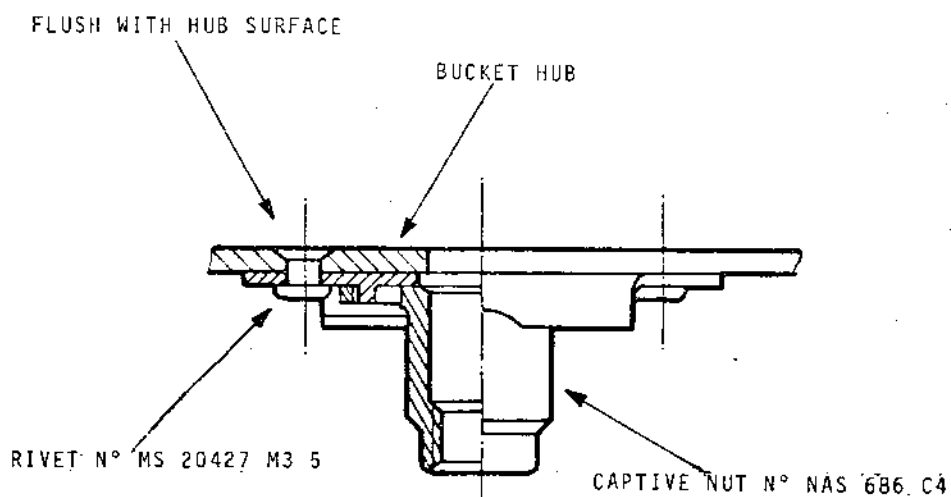
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SECTION AA



SECTION B6



Renewal of Mounting Elements
Figure 402 - Sheet 2 of 4

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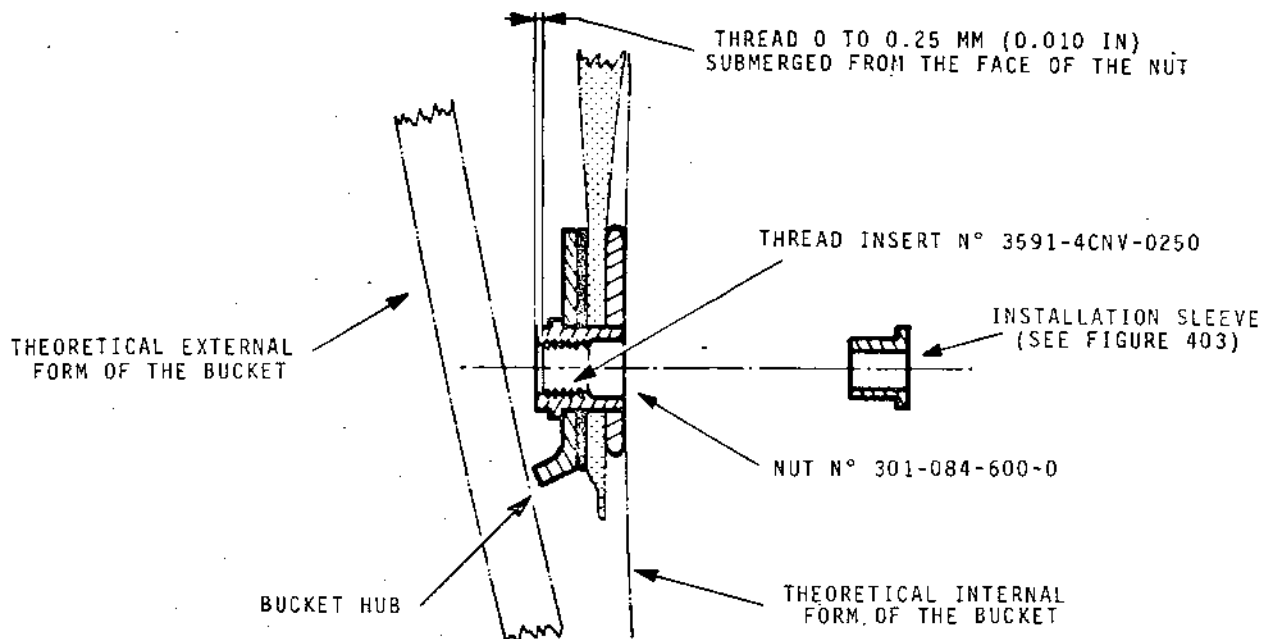
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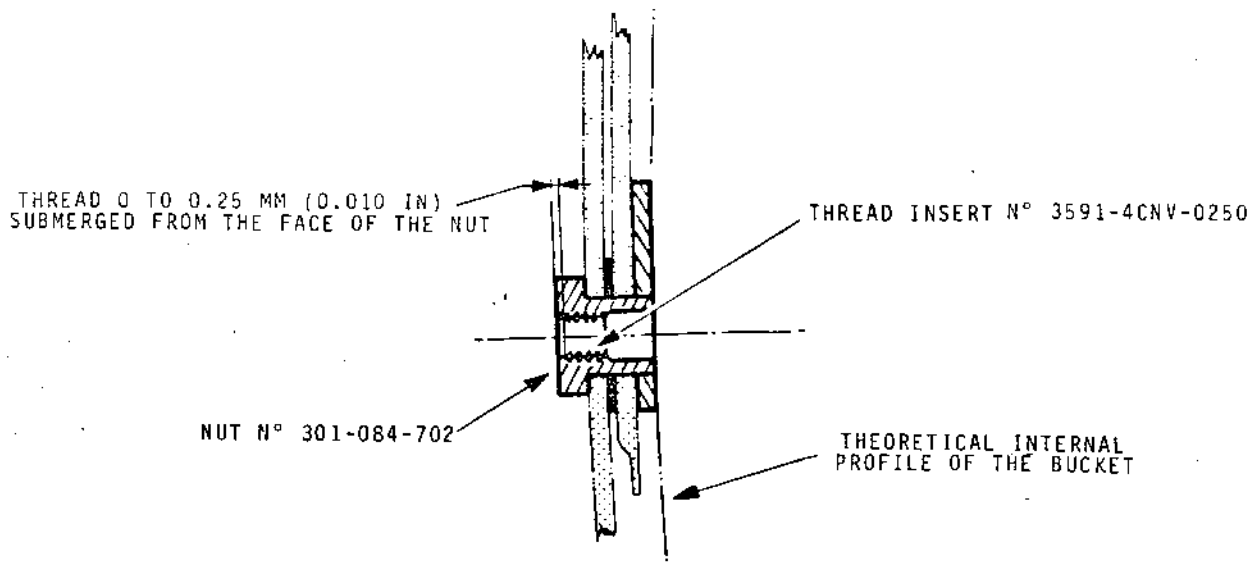
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SECTION CC



SECTION DD



Renewal of Mounting Elements

Figure 402 - Sheet 3 of 4

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**ATP
TEMPORARY
REVISION**

BRITISH AIRWAYS

TR Page 1 of 1
3 April 1992

CONCORDE
OLYMPUS 593
OVERHAUL MANUAL

This Temporary Revision complies with BCAR Chapter A5-3, B5-3 and/or TSS No.0-2 as appropriate.

A. Chalkley

for Chief Engineer (Technical & Quality Services) CAA Design Approval No.
DAI/8566/78

TEMPORARY REVISION NO 78-528

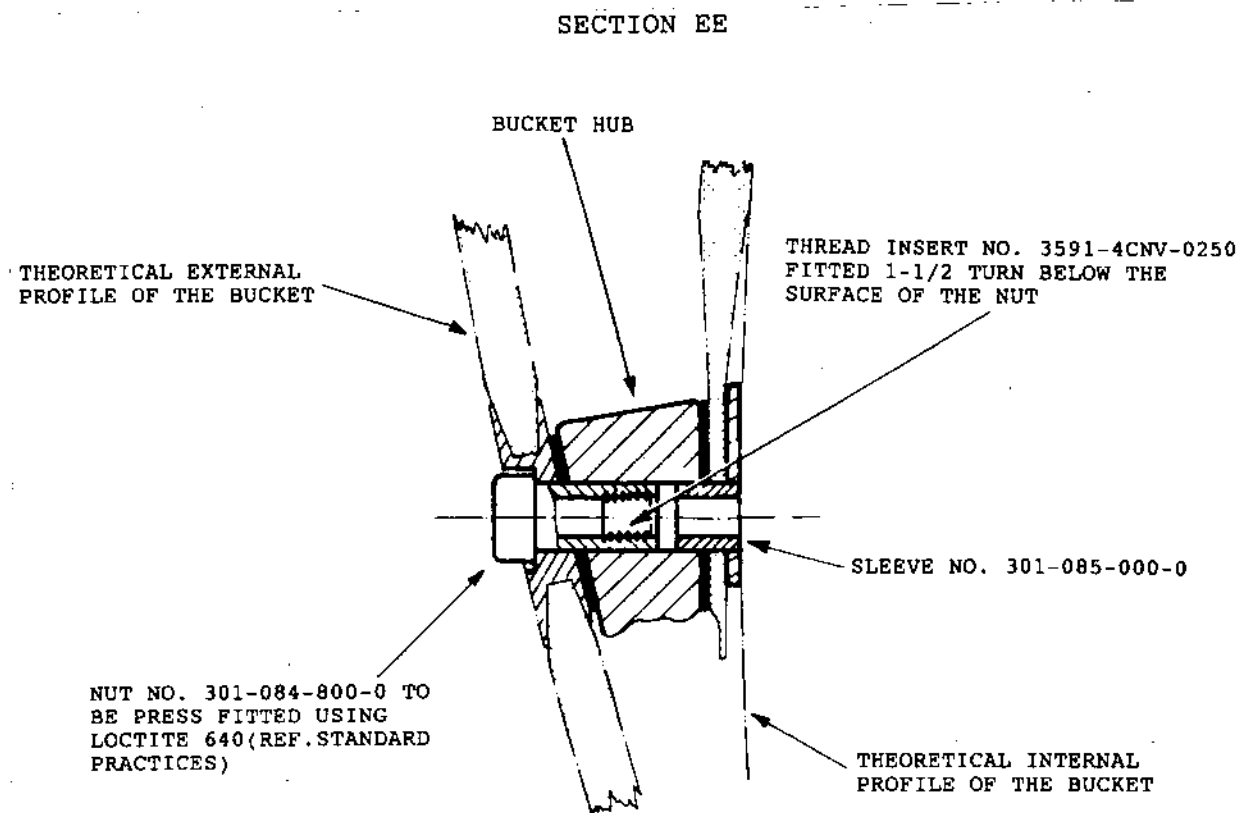
Manual Reference 78-31-01 REP 1-460-2 Page 408

REASON FOR REVISION

Ground Occurrence Report (E1022) - Anchor Nut part number 301-084-800-0 fell out during transit from Workshops, via Stores to Hangar.

ACTION

Figure 402 - Sheet 4 of 4 is REVISED as follows:-



Renewal of Mounting Elements
Figure 402-Sheet 4 of 4

Originator: S. LINCOLN
Ref: EPA/015/SL
Work Record: 78-5

78-31-01 REP 1-460-2

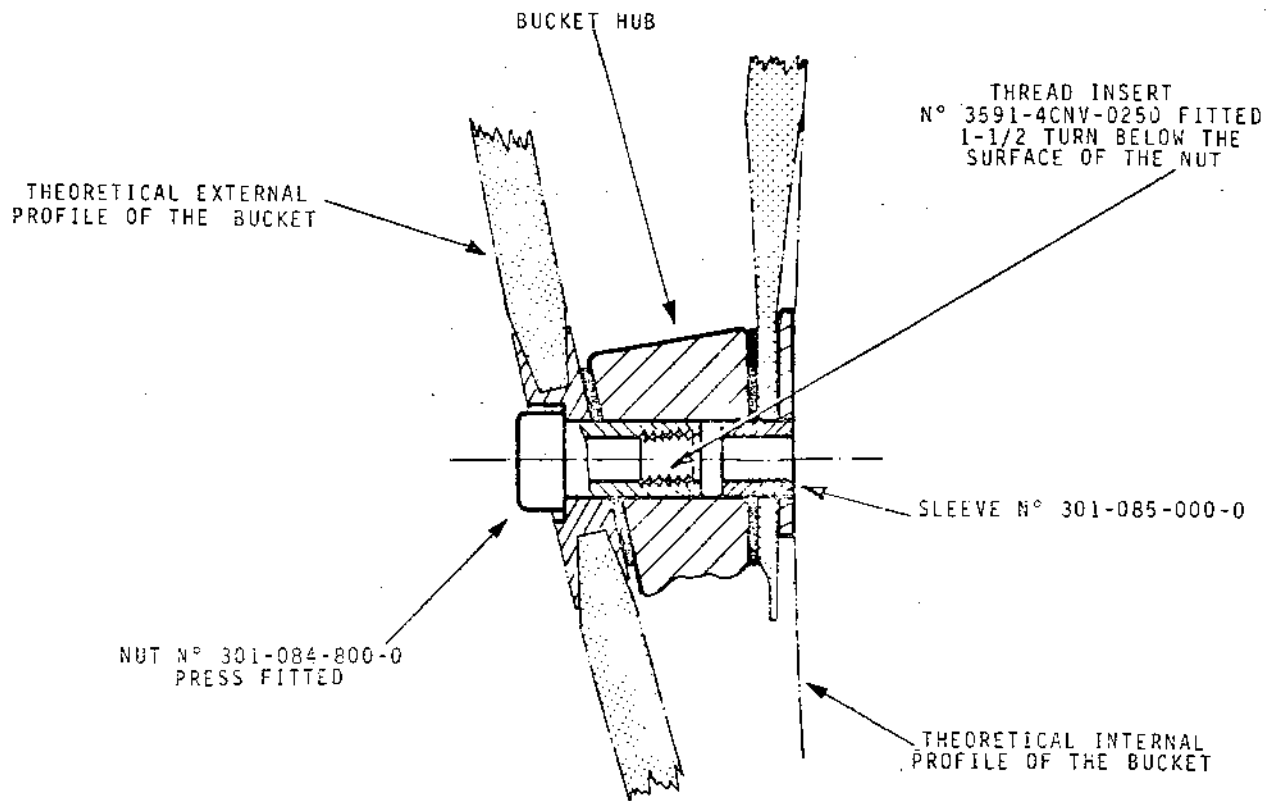


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MK.610-14-28
OVERHAUL



SECTION EE



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Renewal of Mounting Elements
Figure 402 - Sheet 4 of 4

← SEE TEMP. REV. OR SUPPLEMENT

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REP 1-460-2

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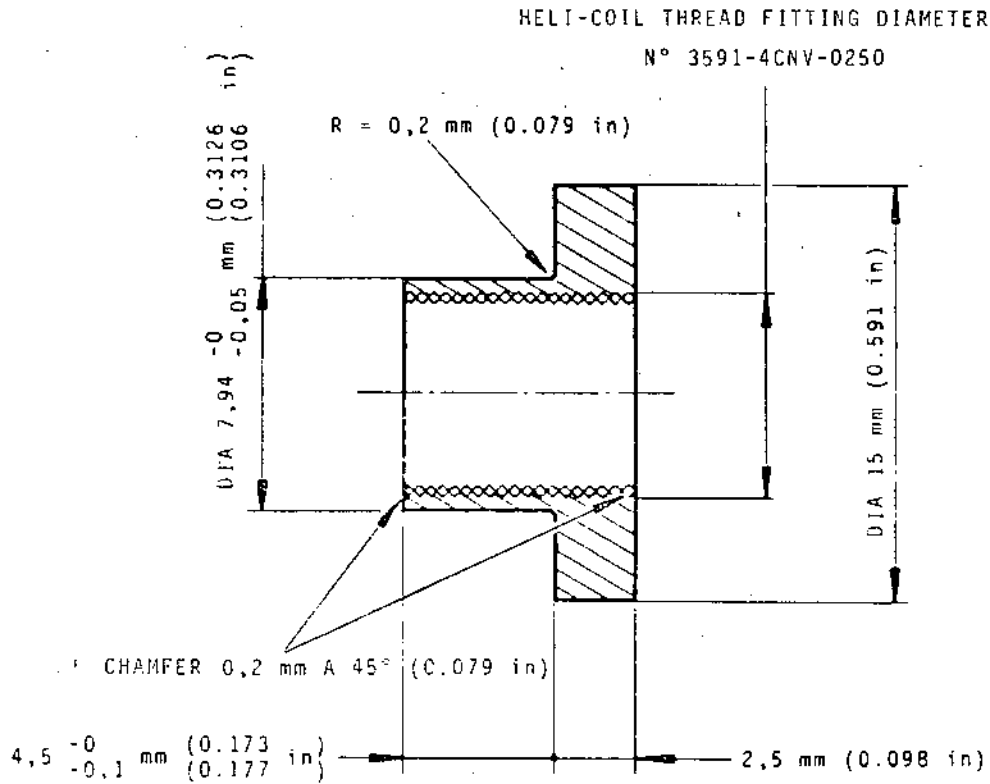
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OLYMPUS 593

MK.610-14-28

OVERHAUL



Installation Sleeve
Figure 403

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****REPAIR****SNECMA****REVERSE BUCKET (1-460)****3. Replacement of inner and outer panel fasteners****PARTS REQUIRED FOR REPAIR**

Blind bolt	PLT1004-6-3	(650-089-930-0)
	PLT1011-6-3	(650-089-930-1)
	PLT1014-6-3	(650-089-930-2)
Blind bolt	PLT1004-6-5-5	(650-089-950-0)
	PLT1011-6-5-5	(650-089-950-1)
	PLT1014-6-5-5	(650-089-950-2)
Blind bolt	PLT1004-6-6	(650-089-933-0)
	PLT1011-6-6	(650-089-933-1)
	PLT1014-6-6	(650-089-933-2)
Blind bolt	PLT1004-6-6-5	(650-089-951-0)
	PLT1011-6-6-5	(650-089-951-1)
	PLT1014-6-6-5	(650-089-951-2)
Blind bolt	PLT1004-6-7	(650-089-934-0)
	PLT1011-6-7	(650-089-934-1)
	PLT1014-6-7	(650-089-934-2)
Blind bolt	PLT1004-6-7-5	(650-089-952-0)
	PLT1011-6-7-5	(650-089-952-1)
	PLT1014-6-7-5	(650-089-952-2)
Blind bolt	PLT1004-6-8	(650-089-935-0)
	PLT1011-6-8	(650-089-935-1)
	PLT1014-6-8	(650-089-935-2)
Rivet	NAS1198-5-9	(650-015-108-0)
	21215CM4015	
	21215CM4816	(650-014-139-0)
Rivet	NAS1198-5-13	(650-014-115-0)
	21215CM4022	
	21215CM4822	(650-014-145-0)
Rivet	NAS1199-5-8	(650-024-106-0)
	21217CM4013	
	NAS1199-5-9	(650-024-108-0)
Rivet	21217CM4015	
	NAS1199-5-11	(650-024-111-0)
	21217CM4018	
Rivet	21217CM4820	(650-024-143-0)
	NAS1199-5-12	(650-024-113-0)
	21217CM4020	
	21217CM4822	(650-024-145-0)

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PARTS REQUIRED FOR REPAIR

Blind rivet	CR2663-5-2	(672-772-068-0)
Blind rivet	CR2838-5-8	(649-772-165-0)
	CR2838-6-8	(649-772-198-0)
Blind rivet	CR2839-5-8	(649-772-087-0)
	CR2839-6-8	(649-772-170-0)
Blind bolt	PLT220-6-3-5	(649-772-031-0)
Blind bolt	PLT1005-8-5-5	(650-772-057-0)
Blind rivet	CR2838-5-8	(649-772-165-0)
+Washer	+SPC9401S5-040	+(649-786-204-0)
Blind rivet	CR2838-6-8	(649-772-198-0)
+Washer	+SPC9401S6-040	+(649-786-215-0)

A. Replacement of blind bolt (See table in figure 401)

- (1) Replace the defective blind bolt as per chapter 70-50-60.
- (2) Check the blind bolt fitting as per chapter 70-50-86.

B. Replacement of solid rivet (See table in figure 401)

- (1) Remove the defective solid rivet as per chapter 70-50-10, paragraph 4.

NOTE: In case of oversize fasteners used, counterbore all the elements to be assembled.

- (a) Fit the solid rivet as per chapter 70-50-10.
 - (b) Fit the blind rivet as per chapter 70-50-60.
- (2) Check the solid rivet fitting as per chapter 70-50-81, and the blind rivet fitting as per chapter 70-50-85.

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SNECMA

REPAIR

- C. Replacement of blind rivet (See table in figure 401)
- (1) Replace the defective blind rivet as per chapter 70-50-60.
 - (2) Check the blind rivet fitting as per chapter 70-50-86.
- D. Replacement of HI-LOK screws (See table in figure 401)
- (1) Remove the defective HI-LOK screw as per chapter 70-50-40, paragraph 4.A.
 - (2) Fit the blind bolt as per chapter 70-50-60.
 - (3) Check the blind bolt fitting as per chapter 70-50-86.

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ITEM N°	ORIGINAL	ORIGINAL	1st REPAIR	2nd REPAIR
1	PLT1004-6-3	PLT1004-6-3	PLT1011-6-3	PLT1014-6-3
2	PLT1004-6-5-5	PLT1004-6-5-5	PLT1011-6-5-5	PLT1014-6-5-5
3	PLT1004-6-6	PLT1004-6-6	PLT1011-6-6	PLT1014-6-6
4	PLT1004-6-6-5	PLT1004-6-6-5	PLT1011-6-6-5	PLT1014-6-6-5
5	PLT1004-6-7	PLT1004-6-7	PLT1011-6-7	PLT1014-6-7
6	PLT1004-6-7-5	PLT1004-6-7-5	PLT1011-6-7-5	PLT1014-6-7-5
7	PLT1004-6-8	PLT1004-6-8	PLT1011-6-8	PLT1014-6-8
8	HL869-6-12		PLT1004-6-6	PLT1011-6-6
9	HL869-6-13		PLT1004-6-6-5	PLT1011-6-6-5
10	HL869-6-14		PLT1004-6-7	PLT1011-6-7
11	HL869-6-16		PLT1004-6-8	PLT1011-6-8
12	NAS1198-5-5		CR2663-5-2	
13	NAS1198-5-9	NAS1198-5-9	21215CM4816	
14	NAS1198-5-13	NAS1198-5-13	21215CM4822	
15	NAS1199-5-8	NAS1199-5-8	21217CM4013	
16	NAS1199-5-9	NAS1199-5-9	21217CM4015	
17	NAS1199-5-11	NAS1199-5-11	21217CM4820	
18	NAS1199-5-12	NAS1199-5-12	21217CM4822	
19	CR2838-5-8	CR2838-5-8	CR2838-6-8	
20	CR2839-5-8	CR2839-5-8	CR2839-6-8	
21	HL40-6-4		PLT220-6-3-5	
22	HL41-8-6		PLT1005-8-5-5	
23	CR2838-5-8 +SPC9401S5-040	CR2838-5-8 +SPC9401S5-040	CR2838-6-8 +SPC9401S6-040	

Replacement of Fasteners
Figure 401

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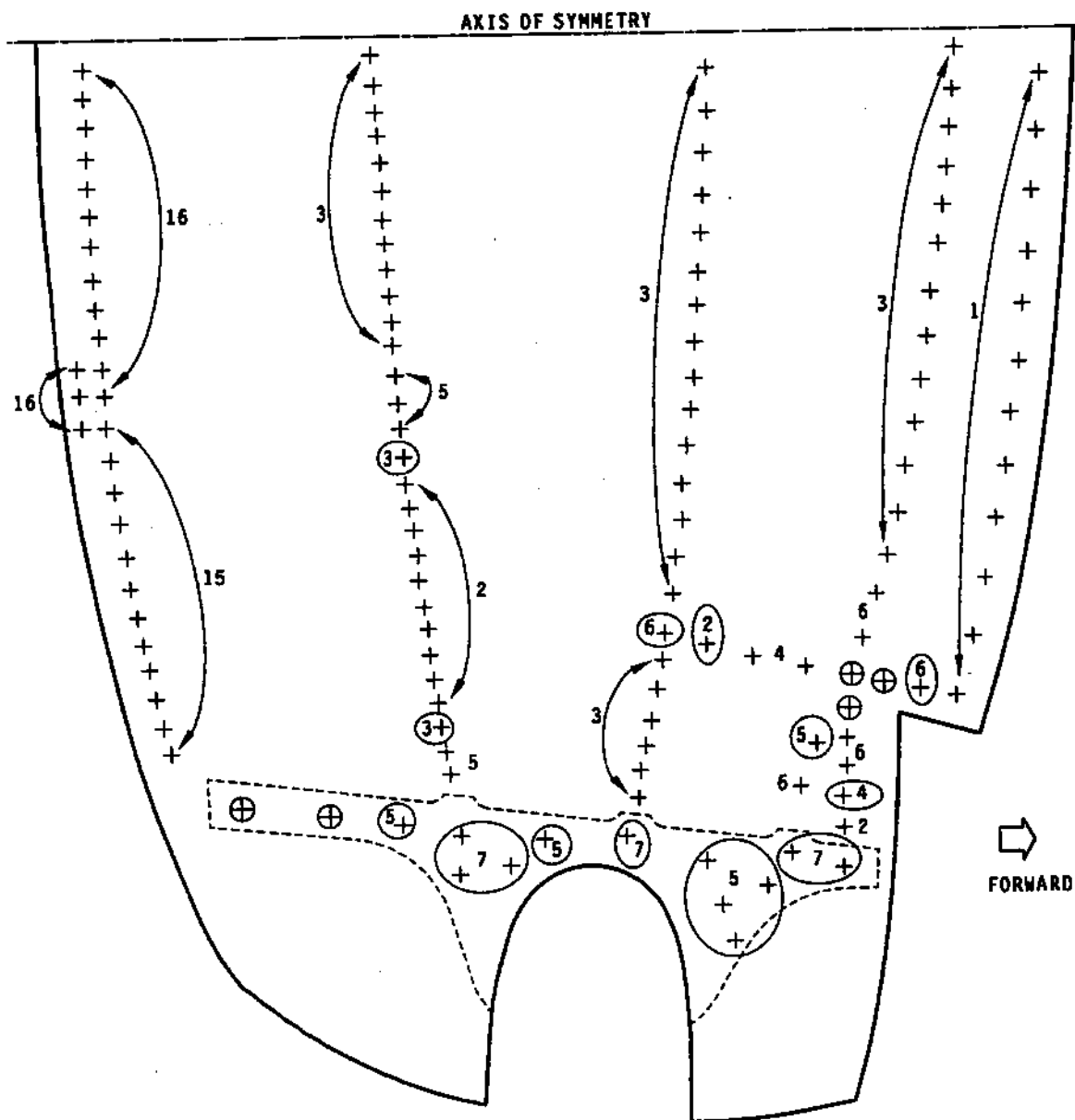
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MK. 610-14-28

OVERHAUL



sneema



ORIGINAL FASTENERS ON THE OUTER PANEL
(WITH DOUBLERS REMOVED)
TO IDENTIFY THEM, SEE TABLE IN FIGURE 401

S-OLY-SM-00029-00-B

Replacement of Outer Panel Fasteners
Figure 402 (Sheet 1 of 2)

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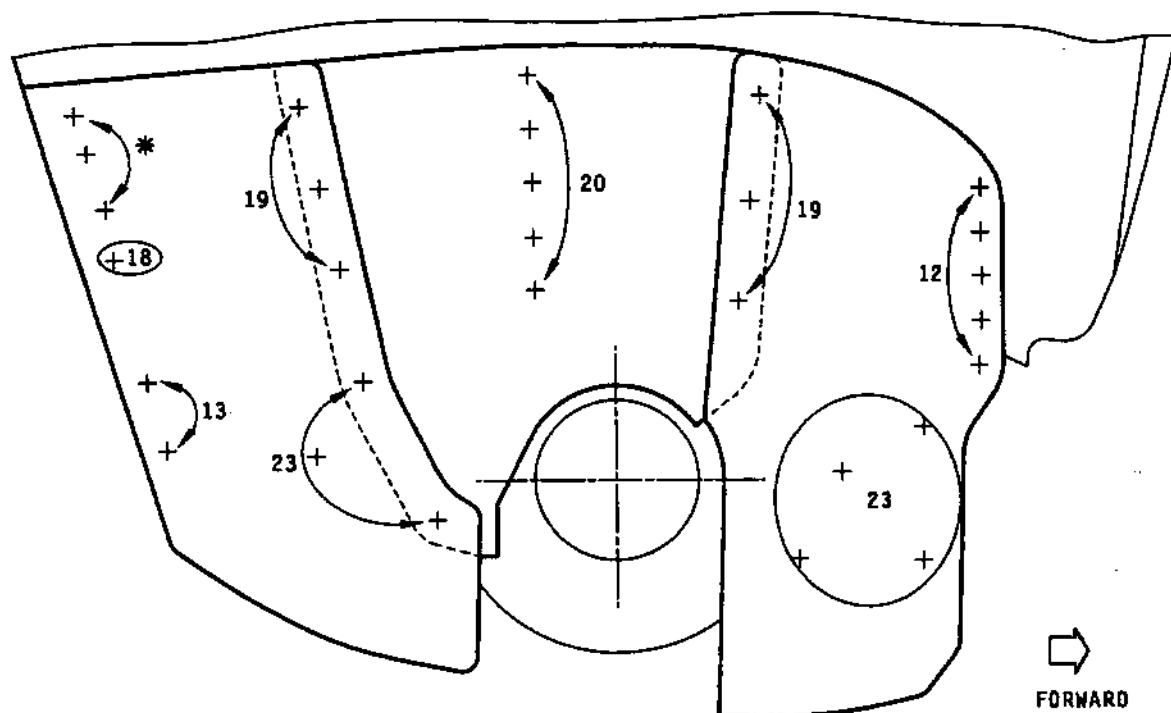
MK. 610-14-28

OVERHAUL

REPAIR



SNECMA



ORIGINAL FASTENERS ON BUCKET DOUBLERS
TO IDENTIFY THEM, SEE TABLE IN FIGURE 401

* FOR REVERSE BUCKET S/N 3511 TO S/N 3574 : Item 17
FOR REVERSE BUCKET S/N 3575 AND SUB : Item 14

S-OLY-SM-00030-00-B

Replacement of Outer Panel Fasteners
Figure 402 (Sheet 2 of 2)

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S-OLY-SM-00031-00-B

Replacement of Inner Panel Fasteners
Figure 403

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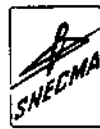
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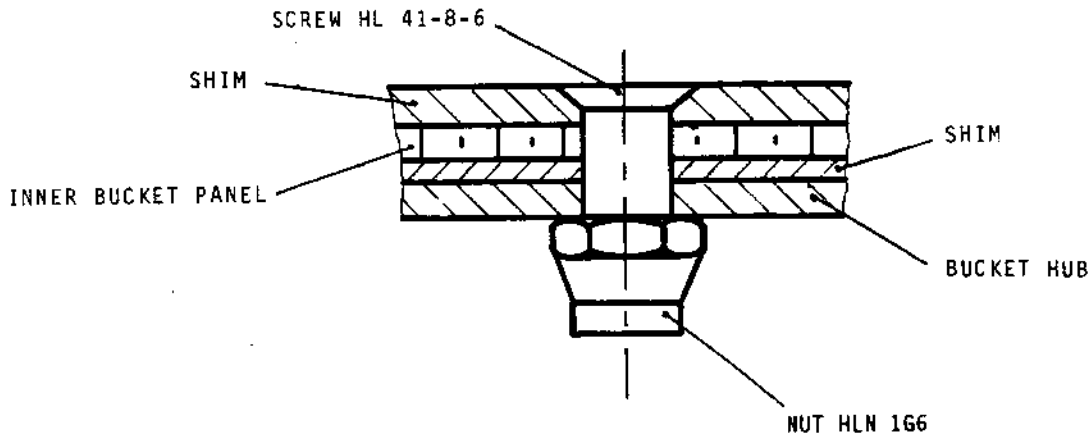
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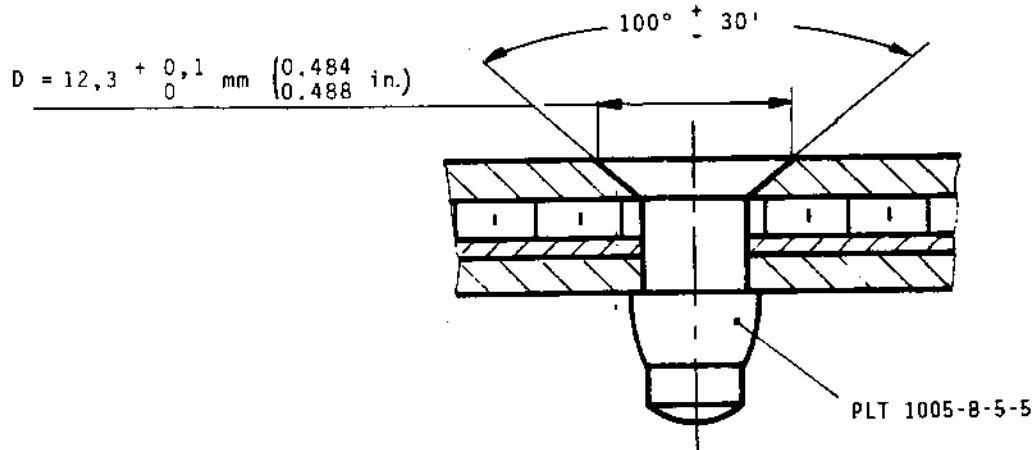
A

BEFORE REPAIR



A

AFTER REPAIR



Replacement of Fasteners on Inner Panel
Figure 403 (Sheet 2 of 2)

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL**REPAIRREVERSE BUCKET (1-460)4. Replacement of Leading Cover and Fasteners

PARTS REQUIRED FOR REPAIR

Cover	301-094-201-0	
Blind bolt	PLT1004-6-3	(650-089-930-0)
	PLT1011-6-3	(650-089-930-1)
	PLT1014-6-3	(650-089-930-2)
Blind rivet	CR2662-3-3	(649-772-060-0)
Blind rivet	CR2663-5-2	(649-772-068-0)
	CR2839-5-2	(649-772-083-0)
Rivet	MS2042M3-4	(650-022-042-0)
	21217TB2406	
Tab nut	NAS686C3	(649-785-086-0)
	NAS1068C3	(649-785-128-0)

A. Determining the leading-edge cover position on the bucket.

- (1) Anchor positioning tools SC 271 in the retaining holes on the heat shields.
- (2) Position the tools relative to the damaged cover and lock the stops (see figure 401, sheet 2 of 3).
- (3) Take down the tools.

B. Disassembly of damaged cover.

- (1) Remove cover fasteners as instructed in Standard Practices, chapter : 70-50-50 for blind rivets
70-50-60 for blind bolts.

C. Inspection

- (1) Make a soundness inspection of the tab nuts and, if necessary, remove any damaged nuts by grinding out the rivet heads as shown in figure 401, and instructed in chapters 70-50-10 and 70-50-50.

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema**

D. New cover drilling

- (1) If necessary, correct the shape of the new cover, matching it to the contour of the bucket.
- (2) Stick a strip of stabylene tracing paper onto the bucket to transfer-mark the locations of holes "A" and "B" (See sheet 3 of 3).
- (3) Put the new cover in position on the structure as shown in figure 401, and by the following mode of procedure.
 - (a) Put the new cover in position on the bucket.
 - (b) Remount the tools onto the bucket.
 - (c) Position the cover relative to the tools.
 - (d) Drill 5 pilot holes 3,25 mm (0.128 in.) dia, subsequently to be used for securing the cover, based on the existing holes in the outer panel.

NOTE: Allot the pilot holes over the entire length of the cover.

- (e) Put on clips, and press the cover tight against the tools.
- (4) Drill the holes marked "C" as shown in figure 401, and as follows:

NOTE: When drilling, start with the hole nearest the axis of symmetry, proceeding towards the sides by drilling alternately on either side of the axis.

- (a) Drill 3,25 mm (0.128 in.) dia. pilot holes on the basis of the panel holes. Clip as you go along.
 - (b) Check the alignment of the holes and if necessary rework lengthwise.
 - (c) Rebore the pilot holes to the "finished" value as indicated in figure 401.

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- (5) Remove the cover as follows:
 - (a) Stick stabylene tracing paper on the cover.
 - (b) Remove the tools.
 - (c) Take off the clips, and remove the cover.
- (6) Drill the holes marked "A" and "B" as shown in figure 401, and as follows:
 - (a) Mark out and drill 3,25 mm (0.128 in.) dia. pilot holes as traced out on the tracing paper.
 - (b) Check the alignment by means of stabylene and, where necessary, rectify working lengthwise.
 - (c) Rebore to the "finished" dimension as shown in figure 401.
- (7) Deburr all the holes with fine buckskin.
- (8) Adjust and cut out the cover as indicated in figure 402 and as follows:
 - (a) Position and clip fasten the cover on the bucket.
 - (b) Use a scriber to trace out the contours of the cover, as shown in figure 402.

NOTE: Press the cover firmly against the nut support cornerplate.

 - (c) Remove and cut out the cover, set back 2 mm (0.078 in.) from the scribed tracing-line.
 - (d) Thoroughly deburr along the cutout.

E. Mounting the tab nuts.

- (1) Position new nuts to the support corner plate as shown in figure 401.

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sneema

- (2) Install the retaining rivets as instructed in chapters 70-50-10 and 70-50-50 in Standard Practices.
- (3) Check the riveting as indicated in chapters 70-50-81 and 70-50-85.

F. Mounting the new cover.

- (1) Position and clip fasten the cover on the bucket.
- (2) Mount the fasteners as shown in figure 401 and described in chapters 70-50-50 and 70-50-60.

NOTE: When fitting PLT type blind bolts, start with the hole nearest the centreline (after removal of the clip), proceeding towards the sides by alternately applying one to the left and one to the right of it.

- (3) Check the way the fasteners have been installed by consulting:
 - (a) Chapter 70-50-85 for blind rivets.
 - (b) Chapter 70-50-86 and figure 401 for blind bolts.

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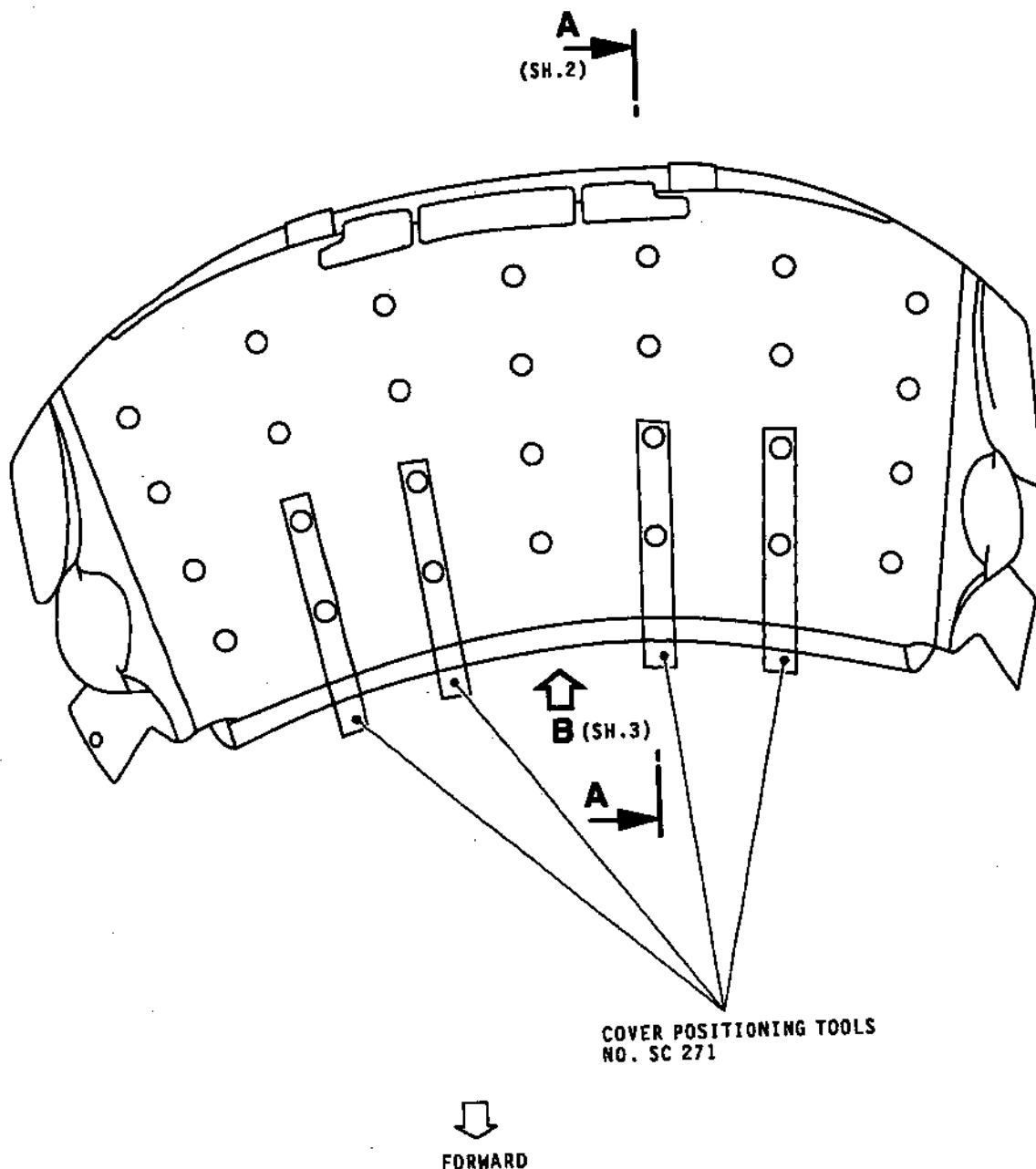
OLYMPUS 593

MK. 610-14-28

OVERHAUL



snecma



S-OLY-SH-00032-00-B

Leading Edge Cover Drilling
Figure 401 (Sheet 1 of 3)

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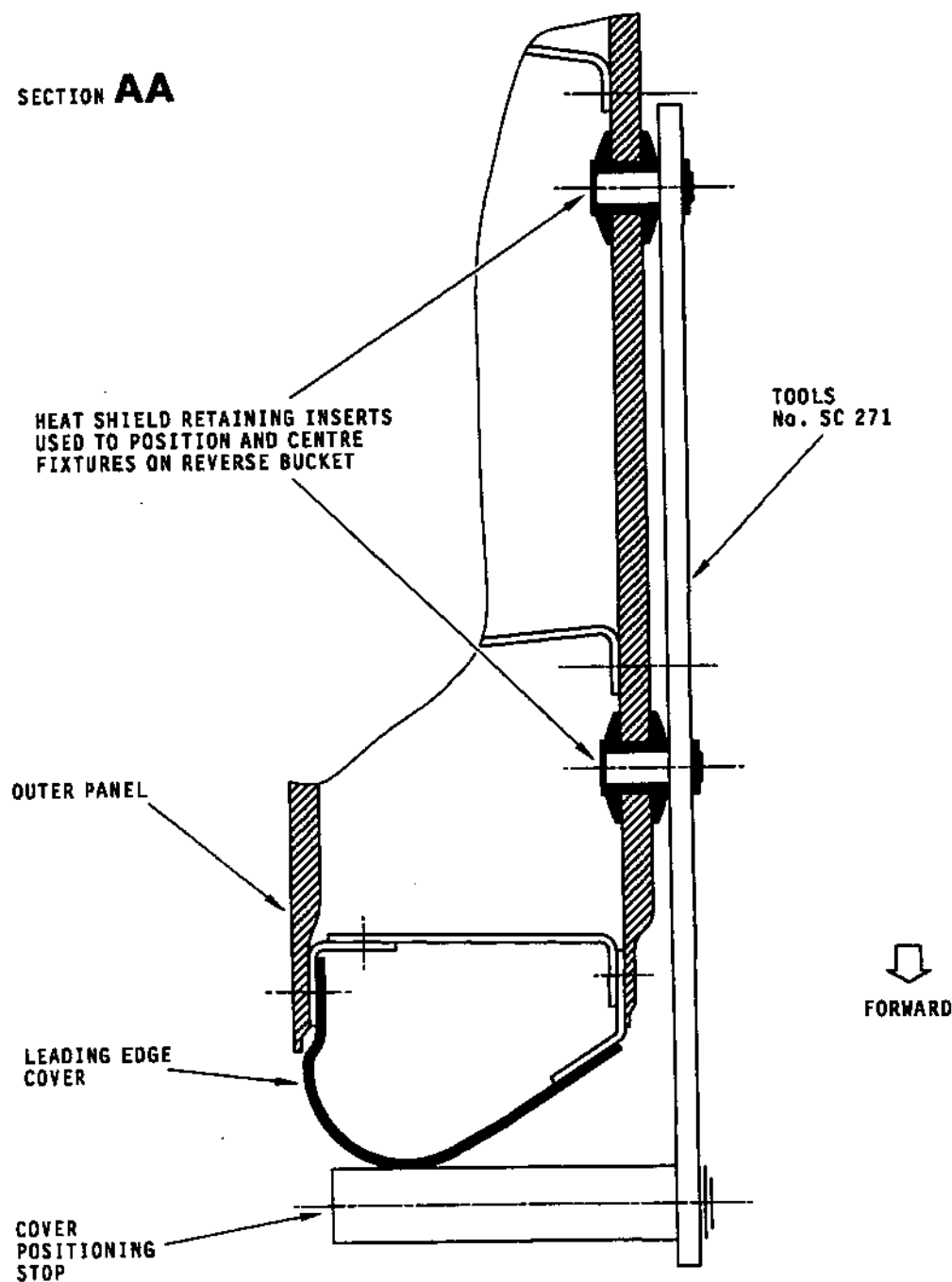
MK. 610-14-28

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sneema

SECTION AA



S-OLY-SH-00033-00-B

Leading Edge Cover Drilling
Figure 401 (Sheet 2 of 3)

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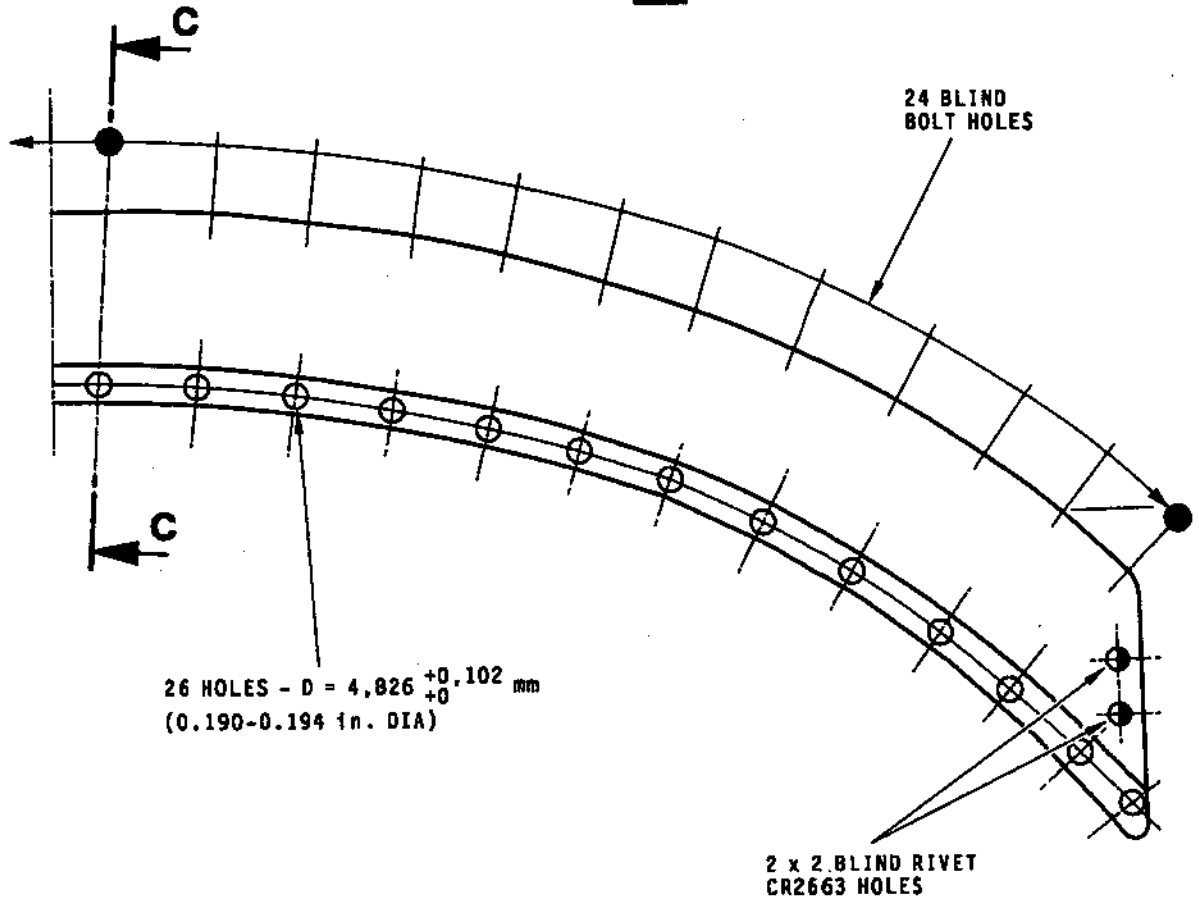


OLYMPUS 593

MK. 610-14-28
OVERHAUL



B



FASTENERS				
TEXT	FIG.	ORIGINAL	1st REPAIR	2nd REPAIR
A		NAS1133C3 SCREWS HOLES		
B		CR2663-5-2	CR2663-5-2	
C		PLT1004-6-3	PLT1011-6-3	PLT1014-6-3

S-OLY-SM-00034-00-B

Leading Edge Cover Drilling
Figure 401 (Sheet 3 of 3)

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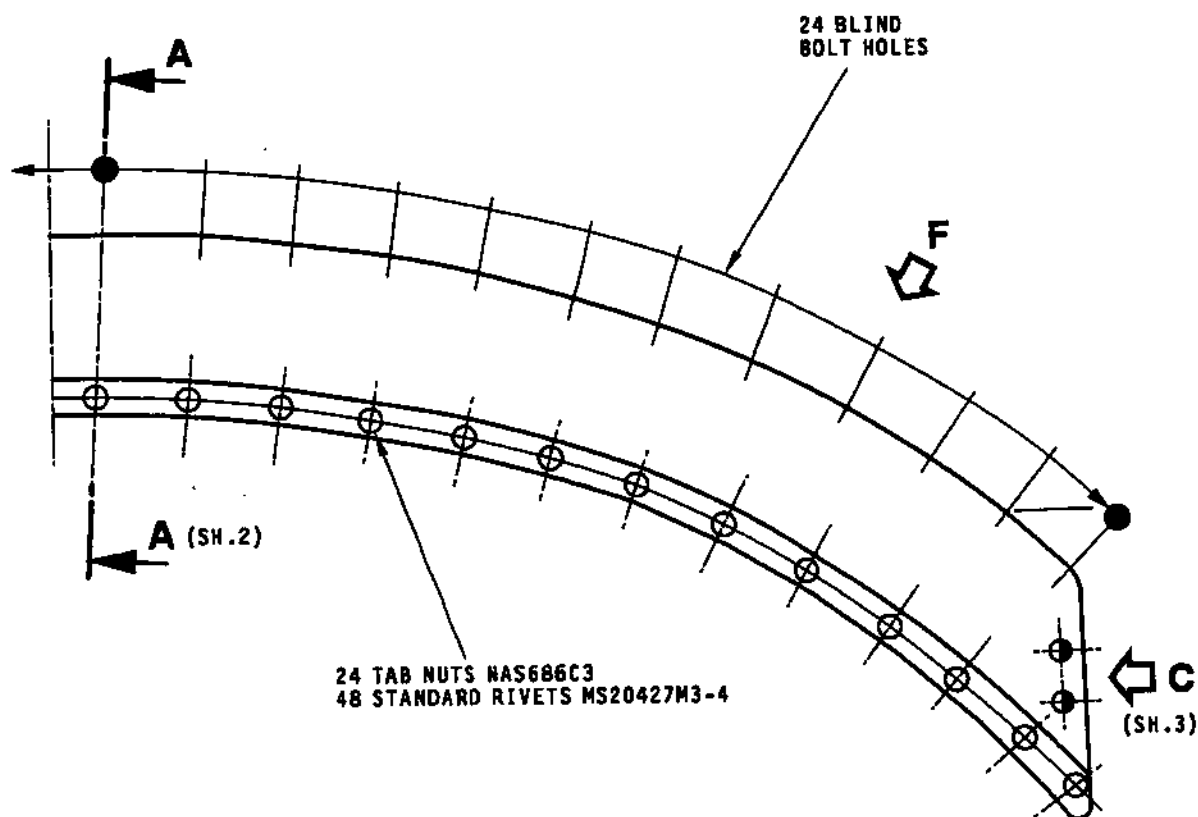
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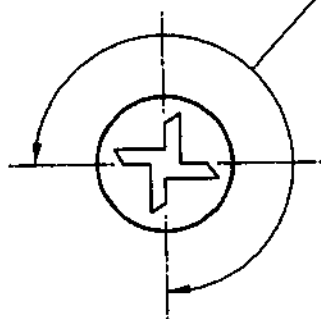


SNECMA

1/2 FRONT VIEW



MIN. CONTACT SURFACE OF
HEADS = 3/4 CIRCUMFERENCE



S-OLY-SM-00035-00-B

Fasteners Replacing and Cover Mounting
Figure 402 (Sheet 1 of 3)

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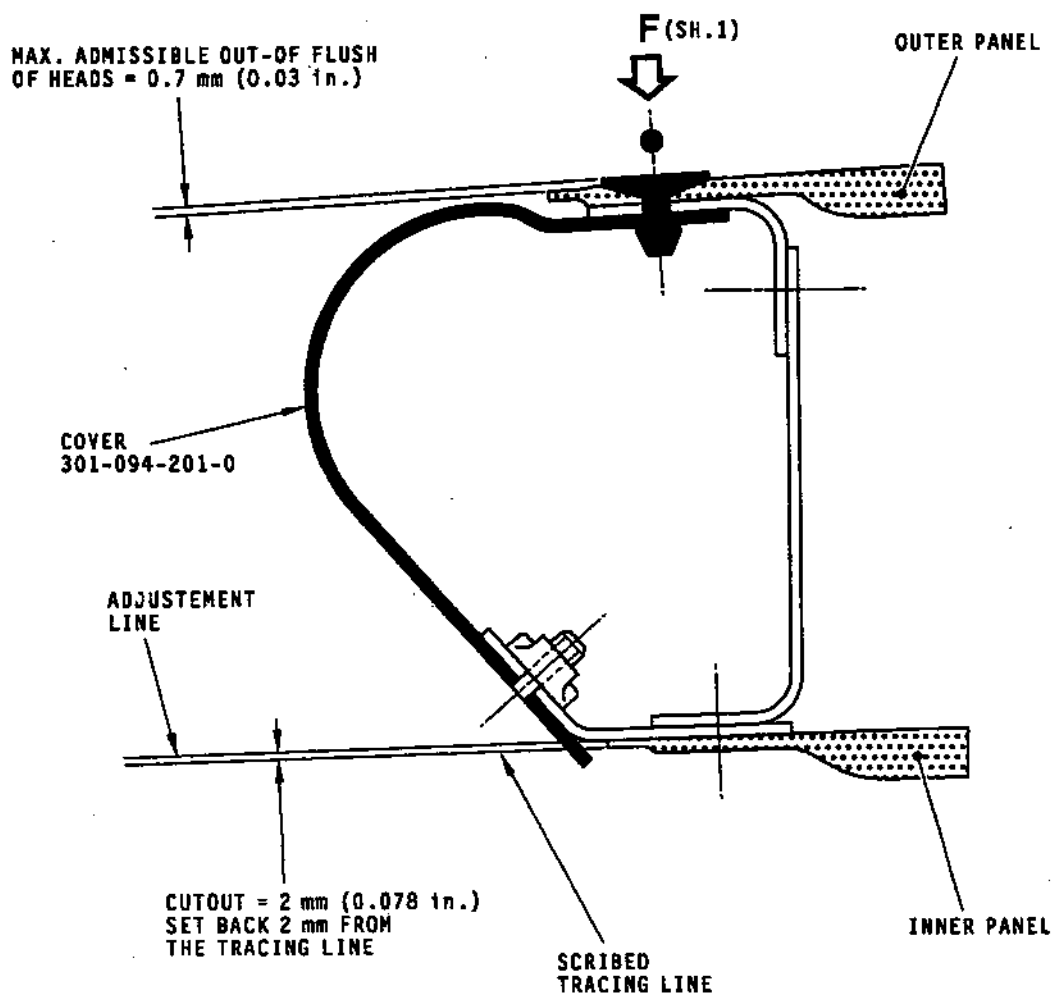
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sneema

SECTION AA



S-OLY-SH-00036-00-B

Fasteners Replacing and Cover Mounting
Figure 402 (Sheet 2 of 3)

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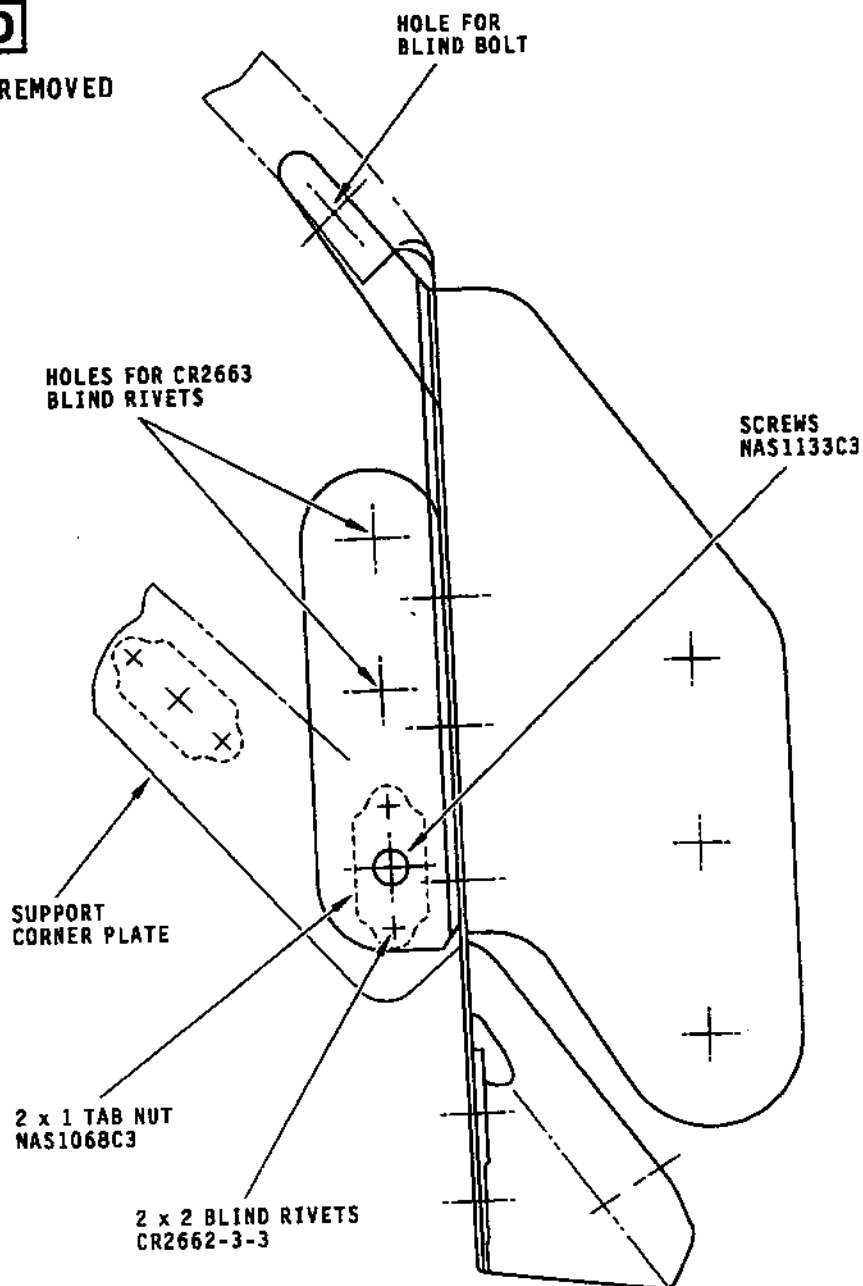
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SNECMA

D

COVER REMOVED



S-OLY-SM-00037-00-B

Fasteners Replacing and Cover Mounting
Figure 402 (Sheet 3 of 3)

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REPAIR

REVERSE BUCKET (1-460).

5. Renewing the Back-up Plates.

PARTS REQUIRED FOR REPAIR

Shim	302-023-801-0
Shim	302-023-500-0
Seal supports	301-051-800-0 and 301-051-850-0
Bucket stops	300-864-802-0 and 300-864-852-0
Heat-shield back-up plates	301-147-600-0
	301-147-650-0
	301-147-700-0
Rivet NAS 1198-5-13	(650-014-115-0)
Rivet NAS 1198-5-9	(650-014-108-0)
Rivet NAS 1199-5-12	(650-024-113-0)
Rivet NAS 1199-5-11	(650-024-111-0)
Rivet NAS 1199-5-9	(650-024-108-0)
Rivet NAS 1199-5-8	(650-024-106-0)

A. Renewing the shims (figure 401, sheet 3 of 6)

NOTE : Prior to removing damaged shims, mark the relative positions of chamfers to the bucket structure.

- (1) Remove rivets by drilling out the heads on the shim side. Remove the shims, guarding against mislaying the bushes.
- (2) Check that the bushes are firmly seated on the doubler after disassembly.
- (3) Put shims in position on the buckets, and do the riveting as instructed in Standard Practices, chapter 70-50-10 (see section A-A on sheet 3 for layout).

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- (4) Machine the snapped parts of the rivets fully flush with the shims.
- (5) Check the riveting as instructed in Standard Practices, chapter 70-50-81.

B. Renewing the seal supports (figure 401, sheets 3 and 4)

- (1) Remove the retaining rivets by drilling out the countersunk rivet heads on the support side, then dismount the damaged supports.

NOTE : After removal of the rivets, insert pins into the retaining holes to keep the shims between the skin panels from shifting and avoid the loss of bushes.

- (2) Check that the bushes are firmly seated on the doubler after disassembly.
- (3) Drill the new supports as indicated in figure 401, and as follows :
 - (a) On the new seal support, trace out and drill a hole, marked "C", in the thickest portion, as shown on sheet 6. Deburr.
 - (b) Scribe the centreline of the other "C" holes.
 - (c) Position, and clip on the seal support along the centreline scribed. Keep in position with adhesive tape (see figure 401, sheets 3 and 6).
 - (d) Counterdrill 3,25 mm (0.128 in.) dia. pilot holes in line with the other "C" holes to register with the existing holes in the bushes.

NOTE : Be careful not to damage the bushes, and be sure to drill perpendicularly.

- (e) Check the alignment of the holes, and rectify, if necessary, by working lengthwise.
- (f) Remove the new sealing support.
- (g) Drill the "C" holes to the "finished" dimension, and make the countersinks as shown in figure 401, sheet 6.

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(h) Thoroughly deburr the holes.

(4) Secure the seal supports as instructed in Standard Practices, chapter 70-50-10, and hereunder :

- 1 Supports on buckets 3511 to 3574 should be fastened with rivets NAS 1199-5-11 and washers 650-355-013-0.
- 2 Those on buckets 3575 and on, with rivets NAS 1198-5-13 (for layout see the two A-A sections on sheet 3).

(5) Machine the snapped parts of rivets fully flush with the support.

(6) Check the riveting as instructed in Standard Practices chapter 70-50-81.

C. Replacing the bucket stops (see figure 401, sheet 4).

(1) Remove the retaining rivets by grinding out their countersunk heads. Remove the stops.

NOTE : Be careful not to damage the countersunk holes in the inserts or in the heat-shield back-up plates.

(2) Put the new stop in position on the bucket as shown in figure 401, sheet 4. Clip it in position at point "E" and hold fast by the use of clamps.

(3) Drill holes marked "A", "B" and "D", as shown in figure 401, sheets 4 and 6, and as follows :

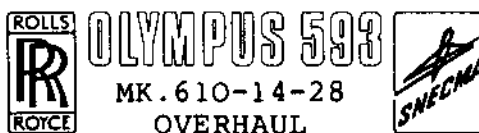
- (a) Counterdrill 3,25 mm (0.128 in.) dia. pilot holes brought into relation with the inserts. Clip as you go along.
- (b) Check the alignment of the pilot holes, and rectify, if necessary, by working lengthwise.
- (c) Remove the stop.

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- (d) Drill to the "finished" dimension, and counter-sink the "B" holes as shown in figure 401, sheets 4 and 6. Deburr.
 - (4) Mount the new stops on the bucket as shown in figure 401, sheet 4, and as follows :
 - (a) Position the bucket stop.
 - (b) Mount the fasteners as shown in figure 401, sheet 4, and described in chapter 70-50-10.
- NOTE : Mind the way the rivet is applied.
Preformed head into insert countersink.
- (c) Machine the rivets flush with the stops, back-up plates and inserts.

(5) Check the riveting as instructed in chapter 70-50-81.

D. Renewing the back-up plates

- (1) Take-off the damaged back-up plates, removing the fasteners by drilling out the rivets on the back-up plate side, as shown in figure 401, sheets 4 and 5.
- (2) Check the plasma sprayed strip on the outer panel for soundness.

In case of flaking or injury, restore the plasma spray-coat as instructed in REP 1-460-12 in this chapter 78-31-01.

- (3) Put the heat-shield back-plates in position on the bucket, as shown in figure 401, sheet 5 and as follows :
 - (a) Mark out the centreline of "A" holes on the face in contact with the panel.
 - (b) Put the heat-shield back-up plates in place.
 - (c) Hold in position by adhesive tape and clamping.



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- (4) Drill the "A" holes into the new back-up plates as follows :

NOTE : When counterdrilling, start with the hole nearest the axis of symmetry, proceeding towards the sides by drilling alternately left and right of the axis.
Put clips as you go along.

- (a) Counterdrill 3,25 mm (0.128 in.) dia. pilot holes, following the inserts.
 - (b) Check the alignment of the pilot holes and rectify as necessary by working lengthwise.
 - (c) Remove the heat-shield back-up plates.
 - (d) Drill the "A" holes to the "finished" diameter, and countersink as shown in figure 401, sheet 6.
 - (e) Thoroughly deburr the holes.
- (5) Mount the back-up plates on the bucket as indicated in figure 401, and as follows :
- (a) Position the plates, and clip-fasten 1 hole out of 4.
 - (b) Mount the fasteners as shown in figure 401, sheet 5 and instructed in chapter 70-50-10.

NOTE : Mind the way the rivets are applied.
Preformed heads into inserts.

- (c) Machine the rivet heads flush with the back-up plates and inserts.
- (6) Check the riveting as instructed in chapter 70-50-81.

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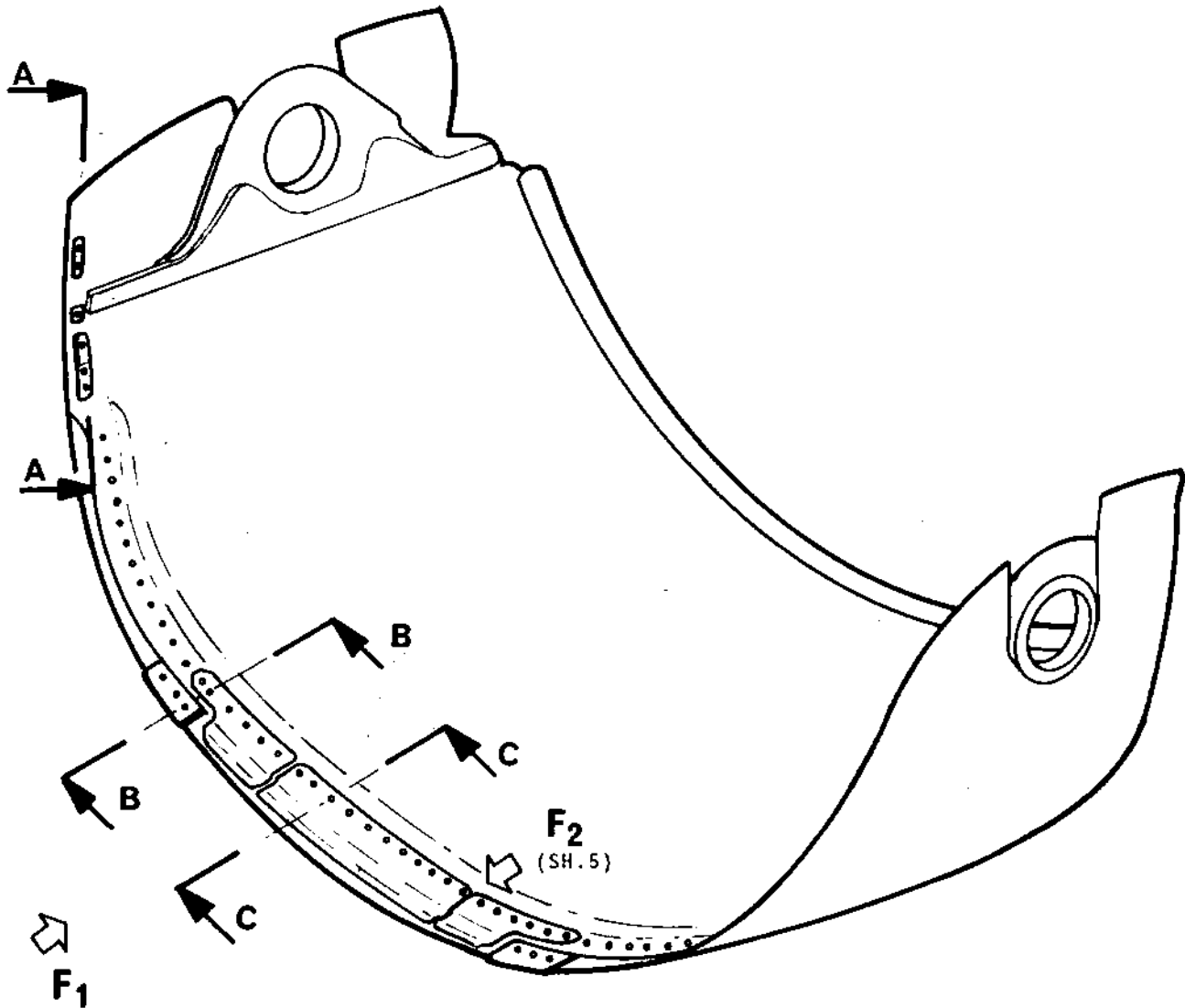
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Renewing the Back-up Plates
Figure 401 (Sheet 1 of 6)

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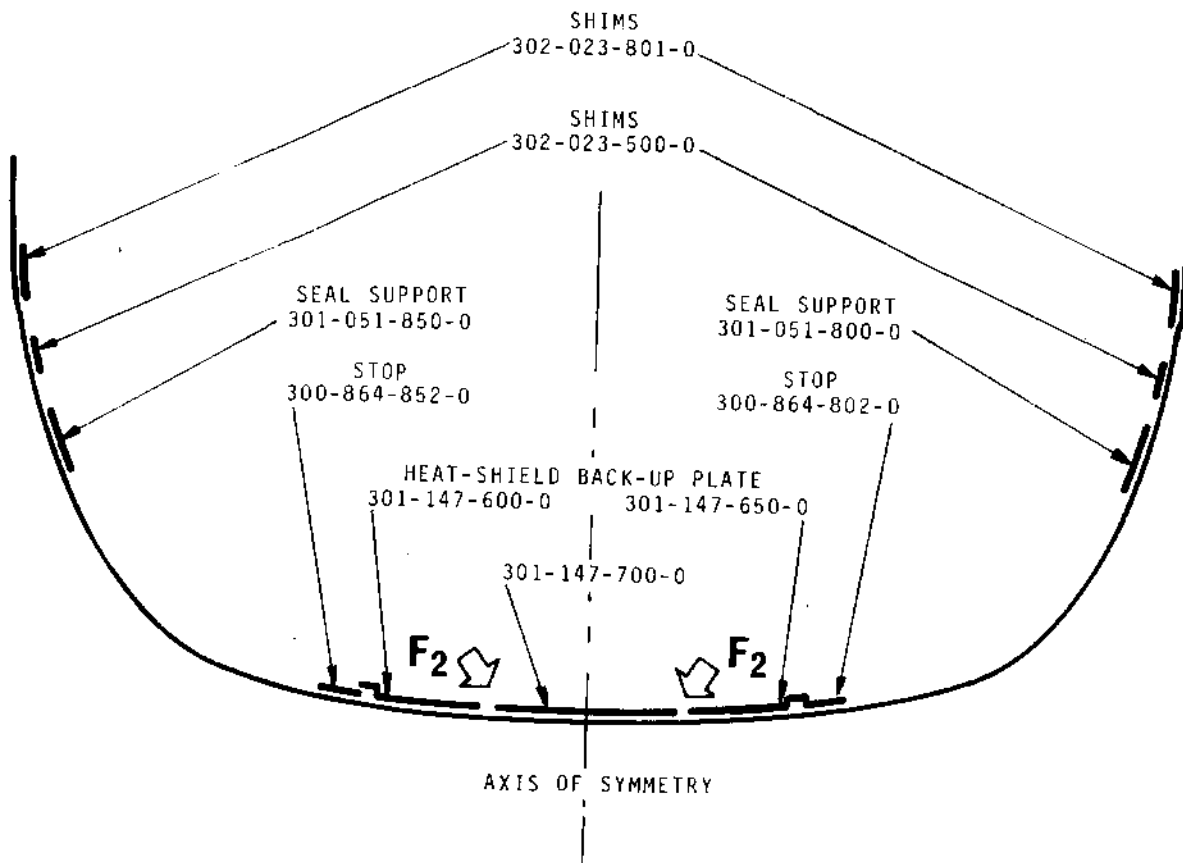


DUMPOS 593

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OVERHAUL



F₁



Renewing the Back-up Plates
Figure 401 (Sheet 2 of 6)

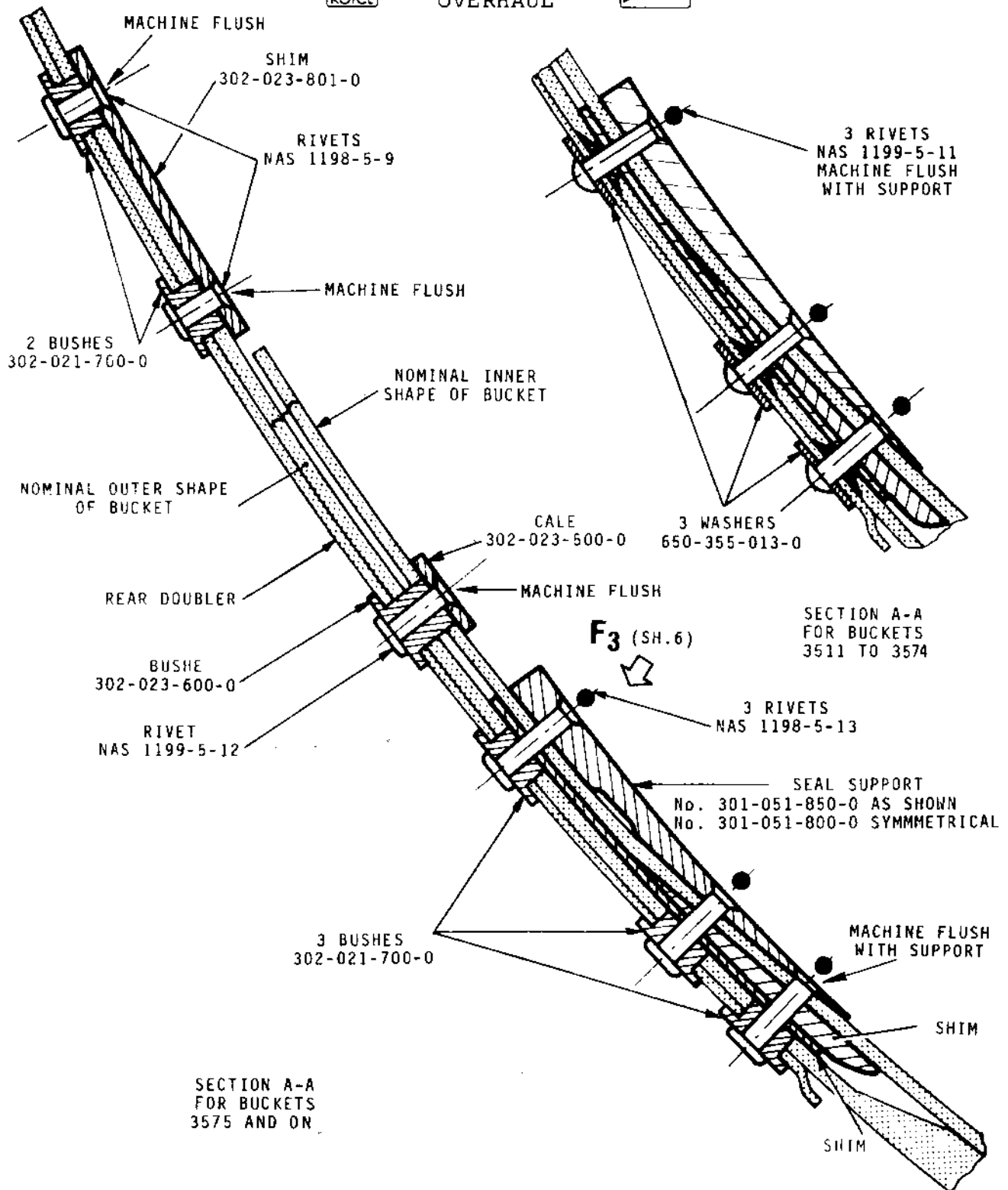
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Renewing the Back-up Plates
Figure 401 (Sheet 3 of 6)

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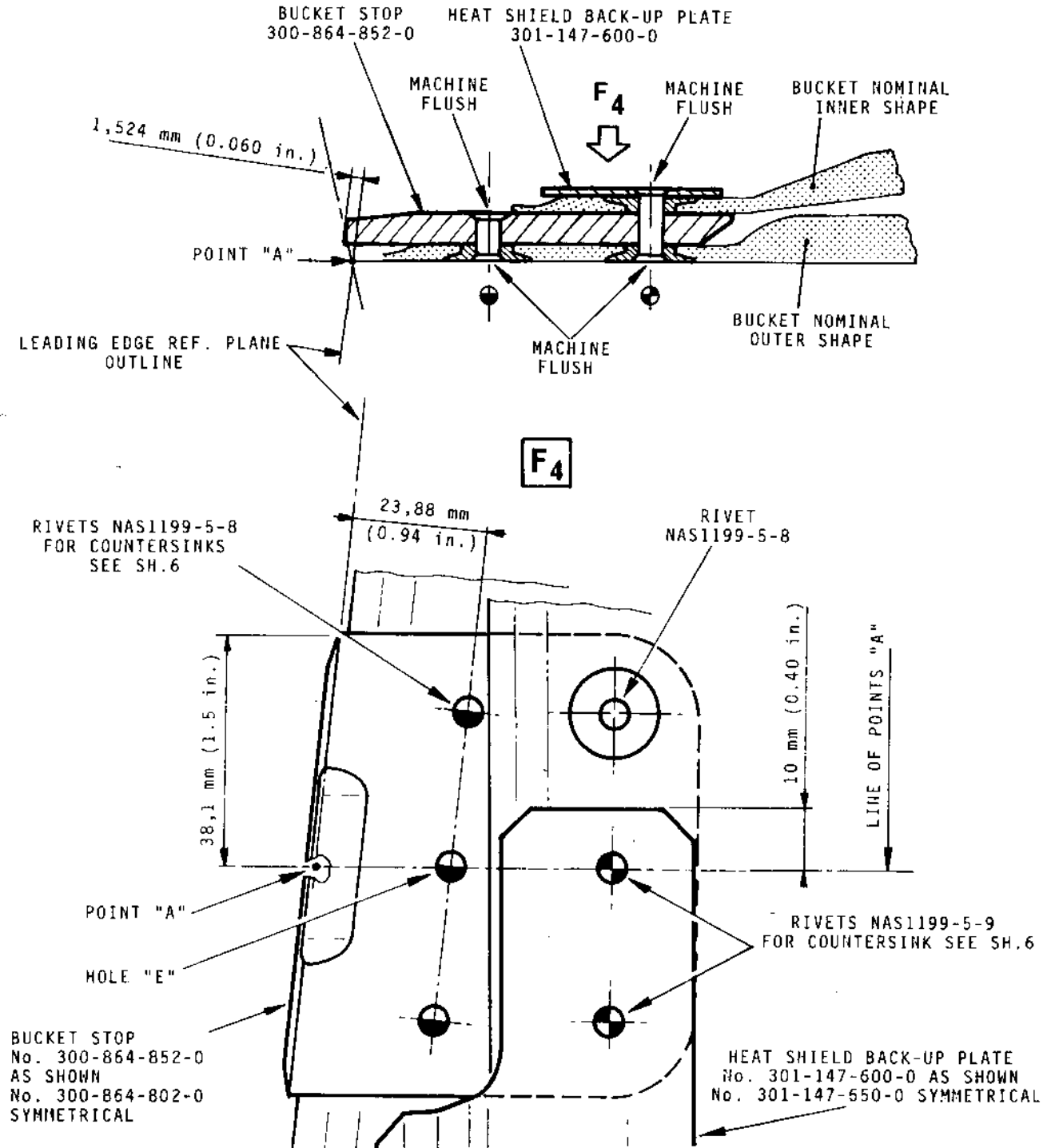


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SECTION 8B



Renewing the Back-up Plates
Figure 401 (Sheet 4 of 6)

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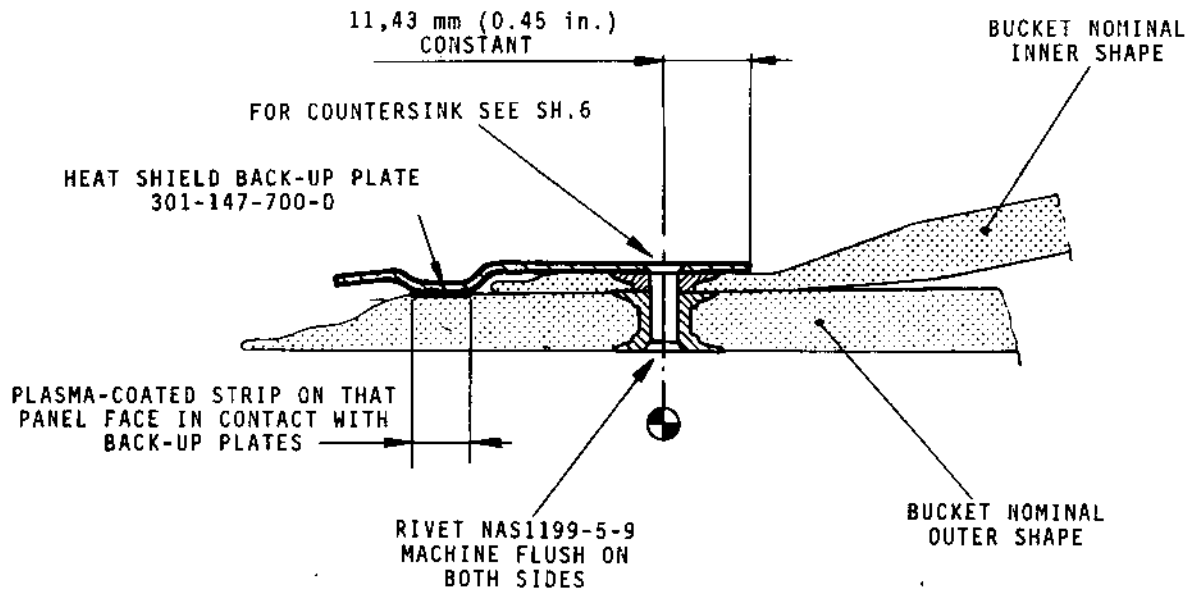
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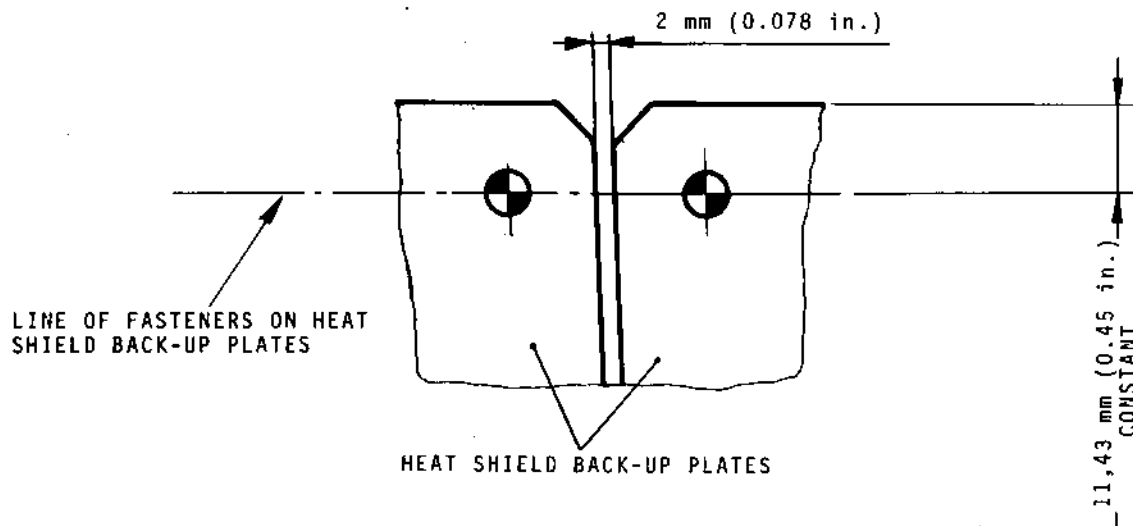


SECTION CC



F₂

APPLICABLE IN TWO PLACES



Renewing the Back-up Plates
Figure 401 (Sheet 5 of 6)

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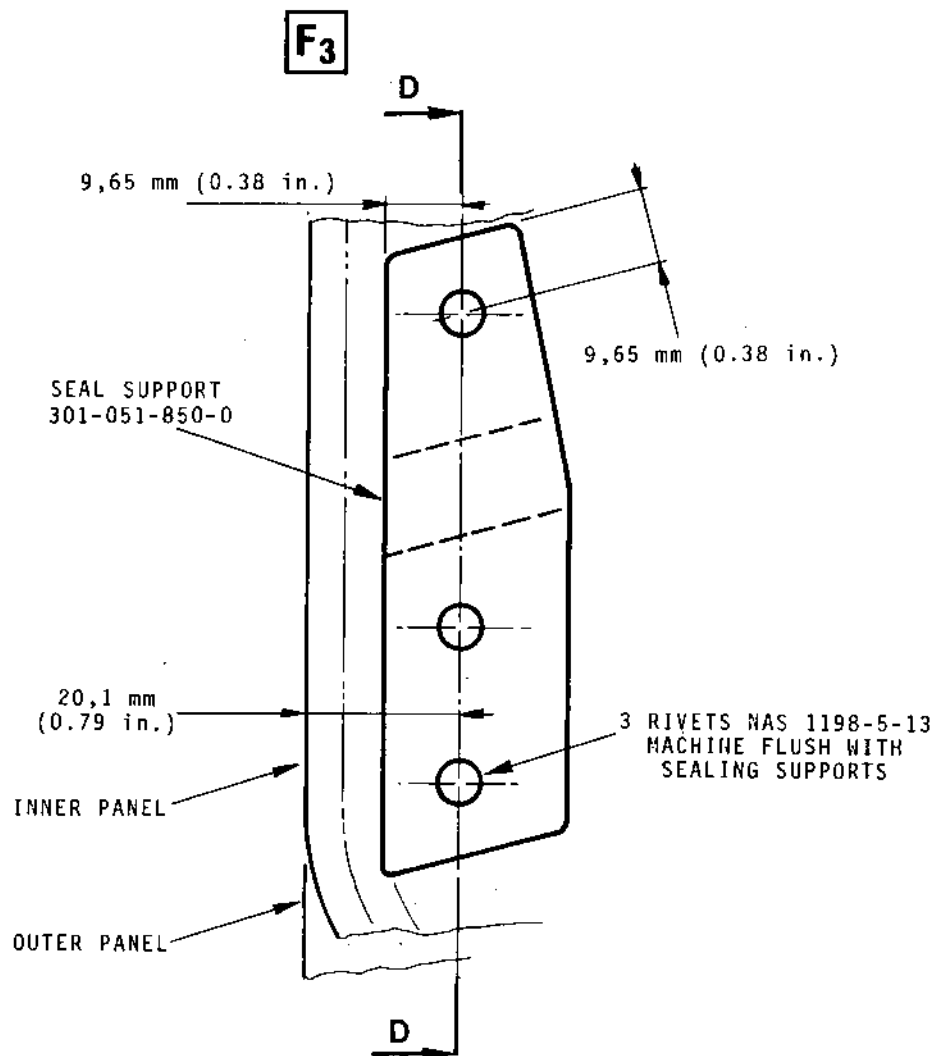
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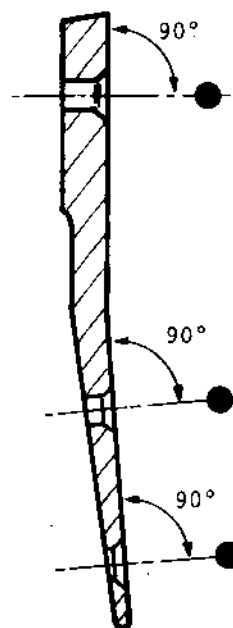
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SECTION DD



MARKING TEXT	FIG.	FASTENERS	COUNTERSINK DIA. mm	in.	ANGLE
"A"	●	NAS1199-5-9	5,537 ± 0,127	0.218 ± 0.005	82° ± 30'
"B"	●	NAS1199-5-8	5,537 ± 0,127	0.218 ± 0.005	82° ± 30'
"C"	●	ou NAS1198-5-13 NAS1198-5-11	5,85 ± 0,25 ± 0,00	0.230 ± 0.010 - 0.00	82° ± 30'
"D"	○	NAS1198-5-8			

Renewing the Back-up Plates
Figure 401 (Sheet 6 of 6)

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REPAIRREVERSER BUCKET (1-460)6. Application of Doubler for the Repair of Damage Sustained in Landing.

PARTS REQUIRED FOR REPAIR

Metal sheet NC 15 Fe (P3324)	1,2 mm (0.047 in.)	thick
Metal sheet Z8 CND 15 (P3305)	1 mm (0.039 in.)	thick
Metal sheet Z8 CND 15 (P3305)	1,3 mm (0.050 in.)	thick
Metal sheet Z8 CND 15 (P3305)	1,6 mm (0.063 in.)	thick
Metal sheet T 60 (P3344)	2,5 mm (0.100 in.)	thick
Metal sheet T 60 (P3344)	1 mm (0.039 in.)	thick
Metal sheet T 60 (P3344)	1,5 mm (0.059 in.)	thick
Metal sheet T 60 (P3344)	2 mm (0.078 in.)	thick
Strip steel Z8 CND 15 (P3305)	0,6 mm (0.023 in.)	thick
Weld filler wire 78 CND 15 (P3008)		
Rivet cherrylock CR 2663-5-2	(649-772-068-0)	
Rivet cherrylock CR 2838-5-3	(649-772-076-0)	
Rivet cherrylock CR 2838-4-4	(649-772-163-0)	
Rivet cherrylock CR 2838-5-7	(649-772-080-0)	
Rivet cherrylock CR 2838-6-6	(649-772-190-0)	
Rivet cherrylock CR 2838-6-8	(649-772-198-0)	
Rivet cherrylock CR 2839-4-2	(649-772-192-0)	
Rivet cherrylock CR 2839-4-3	(649-772-167-0)	
Rivet cherrylock CR 2840-5-6	(649-772-099-0)	
Bolt Hi-lok HL 40-5-3	(649-781-291-0)	
Bolt Hi-lok HL 40-5-4	(649-781-292-0)	
Blind bolt PLT 1004-6-3	(650-089-930-0)	
Nut Hi-lok HL 97-5	(649-782-257-0)	
Cup washer No. 002-004-010-0		

A. Introduction.

This repair scheme offers all requisite particulars on how to apply doublers. It is only applicable where the width of the damaged area falls within the permissible limits (see Fig. 402).

Remove the front-frame leading edge cover; if it is damaged, make sure it is replaced as instructed under REP 1-460-4.

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B. Radiographic Inspection.

Carry out an X-ray inspection of the extent of damage in the outer panel, using an X-ray unit complete with a long anode, as instructed in Chapter 70-20-30, and shown in Fig. 401.

C. Panel Cut-out.

Remove the damaged segment from the panel as follows :

- (1) Remove the panel fasteners from the frames in and around the damaged area, as shown in Fig. 405 and instructed in REP 1-460-3 and Chapter 70-50-60.
- (2) Cut the damaged segment out of the panel, as indicated in Fig. 402 and instructed in Chapter 70-30-10

NOTE : The cut may be made slightly aslant so as to meet the requirements indicated in Fig. 401.

- (3) Blank off the cavities in the outer panel, as indicated in Fig. 402, and by the following procedure :
 - (a) Clean the welding area thoroughly with a pad steeped in isopropyl alcohol (P442). Repeat several times if necessary until the area involved is perfectly free from any grease.
 - (b) Cut a closeout strip from the strip steel (P3305) in a thickness of 0,6 mm (0.023 in.), a length according to need, and a 7,9 mm (0.311 in.) width. Adjust this strip to the outline of the cut-out.
 - (c) Put the closeout strip in position, and argon arc-weld it to the edge of the panel as described in Chapter 70-35-10
 - Weld filler wire P3008 (Z8 CND 15)
 - Weld class B1

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NOTE : When welding, it is essential to apply copper cooling blocks as close to the weld as possible.

CAUTION : THE PENETRANT IS TO BE CLEARED OUT WITH A SWAB SOAKED WITH ISOPROPYL ALCOHOL (P442).

(d) Carry out a Class B1 weld inspection as instructed in Standard Practices, Chapter 70-35-80, and by the procedure below :

- Water washable dye penetrant inspection, Method M 501 B in Chapter 70-20-10.

D. Soundness Inspection of Frames.

- (1) Perform a soundness inspection of the frames in the damaged area and around the angle-plate fasteners by the water-washable dye penetrant procedure, Method M 501 B, Chapter 70-20-10.
- (2) If no cracks show up, smooth off scratches by sandpapering.
- (3) If there are cracks, repair the frames with welded-on or riveted patches as instructed under E. and F. below.

E. Repairing Frames with Welded-on Angle-plate Patches.

NOTE : This form of repair is applied to the front frame and the first frame.

- (1) Remove the angle-plate connecting-pieces in the front frame and the first frame, as shown in Fig. 405.
- (2) Cut-out the damaged angle-plate segment, as shown in Figs. 403 and 404. Deburr.
- (3) Repair the frames with welded-on patches, proceeding as follows :
 - (a) Using P3305 metal sheet (Z8 CND 15) of 1,27 mm (0.050 in.) thickness for the front frame and 1,6 mm (0.063 in.) for the first frame, make up angle-plate segments "1" and "2" as shown in Figs. 403 and 408.

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- (b) Put the angle-plate patch in position and argon arc weld it on, as instructed in Chapter 70-35-10 and indicated in Fig. 402
- Weld filler wire P3008 (Z8 CND 15)
 - Class of weld B1

If necessary, machine the weld flush on the face coming into contact with the support angle-plates.

- (c) Check for Class B weld as instructed in Chapter 70-35-80, and by the procedure below :
- Water washable dye penetrant inspection, Method M 501 B, Chapter 70-20-10.

- (4) Counterdrill the holes marked "D" as indicated in Fig. 405.
- (5) Mark out and drill pilot holes of 3,25 mm (0.128 in.) dia. in the locations marked "A" on the front frame.

F. Repairing the First Frame with Riveted Angle-plate Patches

- (1) Remove the connecting-pieces from the angle-plates in the first frame, as shown in Fig. 405.
- (2) Cut out the damaged angle-plate segment as indicated in Fig. 404.
- (3) Make up the angle-plate patch from P3305 metal sheet (Z8 CND 15) as shown in Figs. 404 and 408.

NOTE : There are two alternative modes of securing the patch to the existing angle-plate (see Fig. 404).

- (4) Put, and keep, the patch in position on the frame. Drill the patch and rivet it to the existing angle-plate, using CR 2839 and CR 2838-4 rivets, and following the guidance in Fig. 404 and Chapter 70-50-50.



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(5) Counterdrill the holes marked "D" as shown in figs. 404 and 405.

(6) Check the riveting as described in Chapter 70-50-85.

G. Applying Reinforcement Angle-plate "6" to the Front Frame.

NOTE : The instructions that follow are only relevant to a front frame repaired as described in Para. E above. Otherwise the need for an angle "6" can be dispensed with, and the use of a 3,5 mm (0.138 in.) thick spacer will do.

(1) Reinforcing angle-plate "6" and spacer "8" are made up as follows :

(a) Tailor angle-plate "6" from P3344 metal sheet of 1 mm (0.039 in.) thickness, as instructed in Fig. 408, Sheet 5.

(b) Cut out spacer "8" from 2,5 mm (0.10 in.) thick metal sheet in the size given in Fig. 405, Sheet 4.

(2) Mount the reinforcement angle and the spacer on the frame as follows :

(a) Stick a strip of STABILENE tracing-paper on the front frame. Mark the locations of the "A" holes. Put angle-plate "6" in position on the frame, stick the STABILENE on the angle-plate, and take down.

(b) Drill mark and drill out 3,25 mm (0.128 in.) dia. pilot holes in the locations marked "A".

(c) Ascertain that the holes are in alignment and rectify, if and as necessary, by smoothing over lengthwise.

(d) Position angle "6" and spacer "8" and counterdrill blind rivet holes "A" as per Chapter 70-50-50. Deburr.

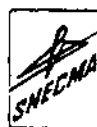
(e) Pin angle-plate "6" onto the front frame, and counterdrill the "D" holes as indicated in Fig. 405.



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- (f) Rivet angle-plate "6" to the front frame as shown in Fig. 405 and directed in Chapter 70-50-40
- (g) Check the riveting as instructed in Chapter 70-50-86.
- H. Applying Reinforcement Angle-plate "7" to the First frame.
- (1) Making up reinforcing angle "7" :
- (a) Tailor the angle-plate from P3344 metal sheet of 1 mm (0.039 in.) thickness as instructed in Fig. 408, Sheet 5.
- (2) Mount reinforcing angle "7" as follows :
- (a) Put the angle-plate in position on the first frame with due regard for the outer contour of the bucket, as indicated in Fig. 405, Sheet 4. Mark the locations of the 2 outer most holes and of one in the middle, marked "D", and take down.
- (b) Drill the pre-marked holes to 4,17 mm (0.164 in.) dia., then put back and pin the angle-plate on the first frame.
- (c) Note the locations of all the other "D" holes, and remove the reinforcement angle-plate.
- (d) Drill out the pilot holes marked "D" to 3,25 mm (0.128 in.) dia.
- (e) Remount the angle-plate, check the alignment of the "D" holes, and rectify, if necessary, by reworking lengthwise. Remove.
- (f) Drill out the "D" holes to their final dia. Deburr.
- (g) Rivet the reinforcement angle-plate onto the first frame as indicated in Fig. 405, and in Chapter 70-50-40
- (h) Check the riveting as per Chapter 70-50-84.

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I. Mounting the Doublers.

- (1) Drill pilot holes in the locations marked "F" and "G" on the panel, proceeding as follows :

- (a) Lightly sandpaper the outer panel skin so as to make the cellular structure apparent.
- (b) Mark out the locations of the "F" and "G" holes as shown in Fig. 405.

NOTE : These holes must each lie in the middle of a cell.

- (c) Drill the pilot holes to 2,5 mm (0.100 in.) dia., and Deburr.

- (2) Cut inner doublers "9" and "10" out of P3344 metal sheet, 1 mm (0.039 in.) in thickness, and shape them up as shown in Figs 405 and 407.

NOTE : The inner doubler sizes vary with the "F" holes marked out and the panel cutout (see Figs. 405 and 407).

- (3) Pre-cut outer doubler "11" out of P3344 metal sheet of 2 mm (0.078 in.) thickness, and tailor it as indicated in Figs. 405 and 406.

- (4) Drill the pilot holes in inner doublers "9" and "10" as follows :

- (a) Put the inner doublers in position as shown in Fig. 405, minding their relative positions to the panel cutout (see Fig. 407).

- (b) Drill-mark the locations of holes "F" and "G" through the panel, then remove.

- (c) Drill out pilot holes "F" and "G" to 2,5 mm (0.10 in.) dia., and deburr.

- (5) Drill the pilot holes in outer doubler "11" as follows

- (a) Note the locations of the existing holes ("A", "B" "F", "J", "K") on the frames and the stressskin panel using STABILENE tracing paper.

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- (b) Put the outer doubler in position on the outer bucket panel, then trace the locations of the front frame holes marked "A" and "J". Remove.

NOTE : During this operation, spacer "8" must be in place.

- (c) Drill pilot holes "A" and "J" to a dia. of 3,25 mm (0.128 in.).
- (d) Put the outer doubler in position and check holes "A" and "J" for correct alignment. If necessary, rectify the holes by reworking lengthwise.
- (e) Put the STABILENE paper on the inner face of outer doubler "11", with holes "A" and "J" used as reference.
Drill marked the locations of holes "B", "F", "K".

- (f) Drill pilot holes in the outer doubler to the following diameters :

"B" and "K" holes : 3,25 mm (0.128 in.)

"F" holes : 2,5 mm (0.10 in.)

- (g) Check the alignment of the previously drilled holes, proceeding as follows :

- 1 Stick a piece of STABILENE tracing paper on bucket frames 1 and 2.
- 2 Put the outer doubler in position on the bucket pinning it to the front frame and over some of the "F" holes.
- 3 The alignment of the "F" holes is checked visually.
- 4 The alignment of "B" and "K" holes is checked by tracing the locations of the holes in doubler "11" on the tracing paper and, with the doubler removed, comparing the markings so made with the locations of the existing frame holes.

NOTE : Rectify where necessary, by reworking the holes lengthwise.



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- (6) Drill pilot holes "C", "H" and "I" in outer doubler "11", and in the front and the first frames.
- (a) Mark out the locations of holes "C", "H" and "I" on the doubler, as indicated in Fig. 405, using the existing holes for reference.
 - (b) Drill out holes "C", "H" and "I" to 3,25 mm (0.128 in.) dia. Deburr.
 - (c) Position and pin the outer doubler on the bucket.
 - (d) Counterdrill the front frame and reinforcing angle "7" adjoining the first frame to 3,25 mm (0.128 in.) dia.
 - (e) Take the doubler down, and deburr the previously drilled holes.

NOTE : During this operation, the first frame must also be drilled as shown in Fig. 405, Sheet 6, to allow for the subsequent application of the blind rivets.

- (7) Drill out all the doubler retaining holes to their final diameters, proceeding as follows :
- (a) Position and pin inner doublers "9" and "10" on the bucket ; rebore the holes marked "G" to 4.47 mm (0.176 in.) dia. and do the dimpling in the stressskin panel as instructed in Chapter 70-50-50. Unpin.
 - (b) Position and pin inner doublers "9" and "10" and outer doubler "11" on the bucket.

NOTE : Spacer "8" must be in place in the course of the drilling jobs.

- (c) Rebore doubler retaining holes "A", "B", "C", "F", "H", "I", "J", "K", as shown in Fig. 405 and instructed in Chapter 70-50-50.

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NOTE : During this operation, the first frame has to be rebored as well, as indicated in Fig. 405, Sheet 6, to allow for the subsequent application of the blind rivets.

- (d) Take-off the inner and outer doublers, and deburr.
- (e) Countersink all the holes of outer doubler "11" as shown in Fig. 405 and instructed in Chapter 70-50-50.
- (8) Machine the contours of outer doubler "11" as indicated in Fig. 406.
- (9) Put inner doublers "9" and "10" in position on the outer panel, and rivet them on by the use of CR 2840 rivets, No. "6", as shown in Fig. 405 and described in Chapter 70-50-50.

NOTE : If necessary, machine the rivet heads flush, as shown in Fig. 405, Sheet 5.

- (10) Stick on the dimpling washers with Loctite 306 (P232A) as indicated in Fig. 405.

NOTE : Dimpling washers may be obtained by reuse of the original PLT 1004 blind bolt heads drilled as shown in Fig. 409.

- (11) Put spacer "8" and outer doubler "11" in position, and clip the inner and outer doublers together on the bucket outer panel and the frames.
- (12) Rivet the inner and outer doublers as shown in Fig. 405 and instructed in Chapter 70-50-50.

NOTE : The rivets intended for locations "A", "H", and "J" are not applied until the cover is mounted (see Para. J).

- (13) Check the mounting of the fasteners as instructed in Chapter 70-50-85.

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J. Mounting the Front Frame(Leading edge) Cover

- (1) Mount the cover as instructed under REP 1-460-4 and shown in Fig. 405.

NOTE : In the doubler region, the type of rivets to be used to mount the cover is indicated in Fig. 405.

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REP 4-460-6

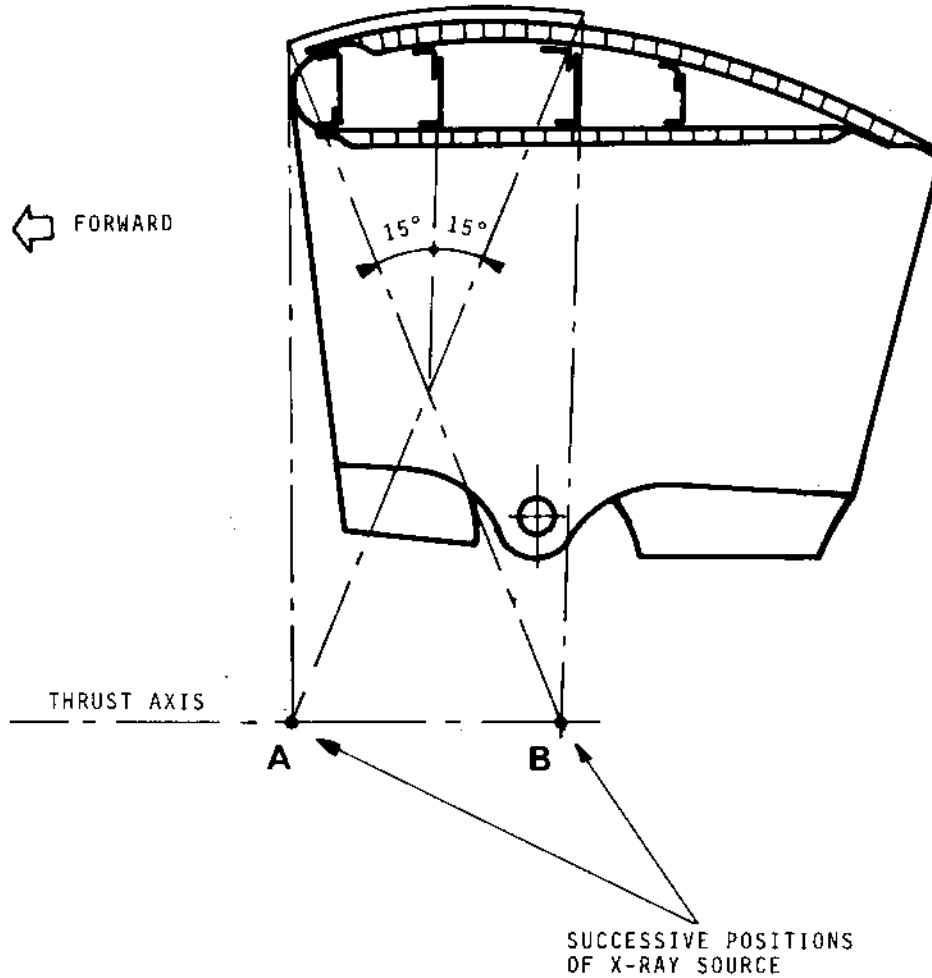
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Reverser Bucket Radiographic Inspection
Figure 401 (Sheet 1 of 2)

78-31-01

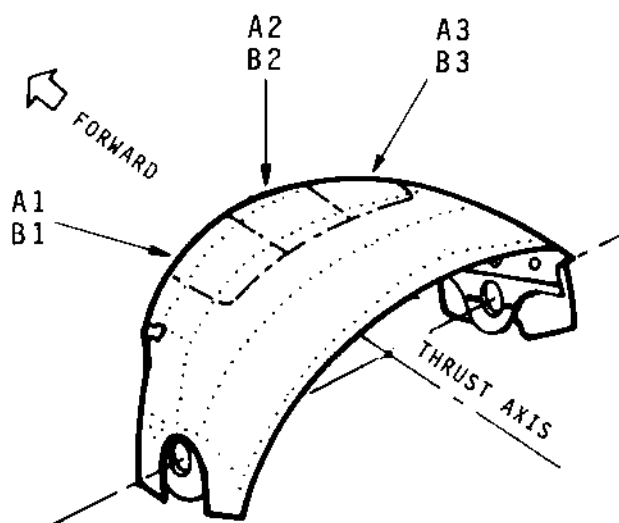
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LOCATION OF SOURCE	AREA INSPECTED	FILMS **	PHOTO- GRAPHIC DENSITY	IMAGE QUALITY (I.Q.I.)
A B	INSPECTION OF DAMAGED AREA ON OUTER PANEL	3 FILMS 0 3 FILMS 0	2,2	WIRE 0 = 0,15 mm (0.006 in. DIA)

** KODAK FILMS TYPE M, WITHOUT SCREEN - OR EQUIVALENT
SIZE OF FILMS 0 : 300 x 400 mm (11.80 x 15.75 in.)

Reverser Bucket Radiographic Inspection
Figure 401 (Sheet 2 of 2)

78-31-01

REP 1-460-6

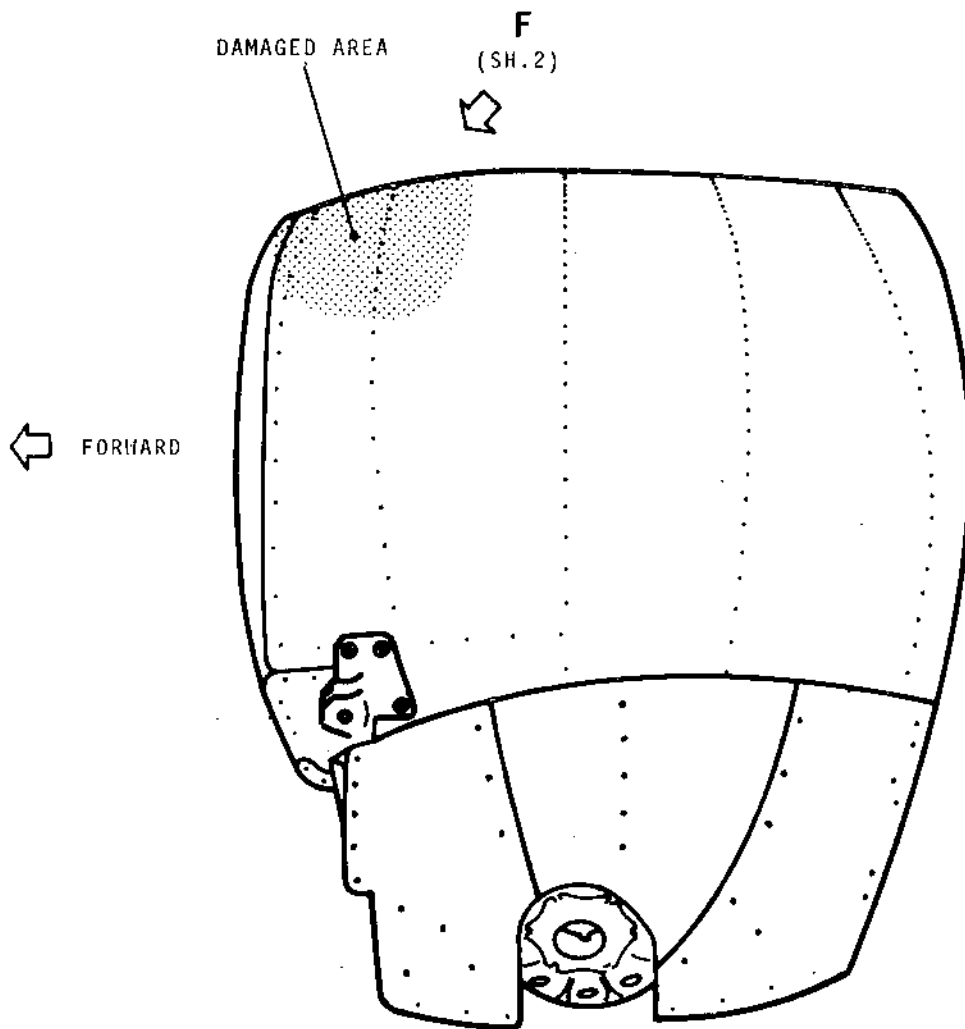
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Cutting Out Damaged Panel
Figure 402 (Sheet 1 of 2)

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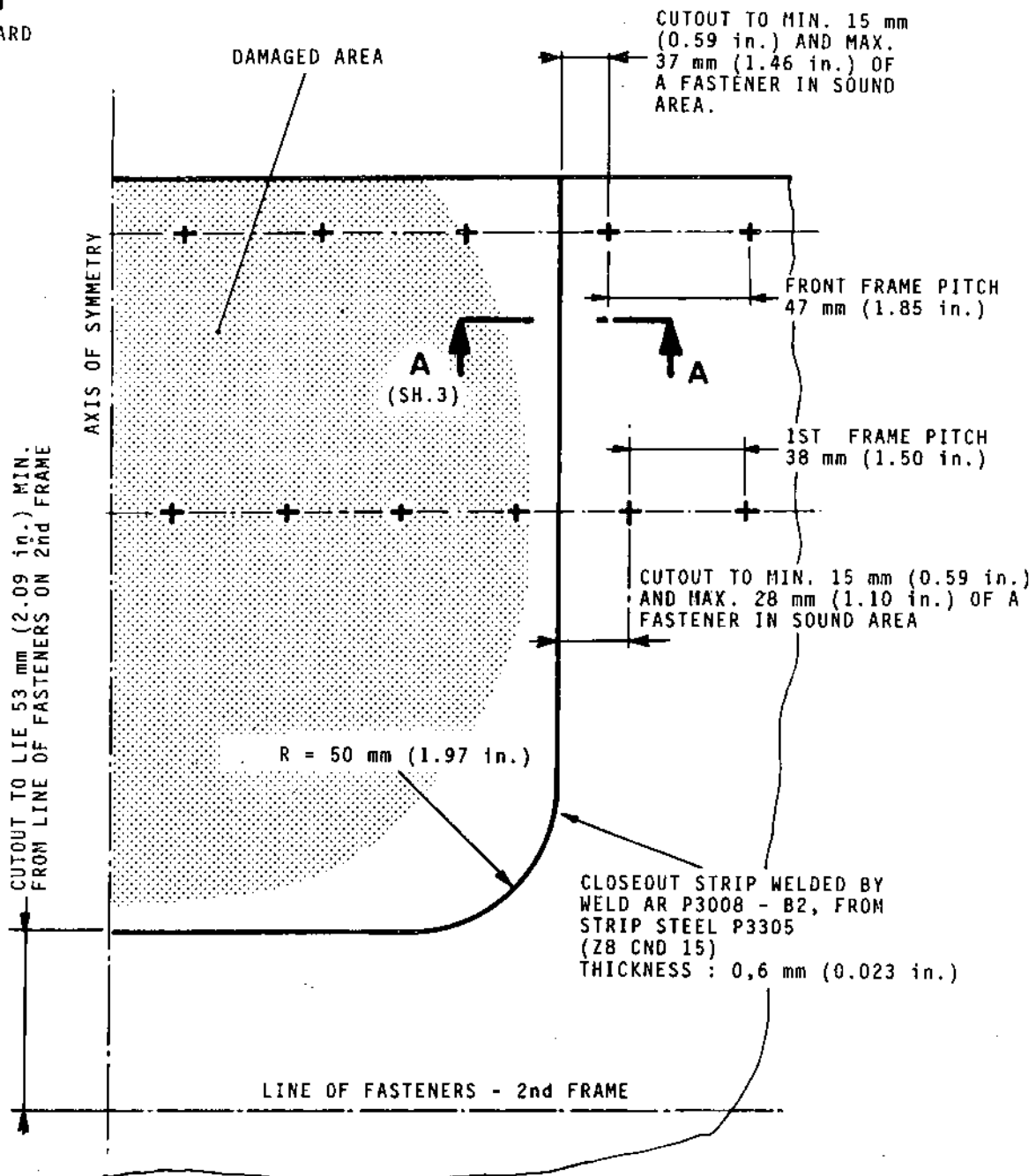
OVERHAUL



F



FORWARD



Cutting Out Damaged Panel
Figure 402 (Sheet 2 of 2)

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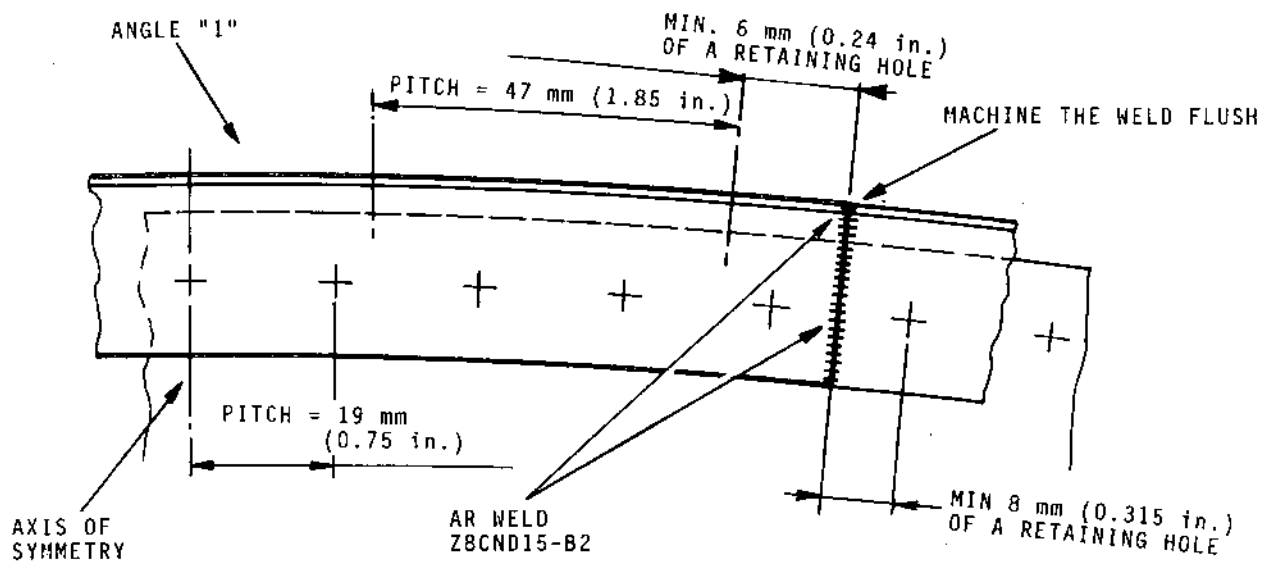


OLYMPUS 593

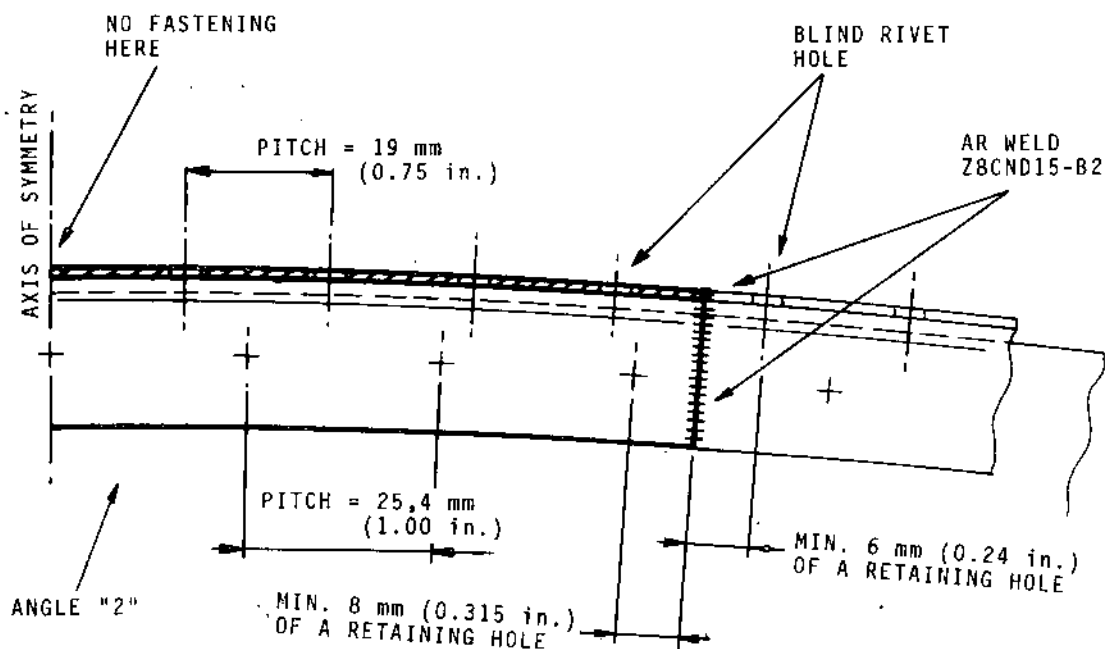
MK.610-14-28
OVERHAUL



REPAIRS ON FRONT FRAME



REPAIRS ON 1ST FRAME



Repair of Frames by Welded Patches
Figure 403 (Sheet 1 of 1)

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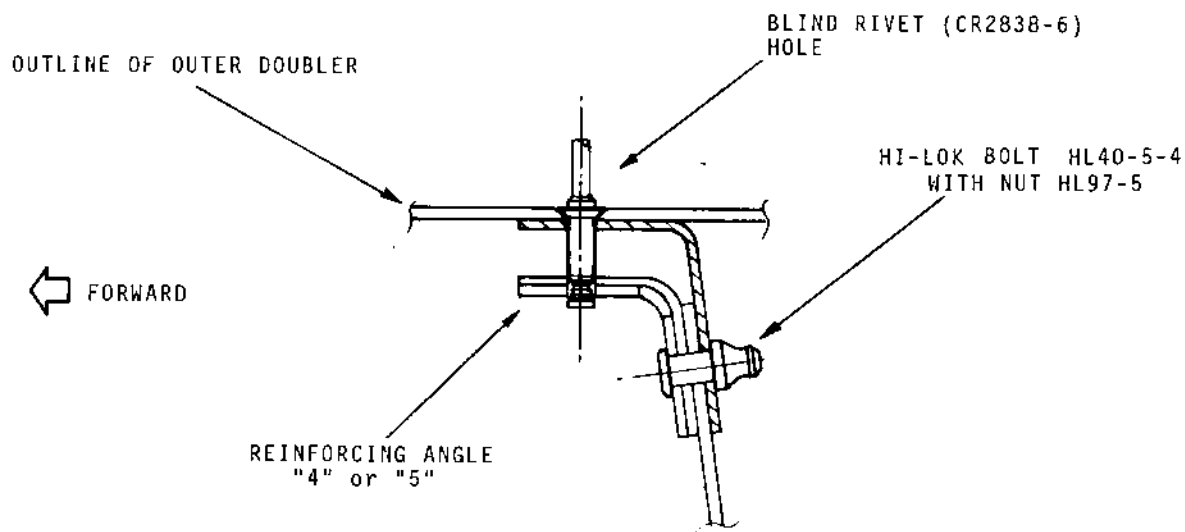
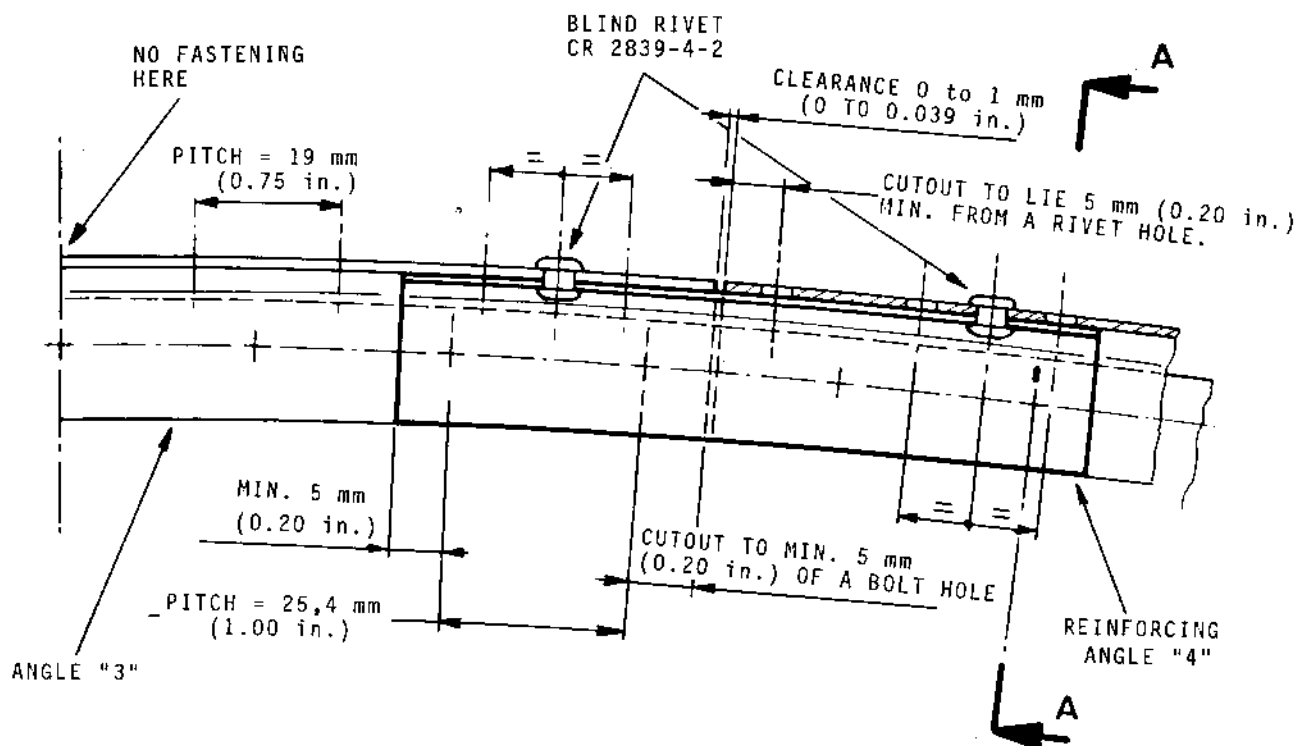
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Repair of 1st Frame by Riveted Patches
Figure 404 (Sheet 1 of 2)

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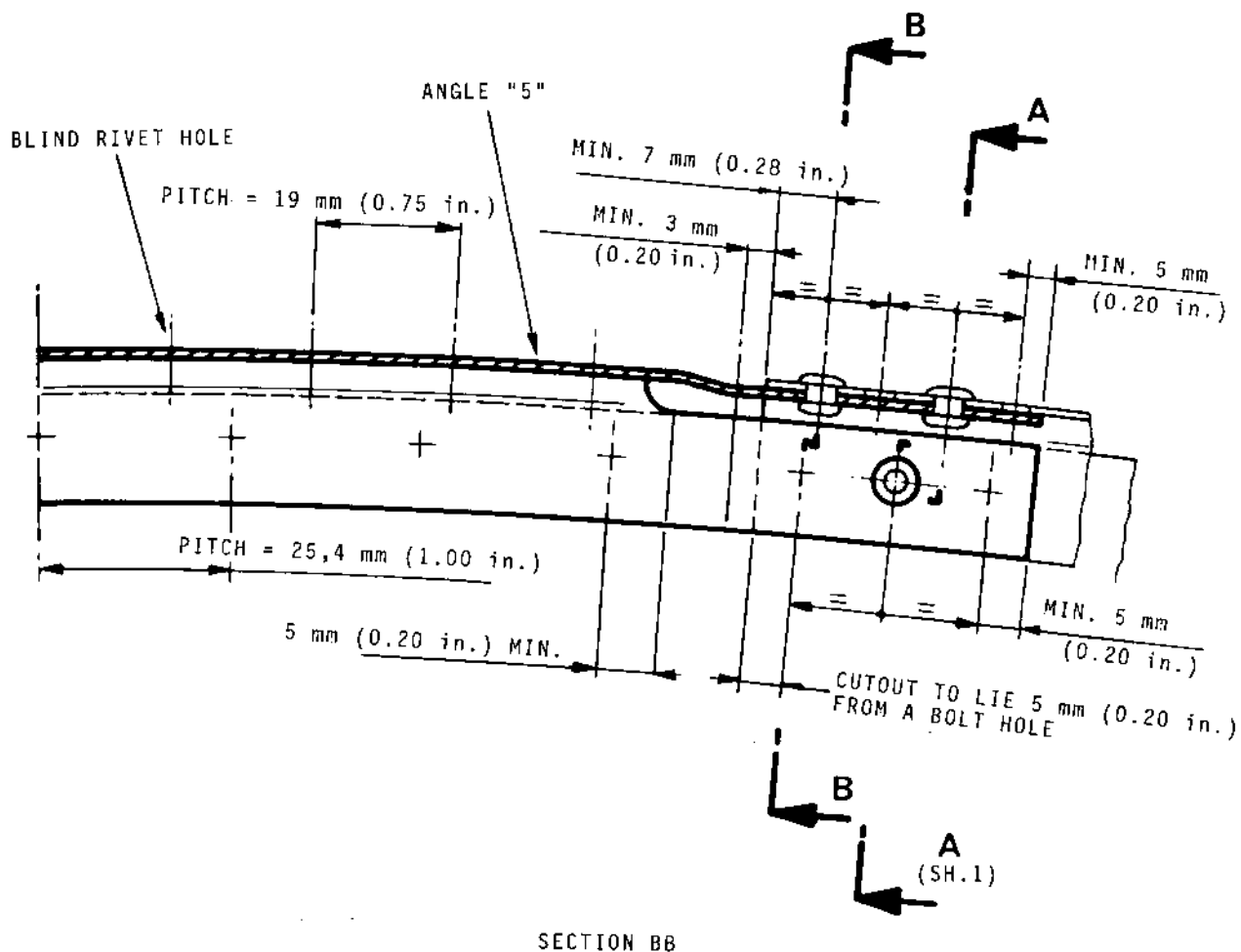
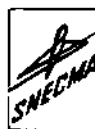
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OVERHAUL



BLIND RIVET
CR 2839-4-3

MACHINE FLUSH TO
 $\pm 0,127 \text{ mm (0.005 in.)}$

ANGLE "5"

BLIND RIVET
CR 2838-4-4

Repair of 1st Frame by Riveted Patches
Figure 404 (Sheet 2 of 2)

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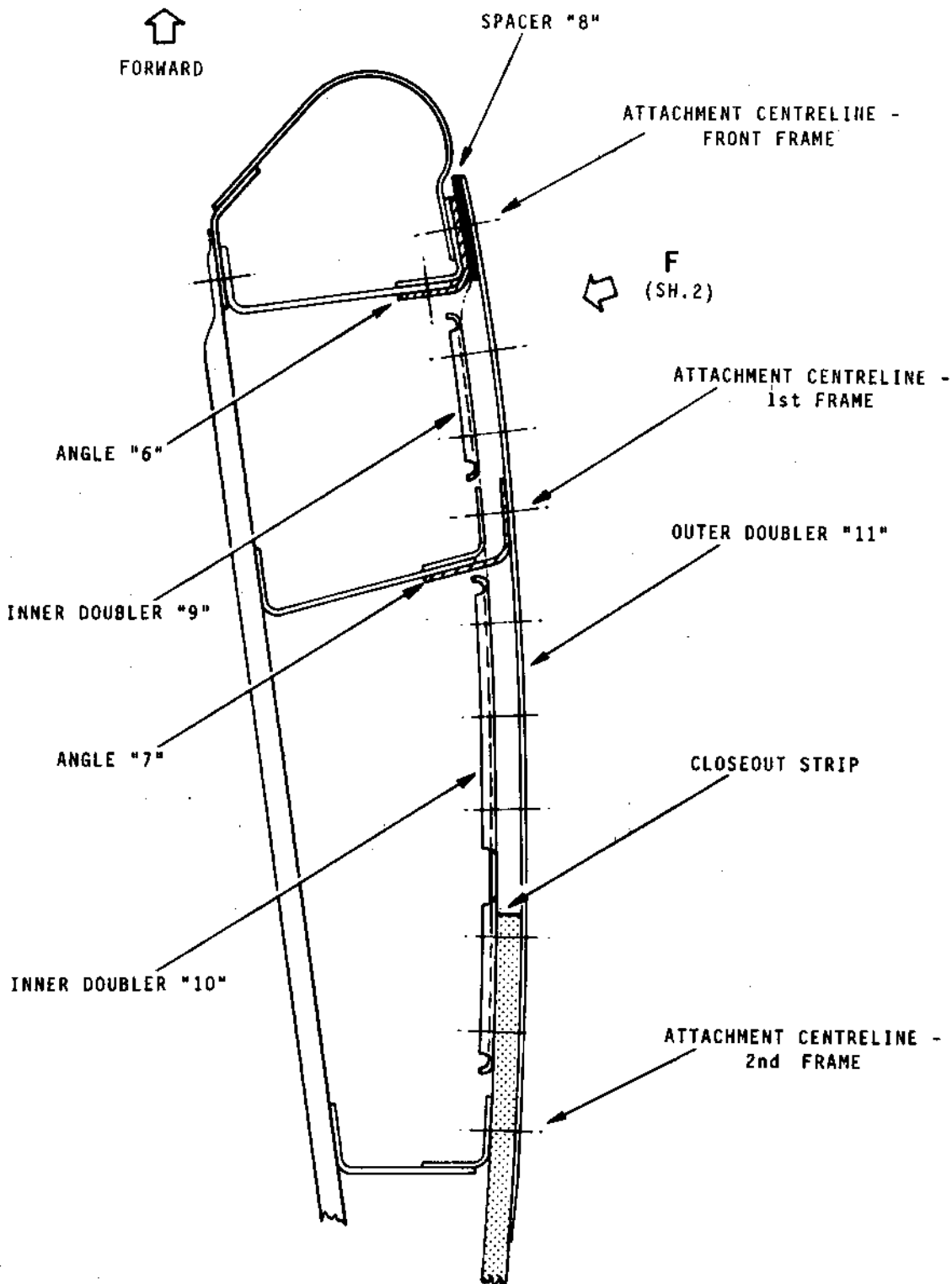
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OVERHAUL



Repair of Outer Panel by Application of Doublers
Figure 405 (Sheet 1 of 6)

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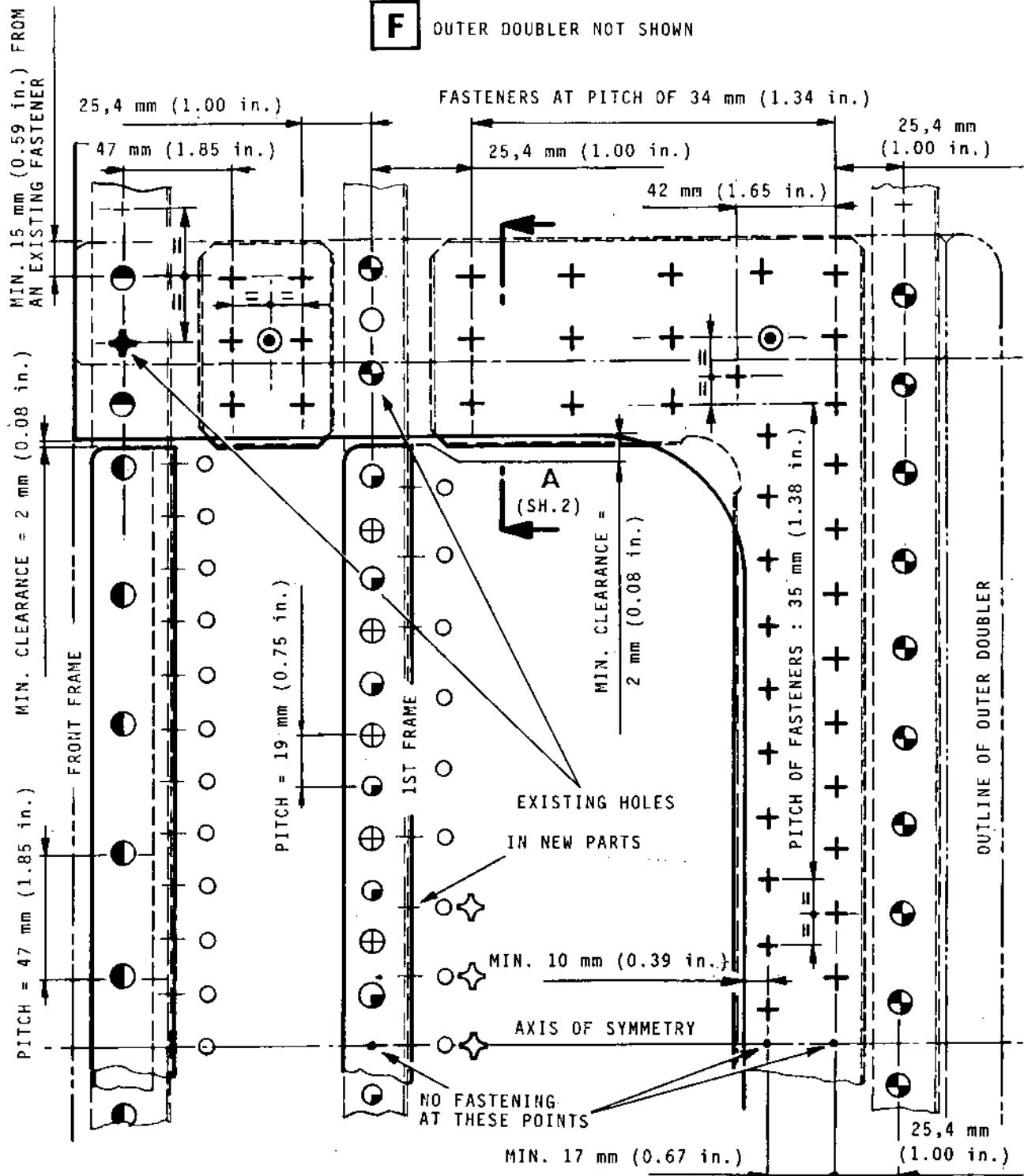
OLYMPUS 593

MK.610-14-28
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F

OUTER DOUBLER NOT SHOWN



Repair of Outer Panel By Application of Doublers
Figure 405 (Sheet 2 of 6)

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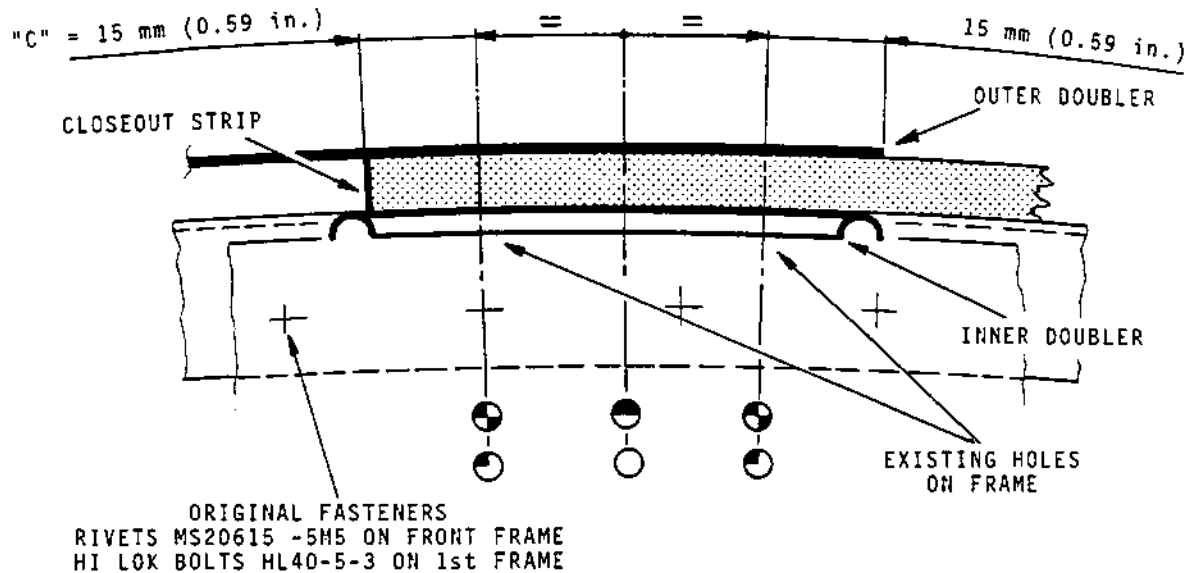
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MK.610-14-28
OVERHAUL



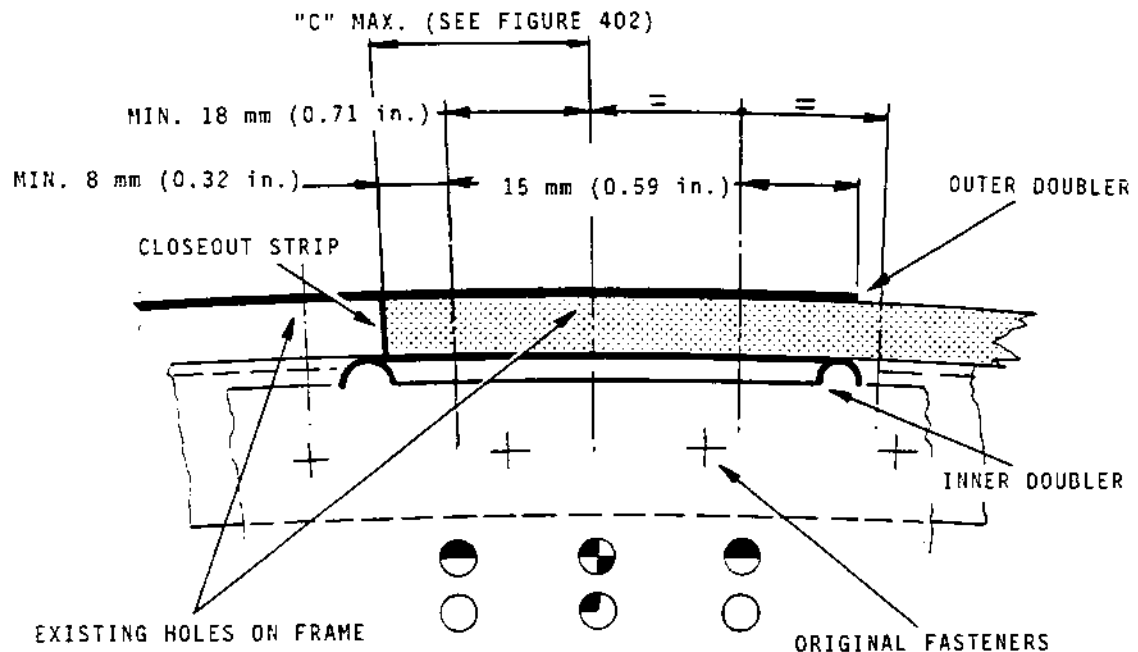
SECTION AA

CUTOUT TO MIN. VALUE "C" OF AN EXISTING HOLE



SECTION AA

CUTOUT TO MAX. VALUE "C" OF AN EXISTING HOLE



Repair of Outer Panel by Application of Doublers
Figure 405 (Sheet 3 of 6)

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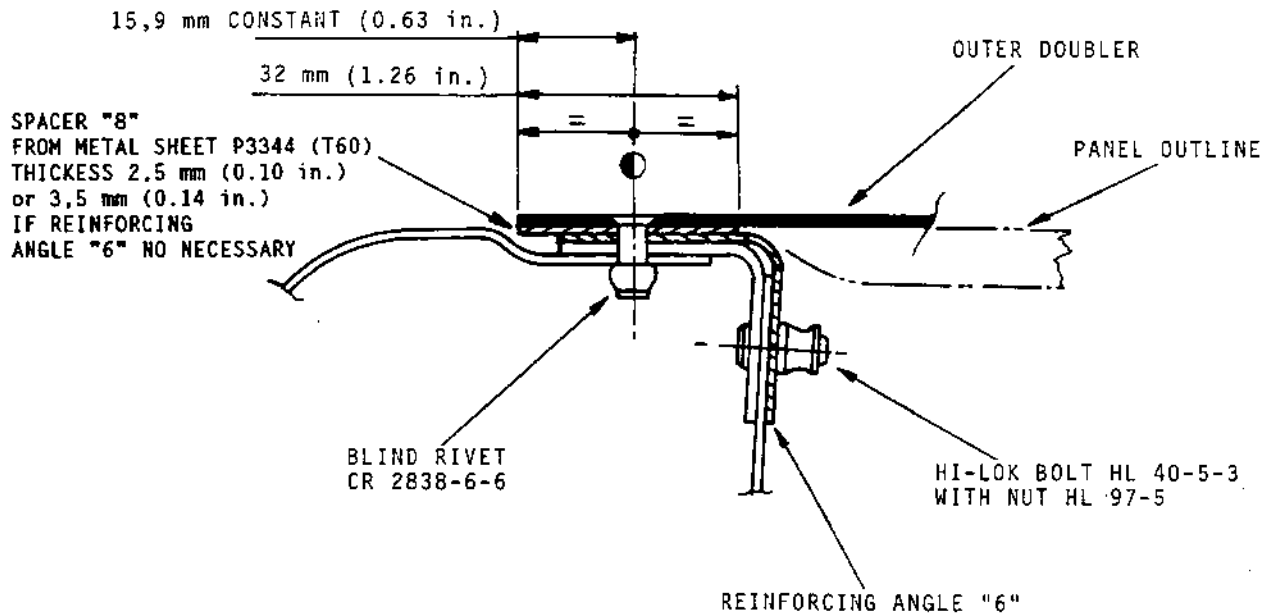


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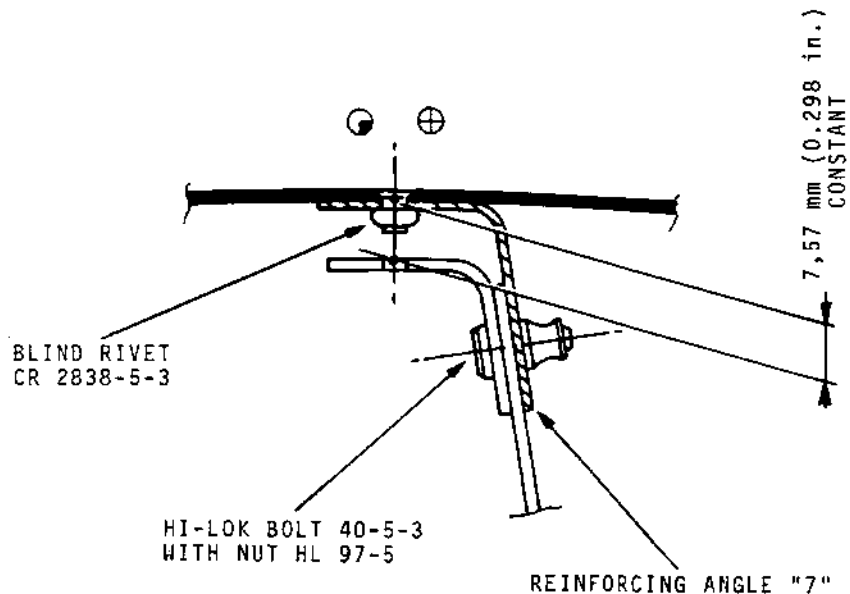
MK.610-14-28
OVERHAUL



ATTACHMENT ON LEADING EDGE



ATTACHMENT ON 1st FRAME



Repair of Outer Panel by Application of Doublers
Figure 405 (Sheet 4 of 6)

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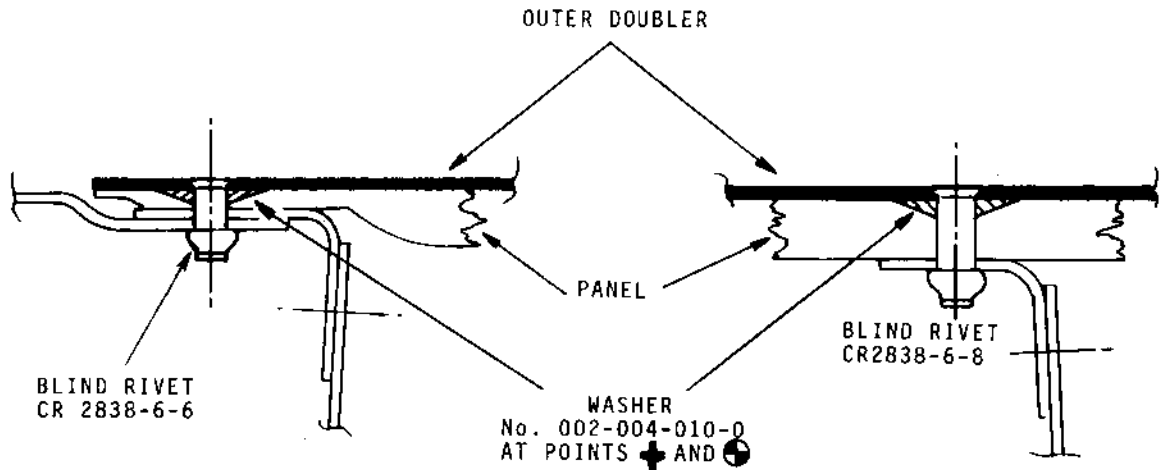
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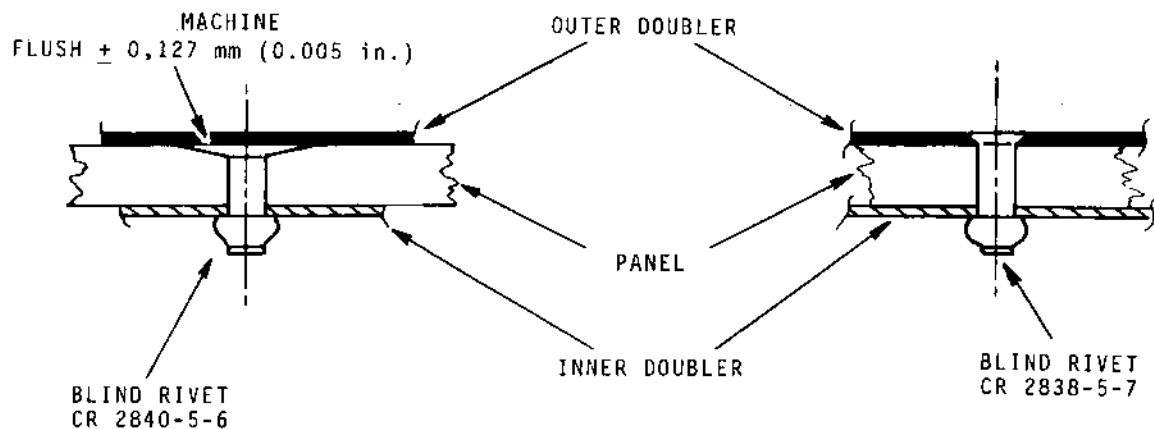
FASTENERS TYPE \oplus AND \ominus
ON LEADING EDGE

FASTENERS TYPE \oplus AND \circ
ON FRAMES



FASTENER TYPE \odot
FOR KEEPING INNER DOUBLERS
IN POSITION

FASTENER TYPE \oplus



Repair of Outer Panel by Application of Doublers
Figure 405 (Sheet 5 of 6)

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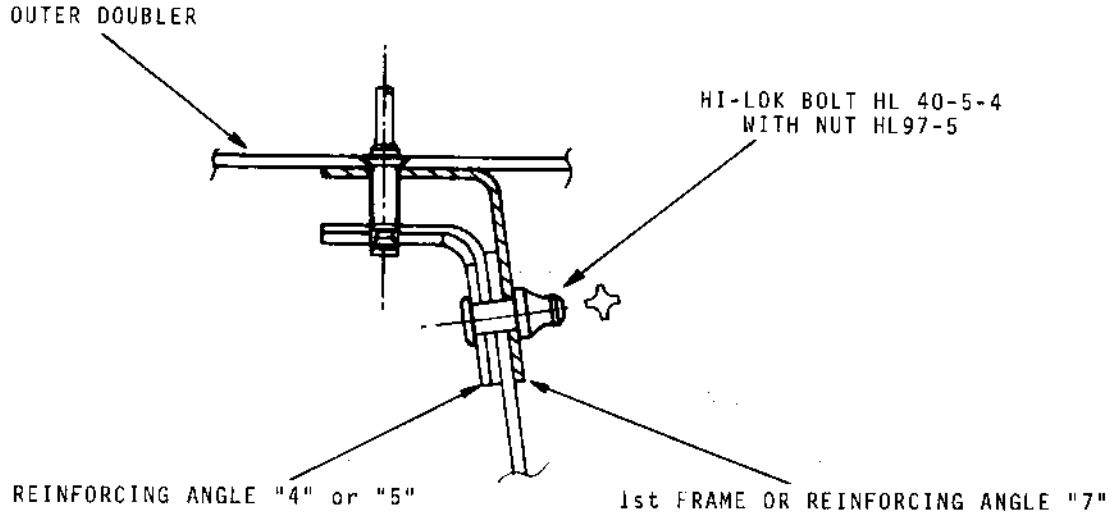













OLYMPUS 593

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OVERHAUL



FIXATION TYPE 



MARKING TEXT	FIGURE	TYPE No.
"A"		CR2838-6-6
"B"		CR2838-5-3
"C"		CR2838-5-3
"D"		HL40-5-3 (WITH HL97-5)
"E"		HL40-5-4 (WITH HL97-5)
"F"		CR2838-5-7
"G"		CR2840-5-6
"H"		CR2838-6-6
"I"		CR2838-6-8
"J"		CR2838-6-6
"K"		CR2838-6-8

Repair of Outer Panel by Application of Doublers
Figure 405 (Sheet 6 of 6)

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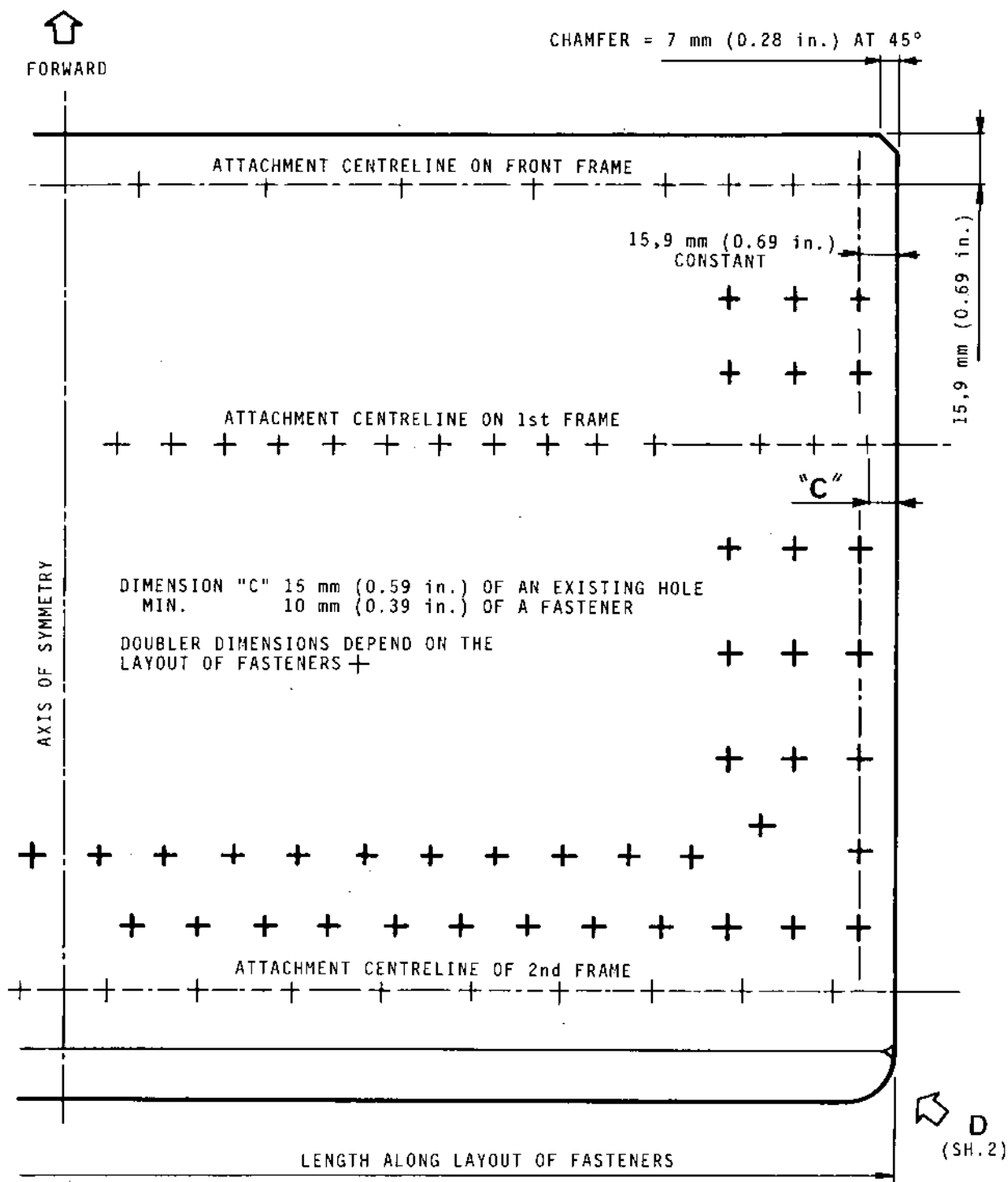
OLYMPUS 593

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OVERHAUL



OUTER DOUBLER "11"
FROM METAL SHEET P3344 (T60)
THICKNESS : 2 mm (0.078 in.)



Making Up the Outer Doubler
Figure 406 (Sheet 1 of 2)

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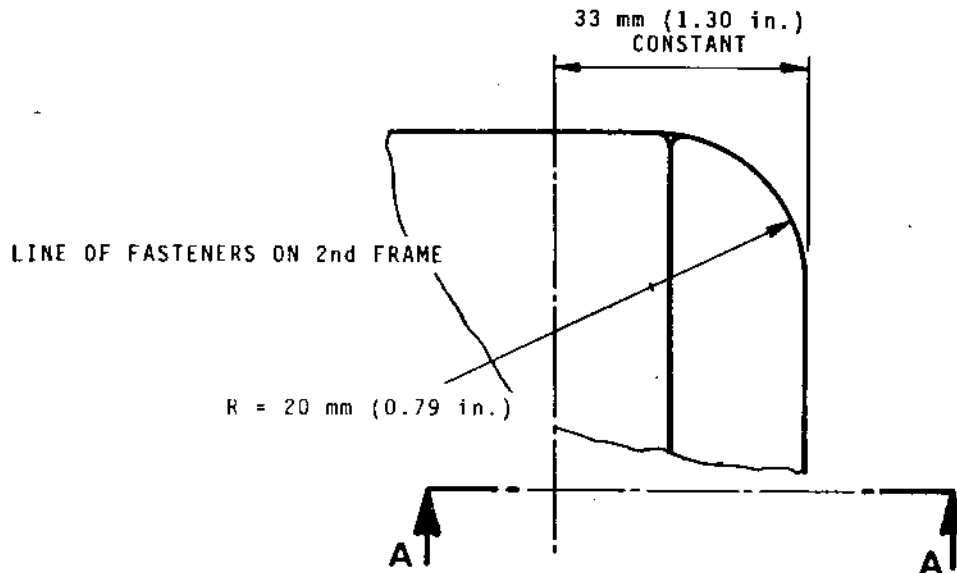
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MK.610-14-28
OVERHAUL

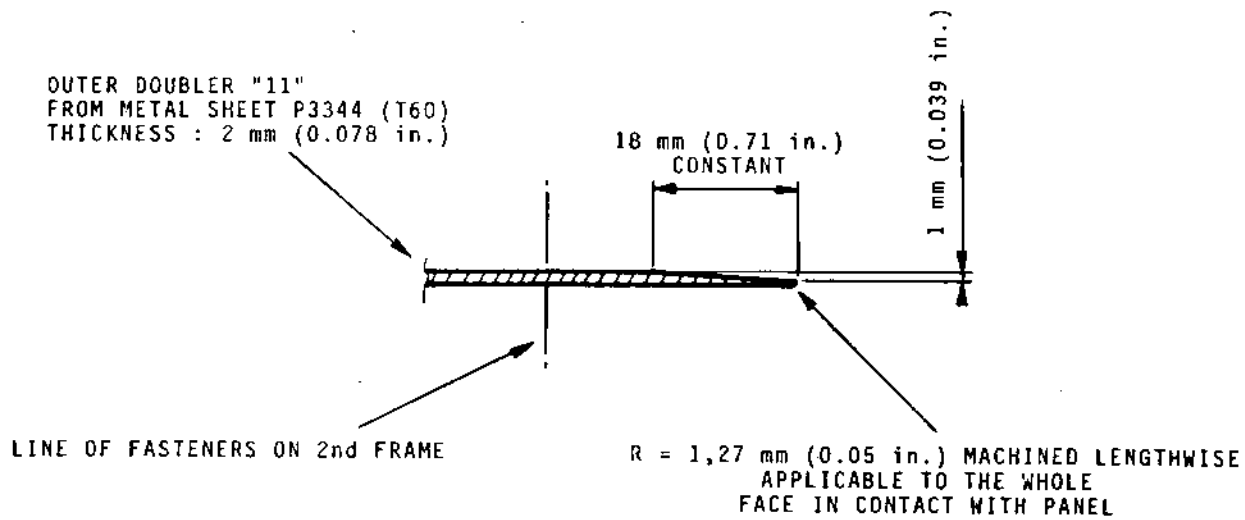


D

OUTER DOUBLER ROUNDED OFF
ON LEADING EDGE



SECTION AA



Making Up the Outer Doubler
Figure 406 (Sheet 2 of 2)

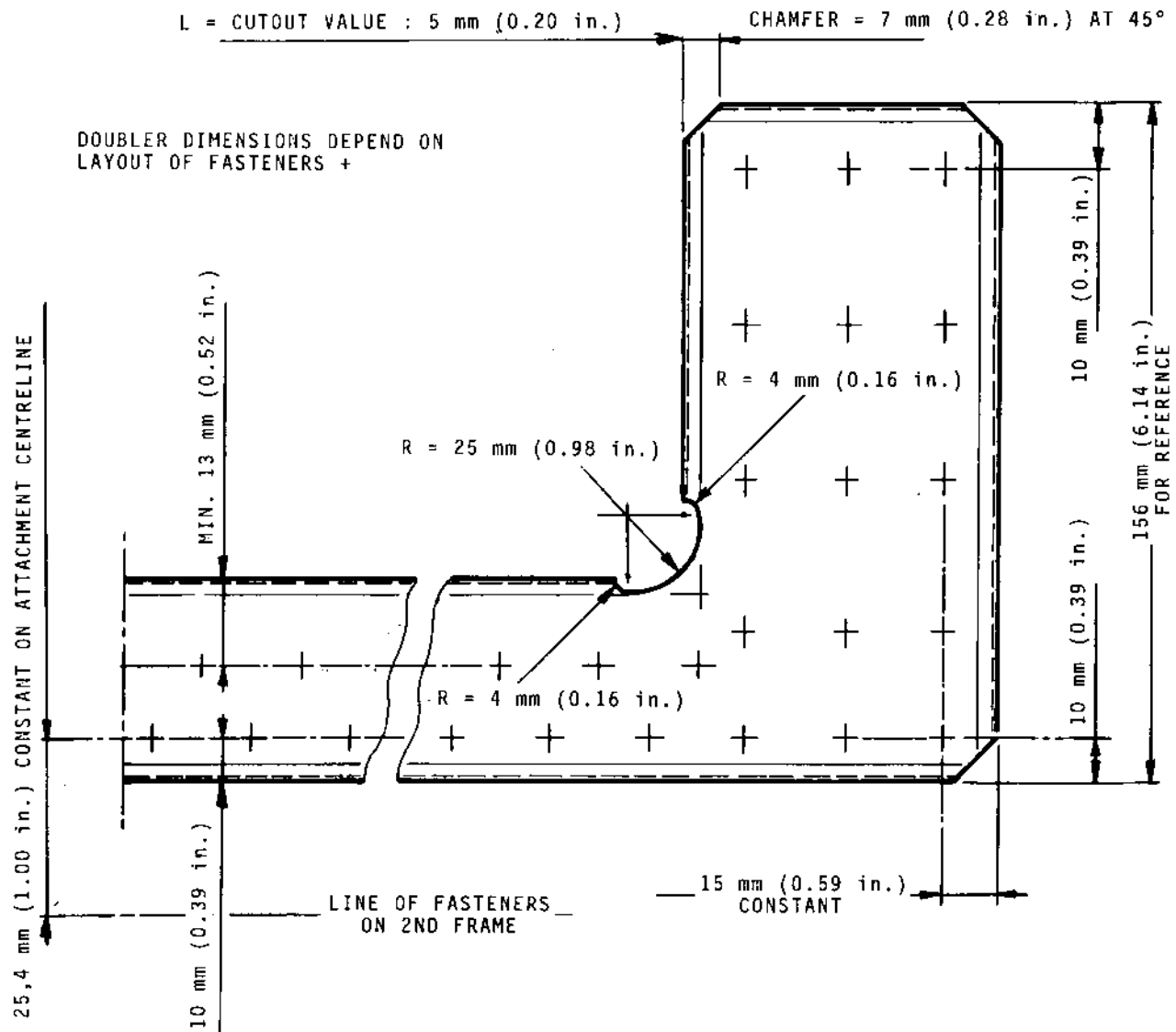
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INNER DOUBLER "10"
FROM METAL SHEET P3344 (T60)
THICKNESS = 1 mm (0.039 in.)



Making Up the Inner Doublers
Figure 407 (Sheet 1 of 2)

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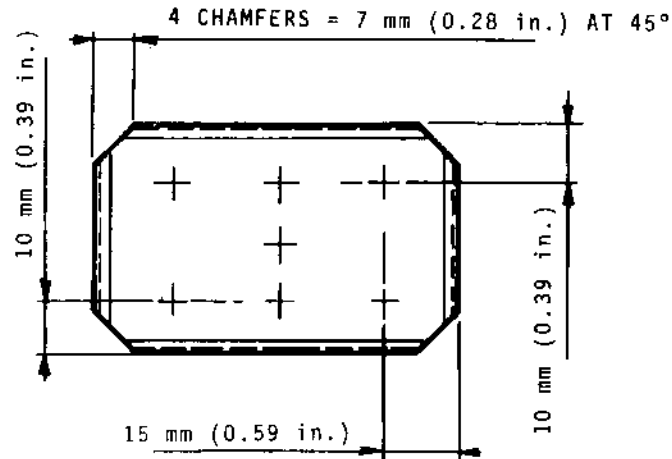
OLYMPUS 593

MK.610-14-28
OVERHAUL



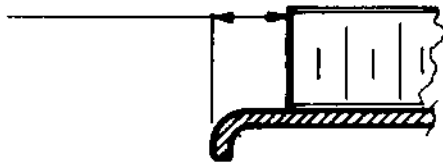
DOUBLER DIMENSIONS DEPEND
ON THE LAYOUT OF FASTENERS +

INNER DOUBLER "9"
FROM METAL SHEET P3344 (T60)
THICKNESS : 1 mm (0.039 in.)

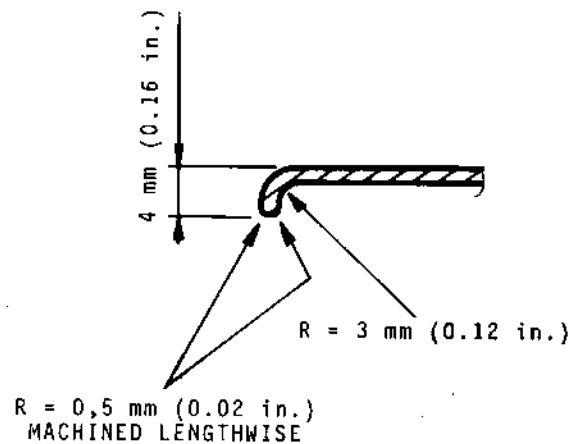


EDGE OF DOUBLERS AT CUTOUT

5 mm CONSTANT (0.20 in.)



DOWNSHEPT EDGE OF
INNER DOUBLERS



Making Up the Inner Doublers
Figure 407 (Sheet 2 of 2)

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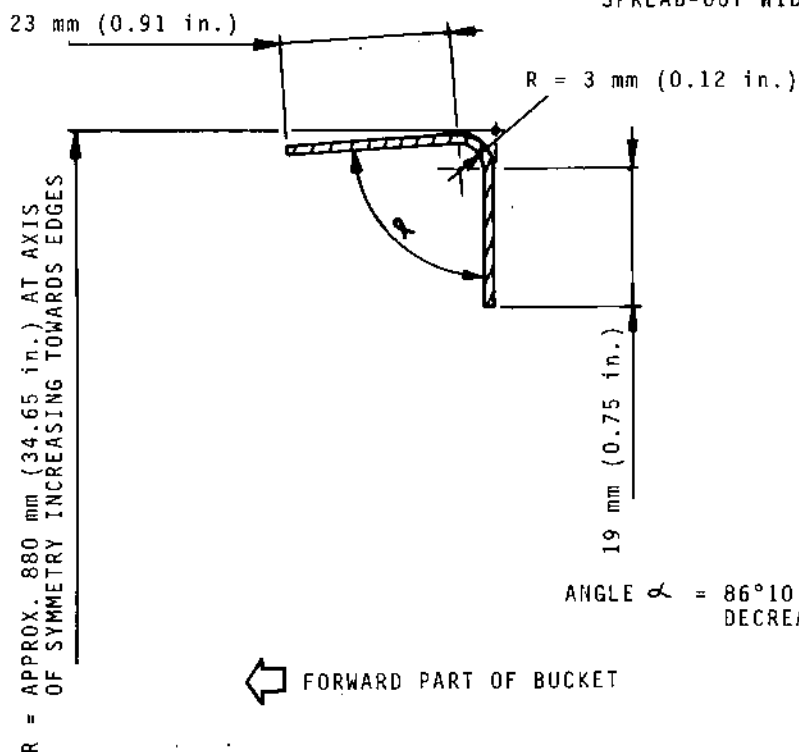
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OVERHAUL



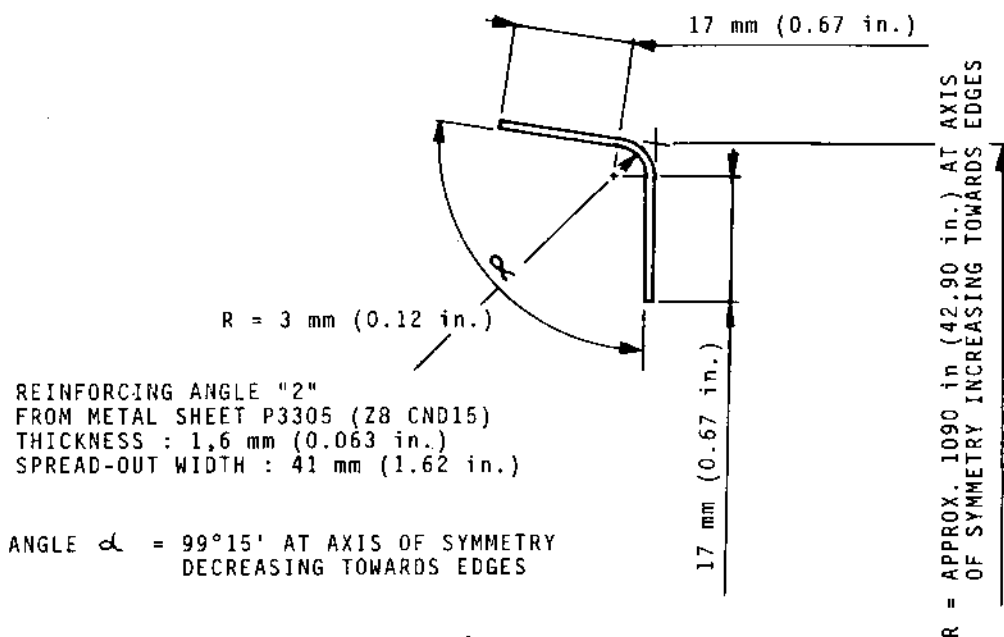
← FORWARD PART OF BUCKET

REINFORCING ANGLE "1"
FROM METAL SHEET P3305 (Z8CND15)
THICKNESS : 1,3 mm (50.050 in.)
SPREAD-OUT WIDTH = 48 mm (1.90 in.)



ANGLE α = 86°10' AT AXIS OF SYMMETRY
DECREASING TOWARDS EDGES

← FORWARD PART OF BUCKET



REINFORCING ANGLE "2"
FROM METAL SHEET P3305 (Z8 CND15)
THICKNESS : 1,6 mm (0.063 in.)
SPREAD-OUT WIDTH : 41 mm (1.62 in.)

ANGLE α = 99°15' AT AXIS OF SYMMETRY
DECREASING TOWARDS EDGES

Making Up Angle-Pieces
Figure 408 (Sheet 1 of 5)

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REP 1-460-6

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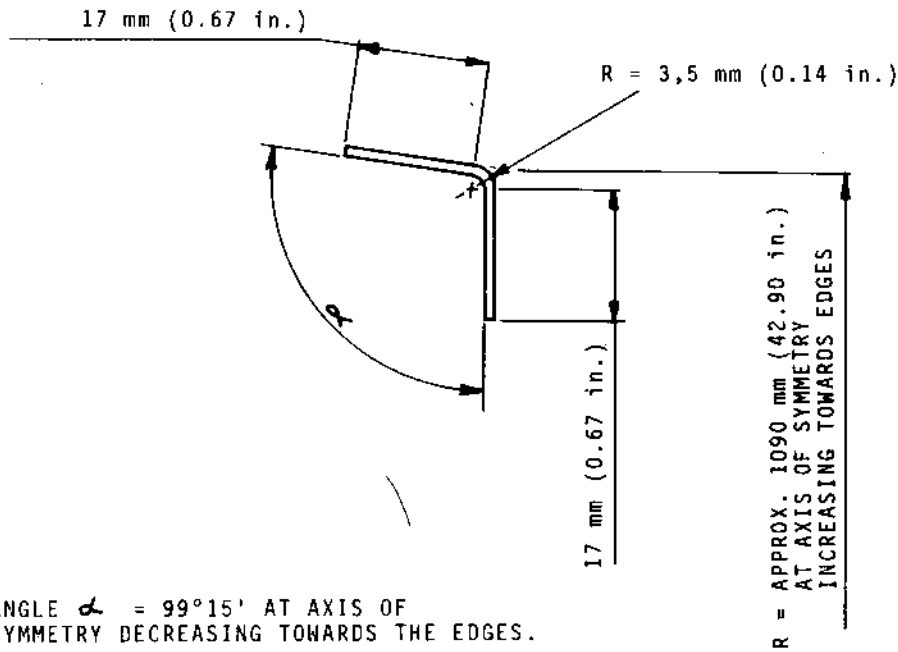


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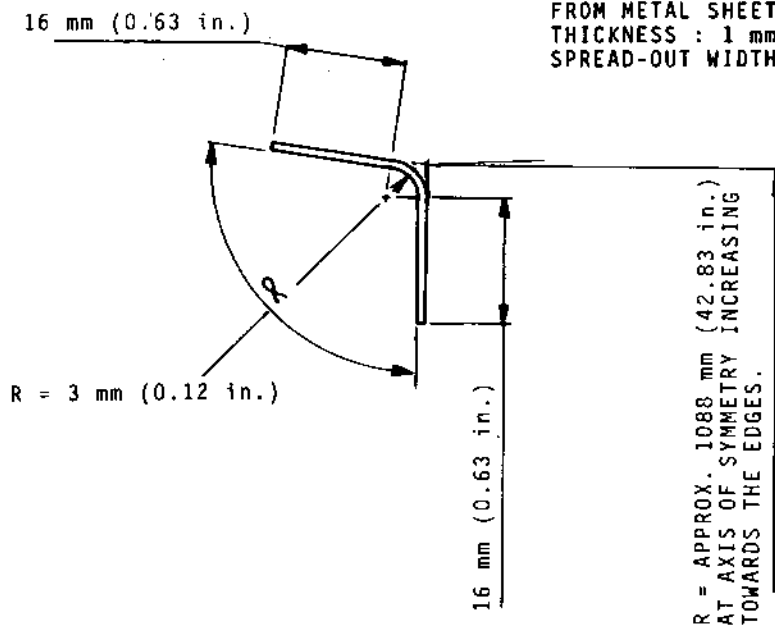
MK.610-14-28
OVERHAUL



REINFORCING ANGLE "3"
FROM METAL SHEET P3305 (Z8 CND15)
THICKNESS : 1,6 mm (0.063 in.)
SPREAD-OUT WIDTH = APPROX. 41 mm (1.62 in.)



REINFORCING ANGLE "4"
FROM METAL SHEET P3305 (Z8 CND15)
THICKNESS : 1 mm (0.039 in.)
SPREAD-OUT WIDTH : APPROX. 37 mm (1.46 in.)



Making Up Angle-Pieces
Figure 408 (Sheet 2 of 5)

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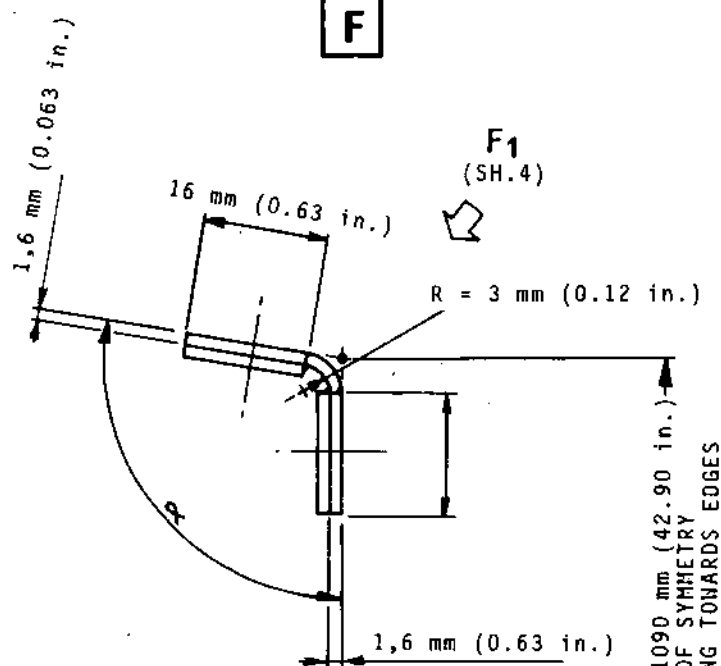
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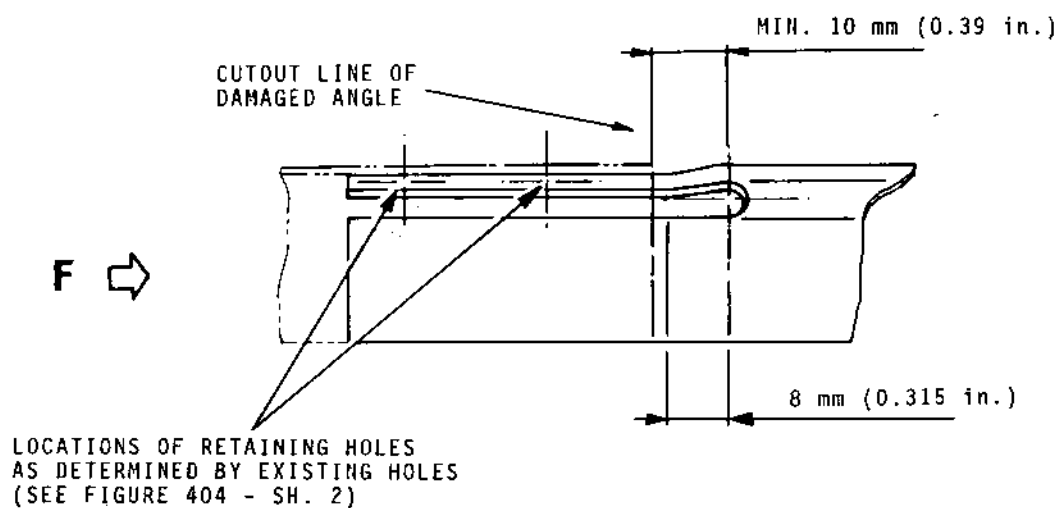
OLYMPUS 593

MK.610-14-28
OVERHAUL**F**

ANGLE α = $99^{\circ}15'$ AT AXIS OF SYMMETRY
DECREASING TOWARDS THE EDGES

REINFORCING ANGLE "5"
FROM METAL SHEET P3305 (Z8 CND15)
THICKNESS : 1,6 mm (0.063 in.)
SPREAD-OUT WIDTH : APPROX. 37 mm (1.46 in.)

R = APPROX. 1090 mm (42.90 in.)
AT AXIS OF SYMMETRY
INCREASING TOWARDS EDGES



LOCATIONS OF RETAINING HOLES
AS DETERMINED BY EXISTING HOLES
(SEE FIGURE 404 - SH. 2)

Making Up Angle-Pieces
Figure 408 (Sheet 3 of 5)

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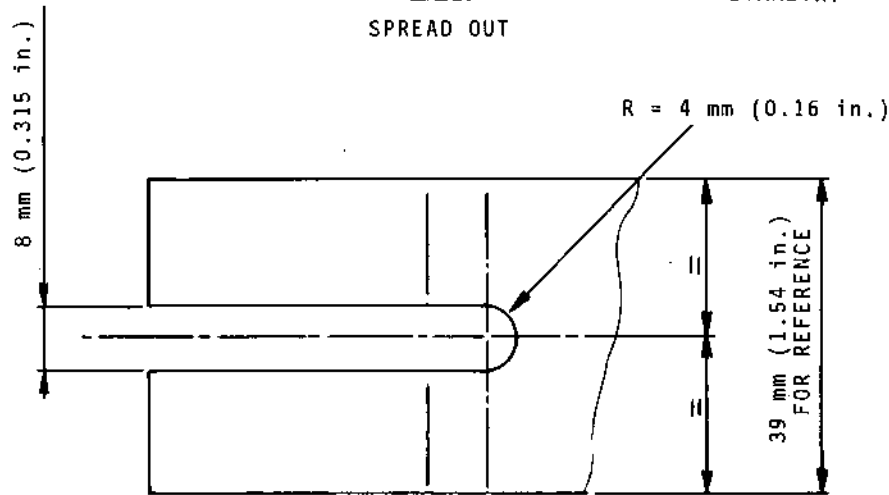
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OVERHAUL



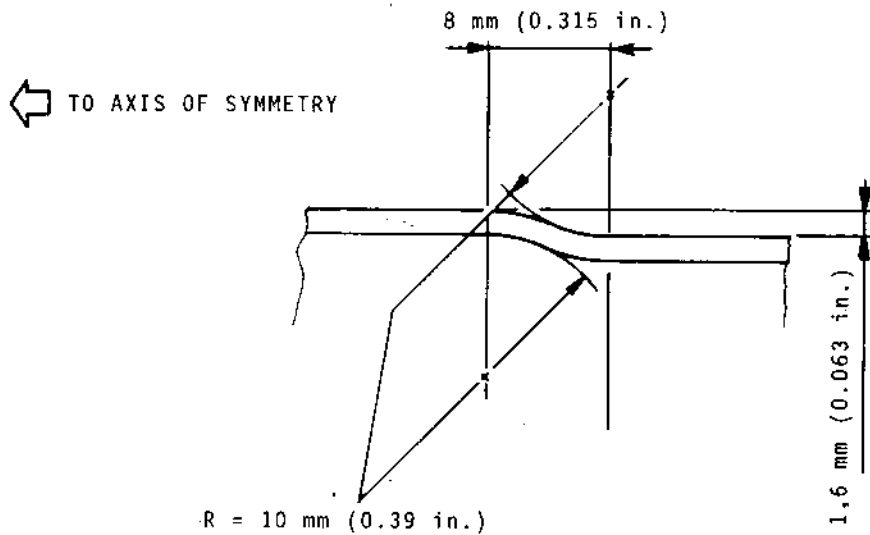
F₁

SPREAD OUT

TO AXIS OF
SYMMETRY



JOGGLING DETAIL



Making Up Angle-Pieces
Figure 408 (Sheet 4 of 5)

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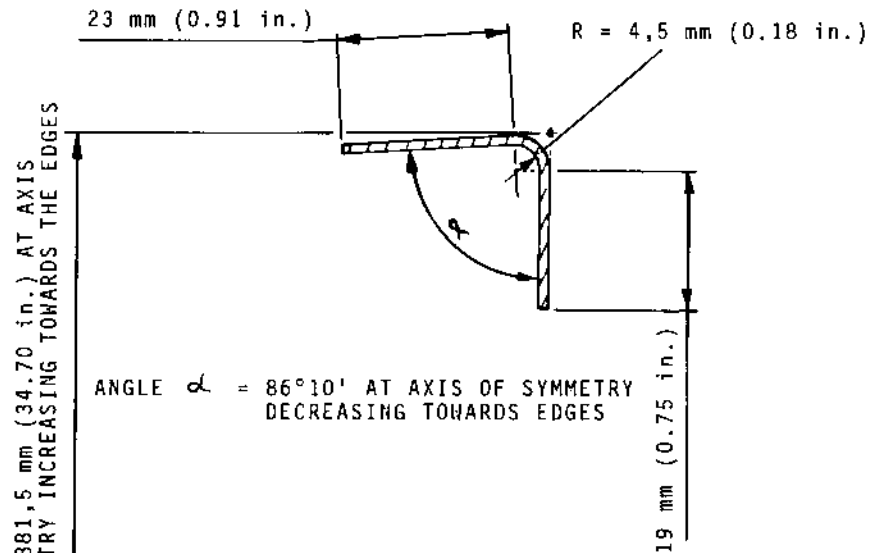
OLYMPUS 593

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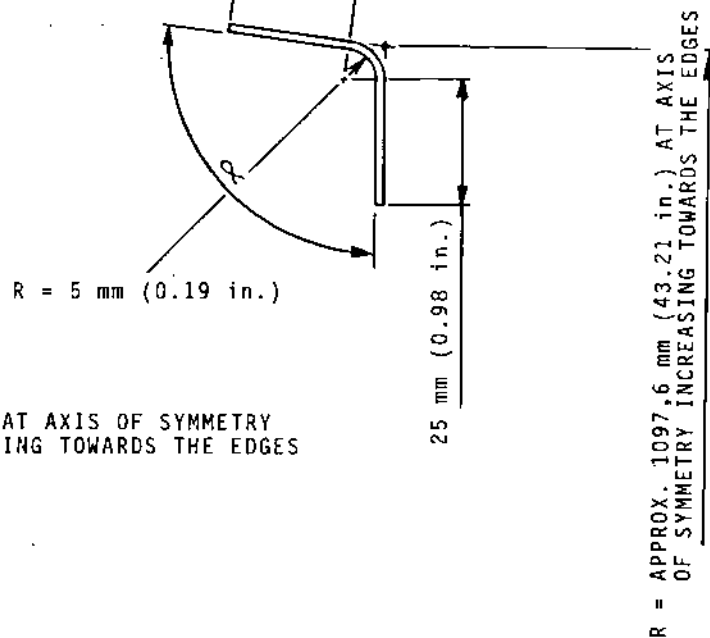


ANGLE "6" FROM
METAL SHEET P3344 (T60)
THICKNESS : 1 mm (0.039 in.)
SPREAD-OUT WIDTH : 50 mm (1.96 in.)



17 mm (0.67 in.)

ANGLE "7" FROM
METAL SHEET P3344 (T60)
THICKNESS = 1 mm (0.039 in.)
SPREAD-OUT WIDTH : 52 mm (2.05 in.)



ANGLE $\alpha = 99^{\circ}15'$ AT AXIS OF SYMMETRY
DECREASING TOWARDS THE EDGES

Making Up Angle-Pieces
Figure 408 (Sheet 5 of 5)

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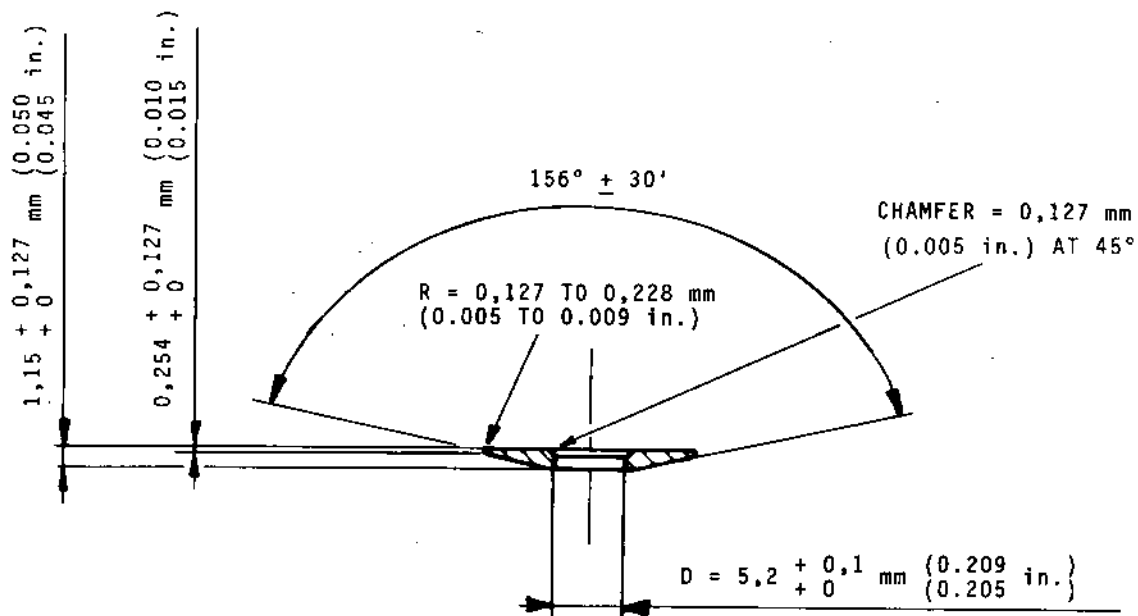
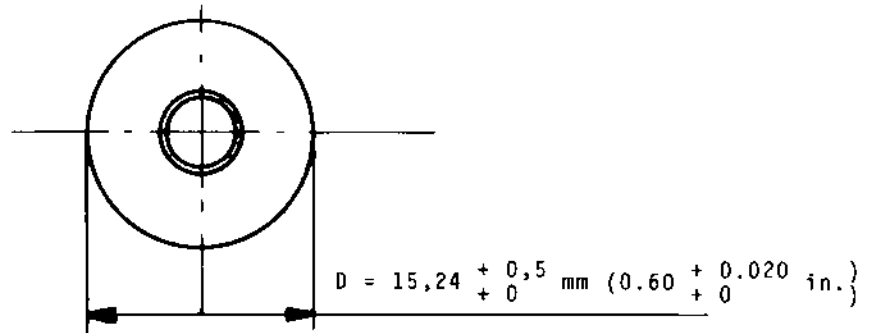


OLYMPUS 593

MK.610-14-28
OVERHAUL



WASHER No. 002-004-010-0
FROM METAL SHEET P3324 (NC15Fe)
THICKNESS : 1,2 mm (0.047 in.)



Making Up Dimpling Washers
Figure 409 (Sheet 1 of 1)

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OLYMPUS 598

MK.610-14-28

OVERHAUL



REPAIR

REVERSER BUCKET (1-460)

7. Replacement of Impaired Panel Segment After Full Disassembly,
for the Repair of Damage Sustained in Landing

PARTS REQUIRED FOR REPAIR

Metal sheet Z8 CND 15 (P 3305), 0.8 mm (0.032 in) in thickness	
Metal sheet Z8 CND 15 (P 3305), 1.2 mm (0.047 in) in thickness	
Metal sheet Z8 CND 15 (P 3305), 1.6 mm (0.063 in) in thickness	
Stressskin panel (P 3711)	
Weld filler wire P 3008	
Blind bolt PLT 1004-6-3	(650-089-930-0)
" " PLT 1004-6-5-5	(650-089-950-0)
" " PLT 1004-6-6	(650-089-933-0)
" " PLT 1004-6-6-5	(650-089-951-0)
" " PLT 1004-6-7	(650-089-934-0)
" " PLT 1004-6-7-5	(650-089-952-0)
" " PLT 1004-6-8	(650-089-935-0)
Blind rivet CR 2838-5-8	(649-772-165-0)
Blind rivet CR 2839-5-8	(649-772-087-0)
Rivet NAS 1198-5-5	(650-014-101-0)
" NAS 1198-5-9	(650-014-108-0)
" NAS 1198-5-13	(650-014-115-0)
" NAS 1199-5- 8	(650-024-106-0)
" NAS 1199-5- 9	(650-024-108-0)
" NAS 1199-5-11	(650-024-111-0)
" NAS 1199-5-12	(650-024-113-0)
Blind nut BTN1 LG 428-12	(649-783-047-0)
Nut No. 301-084-702-0	
Nut No. 301-084-800-0	
Rivet MS 20615-5M5	(650-012-101-0)
Special washer 525-003-859-0	

A. Introduction

This repair scheme offers all particulars on the replacement of a damaged outer-panel segment and of angle sections on the corresponding frames.

- It is applicable where the max-length of the cutout does not exceed 450 mm (71.72 in.) and the width 285 mm (11.22 in.).

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REP 1-460-7

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OLYMPUS 593

MK.610-14-28
OVERHAUL



- For replacement of the front-frame cover, consult REP 1-460-4.

B. Procedure

(1) Disassembly of panel

- (a) Make a radiographic test using X-ray equipment complete with a long anode target as instructed in standard practices, chapter 70-20-30, shown in figure 401, and further indicated below :

- 1 At points A and B take shots at 15° to bring the repair area into view.
- 2 At point C take a panoramic view of the bucket in the region of the outer-panel attachment points, in order to identify the shims suitable to be sandwiched between frames and panel (only applies to buckets 3511 to 3574 in which the shims are not riveted to the frames).

- (b) Remove fasteners from the outer panel (these are itemized in REP 1-460-3 "Replacement of fasteners") from the doublers, and from the attachment fitting of the ball-screw gearbox, as instructed in Standard Practices, notably :

- in chapter 70-50-10 for NAS rivets
- in chapter 70-50-50 for cherrylock blind rivets
- in chapter 70-50-60 for blind bolts.

Remove nuts around bucket hub as instructed in REP 1-460-2

After removal of the 3 screws from the attachment fitting of the ball-screw gearbox, remove the 3 nuts by drilling, as described in REP 1-460-13..

- (c) Disassembling the outer panel

NOTE : To keep the shims from falling between panel and frames on disassembly, fasten them to the frames.

Carefully mark the locations of all screws, bushings and washers for identical reassembly.

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(2) Repair of damaged panel segment

- (a) Cut the damaged segment out of the panel as shown in figure 402 and instructed in standard practices, chapter 70-30-10.
- (b) From a 0,8 mm (0.032 in) thick P 3305 sheet cut a closeout strip of the needed length and of 7,9 mm (0.311 in) width. Shape it to match the contour of the cutout.
- (d) Do a particularly meticulous cleaning with a pad soaked in isopropyl alcohol (P 442), going over the surface involved repeatedly until it is free from the least trace of grease.
- (d) Adjust and tack-weld, by the argon arc procedure, with filler wire P 3008, the closeout strip to the panel cutout, as instructed in standard practices, chapter 70-35-10.
- (e) From a stressskin panel (3711) cut out a piece suited to the repair area in a max. size of approx. 420 mm (16.53 in) X 270 mm (10.63 in).
- (f) Mould the patch to the curved outline of the bucket. Crush the forward edge to match the outline of the adjacent segment, as shown in view D, Figure 402, and instructed in standard practices, chapter 70-30-10.
- (g) Do a class B1 seam welding at the crushed edge, as instructed in standard practices, chapter 70-35-20.
- (h) Shape the patch to suit the contour of the cutout
- (i) Treat the patch as follows :
 - Take into solution in argon at 1065°C for 15 min. Cut off argon supply.
 - Quench in argon at 955°C for 20 min. Cut off argon supply.
 - Refrigerate at - 75°C for 6 hours.
 - Age-harden at 605°C for 1 1/2 hour. Cut off air supply.

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- (j) As this treatment may have wrested the patch out of shape, remedy any deformation by glass-bead shot peening,, using facilities of the following characteristics :
- Sandblasting unit with a nozzle of 12 mm (0.47 in) dia.
 - Glass beads of 0,5 mm (0.020 in) dia.
 - Sandblasting at a 3-bar pressure by cycles of 30 sec to 1 min.
 - Nozzle-to-panel spacing : 200 to 250 mm (7.87 to 9.84 in).
- (3) Replacement of damaged angle section on front frame
- (a) Cut the damaged segment out of the front-frame angle over a max. length of 400 mm(15.75 in). Grind and drive out the rivets to release the angle iron. Remove a rivet on either side of the cutout limits.
- (b) From a 12 mm (0.047 in) thick P 3305 face sheet, cut the front-frame angle to the max. measurements of approx. 420 mm (16.53 in) by approx. 78 mm (3.07 in). Match the angle iron to the segment contours and adjust in size (see figure 402, view B).
- (c) Put the angle in position on the front frame and argon arc-weld with filler wire Z8 CND 15 (P 3008) as instructed in Standard Practices, chapter 70-35-10.
- (d) Make a soundness test of the class B1 weld as instructed in Standard Practices, chapter 70-35-80, and hereunder :
- A water-washable dye penetrant inspection is carried out by Method M 501 B described in Standard Practices, chapter 70-20-10.
- CAUTION : THE PENETRANT IS TO BE CLEARED OUT WITH A SWAB SOAKED WITH ISOPROPYL ALCOHOL (P442).
- (e) Counterdrill the through holes between angle and frame to a dia. of 4,05 mm \pm 0,1 $\begin{matrix} 0.159 \\ 0.163 \end{matrix}$ in, and deburr.
- (f) Rivet angle to frame with rivets MS 20615-5 M5, as instructed in Standard Practices, chapter 70-50-10.

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- (g) Check riveting as instructed in Standard Practices, chapter 70-50-81.
 - (h) Machine-flush welds on top part of angle.
- (4) Replacement of damaged angle section on frame 1

Should the first-frame angle iron be damaged, replace it as follows.

- (a) Cut the damaged segment out of the angle section over a max. length of 400 mm (15.76 in) angle. Take out the HI-LOK screws so as to release the angle. Remove a screw on either side of the cut-out limits.
 - (b) From a 1,6 mm (0.063 in) thick P 3305 face sheet, cut out the angle for frame 1 to the max. measurements of approx. 420 mm (16.53 in) by approx. 65 mm (2.56 in), match it to the contour of the segment, and adjust in size (see figure 402, view C).
 - (c) Put the angle in position on the frame and weld in the same way as described under (c) and (d) of section B (3) above.
 - (d) Counterdrill the through holes between frame and angle to a dia. of 4,83 mm \pm 0,1 (0.190 in) ; and deburr.
 - (e) Screw back the HI-LOK retaining screws HL 40-5-3 as instructed in Standard Practices, chapter 70-50-40.
 - (f) Check that the HI-LOK fasteners have been properly fitted in compliance with the instructions in Standard Practices, chapter 70-50-84.
 - (g) Machine-flush the weld beads on the upper part of the angle.
- (5) Welding-on the patch

CAUTION : IT IS ESSENTIAL TO ADHERE TO THE INSTRUCTIONS BELOW IF THE PANEL IS TO BE KEPT FROM GETTING OUT OF SHAPE IN THE WELDING.

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- (a) Thoroughly clean the patch with a swab soaked in isopropyl alcohol (P 442), going over it repeatedly until the welding area is completely free from any grease.
- (b) On the inner panel skin, seal off the two retaining holes (see figure 402), to be used for argon intake, with adhesive tape.
- (c) Working from the centre outwards to the edges pin back the panel, only leaving out the two inlet holes above and the two retaining holes on frame 2, which serve for argon exhaust (see figure 402).
- (d) Put the patch in position on the assembly, and drill a 3 mm (0.118 in) dia. hole in the outer skin only, for letting the argon through.

NOTE : This hole can be drilled at the height of frame 1 and may subsequently act as a panel retaining hole (see figure 402).

- (e) Blow argon for at least 2 hours through the two holes in frame 1 to purge out the panel and through the 3 mm hole to purge the patch.
- (f) Argon-arc-weld the patch on with filler wire P 3008, as instructed in Standard Practices, chapters 70-30-10 and 70-35-10, and hereunder :

NOTE : It is essential in welding to apply copper cooling blocks as close to the weld as possible.

- Tack-weld the patch on its outer face
- Take down the panel and tack-weld the inner face
- Pin back the panel in the same way as the first time, and weld outer face.

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- Take down the panel and weld the inner face.

- (g) Perform a B1 weld soundness test as instructed in Standard Practices, chapter 70-35-80, and hereunder :

A water-washable dye penetrant inspection is carried out by Method M 501 B as instructed in Standard Practices, chapter 70-20-10.

CAUTION : THE PENETRANT IS TO BE CLEARED OUT WITH A SWAB SOAKED IN ISOPROPYL ALCOHOL (P 442).

- (h) Machine-flush the weld on the panel inner face in the region of the frames.

- (6) Drilling the panel and the two angle sections

This is done when the angles of the front frame and frame 1 have been repaired.

- (a) Pin up the panel on the assembly working from the middle outwards to either edge.
- (b) Matchmark on the patch the locations of the holes in each frame with reference to the existing holes and their centre-to-centre distances.
- (c) Counterdrill the panel and angles as instructed in Standard Practices, chapter 70-50-60, and hereunder :

- counterdrill panel and angle to a stem-end pitch circle dia. of $5,05 + 0,08 \text{ mm}$ $\left(\begin{matrix} 0.199 \\ 0.202 \end{matrix} \text{ in} \right)$
- 0

- bore out the top covering sheet of the panel alone to a head-end pitch circle dia. of $6,76 + 0,08 \text{ mm}$ $\left(\begin{matrix} 0.266 \\ 0.269 \end{matrix} \text{ in} \right)$
0

- do the dimpling

- (d) Take down the panel and carefully deburr the angles and panel.

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- (7) Drilling the panel and angle section of the front frame.

This is done when the front-frame angle alone has been repaired, without the first-frame angle being impaired in any way.

- (a) Stick some tape of polyester tracing-fabric on the first-frame angle section. Matchmark the locations of retaining holes within and outside the panel repair area.
- (b) Transfer the tracing-cloth tape to the panel inner face at the height of frame 1, making it register with the existing retaining holes. Matchmark the locations of the new retaining holes on the patch.
- (c) Drill the retaining holes thus marked as instructed in Standard Practices, chapter 70-50-60, and hereunder :
 - Drill to a stem-end pitch circle dia. of
$$5,05 + 0,08 \text{ mm } (0.199 \text{ in})$$
$$- 0 \text{ mm } (0.202 \text{ in})$$
 - Bore out the panel outer covering sheet alone to a head-end pitch circle dia. of
$$6,76 + 0,08 \text{ mm } (0.266 \text{ in})$$
$$- 0 \text{ mm } (0.269 \text{ in})$$
 - Do the dimpling
 - Deburr the panel.
- (d) Pin up the panel on the assembly, working from the middle outward to either edge.
- (e) Counterdrill panel and angle of front frame in the same way as in Section (6) above.

- (8) Reassembly of panel

For buckets 3511 to 3574, insert any shims identified by X-ray examination. Make them adhere to the frames by applying a coat of pure petrolatum.

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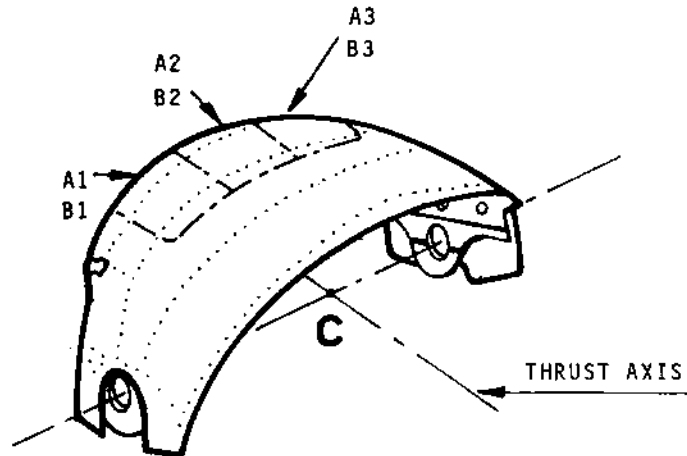


- (a) Rivet the panel to the frames in reverse direction to disassembly, working from the middle outwards to the side edges. Secure the attachment fitting of the ball-screw gearbox, and the doublers, as instructed in Standard Practices, chapters
- 70-50-10 for NAS rivets
 - 70-50-50 for blind rivets
 - 70-50-60 for blind bolts.
- Refit screws, bushes and washers in their original places.
- For the different positions of fastenings see REP 1-460-3 and 1-460-13.
- For remounting back-up plates, see REP 1-460-5
- (b) Check the panel riveting as instructed in Standard Practices, chapters
- 70-50-81 for NAS rivets
 - 70-50-85 for blind rivets
 - 70-50-86 for blind bolts.

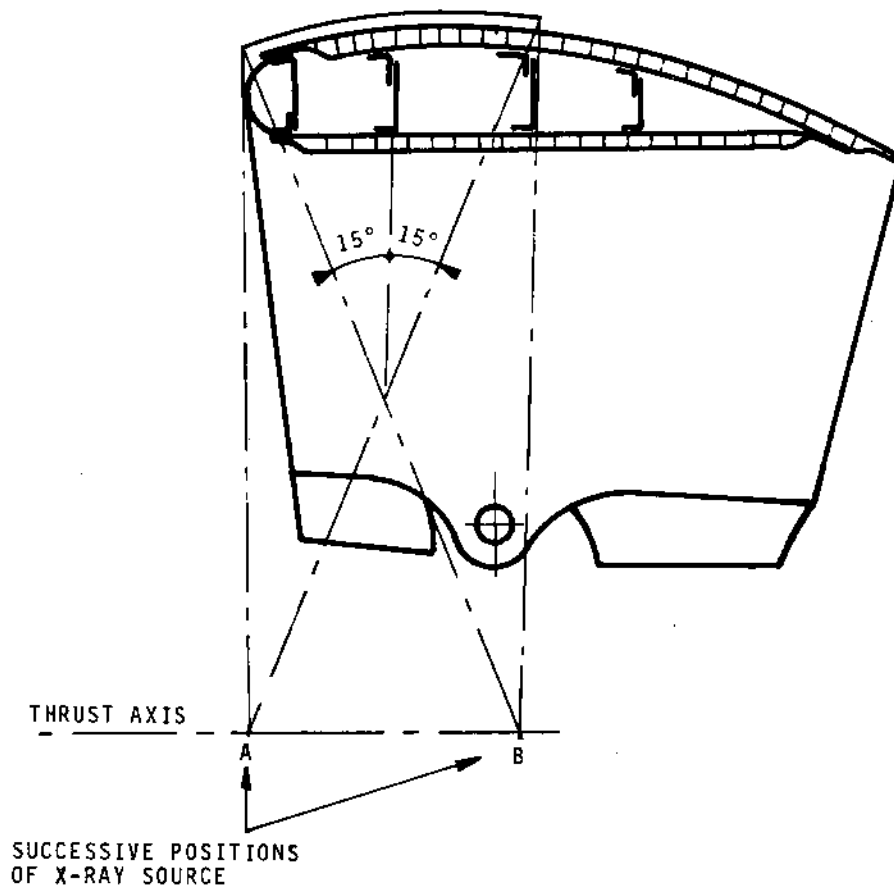


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AT POINT C TAKE A PANORAMIC VIEW OF THE BUCKET



Inspecting the Extent of Damage
Figure 401 - Sheet 1 of 2

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SITE OF SOURCE	ITEMS INSPECTED	FILMS*	PHOTOGRAPHIC DENSITY	IMAGE QUALITY INDICATOR
A B	INSPECTION OF DELA- MINATED AREA ON OUTER STRESSKIN PANEL	3 FILMS 0	2.2	WIRE Ø 0.15 MM (0.006 IN DIA)
		3 FILMS 0		
C	IDENTIFYING SHIMS APPLICABLE BET- WEEN FRAME AND OUTER PANEL	FILMS 0	2.2	WIRE Ø 0.15 MM (0.006 IN DIA)

*KODAK M TYPE FILM STOCK WITHOUT SCREEN OR EQUIVALENT

FILM SIZE : 300 X 400 MM
(11.811 IN X 15.748 IN)

Replacement of a Panel Segment by Welding
Figure 402 - Sheet 2 of 2

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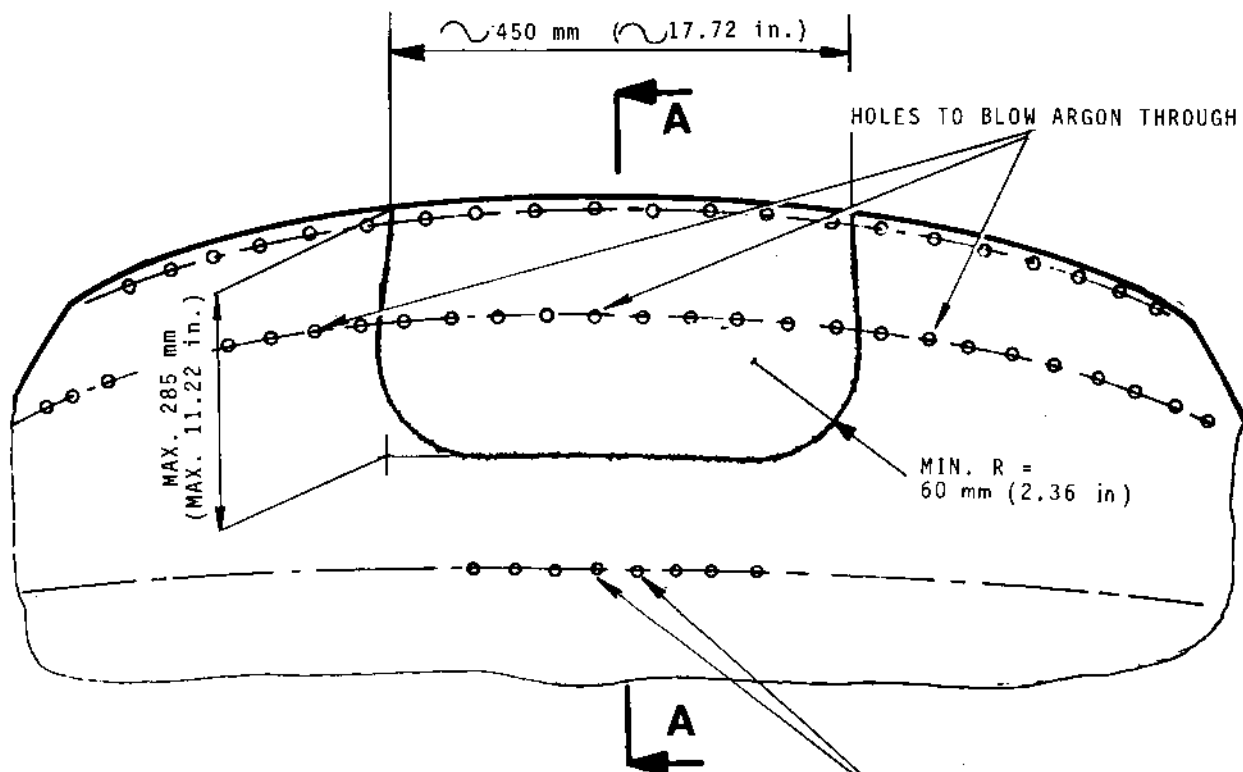
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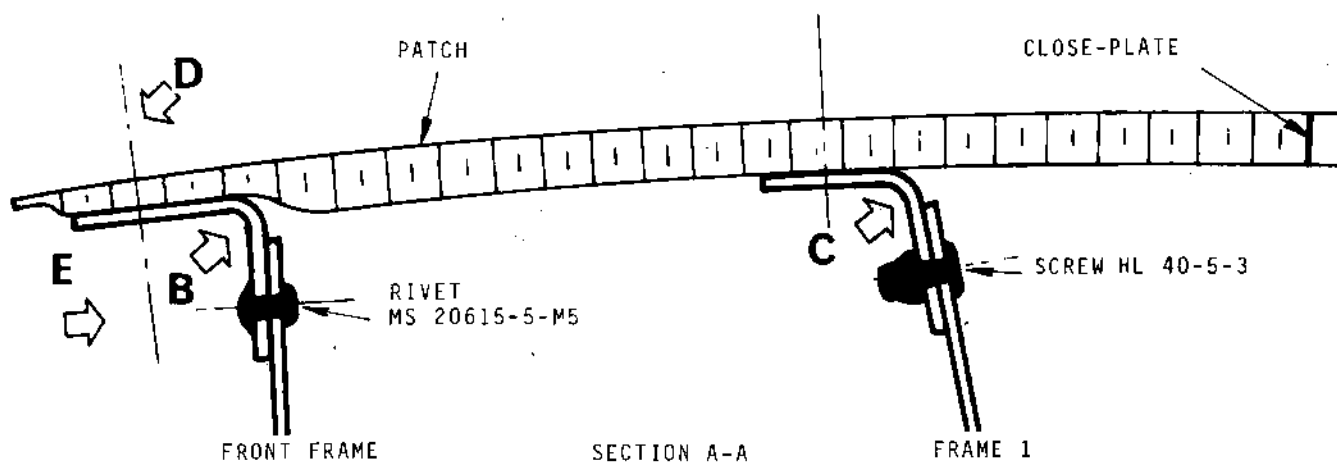
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NOTE : ALL OTHER HOLES
TO BE PINNED ON THE ASSEMBLY

HOLES FOR ARGON EXPULSION
IN PURGING



Replacement of a Panel Segment by Welding
Figure 402 - Sheet 1 of 3

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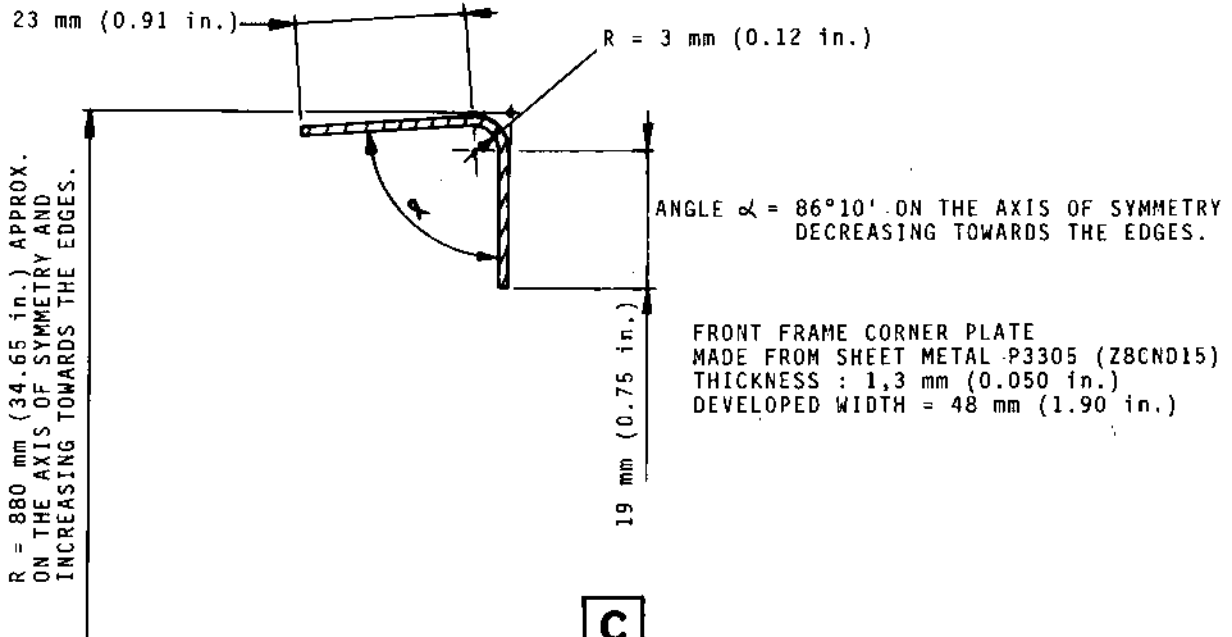
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BUCKET FRONT

B



C

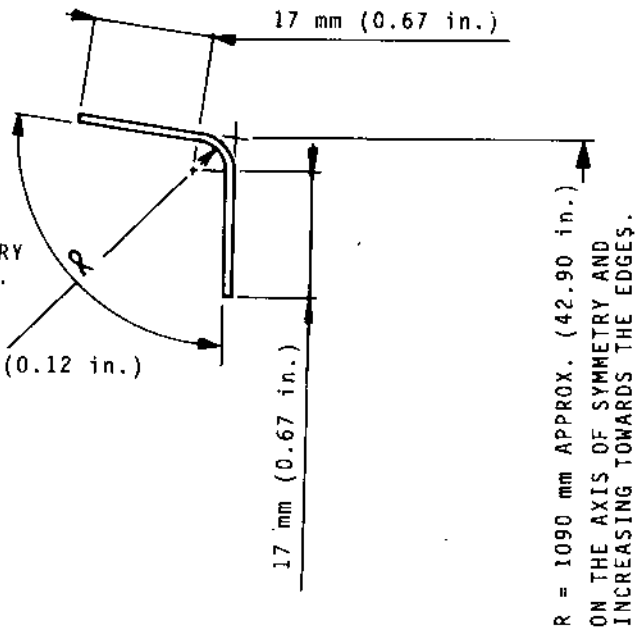


BUCKET FRONT

1ST FRAME CORNER PLATE
MADE FROM SHEET METAL P3305 (Z8CND15)
THICKNESS : 1,6 mm (0.063 in.)
DEVELOPED WIDTH = 41 mm (1.62 in.)

ANGLE $\alpha = 99^\circ 15'$ ON THE AXIS OF SYMMETRY
DECREASING TOWARDS THE EDGES.

$R = 3 \text{ mm (0.12 in.)}$



Replacement of a Panel Segment by Welding
Figure 402 - Sheet 2 of 3

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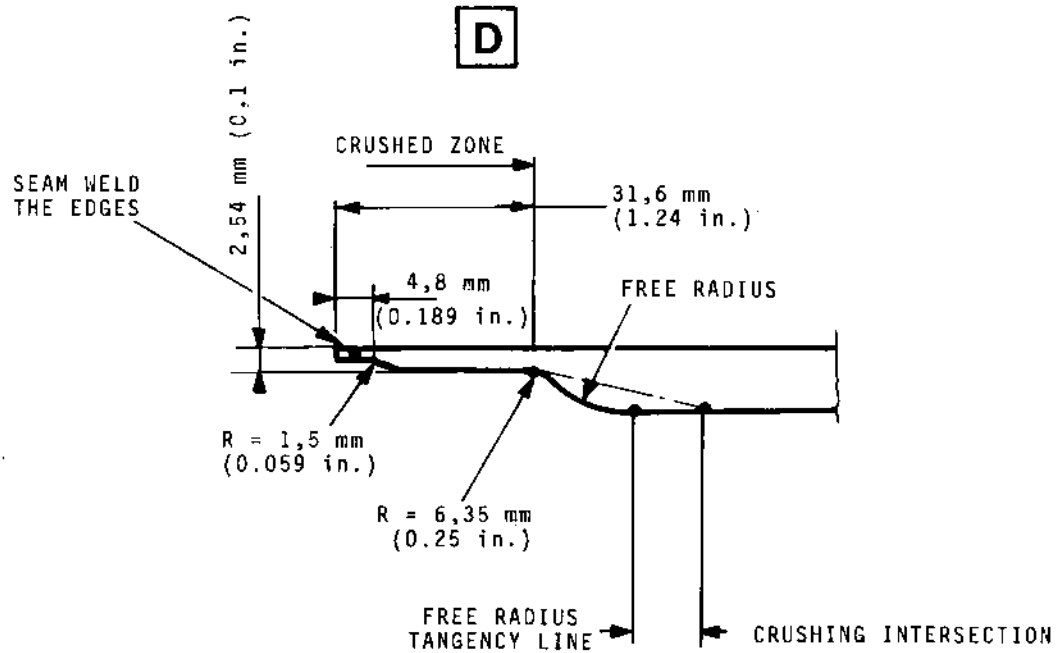
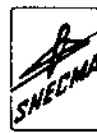
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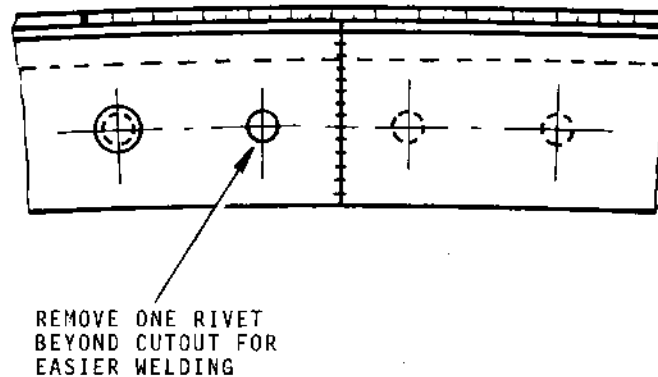


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E BEFORE COUNTERDRILLING



Replacement of a Panel Segment by Welding
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REPAIRREVERSE BUCKET (1-460)8. Replacement of Damaged External Panel and Two First FramesPARTS REQUIRED FOR REPAIR

External panel	No.	301-103-801-0
Leading edge cover	No.	301-094-201-0
Outer frame	No.	301-094-400-0
Outer frame	No.	301-102-201-0
Inner frame	No.	301-094-300-0
Inner frame	No.	301-102-100-0
Angle support	No.	301-093-201-0
Angle support	No.	301-093-251-0
Reinforcing plate	No.	301-100-500-0
Reinforcing plate	No.	301-100-550-0
Reinforcing plate	No.	301-100-201-0*
Reinforcing plate	No.	301-100-251-0*
Seal support	No.	301-051-800-0*
Seal support	No.	301-051-850-0*
Back-up plate	No.	301-147-600-0*
Back-up plate	No.	301-147-650-0*
Back-up plate	No.	301-147-700-0*
Stop	No.	300-864-802-0*
Stop	No.	300-864-852-0*
Front shim	No.	302-023-400-0
Centre shim	No.	302-023-300-0
Rear shim	No.	302-023-200-0
Shim	No.	301-104-301-0*
Shim	No.	301-104-351-0*
Shim	No.	301-104-401-0*
Shim	No.	301-104-451-0*
Skew shim	No.	301-051-700-0*
Skew shim	No.	301-051-750-0*
Shim	No.	302-023-500-0*
Shim	No.	302-023-801-0*
Shim	No.	301-102-401-0*
Adjusting shim	No.	301-150-500-0
Adjusting shim	or	No. 301-150-510-0
Adjusting shim	or	No. 301-150-501-0
Adjusting shim	or	No. 301-150-511-0
Shim	No.	301-100-301-0
Shim	No.	301-100-351-0
Shim	No.	301-102-301-0

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PARTS REQUIRED FOR REPAIR

Shim from	No. 301-098-801-0
Shim from	No. 301-098-901-0
Shim	No. 649-786-448-0
Shim	No. 649-786-450-0
Shim	No. 649-786-484-0
Heli-coil thread insert	No. 3591-4CNV0250 (649-773-219-0)
Heli-coil thread insert	No. 3591-3CNV0190 (649-773-223-0)
Insert	No. 749-773-096-0
Insert	No. 649-773-191-0
Insert	No. 649-773-213-0
Insert	No. 649-773-239-0
Insert	No. 649-773-240-0
Flanged ring	No. 649-773-124-0
Plain washer	No. 649-786-169-0
Plain washer	No. 649-786-173-0
Plain washer	No. 649-786-204-0
Plain washer	No. 649-786-230-0
Front doubler	No. 302-021-001-0
Front doubler	No. 302-021-051-0
Centre doubler	No. 302-021-101-0
Centre doubler	No. 302-021-151-0
Rear doubler	No. 302-021-201-0
Rear doubler	No. 302-021-251-0
Bush	No. 301-085-000-0
Bush	No. 302-021-700-0*
Bush	No. 302-023-600-0*
Nut	No. 301-084-600-0
Nut	No. 301-084-702-0
Nut	No. 301-084-800-0
Plain washer	No. 302-021-800-0
Plain washer	No. 650-355-013-0
Stepped washer	No. 302-021-500-0*
Stepped washer	No. 302-021-600-0*
Insert to be welded	No. 300-864-200-0
Insert to be welded	No. 301-084-500-0
Flanged ring to be welded	No. 300-879-901-0
Flanged rin to be welded	No. 301-089-800-0
Tab nut NAS 686C3	(649-785-086-0)
Tab nut NAS 1068C3	(649-785-128-0)
Captive nut NAS 686C4	(649-785-095-0)
Blind nut BTNILG428-2	(649-783-069-0)
Blind nut BTNILG428-7	(649-783-070-0)
Blind nut BTNILG428-12	(649-783-047-0)
Serrated nut 61170-428	(649-784-271-0)
Nut, Hi-lock HL97-5	(649-782-257-0)
Nut, Hi-lock HL97-8	(649-782-252-0)
Nut, Hi-lock HLN1G6	(649-785-048-0)

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PARTS REQUIRED FOR REPAIR

Screw, Hi-lock	HL 40-5-2	(649-781-290-0)
Screw, Hi-lock	HL 40-5-3	(649-781-291-0)
Screw, Hi-lock	HL 40-5-4	(649-781-292-0)
Screw, Hi-lock	HL 40-5-5	(649-781-293-0)
Screw, Hi-lock	HL 40-6-4	(649-781-298-0)
Screw, Hi-lock	HL 41-8-6	(649-781-116-0)
Screw, Hi-lock	HL 240-6-4	
Screw, Hi-lock	HL 241-8-6	
Screw, Hi-lock	HL 869-6-12	(649-781-042-0)
Screw, Hi-lock	HL 869-6-13	(649-781-043-0)
Screw, Hi-lock	HL 869-6-14	(649-781-044-0)
Screw, Hi-lock	HL 869-6-16	(649-781-046-0)
Screw, Hi-lock	HL 959-6-12	(649-781-584-0)
Screw, Hi-lock	HL 959-6-13	(649-781-585-0)
Screw, Hi-lock	HL 959-6-14	(649-781-586-0)
Screw, Hi-lock	HL 959-6-16	(649-781-588-0)
Screw, Hi-lock	HL 966-6-16	(649-781-611-0)
Screw	NAS 1133C3	(649-781-332-0)
Screw	NAS 6704U11	(649-774-218-0)
Screw	SPC 9000-4-10	(649-781-029-0)
Plain washer	NAS 1587-4C	(649-786-161-0)
Plain washer	NAS 1587-4L	(649-786-162-0)
Rivet	NAS 1198-5-9	(650-014-108-0)
Rivet	NAS 1198-5-13	(650-014-115-0)
Rivet	NAS 1199-5-8	(650-024-106-0)
Rivet	NAS 1199-5-9	(650-024-108-0)
Rivet	NAS 1199-5-12	(650-024-113-0)
Rivet	MS 20615-5M5	(650-012-101-0)
Rivet	MS 20615-5M6	(650-012-103-0)
Rivet	MS 20427-M3-4	(650-022-042-0)
Rivet	MS 20247-M3-5	(650-022-044-0)
Rivet	NAS 1199-3-4	(650-024-043-0)
Blind rivet	CR 2539-5-2	(649-772-127-0)
Blind rivet	CR 2662-3-3	(649-772-060-0)
Blind rivet	CR 2663-5-2	(649-772-068-0)
Blind rivet	CR 2838-5-8	(649-772-165-0)
Blind rivet	CR 2839-5-2	(649-772-083-0)
Blind rivet	CR 2839-5-3	(649-772-084-0)
Blind rivet	CR 2839-5-4	(649-772-085-0)
Blind rivet	CR 2839-5-8	(649-772-087-0)
Blind bolt	PLT 220-8-4	(650-089-362-0)
Blind bolt	PLT 1004-5-5	(650-089-912-0)
Blind bolt	PLT 1004-6-3	(650-089-930-0)
Blind bolt	PLT 1004-6-4	(650-089-931-0)
Blind bolt	PLT 1004-6-5-5	(650-089-950-0)
Blind bolt	PLT 1004-6-6	(650-089-933-0)
Blind bolt	PLT 1005-6-6-5	(650-089-951-0)

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Blind bolt	PLT 1004-6-7	(650-089-934-0)
Blind bolt	PLT 1004-6-7-5	(650-089-952-0)
Blind bolt	PLT 1004-6-8	(650-089-935-0)
Blind bolt	PLT 1011-6-3	(650-089-930-1)
Blind bolt	PLT 1011-6-4	(650-089-931-1)
Blind bolt	PLT 1011-6-5-5	(650-089-950-1)
Blind bolt	PLT 1011-6-6	(650-089-933-1)
Blind bolt	PLT 1011-6-6-5	(650-089-951-1)
Blind bolt	PLT 1011-6-7	(650-089-934-1)
Blind bolt	PLT 1011-6-7-5	(650-089-952-1)
Blind bolt	PLT 1011-6-8	(650-089-935-1)
Blind bolt	PLT 1014-6-3	(650-089-930-2)
Blind bolt	PLT 1014-6-4	(650-089-931-2)
Blind bolt	PLT 1014-6-5-5	(650-089-950-2)
Blind bolt	PLT 1014-6-6	(650-089-933-2)
Blind bolt	PLT 1014-6-6-5	(650-089-951-2)
Blind bolt	PLT 1014-6-7	(650-089-934-2)
Blind bolt	PLT 1014-6-7-5	(650-089-952-2)
Blind bolt	PLT 1014-6-8	(650-089-935-2)

Welding filler wire P 3005 (25 CNU 17)

Welding filler wire P 3008 (28 CND 15)

Sheet metal P 3305 (28 CND 15) thickness 1 mm (0.040 in.)

Sheet metal P 3305 (28 CND 15) thickness 1,3 mm (0.051 in.)

* These items may be recovered from the bucket during disassembly if still in good condition.

AS THE REPLACEMENT OF THE EXTERNAL PANEL AND POSSIBLY THE TWO FIRST FRAMES REQUIRES THE USE OF THE APPROPRIATE JIGS AND PRODUCTION ASSEMBLY TOOLS, THE BUCKET MUST BE RETURNED TO SNECMA FOR THIS REPAIR.

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REPAIRREVERSER BUCKET(1-460)9. Repair of Cracks on the Heat Shield Retaining Trailing Edge Inserts

PARTS REQUIRED FOR REPAIR

Metal sheet Z8CND15 P 3305, 1 mm (0.04 in) in thickness	
Rivet NAS 1199-5-9	(650-024-108-0)
Rivet NAS 1199-5-10	(650-024-109-0)
Rivet NAS 1199-5-12	(650-024-113-0)
Rivet NAS 1199-5-13	(650-024-115-0)
Rivet NAS 1199-5-10	(650-014-109-0)
Rivet NAS 1198-5-14	(650-014-117-0)
Rivet CR 2838-6-6	(649-772-190-0)
Rivet CR 2838-6-7	(649-772-191-0)
Riveting washer	(650-355-014-0)
Rivet	650-015-119-0
Rivet SPC 9004I4-15	(649-772-310-0)
Washer SPC 9409I4	(649-772-311-0)
Insert SPC 9106C5CRF100	(649-773-239-0)
Weld filler wire P 3030	
Rivet	650-015-119-0

A. Introduction

This repair scheme offers all particulars on the repair of cracks, in the region of the plug welding on the heat shield attachment inserts.

The scheme is limited to 3 successive inserts and a maximum of repairs on each bucket.

B. Excision of the damaged segment

- (1) X-ray-check the bucket to mark off any cracks on the insert plug-welding as instructed in Standard Practices, Chapter 70-20-30.
- (2) Remove the trailing-edge fastenings within the limits shown in figure 403, sheet 1 of 6, following the instructions in Standard Practices, chapter 70-50-10. For disassembly of back-up plates, see REP 1-460-5.

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- (3) Cut out the cracked panel segment within the boundaries laid down in figure 403, sheet 1 of 6, as instructed in Standard Practices, chapter 70-30-10.
- (4) Remove the fastenings marked (A) (see figure 402, sheet 1 of 6) as instructed in Standard Practices, chapter 70-50-40.

C. Repair of cut-out segment

- (1) Contain cracking by a 3 mm (0.118 in) hole at either end.

D. Making doublers

- (1) From a 1 mm (0.039 in) thick P 3305 face sheet, cut out two segments larger in size than the doublers. Shape these segments to match the contour of the area under repair.
- (2) Mark and drill out on the doublers the location(s) of the insert(s) according to the requirements of the particular repair job.
- (3) Treat the doublers with air
 - of 760°C for 1.30 hrs
 - of 565°C for 1.30 hrs
- (4) After treatment, put them back into shape as necessary
- (5) Put the doubler in position on the bucket and adjust in size as shown in figure 403, sheet 1 of 6.

E. Drilling panel segment and doublers

Depending on the site of repair, there are two alternative forms of assembly, viz :

- one for the trailing edge area with attachment points marked (2) ; see figure 402, sheet 1 of 2
- Another for general use, with all other attachment points

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(1) General use

- (a) Anchor the inner and outer doublers around the bossing by arc-welding, with filler wire P 3030, as instructed in Standard Practices, chapter 70-35-10.
- (b) Check the B1 class weld for soundness as directed in Standard Practices, Chapter 70-35-80.
- (c) Drill holes marked (B) to a dia. of $3.25 \begin{smallmatrix} + 0.1 \\ - 0 \end{smallmatrix}$
0.128
0.132 in
- Hole spacing on cutout edge : max. 1 pitch
 - Spacing between 2 holes : 2 or 3 pitches
- (d) Dimple the outer doubler and the panel at $156^\circ + 1^\circ$ to a dia. of $12 \begin{smallmatrix} + 0.460 \\ - 0.3 \text{ mm} \end{smallmatrix}$ 0.484 in
- (e) Insert rivets and washers in the holes marked (B) Carry out arc-plug-welding on the washer side with filler wire P 3030, as instructed in Standard Practices, chapter 70-35-10.
- (f) Check B1 class plug-weld for soundness as instructed in Standard Practices, chapter 70-35-80
- A water washable dye penetrant inspection is carried out by Method M 501 B, chapter 70-20-10.
- (g) Stick a strip of tracing-cloth on the bucket and mark the locations of holes(A)
- (h) Put the doublers-and-panel assembly in position on the bucket, stick the tracing-cloth tape on the outer doubler, and disassemble.
- NOTE : For correct placing of the panel, align the trailing edges and centre the cutouts.
- (i) Mark and drill holes(A) to a dia. of $4.8 \begin{smallmatrix} + 0.1 \\ - 0 \end{smallmatrix}$ mm
0.189
0.192 in and deburr.



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- (j) Put the assembly in position on the bucket, and pin on.
- (k) Centre and drill the holes marked (C) to a dia. of
 $4.8 \begin{smallmatrix} + 0.1 \\ 0 \end{smallmatrix} \begin{smallmatrix} 0.189 \\ 0.192 \end{smallmatrix}$ in
- (l) Centre and drill the holes marked (D) to a dia.
of $4.05 \begin{smallmatrix} + 0.1 \\ 0 \end{smallmatrix}$ mm $\begin{smallmatrix} 0.159 \\ 0.163 \end{smallmatrix}$ in
- (m) Take down the doublers-and-patch panel assembly, and carefully deburr all holes previously drilled.
- (n) Put back the assembly, and dimple the holes marked (A) and (C) at $100^\circ \pm 1^\circ$ to a dia. of
 $10.4 \begin{smallmatrix} + 0.2 \\ - \end{smallmatrix}$ mm $\begin{smallmatrix} 0.401 \\ 0.417 \end{smallmatrix}$ in
- (o) Bore out holes (A) and (C) to a dia. of $5.21 \begin{smallmatrix} + 0.1 \\ 0 \end{smallmatrix}$ mm
 $\begin{smallmatrix} 0.205 \\ 0.209 \end{smallmatrix}$ in ; Deburr.
- (p) Counterdrill trailing-edge holes on outer doubler to a dia. of $4.05 \begin{smallmatrix} + 0.1 \\ 0 \end{smallmatrix}$ mm $\begin{smallmatrix} 0.159 \\ 0.163 \end{smallmatrix}$ in
- (2) Assembly for trailing-edge area with attachment points marked (2) ; see figure 402, sheet 1 of 2.
- (a) Put patch and outer doubler in position on bucket.
- (b) Counterdrill trailing-edge holes on outer doubler to a dia. of
 $4 \begin{smallmatrix} + 0.1 \\ - \end{smallmatrix}$ mm $\begin{smallmatrix} 0.153 \\ 0.161 \end{smallmatrix}$ in ; Deburr.
- (c) Remove the assembly and take inserts out of the bucket inner panel.
- (d) Dimple the doubler at $160^\circ \pm 1^\circ$ to a dia. of
 $17.5 \begin{smallmatrix} + 0.2 \\ - \end{smallmatrix}$ mm $\begin{smallmatrix} 0.681 \\ 0.696 \end{smallmatrix}$ in
- (e) Bore out the doubler to a dia. of $7.924 \begin{smallmatrix} + 0.025 \\ 0 \end{smallmatrix}$ mm
 $\begin{smallmatrix} 0.312 \\ 0.313 \end{smallmatrix}$ in ; Deburr.



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(f) Fit inserts 649-773-239-0 in the doubler holes

Next repeat operations described in Section
"General Use" (a) to (n) above.

E. Assembly of doublers and patch panel.

- (1) Put doublers-and-patch assembly in position on bucket.

NOTE : For correct positioning, align the trailing
edges and centre the cutouts.

- (2) Rivet the assembly on the bucket as instructed in
Standard Practices, chapters :

- 70-50-50 for rivets marked (A) and (C) (see figure)
- 70-50-10 for trailing-edge rivets.

For trailing-edge fasteners, consult table in figure
402, sheet 2 of 2, and REP 1-460-5 in case of back-
up plate reassembly.

- (3) Put rivets (D) in place together with washers, machine-
flush the rivets and arc plug-weld to outer doubler
with filler wire P 3030, as instructed in Standard
Practices, chapter 70-35-10.

- (4) Check riveting as instructed in Standard Practices,
chapters :

- 70-50-81 for trailing-edge rivets
- 70-50-85 for rivets (A) and (C)

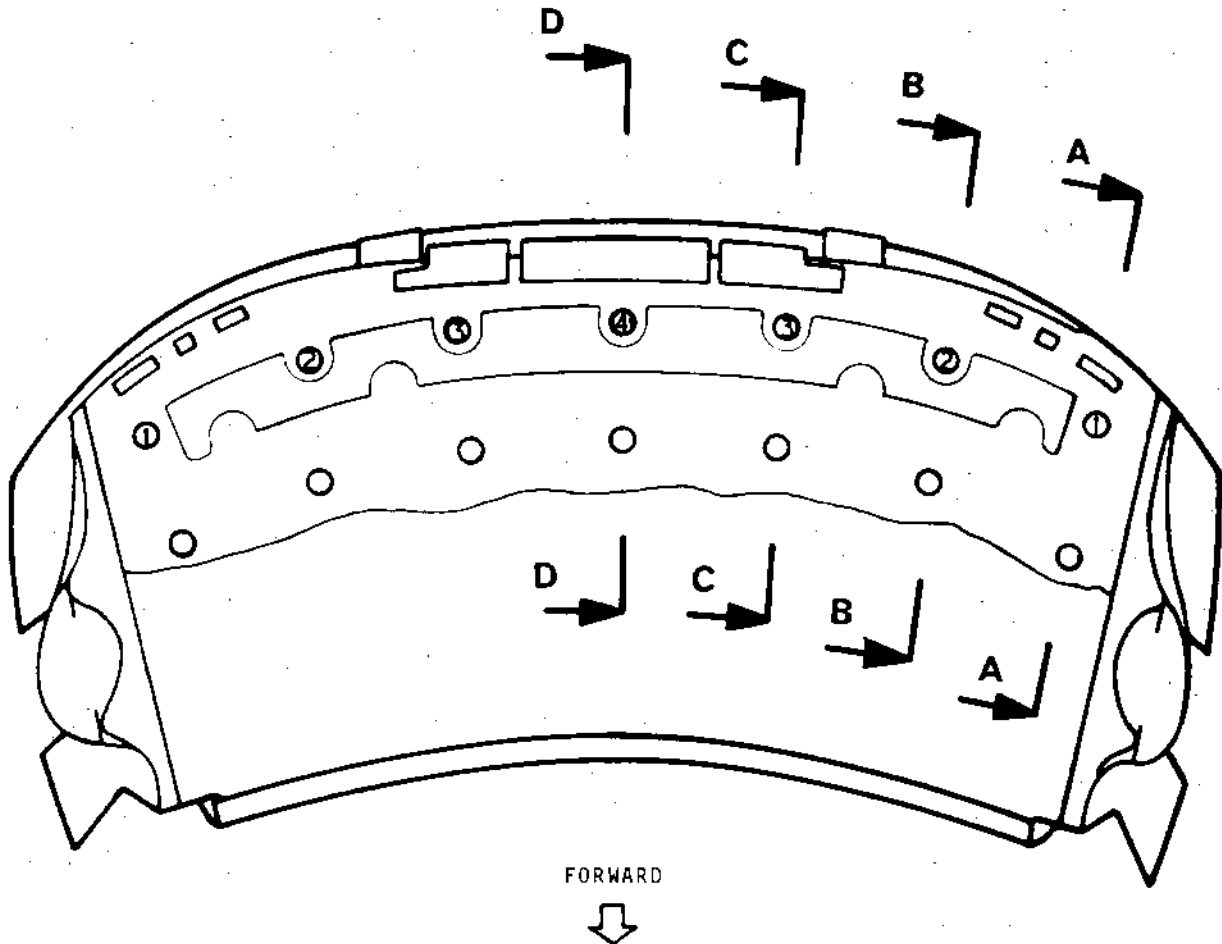
- (5) Check plug weld for soundness as instructed in Stan-
dard Practices, chapter 70-35-80 type B1.

- A water washable dye penetrant inspection is carried
out by Method M501 B in Standard Practices, chapter
70-20-10.



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Identifying the Locations of Inserts
Figure 401 - Sheet 1 of 1

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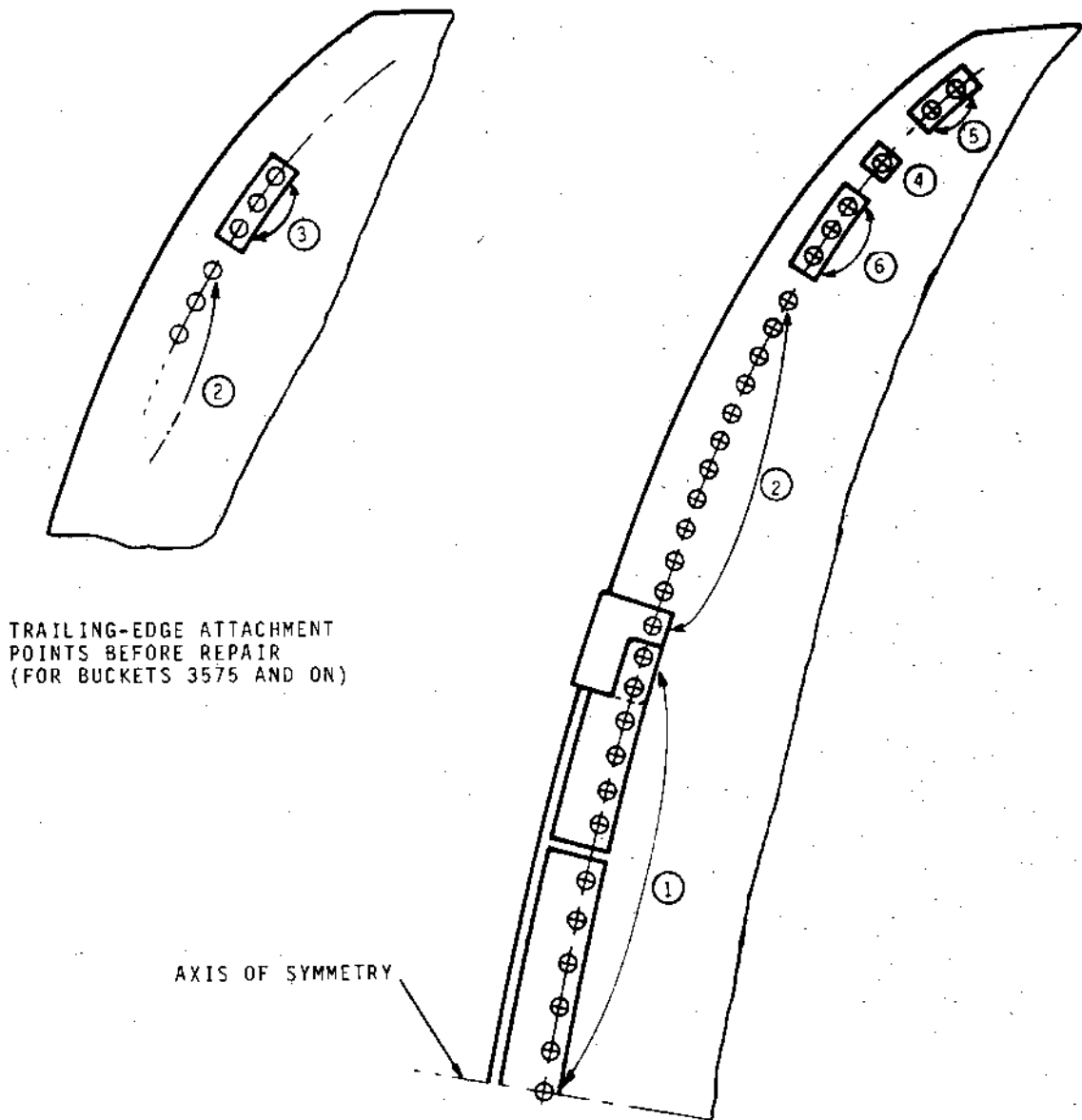


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Identifying Trailing-edge Attachment Points
Figure 402 - Sheet 1 of 2

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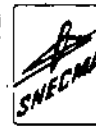
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N°	FASTENERS BEFORE REPAIR	FASTENERS AFTER REPAIR
1	NAS 1199-5-9	NAS 1199-5-10
2	NAS 1199-5-8	NAS 1199-5-9
3	NAS 1199-5-11	NAS 1199-5-12
4	NAS 1199-5-12	NAS 1199-5-13
5	NAS 1198-5-9	NAS 1198-5-10
6	NAS 1198-5-13	NAS 1198-5-14

Identifying Trailing-edge Fasteners
Figure 402 - Sheet 2 of 2

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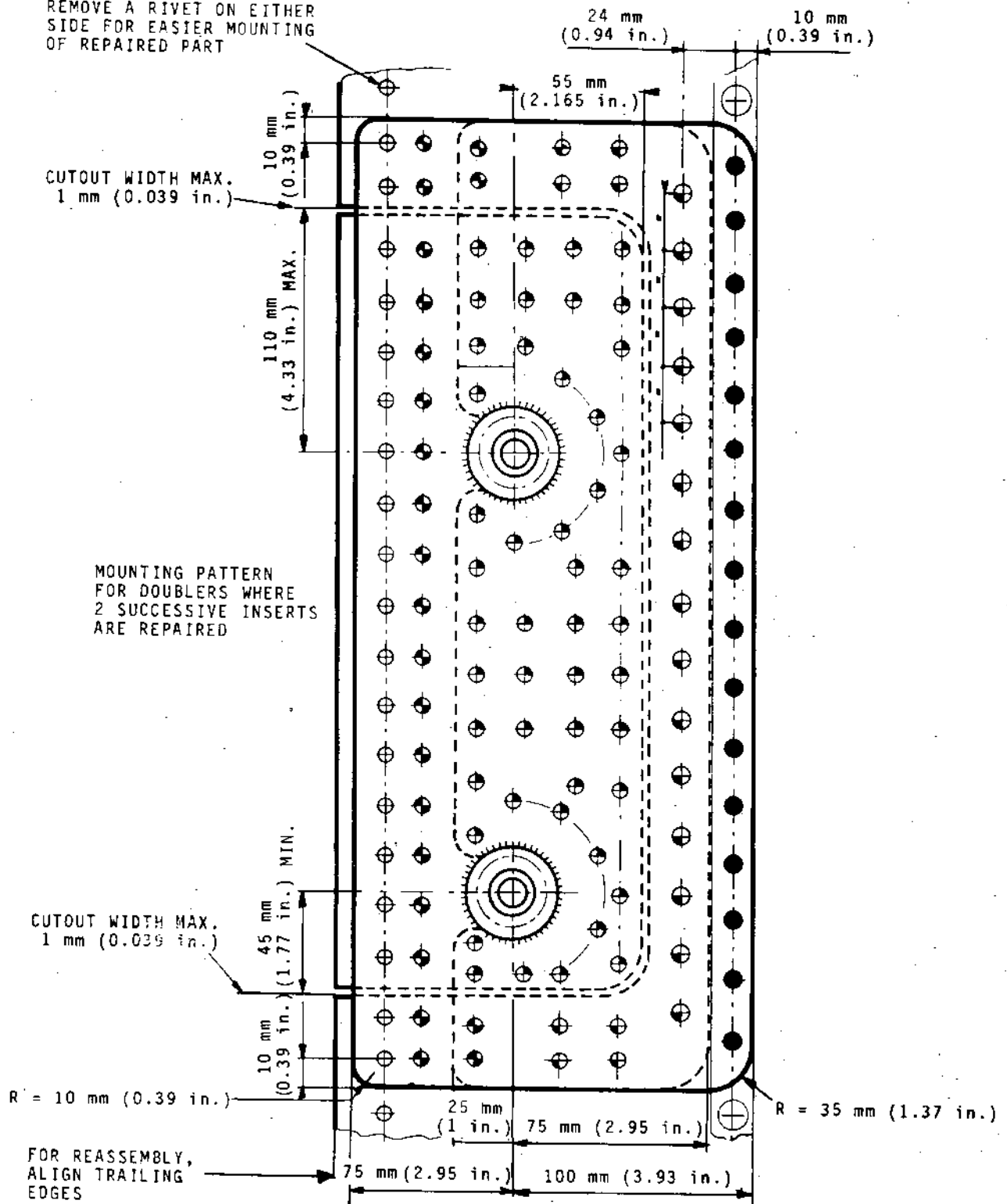
OVERHAUL



REMOVE A RIVET ON EITHER
SIDE FOR EASIER MOUNTING
OF REPAIRED PART

CUTOUT WIDTH MAX.
1 mm (0.039 in.)

MOUNTING PATTERN
FOR DOUBLERS WHERE
2 SUCCESSIVE INSERTS
ARE REPAIRED



Repair by Application of Doublers
Figure 403 - Sheet 1 of 6

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RIVET CR 2838-6-7
(SEE SHEET 6 OF 6)

OUTER DOUBLER

RIVET CR 2838-6-6 OR 6-7
(SEE SHEET 6 OF 6)

WASHERS 649-772-311-0 WITH
RIVETS 649-772-310-0 PLUG-
WELDED ON WASHER SIDE
OR RETAINING PINS PLUG-
WELDED ON EITHER SIDE
MATERIAL Z8CND15 D = 3.2 mm
(0.126 in.). (SEE SHEET 6 OF 6)

BUTT-WELD DOUBLER CONTOURS
WITH BOSSING

SECTION A-A
(CONTACT 1)

WIHS

OUTER PANEL

INNER DOUBLER

WASHERS 650-355-014 AND
RIVETS 650-015-119
FLUSHED AND PLUG WELDED
ON OUTER DOUBLER

FOR IDENTIFICATION, SEE
FIGURE 402.

REAR BUCKET
DOUBLER

Repair by Application of Doublers
Figure 403 - Sheet 2 of 6

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RIVET CR 2838-6-6 OR 6-7
(SEE SHEET 6)

OUTER DOUBLER

RIVET CR 2838-6-6 OR 6-7
(SEE SHEET 6 OF 6)

WASHERS 649-772-311-0 WITH
RIVETS 649-772-310-0 PLUG-
WELDED ON WASHER SIDE
OR RETAINING PINS PLUG-
WELDED ON EITHER SIDE
MATERIAL Z8CND15 D = 3,2 mm
(0.126 in.), (SEE SHEET 6 OF 6)

BUTT-WELD DOUBLER CONTOURS
WITH BOSSING

SECTION B-B
(CONTACT 2)

INSERT
(FOR ASSEMBLY, SEE SHEET 6 OF 6)

OUTER PANEL

INNER DOUBLER

WASHERS 650-355-014 AND
RIVETS 650-015-119 FLUSHED
AND PLUG-WELDED ON OUTER
DOUBLER

Repair by Application of Doublers
Figure 403 - Sheet 3 of 6

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REP 1-460-9

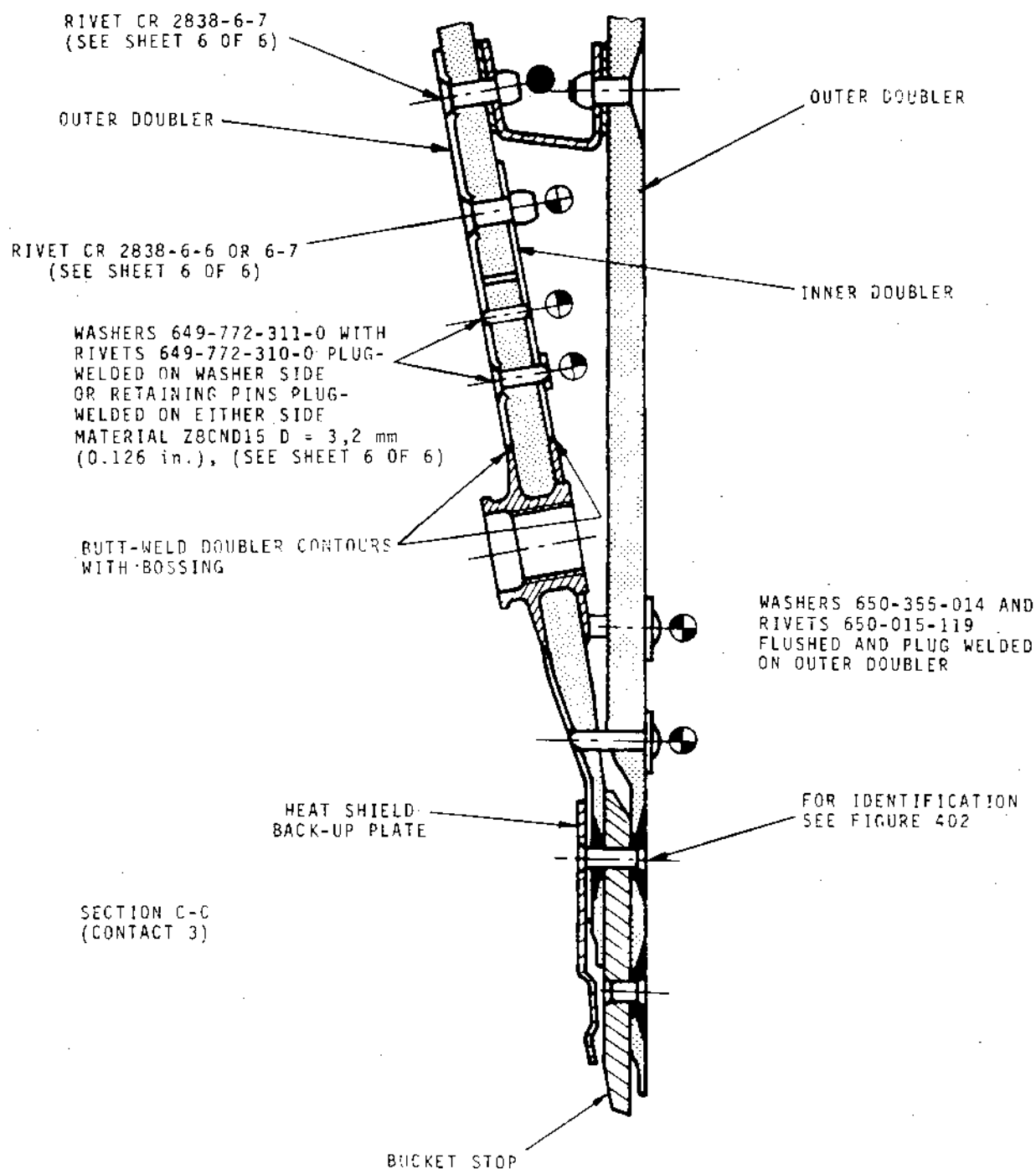
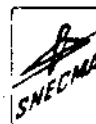
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ENGINE 503

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Repair by Application of Doublers
Figure 403 - Sheet 4 of 6

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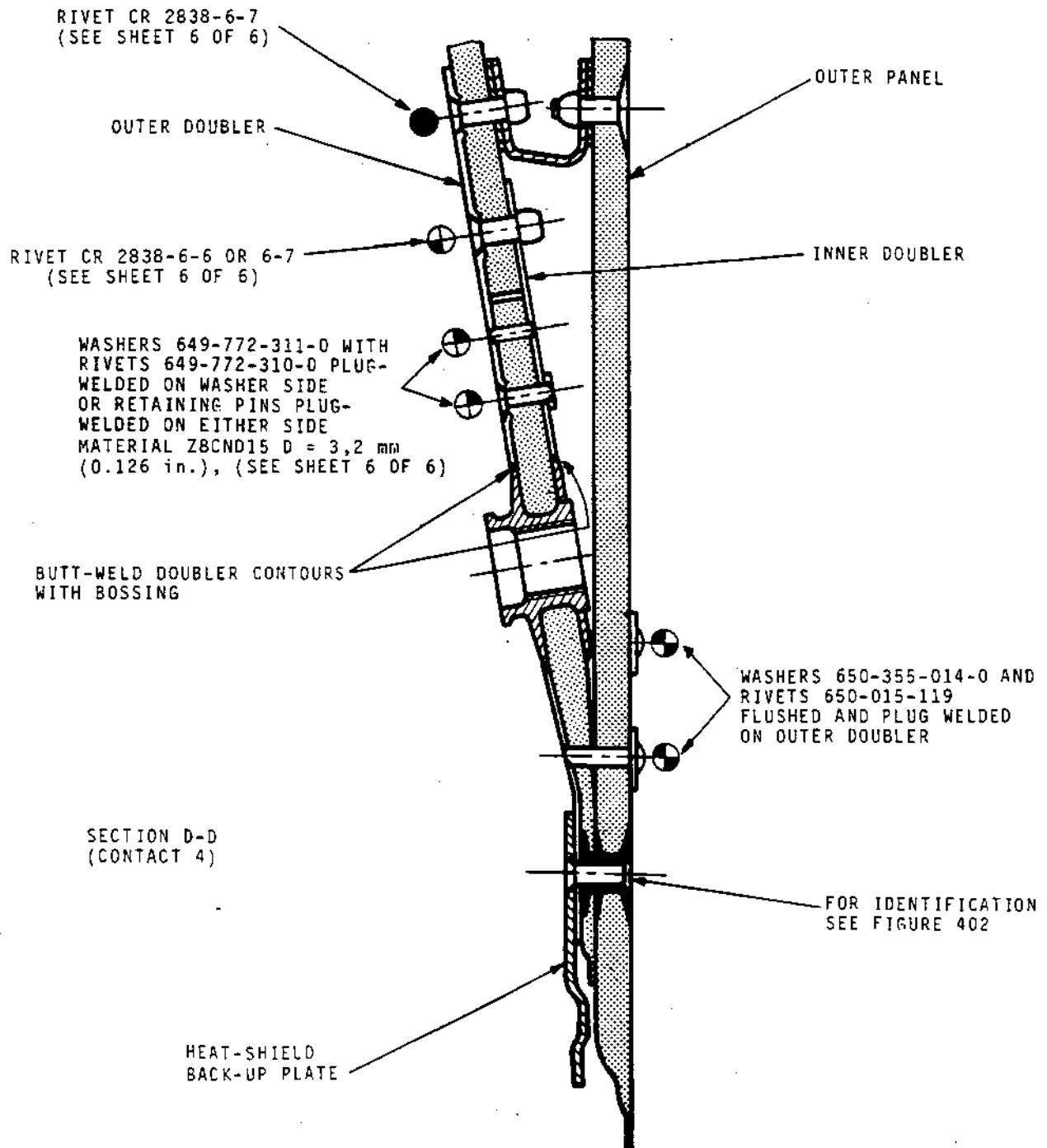


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Repair by Application of Doublers
Figure 403 - Sheet 5 of 6

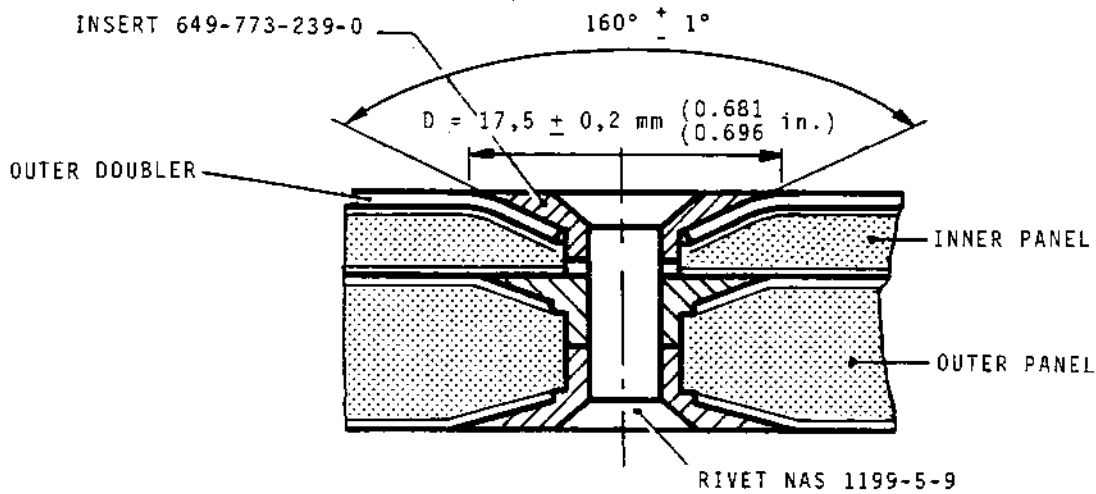


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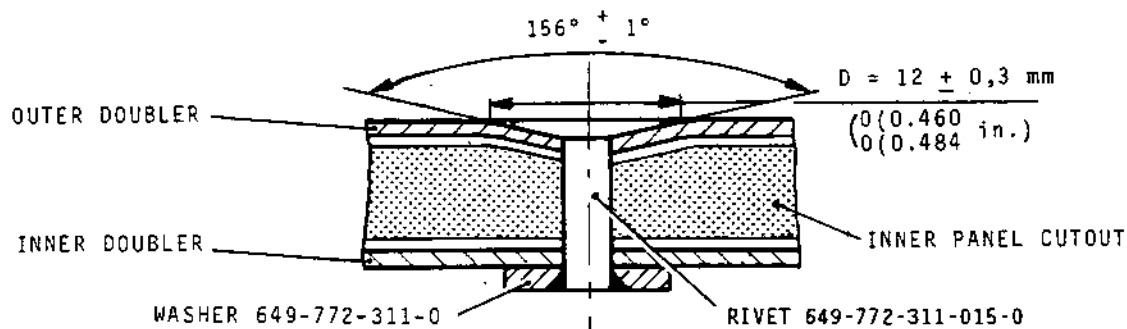
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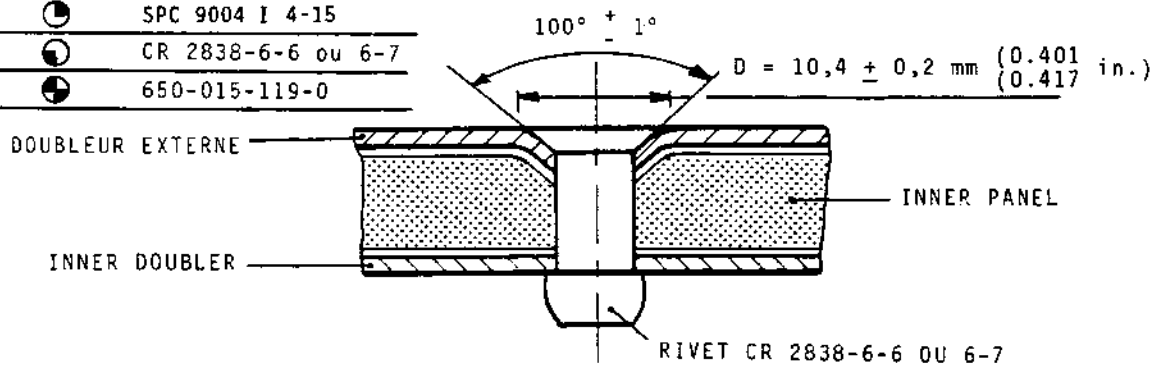
TRAILING-EDGE AREA WITH ATTACHMENT POINTS MARKED ②



ITEM

TEXT	FIGURE	ATTACHMENT
(A)	●	CR 2838-6-6 ou 6-7
(B)	⊕	SPC 9004 I 4-15
(C)	⊙	CR 2838-6-6 ou 6-7
(D)	⊕	650-015-119-0

ATTACHMENT POINTS ⊕



ATTACHMENT POINT ⊕ AND ●

Repair by Application of Doublers
Figure 403 (Sheet 6 of 6)

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REPAIR

REVERSER BUCKET (1-460)

11. Repair of cracks on the inner and outer panels

PARTS REQUIRED FOR REPAIR

Weld filler wire P3008 or P3030

A. Repair of cracks developed away from edges.

(1) Repair limitations.

- A sound area of 100 mm (3.9 in) around the zone to be repaired is required.
- The crack must not be located within a delaminated zone.

(2) Repair instructions

- (a) Check the crack surrounding zone for suitable condition.

Inspection by aural checking (tap-test) using a coin to make sure that the zone concerned is not delaminated.

Otherwise, this type of repair could not be applied.

- (b) Accurately delimit the crack using a binocular magnifier (X 20 magnification) and drill out a 1 mm (0.039 in)-dia hole at each end of the crack.

CAUTION: ONLY THE UPPER SHEET METAL SHOULD BE DRILLED.

- (c) Argon-arc-weld the crack as instructed in chapter "PRINCIPLES FOR REPAIRING COMPONENTS MANUFACTURED BY A WELDED HONEYCOMB TYPE STRUCTURE", 70-30-10 and chapter "WELDING" 70-35-10.

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snecma

Weld filler wire: P3008 or P3030
Class of weld: P1.

NOTE: It is essential in welding to apply copper cooling-blocks as close to the welding zone as possible.

- (d) Inspect the class B1 welding as instructed in chapter "WELDING" 70-35-80 and hereunder:

A water-washable dye penetrant inspection is carried out by method M501B in chapter 70-20-10.

CAUTION: THE DYE PENETRANT SHALL BE REMOVED WITH A SWAB SOAKED IN ISOPROPYL ALCOHOL (P442).

- (e) Inspection check the repaired zone for delamination (tap-test using a coin).

B. Repair of cracks developing in original weld beads

(1) Repair limitations

- The crack must not be located within a delaminated zone.
- No length limits.

(2) Repair instructions

Repair instructions for cracks of this type are the same in paragraph A.

C. Repair of cracks developing from a rivet hole (see figure 403)

(1) Repair limitations

- A sound zone of 100 mm (3.9 in) around the repair area is required.
- The crack must not be located in a delaminated zone.
- The crack length must not exceed 25 mm (1 in).

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(3) Repair instructions

- (a) Prior to repairing, check the crack surrounding zone for delamination (aural check using a coin for tap testing).
- (b) Remove the rivet as instructed in chapter "RIVETING" 70-50-60.
- (c) The crack filling instructions are the same as in paragraph A.
- (d) Insert the rivet as per chapter "RIVETING" 70-50-10 through 60 according to the type of rivet.
- (e) Inspection check the rivet as instructed in chapter "RIVETING" 70-50-81 through 86 according to the type of rivet.

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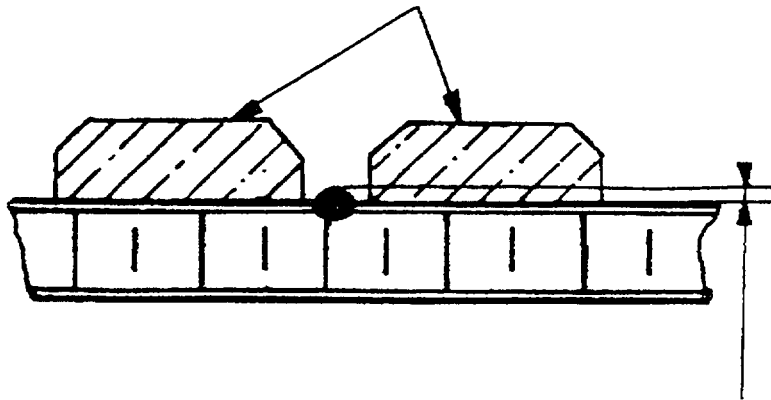
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SECTION AA

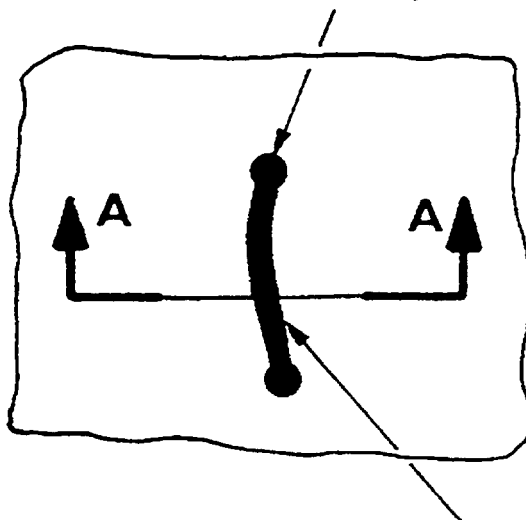
COPPER COOLING-BLOCKS



OFFSET :

0,5 mm (0.02 in.) MAX OVER 75% OF LENGTH
1 mm (0.04 in.) MAX TOLERANCE LOCALLY

HOLE, 3 mm (0.118 in.)-dia



FILLER METAL

Repair of cracks using filler metal
Figure 401

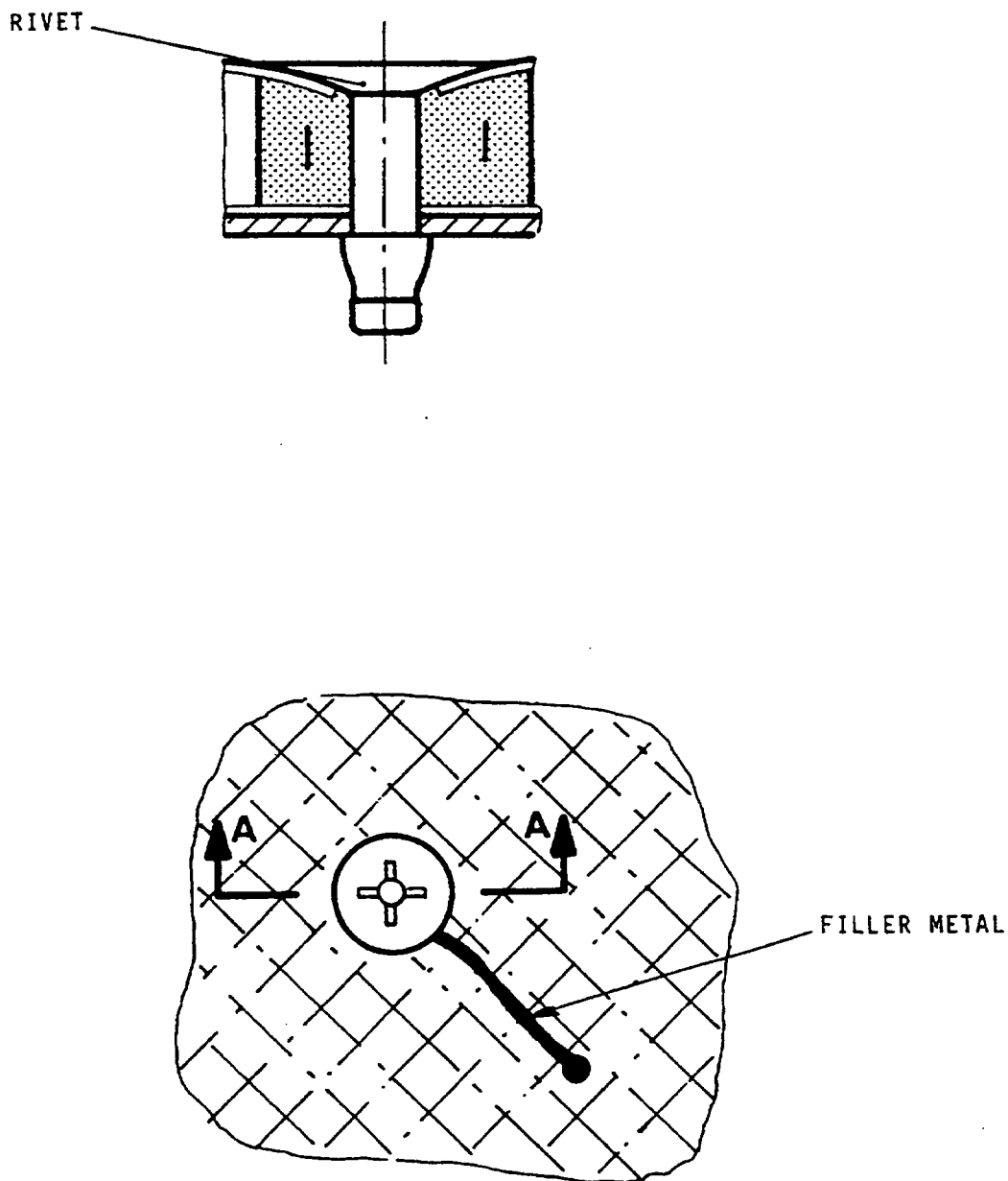
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SECTION AA



Repair of cracks originating from a rivet hole
with filler metal

Figure 402

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REPAIRREVERSER BUCKET(1-460)12. Repair of Trailing-edge-side Outer Panel by Application of a Stressskin Patch.

PARTS REQUIRED FOR REPAIR

Metal sheet Z8 CND 15, 0,8 mm (0.032 in) in thickness
Outer panel No. 301-103-801-0 or
Stressskin panel P 3711 (Z8 CND 15)
Weld filler wire P 3008
Blind bolt PLT 1004-6-3 (650-089-930-0)
" " PLT 1004-6-5,5 (650-089-950-0)
" " PLT 1004-6-6 (650-089-933-0)
" " PLT 1004-6-6,5 (650-089-951-0)
" " PLT 1004-6-7 (650-089-934-0)
" " PLT 1004-6-7,5 (650-089-952-0)
" " PLT 1004-6-8 (650-089-935-0)
Blind rivet CR 2838-5-8 (649-772-165-0)
" " CR 2838-5-8 (649-772-087-0)
Rivet NAS 1198-5-5 (650-014-101-0)
" NAS 1198-5-9 (650-014-108-0)
" NAS 1198-5-13 (650-014-115-0)
" NAS 1199-5-8 (650-024-106-0)
" NAS 1199-5-9 (650-024-108-0)
" NAS 1199-5-11 (650-024-111-0)
" NAS 1199-5-12 (650-024-113-0)
Blind bolt BTN1 LG-428-12 (649-783-047-0)
Screw NAS 6704-U11 (649-774-218-0)
Special washer No. 525-003-859-0
Nut No. 301-084-702-0
Nut No. 301-084-800-0
Chromium carbide powder P 3202

A. Introduction

This repair scheme offers all particulars on the replacement of a damaged outer panel segment lying in an area shown in figure 401.

- The stressskin patch may come
 - from a P 3711 stressskin panel
 - from a new outer skin panel
 - from a sound segment of a discarded skin panel.

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B. Disassembly of outer panel

(1) Checking on the extent of damage

- (a) Make a radiographic test using X-ray equipment complete with a long anode target as instructed in Standard Practices, chapter 70-20-30, shown in figure 401, and further set out below :
- at points A and B, take shots at 15° to bring the repair area into view
 - at point C take a panoramic view of the bucket in the region of the outer-panel attachment points, in order to identify the shims suitable to be sandwiched between frames and panel (only applies to buckets 3511 to 3574 in which the shims are not riveted to the frames).

(2) To take-off the outer panel, proceed as follows :

- (a) Remove the outer-panel fasteners as instructed in repair schemes

- REP 1-460-3 "Replacement of inner and outer panel fasteners"
- REP 1-460-5 "Replacement of back-up plates"

Remove nuts around the bucket hub, as described in REP 1-460-2.

After removal of the 3 screws, take the 3 blind nuts out of the ball-screw gearbox attachment fitting, as described in REP 1-460-13.

- (b) Disassembling the outer panel

NOTE : To keep the shims from falling between panel and frames on disassembly, fasten them to the frame.

Carefully mark the locations of all screws, bushings and washers for identical reassembly.

C. Repair of damaged panel segment

- (a) Cut the damaged segment out of the panel as shown in figure 402, and instructed in Standard Practices, chapter 70-30-10 : Principles of repairing welded honeycomb structures.

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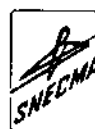
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- (2) From an 0,8 mm (0.032 in) P 3305 sheet, cut a close-out strip of the needed length and of 7,9 mm (0.311 in) width. Shape it to match the contour of the cutout.
- (3) Heat-treat the strip by Methods M 821 and M 822 described in chapter 70-45-10 : "HEAT TREATMENTS".
- (4) Do a particularly meticulous cleaning with a pad soaked in isopropyl alcohol (P 442), going over the surface involved repeatedly until it is perfectly free from any grease.
- (5) Adjust and tack-weld by the argon arc procedure, with filler wire P 3008, the closeout strip to the panel cutout, as instructed in Standard Practices, chapter 70-35-10 : Fusion Welding.

D. Making patches

Depending on their source, patches can be made in one of two ways.

(1) Patches from a ready-formed skin

- (a) Cut a stressskin-panel segment appropriate to the repair area out of a rejected or a new outer skin, as instructed in Standard Practices, chapter 70-30-10 "REPAIR PRINCIPLES" and indicated in figure 402.

NOTE : Use a patch size increased by 1 mm (0.040 in)

- (b) Adjust the patch to the contours of the cutout.

(2) Patches from a stressskin panel

- (a) Cut a stressskin panel segment suited to the repair area from a stressskin panel (3711)

- The size is to be increased by 10 mm (0.400 in)



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- (b) Mould the patch to the curved outline of the bucket. Crush the forward edge to match the contour of the adjacent segment, as shown in figure 402, and instructed in Standard Practices, chapter 70-30-10 : "Principle of Repairing Welded Honeycomb Structures"
- (c) Do a class B1 seam welding at the crushed edge, as instructed in Standard Practices, chapter "WELDING", 70-35-20 (Resistance Welding) and in 70-30-10.
- (d) Shape the patch to suit the contour of the cut-out
- (e) Treat the patch as follows :
- Take into solution in argon at 1065°C for 15 min.
Cut off argon supply
 - Quench in argon at 955°C for 20 min.
Cut off argon supply
 - Refrigerate at 75°C for 6 hrs
 - Age-harden at 605°C for 1 1/2 hrs
Cut off air supply.
- (f) As this treatment may have wrested the patch out of shape, remedy any deformation by glass-bead shot peening, using facilities of the following characteristics :
- Sandblasting unit with a nozzle of 12 mm (0.47 in)
 - Glass beads of 0,5 mm (0.02 in) dia.
 - Sandblasting at a 3-bar pressure by cycles of 30 sec. to 1 min.
 - Nozzle-to-panel spacing 200 to 250 mm (7.87 to 9.84 in).

E. Mounting the patch

(1) Welding on the patch

CAUTION : IT IS ESSENTIAL TO ADHERE TO THE INSTRUCTIONS BELOW IF THE PANEL IS TO BE KEPT FROM GETTING OUT OF SHAPE IN THE WELDING.

- (a) Thoroughly clean the patch with a swab soaked in isopropyl alcohol (P 442), going over it repeatedly until the welding area is completely free from any grease.

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- (b) On the inner panel skin, seal off the two retaining holes, to be used for argon intake, with adhesive tape (see figure 402).
- (c) Working from the centre outwards to the edges, pin back the panel, only leaving out the two inlet holes above, and two retaining holes on the frame, which serve for argon exhaust (see figure 402)
- (d) Put the patch in position on the assembly, and drill a 3 mm (0.118 in) dia. hole in the outer skin only, for letting the argon through.

NOTE : This hole can be drilled at a spot where it may subsequently act as a panel retaining hole (see figure 402).

- (e) Blow argon for at least 2 hrs through the 2 holes in the frame to purge out the panel, and through the 3 mm hole to purge the patch.
- (f) Argon-arc-weld the patch on with filler wire P 3008 as instructed in Standard Practices, chapters 70-30-10 and 70-35-10, and hereunder :

NOTE : It is essential in welding to apply copper cooling-blocks as close to the weld as possible.

- Tack-weld the patch on its outer face
 - Take down the panel and tack-weld the inner face
 - Pin back the panel in the same way as the first time and weld outer face
 - Take down the panel and weld the inner face
- (g) Perform a B1 weld soundness test as instructed in Standard Practices, chapter 70-35-80, and hereunder :

A water-washable dye penetrant inspection is carried out by Method M 501 B described in chapter 70-20-10.



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CAUTION : THE PENETRANT IS TO BE CLEARED OUT
WITH A SWAB SOAKED IN ISOPROPYL
ALCOHOL (P 442).

(h) Machine-flush the weld on the panel inner face,
in the area in contact with the inner panel.

(2) Drilling the panel

To be done if the patch derives from a P 3711 stress-
kin panel or a new outer skin.

There are two cases to consider, viz :

(a) The patch is located downstream of frame 3 :

- Pin the panel onto the assembly
- Counterdrill the patch along the trailing edge, with the inner panel acting as drilling template

NOTE : Consult REP 1-460-3 to identify the attach-
ments and determine the resulting conditions
of drilling

(b) The patch laps into frame 3 :

- Stick a piece of stabylene tape on the angle of frame 3. Mark the locations of retaining holes within and outside the panel repair area.
- Stick the stabylene tape on the panel inner face in the region of frame 3, making it register with the existing holes. Matchmark the hole locations on the patch.
- Drill out the holes so marked, as instructed in Standard Practices, chapter "Riveting", 70-50-60. Assemble with blind bolts as described in repair scheme REP 1-460-3
- Pin the panel into position on the assembly working from the middle outwards to the edges.
- Counterdrill the patch along the trailing edge, with the inner panel serving as drilling template.

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NOTE : Consult REP 1-460-3 to identify attachments and determine the resulting conditions of drilling.

F. Plasma spraying of patch

Spray chromium carbide onto the trailing edge of the patch as indicated in figure 402, sheets 1 and 2 and in chapter 70-65-20.

- Spraying material : P 3202 (chromium carbide)
- Surface condition : 3.2/ (0.126/)
- Spray area tolerance : + 12,5 (+ 0.490)
+ 0 (+ 0.000)

G. Reassembly of outer panel

For buckets 3511 to 3574, insert any shims identified by the X-ray test. Hold them onto the frames by applying a coat of pure petrolatum.

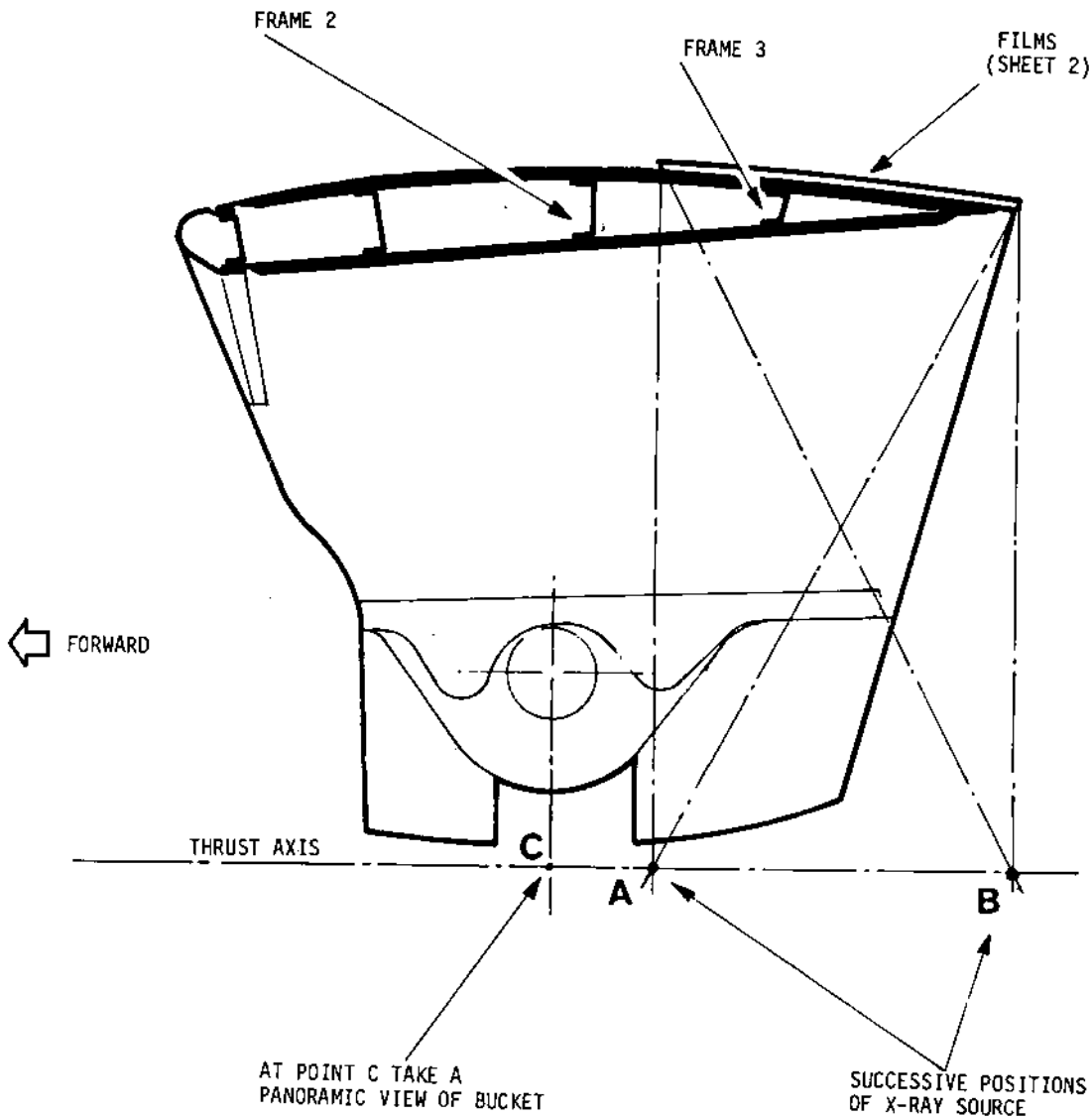
- (1) Rivet the panel to the frames in reverse order of disassembly, working from the middle outwards to the edges, as instructed in repair scheme
 - REP 1-460-3 "Replacement of inner and outer panel fasteners"
 - (2) Fit back all screws, nuts and washers into their original (pre-disassembly) places, working from the middle outwards to the edges, as instructed in repair schemes
 - REP 1-460-2 "Replacement of fasteners next to bucket hub"
 - 1-460-13 "Replacement of blind nuts securing ball-screw gear-box attachment fitting".
 - (3) Remount back-up plates as described in REP 1-460-5.
- H. Mark "REP 12" after bucket No. by Method M 21 contained in chapter 70-10-10 "MARKING".



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Checking the Extent of Damage
Figure 401 - Sheet 1 of 2

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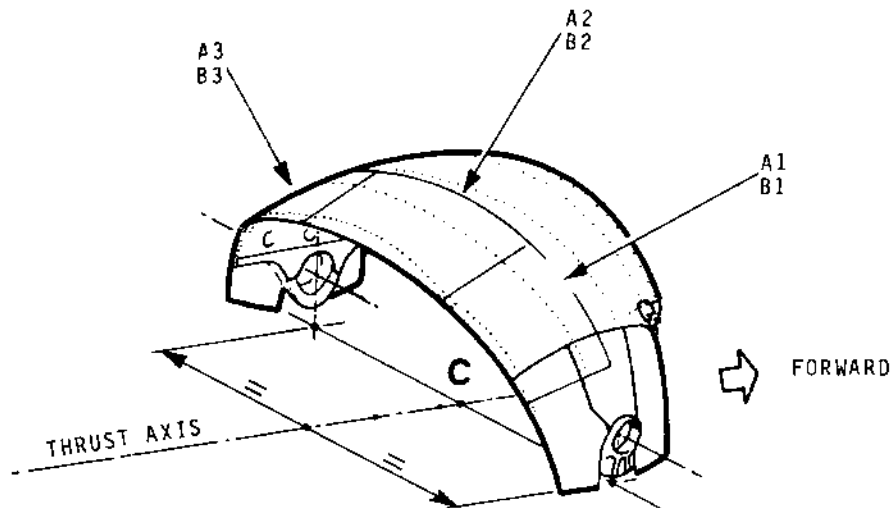
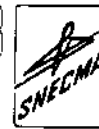
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LOCATION OF SOURCE	ITEMS INSPECTED	FILMS	PHOTOGRAPHIC DENSITY	IMAGE QUALITY INDICATOR (I.Q.I)
A B	INSPECTION OF DELAMINATED AREA ON OUTER STRESSKIN PANEL	3 FILMS 3 FILMS	2,2	WIRE Ø 0,15 mm (0.006 in DIA)
C	IDENTIFYING SHIMS APPLICABLE BETWEEN FRAME AND OUTER PANEL	FILMS	2,2	WIRE Ø 0,15 mm (0.006 in DIA)

KODAK M TYPE FILM STOCK WITHOUT SCREEN, OR EQUIVALENT

FILM SIZE : 300 X 400 mm
(11.811 in X 15.748 in)

Checking the Extent of Damage
Figure 401 - Sheet 2 of 2

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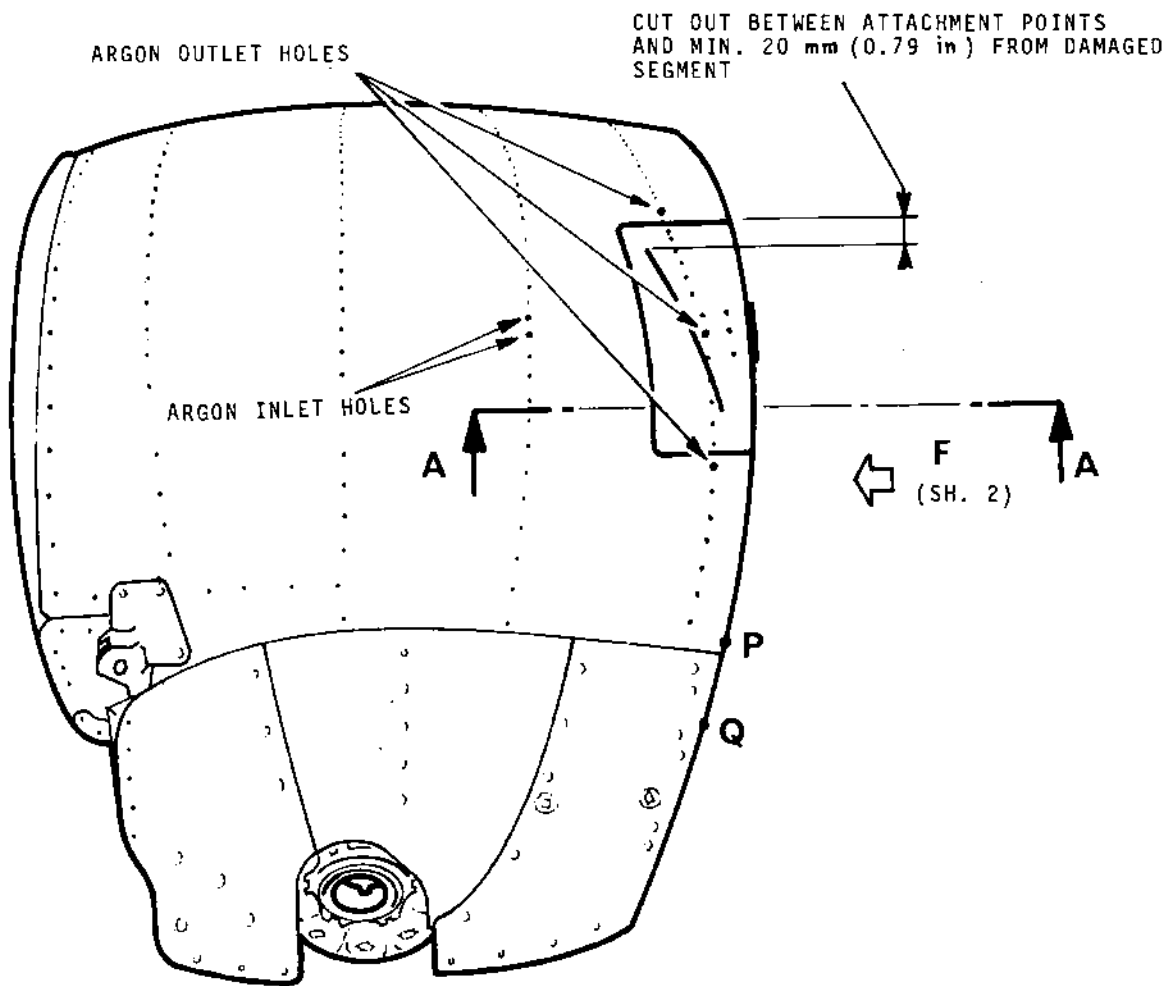
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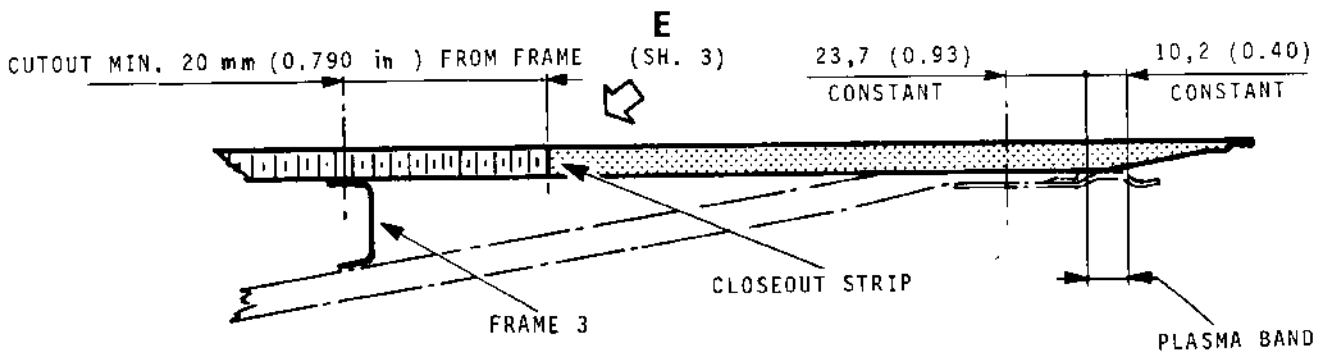


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SECTION AA



Replacement of a Panel Segment by Welding
Figure 402 - Sheet 1 of 5

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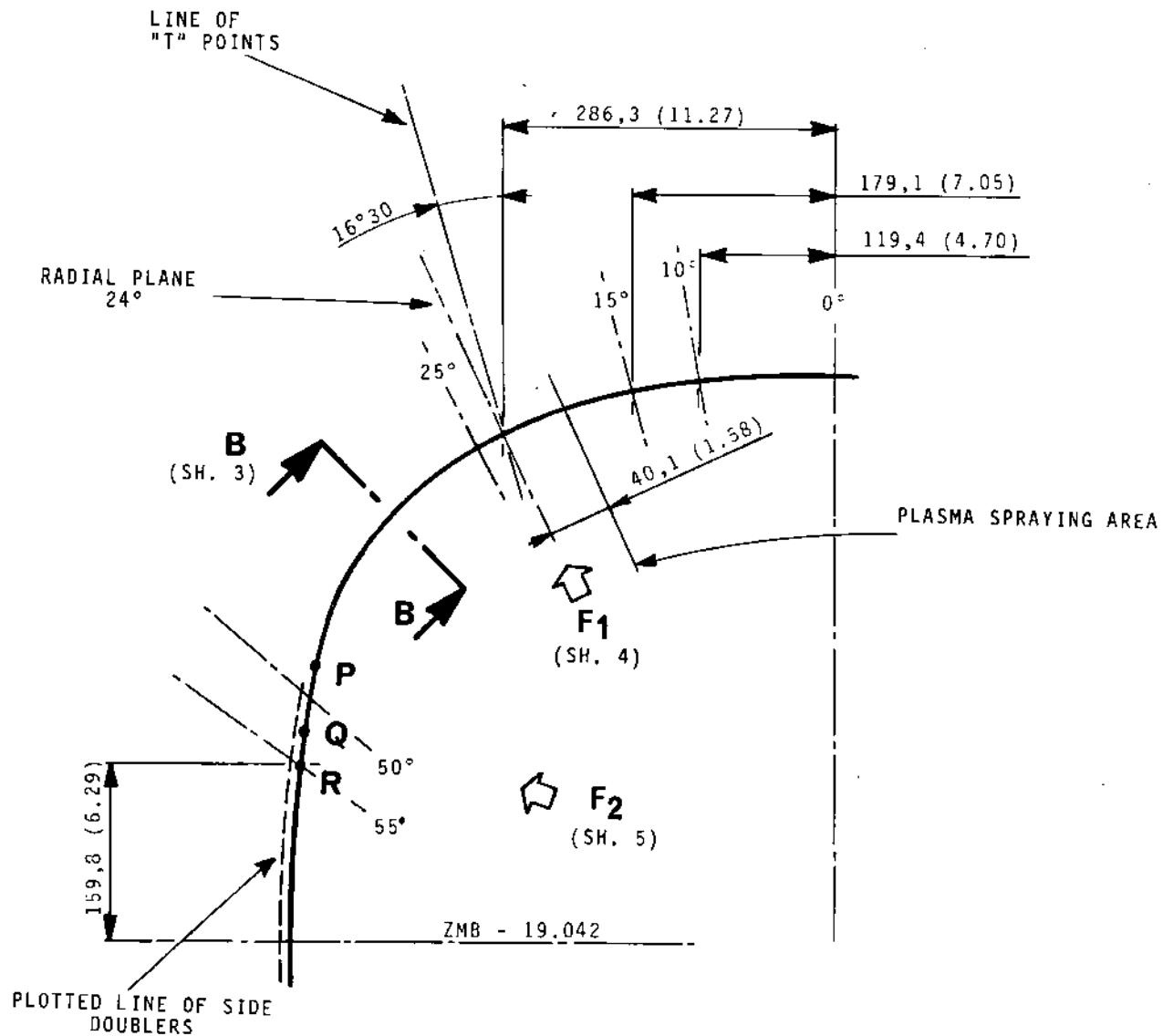
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Replacement of a Panel Segment by Welding
Figure 402 - Sheet 2 of 5

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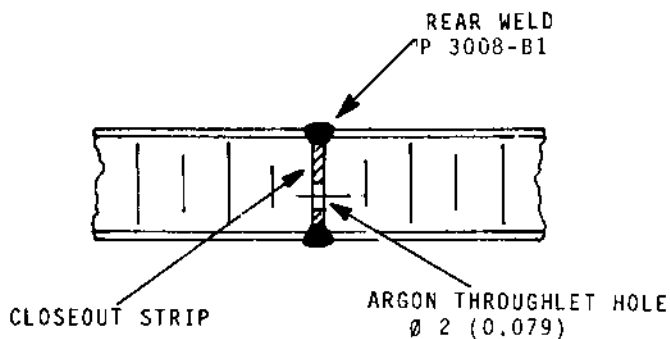


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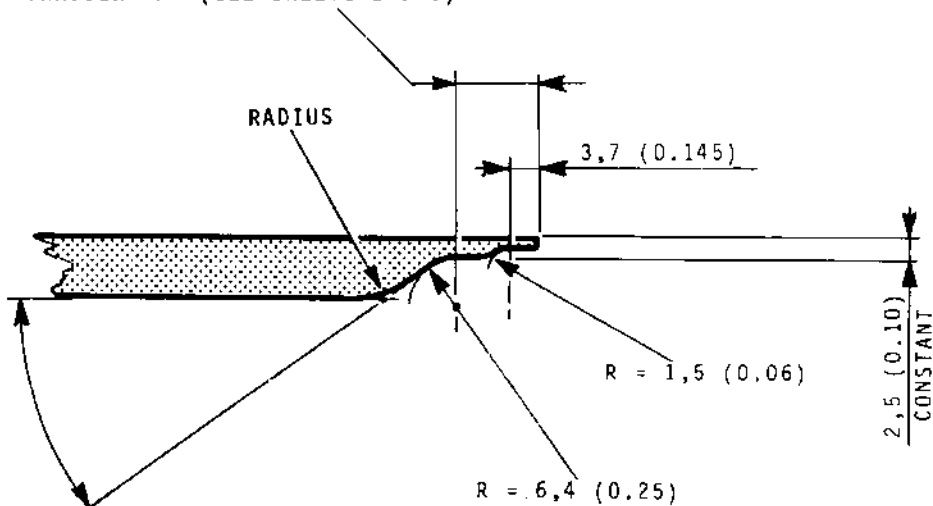


E



SECTION BB

11.2 (0.44) CONSTANT BETWEEN
0° RADIAL PLANE AND PASSING
THROUGH "P" (SEE SHEETS 2 & 5)



TRAILING-EDGE CRUSH ANGLE

- 12° CONST. BETWEEN RADIAL PLANES 0° AND 10°
- FROM 12° TO 35° BETWEEN RADIAL PLANES 10° AND 15°
- 35° CONSTANT BETWEEN RADIAL PLANE 15° AND THAT PASSING THROUGH "P" UNLESS OTHERWISE INDICATED (SEE F1 - SH. 4).
- FROM 35° TO 13°30' BETWEEN RADIAL PLANES PASSING THROUGH "P" AND "Q" (SEE F2 - SH. 5)

Replacement of a Panel Segment by Welding
Figure 402 - Sheet 3 of 5

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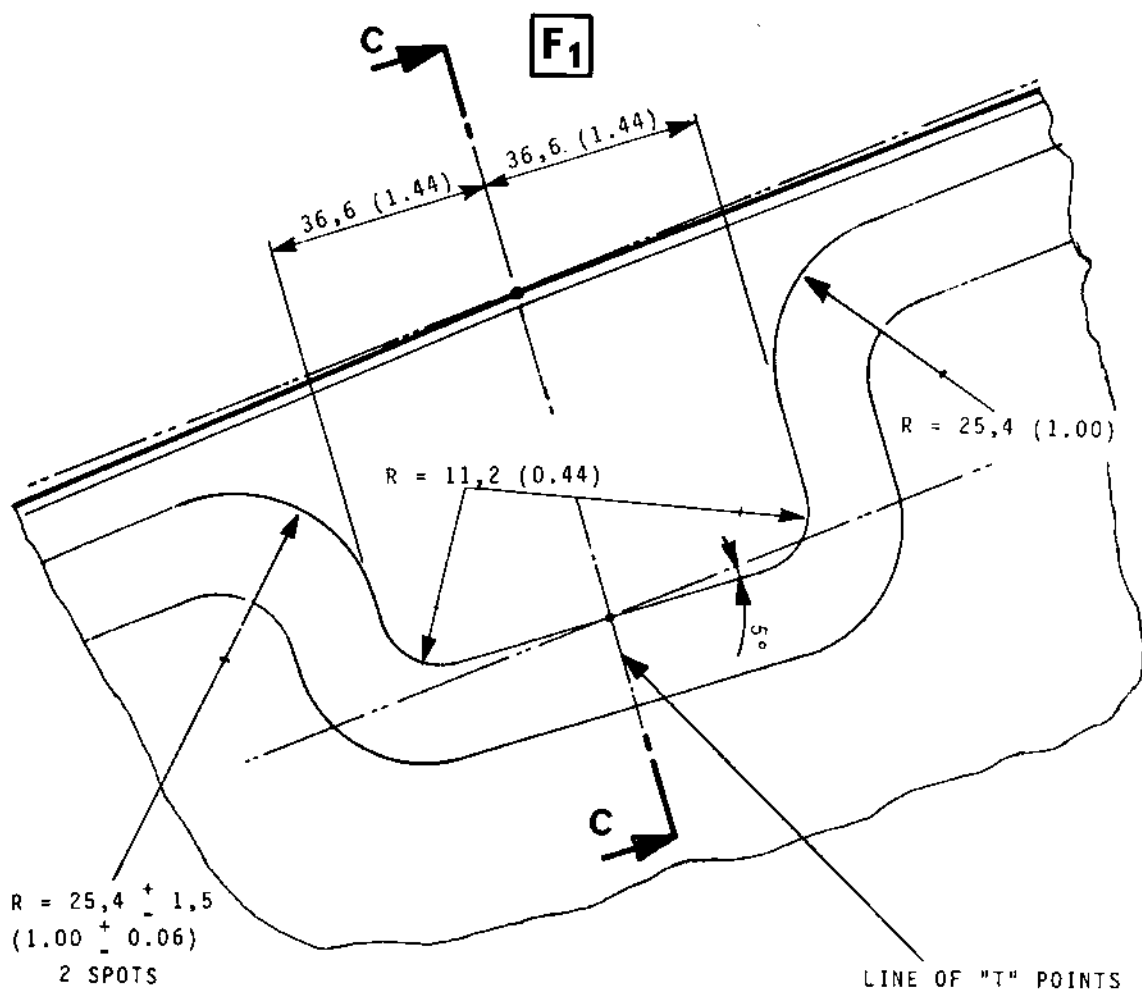
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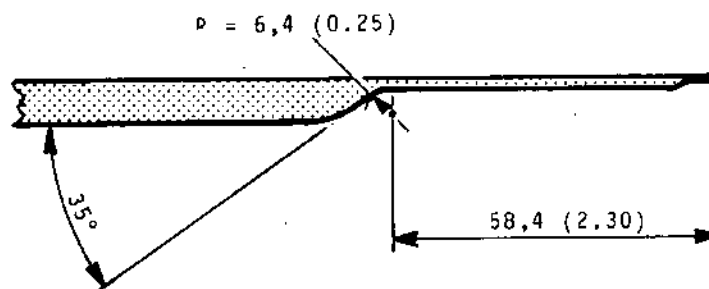
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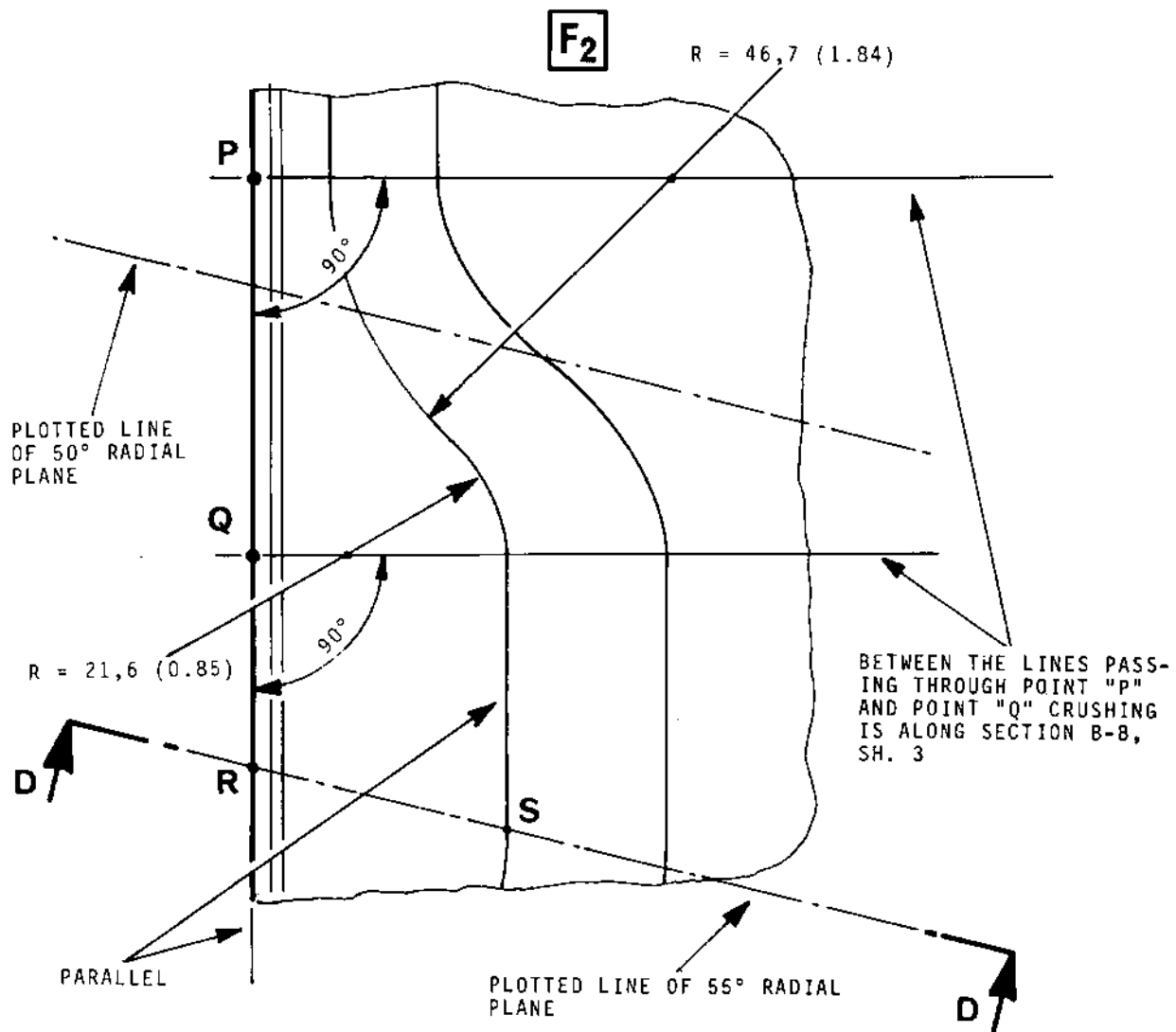
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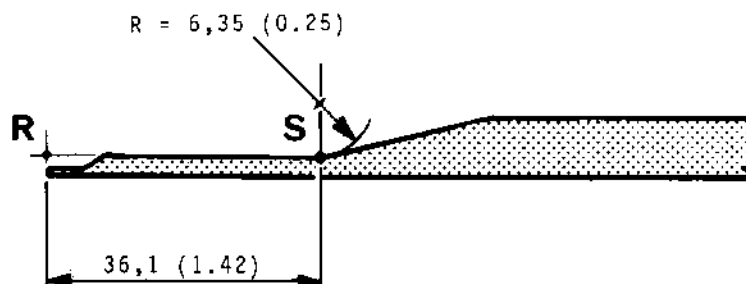
SECTION CC



Replacement of a Panel Segment by Welding
Figure 402 - Sheet 4 of 5



SECTION DD



Replacement of a Panel Segment by Welding
Figure 402 - Sheet 5 of 5

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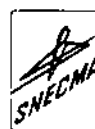
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REPAIR

REVERSER BUCKET (1-460)

13. Replacement of Crimped Nuts Securing Ball-screw Gearbox
Attachment Fitting

PARTS REQUIRED FOR REPAIR

Blind nut BTN 1LG-428-12 (649-783-047-0)
Special washer (525-003-859-0)

A. Removal of crimped nut

- (1) Remove fitting retaining screw and slip out shims
- (2) Bore the fitting as indicated in figure 401
- (3) Drill to a dia. of 7,6 mm (0.3 in) to take out the crimped nut.

NOTE : Remove chips dropped into the recess as far as practicable.

B. Remounting the crimped nut

- (1) Fit back the crimped nut by the use of manufacturer's assembling device as indicated in figure 401 and following manufacturer's instructions.

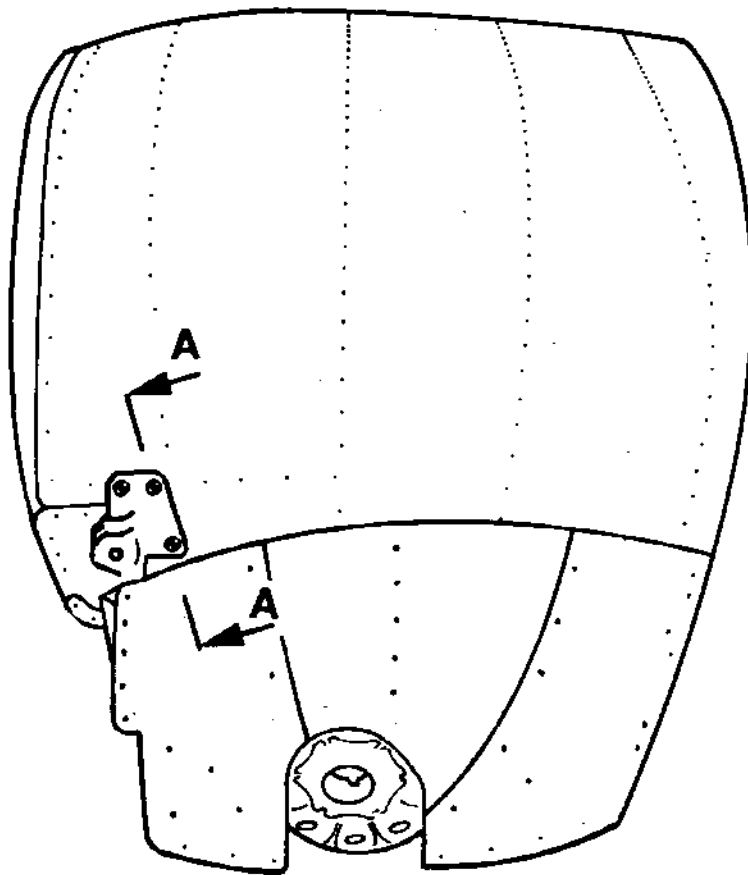
NOTE : Mind the position of the anti-rotation pin

- (2) Check that the nut is properly crimped and its thread has not been damaged in assembly.
- (3) Reinsert the shims between fitting and panel, mount back the special washer, and refit the screw.



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Replacement of Crimped Nuts
Figure 401 - Sheet 1 of 2

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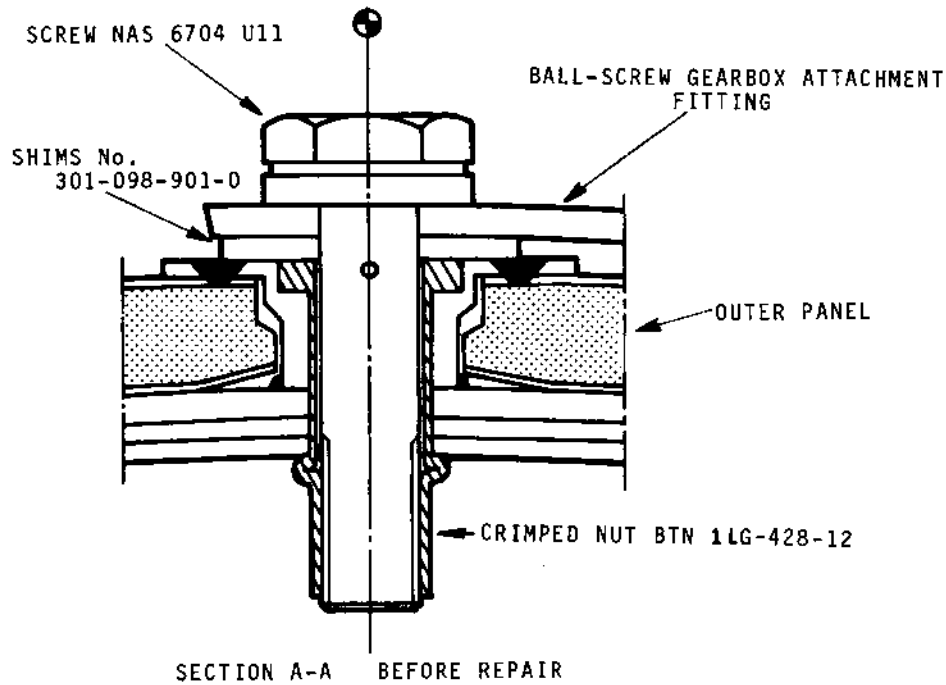
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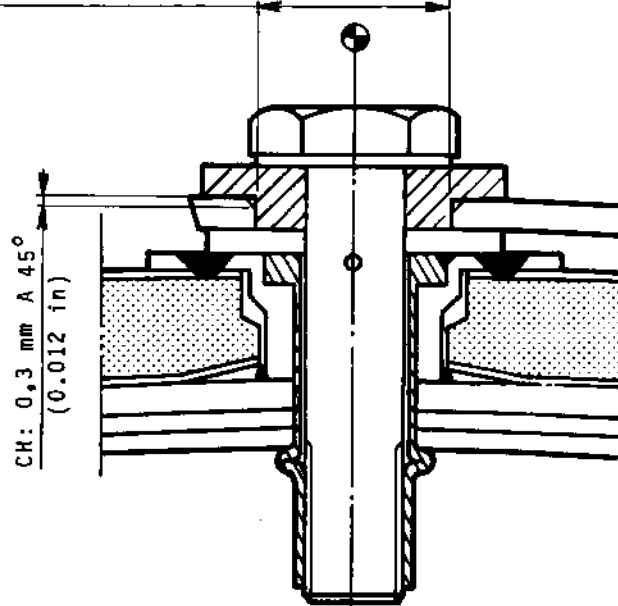


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$\varnothing 13 \begin{matrix} + 0.05 \\ + 0 \end{matrix} \text{ mm } (0.512 \begin{matrix} + 0.002 \\ - 0.000 \end{matrix} \text{ in DIA})$



SECTION A-A AFTER REPAIR

Replacement of Crimped Nuts
Figure 401 - Sheet 2 of 2

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REPAIRREVERSER BUCKET (1-460)14. Repair of trailing-edge-side outer panel by welding a foil strip.

PARTS REQUIRED FOR REPAIR

Metal sheet P3305 (Z8 CND15), 0,8 mm (0.032 in.) in thickness	
Weld filler wire P3008 (Z8 CND 15)	
Blind bolt PLT 1004-6-3	(650-089-930-0)
" " PLT 1004-6-5,5	(650-089-950-0)
" " PLT 1004-6-6	(650-089-933-0)
" " PLT 1004-6-6,5	(650-089-951-0)
" " PLT 1004-6-7	(650-089-934-0)
" " PLT 1004-6-7,5	(650-089-952-0)
" " PLT 1004-6-8	(650-089-935-0)
Blind rivet CR 2838-5-8	(649-772-165-0)
Blind rivet CR 2839-5-8	(649-772-087-0)
Rivet NAS 1198-5-5	(650-014-101-0)
" NAS 1198-5-9	(650-014-108-0)
" NAS 1198-5-13	(650-014-115-0)
" NAS 1199-5-8	(650-024-106-0)
" NAS 1199-5-9	(650-024-108-0)
" NAS 1199-5-11	(650-024-111-0)
" NAS 1199-5-12	(650-024-113-0)
Blind bolt BTN1 LG-428-12	(649-783-047-0)
Screw NAS 6704-U11	(649-774-218-0)
Special washer No. 525-003-359-0	
Nut No. 301-084-702-0	
Nut No. 301-084-800-0	

A. Disassembly of outer panel**(1). Checking on the extent of damage**

- (a) Make a radiographic test using X-ray equipment with a long anode as instructed in Standard Practices, chapter 70-20-30, shown in figure 401 and further set-out below :

- At points A and B, take shots at 15° to bring the repair area into view.

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- At point C take a panoramic view of the bucket in the region of the outer panel attachment points in order to identify the shims suitable to be sandwiched between frames and panel (only applies to buckets 3511 to 3574 in which the shims are not riveted to the frames).

(2) Remove the outer panel as follows :

(a) Remove the outer panel fasteners as instructed in repair schemes

- REP 1-460-3 "Replacement of inner and outer fasteners"
- REP 1-460-5 "Replacement of back-up plates"

Remove nuts around the bucket hub as described in REP 1-460-13.

After removal of the three screws, take the three blind nuts out of the ball-screw gearbox attachment fitting as described in REP 1-460-13.

(b) Disassemble the outer panel

NOTE : To keep the shims from falling between panel and frames on disassembly, fasten them to the frame.

Carefully mark the location of all screws, bushings and washers for identical reassembly.

B. Preparation of damaged panel segment

- (1) At each end, and in the vicinity of the crack, drill 2 mm (0,08 in.)-dia holes as shown in figure 402.
- (2) Groove through the panel along the whole crack length as prescribed in chapter "REPAIR PRINCIPLE", 70-30-10.
 - Groove width : 1 mm (0.04 in.) max.
- (3) Deburr carefully.
- (4) Thoroughly clean the machined area with a swab soaked in isopropyl alcohol (P442) going over it repeatedly until the welding area is completely free from any grease.

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- (5) Seal off the outer panel attachment holes using adhesive tape, except those shown in figure 402.

C. Repair of the outer panel

- (1) Cut out the foil strip to be welded as follows :

- (a) Cut out a 0,8 mm (0.32 in.)-thick strip from P3305 sheet metal to required length and "X" width.
(see figure 402).
- (b) Drill a hole through the strip for argon passage as per figure 402.
- (c) Heat treat the strip as instructed in method M821 and M822, chapter 70-45-10 "HEAT TREATMENTS".

- (2) Repair the outer panel as follows :

- (a) Purge the outer panel by introducing argon through the argon throughlet hole for 30 minutes at least.
- (b) Position and tack-weld the strip in the groove.
- (c) Arc-weld the strip in the groove and in argon atmosphere as instructed in chapters "REPAIR PRINCIPLE" 70-30-10, "WELDING" 70-35-10 and as per figure 402.

- Weld filler wire : P3008
- Class of weld : P1

NOTE : It is essential in welding to apply copper-cooling-blocks as close to the weld as possible.

- (d) Seal off the argon inlet and outlet holes by welding.



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- (e) Perform a B1 weld soundness test as instructed in Standard Practices, chapter 70-35-80, and hereunder :

A water-washable dye penetrant inspection is carried out by method M501B described in chapter 70-20-10.

CAUTION : THE PENETRANT IS TO BE CLEARED OUT WITH A SWAB SOAKED IN ISOPROPYL ALCOHOL. (P442).

- (f) If necessary, machine-flush the weld on the outer panel inner face in the area in contact with the inner panel.

D. Reassembly of outer panel

For buckets 3511 to 3574 insert any shims identified by the X-ray test. Hold them onto the frames by applying a coat of pure petrolatum.

- (1) Rivet the panel to the frames in reverse order of disassembly, working from the middle outwards to the edges, as instructed in repair scheme :

- REP 1-460-3 "Replacement of inner and outer panel fasteners"

- (2) Fit back all bolts, nuts and washers into their original (pre-disassembly) places as instructed in repair schemes :

- 1-460-2 "Replacement of fasteners next to bucket hub"

- 1-460-13 "Replacement of blind nuts securing ball-screw gear-box attachment fitting".

- (3) Remount back-up plates as described in REP 1-460-5.

- E. Mark "REP 14" after bucket No. by method M21 in chapter 70-10-10 "MARKING".

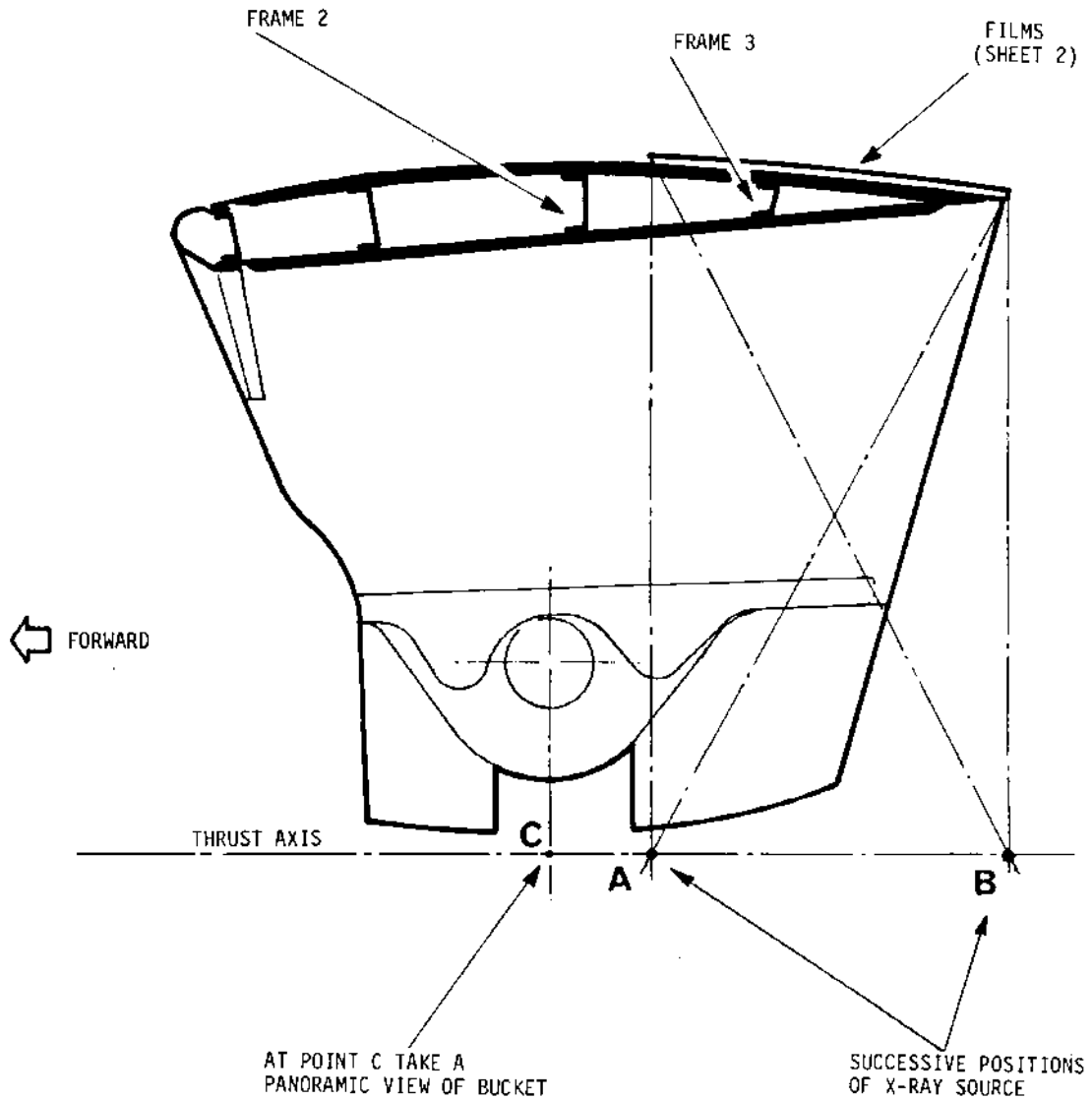


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Checking the Extent of Damage
Figure 401 - Sheet 1 of 2

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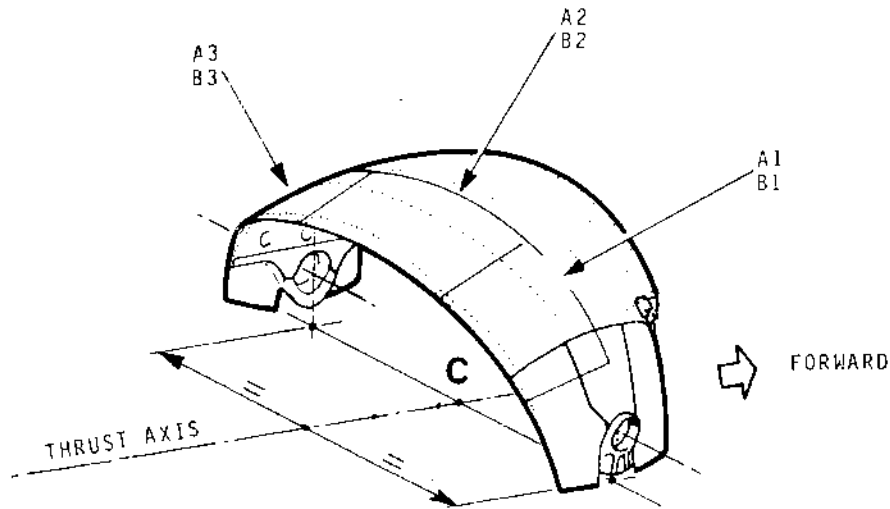
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LOCATION OF SOURCE	ITEMS INSPECTED	FILMS	PHOTOGRAPHIC DENSITY	IMAGE QUALITY INDICATOR (I.Q.I)
A B	INSPECTION OF DELAMINATED AREA ON OUTER STRESSKIN PANEL	3 FILMS ● 3 FILMS ●	2,2	WIRE Ø 0,15 mm (0.006 in. DIA)
C	IDENTIFYING SHIMS APPLICABLE BETWEEN FRAME AND OUTER PANEL	FILMS ●	2,2	WIRE Ø 0,15 mm (0.006 in. DIA)

KODAK M TYPE FILM STOCK WITHOUT SCREEN, OR EQUIVALENT

FILM SIZE ● : 300 X 400 mm
(11.811 in. X 15.748 in.)

Checking the Extent of Damage
Figure 401 - Sheet 2 of 2

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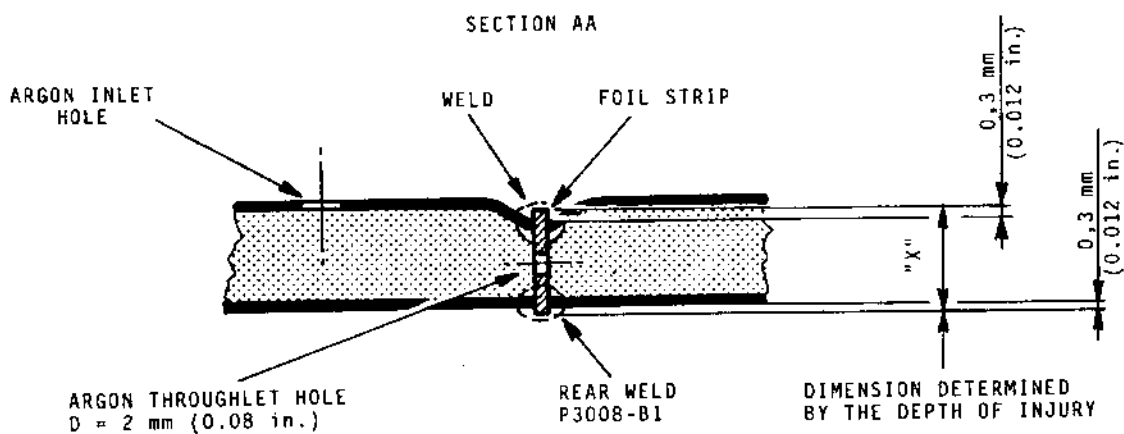
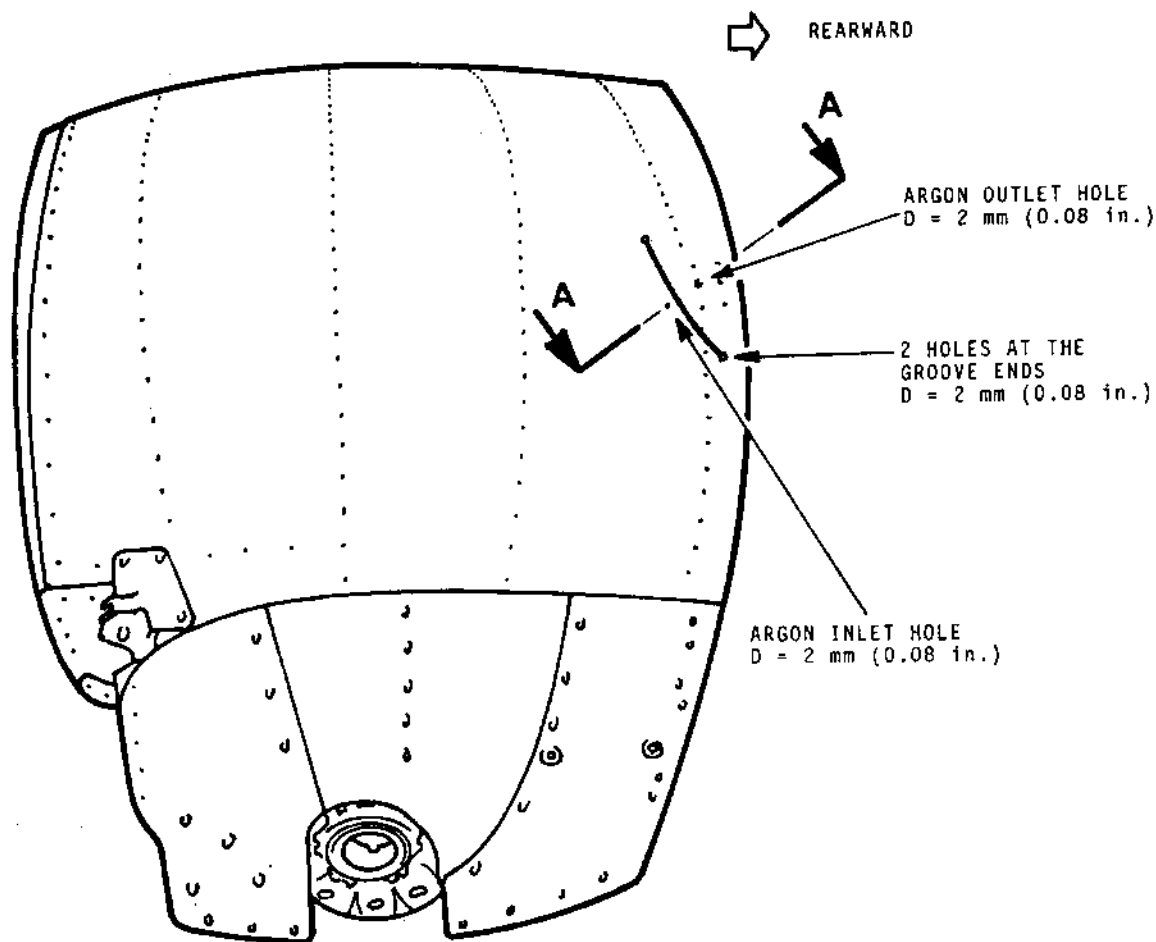
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Repair of Trailing-Edge-Side Outer Panel by Welding a Foil Strip
Figure 402

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REPAIRREVERSER BUCKET (1-460)

15. Reconditioning of the outer panel due to some crack located by the deflector attachment point on trailing edge side.

PARTS REQUIRED FOR REPAIR

Flange nut	No. 093-780-031-0	
Welded washer	No. 093-780-032-0	
Helicoil thread insert	3591-4CNV0250	(649-773-219-0)
Washer	SPC 9401S5-040	(649-786-204-0)
Round head rivet	NAS 1198-5-9	(650-014-108-0)
Round head rivet	NAS 1198-5-13	(650-014-115-0)
F100-head rivet	NAS 1199-5-12	(650-024-113-0)
Weld filler wire	P3005 (Z5 CNU 17)	
	P3008 or P3030	
	(Z8 CND 15 or NC 24 FeC)	

A. Introduction

This repair scheme requires the removal of the rear outer doubler in order to repair the crack (1) originating from the deflector attachment point.

B. Removal

Remove the rear outer doubler as follows :

- (1) Remove the shims and seal support after removing the fasteners as indicated in repair scheme 1-460-5 of this chapter.

NOTE : Matchmark the shims for correct re-installation.

- (2) Remove the rear doubler fasteners by drilling as instructed in chapter 70-50-50 and figure 401.

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NOTE : Exercise care not to damage the stepped washers.
Mark their position. Remove and retain them.

- (3) Remove the rear doubler. Install fasteners at seal support attachment points so as to retain the shims sandwiched between the panels (see figure 401 in REP 1-460-5).

NOTE : Be careful not to loose the bushes.

C. Repair of crack

- (1) Remove the original press-mounted nut by drilling as follows :
 - (a) Remove thread insert No. 3591-4CNV-0250 using manufacturer's extractor as per REP 1-460-2 in this chapter.
 - (b) Remove the nut by successive runs as per Standard Practices, chapter 70-55-00.

NOTE : Nut recess diameter : 10,35 mm (0.4075 in.) maximum.

- (c) Retain spacer SPC 9405T-0075-0075 to be modified later on.
- (2) Repair the crack, originated from the nut recess hole, by welding as specified in this chapter, repair scheme 1-460-11.

NOTE This repair scheme does not require any sealing of the nut recess contour with elastomer resin.

D. Machining

- (1) Bore the repair nut recess as specified in Standard Practices, chapter "REPAIR PRINCIPLES", 70-30-10, and as per figure 402. Deburr.

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NOTE : Make sure that the hole is perpendicular to the face in contact with the side-plate.

- (2) Spotface the shim, as per figure 402, using a facing cutter with 12 mm (0.4725 in.) dia pilot bit. Deburr.
- (3) Bore through the spacer for nut passage as per figure 402. Deburr.
- (4) Dimensionally inspect the nut recess hole in the bucket and spacer, as per figure 402.

E. Nut installation

Install side-plate fastener as instructed in figure 403 and hereunder :

- (1) Position reworked spacer
- (2) Install the flanged nut with liquid nitrogen (P441). Secure it by argon-arc plug welding as specified in Standard Practices, chapter 70-35-10. Machine flush.
 - (a) Weld filler wire : P3005 (Z5 CNU 17)
 - (b) Class of weld : B1
- (3) Position and assemble the washer and the nut by peripheral argon-arc welding as specified in Standard Practices, chapter 70-35-10.

NOTE : Thoroughly press the washer against the bucket outer panel before welding.

- (a) Weld filler wire : P3005 (Z5 CNU 17)
- (b) Class of the peripheral weld : B1



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- (4) Inspect the class B1 plug and peripheral welds as per chapter 70-35-80.
- (5) Install thread insert in nut as instructed in figure 403 and hereunder :
 - (a) Install the thread insert in the recess using standard tool.
 - (b) Inspection check the thread insert installation.
 - (c) Break the drive tongue using the appropriate standard tool.

F. Installation of doubler

- (1) Position and clamp the doubler and washers. Remove the clamps and install the bushes.
 - (a) Position and straighten the doubler through 6,35 mm (0.250 in.)-dia holes. When necessary, draw file the recess accommodating the welded washer.
 - (b) Insert the bushes in the trailing edge (see REP 1-460-5, figure 401). Clamp.
 - (c) Install stepped washers as per figure 401. Clamp.
- (2) Install blind rivets as instructed in Standard Practices, chapter 70-50-50 and figure 401.
- (3) Install shims and seal supports onto the trailing edge as per repair scheme 1-460-5 and chapter 70-50-10.

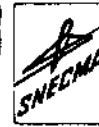
NOTE : Do not forget the plain washers.

NOTE : Mind the way the shims are positioned.



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G. Inspection

- (1) Inspect the doubler fixing items for correct installation as instructed in Standard Practices, chapter 70-50-80.
- (2) Check the doubler 6,35 mm (0.250 in.)-dia holes for free passage of screws. When necessary, draw file as per figure 401.

H. Marking

- (1) Following the part number, mark "REP 15" as per method M21 in chapter 70-10-20.

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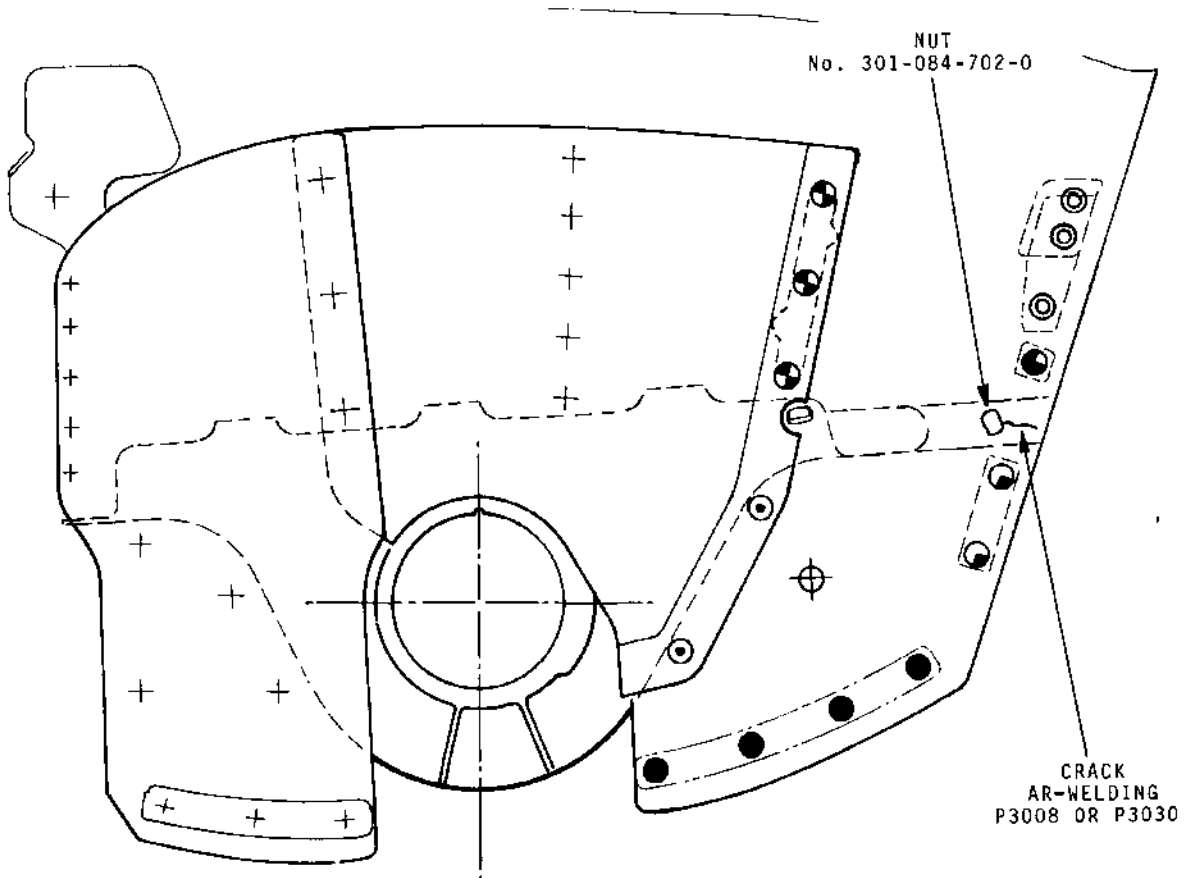


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EXTERNAL VIEW AT LEVEL OF HUB AND TRAILING EDGE
(REAR DOUBLER NOT SHOWN)



Installation and Removal of Rear Doubler
Figure 401 - Plate 1/3

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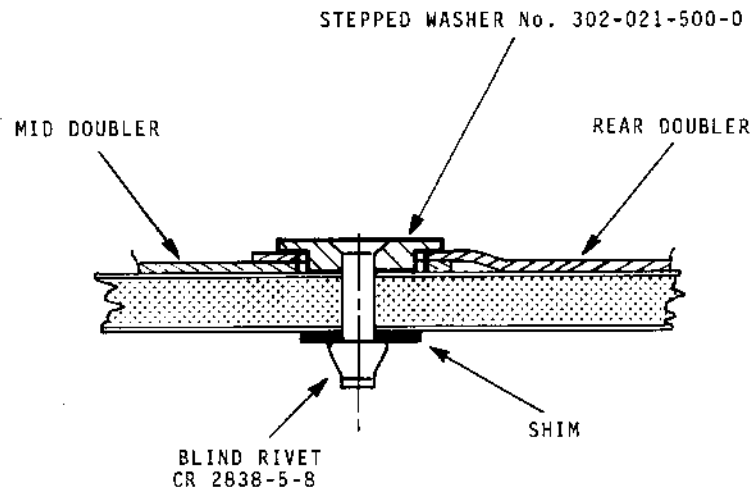
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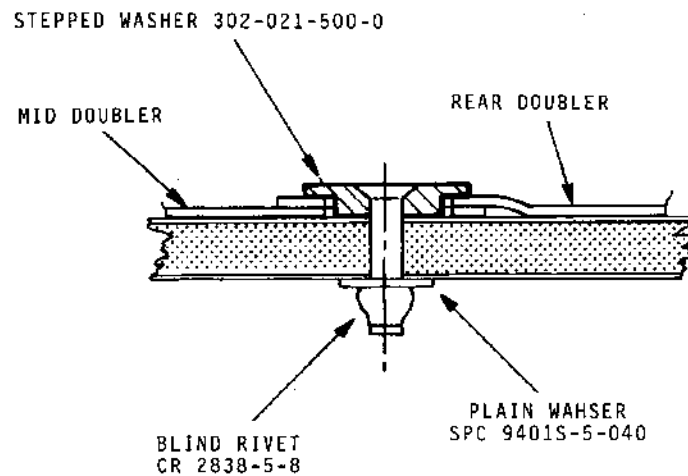


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FASTENER, TYPE 

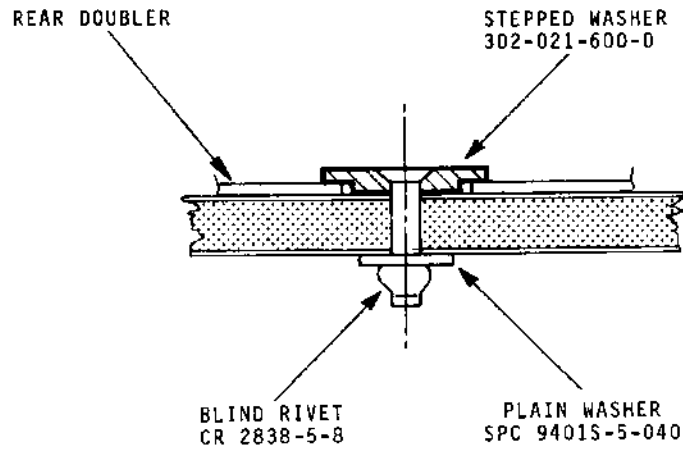



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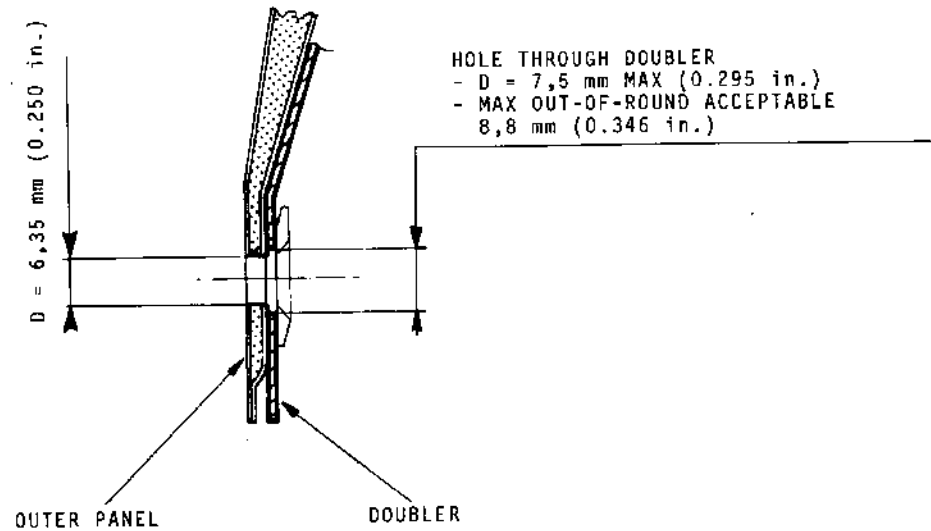


Installation and Removal of Rear Doubler
Figure 401 - Plate 2/3

FASTENER, TYPE 



FASTENER, TYPE 

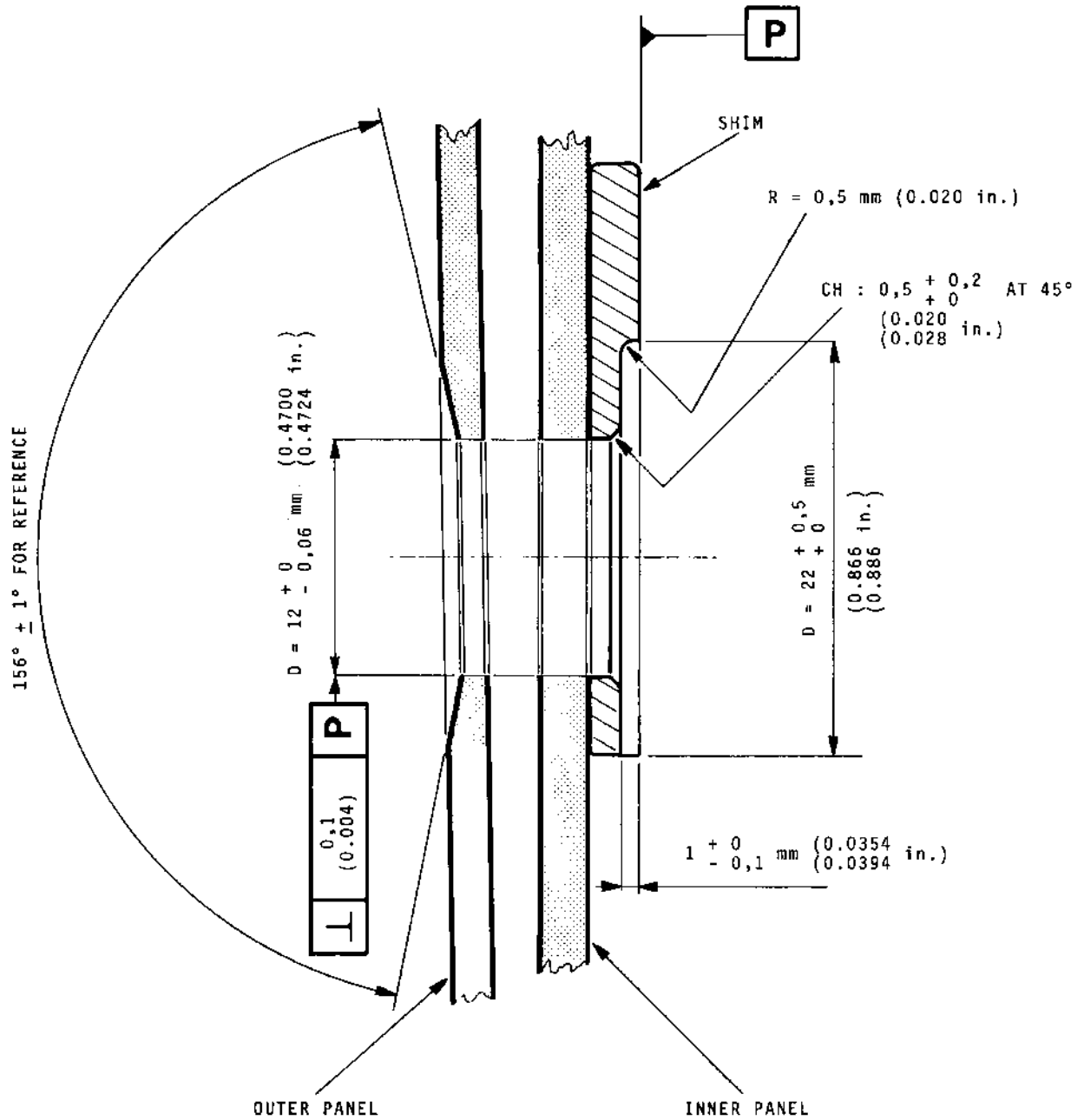


Installation and Removal of Rear Doubler
Figure 401 - Plate 3/3



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Machining of Repair Nut Recess
Figure 402

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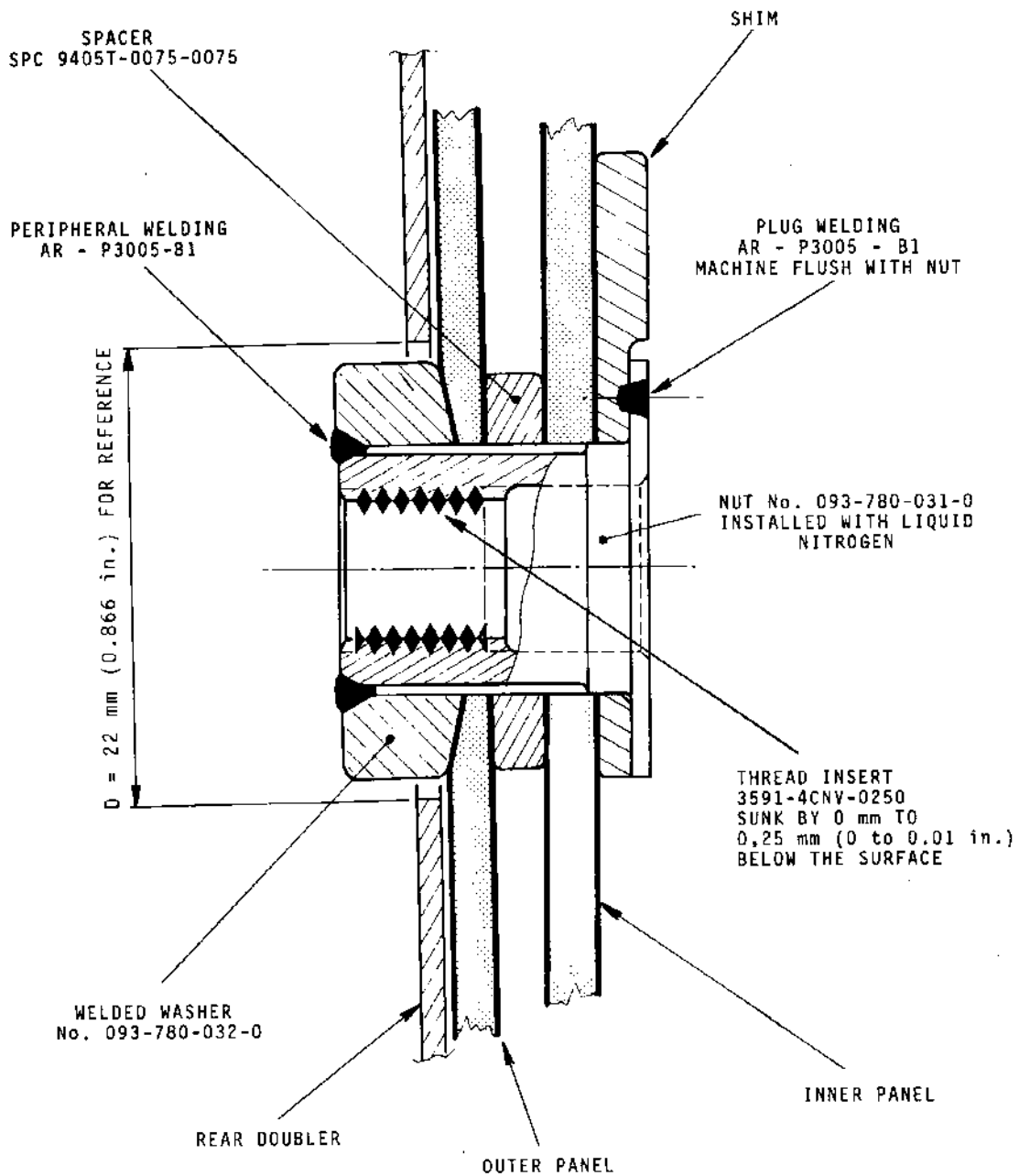


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Installation of Repair Nut
Figure 403

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REP 1-460-15

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REPAIR

REVERSER BUCKET (1-460)16. Replacement of lateral doublers.

PARTS REQUIRED FOR REPAIR

Left front doubler	No.	302-021-001-0
Right front doubler	No.	302-021-051-0
Left mid doubler	No.	302-021-101-0
Right mid doubler	No.	302-021-151-0
Left rear doubler	No.	302-021-201-0
Right rear doubler	No.	302-021-251-0
Round head rivet	NAS 1198-5-5	(650-014-101-0)
Round head rivet	NAS 1198-5-9	(650-014-108-0)
Round head rivet	NAS 1198-5-13	(650-014-115-0)
F100 head rivet	NAS 1199-5-12	(650-024-113-0)
Blind rivet	CR 2838-5-8	(649-772-165-0)
Flat washer	SPC 9401S5-040	(649-786-204-0)
Stepped washer	No.	302-021-500-0
Stepped washer	No.	302-021-600-0
Stepped bush	No.	302-021-700-0
Stepped bush	No.	302-023-600-0
Washer	No.	302-021-800-0

A. Removal of doublers

- (1) Remove the riveted parts at the trailing edge as indicated in figure 401 and in repair scheme 1-460-5 of this Overhaul Manual.

NOTE 1 : Retain the adjusted shims No. 649-786-484-0.
(See Figure 401, Sheet 2).

NOTE 2 : Matchmark the position of the shims and seal supports for correct re-installation.

- (2) Remove attaching parts as indicated in chapters 70-50-20 and 70-50-50 and in figure 401, and then remove the lateral doublers.

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B. Inspection

- (1) Inspect the fasteners of the inner shims as instructed in chapter 70-50-86 and in figure 401.
- (2) If necessary, replace as indicated in chapter 70-50-60. Inspect after installation as per chapter 70-50-86.

C. Drilling of new doublers

CAUTION : - DO NOT USE HALOGEN PRODUCTS ON TITANIUM ALLOY PARTS.

- USE SPECIAL BUFFING TOOL FOR DEBURRING.

- (1) Undercut the rear doubler for the nut heads as per figure 401 and as follows :
 - (a) Stick a strip of Stabilene paper in line with nuts, and mark the position of the undercuts.
 - (b) Position the rear doubler and then stick strip on doubler. Remove.
 - (c) Centre-punch according to marking, then drill pilot holes for punching.
 - (d) Punch out the nut head recesses to 22 mm (0.866 in.) diameter, and deburr.
- (2) Perform drilling of recesses for stepped washers types E, F, G and H, as indicated in figure 401 and as follows :
 - (a) Stick strips of Stabilene paper on the reverser bucket in line with fasteners type E, F and H, and mark positions.
 - (b) Position the mid doubler using a locator centered in the bucket hub so as to obtain the radius R1. Stick the strips on the doubler, then remove the doubler.

NOTE : When positioning the doubler, take position of front and rear doublers into account.

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(c) Drill pilot-holes of 2,5 mm (0.100 in.) diameter and deburr.

(d) Position the mid doubler and maintain in place using spring clamps and clips.

NOTE : Make sure the radius R1 is respected by means of the locator.

(e) Stick strips of Stabilene paper on the mid doubler in line with fasteners E and F, and centre-punch.

(f) Position the front and rear doublers and maintain in place with spring clamp.

NOTE : Fasten the front doubler with clips in the type J fastener pilot holes.

(g) Stick the strips of Stabilene paper on the doublers and trace the type G fastener holes. Remove the doublers.

(h) Centre-punch according to tracing, and then drill pilot holes for punching.

(i) Punch out stepped washer recesses as indicated in figure 401, and deburr.

(j) Chamfer the washer recesses in the front and rear doublers as per figure 401. Deburr.

(3) Prepare recesses of stepped bushes, fasteners type B, C and D, and drill attachment holes type I and J as indicated in figure 401 and as follows :

(a) Position the front and rear doublers and install the stepped washers. Pin in place.

NOTE : Use spring clamps on the doubler edges to hold elements being assembled firmly together

(b) Centre-punch the position of fasteners B, C, D and I.

(c) Check the alignment of the pilot holes of the front doubler J fasteners.



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- 1 If necessary, rework the holes by draw filing.
- (d) Remove the doublers, and then drill pilot holes of 2,5 mm (0.100 in.) diameter. Deburr.
- (e) Rebore the holes as indicated in figure 401, and deburr.

D. Adjustment of doublers

- (1) Shape the lateral doublers to the reverser bucket outer panel contour as follows :
 - (a) Position the doublers, adjust and pin.
 - (b) Use feeler gauge set to check the clearance between the doubler and panel.

NOTE : The maximum clearance is 0,8mm (0.315 in.).

- (c) Shape the doubler according to clearance.
- (2) Position and pin the front doubler, and then check the clearance between the edge and the washer of the actuator attachment fitting, as indicated in figure 402.
 - (a) If required, rework by draw filing.
- (3) Position and pin the front and rear doublers. Check the clearance between the doublers and panel as per figure 402. If necessary, shape.

NOTE : After tightening, play is 0.15 mm (0.006 in.).

- (4) If necessary, rework the end of the rear doubler, as indicated in figure 402, when the distance between the shim "1" fastener and the doubler corner is too large. Deburr.
- (5) Check the edges of the doublers with reference to the reverser bucket outer panel edge. If necessary, trace and then rework by draw filing.

E. Assembly

- (1) Position the doublers and install the washers, bushes and shims as per figure 401.



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- (2) Check the adjustment at the trailing edge between the taper shim (item 1) and the outer panel.
- (a) If necessary, rework the compensating shim, P/N 649-786-484-0, to obtain a setting of 0,25 mm (0.100 in.) minimum. Radius the edges in contact with the panel.
- (3) Install the attachment parts as indicated in figure 401 and as follows :
- (a) Install the fasteners type B, C, D and J as indicated in chapter 70-50-20 and repair scheme 1-460-5.
- (b) Install the fasteners type E, F, G and H as indicated in chapter 70-50-50.
- NOTE : Flat washers are required for fasteners F, G and H.
- (4) Inspect the installed fasteners as indicated in chapters 70-50-82 and 70-50-85.



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VIEW FROM OUTSIDE

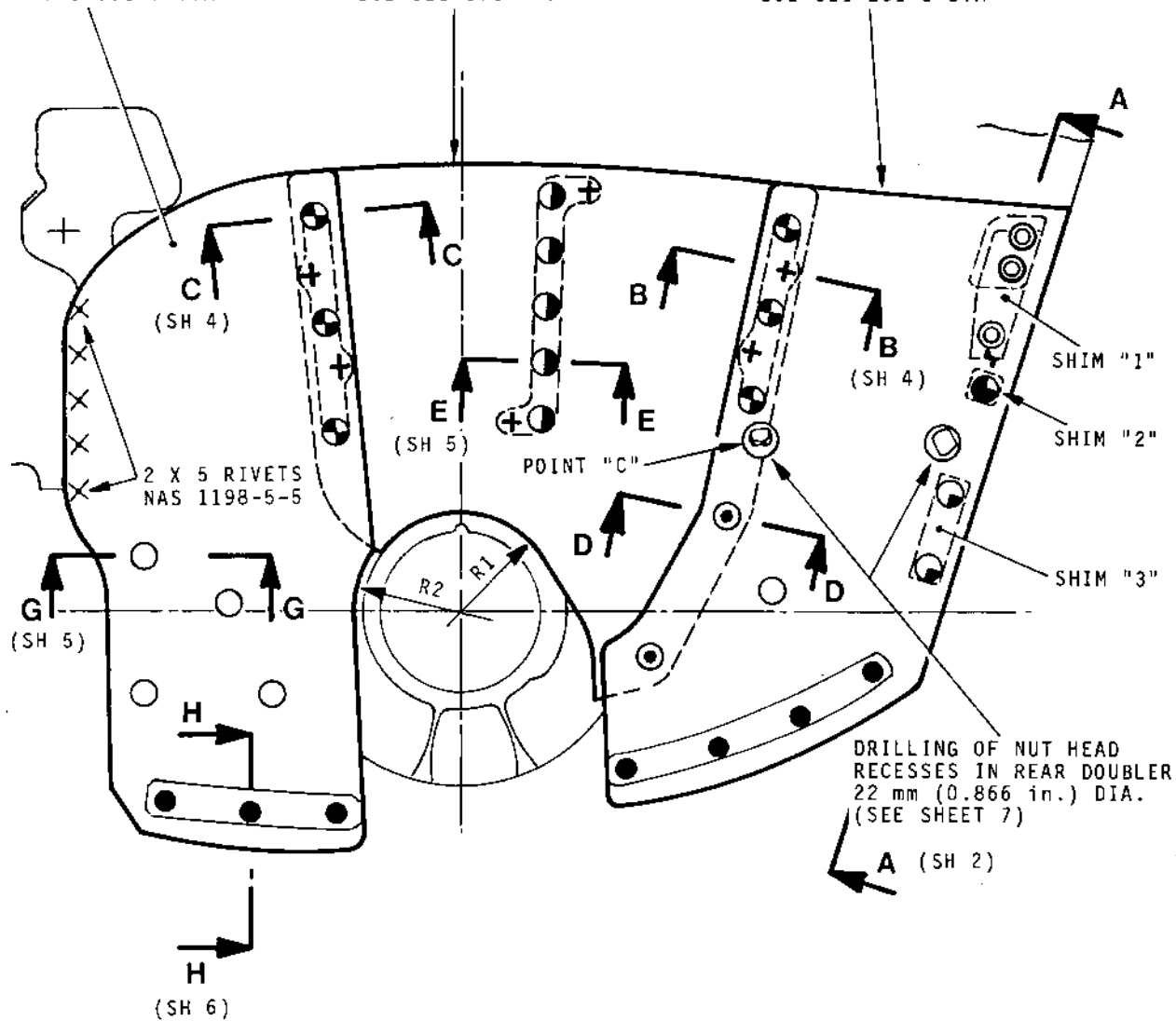


FORWARD

FRONT DOUBLER
302-021-001-0 REP
302-021-051-0 SYM

MID DOUBLER
302-021-101-0 REP
302-021-151-0 SYM

REAR DOUBLER
302-021-201-0 REP
302-021-251-0 SYM



R1 = 51,7 mm (2.04 in.)

R2 = 57 mm (2.24 in.)

Replacement of Doublers
Figure 401 (Sheet 1 of 7)

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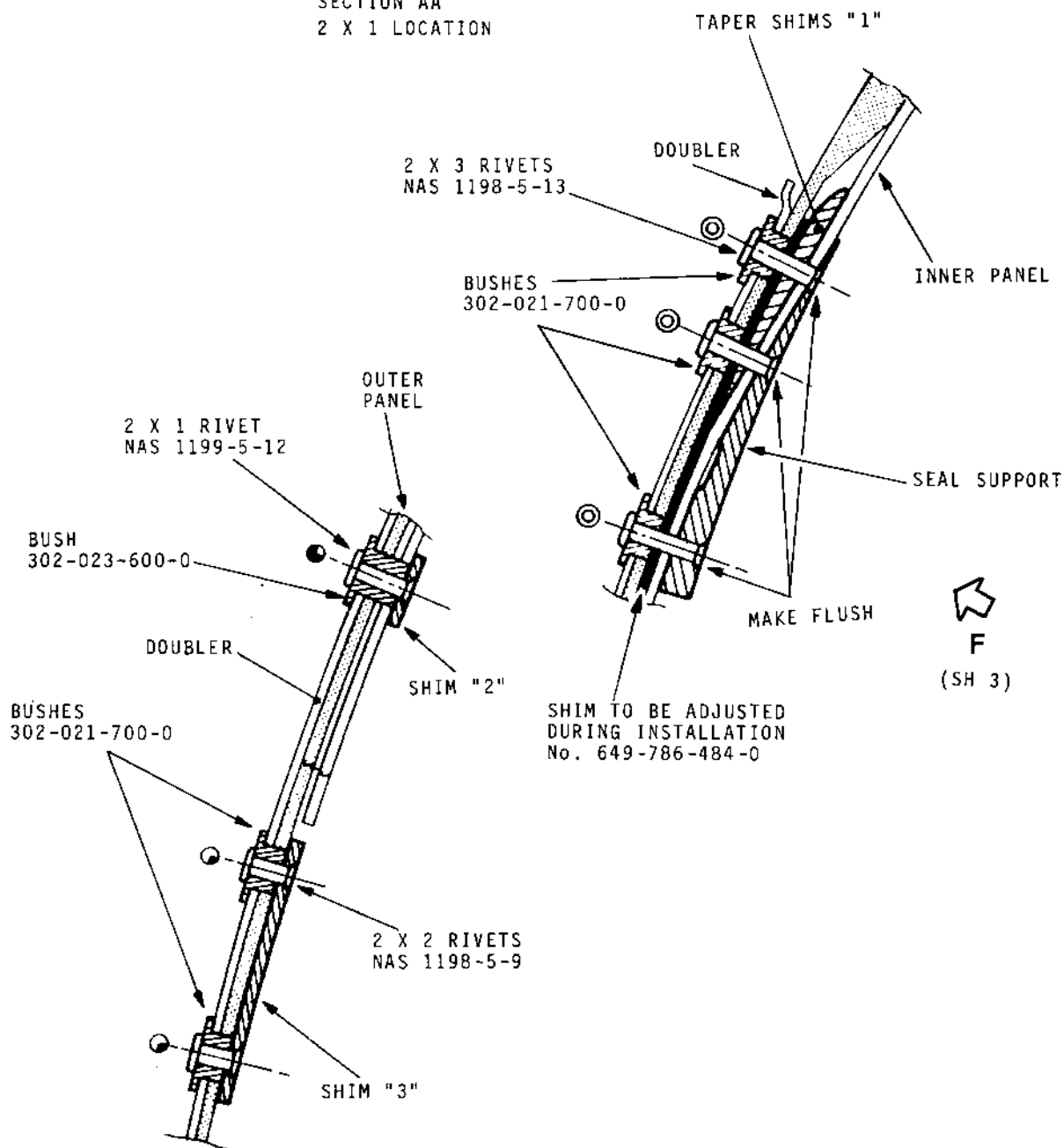


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SECTION AA
2 X 1 LOCATION



Replacement of Doublers
Figure 401 (Sheet 2 of 7)

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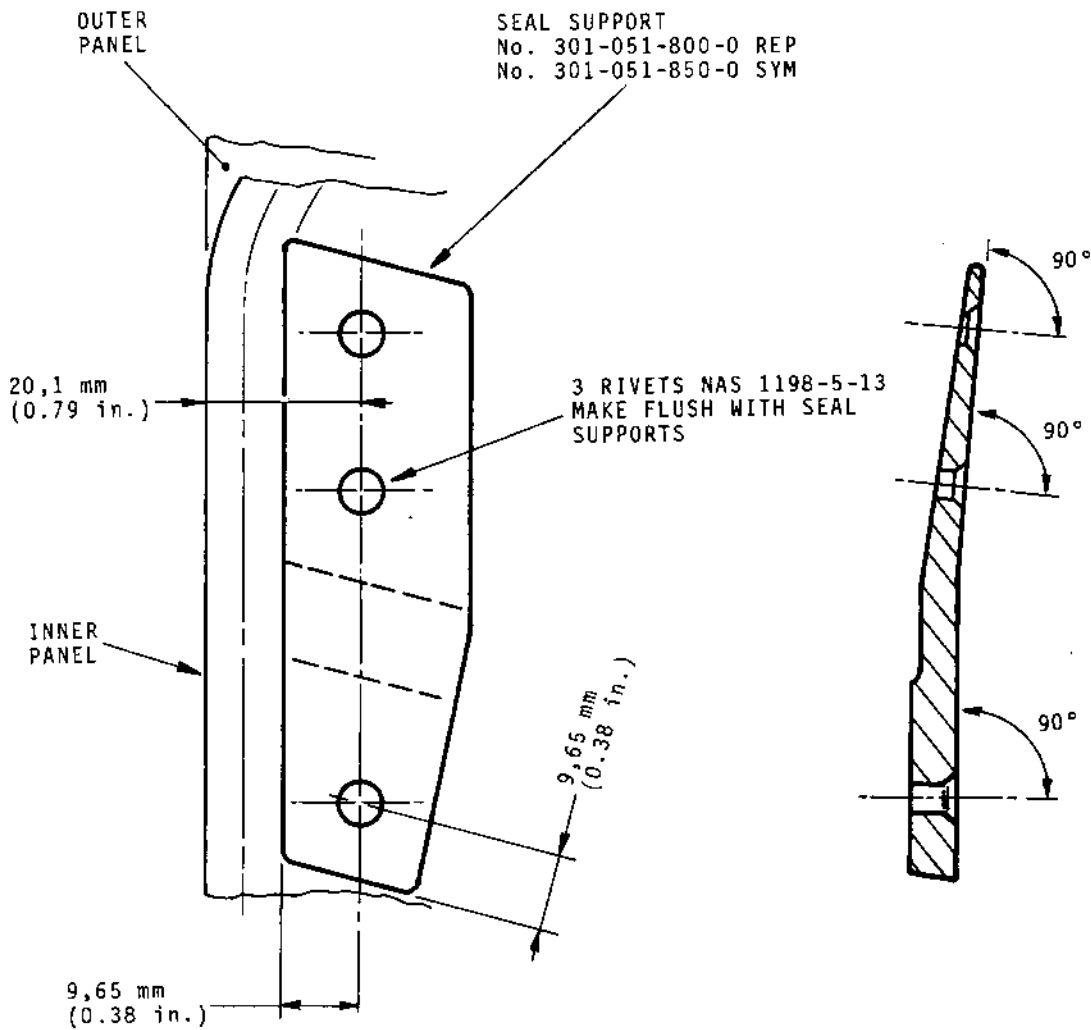


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F



Replacement of Doublers
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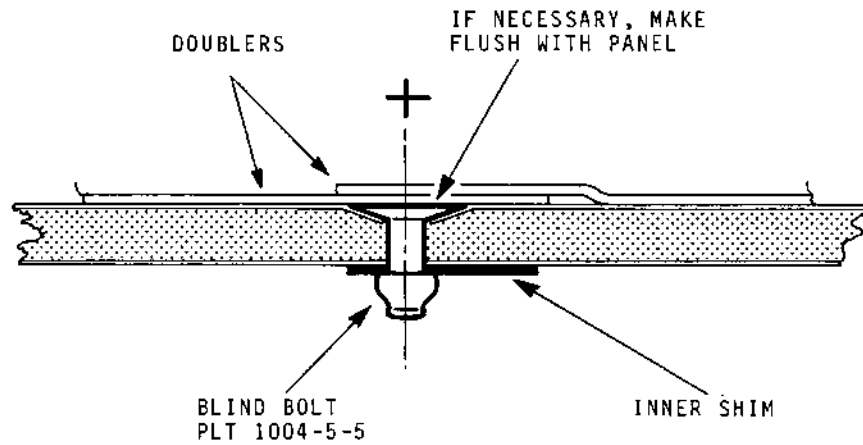


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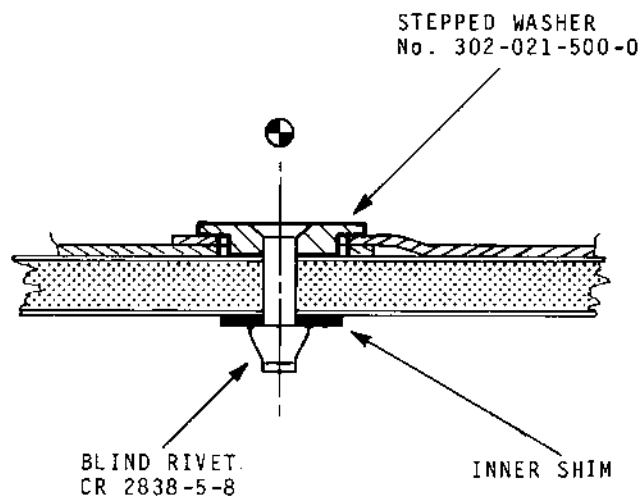
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SECTION BB
2 X 6 LOCATIONS



SECTION CC
2 X 6 LOCATIONS



Replacement of Doublers
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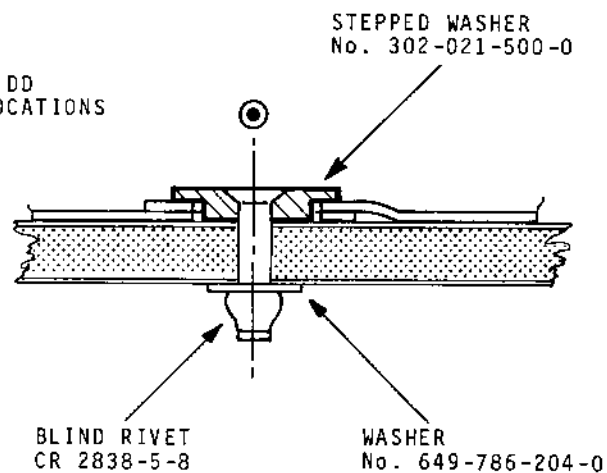


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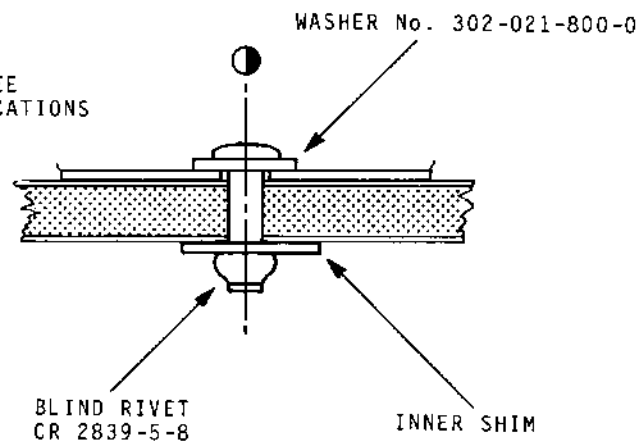
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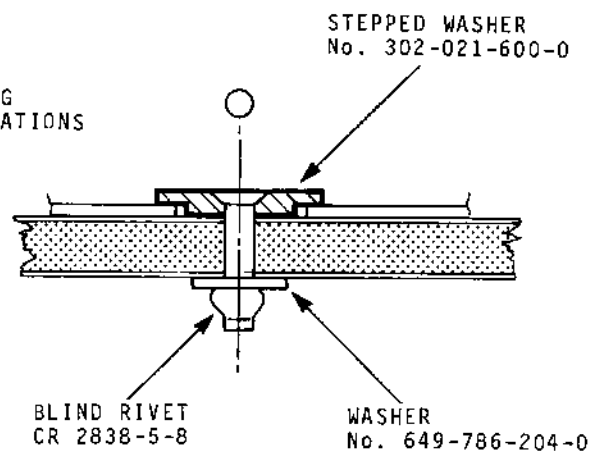
SECTION DD
2 X 2 LOCATIONS



SECTION EE
2 X 5 LOCATIONS



SECTION GG
2 X 5 LOCATIONS



Replacement of Doublers
Figure 401 (Sheet 5 of 7)

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SECTION HH
2 X 7 LOCATIONS

DOUBLER

$$D = 6,35 + 0,1 \text{ mm} \begin{pmatrix} 0.254 \\ 0.250 \end{pmatrix} \text{ in.}$$

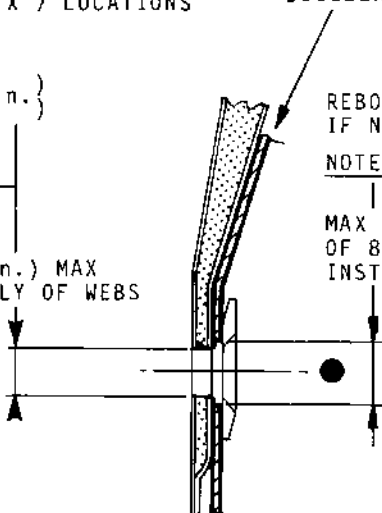
COUNTERDRILL WITH LATERAL
DOUBLERS FOLLOWING EXIS-
TING HOLES IN WEBS

ENLARGE TO 6,8 mm (0.268 in.) MAX
IF NECESSARY DURING ASSEMBLY OF WEBS

REBORE TO 7,5 mm (0.295 in.) MAX
IF NECESSARY WHEN ASSEMBLING DOUBLERS

NOTE : IN DOUBLERS ONLY

MAX ACCEPTABLE ELONGATION
OF 8,8 mm (0.346 in.) DURING
INSTALLATION OF DOUBLERS



ITEMS		DIA FOR DRILLING BUCKET		DIA FOR DRILLING DOUBLER	
TEXT	FIGURE	mm	(in.)	mm	(in.)
"A"	+	4,19 + 0,08 + 0	(0.165) (0.168)	NONE	
"B"	●	9 + 0,02 + 0,01	(0.3544) (0.3548)	10	(0.394)
"C"	⊙	9 + 0,02 + 0,01	(0.3544) (0.3548)	10	(0.394)
"D"	⊗	9 + 0,02 + 0,01	(0.3544) (0.3548)	10	(0.394)
"E"	⊕	4,47 + 0,1 + 0	(0.176)	16	(0.630)
"F"	⊖		(0.180)	(SEE FIGURE 7)	
"G"	○				
"H"	●				
"I"	●	6,35 + 0,1 + 0	(0.250) (0.254)	SEE SECTION HH	
"J"	×	4,06 + 0,1 + 0	(0.160) (0.164)	4,06 + 0,1 + 0	(0.160) (0.164)

Replacement of Doublers
Figure 401 (Sheet 6 of 7)

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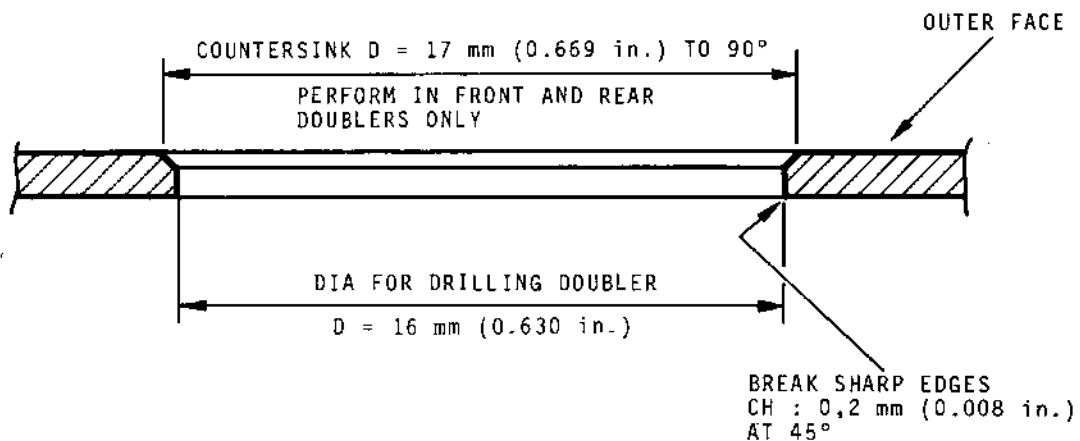


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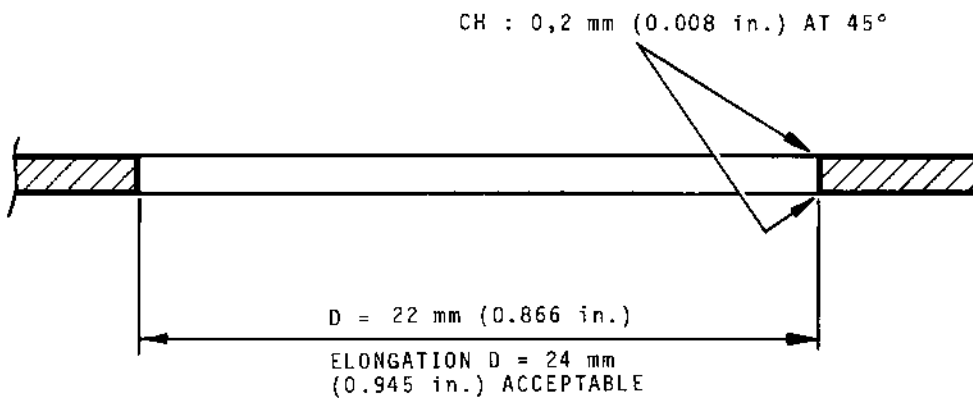
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DRILLING OF STEPPED
WASHER RECESSES



DRILLING PERPENDICULAR
TO NUTS



Replacement of Doublers
Figure 401 (Sheet 7 of 7)

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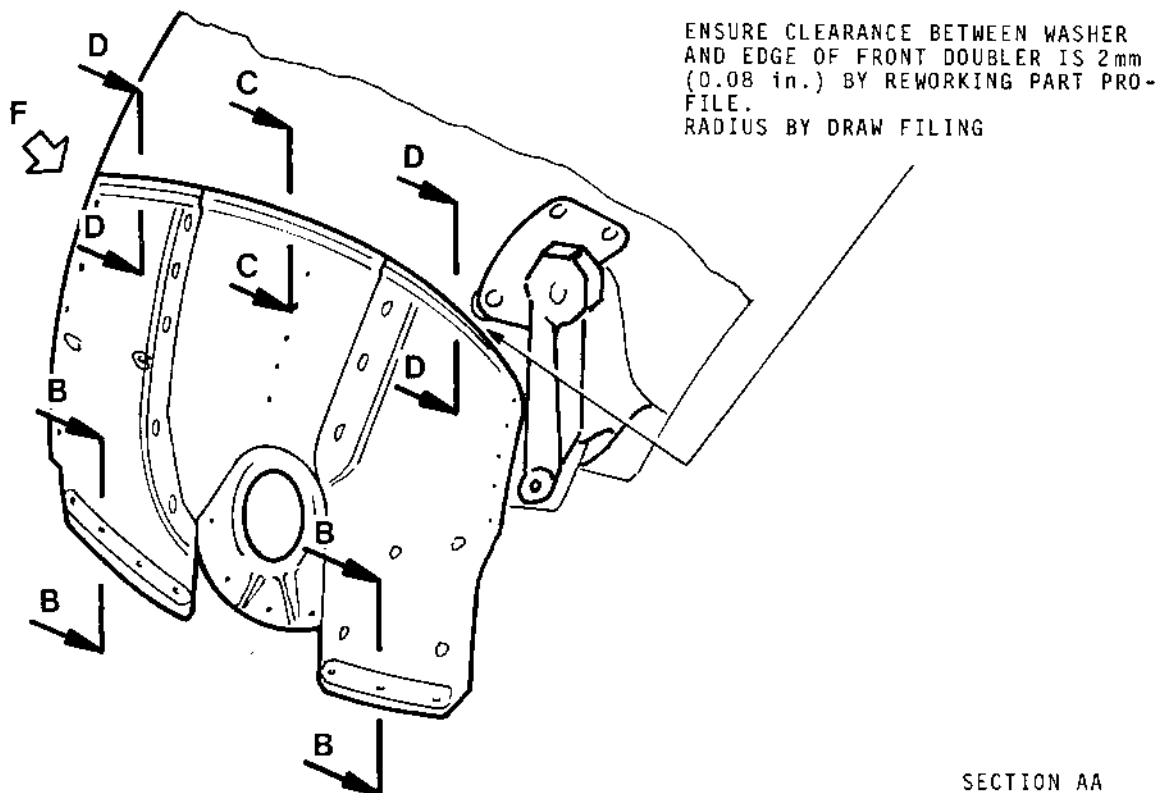
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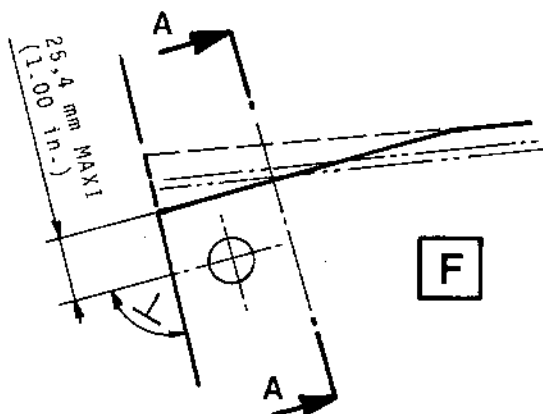


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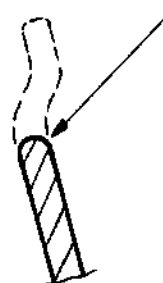
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SECTION AA



RADIUS BY
DRAW FILING



Adjustment of Lateral Doublers
Figure 402 (Sheet 1 of 3)

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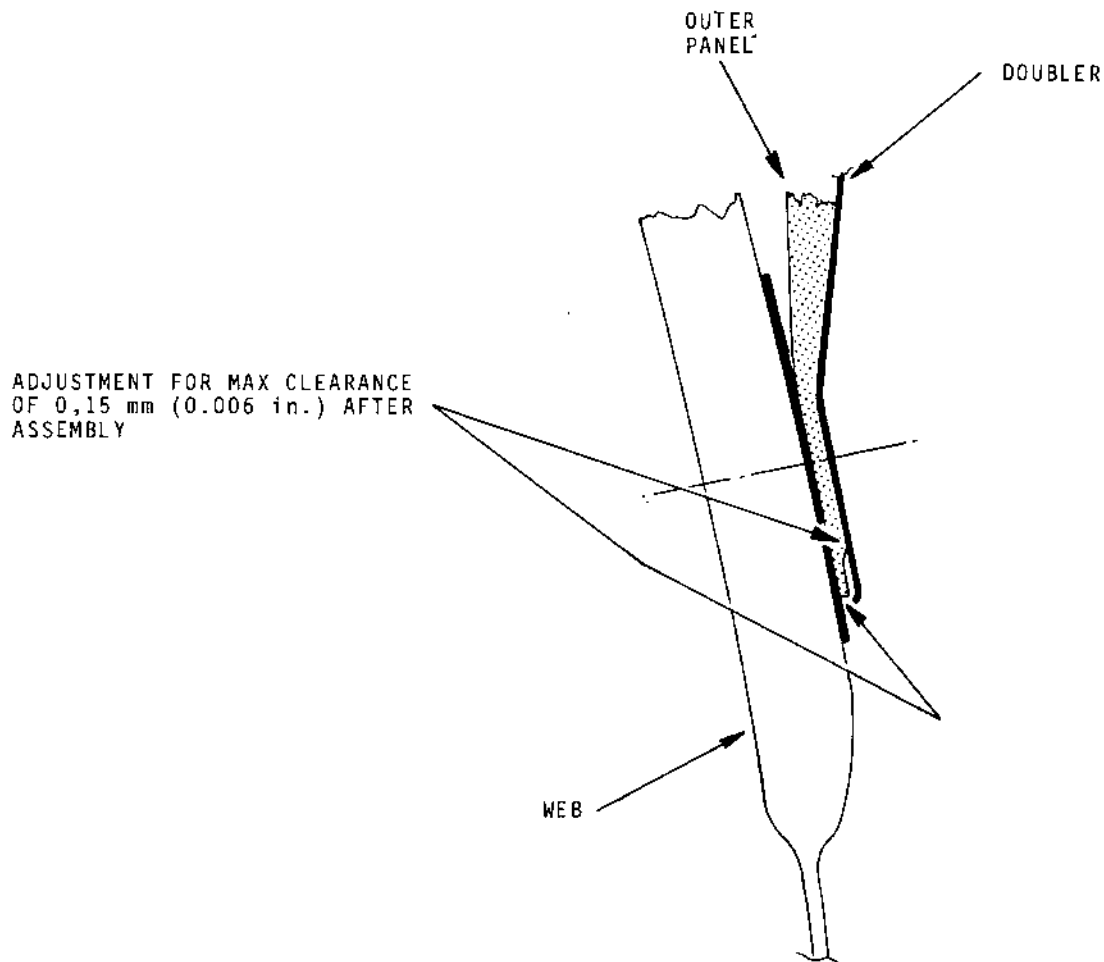


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SECTION BB



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Adjustment of Lateral Doublers
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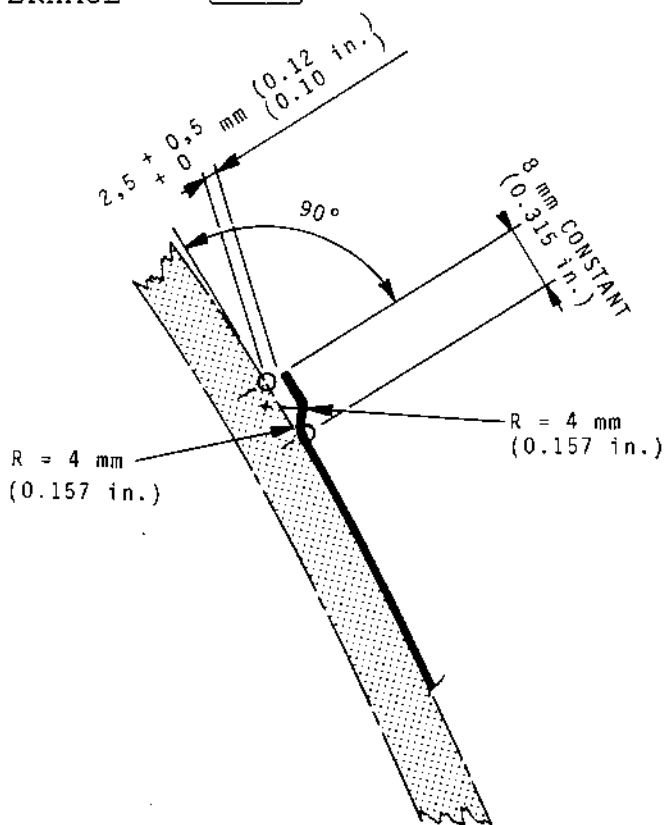


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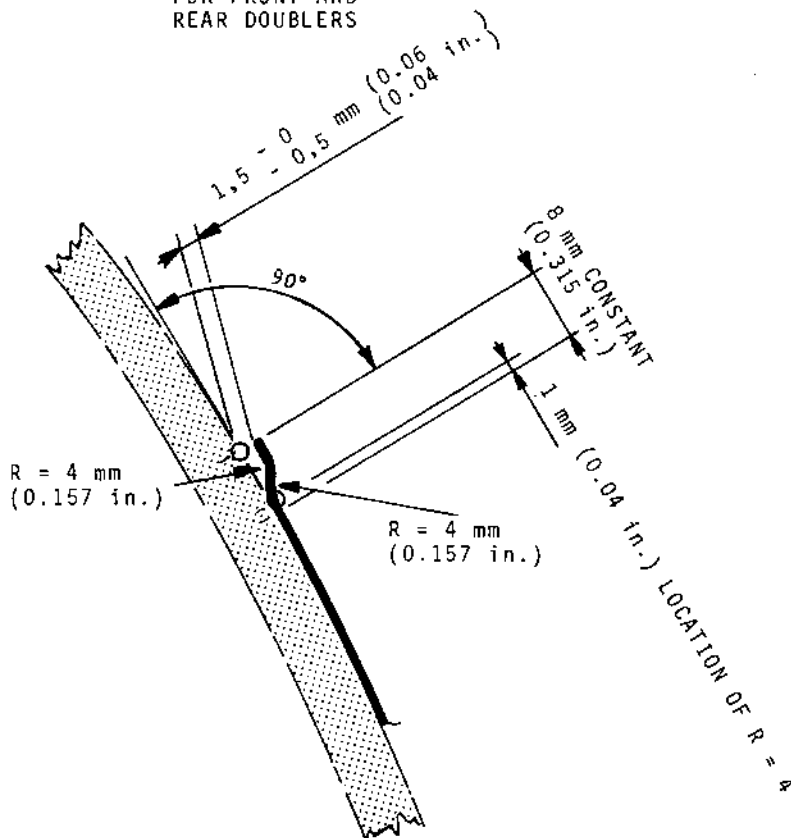
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SECTION CC



SECTION DD
FOR FRONT AND
REAR DOUBLERS



Adjustment of Lateral Doublers
Figure 402 (Sheet 3 of 3)

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REPAIRREVERSER BUCKET (1-460)

17. Repair of cracks located on the panel around the thermal shield attachment points.

PARTS REQUIRED FOR REPAIR

Sheet metal P3305 (PH 15-7M0 or 28CND15)

Thickness: 1 mm (0.04 in.)

Round head rivet NAS1198-5-13 (650-014-115-0)
or 21215CM4822 (650-014-145-0)

F100 head rivet NAS1199-5-8 (650-024-106-0)
F100 head rivet NAS1199-5-9 (650-024-108-0)
F100 head rivet NAS1199-5-12 (650-024-141-0)
or 21217CM4820 (650-024-143-0)

Blind rivet CR2838-6-7 (649-772-191-0)
Blind rivet CR2838-6-8 (649-772-198-0)

Blind bolt PLT 1004-6-6 (649-089-933-0)
Blind bolt PLT 1004-6-6-5 (650-089-951-0)
Blind bolt PLT 1004-6-7 (650-089-934-0)
Blind bolt PLT 1004-6-8 (650-089-935-0)
Blind bolt PLT 1005-8-5-5 (650-772-057-0)
Blind bolt PLT 1011-6-6 (650-089-933-1)
Blind bolt PLT 220-6-3-5 (650-772-031-0)

Crimping nut BNT 1LG 428-7 (649-783-070-0)

Filler wire for welding P3030 (Hastelloy W or ND24FeC)

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A. Introduction.

This procedure provides all the informations necessary for the repair of the inner panel cracked at the attachment point location of the thermal shield.

This repair requires the removal of the inner panel in order to repair it by the installation of doublers.

B. Removal of the inner panel.

- (1) Remove the attachment parts at the bosses level as instructed in REP 1-460-2 and 1-460-3.
- (2) Remove the attachment parts at the leading edge level as instructed in REP 1-460-3 and 1-460-5.
- (3) Remove the attachment parts at the frames level as instructed in REP 1-460-3.

C. Preparation of the doublers.

- (1) From sheet metal P3305, thickness 1 mm (0.04 in.), cut and deburr the following doublers:
 - (a) The outer doubler to dimensions 400 x 600 mm (15.8 x 24.0 in.).
 - (b) The front and rear inner doublers to dimensions 170 x 600 mm (6.7 x 24.0 in.).
- (2) Shape the doublers according to the outlines of the inner panel.
- (3) Mark the location of the thermal shield attachment points on the doublers and machine the openings at 41 mm diameter (1.61 in. Dia).
- (4) Heat-treat the doublers according to procedures M822 and M821 of chapter 70-45-10 of standard practices.
- (5) Clean the doublers according to procedure M100B of chapter 70-15-20 of standard practices.

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- (6) If necessary, rework the holes until correct alignment is obtained, and finish to shape the doublers.

D. Drilling in the panel and in the doublers.

- (1) Lightly rub the surface to be repaired with a very fine emery cloth until the cellular structure is visible.
Blow the dust with compressed air.
- (2) Centre mark the position of the attachment holes in the centre of the cells in the stressskin panel according to figure 401.
- (3) Drill pilot holes of 4,8 mm diameter (0.19 in. Dia) in the centre marked areas. Deburr.
- (4) Position the doublers on the inner panel, then centre mark all the attachment holes. Remove the doublers.
- (5) Drill pilot holes of 4,8 mm diameter (0.19 in. Dia) in the centre marked areas. Deburr.
- (6) Make sure that the holes of the doublers align with the holes of the inner panel. If necessary, rework the holes until alignment is correct.
- (7) Position and fasten the doublers on the inner panel.
- (8) Machine dimples for the recesses of the CR2838 rivet heads at $100^{\circ} \pm 1^{\circ}$ and of 10,2 to 10,6 mm diameter (0.40-0.42 in. Dia) on all the holes of the outer doubler according to figure 401.
Reinstall the fasteners as you proceed.

NOTE: Do not rebores the pilot holes located on the frame in the procedure hereafter.

- (9) Rebores the pilot holes of the attachment holes in the panel to 5,21-5,31 mm diameter (0.205-0.209 in. Dia). Fasten as you proceed.
- (10) Remove the doublers. Deburr all the holes.

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E. Drilling in the outer doubler, in the stressskin panel and in the frames.

- (1) Position and fasten the outer doubler on the inner panel.
- (2) Position the assembly on the reverser bucket and install the fasteners at the frames level, starting by the centre working towards the extremities.
- (3) Rebore the pilot holes at the frames level to 5,21-5,31 mm diameter (0.205-0.209 in. Dia) starting by the centre and working towards the edges of the doubler. Install the fasteners as you proceed.
- (4) Remove the doubler and the inner panel. Deburr all the holes rebored.

F. Preparation of the parts to assemble.

- (1) Cut-out the edges of the doublers in function of the peripheral attachment holes according to figure 401.
- (2) Radius by draw filling the ridge of the doublers surface that must be in contact with the skin of the inner panel according to figure 401.
- (3) Clean the doublers according to procedure M101A of chapter 70-15-20 of standard practices.
- (4) Clean the reverser bucket and the inner panel according to procedure M116 of chapter 70-15-20 of standard practices.

G. Assembly.

- (1) Position and fasten the doublers on the inner panel (except at the frames level).
- (2) Install the blind rivets CR2838-6-7 in the centre of the panel according to chapter 70-50-50 and figure 401.
- (3) Check the installation of the rivets according to chapter 70-50-85.

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- (4) Weld a bead around the attachment bosses of the thermal shield with filler metal (P3030) according to chapter 70-35-10.
- (5) Check the weld beads according to chapter 70-35-80, class B2.
 - (a) Fluorescent penetrant inspect according to procedure M502B of chapter 70-20-10 of standard practices.
 - (b) Carry out a radiographic inspection according to chapter 70-20-30.
 - (c) The defects acceptance criteria are listed in chapter 70-35-80.
- (6) Position the reinforced inner panel on the reverser bucket structure, then install fasteners starting by the centre and working towards the edges.
- (7) Install the attachment parts of the inner panel on the reverser bucket structure starting by the centre working towards the edges.
 - (a) Install blind rivets at the level of the doubler according to chapter 70-50-50 and figure 401.
 - (b) Install the attachment parts at the frames level according to REP 1-460-3 of this present overhaul manual.
 - (c) Install the attachment parts at the trailing edge level according to REP 1-460-3 and 1-460-5 of this present overhaul manual.
 - (d) Install the attachment parts at the bosses level according to REP 1-460-2 and 1-460-3 of this present overhaul manual.
- (8) Check the installation of the attachment parts according to REP 1-460-2, 1-460-3, 1-460-5 and chapter 70-50-50 for the rivets CR2838-6.
- (9) Remove all the machining debris by suction through the borescope holes.

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REP 1-460-17

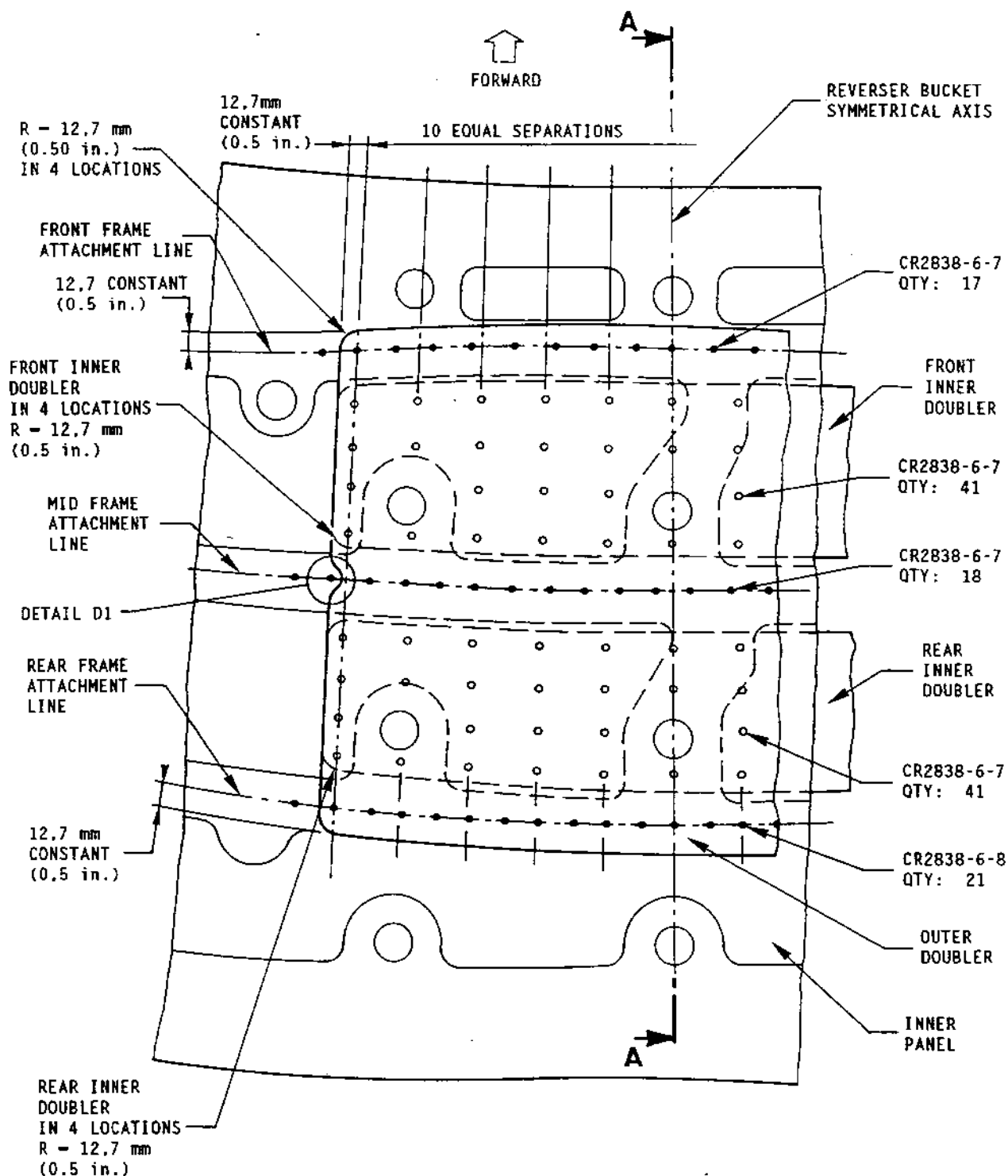
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Reinforcement of the thermal shield
attachment points
Figure 401 (Sheet 1 of 3)

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REP 1-460-17

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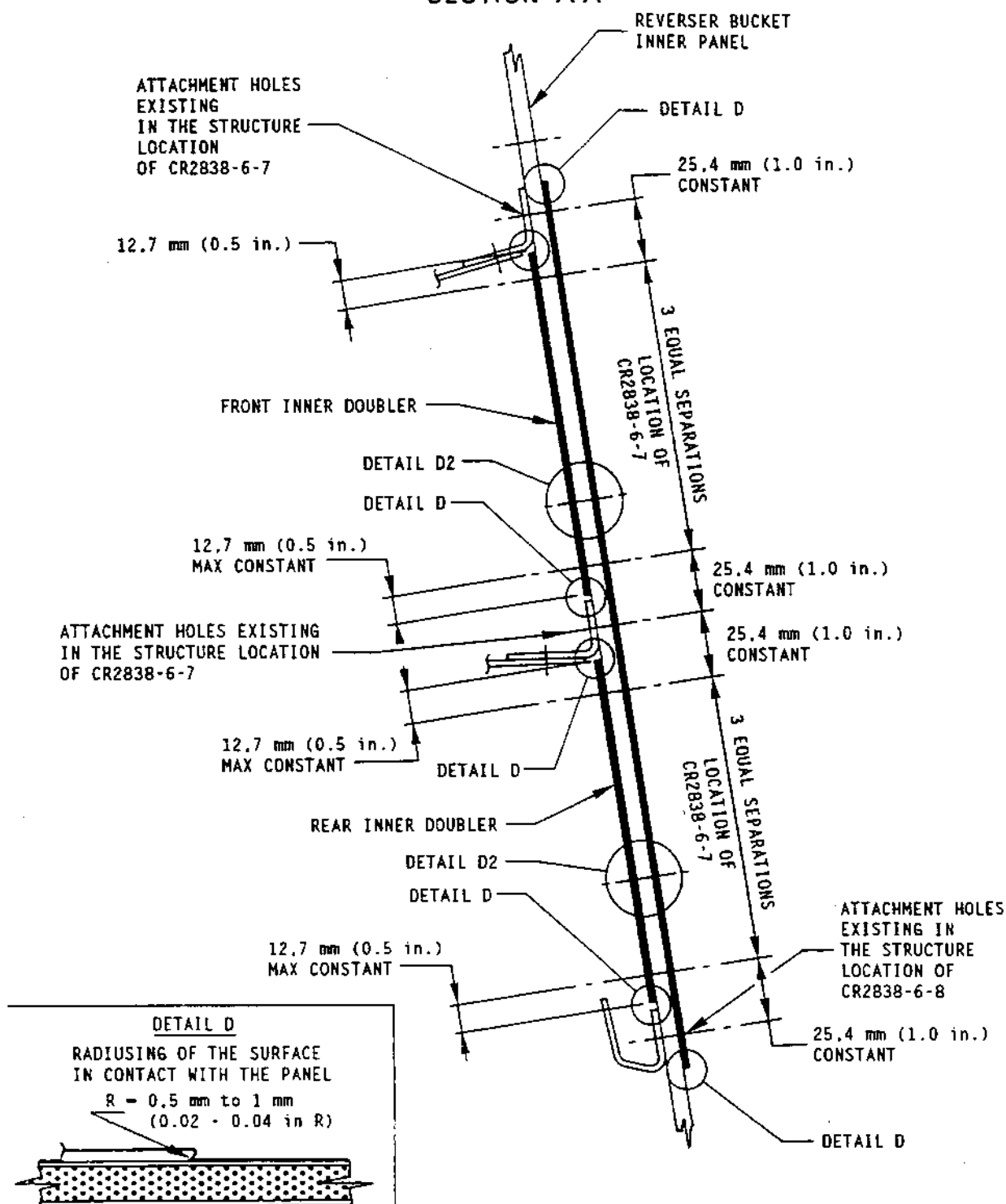


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SECTION AA



Reinforcement of the thermal shield
attachment points

Figure 401 (Sheet 2 of 3)

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REP 1-460-17

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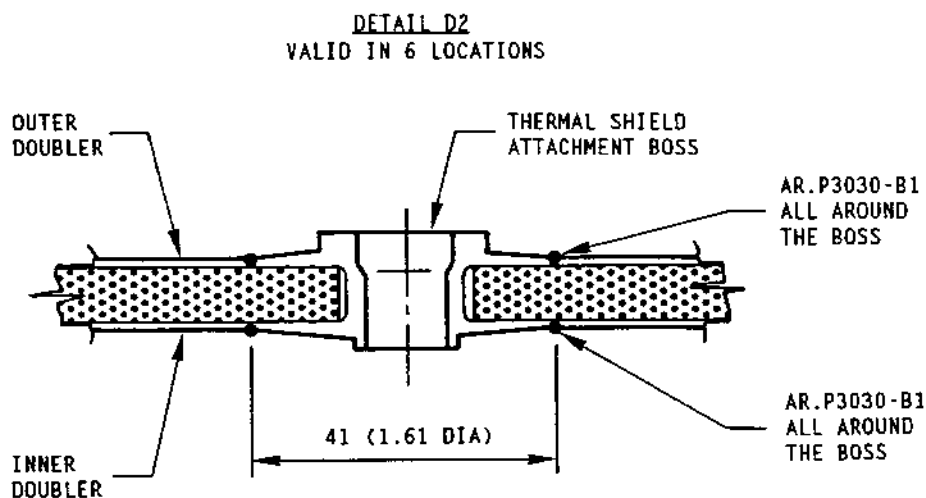
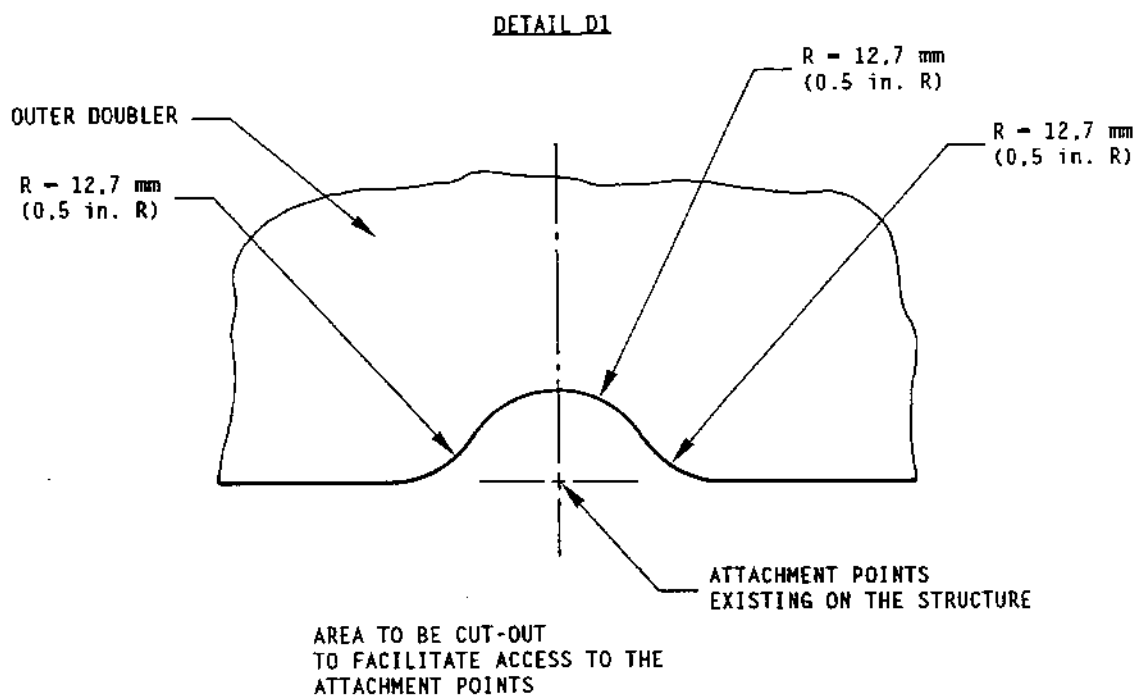
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Reinforcement of the thermal shield
attachment points

Figure 401 (Sheet 3 of 3)

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REP 1-460-17

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**OLYMPUS 593**MK.610-14-28
OVERHAULREPAIRREVERSER BUCKET (1-460)18. Repair of the leading edge panel

PARTS REQUIRED FOR REPAIR

Filler metal	P3030	(ND24FeC)
Powder	P3219	(Ni-Cr-Al 45-90 μ m)

- A. In the areas extremely worn, or of uneven profile, weld build-up area(s) with tungsten inert gas according to chapter 70-35-10, paragraph 2.
- (1) Filler metal: P3030 (ND24FeC)
- (2) Class of weld: A.
- B. Check build-up of class A weld according to chapter 70-35-80.
- C. Blend welded areas flush with surrounding material. Polish the area to be thermal-sprayed.
- D. Thermal-spray the contact surface of the leading edge panel according to figure 401 and chapter 70-65-20.
- (1) Powder P3219 (Ni-Cr-Al).
- (2) Thickness of deposit: 0.10 to 0.15 mm
(0.004-0.006 in.)
- E. Check thermal spraying according to chapter 70-65-80.
- F. Mark "REP 18" following the identification number of the part according to method M28 of chapter 70-10-10.

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REP 1-460-18

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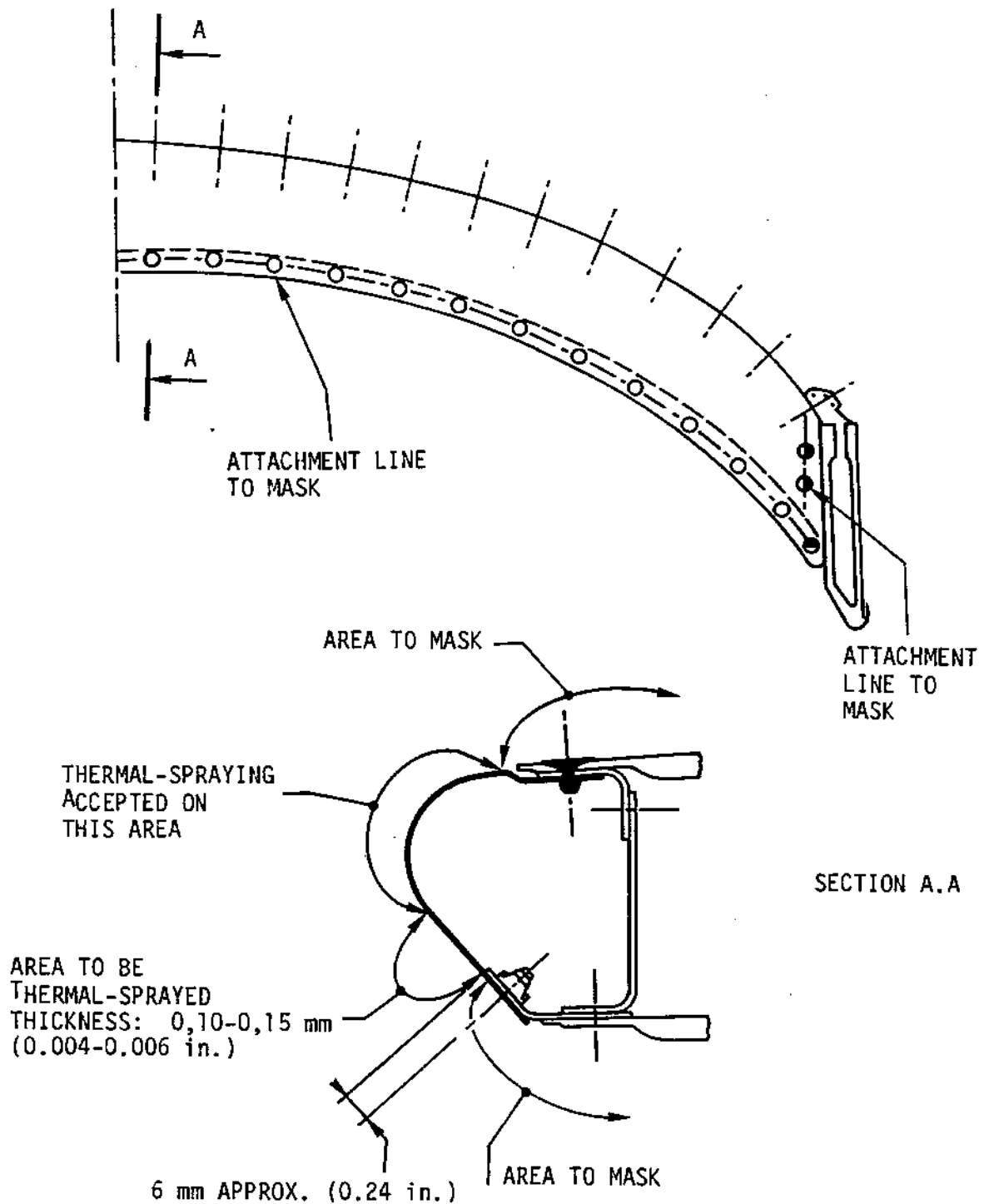


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1/2 FRONT VIEW



Thermal spraying of the leading edge
Figure 401

**OLYMPUS 593****MK. 610-14-28****OVERHAUL****REPAIR****REVERSER BUCKET (1-460)****19. Reconditioning of the Thread Insert Housing in an Inaccessible Riveted Nut.**

PARTS REQUIRED FOR REPAIR

Filler metal	P3030
Bar for bushing	P3601

A. Machining.

- (1) Machine out the thread insert housing by drilling to 10,30-10,35 mm (0.4055-0.4075 in.) diameter, according to figure 401.
- (2) Rebore the spacer plate and the hub to 11,250-11,268 mm (0.44291-0.44362 in.) diameter according to figure 402.
- (3) Chamfer the edges of the bore according to figure 402.

B. Machining of the Bushing.

- (1) Machine the bushing in the bar P3601 according to figure 403.

C. Installation of the Bushing.

- (1) Chill bushing in liquid nitrogen and install it in its housing according to figure 404.
- (2) Secure the bushing to the spacer plate by tungsten inert gas arc welding according to chapter 70-35-10.
 - (a) Filler metal: P3030.
 - (b) Welding class: B1.
- (3) Blend the weld bead flush into the profile of the spacer plate face.

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D. Welding Check.

- (1) Plug the threaded hole with an elastomer plug.
- (2) Check the weld bead according to chapter 70-35-80, class B1.
 - (a) Carry out a local inspection, with water washable fluorescent penetrant according to procedure M503B of chapter 70-20-10.
 - (b) No crack allowed.

E. Installation of the Threaded Insert.

- (1) Install the threaded insert in the bushing according to REP-1-460-2 of this present overhaul manual.

F. Marking.

- (1) Mark "REP 19" following the identification number of the part according to method M28 of Chapter 70-10-10.

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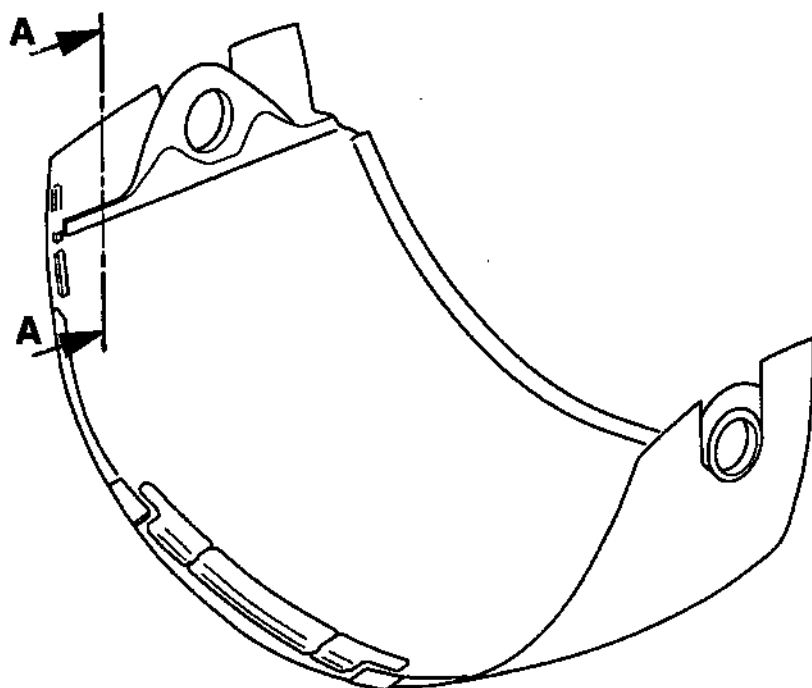
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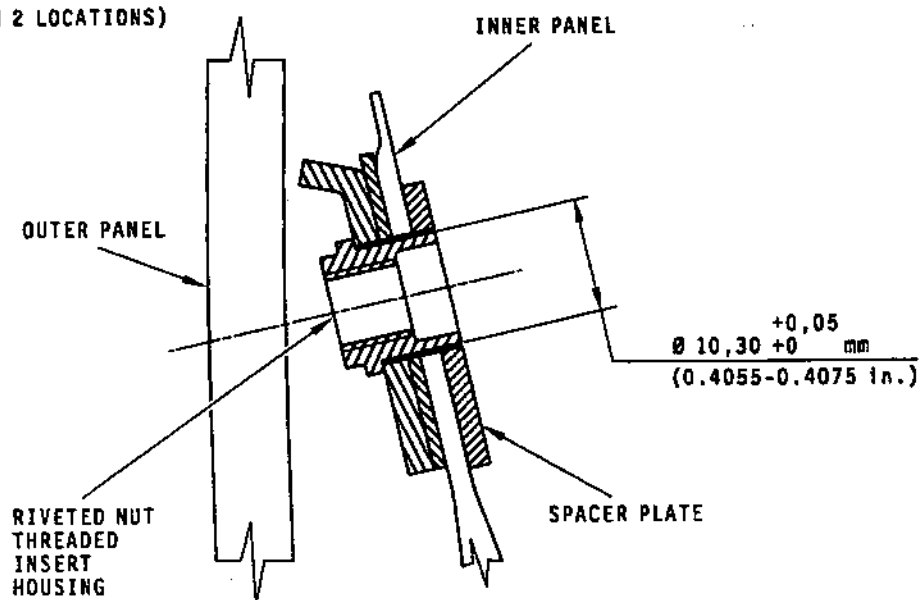
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SECTION **AA**
(VALID IN 2 LOCATIONS)



S-OLY-SM-00056-00-B

Removal of the Threaded Insert
Figure 401

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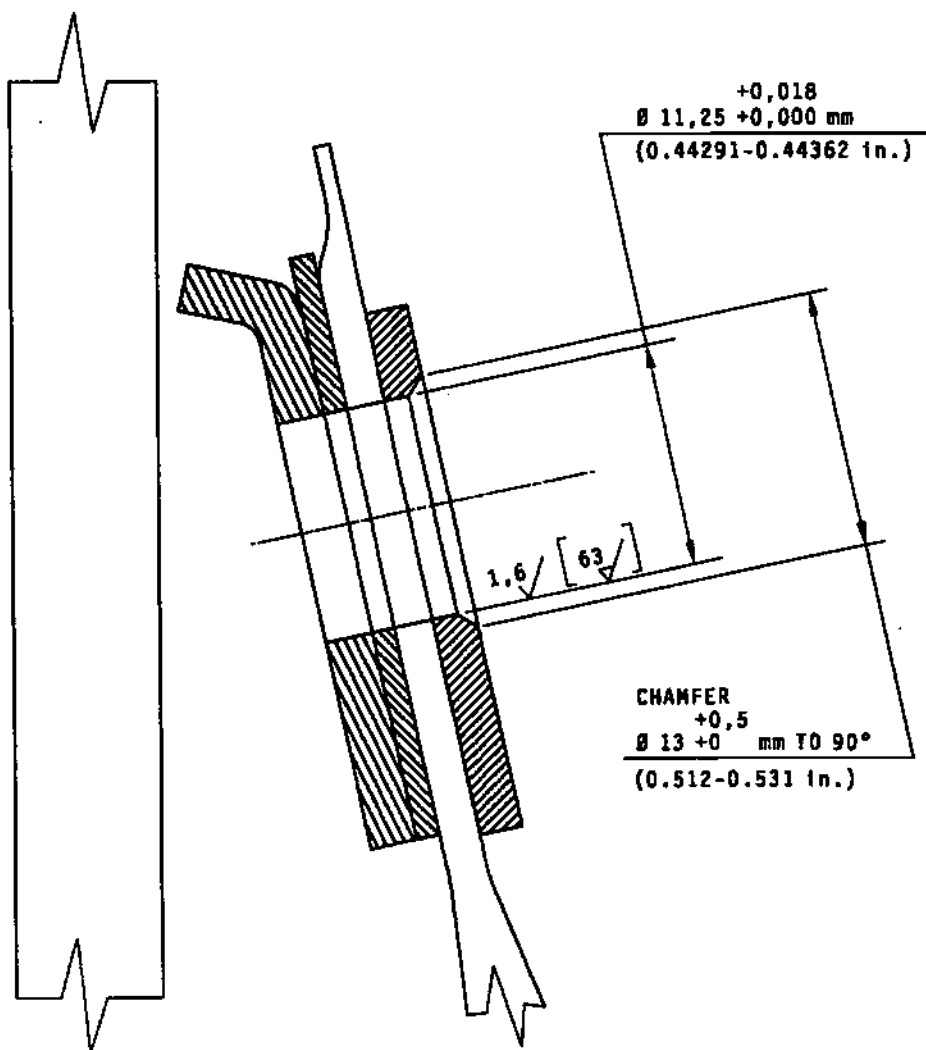
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ROUGHNESS : $3.2 \sqrt{[125/]}$

UNLESS OTHERWISE SPECIFIED

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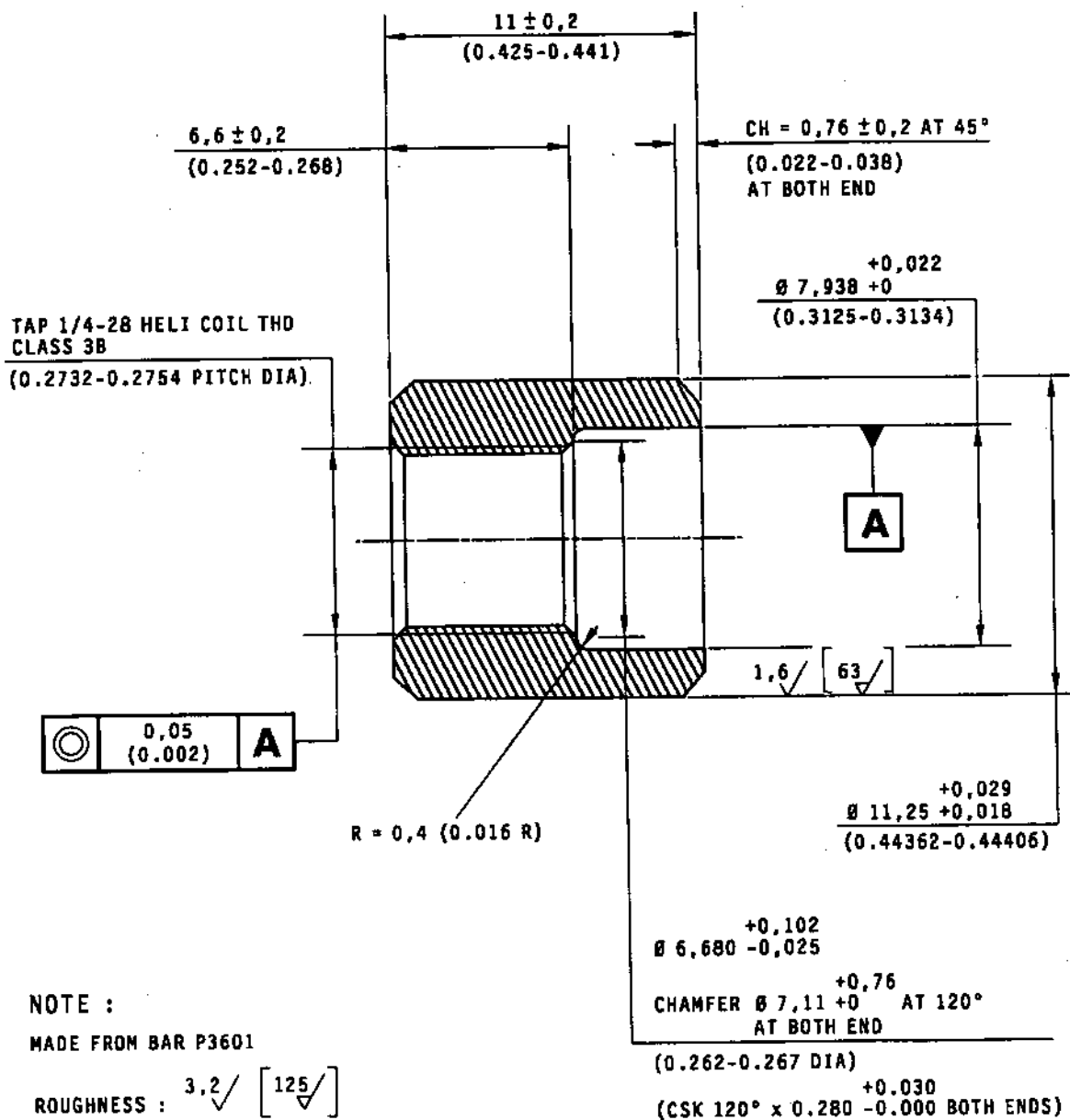
Machining of the Bushing Housing
Figure 402

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**OLYMPUS 593****MK. 610-14-28
OVERHAUL****sneema****S-OLY-SM-00058-00-B**

Machining of the Bushing
Figure 403

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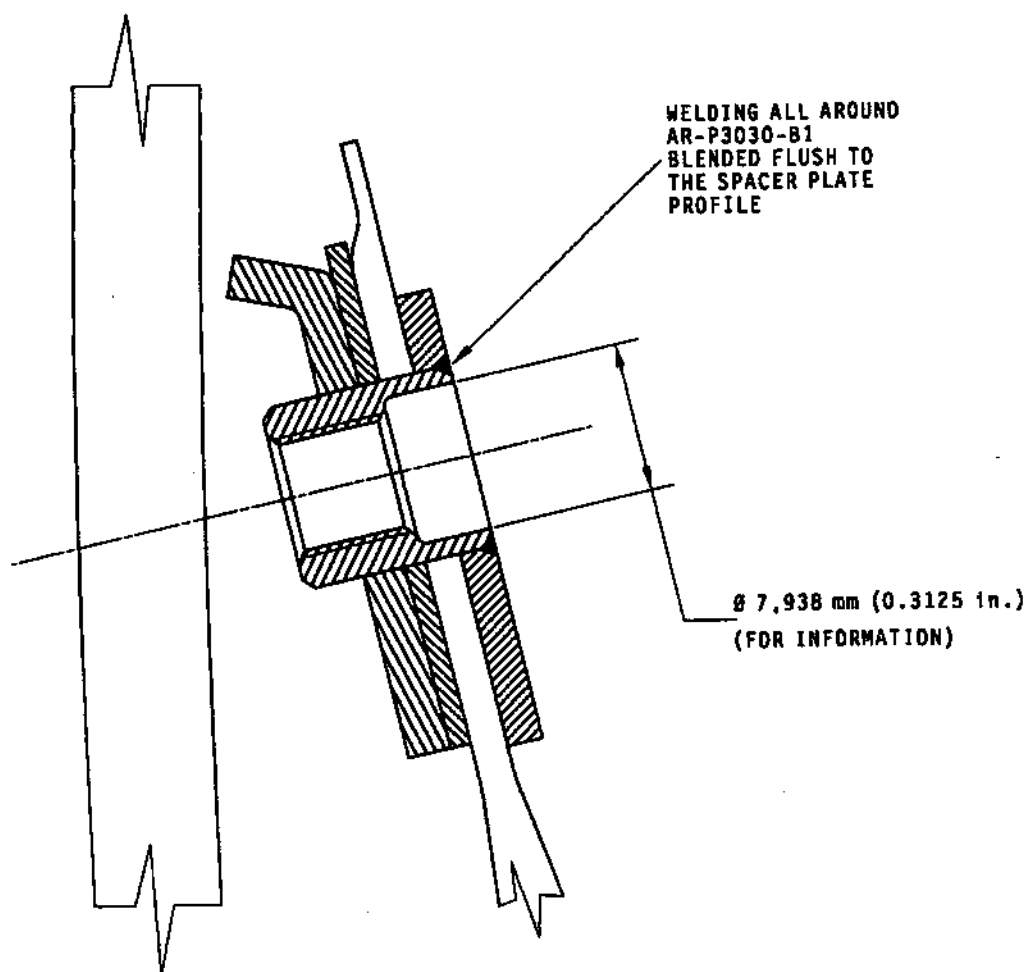
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S-OLY-SM-00059-00-B

Installation of the Bushing
Figure 404

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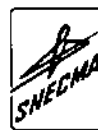
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ASSEMBLY

1. General

- A. During assembly, follow the general recommendations given in chapter 70-65-00 of the Standard Practices Manual and the working procedures of the Overhaul manual.
- B. Use only tools and other special equipment nominated in the assembly procedures and identified by a number SC... ; these tools are shown in the Illustrated Tools and Equipment Manual (I.T.E.M.)
- C. When assembling bolts and nuts, refer to pages 601-700 of the "Fits and Clearances" chapter for :
- (1) The tightening torque for the bolt or nut.
 - (2) The lubrication to be applied to the nut or the bolt before fitting.
- D. The clearances to be checked during assembly are identified by a number. Refer to pages 601-700 of the "Fits and Clearances" chapter for the values which must be complied with.
- E. In the working procedures section of the manual, parts are referenced to the IPL by two numbers in brackets, the first of which is the figure number in the IPL, the second being the item number within that figure.
- F. Torques should be applied with a torque spanner accurate to $\pm 5\%$.
- G. Shimming
- (1) Conditions related to the use of shims.

Shims may be employed in the case where adjoining of the various components necessitates the use of external loads liable to generate heavy stresses.
 - (2) Shim design characteristics.

Shim dimensions will be dictated by the overhaul requirements upon assembly of any new item.

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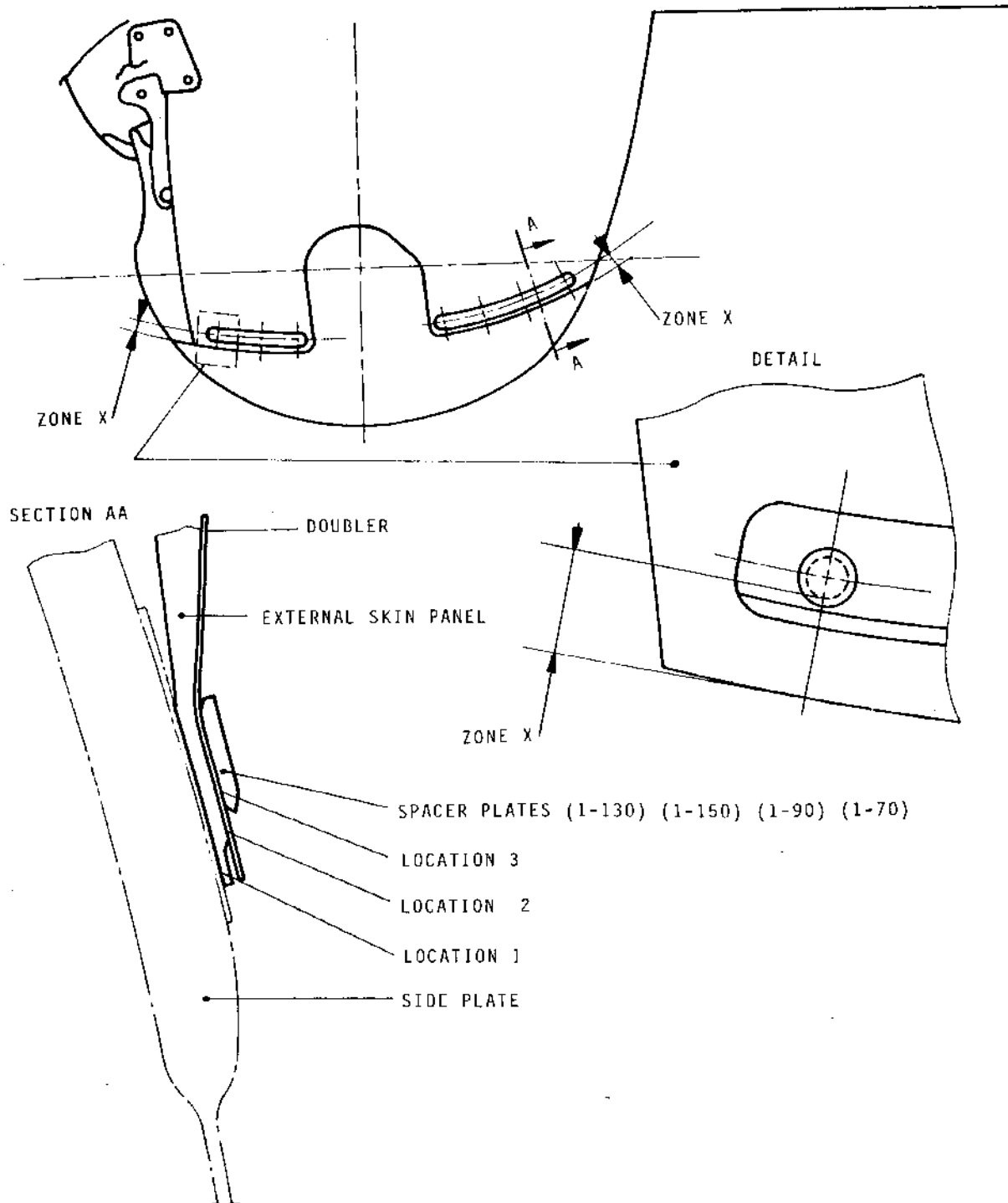
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Installing the Side Plates
Figure 1

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NOTE : When shims are installed, it is essential to use shims made from the same material, at the same location.

T 40 (P3340)
T 50 (P3345)
Z 10 CNT 18 (P3301)
Z 8 CND 15 (PH15-7MO)

H. Fastener design characteristics

Fasteners required for joining the parts are detailed in the IPL taking into account the nominal thickness of the various components to be assembled.

Past experience shows that these thicknesses can vary thus rendering, in some cases, assembly work impracticable (tolerances on each component, zones locally collapsed on panels, cushioning effect...).

Therefore, during an assembly procedure it is permissible to mount fasteners whose lengths are different from the recommended ones.

Their type and diameter, however, must comply with the fastener design characteristics.

2. Assembling the Reverse Buckets

For each bucket, carry out the following operations :

NOTE : Assembly of the buckets is carried out with the buckets installed on the storage stand tool SC 37.

A. Installing the side plates.

(1) General

When side plates (1-110) and (1-50), external skin panels, doublers and spacer plates are adjoined (brought together), the permissible clearance shall not exceed 0,15 mm (0.006 in.) in zone X and at one of the locations shown in section A-A, Figure 1. The mechanical pressure induced by the tightening torque being not important enough due to friction (counter-sunk head screws), adjoining of the parts, before tightening the screws, will be carried out using clamps screwed by hand. The bearing points of the clamp jaws shall be applied within the fastening intervals. Use protective blocks to prevent damage to the parts.

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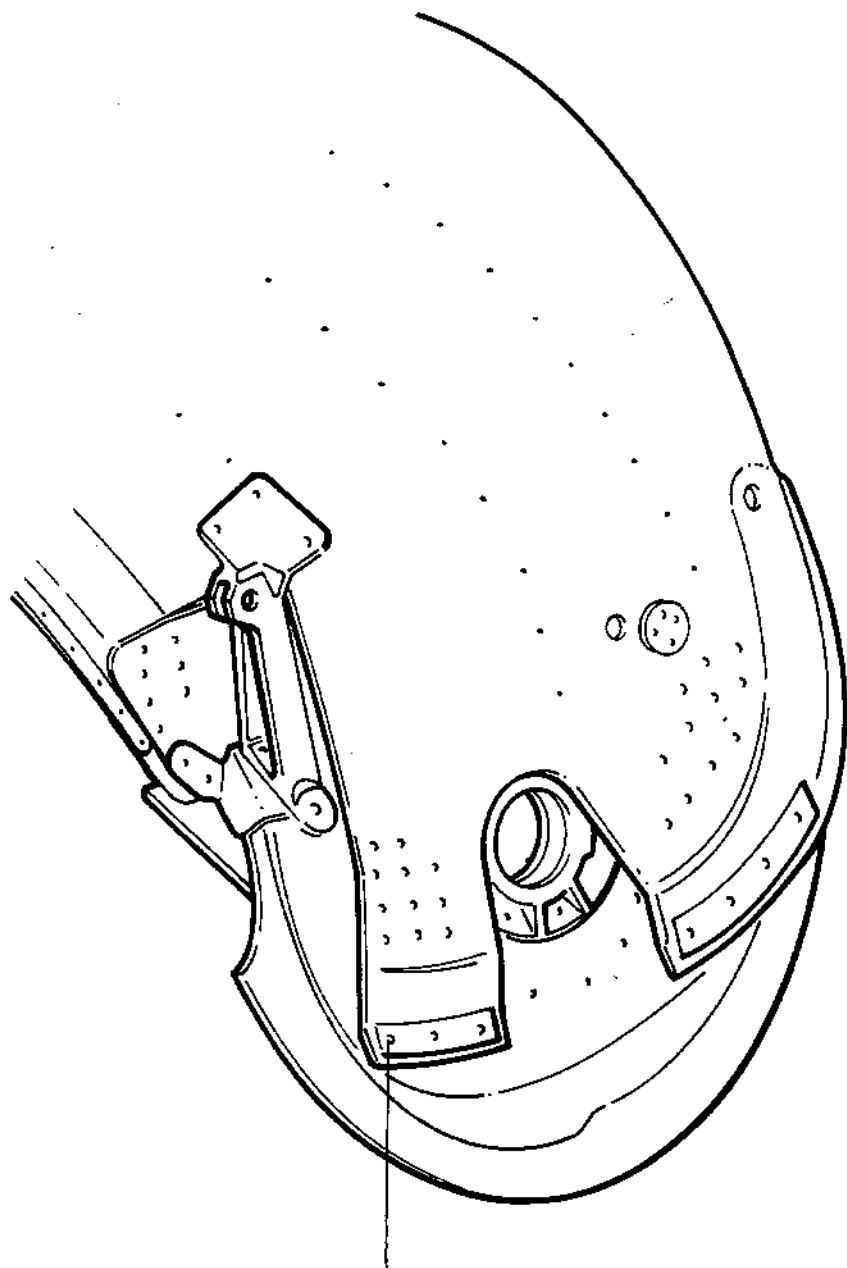
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7 IDENTICAL HOLES FOR FASTENING OF THE
SIDE PLATES ON THE BASIC BUCKET (1-460)

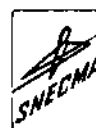
Aligning the Attachment Holes
Figure 2



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- (2) Install the original side plate (1-110);
 - (a) Position the side plate (1-110) on the basic bucket (1-460) and secure it using bolts (1-160) inserted from the inner side of the bucket.
 - (b) Position the spacer plate (1-130) on the side plate external face and attach it using screws (1-120).
 - (c) Position the spacer plate (1-150) on the side plate external face and attach it using screws (1-140).

NOTE : Be careful to position the spacer plates (1-130) and (1-150) with their chamfered side against the side plate.

- (d) Tighten the screws to the prescribed torques.

- (3) Install the original side plate (1-50)
 - (a) Position the side plate (1-50) on the basic bucket (1-460) and secure it using bolts (1-100) inserted from the inner side of the bucket.
 - (b) Position the spacer plate (1-70) on the side plate external face and attach it using screws (1-60).
 - (c) Position the spacer plate (1-90) on the side plate external face and attach it using screws (1-80).

NOTE : Be careful to position the spacer plates (1-70) and (1-90) with their chamfered side against the side plate.

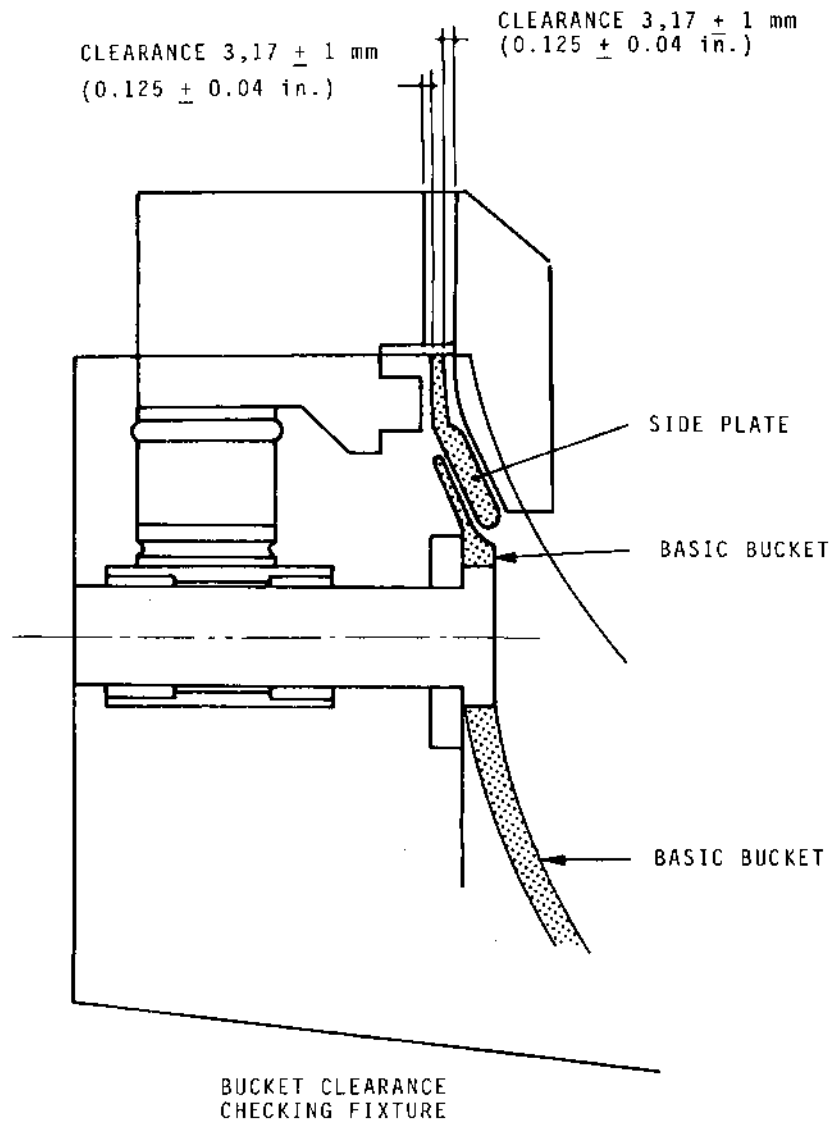
- (d) Tighten the screws to the prescribed torques.

- (4) Installing a new side plate (1-50)
 - (a) Position spacer plate (1-50) on the basic bucket (1-460).
 - (b) Check for correct alignment of side plate-to-basic bucket attachment holes for screws (1-80) and (1-60).



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Checking the Side Plate Position
Figure 3

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NOTE : If holes are not aligned, elongate them slightly until attachment screws can be freely inserted and carry out assembly procedure as indicated below see fig. 2.

- (c) Position side plate (1-50) on the basic bucket (1-460) and secure it using bolts (1-100) inserted from the inner side of the bucket. Hand-tighten the bolts.
- (d) Install spacer plates (1-70) and (1-90) then, position screws (1-80) on spacer plate (1-90) and (1-60) on spacer plate (1-70).

NOTE : For the above operation, use slave bolts with a reduced diameter obtained by etching.

- (e) Place the bucket on fixture - tool SC 273 - and check the clearance dimension of $3,17 \pm 1$ mm (0.125 ± 0.04 in.), fig. 3. Adjust clearance within limits by addition of shims (1-105) and (1-107) if required. These shims are to be inserted between side plate and bucket hinge-point support, and bonded using CYANOLITE TYPE 202 (P496).
- (f) Check clearance again, once the assembly operation is completed and that the external screws (1-60) and (1-80) are tightened on spacer plates (1-90) and (1-70). Tighten the screws to be prescribed torques.

NOTE : Should several shims be required for a correct assembly, use shims made from the same material ; besides, they are not symmetrical.

CAUTION : NEVER USE SLAVE SCREWS FOR FINAL ASSEMBLY. SLAVE SCREWS SHALL BE CLEARLY IDENTIFIABLE.

- (5) Installing a new side-plate (1-110)
 - (a) Perform the same operations as above, using shims (1-165), (1-167), screws/bolts (1-160), (1-140) and (1-120) instead.
- (6) Using the side plate scribing gauge - tool SC 274 -, trace on side plates a radius of 247,50 mm (9.744 in.) from the hinge-point center (or hub) towards the side plate leading edge ; remove material in excess, deburr and round off. See Figure 4.

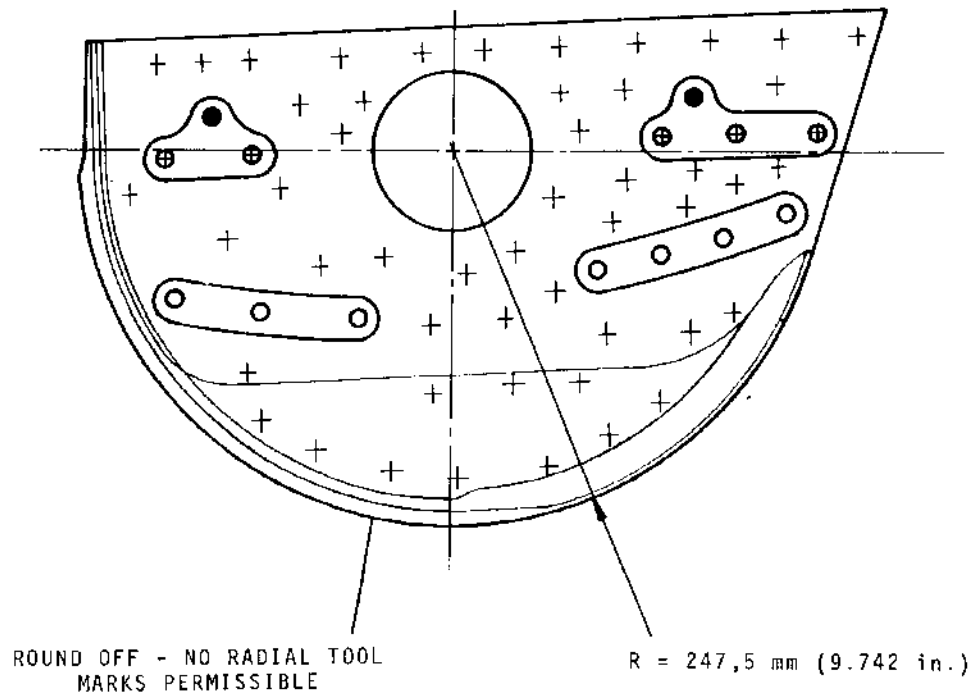
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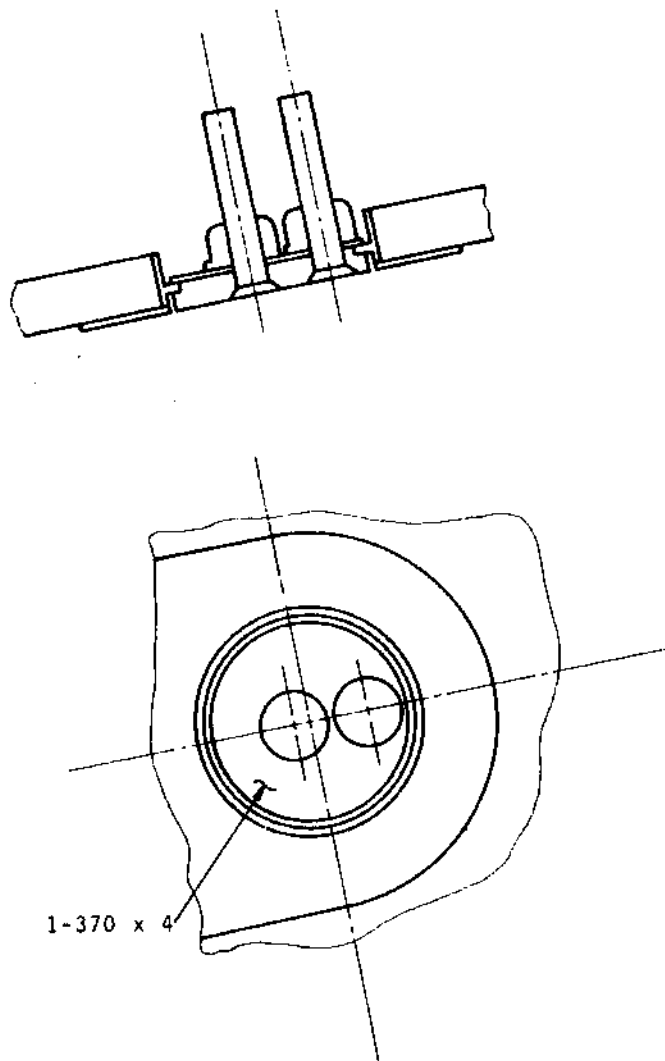


Adjusting the Side Plate Leading Edge
Figure 4

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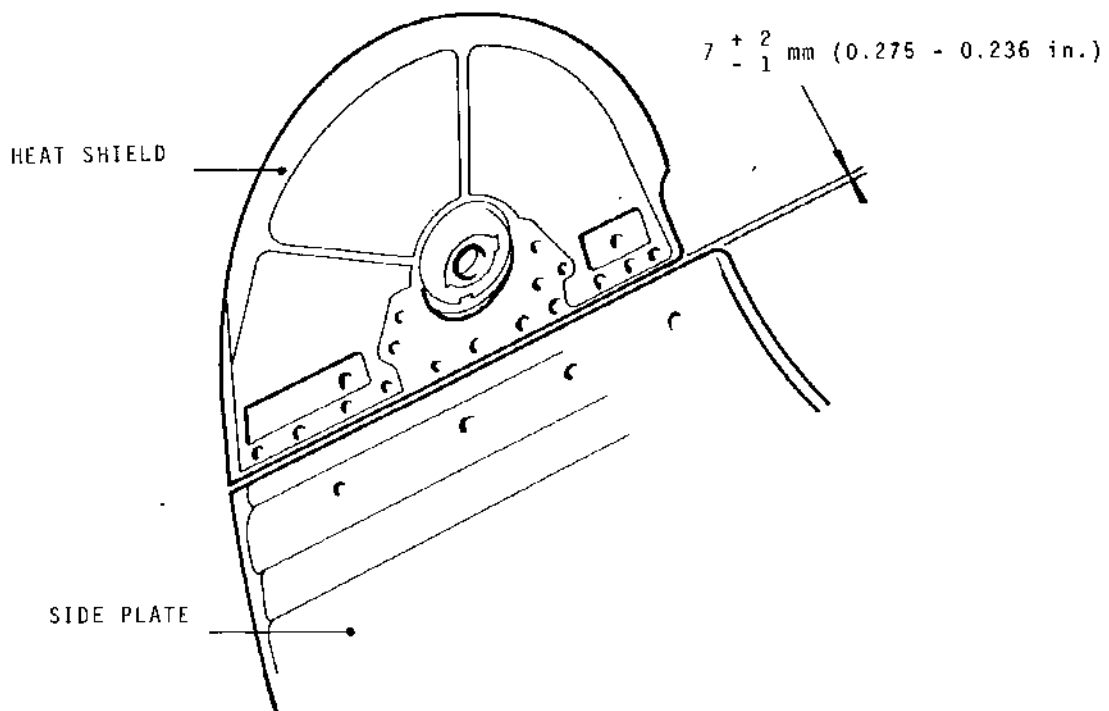
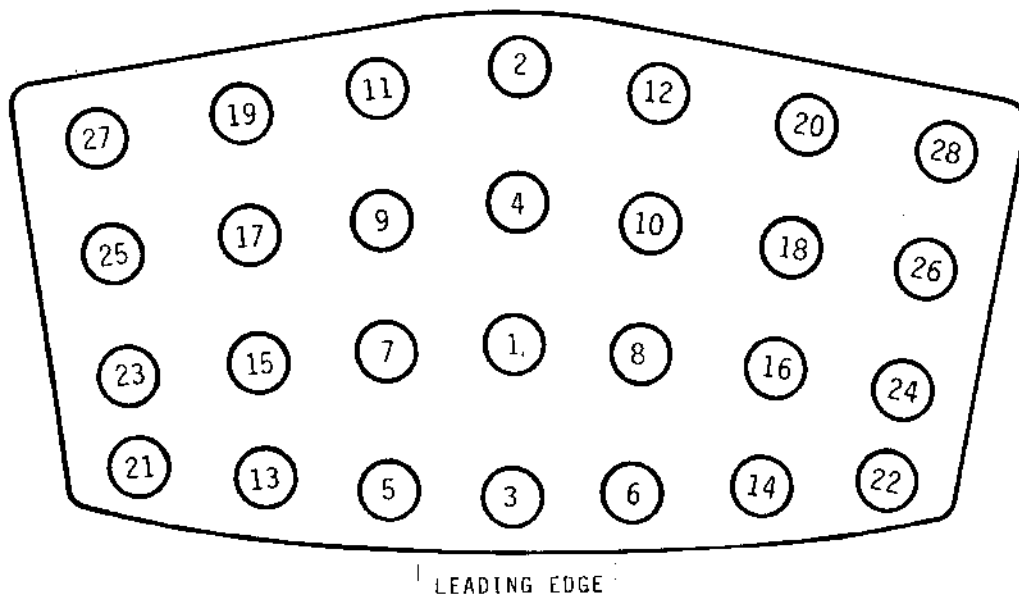


Installing the Cover Assemblies
Figure 5



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Heat Shield Installation
Figure 6

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NOTE : No radial tools marks permissible.

B. Install the primary and secondary heat shields assemblies

- (1) Install cover assemblies (1-370) on the basic bucket (1-460). Tighten the screws to the prescribed torque. (Fig. 5).
- (2) Screw in the threaded sleeves (1-20) using the special wrench - tool SC 206 - and torque to the prescribed values.
- (3) Position the secondary heat shield (1-40) and locate it relative to the threaded sleeves.
- (4) Locate the primary heat shield assy (1-30) and secure it to the threaded sleeves (1-20) using the screws (1-10).
- (5) Pre-tighten screws (1-10) per sequence shown on figure 6. Tighten the screws (1-10) to the prescribed torque.
- (6) Check the $7 \begin{smallmatrix} + 2 \\ - 1 \end{smallmatrix}$ mm (0.275 - 0.236 in.) clearance between heat shield and side plate.

If not within limits :

- (a) Loosen the 28 screws and adjust final clearance by re-distribution of individual clearances (figure 6).
- (b) If clearance is still not within limits, remove the 28 screws and adjust as required.

1 After adjustment, break sharp edges by a 0,4 mm (0.016 in.) maximum chamfer.

2 Smooth out lengthwise using emery cloth.

NOTE : No radial tool marks permissible.

3 Re-install heat shield assemblies.

- (7) Tighten the screws to the prescribed torque per sequence given on figure 6.
- (8) Check the final clearance of $7 \begin{smallmatrix} + 2 \\ - 1 \end{smallmatrix}$ mm (0.275-0.236 in.)

C. Install the seal segments (figure 7)

- (1) Position the central seal segment (1-250) and secure it using screws (1-230) fitted with washers (1-240).

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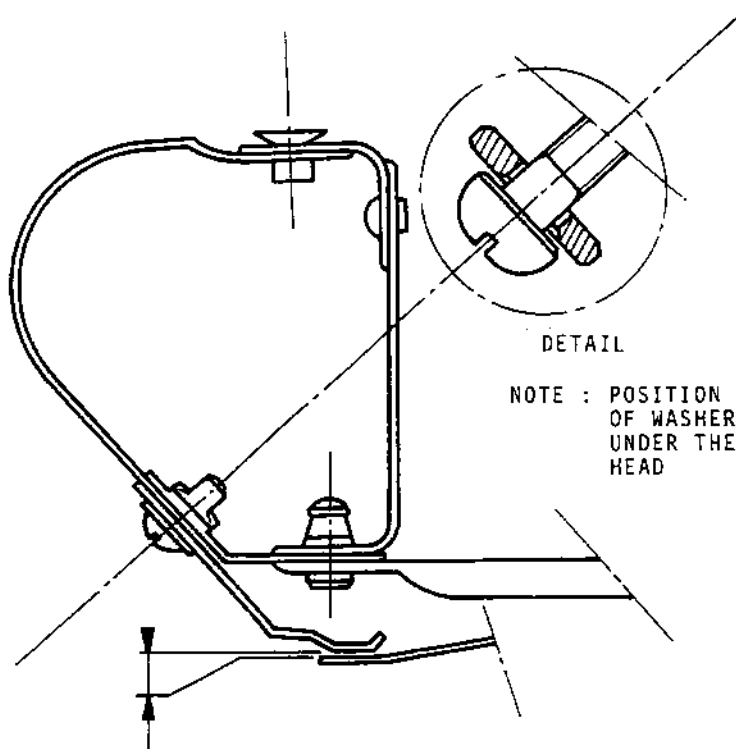
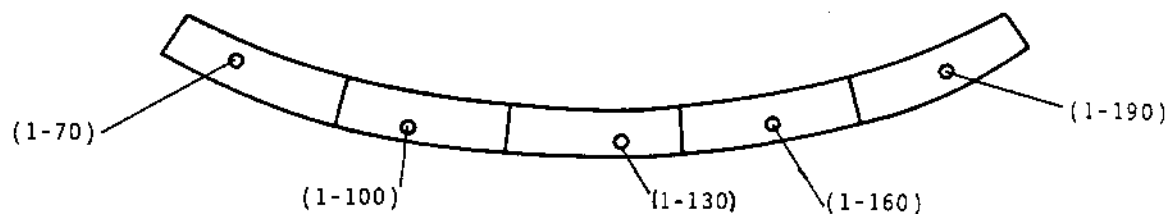
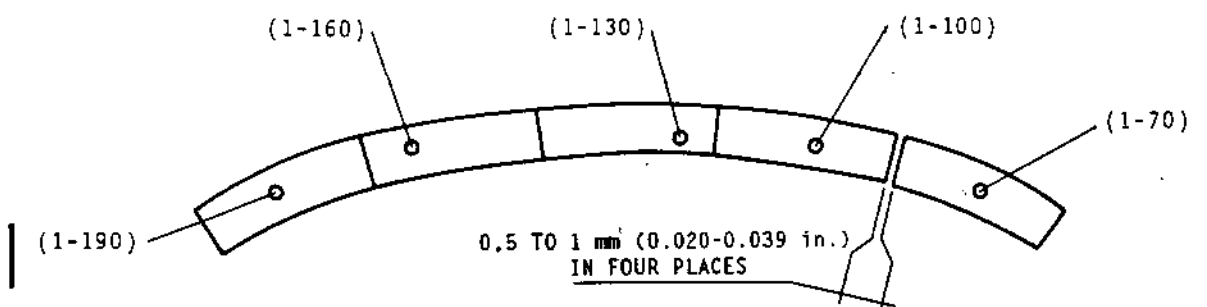
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NOTE : POSITION CHAMFER
OF WASHER (4900)
UNDER THE SCREW
HEAD

CLEARANCE : 0 TO 0,5 mm (0 - 0.020 in.)
MAXIMUM

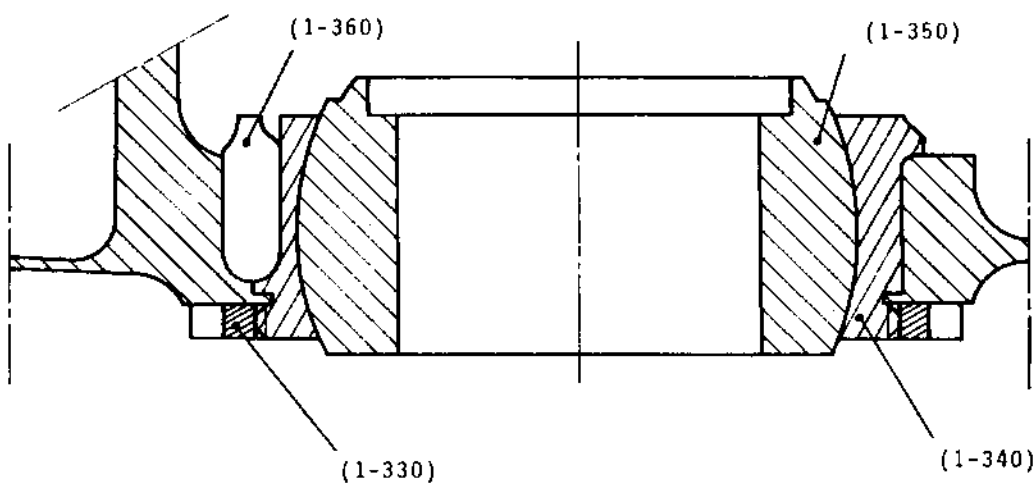
Installing the Seal Segments
Figure 7

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Installing the Spherical Bearing Housing and
Positioning the Anti-Rotation Pin
Figure 8

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- (2) Position seal segment (1-220) and secure it using screws (1-200) fitted with washers (1-210).
- (3) Position seal segment (1-280) and secure it using screws (1-260) fitted with washers (1-270).
- (4) Position seal segment (1-310) and secure it using screws (1-290) fitted with washers (1-300).
- (5) Position seal segment (1-190) and secure it using screws (1-170) fitted with washers (1-180). Tighten slightly.
- (6) Comply with the maximum clearance requirement of 0,5 to 1 mm (0.020 - 0.039 in.) at four locations.
- (7) Either of these two cases will occur :
 - (a) The clearance is within limits : tighten to the prescribed torque.
 - (b) The clearance is not within limits thus entailing the rework of segment concerned. To this end, remove the screws and washers. Smooth out lengthwise using an emery cloth. Re-install the reworked seal segments and tighten the screws to the prescribed torque. Be careful to position the chamfer of the washers under the screw heads (figure 7).
- (8) Tighten the screws to the prescribed torque and check the final clearance (figure 7).

D. Install the bushings

- (1) Install the bushings (1-410) and (1-400) and hold them in position using a piece of brass wire.
- (2) Install the bushings (1-380) and (1-390) and hold them in position using a piece of brass wire.

E. Install the spherical bearing housings (1-340)

For each housing perform the following :

- (1) On the basic bucket, check the hinge-point support (hub) abutment faces :
 - (a) At the housing end of the support, using the housing itself, a set of feeler gauges and Prussian blue.

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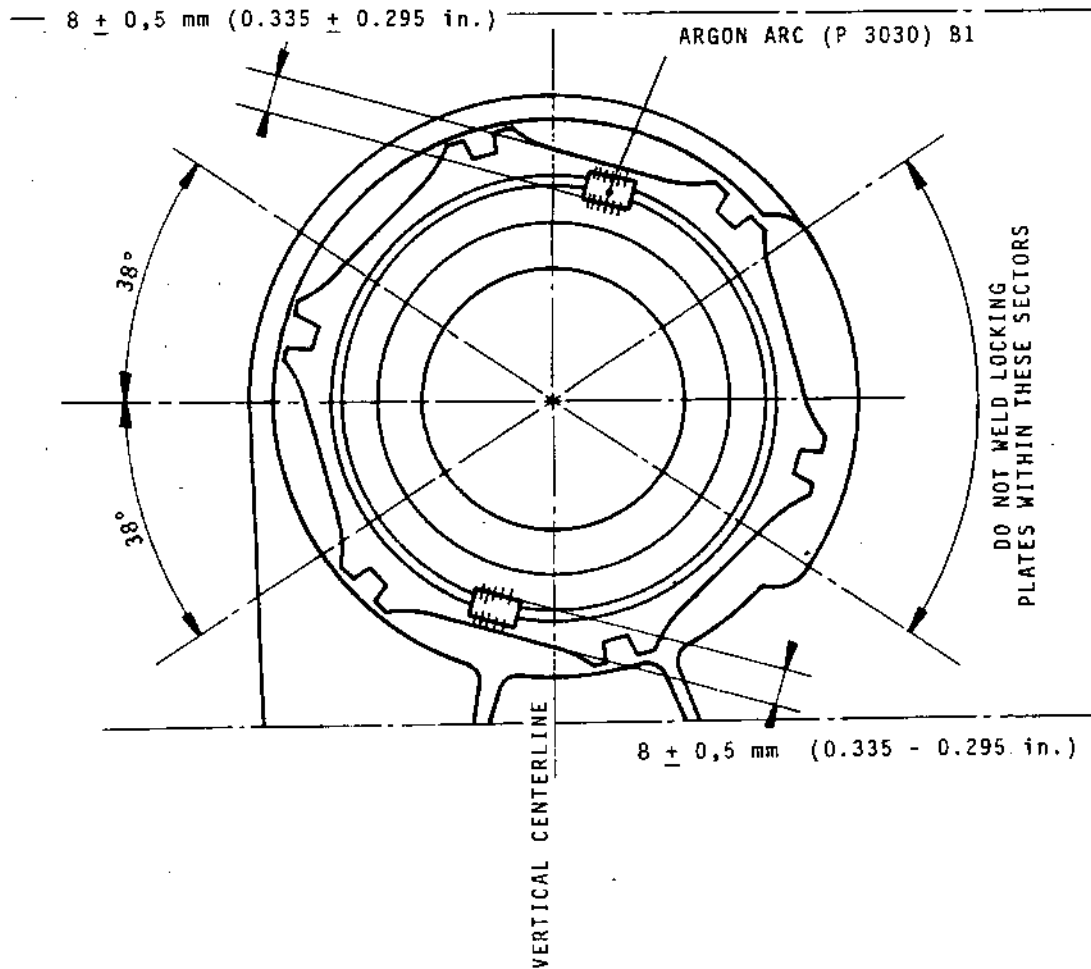


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Positioning the Locking Plates
Figure 9

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- (b) On the retaining nut end of the support, using a set of feeler gauges and Prussian blue.
- (2) Before installing the housing, lap the abutment face of the bucket hinge-point support (hub), if necessary, using lapping compound ABEILLE SC 400 (P270B) for rough finition and AOC 60 (P270C) for superfinishing. For external lapping use - tool SC 277, for internal lapping use - tool SC 278.
- (3) Check the abutment faces:
 - (a) At the housing end, using-tool SC 279.
 - (b) At the retaining nut end, using - tool SC 280.
- (4) From the inner side of the bucket, engage the spherical bearing housing (1-340), in its bore together with the positioning anti-rotation pin (1-360) (see figure 8), both parts coated of anti-seizure lubricant C200 (P209).
- (5) From the outer side of the bucket, position the non-lubricated retaining nut (1-330).
- (6) Screw up the nut and torque it to 2,8 daN.m (20.65 lb.ft); using a mallet, finish the positioning operation then, re-tighten to the prescribed torque value, using tool SC 40.
- (7) Check, using a set of feeler gauges, that both the spherical bearing housing and the retaining nut contact their support (bucket hub).
- (8) Deleted.
- (9) Position the spherical bearing (1-350) in its housing (1-340).
- (10) Remove excess of anti-seizure lubricant using a clean cloth moisted with acetone (P325) or methylethylketone (P422).
- (11) Lock the retaining nut (1-330) using the locking plates (1-320) as follows:
 - (a) Scribe the locations of the locking plates on the retaining nuts and on the spherical bearing housings (figure 9).

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- (b) Argon arc weld the locking plates as shown on figure 9, using filler material (P3030) category B1, as instructed in chapter 70-35 of the Standard Practices manual.

NOTE : The two locking plates must be positioned 180° apart.

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**FITS AND CLEARANCES****1. General****A. Layout**

- (1) The table of clearances gives the machining tolerances of parts in new condition and acceptable wear limits. The values are expressed in millimeters.

ITEM FIG.	IPL FIGURE ITEM	NOMINAL DIMENSION	TYPE	CLEARANCES		MAX LIMIT	CAT.	REMARKS SELECTIONS
				MIN	MAX			
1	2	3	4	5	6	7	8	9

- (2) The item numbers in column (1) by reference to the corresponding figure provide a means of locating the clearance or dimension to be measured.
- (3) The item numbers in column (2) identify the parts in the "Illustrated Parts List". (FIGURE + ITEM).
- (4) Column (3) gives the manufacturing dimensions of parts together with the machining tolerances.
- In the case of two parts which form an assembly the first one is always the male part.
- (5) The code letters in column (4) indicate the type of clearance.
- A denotes an axial clearance
 - D denotes a diametral clearance
 - L denotes a side clearance
- (6) Columns (5) and (6) give the clearance (symbol J) or the interference (symbol S) which result from the manufacturing tolerances.
- Column (9) is used to indicate that a smaller clearance than that resulting from the manufacturing tolerances is required. This reduced clearance is obtained by selective assembly of parts.

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- (7) The digits or letter in column (8) give the clearance category the definition of which is as follows :

M - Check or adjustment to be carried out at each assembly

- 1 - Check to be systematically carried out.
- 2 - Check to be carried out if the condition of parts makes it necessary.
- 3 - Dimensions intended for use by Design Offices (not applicable in this document).
- 4 - Check to be systematically carried out on the equipments intended for ageing studies (Sampling)

B. Max. after wear (column 7)

- (1) The MAX. LIMITS are the maximum wear limits within which a part can be accepted for a further period of use.
- (2) Parts worn beyond these limits will be either repaired in accordance with the instructions given in chapter "REPAIR" or replaced as applicable.
- (3) Therefore the values given in this column will change as experience is gained with the repaired equipment or the equipment intended for ageing studies.
- (4) This kind of information may be entered in this column.

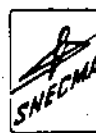
(a) Clearance

The maximum clearance or the minimum interference between two parts will be given only if they are matched parts. The distribution of this clearance on the male or female part is left to the discretion of the repairer.

(b) Dimension

In order to preserve interchangeability, the degree of permissible wear on male and female parts is given, thus ensuring a correct assembly at all times whatever the mating parts may be.

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2. Torque values

As torque is variable with respect to lubrication, we indicate in this paragraph both the torque and lubrication to comply with during assembly. Bolts, nuts... bear the I.P.L. references.

Bolts or nuts Fig. Item	Lubrication when assembly	Torque value
1-10	Lubricate threads with anti-seizing graphite grease (P189)	0,8 to 1 daN.m
1-20	Lubricate threads with anti-seizing graphite grease (P189)	0,96 to 1.13 daN.m
1-60	Lubricate threads with anti-seizing graphite grease (P189)	0,34 to 0,45 daN.m
1-80	Lubricate threads with anti-seizing graphite grease (P189)	0,34 to 0,45 daN.m
1-100	Lubricate threads with anti-seizing graphite grease (P189)	0,34 to 0,45 daN.m
1-120	Lubricate threads with anti-seizing graphite grease (P189)	0,34 to 0,45 daN.m
1-140	Lubricate threads with anti-seizing graphite grease (P189)	0,34 to 0,45 daN.m
1-160	Lubricate threads with anti-seizing graphite grease (P189)	0,34 to 0,45 daN.m
1-170	Lubricate threads with anti-seizing graphite grease (P189)	0,26 to 0,34 daN.m
1-200	Lubricate threads with anti-seizing graphite grease (P189)	0,26 to 0,34 daN.m
1-230	Lubricate threads with anti-seizing graphite grease (P189)	0,26 to 0,34 daN.m
1-260	Lubricate threads with anti-seizing graphite grease (P189)	0,26 to 0,34 daN.m

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Bolts or nuts Fig. Item	Lubrication when assembly	Torque value
1-290	Lubricate threads with anti-seizing graphite grease (P189)	0,26 to 0,34 daN.m
1-330		2,82 to 4,52 daN.m
1-370	Lubricate threads with anti-seizing graphite grease (P189)	0,23 to 0,28 daN.m

3. Table of Fits and Clearances



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TABLE OF FITS AND CLEARANCES

IND. — FIG.	IPL FIGURE INDEX	NOMINAL DIMENSION	TYPE	CLEARANCES		MAX. LIMIT	CAT.	REMARKS
				MIN.	MAX.			SELECTIONS
1 (601)	1-460	15,875 H7 ^{+0,018} ₊₀ (0.625 H7 ^{+0.0007} ₊₀)	D	0 (0.0000)	0,029 (0.0011)		2	
	1-380 -400	15,875 h6 ⁻⁰ _{-0,011} (0.625 h6 ⁻⁰ _{-0.0004})	D					
2 (601)	1-460	15,875 H7 ^{+0,018} ₊₀ (0.625 H7 ^{+0.0007} ₊₀)	D	0 (0.0000)	0,029 (0.0011)		2	
	1-390 -410	15,875 h6 ⁻⁰ _{-0,011} (0.625 h6 ⁻⁰ _{-0.0004})	D					
3 (601)	1-460	22,86 H7 ^{+0,021} ₊₀ (0.900 H7 ^{+0.0008} ₊₀)	D	0,007 (0.0003)	0,041 (0.0016)		2	
	1-380 -400	22,86 g6 ^{-0,007} _{-0,020} (0.900 g6 ^{-0.0003} _{-0.0008})	D					
4 (601)	1-460	22,86 H7 ^{+0,021} ₊₀ (0.900 H7 ^{+0.0008} ₊₀)	D	0,007 (0.0003)	0,041 (0.0016)		2	
	1-390 -400	22,86 g6 ^{-0,007} _{-0,020} (0.900 g6 ^{-0.0003} _{-0.0008})	D					

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TABLE OF FITS AND CLEARANCES

IND. FIG.	IPL FIGURE INDEX	NOMINAL DIMENSION	TYPE	CLEARANCES		MAX. LIMIT	CAT.	REMARKS
				MIN.	MAX.			SELECTIONS
5 (601)	1-380 -400	$12,687^{+0,013}_{+0}$ $(0.4995^{+0.0005}_{+0})$	D	0,002 (0.0001)	0,033 (0.0013)		2	
	2-420 (78-13-01)	$12,685^{-0}_{-0,018}$ $(0.4994^{-0}_{-0.0007})$	D					
6 (601)	1-390 -410	$12,687^{+0,013}_{+0}$ $(0.4995^{+0.0005}_{+0})$	D	0,002 (0.0001)	0,033 (0.0013)		2	
	2-420 (78-13-01)	$12,685^{-0}_{-0,018}$ $(0.4994^{-0}_{-0.0007})$	D					
7 (601)	1-460	$85,725^{+0,025}_{+0}$ $(3.375^{+0.0010}_{+0})$	D	0,020 (0.0008)	0,018 (0.0007)		2	85,73 min. after use (3.3753)
	1-340	$85,745^{-0}_{-0,013}$ $(3.3758^{-0}_{-0.0005})$	D					
8 (601)	1-340 -460	$7,924^{+0,127}_{+0}$ $(0.312^{+0.050}_{+0})$	D	0,124 (0.050)	0,351 (0.0138)		3	
	1-360	$7,800^{-0}_{-0,100}$ $(0.307^{-0}_{-0.039})$	D					

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TABLE OF FITS AND CLEARANCES

IND. — FIG.	IPL FIGURE INDEX	NOMINAL DIMENSION	TYPE	CLEARANCES		MAX. LIMIT	CAT.	REMARKS
				MIN.	MAX.			SELECTIONS
9 (601)	1-340	73,025 H7 ^{+0,03} ₊₀ (2.875 H7 ^{+0.0012} ₊₀)	D	0,063 (0.0025)	0,123 (0.0049)		2	
	1-350	72,962 ⁻⁰ _{-0,03} (2.8725 ⁻⁰ _{-0.0012})	D					
10 (601)	1-350	47,625 H6 ^{+0,016} ₊₀ (1.875 H6 ^{+0.0006} ₊₀)	D	0,010 (0.0004)	0,034 (00013)	0,041 (0.0016)	2	47,60 min. after use (1.8740)
	2-260 -350 (73-13-01)	47,615 ⁻⁰ _{-0,008} (1.8746 ⁻⁰ _{-0.0003})	D					
11 (601)	1-350	47,625 H6 ^{+0,016} ₊₀ (1.875 H6 ^{+0.0006} ₊₀)	D	0,010 (0.0004)	0,034 (00013)	0,041 (0.0016)	2	47,60 min. after use (1.8740)
	2-160 -170 (73-13-01)	47,615 ⁻⁰ _{-0,008} (1.8746 ⁻⁰ _{-0.0003})	D					

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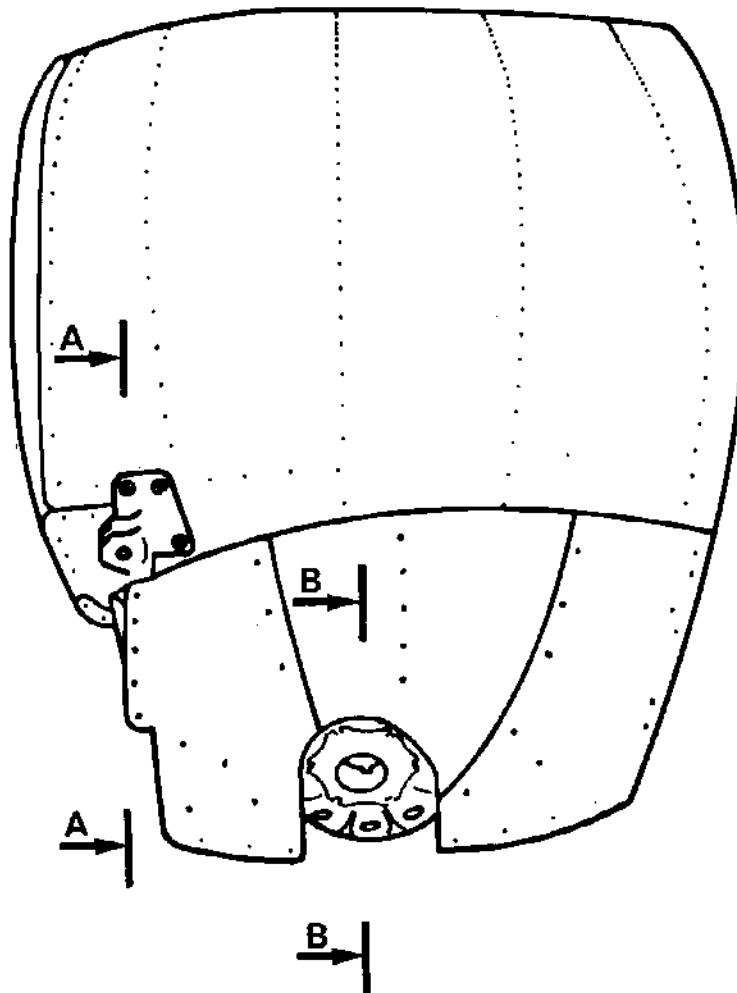


Table of fits and clearances
Figure 601-(Sheet 1 of 3)

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SECTION AA

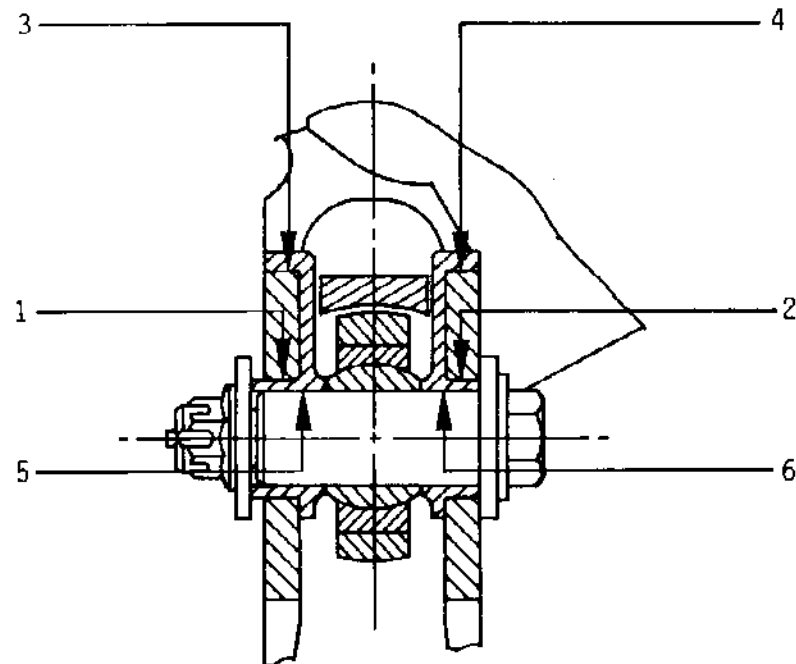


Table of Fits and Clearances
Figure 601 (Sheet 2 of 3)



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SECTION BB

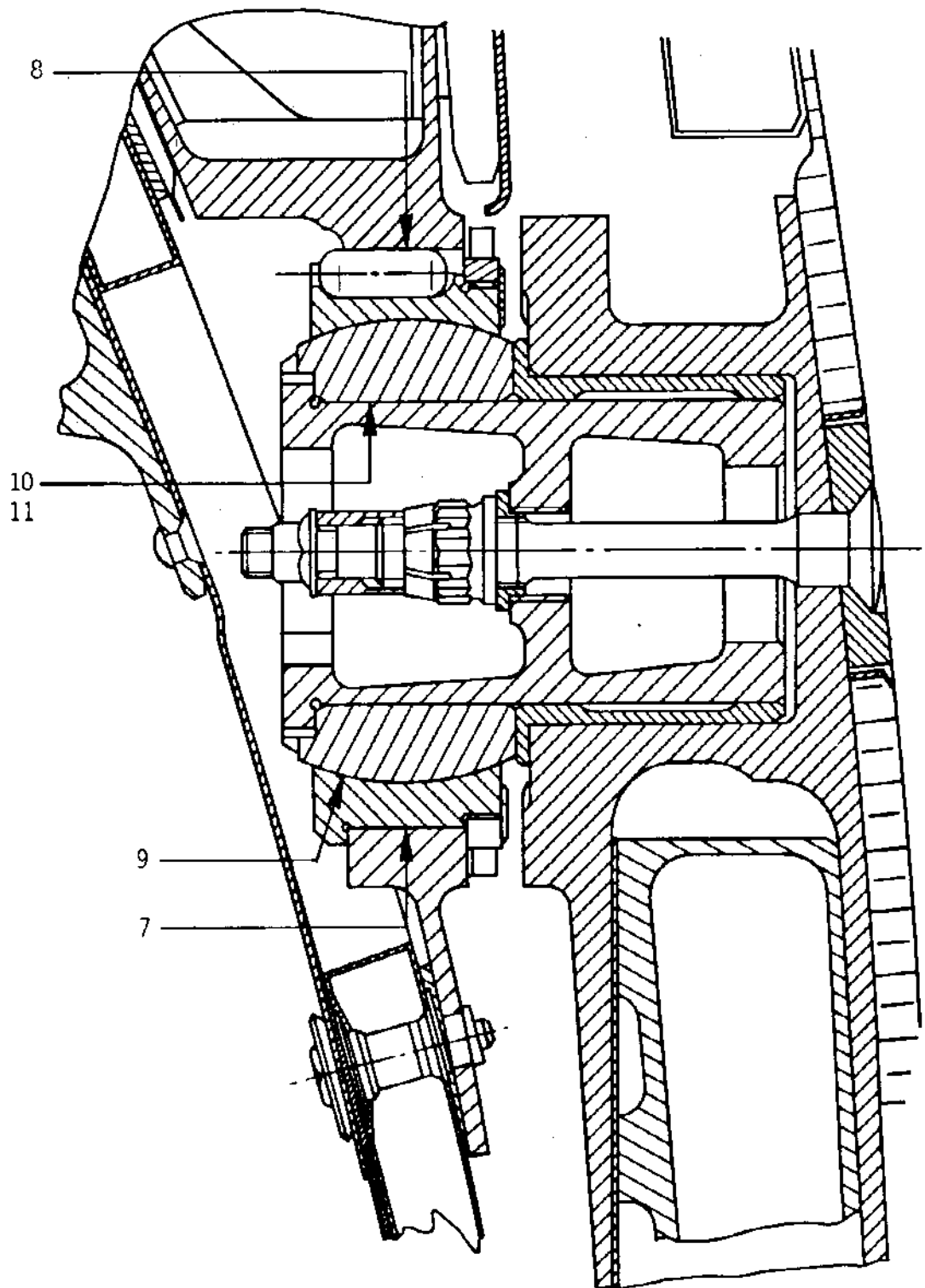


Table of Fits and Clearances
Figure 601 (Sheet 2 of 3)

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STORAGE

1. General

The container used for storage and transport of the bucket is designed to conform to the requirements of category III ATA 300 specification, i.e., expendable package, but valid for at least one transportation trip.

The case is manufactured in 3 ply cardboard (Tri-wall), and comprises a double-skinned case with the walls separated by blocks of rubberised horsehair (rubber-crin). For transport, it is strapped to a pallet.

The bucket is mounted in what corresponds to the bottom position on the aircraft, and is retained by (see figure 901) :

- two mounting pins which engage in the bucket hinge points and are fixed to a wooden frame work,
- blocks of rubberised horsehair at the leading and trailing edges to avoid any swinging of the bucket.

Two positions are provided inside the container to house, if necessary, the deflectors.

The container must be handled with a fork lift truck.

2. Removal of the bucket from its container (see figure 901)

- A. Remove the straps which hold the case to the pallet.
- B. Cut the adhesive band which retains the lid to the outer casing.
- C. Remove :
 - (1) The outer case lid.
 - (2) The rubberised horsehair corner pieces and stiffeners.
 - (3) The inner case lid.
- D. Remove the wire locking the wing nuts on the mounting system.
- E. Slacken the wing nuts, and swing the eye-bolts to one side.
- F. Withdraw the mounting pin locking brackets.

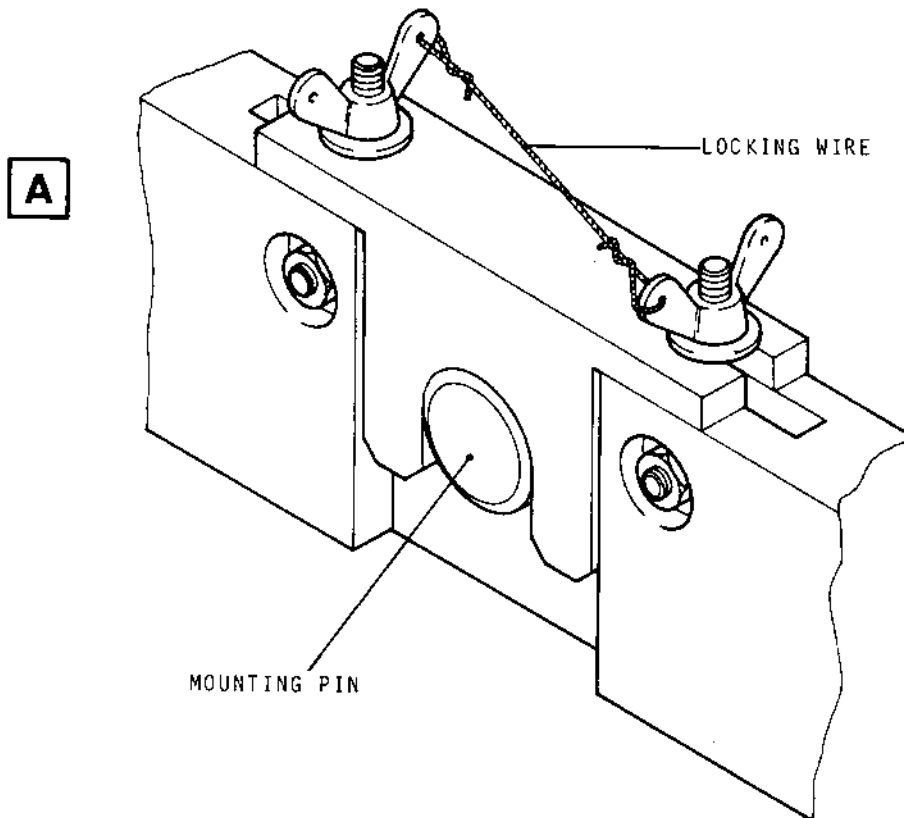
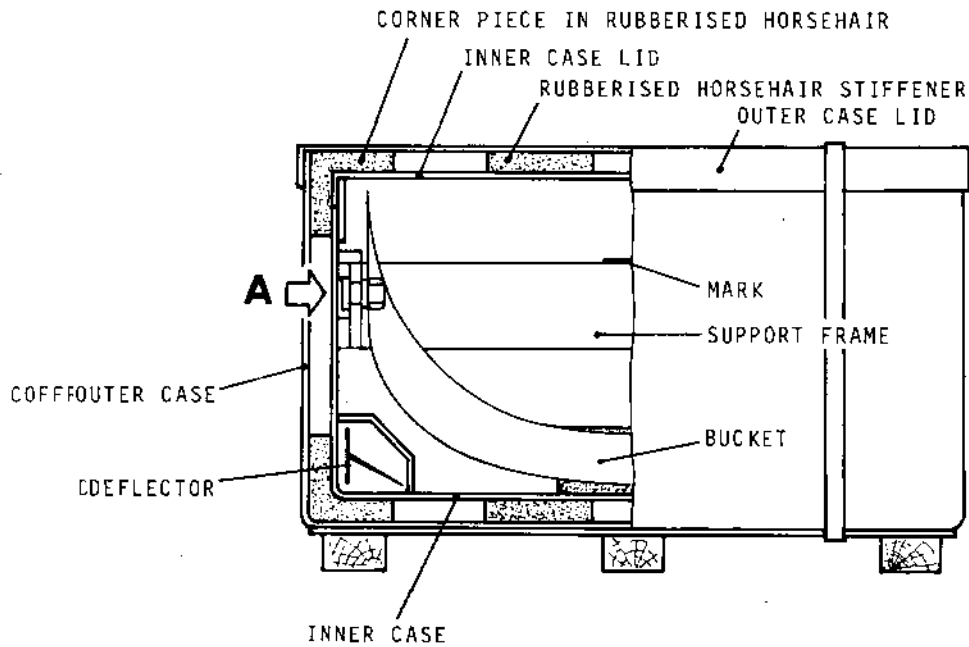
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Mounting the Reverser Bucket in the Container
Figure 901

78-31-01

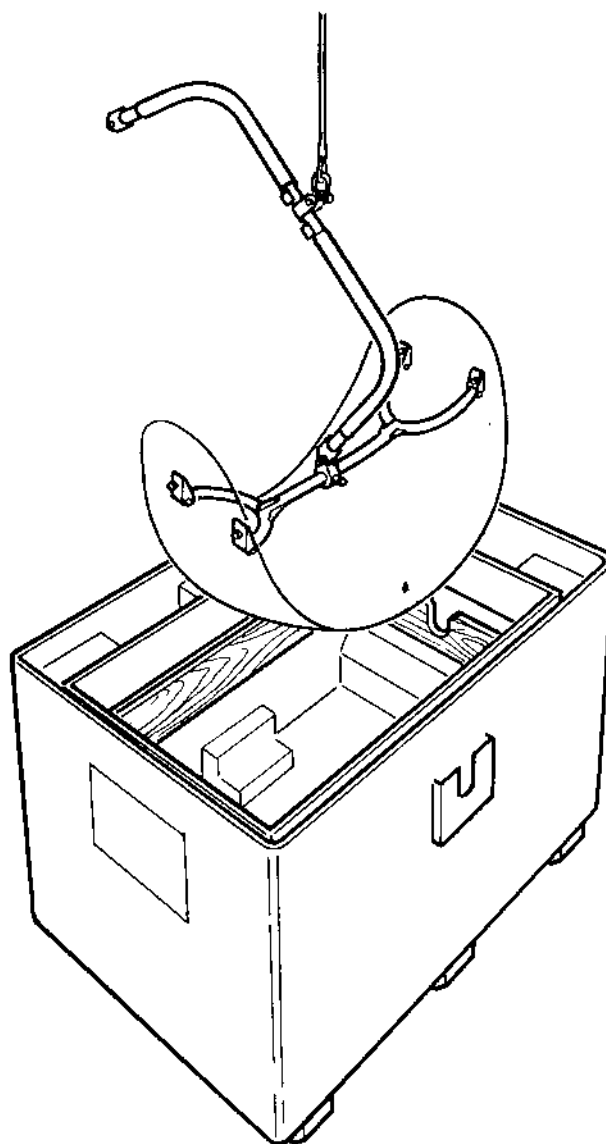
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Bucket Positioning in or Removal from the Container
Figure 902

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- G. Position the lifting beam - tool SC 205 - to the bucket and secure it at the deflector mounting points.
- H. Using a hoist, remove the bucket from its container and place it on the storage fixture - tool SC 37.
- J. Remove the mounting pins and the lifting beam - tool SC 205 -
- K. If the container is to be returned empty, proceed as follows:
 - (1) Fit the mounting pins, the locking brackets and the wing nuts.
 - (2) Fit the inner lid, the rubberised corner pieces and spacers, and the outer lid.
 - (3) Fix the outer lid by sticking adhesive tape all round the circumference.

3. Placing the bucket in its container

- A. Open the container and check that it is not damaged.
- B. Remove the locking brackets and the mounting pins.
- C. If necessary, fit the deflectors and their bolting in the appropriate compartments in the container.

NOTE : The deflectors are to be cleaned with white spirit and dried before storage.
- D. With the bucket on the storage stand - tool SC 37 - fit the lifting beam - tool SC 205.
- E. Using a hoist, lift the bucket from the storage stand - tool SC 37.
- F. Clean the bucket as follows :
 - (1) Degrease the bucket assembly using a rag soaked in white spirit (P 129)
 - (2) Wipe with a clean, dry rag to eliminate any trace of the degreasant, and ensure that any dribbles are removed.

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- (3) Immediately after cleaning and drying, apply to the stressskin panels only, a protective mixture comprising

- (a) 50% isopropyl alcohol (P 442)
- (b) 50% phosphoric acid (P 8A) diluted to 60%

NOTE : For this operation, use gloves and protect the eyes. Apply the protective liquid, as evenly as possible with a brush to all the stressskin surfaces to be protected.

- G. Fit the mounting pins to the bucket. Enter them into the spherical bearings from the outside.
- H. Operate the hoist to lower the bucket into the container taking care to :
 - (1) Place the leading edge opposite the mark (red paint) on the support frame.
 - (2) Ensure that the mounting pins are correctly engaged in the slots in the support frame.
- J. Remove the lifting beam -tool SC 205.
- K. Fit the mounting pin locking brackets and the wing nuts.
- L. Tighten the nuts and wire-lock them in pairs.
- M. Place all the technical documents relevant to the stored bucket (Log book, release notes etc...) in the documents box (between the inner and outer cases).
- N. To close the container
 - (1) Fit the inner case lid.
 - (2) Position the rubberised corner pieces and stiffeners.
 - (3) Fit the outer case lid and fix it to the outer case with adhesive tape all around the circumference.
 - (4) Secure the container to the pallet using the two straps.

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- P. Place the customs documents in the external box.
- Q. Stencil onto the black rectangle on the container :
- the bucket number
 - the packaging date
 - the storage life

4. Storage life

A. In the container

If the conditions of containersation described in the preceding paragraph have been respected, and the container is sheltered from sunlight and bad weather, the storage life is 3 months maximum.

B. Out of the container

- (1) Envelope the bucket in a non-hermatic, anti-dust polythene bag.
- (2) If the humidity is less than 60 %, inspect the parts every 3 months; if greater than 60 % a monthly inspection is required.
- (3) If the onset of corrosion is noticed, clean and renew the protective coating as per paragraph 3.

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**OLYMPUS 593****MK. 610-14-28****OVERHAUL****sneema****SPECIAL TOOLS, FIXTURES AND EQUIPMENT (LIST)**

TOOL N°	PART NUMBER	DESCRIPTION	UTILIZATION						PAGE
			DIS- ASSEMBLY	CLE- ANING	CHE- CK	REP- AIR	AS- SEMBLY	TEST- ING	
SC 37	9970-521-069	STORAGE STAND	X				X	X	1001
SC 40	9970-515-273	WRENCH	X				X		1002
SC 41	9970-511-037	EXTRACTOR	X				X		1003
SC 205	852-500-145-0	HOISTING BEAM	X				X	X	1004
SC 206	852-500-146-0	SPECIAL WRENCH	X				X		1005
SC 235	852-630-160	DELETED				X			1006
SC 236	852-630-161	DELETED				X			1007
SC 273	852-500-159-0	BUCKET CLEARANCES CHECKING FIXTURES					X		1008
SC 274	852-500-160-0	SIDE PLATE SCRIBING GAUGE					X		1009
SC 277	852-500-162-0	EXTERNAL GRINDING TOOL					X		1010
SC 278	852-500-161-0	INTERNAL GRINDING TOOL					X		1011
SC 279	852-500-163-0	INTERNAL PLUG GAUGE					X		1012
SC 280	852-500-164-0	EXTERNAL PLUG GAUGE					X		1013
SC 271	852-630-165-0	BUCKET LEADING EDGE COVER POSITIONNING TOOLS				X			1014

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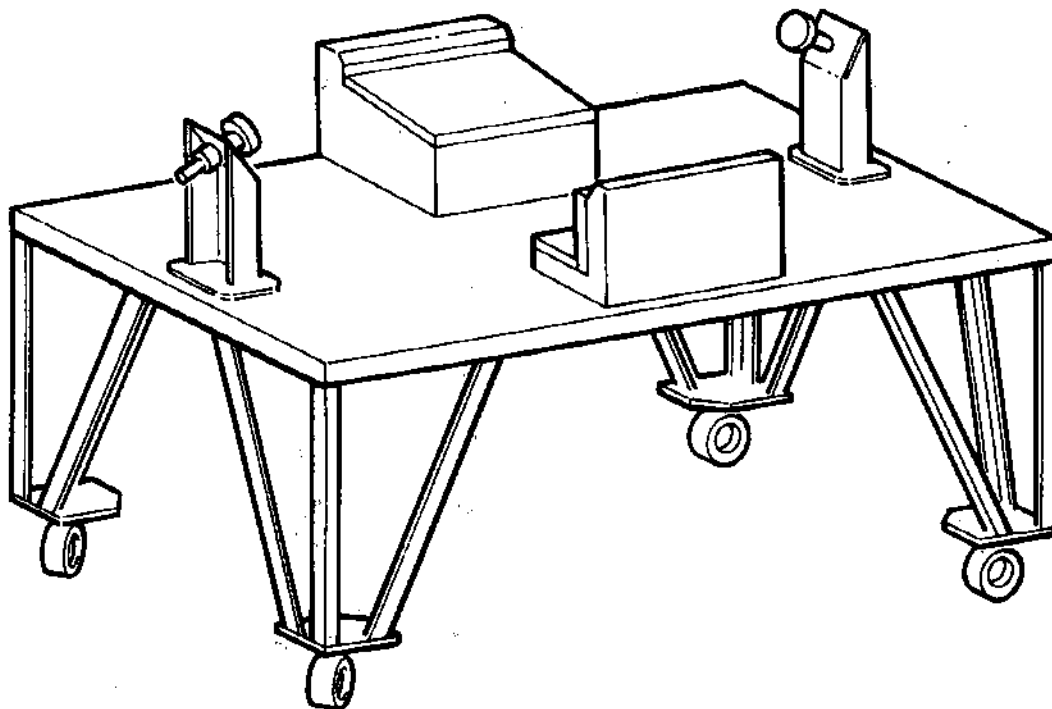
STORAGE AND WORKSTAND

SNECMA No. 9970-521-069

Description..... This mobile workstand is used for removing/
installing and handling the twin secondary
nozzle reverse buckets.

Weight.....

Dimensions..... 1340 x 900 x 790 mm (52.75 x 35.43 x 31.10 in.)



Tool
SC 37

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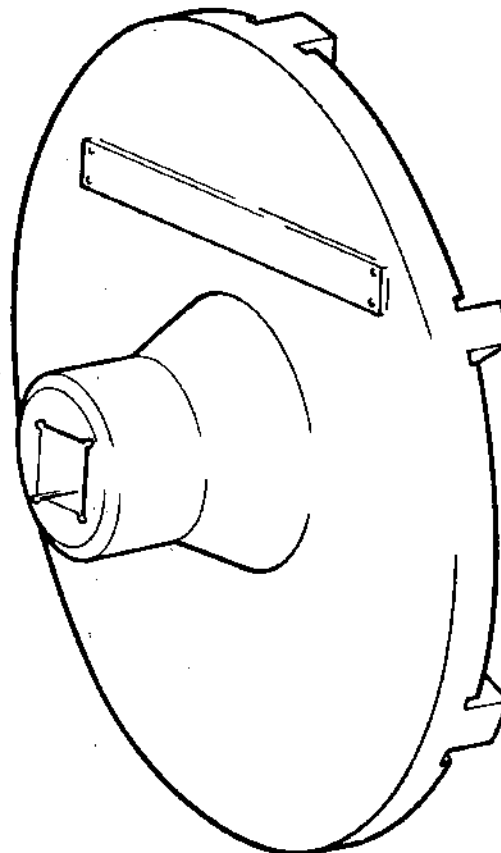
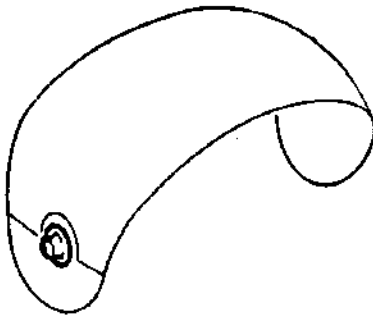
CASTELLED WRENCH - BUCKET SPHERICAL JOINT

SNECMA No. 9970-515-273

Description..... This wrench is used for tightening or slackening of the bucket spherical joint nuts.

Weight..... 0.350 kg (0.77 lb).

Dimensions..... 102 x 102 x 35 mm (4 x 4 x 1.4 in.).



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Tool
SC 40

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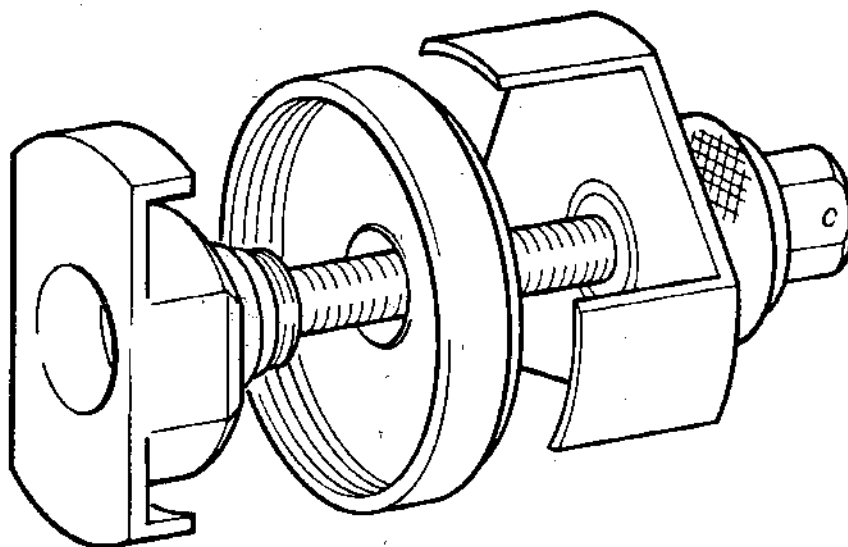
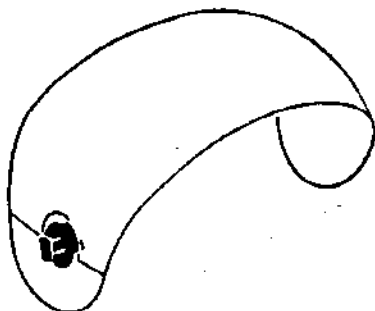
BUCKET SPHERICAL JOINT CAGE EXTRACTOR

SNECMA No. 9970-511-037

Description..... This tooling is used to extract the spherical joint cage from the bucket pin.

Weight..... 1.800 kg (4 lb).

Dimensions..... 200 x 120 x 120 mm (7.9 x 4.7 x 4.7 in.).



Tool
SC 41

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HOISTING BEAM

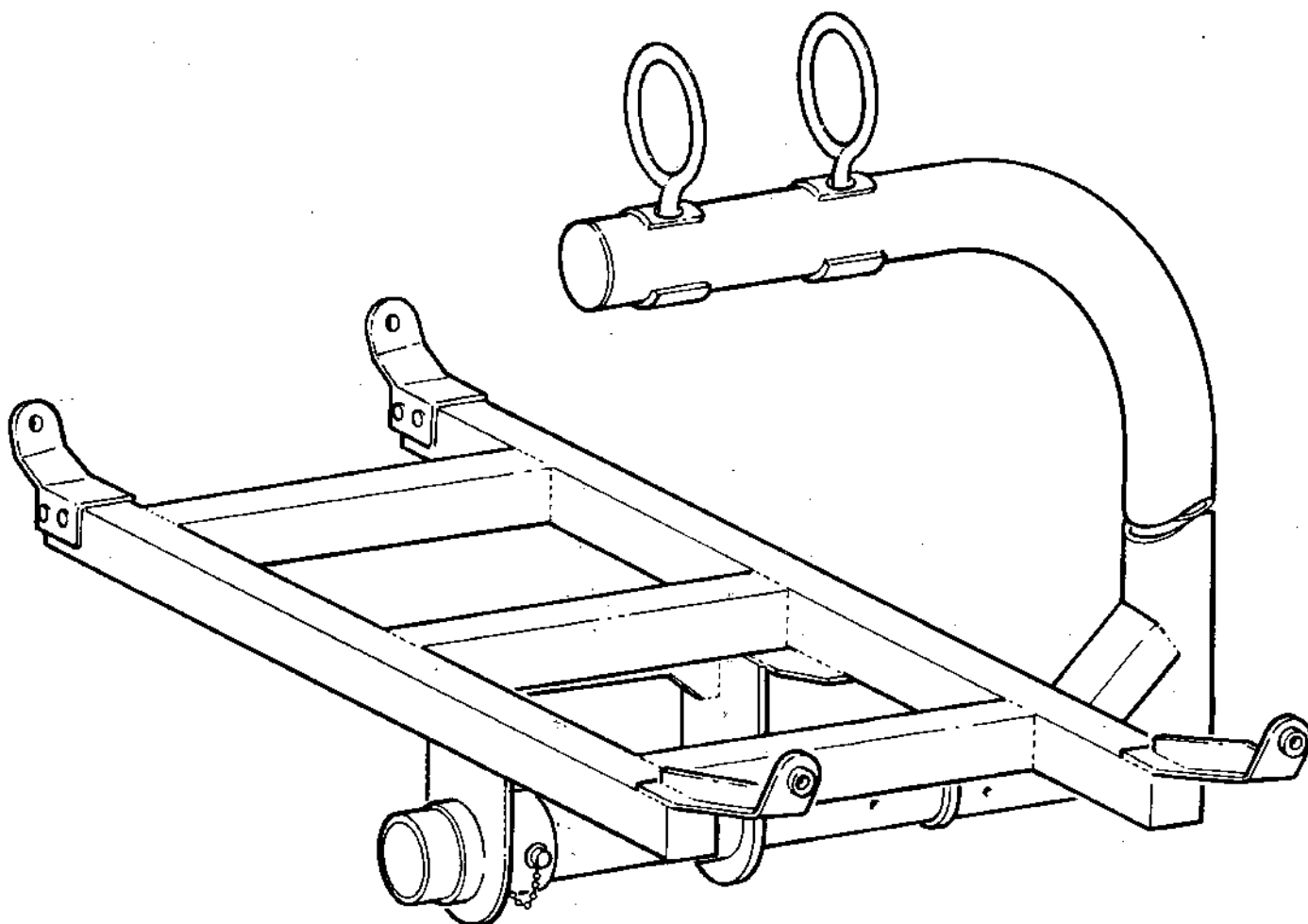
SNECMA No. 852-500-145-0

Description..... This beam is used for removal/installation
of the twin secondary nozzle reverse buckets.

Weight..... 30 Kg (66 lb)

Dimensions..... 1200 x 755 x 700 mm (47.24 x 29.72 x 29.53 in)

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Tool
SC 205

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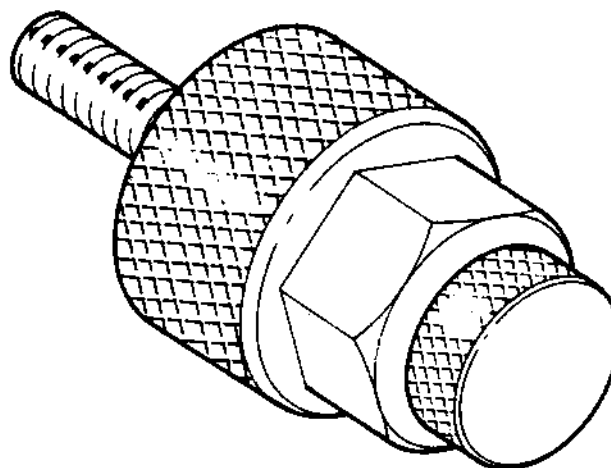
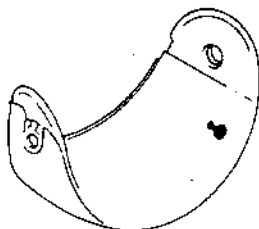
SPECIAL WRENCH FOR INSTALLATION-REMOVAL OPERATIONS

SNECMA No. 852-500-146-0

Description..... Wrench used for positioning-removing the threaded sleeves used to fasten the primary and secondary heat shields

Weight..... 0.1 kg (0.22 lb)

Dimensions..... D = 26 mm (1 in.), length = 40 mm (1.57 in.)



Tool
SC 206

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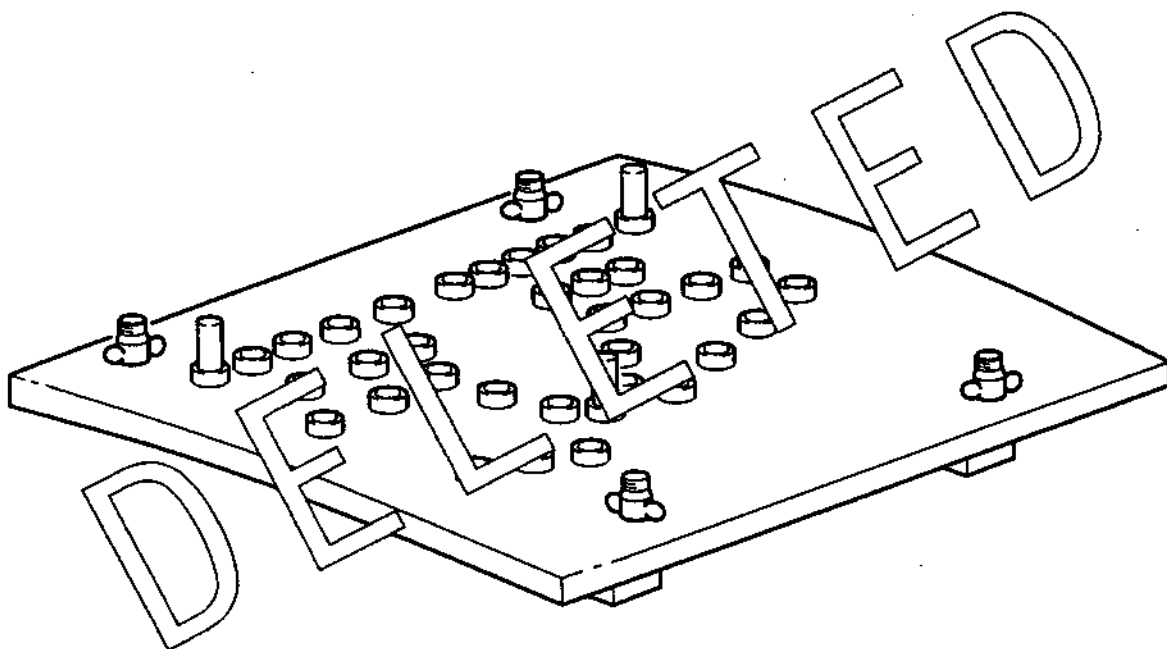
DRILLING TEMPLATE

SNECMA N°. 852-630-160

Description..... Template used for drilling the bucket L.H.
side plate for the purpose of renewing
inserts.

Weight.....

Dimensions.....



To be manufactured by duplication of master tool.

Tool
SC235

S-OLY-SM-00038-00-B

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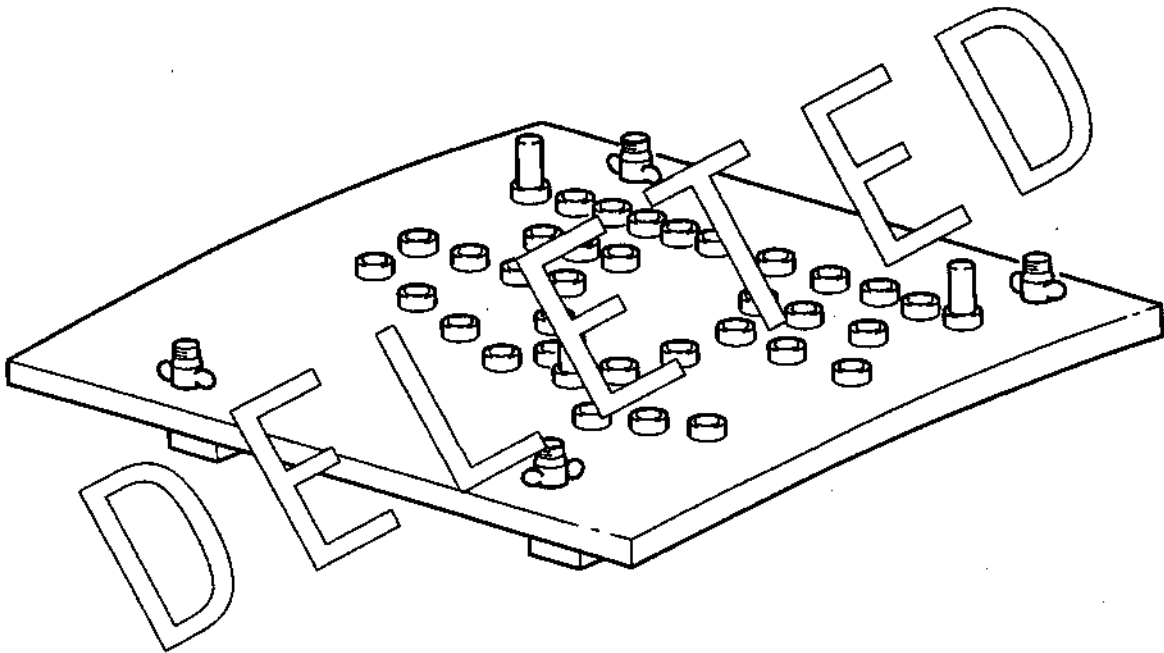
sneema

DRILLING TEMPLATE
SNECMA N°. 852-630-161

Description..... Template used for drilling the bucket R.H.
side plate for the purpose of renewing
inserts.

Weight.....

Dimensions.....



To be manufactured by duplication of master tool.

Tool
SC236

S-OLY-SM-00039-00-B

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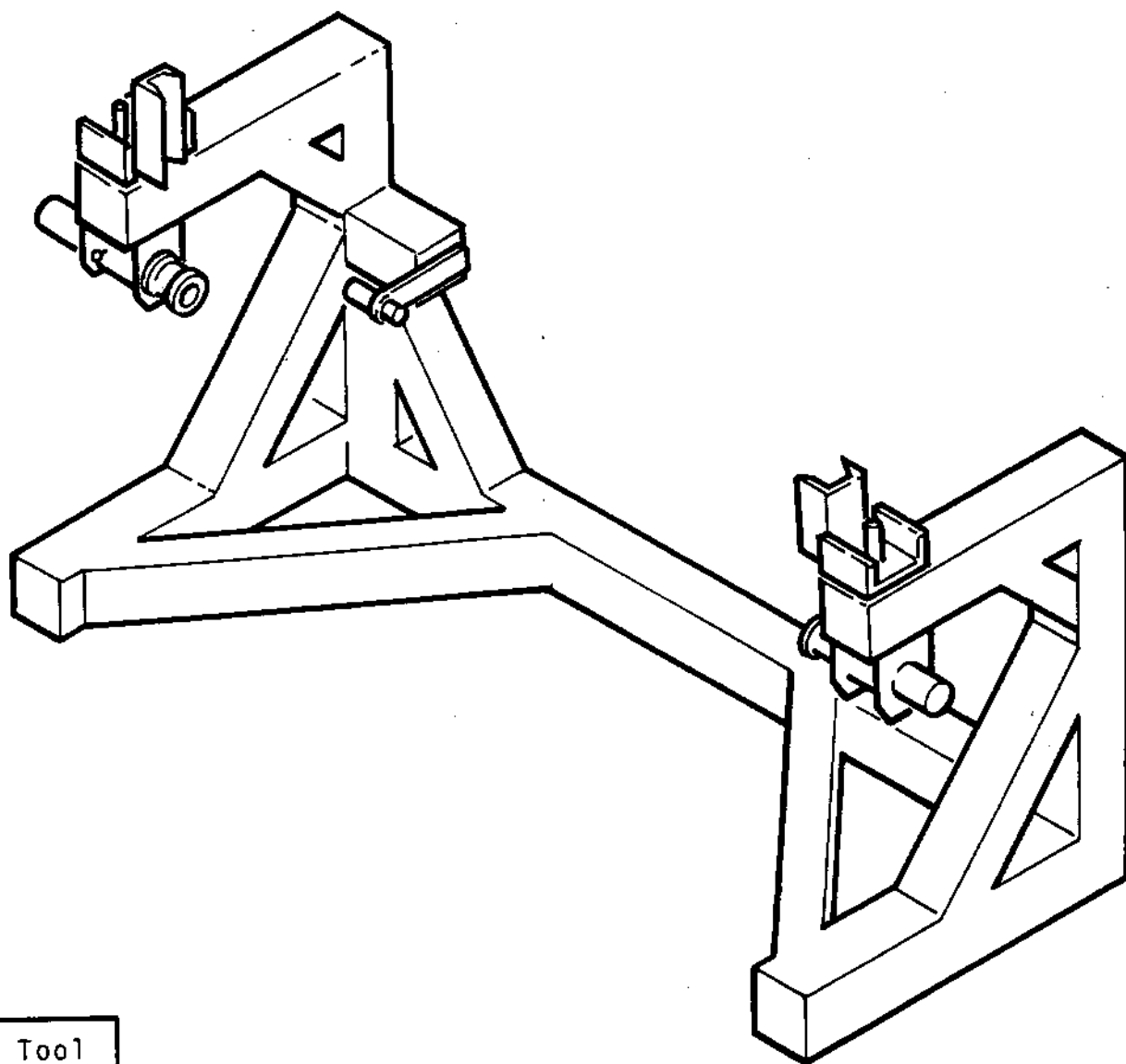
BUCKET CLEARANCES CHECKING FIXTURE

SNECMA No. 852-500-159-0

Description This tool is designed for checking the positioning of the side-plates on the bucket.

Weight 140 kg (308.65 lb)

Dimensions 1500 x 850 x 650mm(59.05 x 33.46 x 25.6in.)



Tool
SC273

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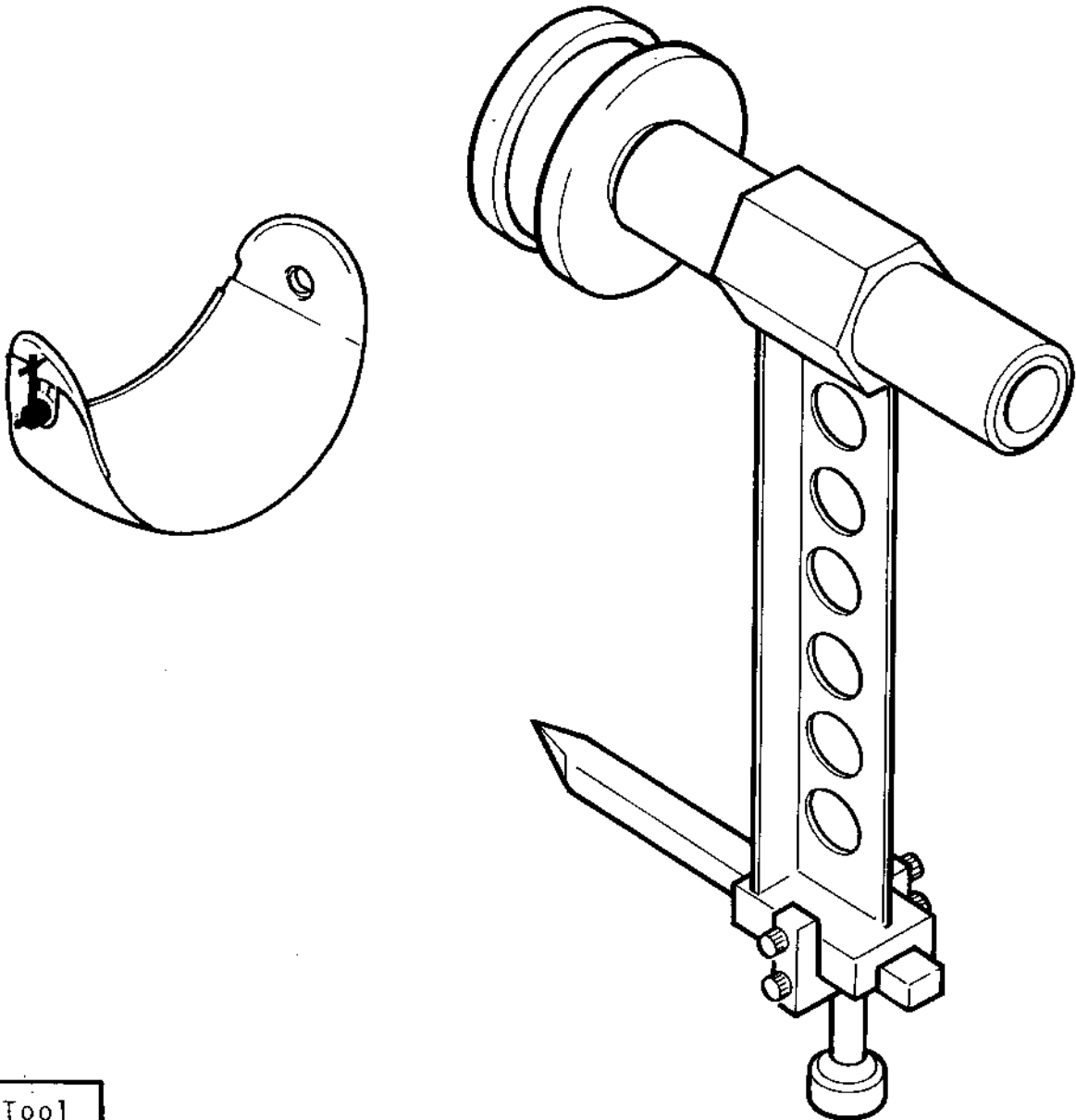
SIDE-PLATES SCRIBING GAUGE

SNECMA No.852-500-160-0

Description Tool designed for scribing the 247,5 mm
(9.74 in.) radius cutting out profile on
the bucket side-plates.

Weight 3,8 kg (8.38 lb)

Dimensions 314 x 210 x 91mm(12.36 x 8.26 x 3.58in.)



Tool
SC 274

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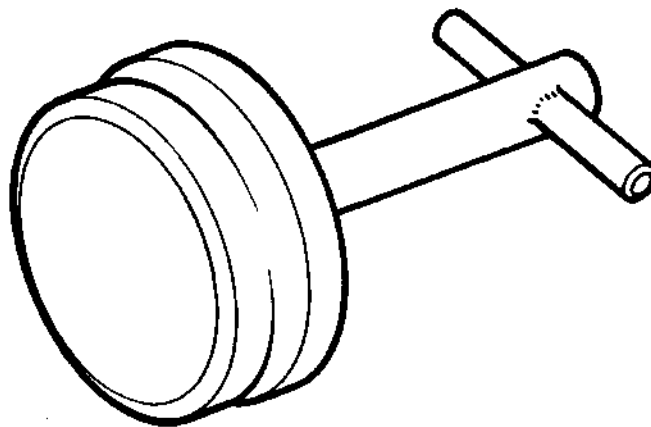
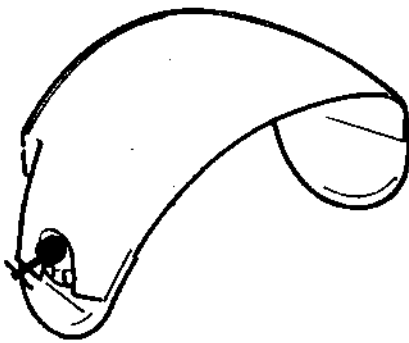
EXTERNAL GRINDING TOOL

SNECMA No. 852-500-162-0

Description Tool designed for external grinding
of the basic bucket hinge-point
supports.

Weight 1,7 kg (3.75 lb)

Dimensions 200 x 100 mm (7.87 x 3.94 in.)



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Tool
SC277

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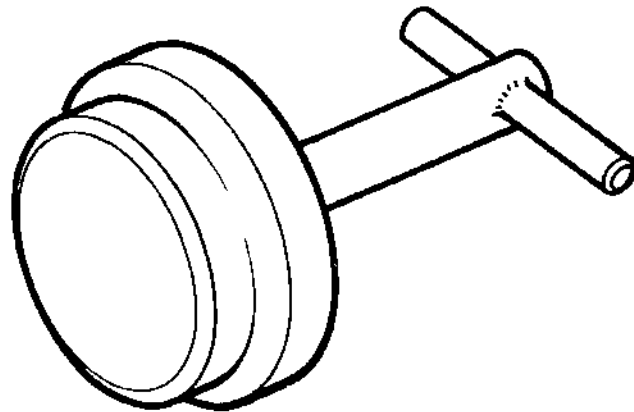
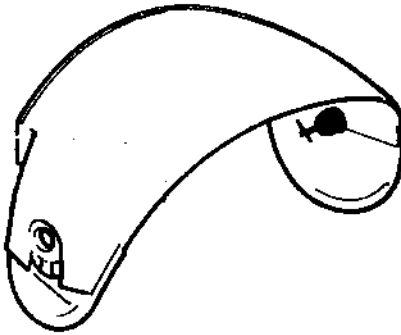
INTERNAL GRINDING TOOL

SNECMA No.852-500-161-0

Description Tool designed for internal grinding of
the basic bucket hinge-point supports.

Weight 2,1 kg (4.63 lb)

Dimensions 200 x 92 mm (7.87 x 3.62 in.)



Tool
SC278

78-31-01

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OLYMPUS 593

MK.610-14-28
OVERHAUL



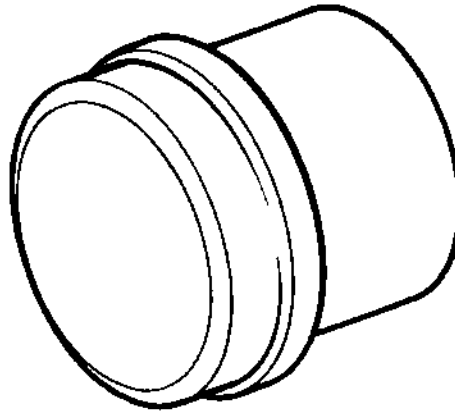
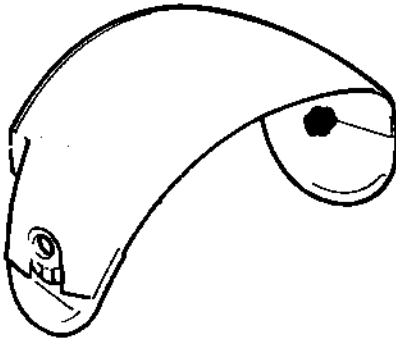
INTERNAL PLUG GAUGE

SNECMA No. 852-500-163-0

Description Tool designed for checking the
internal bearing surface of the
bucket hinge-point supports.

Weight 1,6 kg (3.53 lb)

Dimensions 200 x 92 mm (7.87 x 3.62 in.)



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Tool
SC 279

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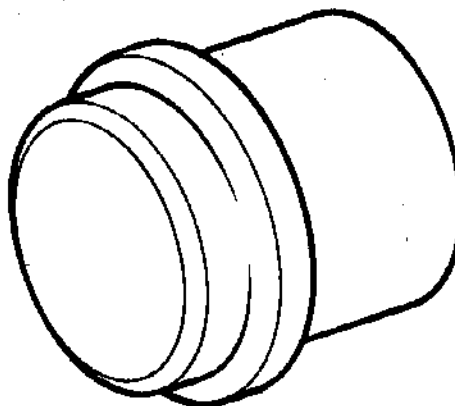
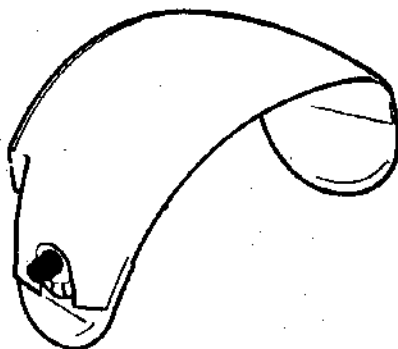
EXTERNAL PLUG GAUGE

SNECMA No. 852-500-164-0

Description Tool designed for checking the external bearing surface of the bucket hinge-point supports.

Weight..... 1,7 kg (3.75 lb)

Dimensions 80 x 105 mm (3.149 x 4.134 in.)



Tool
SC280

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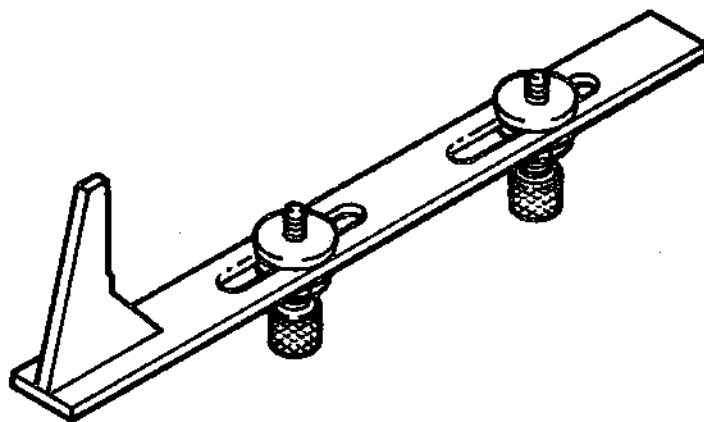
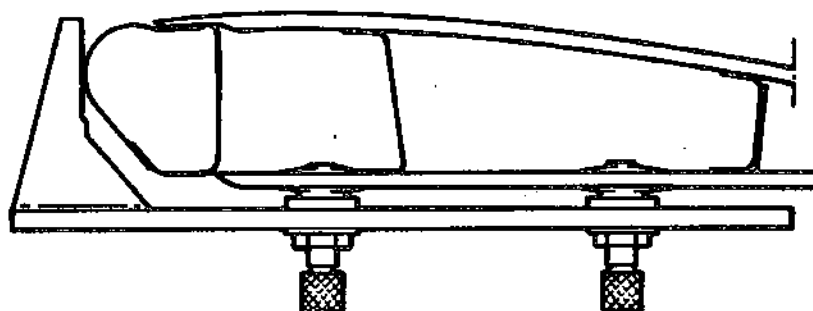
**POSITIONING TOOLS FOR
BUCKET LEADING EDGE COVERS**

SNECMA N° 852-630-165-0

Description : These tools are used to secure bucket
leading edge covers

Weight :

Dimensions :



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Tool

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ILLUSTRATED PARTS LIST

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INTRODUCTION

1. Purpose

This illustrated parts list gives a complete list of the components required for the overhaul of an equipment.

2. Illustrated parts list

The illustrated parts list is divided into three parts :

- Introduction
- Numerical index
- Detailed parts list

A. Numerical index :

For the sake of clearness, this repertory is divided into two parts :

- (1) Index of manufacturers references beginning with a letter.
- (2) Index of manufacturers references beginning with a figure.

These indexes include all the manufacturers references for the parts described in the detailed nomenclature in alphabetical or numerical order. Opposite each reference is given the chapter-section-subject-figure-item number and the quantity.

B. Detailed parts list.

The detailed parts list gives, in disassembly order, the list and illustrations of the parts making up the assembly concerned from the origin as shown in the example paragraph B6 effectivity.

- (1) Items index numbers.

To allow simple and speedy identification, each item is given a numerical item in 10 to 10 sequence, this item will not vary during the whole life of the item.

- (2) Original item.

To cater for systematic evolution due to modifications a "letter" variant is added to the numerical item. The letter variant "A" is given in the original document to identify all the items in original definition.

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It is given in the text part only.

(3) Modified item (Item variant).

After each modification concerning an item, the numerical item of this item is maintained but the "letter" variant progresses systematically to "B", then "C", "D" etc. (letters I, O and X are not used). This variant evolution is shown in the text and on the drawings only in the case of a change. The use of the "letter" variant added to the numerical item has been made necessary to make possible the rational use of the "effectivity Code" (usage code) such as it is presented paragraph 6 of this foreword.

(4) Indent

The detailed nomenclature is presented indented showing the relation between the various items, i.e :

1	2	3	4	5	6	7
Assembly						
	Assembly component parts					
	Sub-assembly					
	Sub-assembly attachment parts					
	*	*	*			
	Sub-assembly component parts					
	Sub sub-assembly					
	Sub sub-assembly attachment parts					
	*	*	*			
	Sub sub-assembly component parts					

(5) Quantity per assembly

The quantity indicated in the "Quantity per assembly" column is that required by the next higher assembly.

(6) Effectivity

A coded method is used to indicate parts effectivity. This alphanumerical code indicates the installation possibilities of sub-assemblies and primary parts in relation to the next higher sub-assembly or assembly. The validity column is left blank when installation is possible in all cases.

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This code corresponds to the next higher assembly or sub-assembly item.

Figure Item	Manufacturers Reference	Description							Effectivity
		1	2	3	4	5	6	7	
1A	123450	Assembly							
1B	123451	Assembly (SB 1)							
1C	123452	Assembly (SB 2)							
1D	123453	Assembly (SB 3)							
10A	234560	. PRIMARY PART							1A
10B	234561	. PRIMARY PART (BS 1)							1BAC
10C	234562	. PRIMARY PART (BS 3)							1D
20A	345670	. SUB-ASSEMBLY							1A
20B	345671	. SUB-ASSEMBLY (BS 1)							1BAC
20C	345672	. SUB-ASSEMBLY (BS 2)							
20D	345673	. SUB-ASSEMBLY (BS 3)							
		. ATTACHING PARTS							
30A	456780	. PRIMARY PART							
		* * *							
40A	567890	. . PRIMARY PART							20A
40B	567891	. . PRIMARY PART (BS 1)							20BA
40C	567892	. . PRIMARY PART (BS-2)							20CAB
40D	567893	. . PRIMARY PART (BS 3)							20D

The above example shows that :

- The primary part index 10A can only be installed in assembly indexed 1A.
- The primary part index 10B can be installed in assemblies indexed 1A, 1B, and 1C.
- The primary part index 10C can only be installed in assembly indexed 1D.
- The sub-assembly index 20A can only be installed in assembly indexed 1A.
- The sub-assembly index 20B can be installed in assemblies indexed 1A, 1B and 1C.
- The sub-assemblies indexes 20C and 20D and their attaching parts indexed 30A can be installed in all assemblies indexed 1 and thus do not have an "effectivity" code.
- The primary part index 40A can only be installed in sub-assembly indexed 20A.
- The primary part index 40B can be installed in sub-assemblies indexed 20A and 20B.

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- The primary part index 40C can be installed in sub-assemblies indexed 20A, 20B and 20C.
- The primary part index 40D can only be installed in the sub-assembly indexed 20D.

(7) Figure Variant

When it is not possible to illustrate the different variants of an assembly, resulting from modifications to the basic figure, one or several supplementary illustrations will describe these variants.

These supplementary illustrations will bear the same number as that of the basic figure, followed by a letter taken in the alphabetical order (except I and O).

Whatever the number of figure variants, they will be covered by only one nomenclature.

To ascertain quickly on which figure variant the item variant is to be found, the figure variant letter will be indicated in the nomenclature, in the "index reference figure item" immediately in front of the item number.

3. Using the illustrated nomenclature

The identification of a component is possible taking the following elements in consideration :

A. Through the manufacturer's reference.

Search for the manufacturer's reference in the numerical index, note the chapter-section-subject-figure-item number and refer to the corresponding nomenclature.

B. At sight of the component, without knowing its references.

Look for the figure showing the component among the illustrations this will indicate the item permitting reference to the detailed nomenclature.

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4. Manufacturer Codes

Code

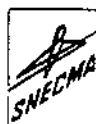
11815

Name and address

CHERRY AEROSPACE FASTENERS
CHERRY DIV OF TEXTRON INC
1224 E WARNER ST
PO BOX 2157
SANTA ANA CA
ETATS-UNIS

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
CR2663S3-1 DELETED NAS1133C3 OPT TO NAS1133E3		1 1 1 1 1	170A 200A 230A 260A 290A	5 5 6 5 5

- ITEM NOT ILLUSTRATED

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
300-852-301-0		1	340A	2
300-854-302-0		1	330A	2
300-854-401-0		1	380A	1
300-854-451-0		1	400A	1
300-854-501-0		1	410A	1
300-854-551-0		1	390A	1
300-855-301-0		1	350A	2
300-855-700-0		1	360A	2
300-895-602-0		1	10A	28
301-076-201-0		1	370A	4
SUPSD BY 301-076-202-0				
301-076-202-0		1	-370B	4
SUPSDS 301-076-201-0				
301-092-700-0				
DELETED				
301-092-802-0				
DELETED				
301-093-503-0		1	250A	1
301-093-603-0		1	220A	1
301-093-653-0		1	280A	1
301-093-703-0		1	190A	1
301-093-753-0		1	310A	1
301-104-301-0		1	70A	1
301-104-351-0		1	130A	1
301-104-401-0		1	90A	1
301-104-451-0		1	150A	1
301-109-901-0		1	40A	1
301-139-201-0		1	20A	28
301-150-500-0		1	-105A	AR
OPT TO 301-150-501-0				
		1	-165A	AR
301-150-510-0		1	-107A	AR
OPT TO 301-150-511-0				
		1	-167A	AR
301-152-303-0		1	30A	1
301-216-002-0		1	- 1A	RF
302-014-200-0		1	50A	1
302-014-300-0		1	110A	1
302-016-200-0		1	320A	4
302-061-100-0		1	460A	1
649-341-010-0		1	180A	5
		1	210A	5
		1	240A	6
		1	270A	5
		1	300A	5
649-781-024-0				
SEL FROM		1	- 67A	AR

- ITEM NOT ILLUSTRATED

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**OLYMPUS 593**

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PART NUMBER	AIRLINE PART NUMBER	FIG	ITEM	TTL REQ
649-781-024-0		1	- 87A	AR
SEL FROM		1	-127A	AR
SEL FROM		1	-147A	AR
SEL FROM		1	60A	3
649-781-142-0		1	80A	4
SEL FROM		1	120A	3
SEL FROM		1	140A	4
SEL FROM		1	100A	4
649-781-143-0		1	160A	4
SEL FROM		1	- 63A	AR
649-781-526-0		1	- 83A	AR
SEL FROM		1	-123A	AR
SEL FROM		1	-143A	AR
SEL FROM		1	-103A	AR
649-781-528-0		1	-163A	AR
SEL FROM		1	-104A	AR
SEL FROM		1	-164A	AR
649-781-529-0				
SEL FROM				

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- ITEM NOT ILLUSTRATED

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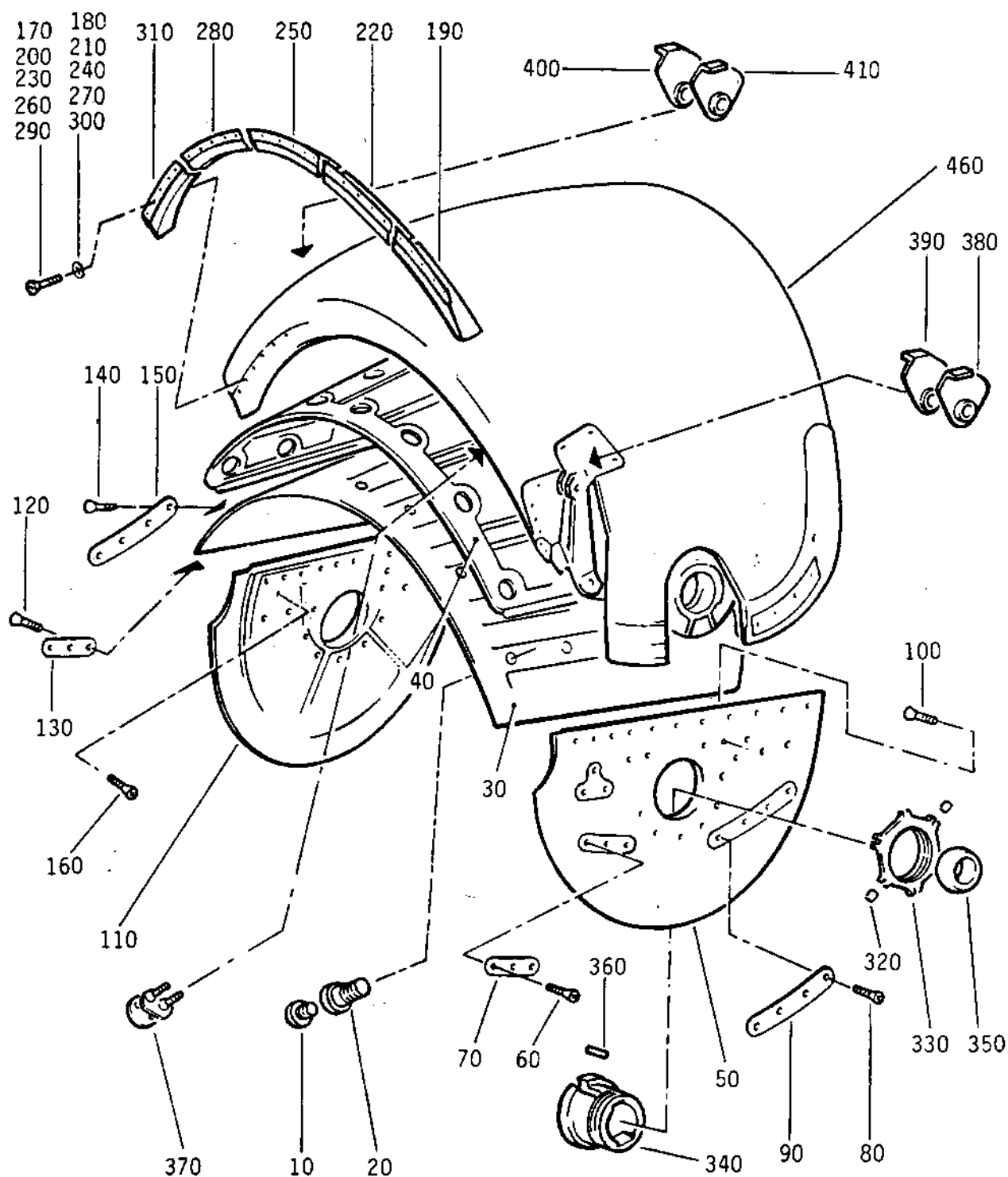
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Bucket, Assy Reverser Complete
Figure 1

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7 1 1 1 1 1 1 1		
1 - 1A	301-216-002-0	BUCKET ASSY, REVERSER COMPLETE POST SB 0L-593-78-17		RF
10A	300-895-602-0	.SCREW		28
20A	301-139-201-0	.SLEEVE, THREADED		28
30A	301-152-303-0	.HEAT SHIELD ASSY, PRIMARY		1
40A	301-109-901-0	.HEAT SHIELD ASSY, SECONDARY		1
50A	302-014-200-0	.PLATE, SIDE ATTACHING PARTS		1
60A	649-781-142-0	.SCREW, CSK HEAD LENGTH 16,5 MM (0.653 IN) SEL FROM		3
- 63A	649-781-526-0	.SCREW, CSK HEAD LENGTH 15,1 MM (0.591 IN) SEL FROM		AR
- 67A	649-781-024-0	.SCREW, CSK HEAD LENGTH 18,1 MM (0.716 IN) SEL FROM		AR
70A	301-104-301-0	.PLATE, SPACER		1
80A	649-781-142-0	.SCREW, CSK HEAD LENGTH 16,5 MM (0.653 IN) SEL FROM		4
- 83A	649-781-526-0	.SCREW, CSK HEAD LENGTH 15,1 MM (0.591 IN) SEL FROM		AR
- 87A	649-781-024-0	.SCREW, CSK HEAD LENGTH 18,1 MM (0.716 IN) SEL FROM		AR
90A	301-104-401-0	.PLATE, SPACER		1
100A	649-781-143-0	.SCREW, CSK HEAD LENGTH 32,4 MM (1.278 IN) SEL FROM		4
-103A	649-781-528-0	.SCREW, CSK HEAD LENGTH 30,8 MM (1.216 IN) SEL FROM		AR
-104A	649-781-529-0	.SCREW, CSK HEAD LENGTH 34,1 MM (1.341 IN) SEL FROM		AR
-105A	301-150-500-0	.SHIM OPT TO 301-150-501-0 SEL FROM		AR
-107A	301-150-510-0	.SHIM OPT TO 301-150-511-0 SEL FROM		AR
110A	302-014-300-0	**** .PLATE, SIDE ATTACHING PARTS		1

- ITEM NOT ILLUSTRATED

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FIG-ITEM	PART NUMBER	NOMENCLATURE	USAGE CODE	UNITS PER ASSY
		1 2 3 4 5 6 7 1 1 1 1 1 1 1		
1 120A	649-781-142-0	.SCREW,CSK HEAD LENGTH 16,5 MM (0.653 IN) SEL FROM		3
-123A	649-781-526-0	.SCREW,CSK HEAD LENGTH 15,1 MM (0.591 IN) SEL FROM		AR
-127A	649-781-024-0	.SCREW,CSK HEAD LENGTH 18,1 MM (0.716 IN) SEL FROM		AR
130A	301-104-351-0	.PLATE,SPACER		1
140A	649-781-142-0	.SCREW,CSK HEAD LENGTH 16,5 MM (0.653 IN) SEL FROM		4
-143A	649-781-526-0	.SCREW,CSK HEAD LENGTH 15,1 MM (0.591 IN) SEL FROM		AR
-147A	649-781-024-0	.SCREW,CSK HEAD LENGTH 18,1 MM (0.716 IN) SEL FROM		AR
150A	301-104-451-0	.PLATE,SPACER		1
160A	649-781-143-0	.SCREW,CSK HEAD LENGTH 32,4 MM (1.278 IN) SEL FROM		4
-163A	649-781-528-0	.SCREW,CSK HEAD LENGTH 30,8 MM (1.216 IN) SEL FROM		AR
-164A	649-781-529-0	.SCREW,CSK HEAD LENGTH 34,1 MM (1.341 IN) SEL FROM		AR
-165A	301-150-500-0	.SHIM OPT TO 301-150-501-0 SEL FROM		AR
-167A	301-150-510-0	.SHIM OPT TO 301-150-511-0 SEL FROM		AR
170A	NAS1133C3	*** .SCREW,CSK HEAD OPT TO NAS1133E3		5
180A	649-341-010-0	.WASHER,FLAT		5
190A	301-093-703-0	.SEGMENT,SEAL		1
200A	NAS1133C3	.SCREW,CSK HEAD OPT TO NAS1133E3		5
210A	649-341-010-0	.WASHER,FLAT		5
220A	301-093-603-0	.SEGMENT,SEAL		1
230A	NAS1133C3	.SCREW,CSK HEAD OPT TO NAS1133E3		6
240A	649-341-010-0	.WASHER,FLAT		6
250A	301-093-503-0	.SEGMENT,SEAL		1

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FIG-ITEM	PART NUMBER	NOMENCLATURE						USAGE CODE	UNITS PER ASSY
		1	2	3	4	5	6		
1	260A	NAS1133C3	.SCREW,CSK HEAD						5
			OPT TO NAS1133E3						
	270A	649-341-010-0	.WASHER,FLAT						5
	280A	301-093-653-0	.SEGMENT,SEAL						1
	290A	NAS1133C3	.SCREW,CSK HEAD						5
			OPT TO NAS1133E3						
	300A	649-341-010-0	.WASHER,FLAT						5
	310A	301-093-753-0	.SEGMENT,SEAL						1
	320A	302-016-200-0	.PLATE,LOCKING						4
	330A	300-854-302-0	.NUT,RETAINING HOUSING						2
			SPHERICAL BEARING						
	340A	300-852-301-0	.HOUSING,SPHERICAL BEARING						2
	350A	300-855-301-0	.BEARING,SPHERICAL						2
	360A	300-855-700-0	.PIN,ANTI-ROTATION						2
	370A	301-076-201-0	.COVER ASSY						4
	-370B	301-076-202-0	.COVER ASSY						4
	380A	300-854-401-0	.BUSHING						1
	390A	300-854-551-0	.BUSHING						1
	400A	300-854-451-0	.BUSHING						1
	410A	300-854-501-0	.BUSHING						1
	-420A	CR2663S3-1	.DELETED						
			POST SB 0L-593-78-17						
	-430A	301-092-700-0	.DELETED						
			POST SB 0L-593-78-17						
	-440A	CR2663S3-1	.DELETED						
			POST SB 0L-593-78-17						
	-450A	301-092-802-0	.DELETED						
			POST SB 0L-593-78-17						
	460A	302-061-100-0	.BUCKET,BASIC						1
			POST SB 0L-593-78-17						

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CHAPTER

79

OIL



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sneema

OVERHAUL

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	309	Dec 31/01		403	Jun 30/95
	310	Dec 31/01		404	Jan 4/93
	311	Dec 31/01	Repair No.3	401	Jun 1/96
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CHAPTER 79

OIL

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Connection Tubes	79-22-01	201
Oil Return, Oil Pump and RH Gearbox to Oil		
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Anti Drain Connection to Connection on Tube,		
Oil Cooler to Oil Tank Tube	79-22-03	201
IDG Supply and Return to Oil Cooler Tubes ...	79-22-04	201
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Engine Oil Pressure Transmitter	79-33-01	201
Engine Oil Pressure Switch	79-34-01	201
RH Gearbox Oil Pressure Transmitter	79-34-01	201
RH Gearbox Oil Pressure Switch	79-34-02	201

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The following Repair Schemes have been approved by CAA/DGAC.

<u>Chapter/Section</u>	<u>Repair No.</u>	<u>Title</u>	<u>Salvage No.</u>
79-11-01	1	Repair of cracks in internal stiffener adjacent to oil separator by welding	B.514656
	2	Cover, Access. Repair of fretting/damage by blending or Inert Gas Arc welding	B.515309-10
	3	Tank A/O, Lubricating Oil. Repair of cracks in internal stiffeners positioned at the sump end of the tank by direct welding.	B.515749
79-22-02	1	Tube. Repair of fretting/damage by inert gas arc welding	B.514566
79-22-04	1	Tube. Repair of fretting/damage by inert gas arc welding	B.514566



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1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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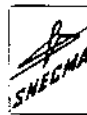
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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

No current requirement

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	40	Adjusting Plate	F2A
302	60	Vent Valve	FlA
302	70	Vent Valve Housing	FlA
302	80	Liner	FlA
302	90	Liner	FlA
302	130	Filter Housing	FlA
302	170	Cover	FlA
302	200	Housing	FlA
302	250	Cover	FlA
302	280	Ball (Metal Pattern)	FlA
302	330	Spring Retainer	FlA
302	340	Filter Assembly	FlA
303	10	Oil Tank	FlA/S3
303	60	Link	FlA
303	120	Mounting Bracket	FlA
303	180	Stiffener Plate	FlA
303	230	Mounting Bracket	FlA
304	60	Fill/Drain Connection	FlA

Items to be Fluorescent Dye Crack Tested
Table 302

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No current requirement

Crack Detection Test Diagram
Figure 301

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	79-11-01	Fig.1
303	79-11-01	Fig.2
304	79-11-02	Fig.1
305	79-11-03	Fig.1
306	Not applicable	
307	Not applicable	
308	Not applicable	

Cross References to Illustrated Parts Catalogue
Table 3034. Oil Tank (303-10)

A. Inspect Tank Shell.

- (1) Cracks. Reject.
- (2) Dents.
 - (a) Dents of smooth contour, with no impact marks, clear of corners or edges. Accept.

B. Inspect Location Faces.

- (1) Inspect wire thread inserts (Ref.72-09-00 Inspection/Check).
- (2) Nicks, scores and burrs. Accept, if repair preserves sealing capability.
- (3) Wear and fretting.
 - (a) Bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

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(4) Distortion.

(a) Any detectable distortion Reject.
or misalignment.

C. Inspect Filter Location.

NOTE: Carry out this inspection in conjunction with
the filter (302-340).

- | | |
|--|--|
| (1) Nicks, burrs and scores at
filter inner location bore. | Accept, if repair
preserves profile
and sealing
capability. |
| (2) Wear and fretting at outer
end of filter location
bore. | Accept, if repair
preserves profile
and sealing
capability. |
| (3) Nicks and burrs at spring
retainer location and retaining
ring groove. | Accept after
repair. |

D. Test Tank (Ref.79-11-00 Testing).

5. Mounting Brackets (303-120 and 230) and Link (303-60);
Stiffener Plate (303-180)

A. Inspect all Items.

(1) Distortion. Reject.

B. Inspect Attachment Faces of Brackets and Link and Hollow
Pin Location Bore of Link.

(1) Nicks and burrs. Accept, if repair
preserves surface
flatness and
profile of bore.

(2) Wear and fretting.

(a) Bolt-holes or link bores Reject.
elongated not more than
0.010 in. (0,250 mm).

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6. Filter Housing (302-130) and Cover (302-170)

A. Inspect Both Items.

(1) Distortion.

Reject.

B. Inspect Housing/Cover Location Bore/Diameter.

(1) Nicks, burrs and scores.

Accept, if repair preserves profile and sealing capability.

C. Inspect Filter Locations.

(1) Nicks and burrs.

Accept after repair.

D. Inspect Gasket Abutment Face on Filter Housing.

(1) Nicks, burrs and scores.

Accept, if repair preserves surface flatness and sealing capability.

7. Vent Valve Housing (302-70) and Housing (302-200)

A. Inspect Abutment Faces, Seal Location Groove, Liner and Vent Valve Location Bores, valve seat insert and Bushing Sleeve Bore.

NOTE: Check the bushing sleeve in conjunction with the vent valve 302-60 in para.8.

(1) Nicks and burrs.

Accept, if repair preserves profile and surface flatness.

(2) Valve seat insert.

(a) Inspect insert secure in housing.

Accept, after locking repair to improved standard, refer to SB.79-8757-16.

B. Inspect Thread Inserts (Ref.72-09-00 Inspection/Check).

8. Vent Valve (302-60)

A. Inspect Contact Faces (Ref.Fig.306).

NOTE: Carry out this inspection in conjunction with the vent valve housing (302-70) in para.7.

(1) Nicks and burrs.

Accept, if repair retains profile and sliding fit in bushing sleeve.

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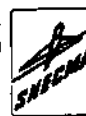
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(2) Wear and fretting.

(a) Step at inner end
abutment face and at
bellows contact face.

Accept after repair
if location is
maintained.

(3) Check valve for rocking in bushing sleeve.

NOTE: Make this check with a new or unworn
vent valve housing. Finally select a valve
and vent valve housing that are compatible
and retain as a set for assembly.

(a) Snug fit, with no rocking. Accept.

9. Liners (302-80 and 90)

A. Inspect Liners.

(1) Nicks and burrs.

Accept, if repair
preserves 90 per
cent contact area.

10. Bellows Assembly (302-20)

A. Dimension Check (Ref. Fig.308).

(1) Overall length
2.380/2.340 in.
(60,45/59,44 mm).

Accept.

(2) Free movement
0.330/0.260 in.
(8,38/6,60 mm).

Accept.

B. Leakage Check.

NOTE: The bellows must be restrained at its free
state dimension (Ref. Fig.308) during the
check.

(1) Pressurize the bellows internally to 65/70 p.s.i.
(448/483 kPa) and immerse in kerosene, white spirit
or soapy water. No leaks are acceptable.

(2) Dry bellows thoroughly, and apply de-watering oil.

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C. Bellows Rate Check.

NOTE: The bellows must be vented to atmosphere during the check.

- (1) Check the bellows rate over the full range of free movement (Ref. Fig.308). The rate must be between 20 and 26 lbf/in. (3,50 and 4,55 N/mm.). Reject the bellows if outside these limits.

11. Adjusting Plate (302-40)

A. Inspect Abutment Faces.

NOTE: This item is selected during initial assembly. Ensure that it is retained with its original bellows and vent valve.

- (1) Nicks, burrs and scores.

Accept, provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

- (2) Fretting and wear.

Reject.

12. Cover (302-250)

A. Inspect Abutment Face.

- (1) Nicks and burrs.

Accept, if repair preserves surface flatness and sealing capability.

B. Inspect Tube.

- (1) Distortion and dents.

Accept, after repair if ball (302-280) moves freely in tube.

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13. Ball (302-280)

A. Inspect Surface.

- (1) Nicks and burrs.

Accept after repair

14. Spring Retainer (302-330)

A. Inspect Locating and Spring Contact Faces.

- (1) Nicks and burrs, wear
and fretting.

Accept, if repair
preserves flatness
and profile.

15. Filter Assembly (302-340)

A. Inspect Screen.

- (1) Punctures, tears or separation
from cage.

Reject.

B. Inspect Cage.

- (1) Cracks or distortion.

Reject.

- (2) Nicks, burrs and scores.

Accept, if unbroken
contact is retained
after repair.

- (3) Wear and fretting.

Accept, if sealing
unimpaired.

- (4) Spring security.

- (a) Spring detached from cage,
or loose at attachment
point.

Accept after
repair.

16. Internal Stiffeners (303A)

A. Inspect Rear Stiffener Flanges.

- (1) Cracks.

- (a) Cracking over full length
of top of flange at spot-
welded locations.

Accept, provided that
cracks do not
propagate into web
of stiffener.

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- (b) Cracking in outboard flange at spot-welded locations.

Accept, provided that cracks do not exceed half the length of the outboard flange and do not propagate into web of stiffener.

B. Inspect Centre Stiffener Flanges.

- (1) Cracks over the full length of all flanges

Accept, provided that cracks do not propagate into web of stiffener.

C. Inspect Front Stiffener Flanges.

- (1) Cracking in all flanges

Accept, provided that cracks do not exceed half the length of the outboard flange and do not propagate into web of stiffener.

17. Pressure Cap Assembly (304-10)

A. Inspect Cap.

- (1) Check condition of Metaseal ring on seal carrier.

- (a) No damage to faces or insert; seal secure in carrier; sealing capability unimpaired.

Accept.

- (2) Check circlips - two off.

- (a) Displaced from locating grooves.

Accept after repair if otherwise serviceable.

- (3) Nicks and burrs.

Accept, if operation is satisfactory after repair (para.B).

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B. Check Operation (Ref.Fig.307).

NOTE: Carry out this check after the inspection of, and in conjunction with the Fill/Drain Connection 304-60 (para.18).

- (1) Temporarily locate Fill/Drain Connection to suitable rigid base, such as mounting face on tank.
- (2) Ensure that locking sleeve is in unlocked condition, by turning counter-clockwise until locking pin is at top of cut-out in sleeve.
- (3) Push cap fully home, against spring pressure, on end of connection; rotate sleeve clockwise until locking pin is in lower location of cut-out.
- (4) Give sharp pull on cap without rotating sleeve to confirm that locking balls are located in connector groove.
- (5) Turn locking sleeve counter-clockwise to unlocked position at same time withdrawing cap from connection. Ensure locking pin is at top of cut-out.
 - (a) Balls engaged and cap secure; cap removable from connection. Accept.

C. Check Lanyard and Locking Tab.

- (1) Security.
 - (a) Lanyard broken or frayed; tab missing; retaining ring damaged. Accept after repair or replacement.

D. Test Pressure Cap for Leakage.

- (1) Connect the Pressure Cap to a test nipple with its valve assembly removed. Apply a pressure of 2 p.s.i.g. (13,79 kN/m²) with the pressure cap totally submerged in water. There must be no air leakage.
- (2) Increase the test pressure to 5 p.s.i.g. (34,47 kN/m²). An intermittent leakage is allowed.

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18. Fill/Drain Connection Assembly (304-60)

A. Inspect Gasket Abutment Face.

(1) Nicks and burrs.

Accept, if repair preserves surface flatness.

B. Inspect Pressure Cap Contact Faces.

(1) Nicks and burrs.

Accept, if repair preserves profile and operation is satisfactory (para.17B).

C. Inspect Pressure Cap Seal Location Bore.

(1) Nicks and burrs.

Accept, if repair preserves sealing capability.

D. Inspect Valve Seat Face.

(1) No damage to face.

Accept if sealing capability is unimpaired.

E. Inspect Locking Balls Locating Ring.

(1) Nicks and burrs.

Accept, if repair preserves ring profile.

F. Check Operation (Ref.Fig.307).

(1) Depress valve against spring. Check that valve moves smoothly in connection bore. Check that spring valve seats squarely on contact face when released.

(a) Smooth movement of valve, with full contact on closure.

Accept.

(2) Check pressure cap is locking satisfactorily (Ref.para.17).

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G. Test for Leakage.

- (1) Connect the flanged end of the nipple to a suitable test rig. Apply a pressure of 3 to 4 p.s.i.g. (20,55 to 27,58 kN/m²) with air under water. Maintain for a period of 2 minutes. An intermittent leakage of bubbles is allowed.
- (2) Relieve pressure. Slowly apply a pressure of 10 p.s.i.g. (68,95 kN/m²) and repeat test as in para. (1). An intermittent leakage of bubbles is allowed.
- (3) Relieve pressure and remove the nipple from the test rig. Remove the excess water and place the nipple in a drying oven for a period of 30 minutes at a temperature of 100°C to 110°C.
- (4) Test Socket Assy for Leakage.
 - (a) Connect the rear (screwed termination) of the socket to a suitable air test rig. Completely immerse the socket in water and apply an air pressure of 3 to 10 p.s.i.g. (20,55 to 68,95 kN/m²). There must be no air leakage from any part of the socket, as will be evident by the presence of air bubbles.
 - (b) Connect the socket to a serviceable mating nipple. Blank nipple termination. Immerse the coupling in water and apply an air pressure in increments from 5 to 10 p.s.i.g. (34,47 to 68,95 kN/m²). There must be no leakage from any part of the coupling.

19. Overflow Drain Cable Assembly (305-15)

NOTE: The overflow drain cable assembly includes the screwed plug to which the cable is attached.

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Plug.

(1) Seal face damaged.

Reject.

(2) Cable groove.

(a) Cable displaced from groove.

Accept after repair if otherwise serviceable.

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C. Check Cable and Locking Tab.

(1) Security.

- | | |
|--|---|
| (a) Cable broken or frayed;
tab missing; retaining
ring damaged. | Accept after
repair or
replacement. |
|--|---|

20. Screwed Plug (305-25)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Seal Abutment Faces.

- | | |
|------------------------------|---|
| (1) Nicks, burrs and scores. | Accept, if repair
preserves surface
flatness. |
|------------------------------|---|

21. Mounting Brackets (302-50, 304-30 and 304-40)

A. Inspect Brackets.

(1) Wear and fretting.

- | | |
|--|-------------------------|
| (a) Attachment face thickness
reduced by not more than
5 per cent. | Accept. |
| (b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm). | Accept after
repair. |

(2) Scoring.

- | | |
|---|--|
| (a) Not more than 0.010 in.
(0,250 mm) in depth. | Accept after repair
providing material
thickness is not
reduced by more
than 5 per cent. |
|---|--|

- | | |
|----------------------|-------------------------|
| (3) Nicks and burrs. | Accept after
repair. |
|----------------------|-------------------------|

- | | |
|-----------------|---|
| (4) Distortion. | Accept if
compatibility is
preserved. |
|-----------------|---|

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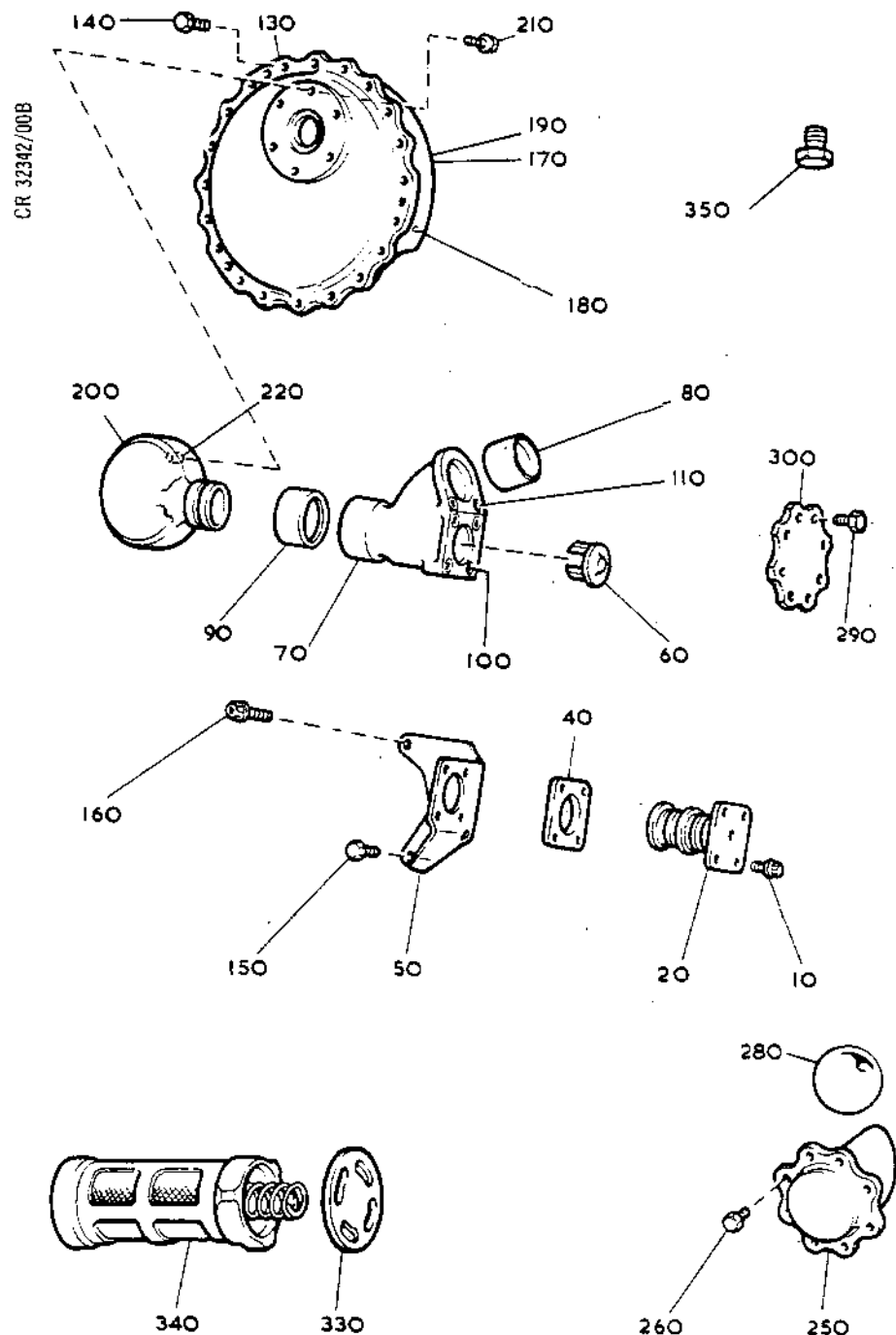


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Oil Tank Assembly (Part 1 of 3)
Figure 302

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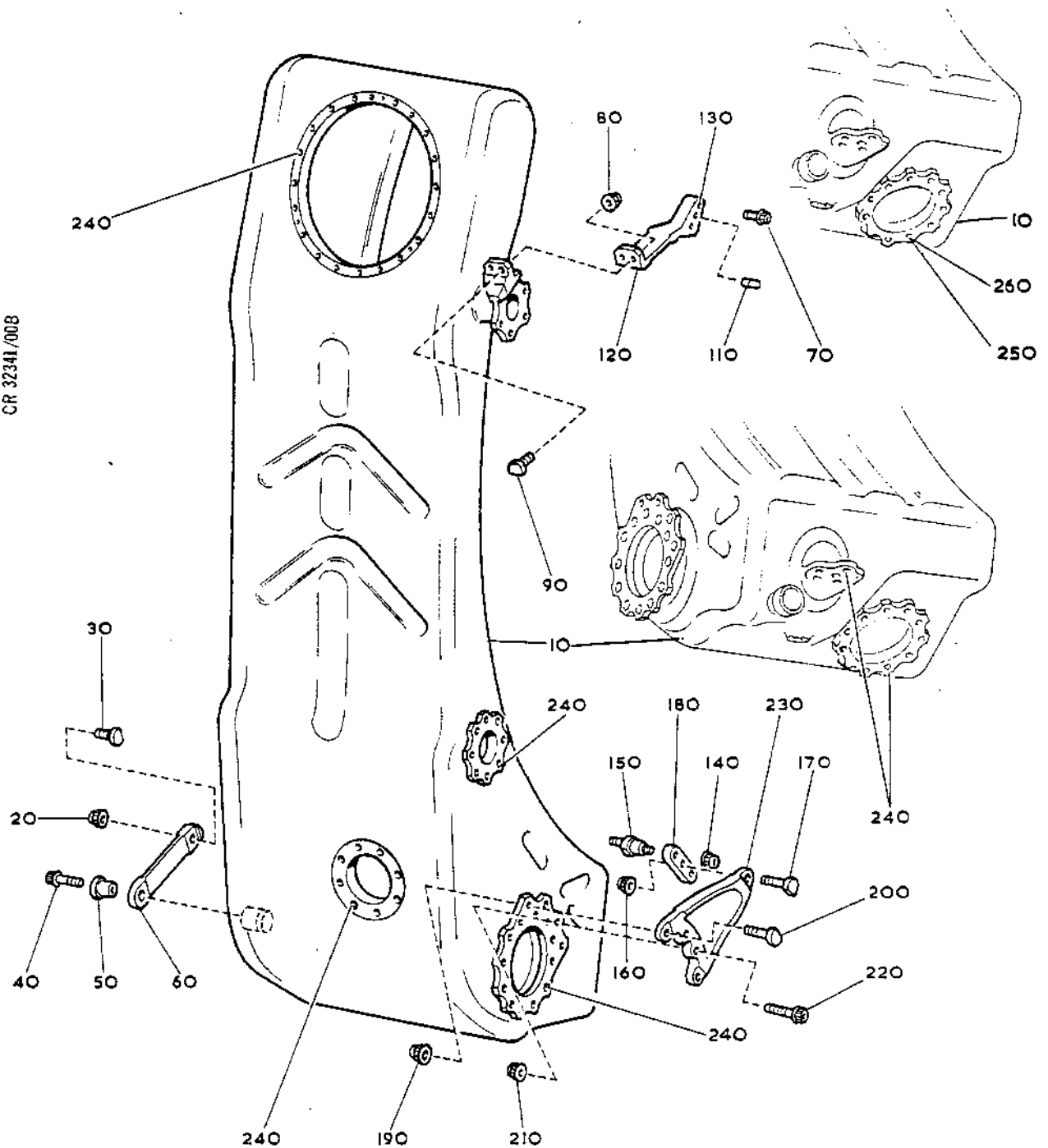
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Oil Tank Assembly (Part 2 of 3)
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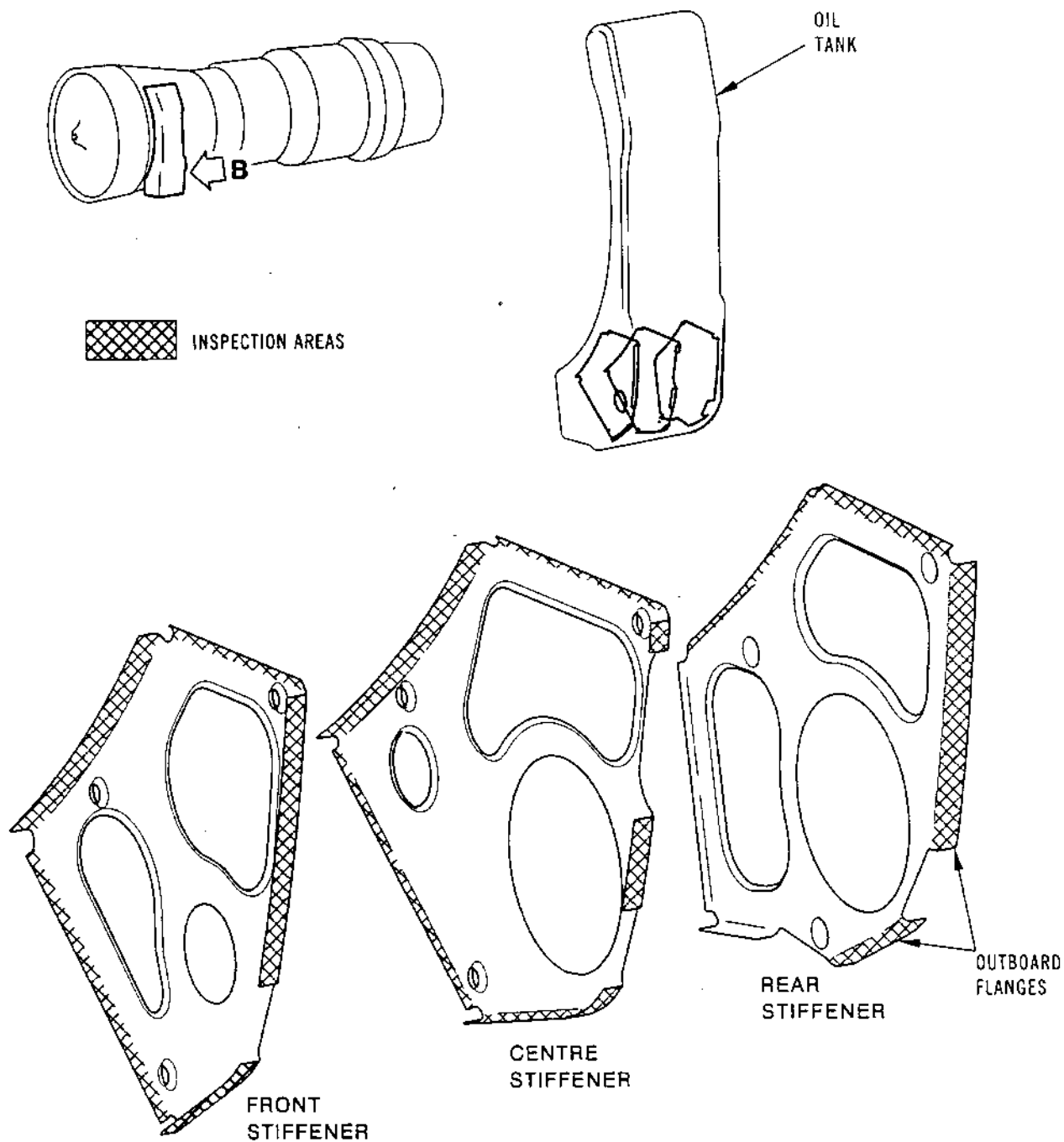


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Oil Tank Assembly (Part 3 of 3)
Figure 303A

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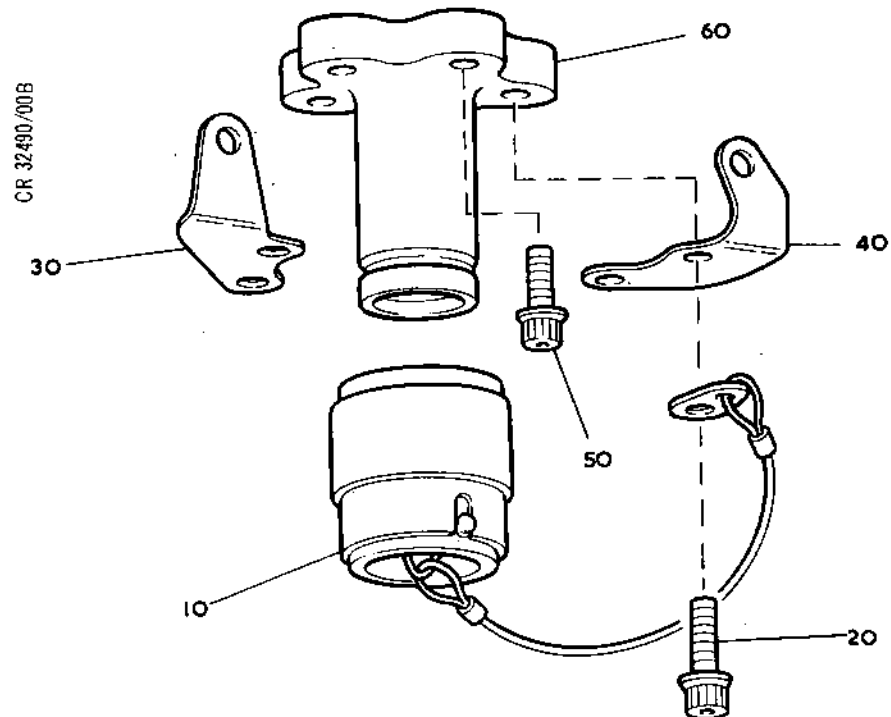


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Fill/Drain Coupling
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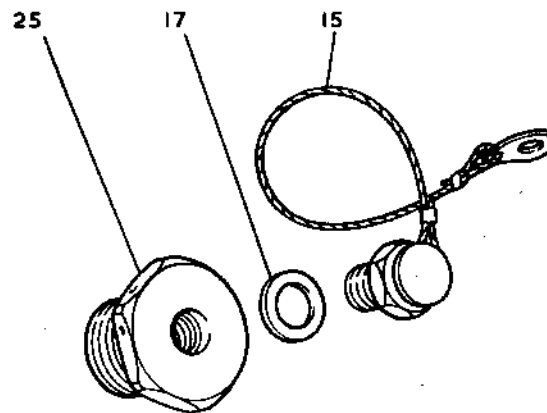
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CR 32491/00C



TN32535

Overflow Drain Valve
Figure 305

INSPECTION/CHECK

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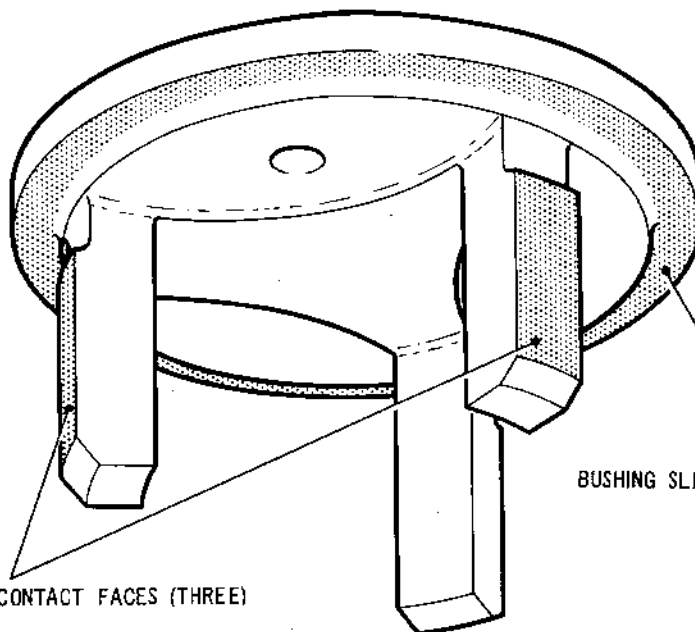
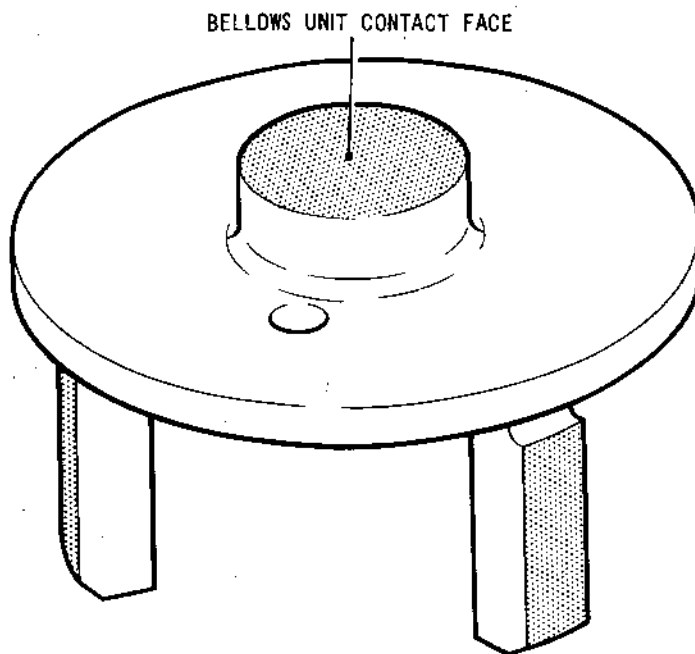
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CR 33053/00A



BUSHING SLEEVE BORE CONTACT FACES (THREE)

BUSHING SLEEVE END CONTACT FACE

Vent Valve Inspection Zones
Figure 306

INSPECTION/CHECK

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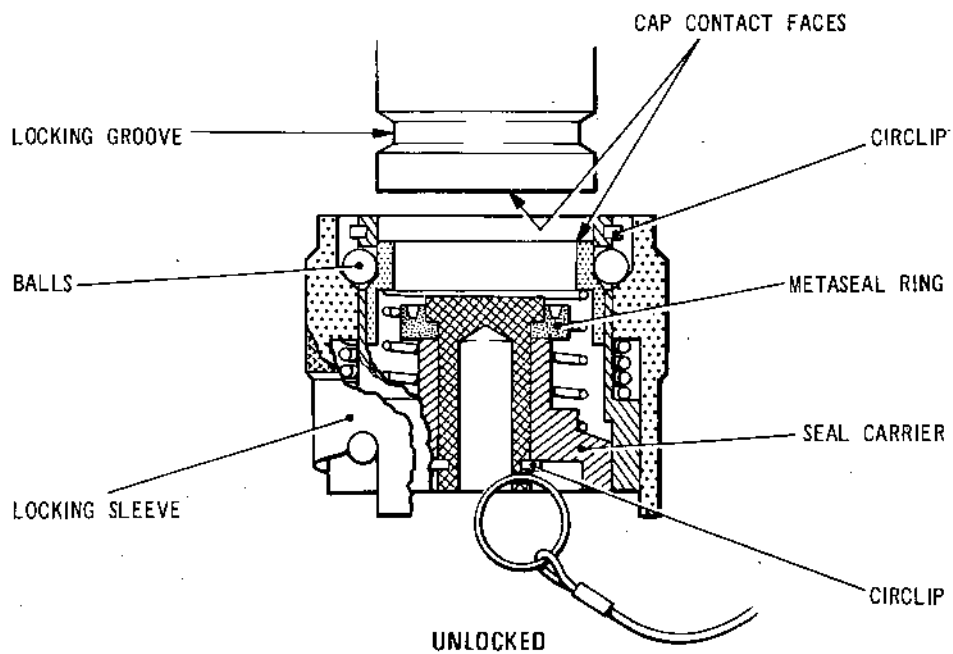
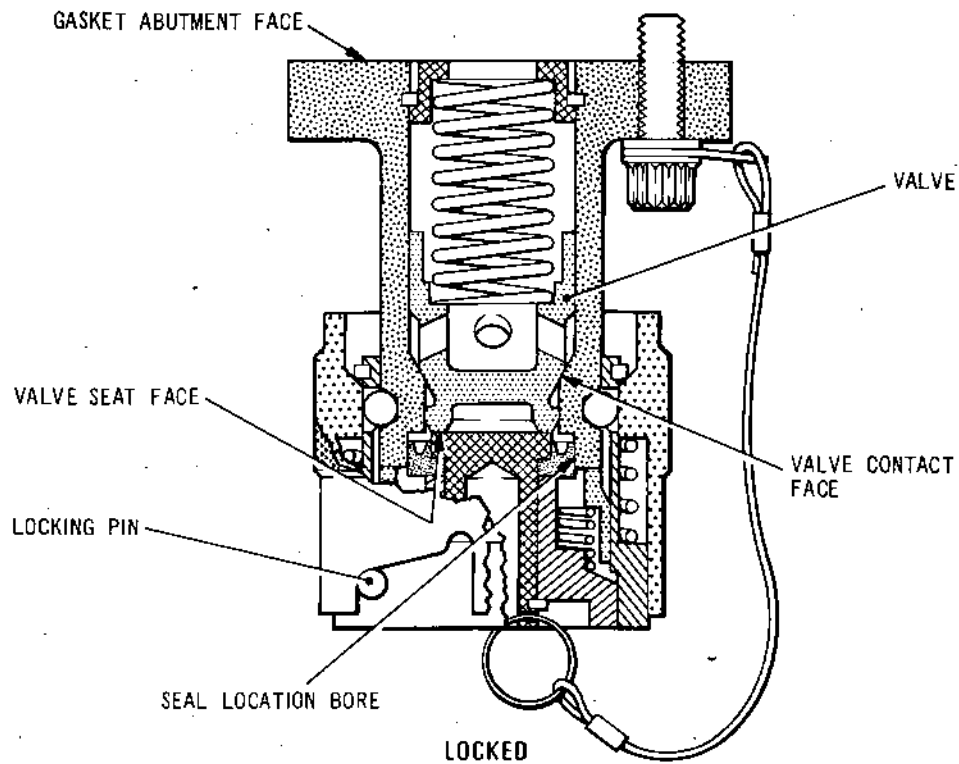


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CR 33052/00A



Fill/Drain Coupling Details
Figure 307

INSPECTION/CHECK

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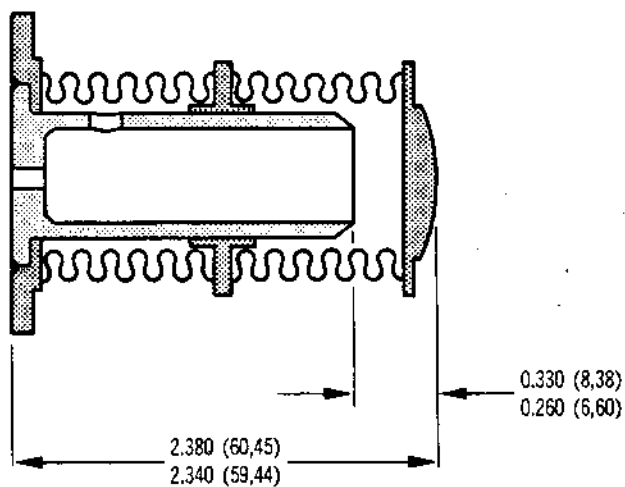
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OVERHAUL



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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



Bellows Assembly Dimensions
Figure 308

INSPECTION/CHECK

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MAIN OIL TANK - DISASSEMBLY

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A. Assemble the Oil Tank to the Stand	101
3. Disassemble the Oil Tank	101
A. Remove the Drain Plug	101
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D. Remove the Inspection Cover	105
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102 Removing Vent Valve and Filter Assembly	103
103 Main Oil Tank Component/Item Location	106

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DISASSEMBLY

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MAIN OIL TANK - DISASSEMBLY

1. General

- A. Prior to commencing disassembly, refer to 72-09-00 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly of the oil tank and for the Manufacturers Part No. refer to the Special Tools, Fixtures and Equipment, Table 1001.

2. Prepare the Oil Tank for Disassembly

- A. Assemble the Oil Tank to the Stand (Ref. Fig.101).
 - (1) Place the oil tank on the bench with its mounting brackets uppermost.
 - (2) Remove the support frame (Tool 673) from the stand (Tool 482) by unscrewing the four hand nuts on the cradle.
 - (3) Secure the support frame to the oil tank with a slave nut and bolt at the front and lower bracket locations, and two slave bolts at the rear upper bracket location.
 - (4) With the stand cradle in the vertical position, lift the oil tank and support frame, then, with the base (larger end) of the oil tank downwards, locate the support frame over the four retaining hooks on the cradle and tighten the hand nuts.

3. Disassemble the Oil Tank (Ref. Fig.103)

- A. Remove the Drain Plug.
 - (1) Remove the lockwire, then unscrew and remove the drain plug. Allow any surplus oil to drain from the oil tank, then assemble the screwed protector (Tool 918) into the drain plug location.
- B. Remove the Negative 'G' Ball Valve.
 - (1) Unscrew and remove the eight retaining bolts from the cover.



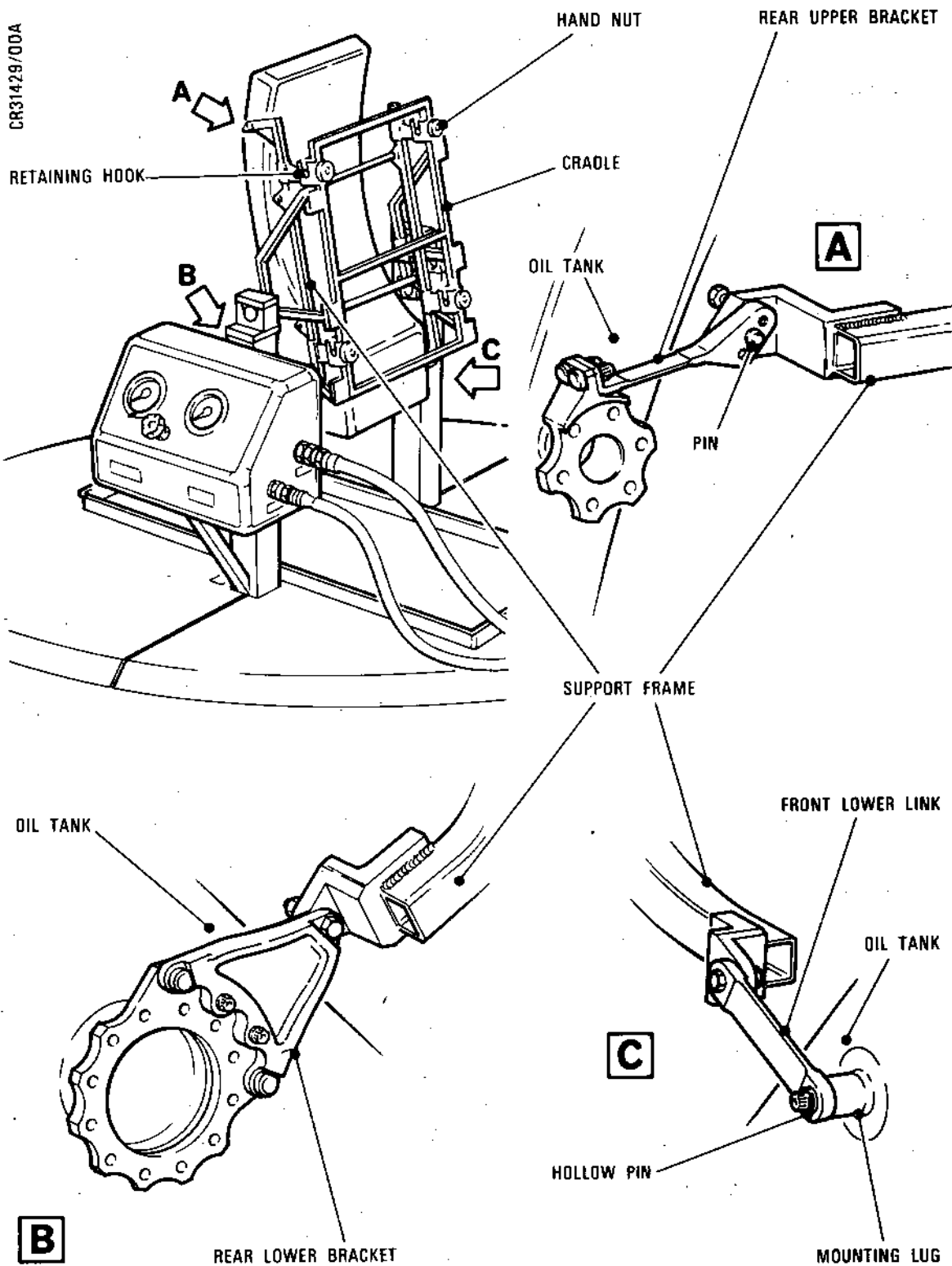
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CR31429/00A



Assembling Oil Tank to Stand
Figure 101

DISASSEMBLY

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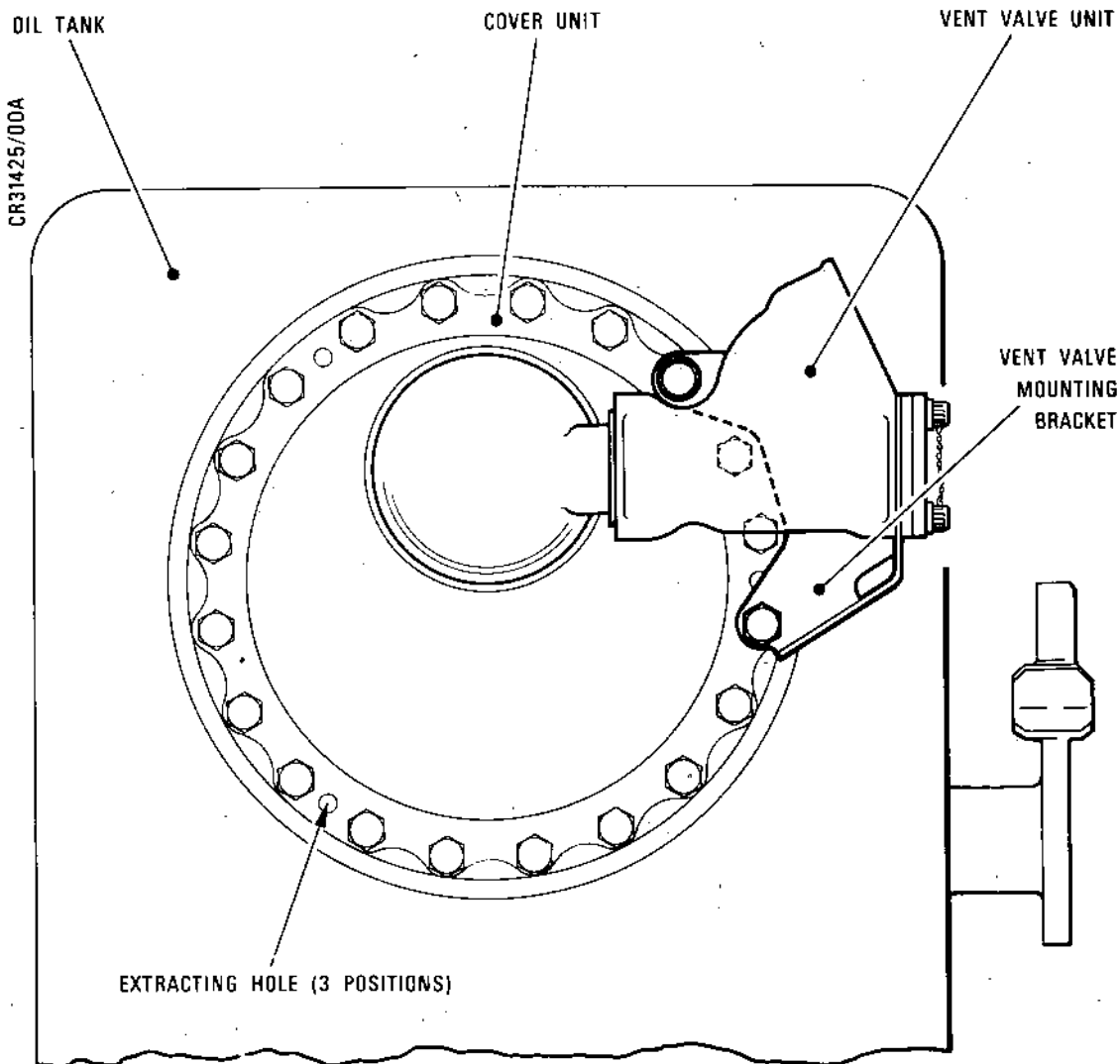
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Removing Vent Valve and Filter Assembly
Figure 102

DISASSEMBLY

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- (2) Rotate the cover through 180 degrees allowing the ball within the tank to drop into the cup, then carefully withdraw the cover and ball.
 - (3) Remove the gasket, then assemble the protector (Tool 919) to the ball valve location and secure with its two retaining bolts.
- C. Remove the Vent Valve/Filter Assembly, (Ref. Fig.102).
- (1) Withdraw the locking pin from the stand, then turn the oil tank to the horizontal position and replace the pin.
 - (2) Unscrew and remove the two bolts securing the vent valve mounting bracket to the oil tank, then slide the vent valve off the filter housing.
 - (3) Remove the locking wire, then unscrew and remove the four bolts securing the bellows unit to the vent valve housing. Withdraw the bellows, then remove the adjusting plate, sealing washers and mounting bracket. Withdraw the valve from the housing.
 - (4) Unscrew and remove the remaining 18 bolts which retain the filter housing. Screw three slave bolts ($\frac{1}{4}$ 28 UNF) into the extracting holes in the filter cover and withdraw the cover from the tank.
 - (5) Assemble the protector (Tool 677) to the vent valve filter location on the oil tank and secure with the four retaining bolts.
 - (6) Dismantle the filter assembly (Pre SB.79-9 only).

NOTE: Do not dismantle the filter assembly unless the cover/housing joint leaks, it is suspected that the filter is contaminated, or with the filter dished towards the cover assembly, the clearance between the deflector cover and the filter is not between 0.625 in. (15,87 mm) minimum and 0.875 in. (22,22 mm) maximum.

- (a) Drill out the three rivets which secure the deflector cover to the filter cover, then withdraw the deflector cover and filter.
- (b) If leakage has occurred from the cover/housing joint, unscrew and remove the six bolts securing the housing, then remove the housing and gasket.

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D. Remove the Inspection Cover.

- (1) Unscrew the eight retaining bolts and remove the inspection cover and gasket.
- (2) Assemble the protector (Tool 678) to the inspection cover location on the oil tank and secure with the two retaining bolts.

E. Remove the Filler/Drain Coupling.

- (1) Remove the pressure cap from the filler/drain coupling by rotating the outer sleeve and withdrawing it locating the pegs in the slots of the sleeve.
- (2) Unscrew and remove the five retaining bolts then remove the coupling and brackets. Assemble the protector (Tool 680) to the flange and secure with the two retaining bolts.

F. Remove the Overflow Drain Plug S.B.79-6.

- (1) Remove the oil sampling plug locking wire then unscrew and remove the plug and seal. Remove the locking wire from the overflow drain plug, unscrew and remove both plug and seal.
- (2) Screw the threaded protector (Tool 681) into the overflow drain plug location.

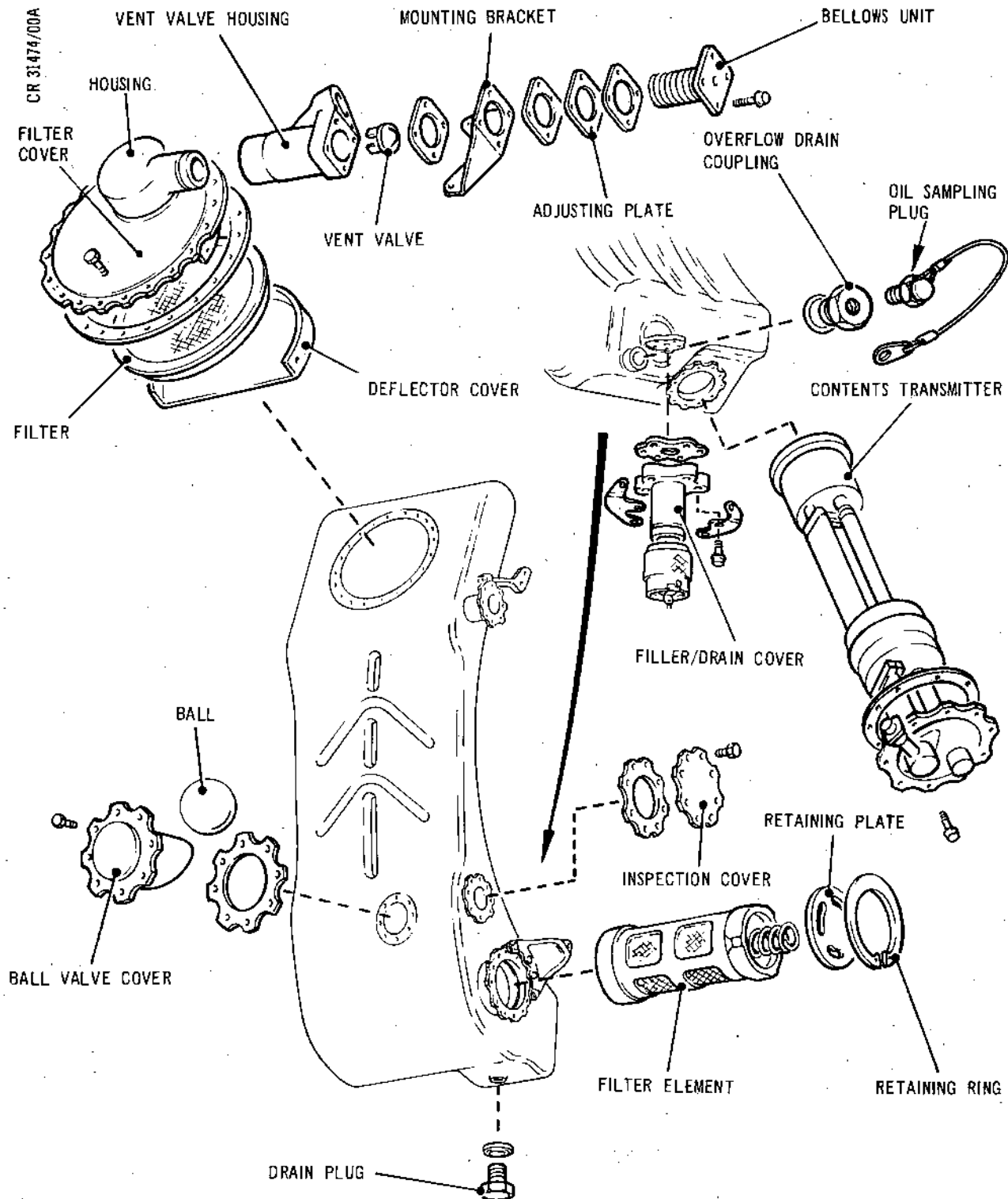
G. Remove the Contents Transmitter.

- (1) Remove the locking wire, then unscrew and remove the eleven bolts to release the transmitter and carefully withdraw the transmitter from the tank. Remove the gasket.
- (2) Assemble the protector (Tool 917) to the contents transmitter location on the oil tank and secure with the three retaining bolts.



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Main Oil Tank Component/Item Location
Figure 103

DISASSEMBLY
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H. Remove the Filter.

- (1) Press in the filter retaining plate to compress the spring, then remove the retaining ring and withdraw the retainer and filter.
- (2) Assemble the protector (Tool 676) to the oil feed flange, then ensure that the protector (Tool 916) is assembled to the oil return flange.

I. Remove the Mounting Brackets.

- (1) Remove the oil tank from the stand.
 - (a) With the oil tank positioned vertically, unscrew the four hand nuts which secure the support frame to the cradle.
 - (b) Lift the support frame and oil tank from the cradle and carefully place them on the bench with the support frame uppermost.
 - (c) Remove the nuts and bolts securing the support frame to the oil tank mounting brackets, then remove the frame.
- (2) Remove the rear upper mounting bracket by unscrewing and removing the two nuts and bolts which secure it to the oil return flange.
- (3) Remove the rear lower mounting bracket by unscrewing and removing the four nuts and bolts which secure it to the oil feed flange.
- (4) Remove the front lower link by unscrewing the bolt which secures it to the oil tank boss, then remove the hollow pin from the link.

NOTE: The disassembly of the oil tank is now complete and the tank and its components can be despatched for cleaning.



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OVERHAUL



OIL TANK - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig. 201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

CLEANING

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

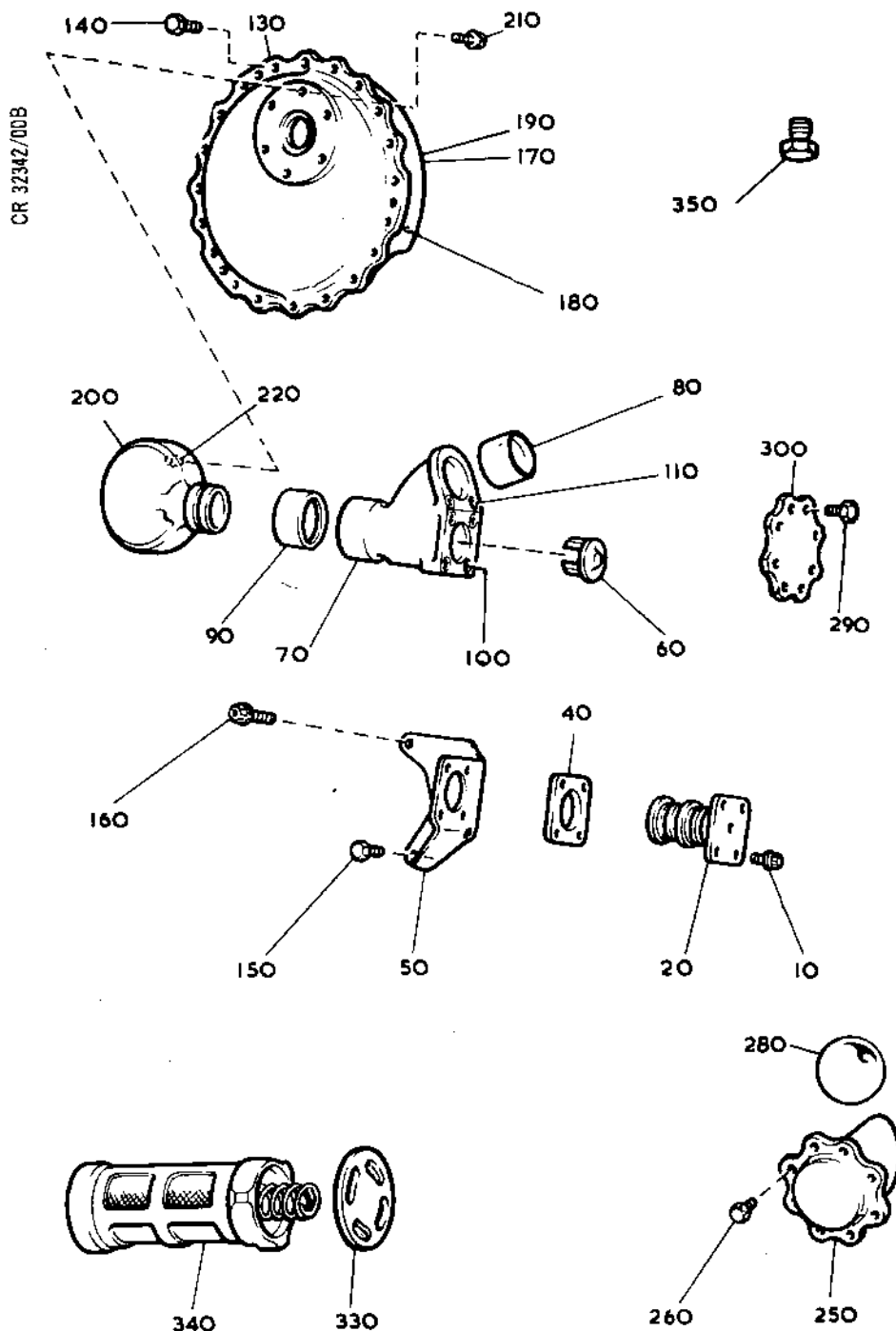
FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		B	-	-
202	ALL		B	-	-

Cleaning Processes
Table 201

TN11910



OLYMPUS 593
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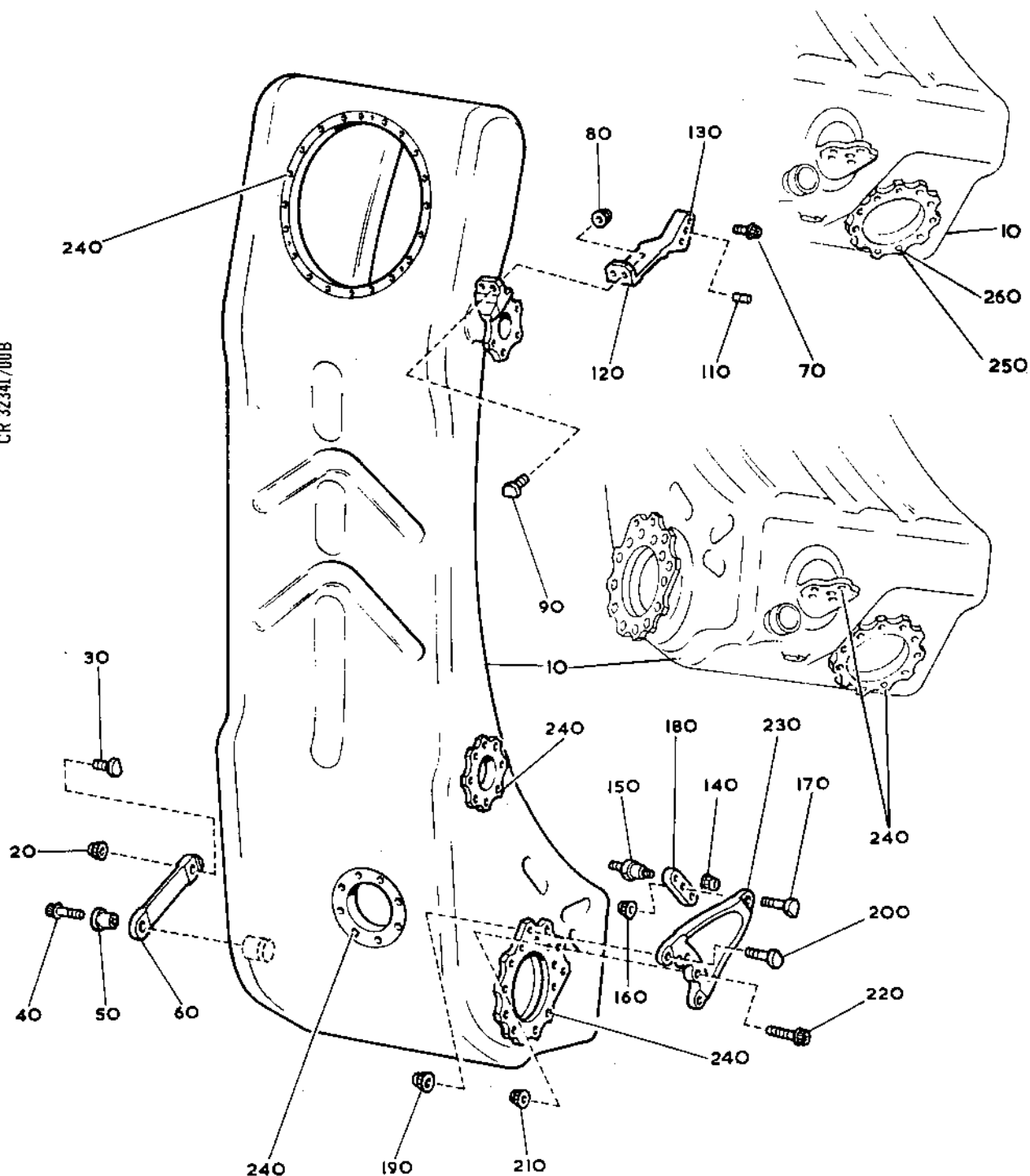
Oil Tank Assembly
Figure 201



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CR 32341/00B



Oil Tank Assembly
Figure 202

CLEANING

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OIL TANK - REPAIR

TABLE OF CONTENTS

Repair No.	Title	Scheme No.
1	Repair of cracks in internal stiffener adjacent to oil separator by welding	B.514656
2	Cover, Access. Repair of fretting/ damage by blending or Inert Gas Arc welding	B.515309-10
3	Tank A/O, Lubricating Oil. Repair of cracks in internal stiffeners positioned at the sump end of the tank by direct welding	B.515749

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REPAIR

79-11-01

Contents 1
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OVERHAUL



sneema

TANK, ASSEMBLY OF, LUBRICATING OILREPAIR OF CRACKS IN INTERNAL STIFFENER
ADJACENT TO OIL SEPARATOR BY WELDINGREPAIR NO. B5146561. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
79-11-01	02A 10G	B930660
		B930662
		B930663
		B930664
	02 10H	B930661

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

3. GENERALUNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURESUPPLEMENTARY INFORMATION

- 1) Mask off bosses and holes etc. with blanks and fill tank with clean 1.1.1. Trichloroethylene (Triklone N). Heat at 90°C for 10 minutes in a vapour degreasing tank.

Use OMat 1/21.
Note. Use the same type of solvent as contained in the vapour degreasing tank to be used.

- 2) Empty tank and remove blanks.

- 3) Vapour degrease tank.

Refer TSD 594 OP.101

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OVERHAUL

- 4) Blow through tank with clean, dry, compressed air.
- 5) Stove at 120°C for 10 minutes.
- 6) Inspect stiffener flanges adjacent to the oil separator mounting flange and determine extent of cracking.
- 7) Mark out areas of skin to be removed. Refer fig.401
- 8) Visually inspect to ensure that no previous identity marking(s) will be lost. If marking(s) will be lost (or obscured), record and retain for re-marking at op.50). Refer fig.403 for identity marking area.
- 9) Cut away to remove area of skin, allowing sufficient material to dress back to marked outline. **NOTE:** Do not impair flange material under skin section.
- 10) Release skin from internal stiffener by grinding through spot weld nuggets and remove skin.
- 11) Fluorescent penetrant inspect the internal stiffener flange areas immediately adjacent the aperture for cracks. Refer TSD 594 OPS.210 or 213.
- 12) If further cracking is evident, extend the aperture size until all signs of cracking are removed. **NOTE:** Repeat op.8).
- 13) Trim the aperture and remove the cracked flange section from the stiffener. Refer fig.401 to 403
- 14) Trim the existing stiffener flange at each end of the aperture for a distance of 0.250(6,35). Refer fig.402
- 15) Fabricate a stiffener locating flange section. Make from 22 SWG MSRR8608 Refer fig.404

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- 16) Produce 0.125(3,18) dia. holes at 0.500(12,70) centres in replacement flange section. Refer fig.404
- 17) Produce a closing patch to suit contour of tank. Make from 20 SWG MSRR8608
Ensure fit of patch in relationship to aperture is of close tolerance to minimise shrinkage when welding. Refer fig.404
- 18) Locate replacement flange section and patch temporarily on tank and mark where centre of flange corresponds in relation to the patch.
- 19) Using the position marked at op.18) produce 0.125(3,18) dia. holes at 0.500(12,70) centres in patch. Refer fig.404
- 20) Heat treat replacement flange section and patch at 650°C for 1 hour.
- 21) Fluorescent penetrant inspect the replacement flange section and patch for cracks. Refer TSD 594 OPS.210 or 213.
- 22) Thoroughly clean the existing stiffener and replacement flange section using abrasive matt in preparation for welding. Refer TSD 594 OP.409
Use OMat 583.
- 23) Degrease existing stiffener and replacement flange section prior to welding. Refer TSD 594 OP.101
- 24) Locate replacement flange section in position on existing stiffener then clamp to secure.
- 25) Tack weld replacement flange section to existing stiffener. Refer TSD 594 OP.409
Use filler rod OMat 366.
- 26) Remove clamps and check for position by temporarily fitting patch. Adjust the position of the replacement flange section (if necessary).

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MK.610-14-28 snecma
OVERHAUL

- | | | |
|-----|---|---|
| 27) | Finally plug weld replacement flange section to existing stiffener using holes produced at op.16). Ensure adequate argon coverage. | Refer TSD 594 OP.409
Use filler rod OMat 366.
Refer fig.403 |
| 28) | Fluorescent penetrant inspect the plug welds for cracks. | Refer TSD 594 OPS.210 or 213. |
| 29) | Position patch on tank and locate from three of the holes produced at op.19) i.e. middle and either end. | Refer fig.404 |
| 30) | Drill 3 off 0.125(3,18) holes through replacement flange section. | Refer fig.404
<u>NOTE:</u> These holes are used for clamping the patch during welding. |
| 31) | Fabricate a flat chill to bolt to the oil separator mounting flange during welding. Chill must be of sufficient section to prevent distortion of flange during welding. | |
| 32) | Bolt the chill to the oil separator flange. | |
| 33) | Clean all surfaces of patch, tank aperture and flange areas using abrasive matt in preparation for welding. | Refer TSD 594 OP.409
Use OMat 583 |
| 34) | Degrease all surfaces of patch, tank aperture and flange areas prior to welding. | Refer TSD 594 OP.101 |
| 35) | Locate patch in position and secure using 3 off sheet metal clamps eg.'Avdel'. | |
| 36) | Place tank in an enclosed argon atmosphere and plug weld patch to replacement flange section. | Refer TSD 594 OP.409
Use filler rod OMat 366. |
| 37) | Remove 3 off clamps and repeat ops.34 and 36 to the vacated positions. | Refer TSD 594 OP.409
Use filler rod OMat 366. |

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MK.610-14-28 *sneema*

OVERHAUL

- 38) Inspect for fit of patch and adjust (if necessary).
- 39) Locally degrease prior to welding. Refer TSD 594 OP.101
- 40) Place tank in an enclosed argon atmosphere and tack-weld the patch at equi-spaced positions around the patch to prevent distortion during welding. Refer TSD 594 OP.409
Use filler rod OMat 366.
- 41) Finally inert gas arc weld patch into position. Refer TSD 594 OP.409
Weld group 2. Use filler rod OMat 366.
Refer fig.403
- 42) Fluorescent penetrant inspect the repair area for cracks. Refer TSD 594 OPS.210 or 213.
- 43) Remove the chill from the oil separator flange and inspect for flatness.
- 44) Radiographically inspect for adequate penetration of external repair welds. Refer TSD 594 OP.409
- 45) Hydraulic pressure test using water as a medium, pressure test at 12 lbf/sq. in.(84kPa) for 2 minutes minimum.
No leakage permissible.
- 46) Fluorescent penetrant inspect tank all over for cracks. Refer TSD 594 OPS.210 or 213.
- 47) Vapour degrease tank. Refer TSD 594 OP.101
- 48) Visually inspect for cleanliness.
- 49) Fit standard protection blanks.
- 50) Mark Repair Instruction number RI 8514656 or R1 on component adjacent to normal 'assy of' number. Re-mark any information recorded at op. 8). Refer Overhaul Manual
Use the electro-chemical marking Chapter 72-09-00 Repair.
technique.

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- 47) Vapour degrease tank. Refer TSD 594 OP.101
- 48) Visually inspect for cleanliness.
- 49) Fit standard protection blanks.
- 50) Mark Repair Instruction number RI B514656 or R1 on component adjacent to normal 'assy of' number. Re-mark any information recorded at op. 8). Refer Overhaul Manual Chapter 72-09-00 Repair.
Use the electro-chemical marking technique.

5. MATERIAL

COMPONENT	MATERIAL	RR CODE
TANK, ASSEMBLY OF, LUBRICATING OIL	TITANIUM MSRR 8608	TAK

6. DATA

NONE.

7. TOOLS

TOOL NUMBER	DESCRIPTION	ITEM
NONE.		

8. REPLACEMENT PARTS

PART NUMBER	DESCRIPTION	QUANTITY	ITEM
NONE.			

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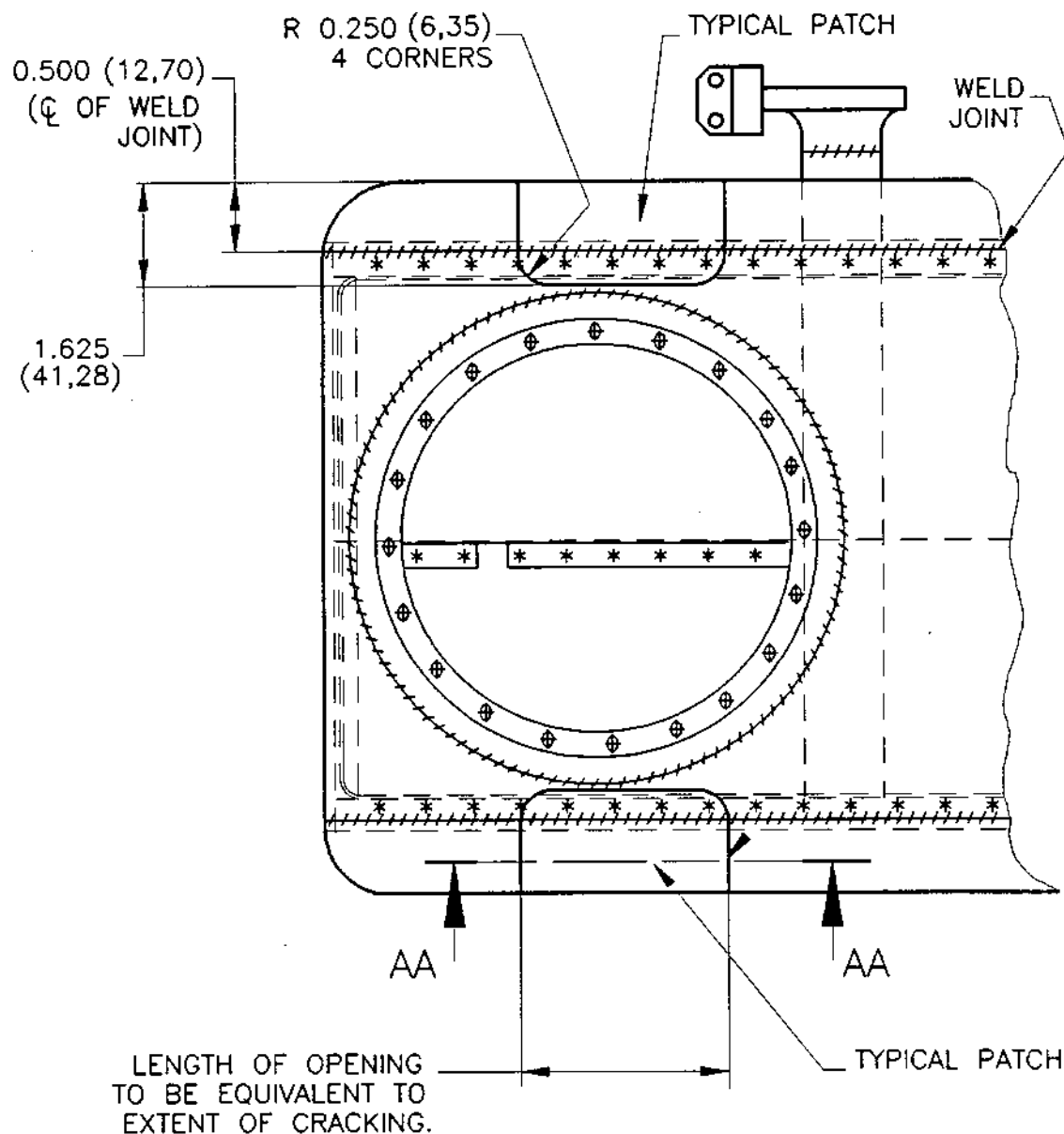
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GENERAL VIEW OF OIL TANK
FIG.401

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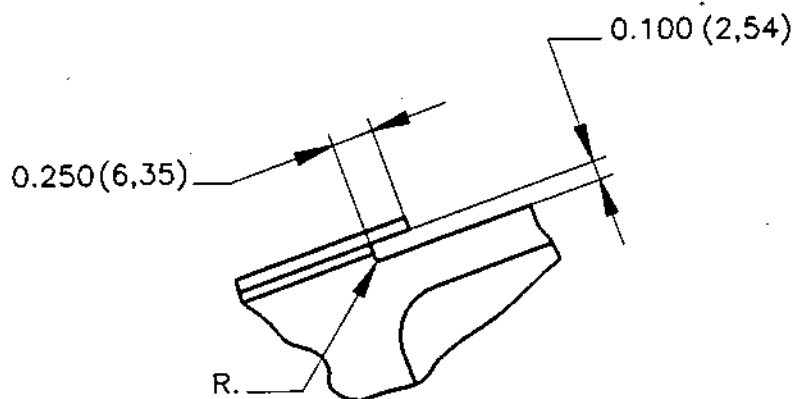
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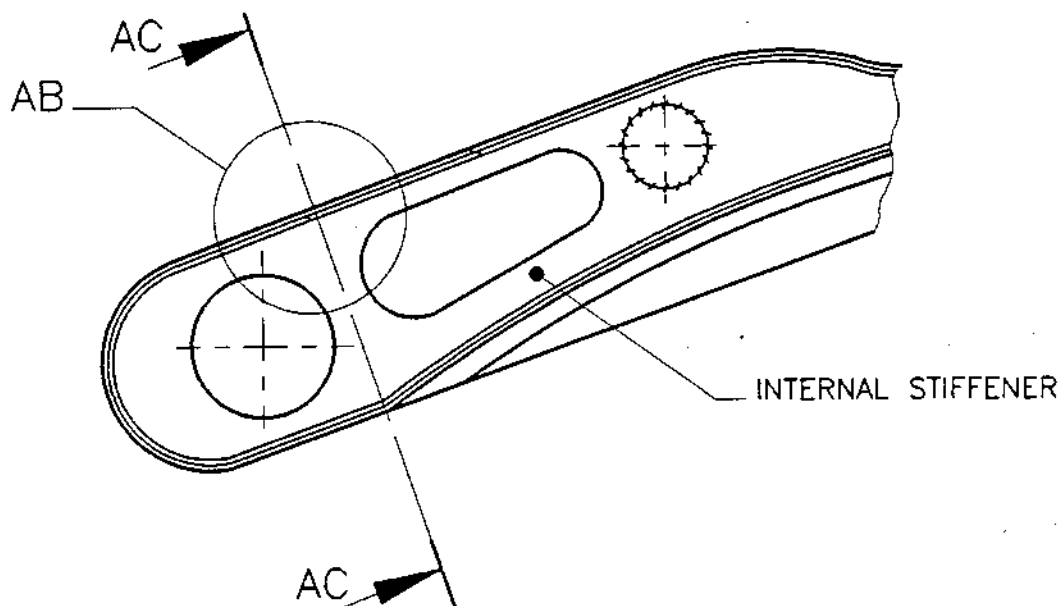
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ENLARGED VIEW AT AB
SHOWING DRESSING OF FLANGE
ADJACENT TO OPENING



SECTION AA

FIG.402

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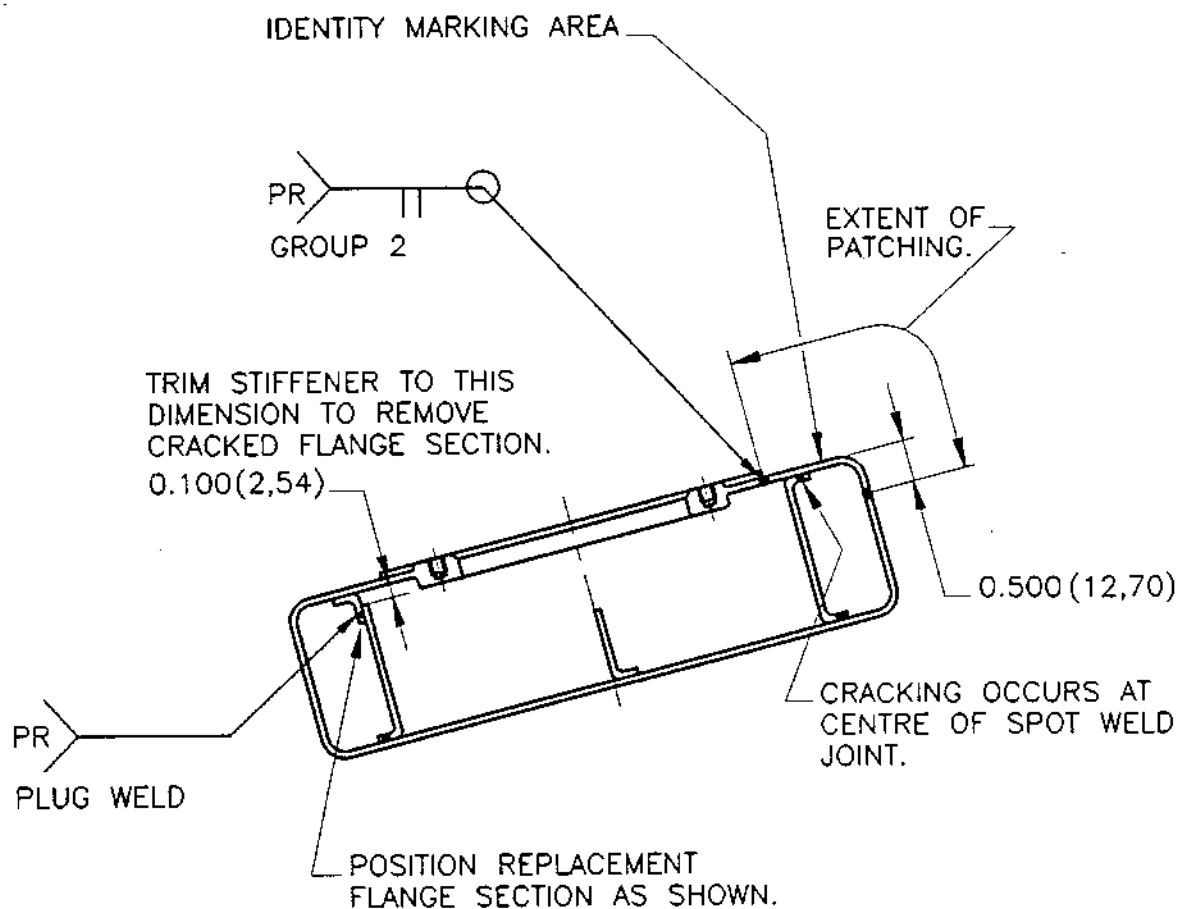
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SECTION AC

FIG.403

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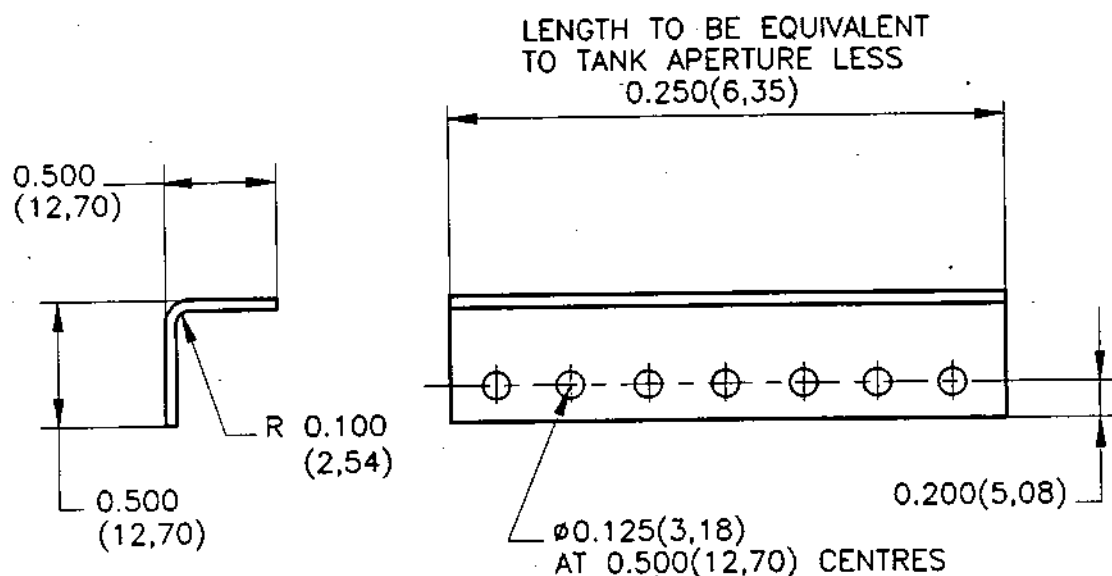
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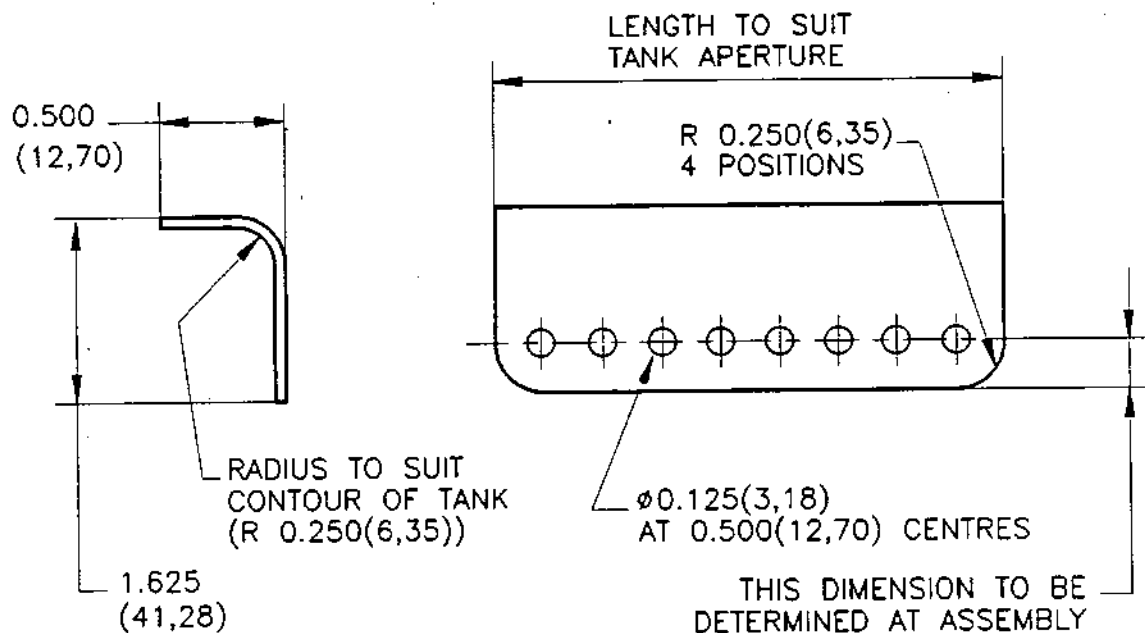
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STIFFENER LOCATING FLANGE SECTION

MATERIAL: 22 SWG MSRR 8608 TAK (IMI130)
REMOVE SHARP EDGES



SKIN PATCH

MATERIAL: 20 SWG MSRR 8608 TAK (IMI130)
REMOVE SHARP EDGES

FIG.404

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OVERHAUL

COVER, ASSEMBLY OF, ACCESSREPAIR OF FRETTING/DAMAGE BY BLENDING
OR INERT GAS ARC WELDINGREPAIR NO. B515309-101. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
79-11-01	01 /250A	B477530

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

Direct welding of fretting/damage is limited to a maximum depth of 50% of the gauge thickness of the individual tube.

Maximum size of repairable fret/damage mark to be contained within an envelope measuring 0.350 x 0.350 (8,90 x 8,90) (Refer fig.401).

Fretting/damage up to 0.003(0,08) in depth may be repaired by blending (light dressing). Fretting/damage in excess of 0.003(0,08) shall be repaired by welding.

Repair by blending (light dressing) may be embodied once only.

3. GENERALUNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

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4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

A. REPAIR BY BLENDING.

- 1) Lightly hand dress to remove any sharp edges and/or raised material. A residual fret/damage witness is permissible. Do not remove any material in excess of 0.003(0,08) deep. Maintain general surface finish using adjacent undressed areas as a guide.

- 2) Locally inspect repair area for cracks.

Refer TSD 594 OP.210 or 213.

- 3) Mark Repair Instruction number RI B515309 or R.2A adjacent to normal 'assy of' number using the electro-chemical marking or vibro-percussion engraving techniques.

Refer Overhaul Manual
Chapter 72-09-00 Repair
Refer fig.401 for identity
marking location.

B. REPAIR BY WELDING.

- 1) Clean fretted/damaged areas and prepare for welding.

Refer TSD 594 OP.409

- 2) Degrease areas to be welded immediately prior to welding.

Refer TSD 594 OP.101

- 3) Build up fretted/damaged area by inert gas arc welding. Apply sufficient weld metal to restore diameter of tube. Group 2 weld classification.

Refer TSD 594 OP.409
Use filler rods to
OMat 366.

- 4) Hand dress weld to restore diameter. Adjacent parent material is not to be impaired. Maintain general surface finish using adjacent undressed areas as a guide.

Refer fig.401

- 5) Manipulate to remove distortion (if required).

Refer fig.401

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- 6) Locally inspect repair area for cracks. Refer TSD 594 OP.210 or 213.
- 7) Visually inspect on completion of repair. Refer TSD 594 OP.409
- 8) Polish tube diameter to remove discolouration. Use OMat 583 (or similar).
- 9) Mark Repair Instruction number RI B515310 or R.28 adjacent to normal 'assy of' number using the electro-chemical marking or vibro-percussion engraving techniques. Refer Overhaul Manual Chapter 72-09-00 Repair Refer fig.401 for identity marking location.

5. MATERIAL

COMPONENT

MATERIAL

RR CODE

Cover, Assembly of,
access.

Commercially pure
Titanium.
DTD5023

6. DATA

None.

7. TOOLS

TOOL NUMBER

DESCRIPTION

ITEM

None.

8. REPLACEMENT PARTS

PART NUMBER

DESCRIPTION

QUANTITY

ITEM

None.

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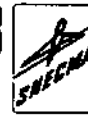
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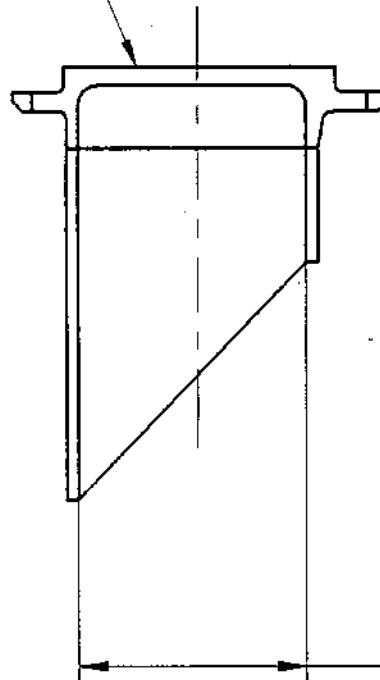
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IDENTITY MARKING
LOCATION.



(1.800(45.72))
(ϕ 1.790(45.47))

ENSURE THIS DIAMETER
IS MAINTAINED.

THICKNESS 22 SWG (0.024/0.031(0.61/0.79))

TYPICAL SECTION THROUGH COVER, A/O, ACCESS
FIG.401

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SNECMA

TANK, ASSEMBLY OF, LUBRICATING OILREPAIR OF CRACKS IN INTERNAL STIFFENERS POSITIONED
AT THE SUMP END OF THE TANK BY DIRECT WELDINGB5157491. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
79-11-01	02A /10G	B930660
		B930662
		B930663
		B930664
	02 /10H	B930661

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

3. GENERALUNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.025 (0,64)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURESUPPLEMENTARY INFORMATION4.A. PREPARATION.

- 1) Mask off bosses and holes etc. Use OMat 1/21.
with blanks leaving an aperture
open and fill oil tank with
clean Trichloroethylene
(Triklone N). Heat for 10
minutes in a vapour degreasing
tank.
- 2) Remove oil tank from degreasing
tank, drain and remove blanks.

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- 3) Vapour degrease oil tank. Refer TSD 594 OP.101
 - 4) Blow through tank with clean, dry, compressed air.
 - 5) Oven dry at $1200^{\circ}\text{C} \pm 50^{\circ}\text{C}$ for 10 minutes.
 - 6) Visually inspect internal stiffeners at sump end of tank to establish the basic position and extent of cracking.
 - 7) Mark out the relevant positions for exterior skin removal to expose the defective locations as applicable. Refer fig's.401 and 402. Note: Outer skin must be removed to effect Repair. Inner skin removal only required if inner flange(s) require replacement.
 - 8) Visually inspect to ensure that no previous identity marking(s) will be lost. If marking(s) will be lost (or obscured), record and retain for re-marking at op.4.H.9. Refer fig.401 for identity marking area.
4. B. EXTERIOR SKIN REMOVAL AND STIFFENER FLANGE DRESSING.
- 1) Cut away to remove area of skin, allowing sufficient material to dress back to marked outline(s) established at op.4.A.7. Refer fig's.401 and 402. Note: Do not impair flange material under skin section if flange is not to be replaced.
 - 2) Release skin from internal stiffener flange by grinding through spot weld nuggets and remove skin. Refer fig's.401 and 402. Note: Do not impair flange material under skin section if flange is not to be replaced.
 - 3) Trim the aperture to the outlines produced at op.4.A.7. Refer fig's.401 and 402. Repeat op.4.B.1 to 3 for each affected location.
 - 4) Remove anti-gravity ball securing flange from the removed exterior skin by grinding through attachment weld (on scrap side) around periphery of boss. Retain for refitment at op.4.G.13.

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- 5) Locally fluorescent penetrant inspect exposed internal stiffener flanges. Refer TSD 594 OPS.210 or 213.
NOTE: If further internal flanges are found to be cracked, repeat operations 4.A.7. to 8 and 4.B.1. to 3.
 - 6) Dress to remove cracked flanges from the stiffeners as applicable. Refer fig's.403 and 404.
 - 7) Clean interior of tank to ensure removal of all debris produced by previous operations.
- 4.C. FABRICATION OF REPLACEMENT PARTS.
- 1) Fabricate new stiffener locating flanges. Refer fig's.410 to 413.
NOTE: Locating flanges, at each end of centre stiffener-outer skin location, are integral with closing patching supporting flanges.
 - 2) Fabricate side doubler plates for the closing patch at the outer skin location. Refer fig.412.
 - 3) Fabricate closing patches where applicable to suit contours of tank. Ensure fit of patch in relationship to aperture is of close tolerance to minimise shrinkage when welding. Refer fig.414.
 - 4) Stress relieve all new manufactured parts i.e. closing patches, stiffener locating flanges, supporting flanges, etc., at $650^{\circ}\text{C} \pm 50^{\circ}\text{C}$ for 1 hour.
 - 5) Fluorescent penetrant inspect all fabricated parts. Refer TSD 594 OPS.210 or 213.
- 4.D. STIFFENER WEB CRACK REPAIR.
- 1) Locally fluorescent penetrant inspect exposed internal stiffeners. Refer TSD 594 OPS.210 or 213.
If no cracks are present proceed to para.4.E.

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- | | | |
|----|---|---|
| 2) | Prepare cracks in stiffener webs for welding using a rotary burr. Abrade the areas surrounding the crack using abrasive matt. | Refer TSD 594 OP.409
Use OMat 583.
Refer fig.403. |
| 3) | Degrease prepared areas prior to welding. | Refer TSD 594 OP.101 |
| 4) | Inert gas arc weld cracks in stiffeners, ensure adequate argon backing. | Refer TSD 594 OP.409
Use filler rod OMat 366. |
| 5) | Dress weld beads to within 0.010 (0,25) flush of the surface. | |
| 6) | Locally fluorescent penetrant inspect the repair area(s). | Refer TSD 594 OPS.210 or 213. |

4.E. STIFFENER FLANGE REPLACEMENT.

NOTE: The following operations apply to the front and rear stiffener inner and outer flanges and the centre stiffener inner location only.

For centre stiffener outer location refer to para.4.G.

- | | | |
|----|---|---|
| 1) | Thoroughly clean the fabricated locating flanges and the associated stiffeners in preparation for welding using abrasive matt. | Refer TSD 594 OP.409
Use OMat 583.
Refer fig's 404 and 405. |
| 2) | Degrease prepared areas prior to welding. | Refer TSD 594 OP.101 |
| 3) | Place the locating flange in position on the stiffener and clamp in place, adjust as necessary. | Refer fig.405.
Ensure clean clamps are used. |
| 4) | Tack weld to retain. | Refer TSD 594 OP.409
Use filler rod OMat 366. |
| 5) | Remove clamps and check position of the locating flange by temporarily fitting the inner skin closing patch, adjust the position of the flanges as necessary. | |

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- | | | |
|-------------------------------|---|--|
| 6) | Complete the plug welding of the location flange to the stiffener. Ensure adequate argon coverage. | Refer TSD 594 OP.409
Use filler rod OMat 366.
Refer fig.405. |
| 7) | Fluorescent penetrant inspect the plug welds. | Refer TSD 594 OPS.210 or 213. |
| 8) | Clean interior of tank to ensure removal of all debris produced by previous operations. | |
| 4.F. INNER PATCH REPLACEMENT. | | |
| | <u>NOTE:</u> The following operations are required only where replacement of front, centre or rear inner stiffener flanges has been accomplished. | Repeat operations for each location affected.
Proceed to para.4.G. if not applicable. |
| 1) | Position inner skin closing patch on tank and mark where the centre of the flange corresponds in relation to the patch, remove patch. | Refer fig.406. |
| 2) | Using the position established at op.4.F.1, drill 0.125 (3,18) dia. holes spaced at 0.500 (12,70) centres through the closing patch. | Refer fig.414. |
| 3) | Position closing patch on tank and locate from three of the holes produced at op.4.F.2. i.e. middle and either end. | Refer fig.406. |
| 4) | Drill 3 off 0.125 (3,18) dia. holes through locating flange section. | Refer fig.406.
<u>NOTE:</u> These holes are used for clamping the patch during welding. |
| 5) | Clean all surfaces of inner skin closing patch, tank aperture surrounds and the stiffener flange using abrasive matt in preparation for welding. | Refer TSD 594 OP.409
Use OMat 583 |
| 6) | Degrease all surfaces of patch, tank aperture and flange areas prior to welding. | Refer TSD 594 OP.101 |

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|-----------------------------------|--|--|
| 7) | Locate closing patch in position and secure using 3 off sheet metal clamps eg. 'Avdel'. | Ensure clean clamps are used. |
| 8) | Place tank in an enclosed argon atmosphere and plug weld closing patch to replacement flange section. | Refer TSD 594 OP.409
Use filler rod OMat 366.
Refer fig.406. |
| 9) | Remove 3 off clamps and plug weld vacated positions. | Refer TSD 594 OP.409
Use filler rod OMat 366.
Refer fig.406. |
| 10) | Inspect for fit of closing patch and manually manipulate if necessary. | |
| 11) | Locally degrease prior to welding. | Refer TSD 594 OP.101 |
| 12) | Place tank in an enclosed argon atmosphere and tack-weld the patch at equi-spaced positions around the patch to prevent distortion during welding. | Refer TSD 594 OP.409
Use filler rod OMat 366.
Refer fig.406. |
| 13) | Finally inert gas arc weld patch into position.
Weld group 2. | Refer TSD 594 OP.409
Use filler rod OMat 366.
Refer fig.406. |
| 14) | Fluorescent penetrant inspect the repair area. | Refer TSD 594 OPS.210 or 213. |
| 15) | Inspect the weld joint for acceptable weld penetration. | Refer TSD 594 OP.409 |
| 16) | Clean interior of tank to ensure removal of all debris produced by previous operations. | |
|
4.G. OUTER PATCH REPLACEMENT. | | |
| 1) | Clean all surfaces of the supporting flanges, side doubler plates and the mating areas of the oil tank using abrasive matt in preparation for welding. | Refer TSD 594 OP.409
Use OMat 583 |
| 2) | Degrease all surfaces prior to welding. | Refer TSD 594 OP.101 |

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- 3) Place the supporting brackets and side doubler plates in position around the aperture at the outer skin location and clamp in position. Refer fig.407.
- 4) Resistance spot weld the supporting brackets and side doubler plates to the tank and the centre stiffener. Spot welds are to be spaced at 0.500 (12,70) centres. Refer TSD 594 OP.403
NOTE: Electrode tip to be 0.187 (4,75) dia. Refer fig's 405 and 407.
- 5) Clean the outer centre stiffener locating flange and the centre stiffener at the outer skin location using abrasive matt in preparation for welding. Refer TSD 594 OP.409
Use OMat 583
- 6) Degrease all surfaces prior to welding. Refer TSD 594 OP.101
- 7) Place the outer centre stiffener locating flange in position on the stiffener and clamp in place, adjust as necessary. Refer fig.405.
Ensure clean clamps are used.
- 8) Resistance tack weld the locating flange to the stiffener. Refer TSD 594 OP.403
Refer fig.405.
- 9) Remove clamps and check position of the locating flange by temporarily fitting the closing patch, adjust the position of the flange as necessary.
- 10) Resistance spot weld the locating flange to the stiffener. Spot welds are to be spaced at 0.500 (12,70) centres. Refer TSD 594 OP.403
NOTE: Electrode tip to be 0.187 (4,75) dia. Refer fig's.405 and 407.
- 11) Fluorescent penetrant inspect the welded joint. Refer TSD 594 OPS.210 or 213.
- 12) Place closing patch in position on tank and mark out the position of the anti-gravity ball securing flange. Remove patch. Refer fig.408.

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- 13) Remove the necessary material to enable fitment of flange (previously removed in op.4.B.4). Refer fig.408.
- 14) Trim the anti-gravity ball securing flange to suit aperture in tank.
- 15) Clean all surfaces of the securing flange and the mating surfaces of the patch using abrasive matt in preparation for welding. Refer TSD 594 OP.409
Use OMat 583
- 16) Degrease all surfaces of the securing flange and the mating surfaces of the patch prior to welding. Refer TSD 594 OP.101
- 17) Place securing flange in position and tack weld to secure. Refer TSD 594 OP.409
Use filler rods OMat 366
Refer fig.409.
- 18) Inspect for position and manually manipulate if necessary. Refer fig.409.
- 19) Place tank in an enclosed argon atmosphere and complete the weld joint. Weld group 2. Refer TSD 594 OP.409
Use filler rod OMat 366.
Refer fig.409.
- 20) Inspect the weld joint for acceptable weld penetration. Refer TSD 594 OP.409
- 21) Fluorescent penetrant inspect the welded location. Refer TSD 594 OPS.210 or 213.
- 22) Place closing patch in position on tank and mark where the positions and centre line of the centre flange corresponds in relation to the closing patch, remove patch.
- 23) Using the positions established at op.4.F.22, drill 0.125 (3,18) diameter holes spaced at 0.500 (12,70) centres through the closing patch. Refer fig.414

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- | | | |
|-----|--|--|
| 24) | Replace patch in position on tank, locating from 2 holes corresponding to each of the larger flange positions and 1 hole at the smaller flange position, drill through the stiffener locating flanges using a 0.125 (3,18) diameter drill. | Refer fig.414
NOTE: These holes are used for clamping the patch during welding. |
| 25) | Clean all surfaces of the outer closing patch, supporting brackets, side doubler plates and stiffener locating flanges using abrasive matt in preparation for welding. | Refer TSD 594 OP.409
Use OMat 583 |
| 26) | Degrease all surfaces prior to welding. | Refer TSD 594 OP.101 |
| 27) | Locate outer closing patch in position and secure using 3 off sheet metal clamps eg. 'Avdel'. | Ensure clean clamps are used. |
| 28) | Place tank in an enclosed argon atmosphere and plug weld outer closing patch to stiffener locating flanges. | Refer TSD 594 OP.409
Use filler rod OMat 366.
Refer fig.409. |
| 29) | Remove 3 off clamps and plug weld vacated positions. | Refer TSD 594 OP.409
Use filler rod OMat 366.
Refer fig.409. |
| 30) | Inspect for fit of closing patch and manually manipulate if necessary. | |
| 31) | Locally degrease prior to welding. | Refer TSD 594 OP.101 |
| 32) | Place tank in an enclosed argon atmosphere and tack-weld the patch at equi-spaced positions around the patch to prevent distortion during welding. | Refer TSD 594 OP.409
Use filler rod OMat 366.
Refer fig.409. |
| 33) | Inspect for fit of closing patch and manually manipulate if necessary. | |

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- | | | |
|---------------------------|---|---|
| 34) | Finally inert gas arc weld patch into position.
Weld group 2. | Refer TSD 594 OP.409
Use filler rod OMat 366.
Refer fig.409 |
| 35) | Dimensionally inspect. | Refer fig.409. |
| 36) | Fluorescent penetrant inspect the repair area. | Refer TSD 594 OPS.210 or 213. |
| 37) | Inspect the weld joint for acceptable weld penetration. | Refer TSD 594 OP.409 |
| 38) | Clean interior of tank to ensure removal of all debris produced by previous operations. | |
|
4.H. COMPLETE REPAIR. | | |
| 1) | Radiographically inspect for adequate penetration of external repair welds. | Refer TSD 594 OP.409
Group 2 welds. |
| 2) | Hydraulic pressure test using water as a medium, pressure test at 12 lbf/sq.in.(84kPa) for 2 minutes minimum.
No leakage permissible. | |
| 3) | Pressure wash interior of tank to remove any remaining debris. | |
| 4) | Oven dry at 120°C ± 50°C for 10 minutes. | |
| 5) | Fluorescent penetrant inspect tank all over external surfaces. | Refer TSD 594 OPS.210 or 213. |
| 6) | Vapour degrease tank. | Refer TSD 594 OP.101 |
| 7) | Visually inspect for cleanliness of both internal and external surfaces. | |
| 8) | Fit standard protection blanks. | |
| 9) | Mark Repair Instruction number RI B515749 or R3 on component adjacent to normal 'assy of' number. Re-mark any information recorded at op.4.A.8. | Refer Overhaul Manual
Chapter 72-09-00 Repair
para.3.E. |

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5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
TANK, ASSEMBLY OF, LUBRICATING OIL	MSRR 8608 TITANIUM	TAK

6. DATA

NONE.

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE.		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			

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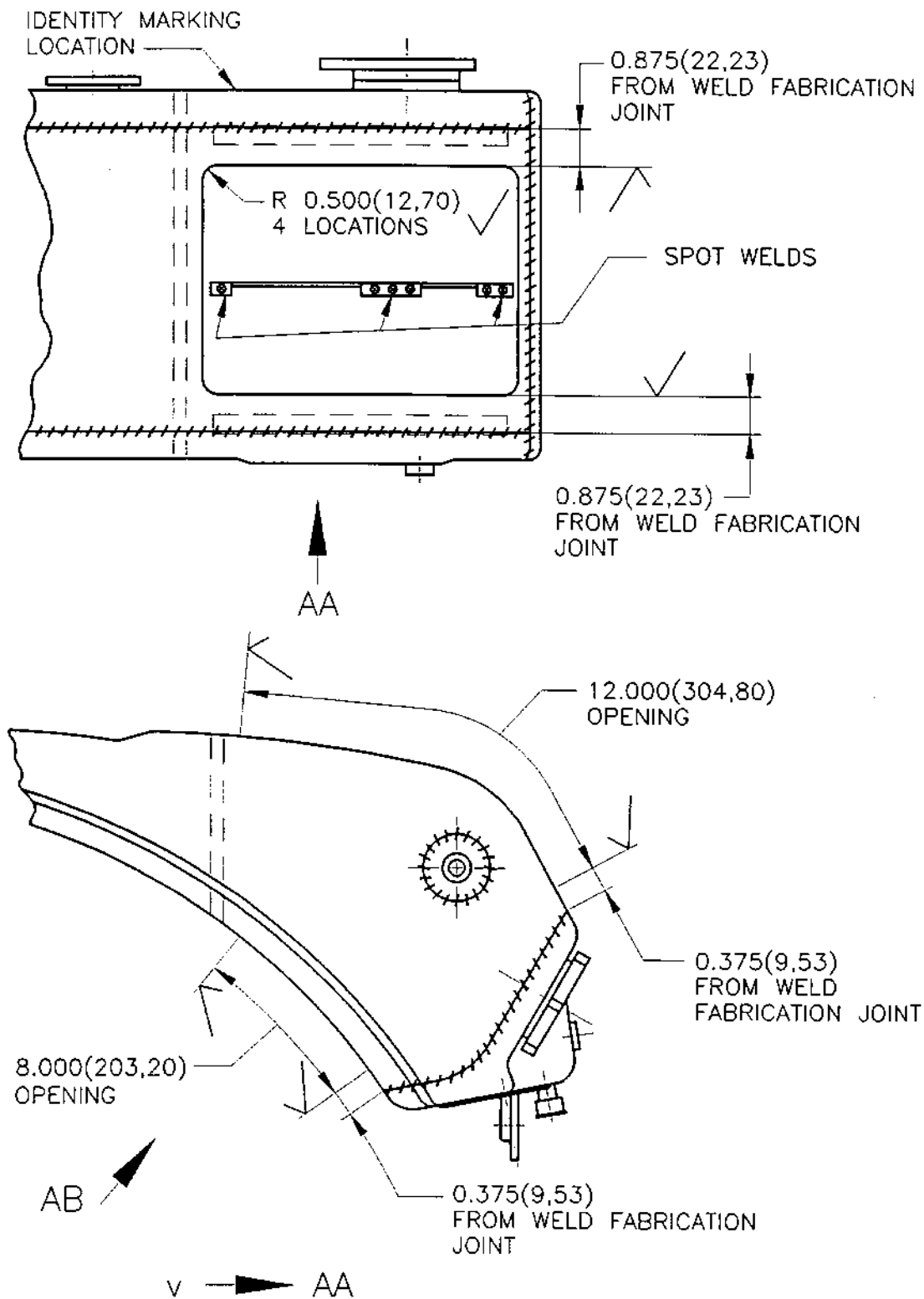


FIG.401

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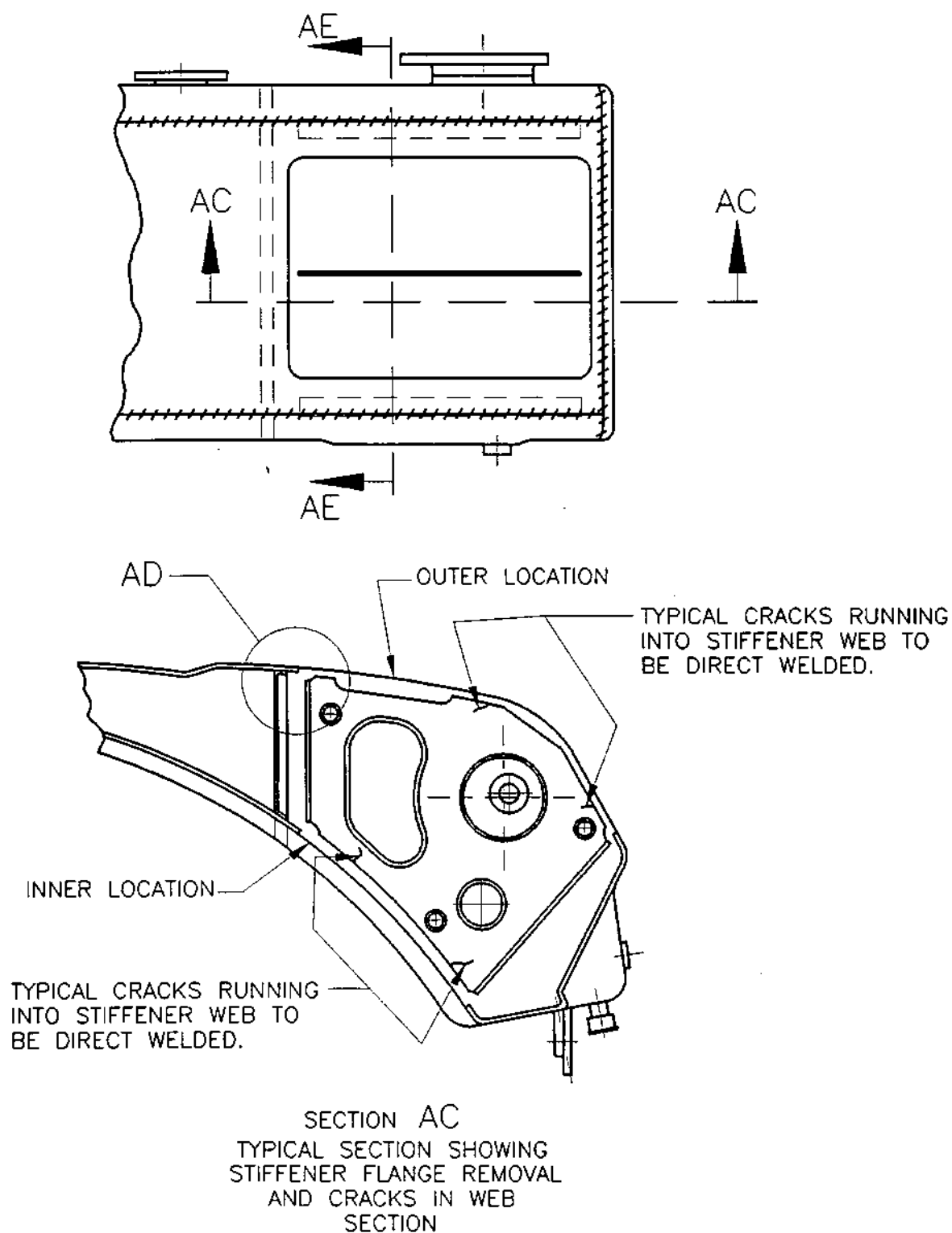


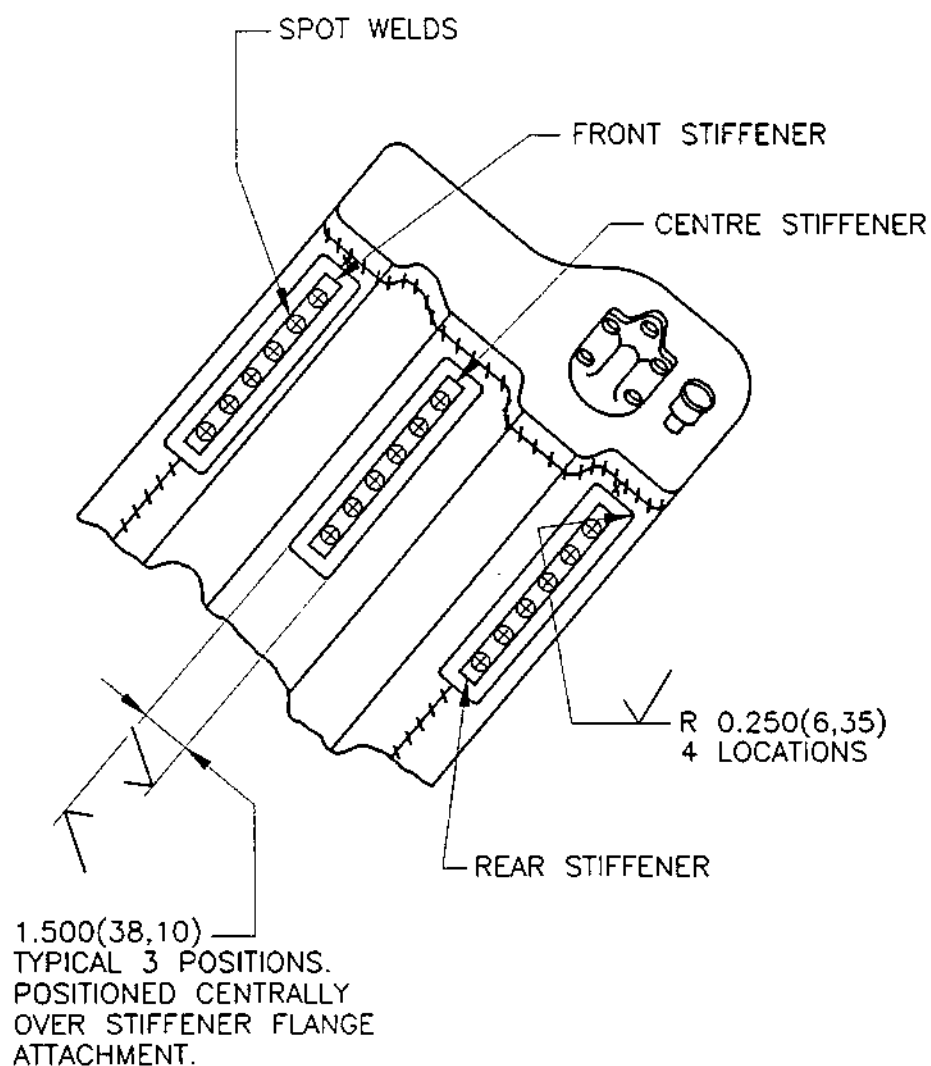
FIG.403



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v —▶ AB

FIG.402



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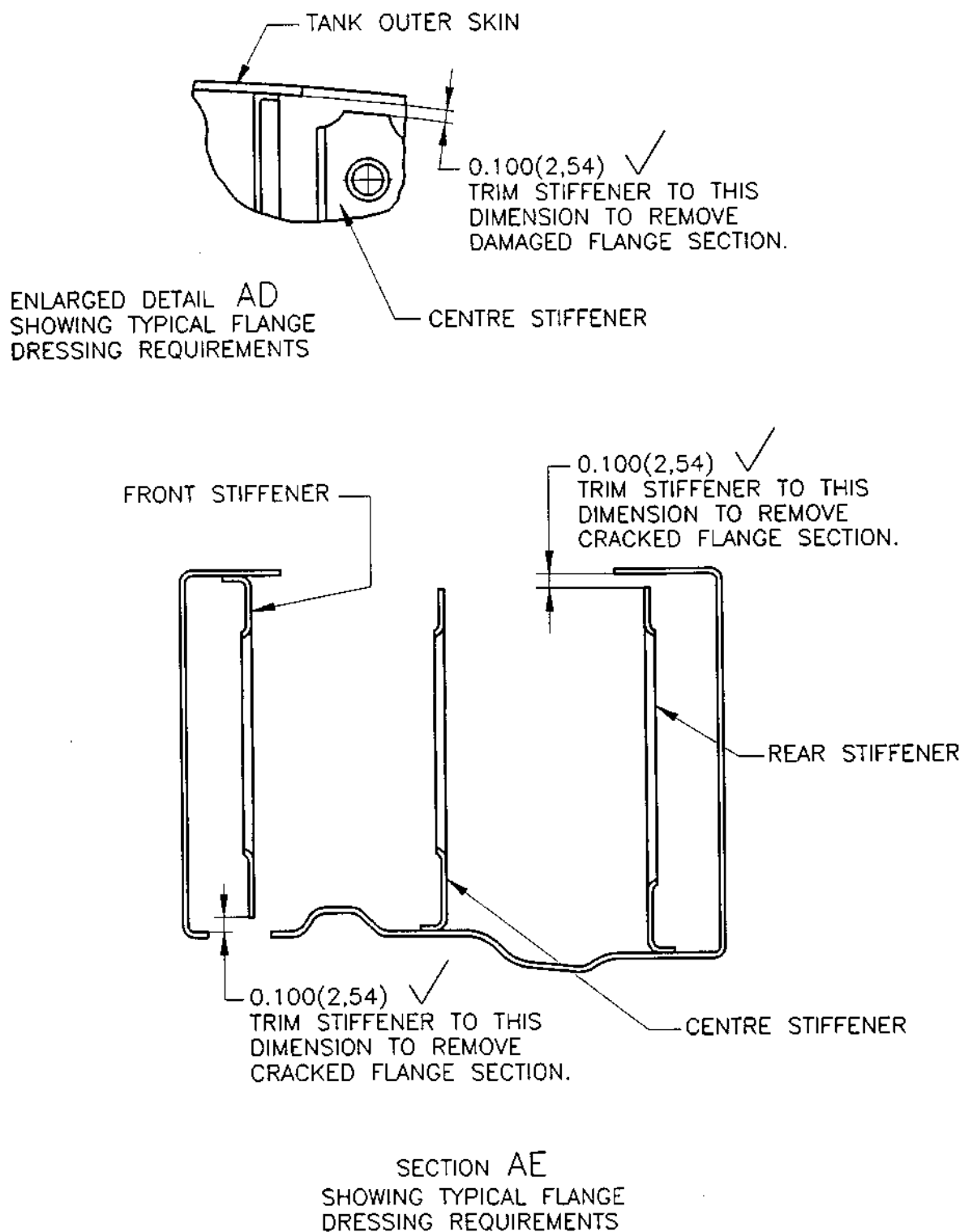


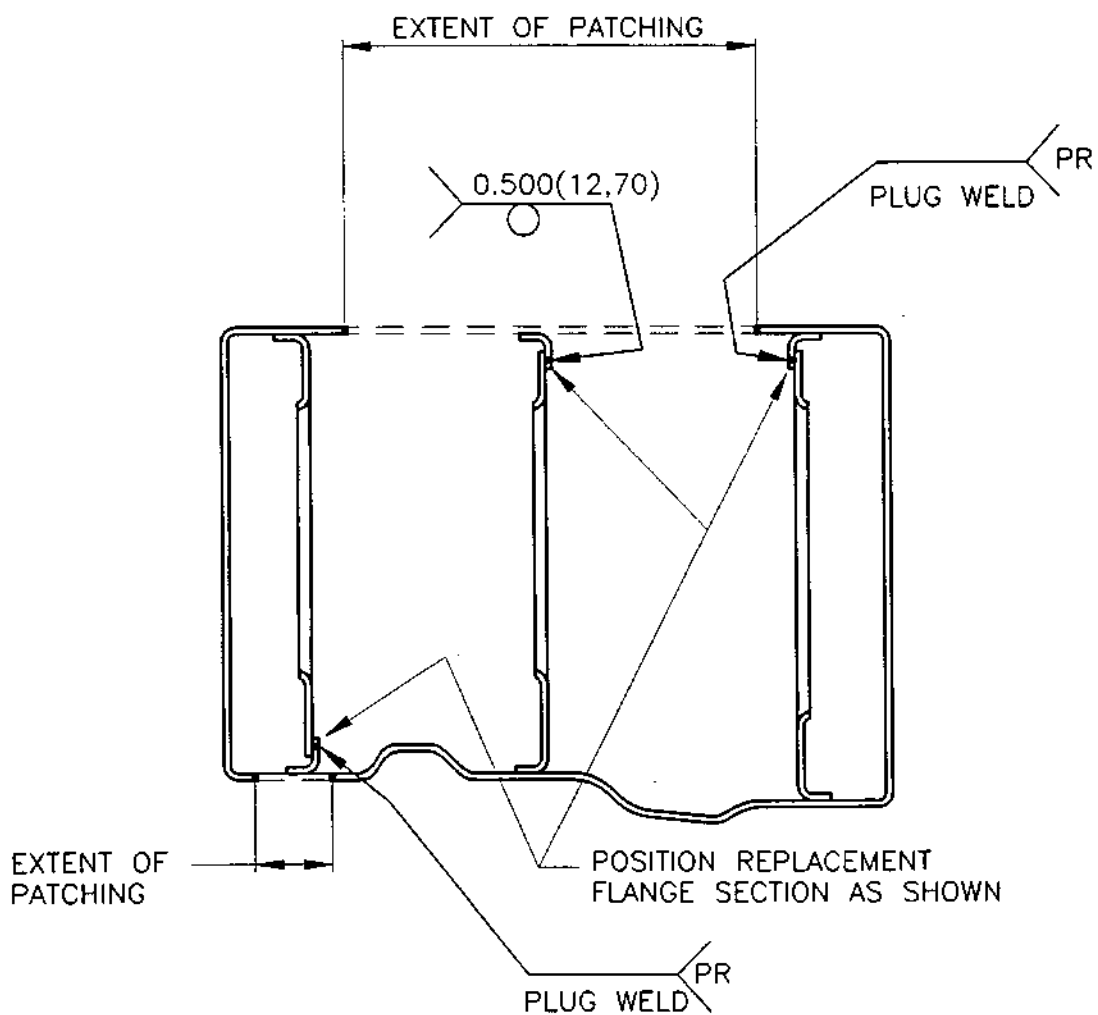
FIG.404



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REPEAT SECTION AE
SHOWING TYPICAL FLANGE
REPLACEMENT REQUIREMENTS

FIG.405

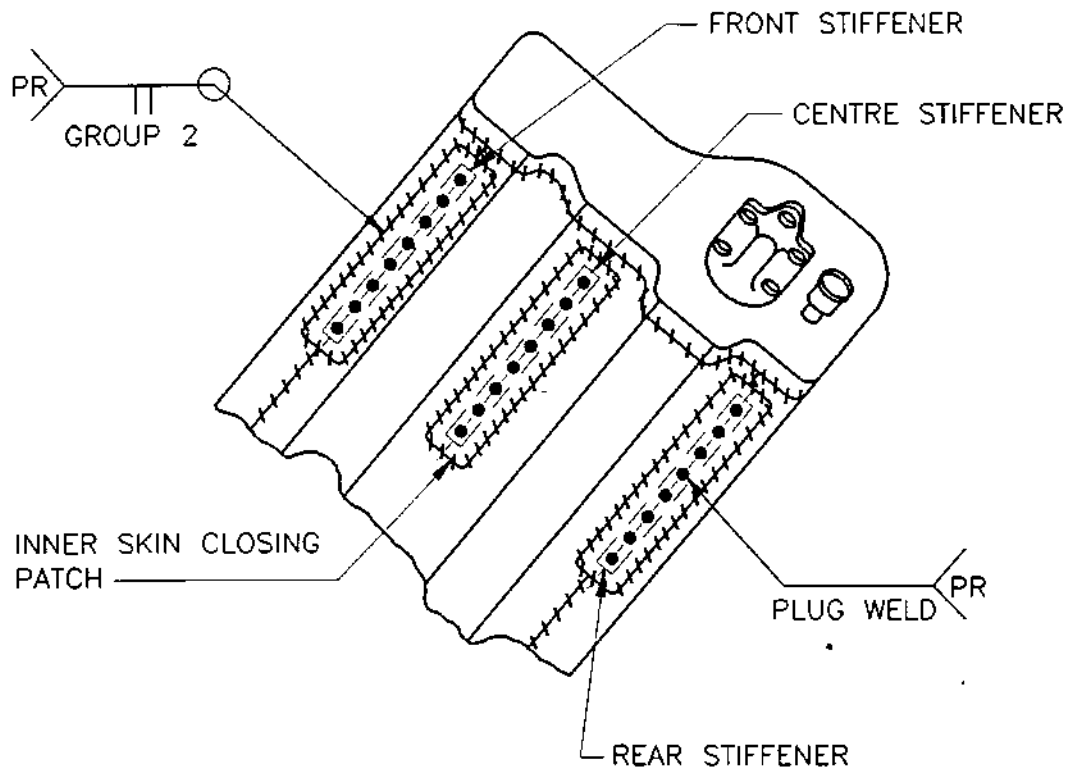


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REPEAT V —▶ AB

SHOWING INNER SKIN PATCH WELD
REQUIREMENTS

FIG.406

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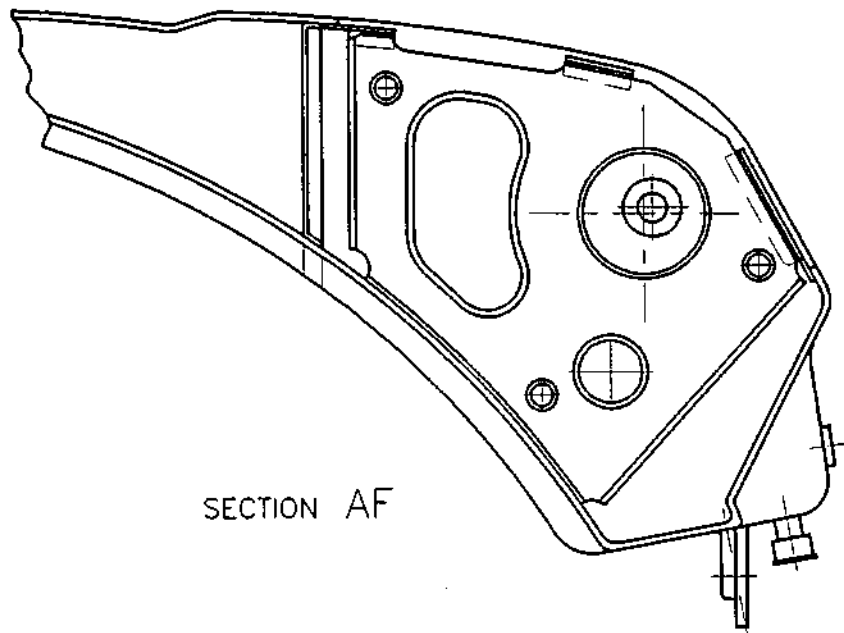
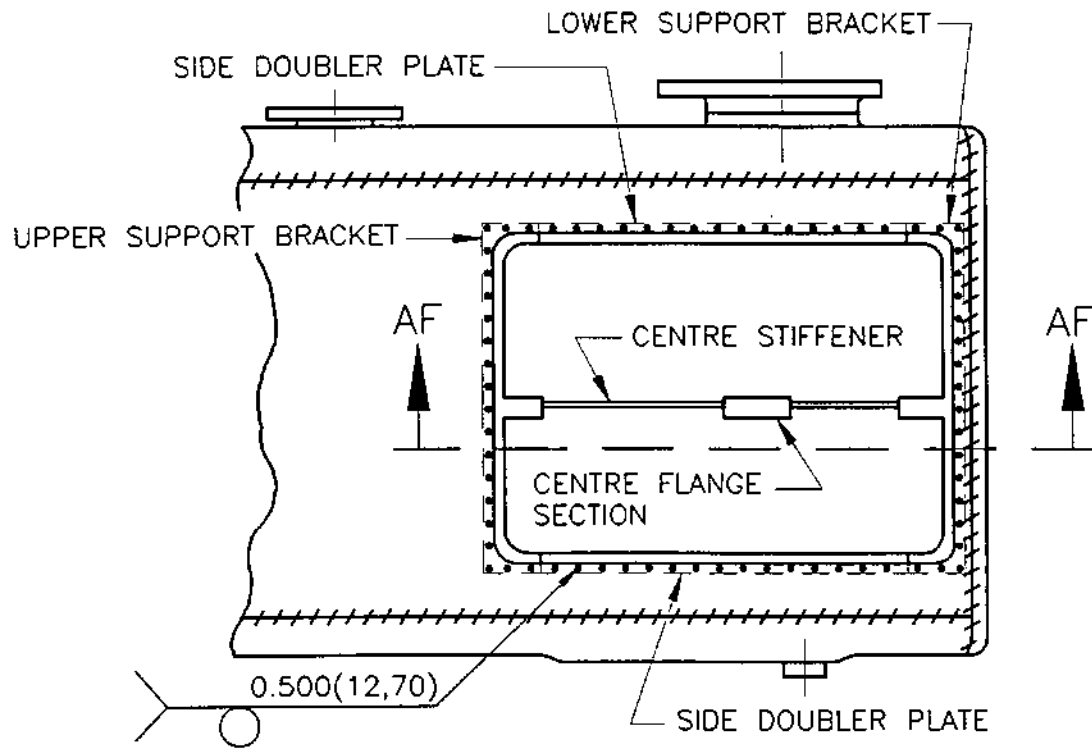
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VIEW SHOWING WELDING OF SUPPORT BRACKETS AND PLATES
PRIOR TO FITMENT OF OUTER SKIN PATCH
FIG.407

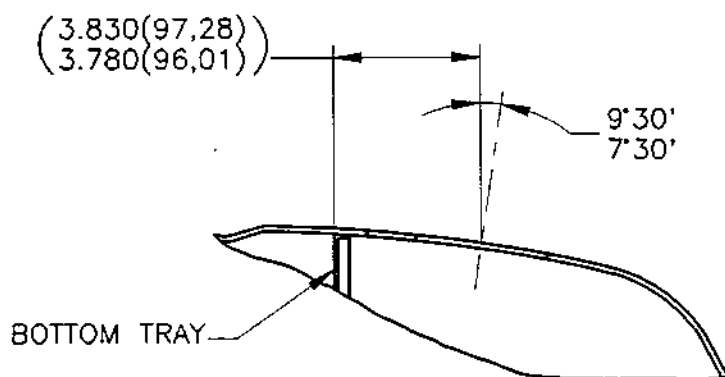
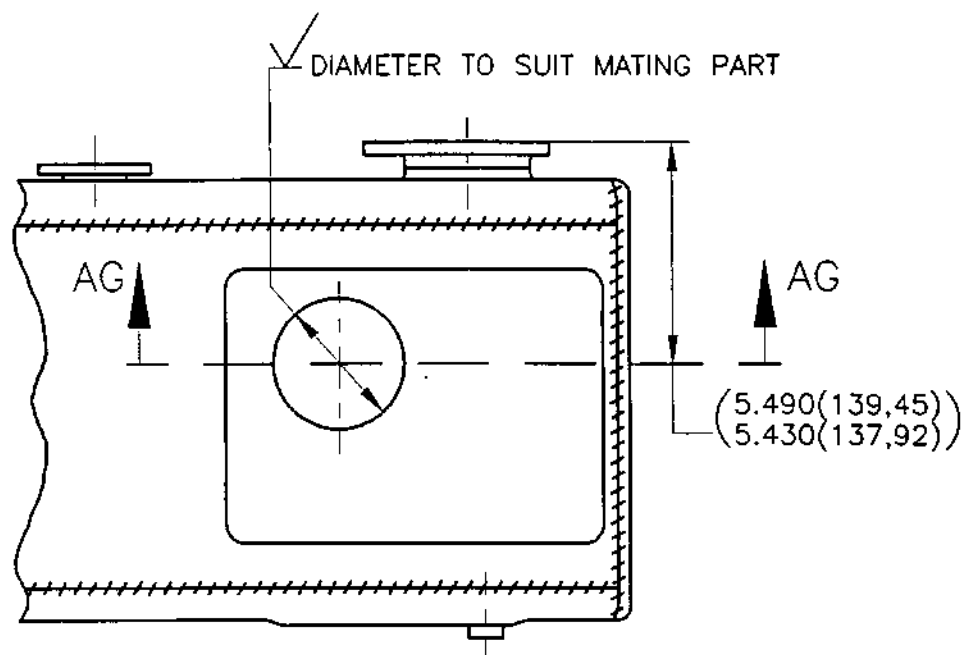


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SECTION AG

POSITION OF HOLE FOR FLANGE REFITMENT
FIG.408

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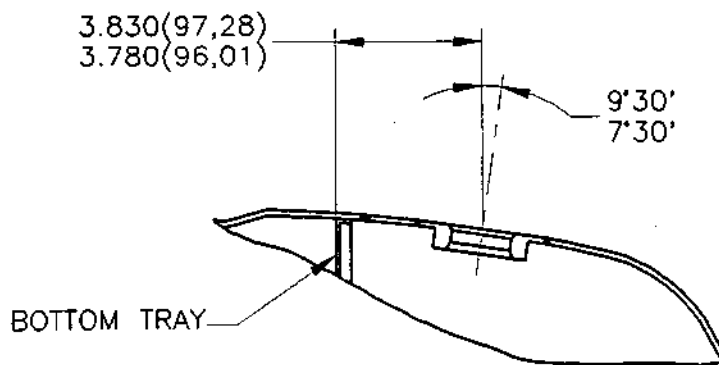
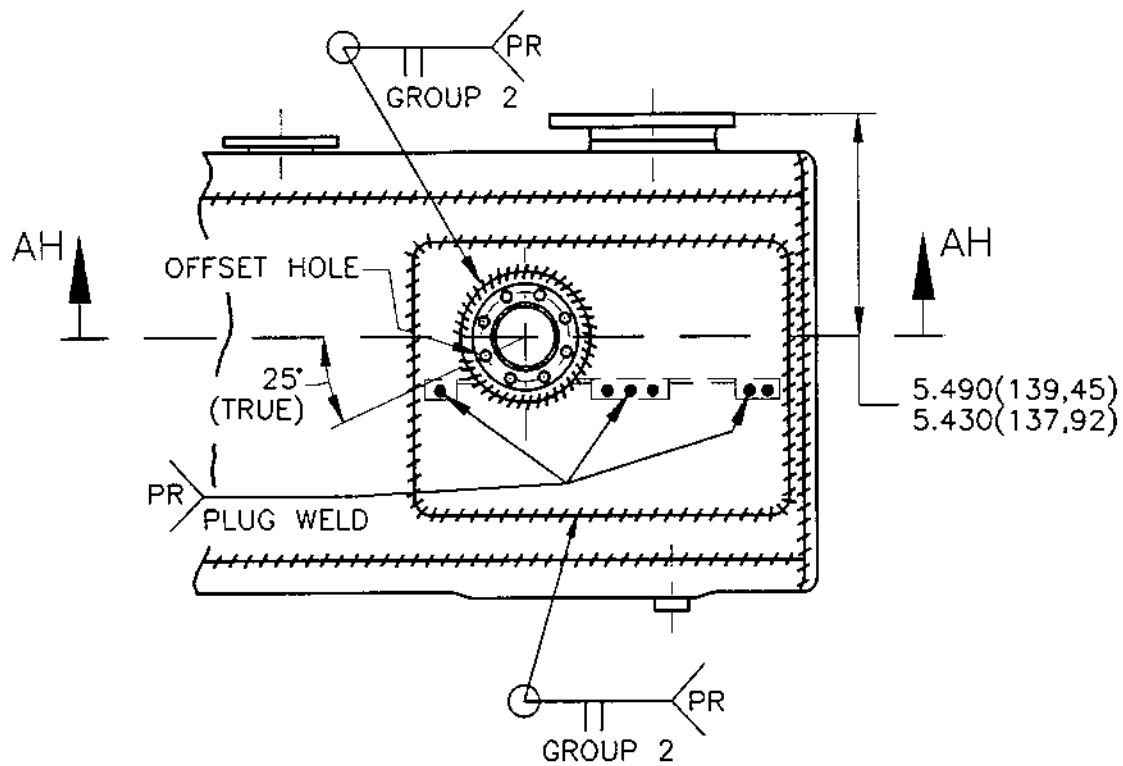
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SECTION AH

SHOWING REFITMENT OF FLANGE
AND FITMENT OF OUTER SKIN PATCH
FIG.409

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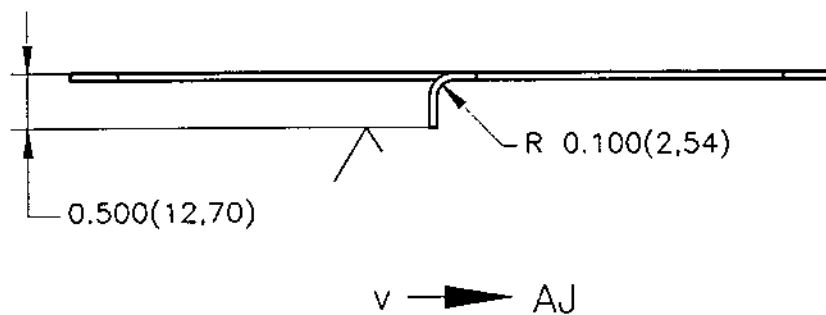
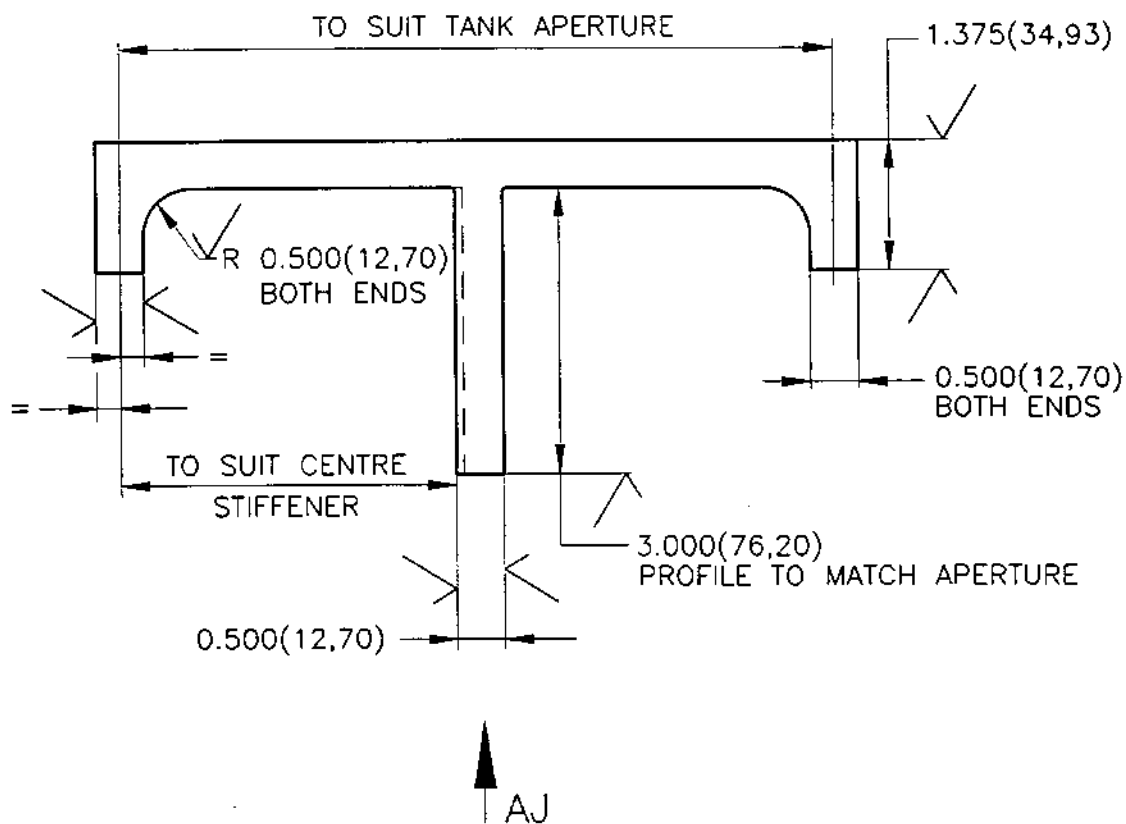
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MATERIAL: 22 SWG MSRR8608 TAK (IMI130)
REMOVE SHARP EDGES

LOWER CLOSING PATCH SUPPORT BRACKET
INCORPORATING CENTRE STIFFENER FLANGE PIECE
FIG.410

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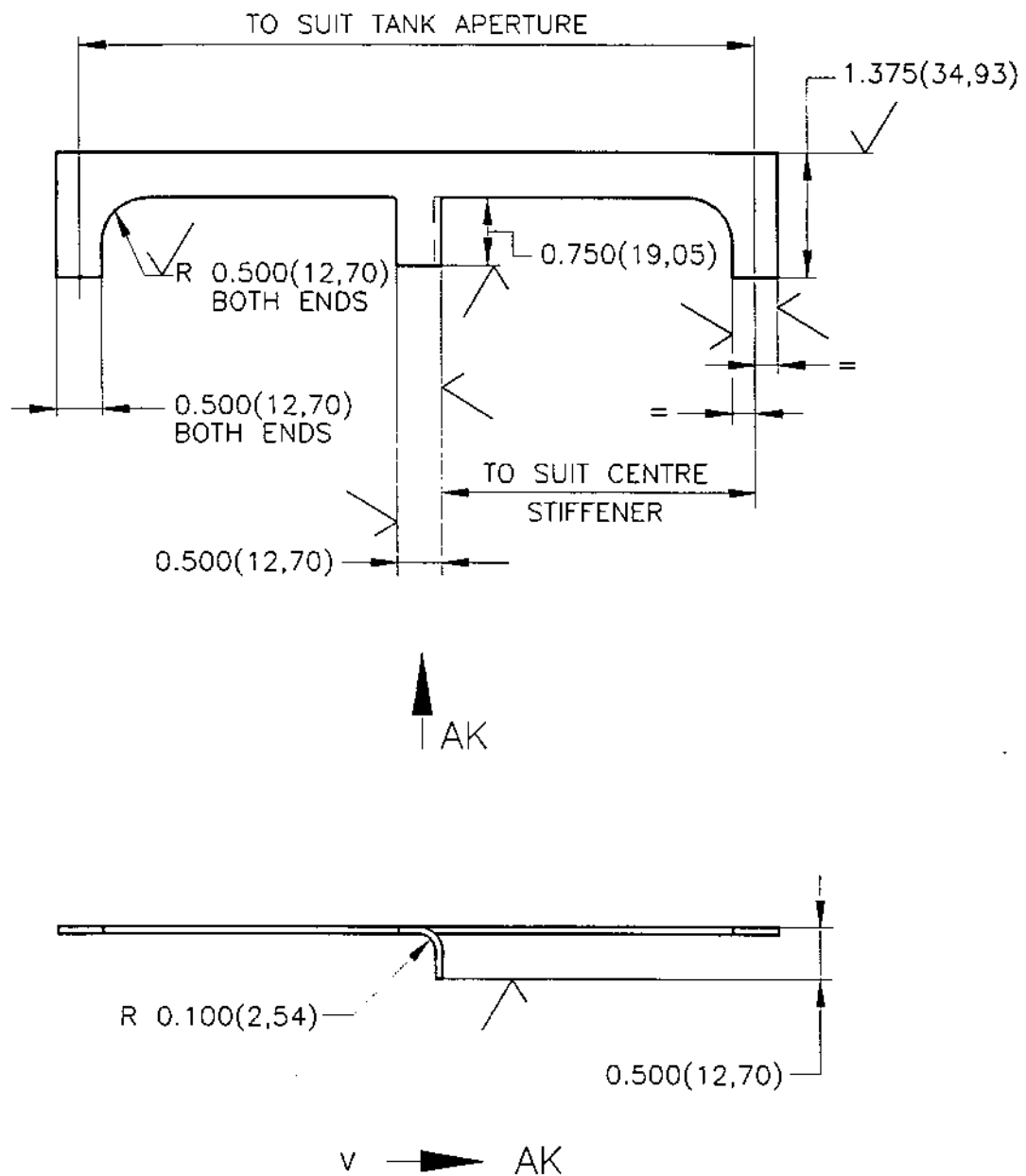


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MK.610-14-28
OVERHAUL

SNECMA



MATERIAL: 22 SWG MSRR8608 (IMI130)
REMOVE SHARP EDGES

UPPER CLOSING PATCH SUPPORT BRACKET
INCORPORATING CENTRE STIFFENER FLANGE PIECE
FIG.411

REPAIR

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Repair No. 3

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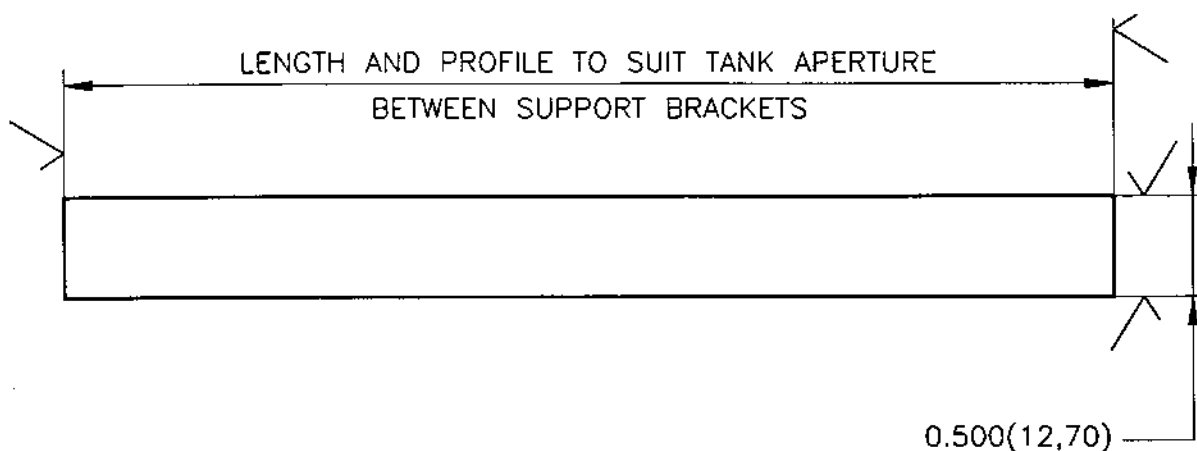
OLYMPUS 593



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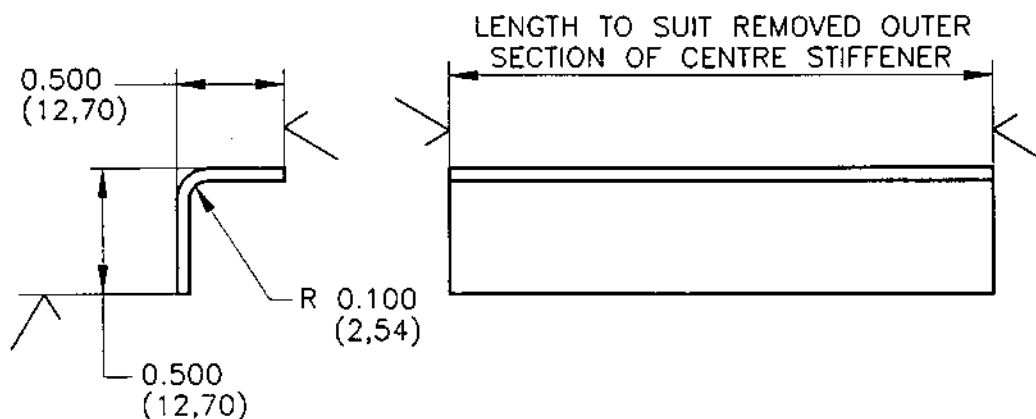
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MATERIAL: 22 SWG MSRR8608 TAK (IMI130)
REMOVE SHARP EDGES

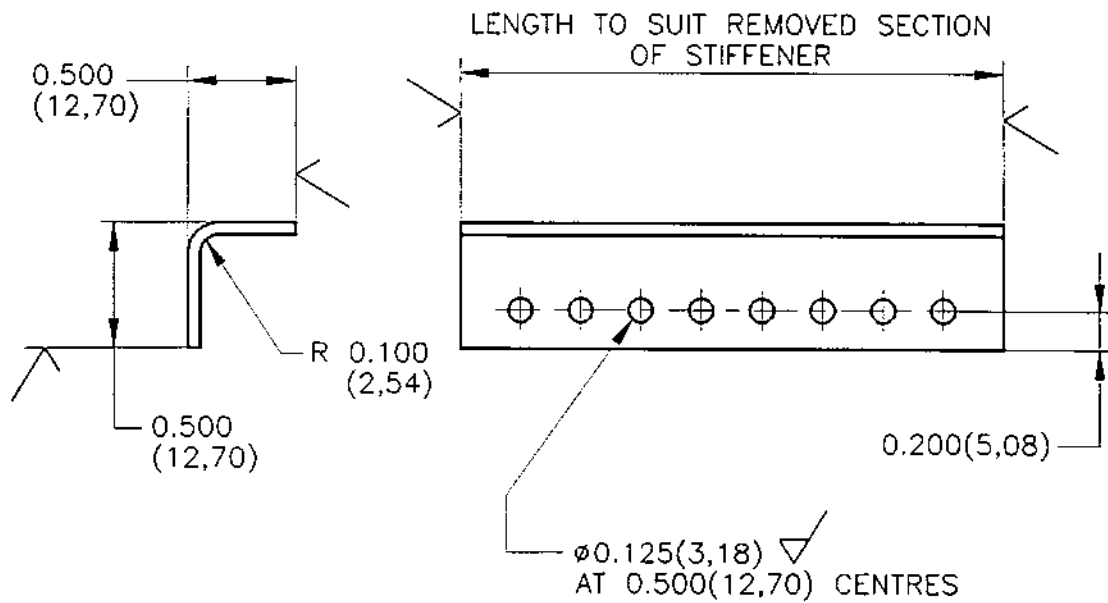
CLOSING PATCH SIDE DOUBLER PLATE



MATERIAL: 22 SWG MSRR8608 TAK (IMI130)
REMOVE SHARP EDGES

OUTER CENTRE STIFFENER LOCATING FLANGE SECTION

FIG.412



MATERIAL: 22 SWG MSRR8608 TAK (IM130)
REMOVE SHARP EDGES

STIFFENER LOCATING FLANGE SECTION
FIG.413

REPAIR

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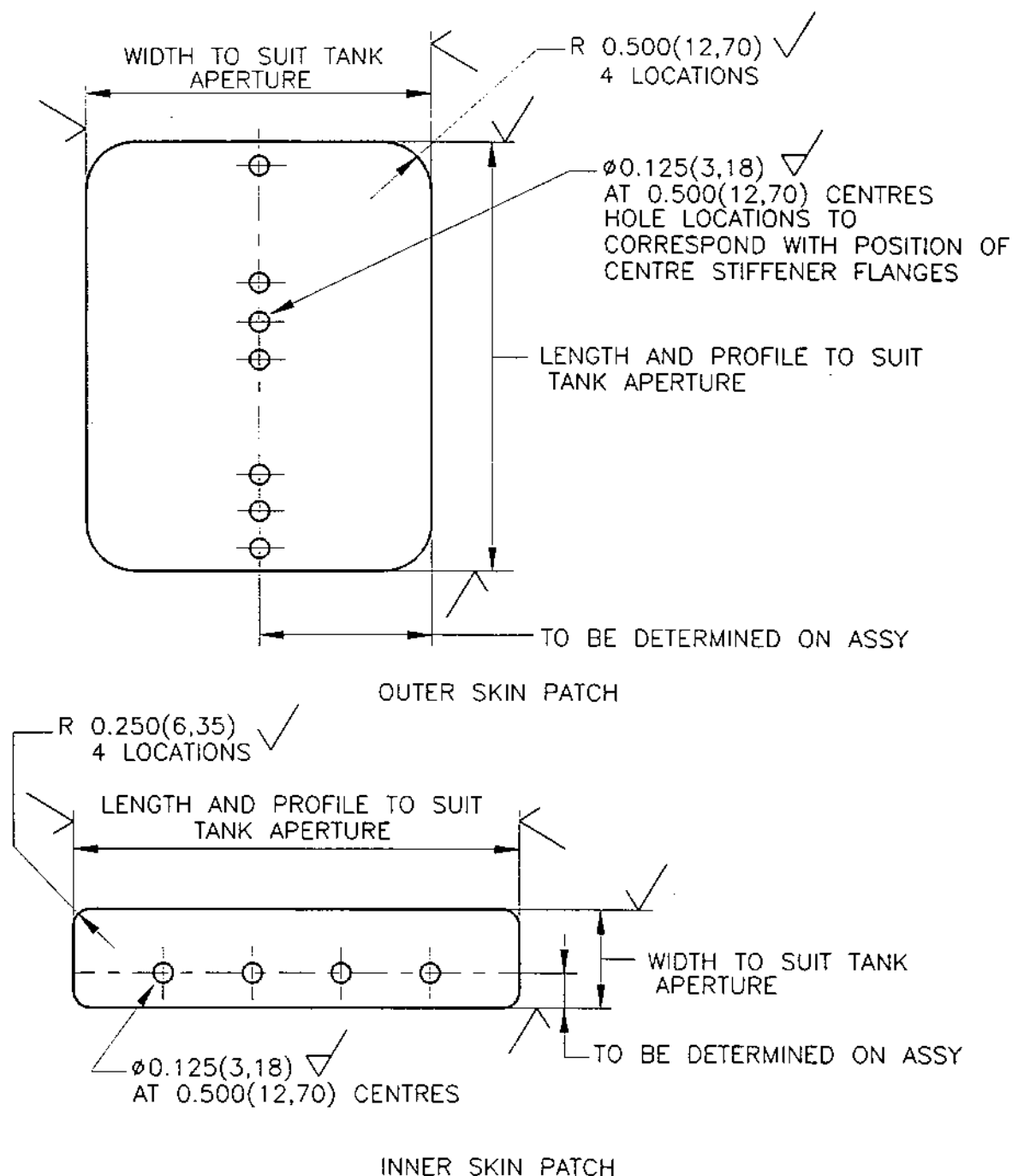
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OLYMPUS 593



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OVERHAUL



MATERIAL: 20 SWG MSRR8608 TAK (IMI130)
REMOVE SHARP EDGES

TYPICAL SKIN PATCH REQUIREMENTS
FIG.414

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OVERHAULMAIN OIL TANK - SUB-ASSEMBLYLIST OF CONTENTS

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OVERHAUL



MAIN OIL TANK - SUB-ASSEMBLY

1. General

- A. Prior to commencing assembly, refer to 72-09-00 Assembly for general assembly information.
- B. During the sub-assembly procedure, reference will be made to the Illustrated Parts Catalogue (I.P.C.) to identify those items where the nomenclature does not positively identify them, due to duplication of the title e.g. nuts, bolts, washers, bearings, gears, housings, tubes etc. When the item is a part of the breakdown of the text concerned, the item will be identified as bolt (1-10), the 1 referring to the I.P.C. Fig. No., and the 10 referring to the Item No. Where items from a different breakdown are introduced, then the breakdown number will be quoted in addition e.g. bolt (72-32-01/1-10).
- C. Throughout the text special tools are quoted by their Ref. No. e.g. (Tool 1234). For a complete list of tooling required for the assembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1002.

2. Internal Cleaning of the Oil Tank

- A. Assemble Protective Blanks (Ref.Fig.501).
- (1) Screw the threaded protector (Tool 681) into the overflow drain/oil sampling plug location and tighten.
 - (2) Screw the threaded protector (Tool 918) into the drain plug location and tighten.
 - (3) Assemble protectors to the remaining locations as listed in Table 501.

NOTE: Protective blank retaining bolts should be hand-tight only.

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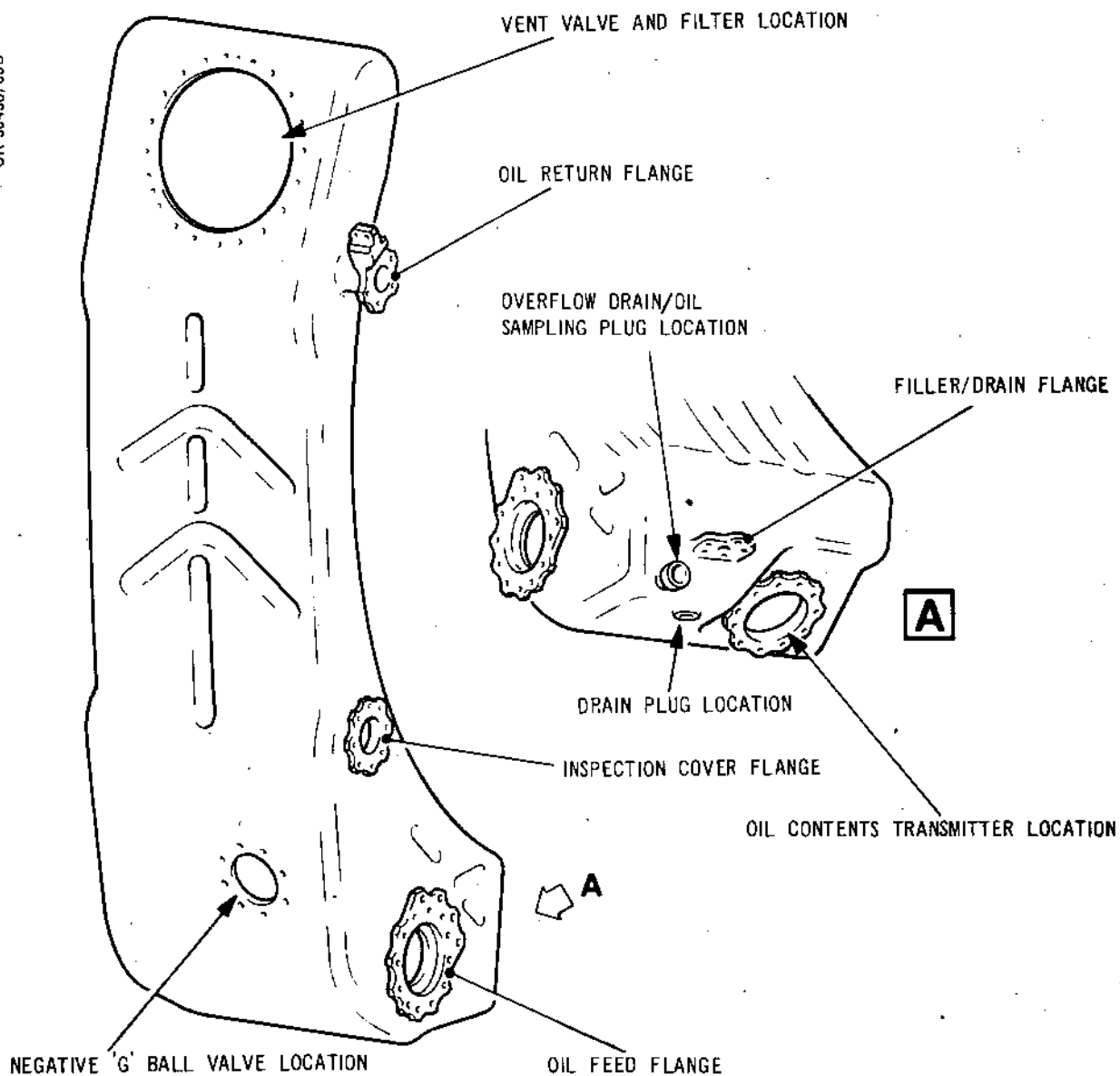


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Main Oil Tank Component Location
Figure 501

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Tool No.

Location

676	Oil feed flange
677	Vent valve and filter
678	Inspection cover flange
680	Filler/drain flange
916	Oil return flange
917	Contents transmitter
919	Negative 'G' ball valve

Oil Tank Protectors
Table 501

B. Prepare the Mobile Cleaning Tank.

NOTE: A cleaning tank, similar to the one described and illustrated (Tool 898) (Ref.Fig.502), may be used providing it incorporates the following. A reservoir capable of holding a minimum of two gallons (Imp.) (9,09 L) and a drain tray incorporating a removable filter paper.

- (1) Thoroughly clean the tray of the cleaning tank, then assemble a new paper filter, Whatman N.117, 27 cm diameter, to the holder and secure it with the retaining ring.
- (2) Install the filter assembly into the drain location of the cleaning tank.

C. Assemble the Oil Tank to the Cleaning Fixture (Ref.Fig.503).

- (1) Unscrew the two swing bolt hand nuts on the cleaning fixture (Tool 899), then raise the two hinged latches.
- (2) Slide the oil tank into the cleaning fixture, reposition the latches and tighten the hand nuts.

D. Cleaning Procedure.

- (1) Using lifting equipment raise the cleaning fixture/tank and suspend it over the cleaning tank tray.
- (2) If necessary, loosen the two cap head bolts and adjust the position of the fixture lifting ring so that the cleaning fixture is level.

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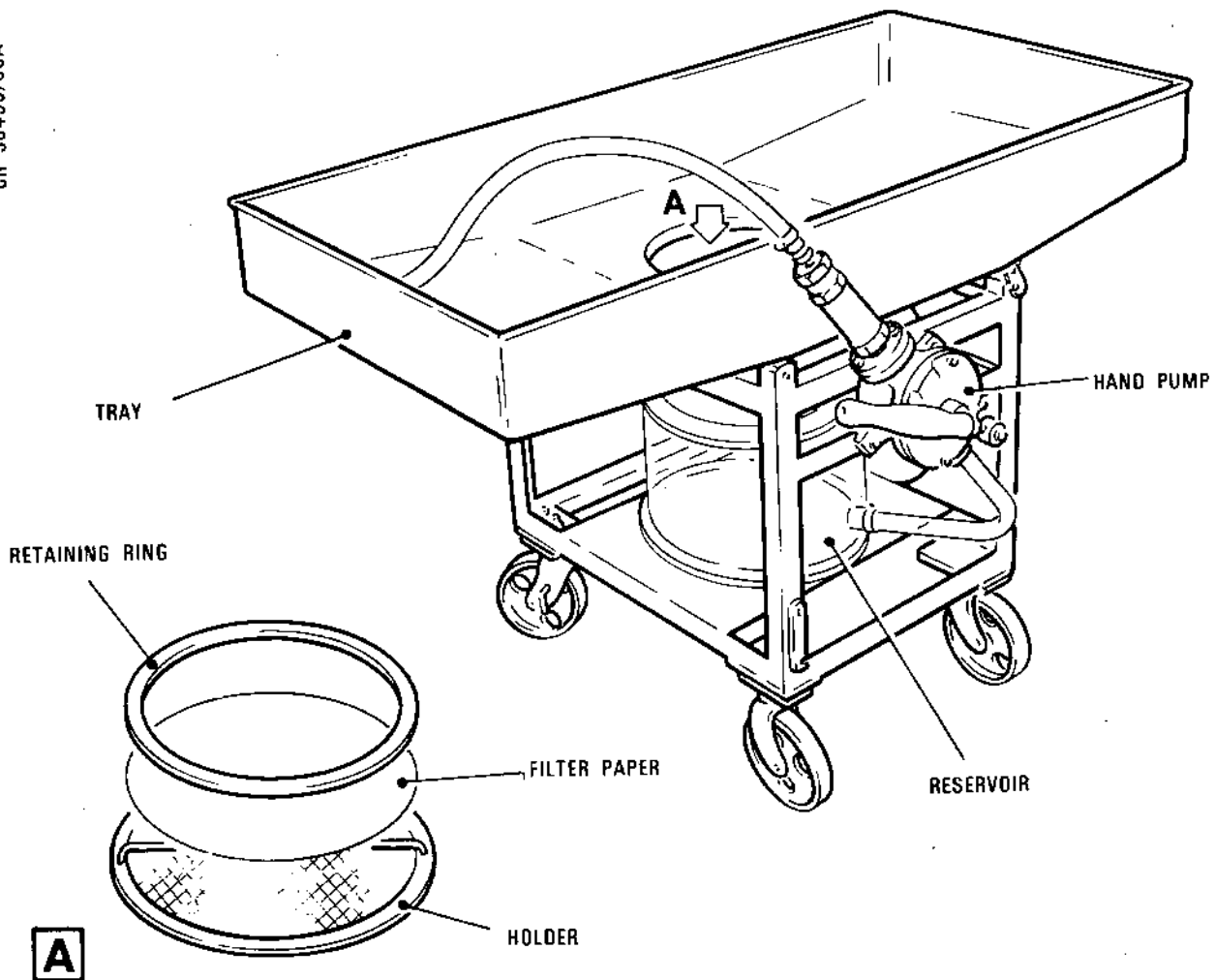
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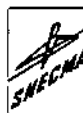
Mobile Cleaning Tank
Figure 502

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OVERHAUL



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- (3) Remove the protector (Tool 917) from the contents transmitter location and pump approx. two gallons of white spirit into the oil tank.
- (4) Replace the protector and agitate the oil tank, tilting it as far as possible to ensure thorough cleaning of the tank interior.
- (5) Lower the oil tank to approx. six inches above the tray of the cleaning tank, then remove the protector from the vent valve location on the underside of the tank. Allow the oil tank to drain completely, then re-assemble the protector.
- (6) Carefully remove the filter assembly from the cleaning tank and inspect the filter for impurities.
- (7) If any impurities are present, renew the filter paper and repeat the cleaning process. Continue the cleaning process until the filter paper is found to be clean.
- (8) After satisfactory cleaning thoroughly dry the interior of the tank with clean dry air.

E. Remove the Oil Tank from the Cleaning Fixture.

- (1) Position the oil tank and cleaning fixture on the bench, unscrew the two swing bolt hand-nuts, raise the hinged latches and slide the oil tank out of the cleaning fixture.
- (2) Ensure the stencilled markings on the tank are complete (Ref. SB.79-8433-8), then place the tank into the container (Tool 84).

3. Assemble the Vent Valve and Filter Unit

A. Assemble the Housing to the Filter Cover.

NOTE: This procedure is only applicable if it has been found necessary to dismantle the filter unit during disassembly.

- (1) Secure the holder (Tool 970) in the vertical position to a Hydraclamp.
- (2) Assemble the cover (1-130), with the housing location on the horizontal centre line and to the left, to the holder and secure with four nuts and washers.

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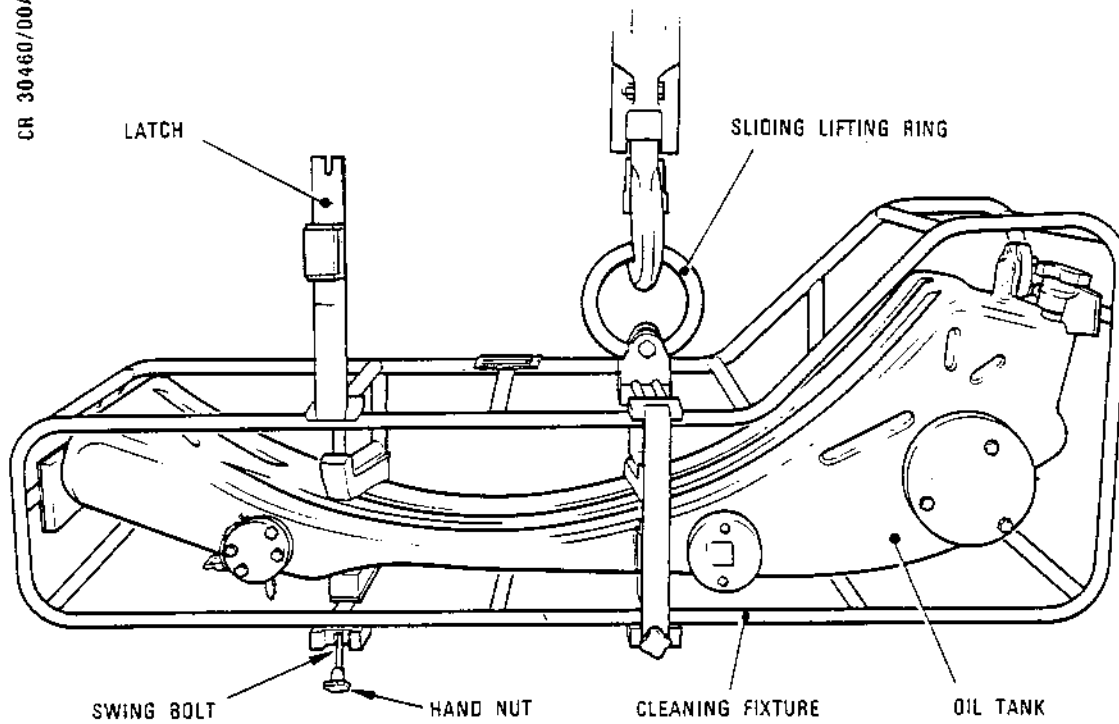


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CR 30460/00A



Assembling Oil Tank to Cleaning Fixture
Figure 503

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- (3) Assemble the gasket (1-230) and housing (1-200), with the vent valve location facing upward, to the cover.
- (4) Apply lubricant 'A' to the six retaining bolts (1-210), screw them, from the inside of the cover, into the housing. Ensure the bolts have a minimum locking (run-down) torque of 3.5 lbf in. (0,4 N.m) torque-tighten between 67 and 73 lbf in. (7,6 and 8,2 N.m).
- (5) Remove the cover assembly from the holder and the holder from the Hydraclamp.

B. Pressure Test the Cover and Housing Assembly.

NOTE: This procedure is only applicable if the procedure in para.3.A. has been carried out.

- (1) Assemble the cover/housing to the blanking fixture.
 - (a) Withdraw the locking pin from the bleed valve retaining plate of the pressure test blanking fixture (Tool 983), then swing the bleed valve away from the fixture (Ref.Fig.504).
 - (b) Offer the cover assembly to the fixture with the housing positioned over the inlet union of the fixture. Ensure the outlet of the housing is in line with the bleed valve, then secure the cover with nuts and washers.
 - (c) Assemble the sealing ring (1-120) to the groove of the housing outlet.
 - (d) Unscrew the knurled locking nut on the bleed valve, allowing the valve to slide in the retaining plate. Swing the retaining plate to the vertical and insert the locking pin. Slide the bleed valve forward over the sealing ring and secure by tightening the locking nut against the retaining plate.

NOTE: The position of the bleed valve can be adjusted, if necessary, by unscrewing the grub screw in the stop ring and screwing the stop ring in or out.

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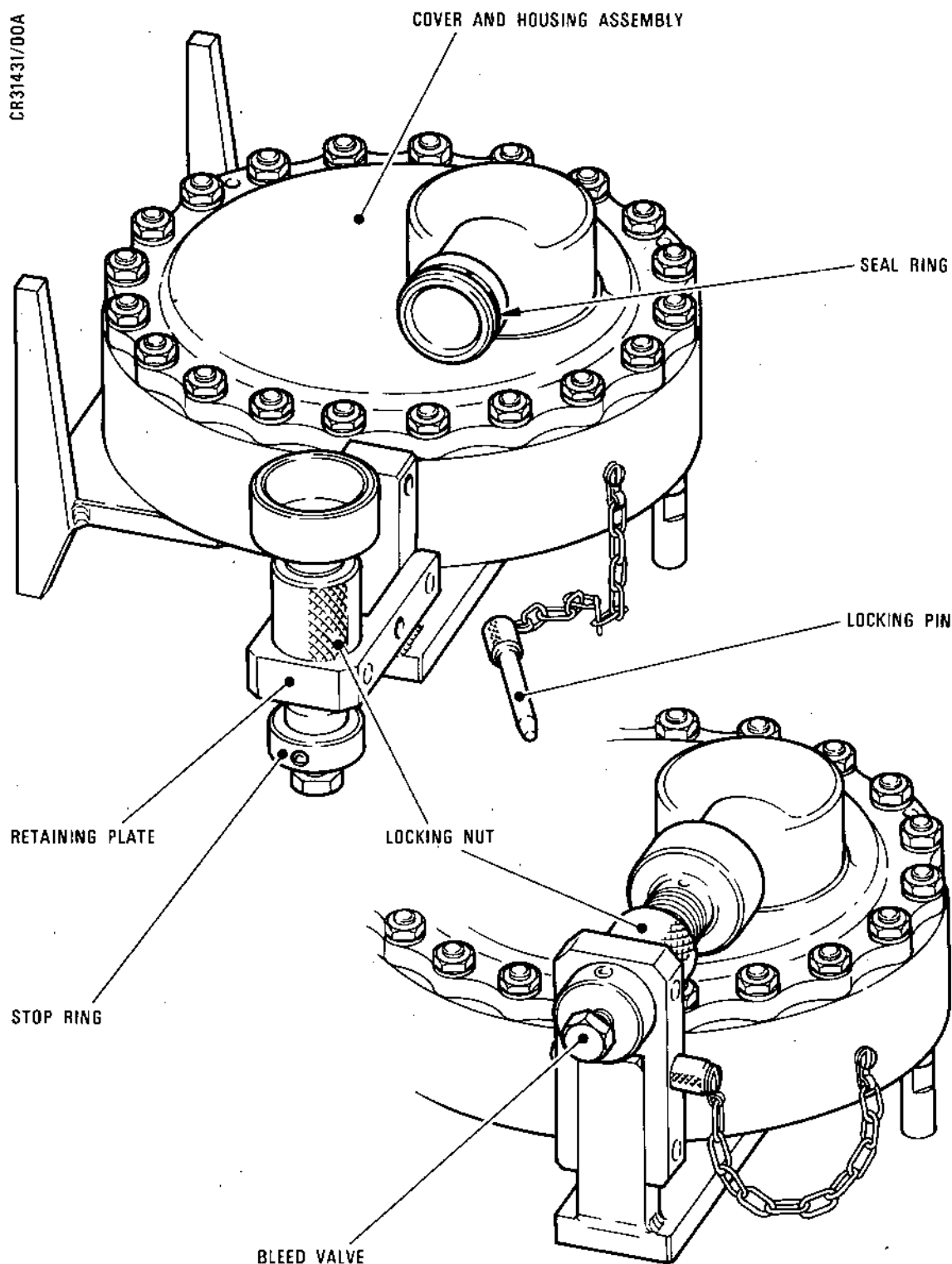
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CR31431/DOA



Assembling Cover Housing to Blanking Fixture
Figure 504

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(2) Pressure test procedure.

The pressure test is carried out with oil, lubricant A, at a temperature of 120 ± 5 deg C and pressure of 6 psig (41,5 kPA). Alternative equipment to that described and illustrated (Tool 583) (Ref.Fig.505) may be used.

WARNING: PROTECTIVE CLOTHING MUST BE WORN AND
ENSURE ADEQUATE ROOM VENTILATION.

- (a) Place the cover and fixture assembly in the drain tray of the pressure test rig and couple the rig oil pressure pipe to the inlet union on the fixture.
- (b) Check that the rig contains the required amount of oil, shown by the dipstick.
- (c) Connect the test rig to the mains power supply, switch ON the heater and allow the oil temperature to reach 120 ± 5 deg C.

WARNING: ENSURE THAT THE BLEED VALVE NIPPLE
IS POINTING DOWNWARDS AND THAT THE
HOT OIL DOES NOT SPLASH.

- (d) Open the bleed valve on the fixture, then switch ON the rig oil circulating pump to flow oil through the fixture and out of the bleed valve.
- (e) Allow the oil to flow until the temperature stabilises at 120 ± 5 deg C. (approx. 10 min), then close the bleed valve.
- (f) Increase the oil pressure from the test rig to 6 psig (41,5 kPA) and maintain this pressure for at least 15 min checking continuously for leakage from the cover to housing joint. No leakage is permissible.
- (g) Switch OFF the circulating pump and oil heater then disconnect the test rig from the electrical supply. Allow the assembly to cool then open the bleed valve to relieve the oil pressure.

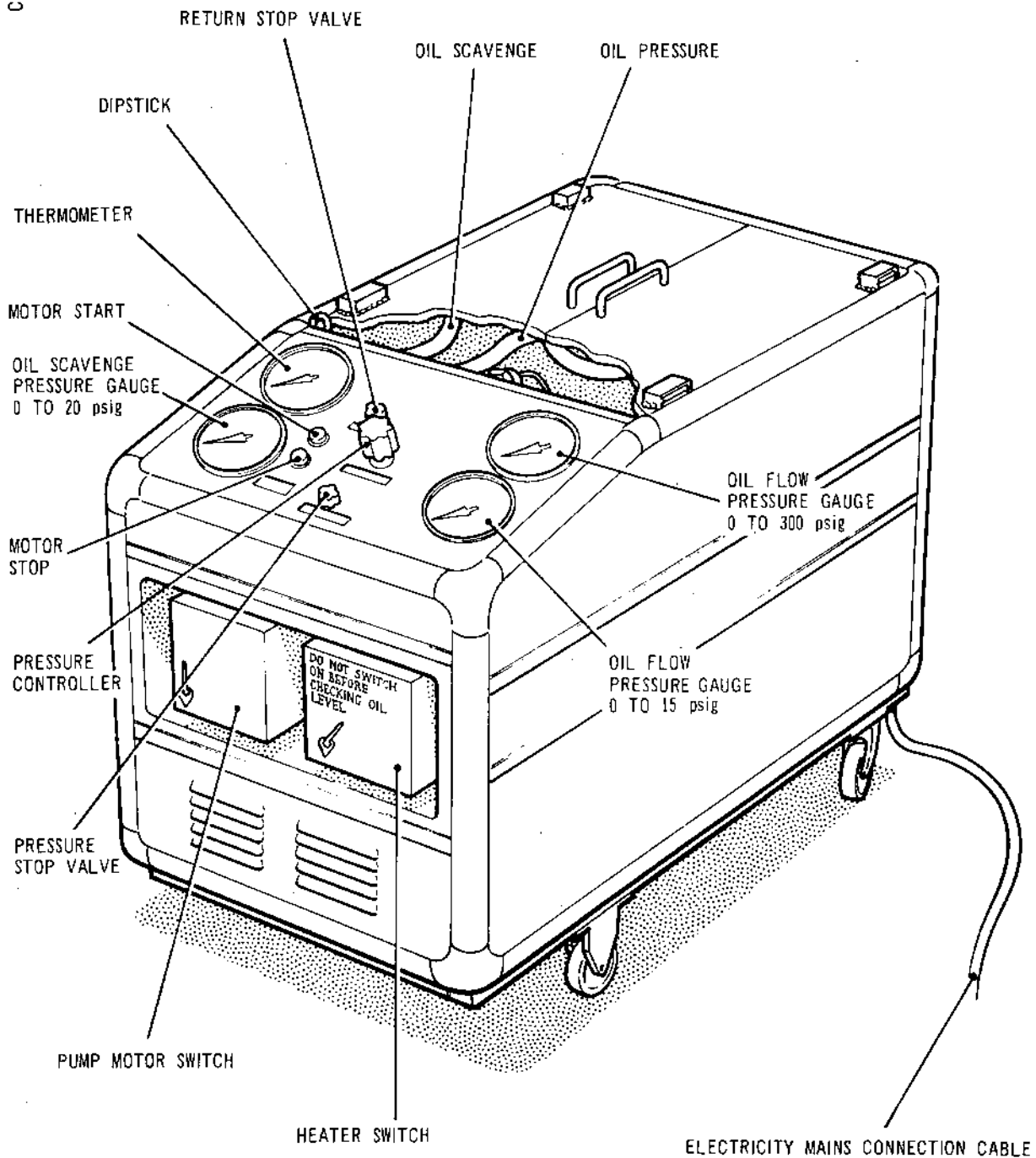


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CR 32155/00A



JN29830

Pressure Test Rig
Figure 505

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- (3) Remove the pressure test equipment.
- (a) Uncouple the oil pressure pipe from the union of the fixture.
 - (b) Unscrew the bleed valve locknut and withdraw the bleed valve over the seal on the housing outlet.
 - (c) Withdraw the locking pin from the retaining plate and swing the retaining plate to the horizontal position.
 - (d) Unscrew and remove the nuts and washers securing the cover assembly and remove the cover from the fixture.
 - (e) Remove the sealing ring from the housing outlet and place it in a suitable container. Wipe off all oil from the cover assembly with a clean rag.
- (4) Rectification of leakage from the joint face.
- (a) Secure the holder (Tool 970) in the vertical position to a Hydraclamp.
 - (b) Assemble the cover, with the vent valve connection to the left and facing upward, to the holder and secure with four nuts and washers.
 - (c) Remove the six bolts securing the housing to the cover and remove the housing.
 - (d) Inspect the gasket and, if faulty, replace with a new item. If the gasket is found to be acceptable carry out a blueing check on the faces of the cover and housing and remove any high spots.
 - (e) Apply lubricant 'A' to the six retaining bolts and screw them from the inside of the cover into the housing. Ensure the bolts have a minimum locking (run-down) torque of 3.5 lbf in. (0,4 N.m) torque-tighten between 67 and 73 lbf in. (7,6 and 8,2 N.m).
 - (f) Remove the cover assembly from the holding plate and the holder from the Hydraclamp.

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- (g) Repeat the pressure test (Ref. para.3B) until a satisfactory result has been obtained.

NOTE: Do not separate the housing from the cover after a satisfactory pressure test.

C. Assemble the Filter Pack (Pre SB.79-9 only) (Ref.Fig.506).

NOTE: If the filter and deflector are assembled to the cover assembly, this procedure is not applicable, but the clearance between the deflector and filter must be as quoted in para.(6). If the items are disassembled, assemble the original items as detailed para.(1),(2),(6) and (7), or new items as detailed in para.(1) and (3) to (7).

- (1) Insert the filter (1-190), with the largest outside diameter entering first, into the cover assembly and press fully home.
- (2) Assemble the deflector cover (1-170) to the cover assembly and align the rivet holes in both items.
- (3) Assemble the protector (Tool 581) to the inside of the deflector cover (1-170) with the rubber face of the protector abutting the deflector.
- (4) Assemble the deflector cover and protector into the cover assembly so that the rim of the deflector abuts the filter pack. Ensure that the scallop lines up with the scallop in the rim of the cover assembly.
- (5) Using the holes in the cover as a guide, drill three holes 0.1331/0.1299 in. (3,378/3,277 mm) in the deflector. Remove the protector then reassemble the deflector to the cover assembly.
- (6) Insert the three rivets (1-180) to locate the deflector within the cover. Apply finger pressure to the filter to dish the filter gauze toward the cover. Ensure that the distance from the centre of the filter to the deflector is within 0.625 in. (15,87 mm) minimum and 0.875 in. (22,22 mm) maximum.
- (7) Secure the deflector to the cover, and check that the filter has maintained its concave shape and clearance from the deflector,

D. Assemble the Vent Valve.

- (1) Determine the adjusting plate thickness. (Ref. Fig.507).
 - (a) Insert the valve (1-60) into the vent valve housing (1-70) (Ref.Fig.506), then measure the depth from the joint face of the housing to the top of the valve and record as dimension A.
 - (b) Measure the thickness of the mounting bracket (1-50) and record as dimension B.

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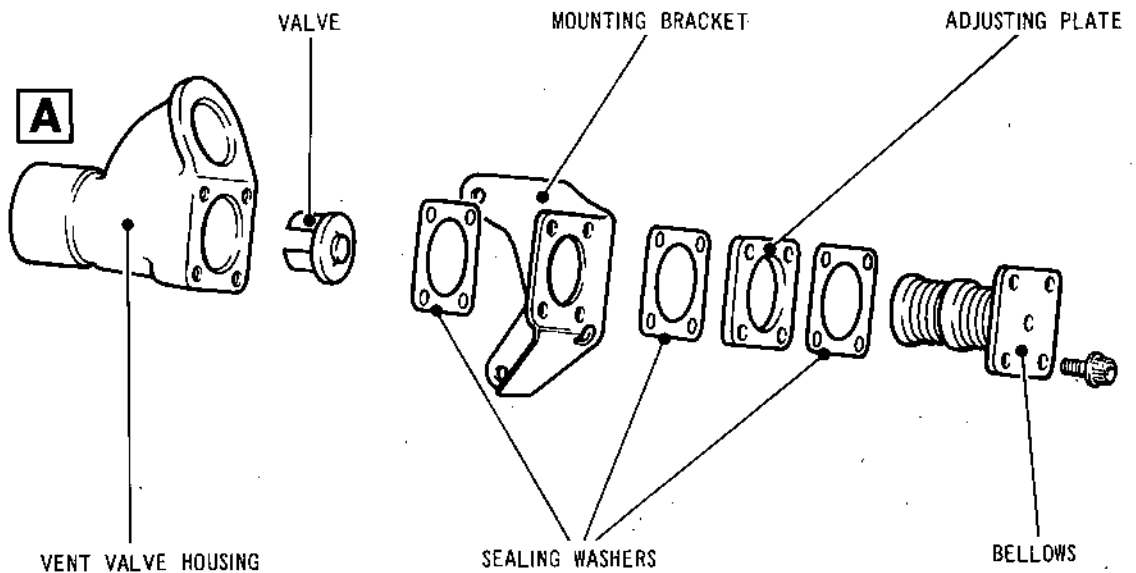
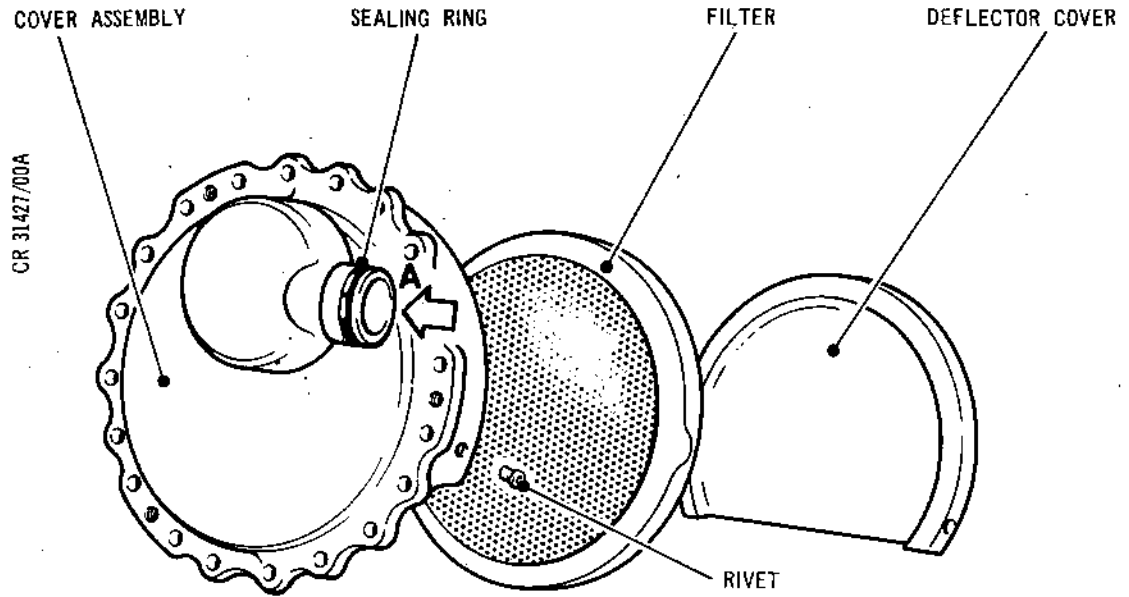
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Assembling Vent Valve and Filter
Figure 506

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- (c) Measure the free length of the bellows unit, from the mating side of the flange. Subtract from this dimension, dimension A + B + 0.030 in. (0,762 mm), the 0.030 in. representing the combined thickness of the sealing washers (1-30).
- (d) Machine the adjusting plate (1-40) to the required thickness (Ref.72-09-21 Repair Fig.453).
- (2) Assemble the vent valve. (Ref.Fig.506).
 - (a) To the mounting face of the vent valve housing assemble the mounting bracket, adjusting plate and bellows unit, interpose a sealing washer between each item.
 - (b) Apply lubricant 'B' to the four retaining bolts (1-10) and screw the bolts into the housing. Ensure the bolts have a minimum locking (run-down) torque of 2 lbf in. (0,23 N.m) torque-tighten between 36 and 40 lbf in. (4,1 and 4,5 N.m), wire-lock the bolts in pairs.
 - (c) Assemble the sealing ring (1-120) to the cover assembly, then slide the vent valve housing over the seal.
- 4. Assemble the Mounting Brackets to the Oil Tank (Ref.Fig.508)
 - A. Assemble the Rear Upper Bracket.
 - (1) If a new bracket (2-120) is to be assembled, first assemble a pin (2-110) and retaining ring (2-100) to the bracket.
 - (a) Assemble the retaining ring to the pin groove then place the pin into an approved freezing agent (Cardice) for approximately 20 minutes.
 - (b) Using protective gloves remove the pin from the freezing agent then press the pin into its location in the bracket, from the counterbored side of the hole.
 - (2) Apply lubricant 'B' to the two retaining bolts (2-90). Offer the bracket, at 90 degrees to the oil return flange face with the dowel pointing away from the tank.

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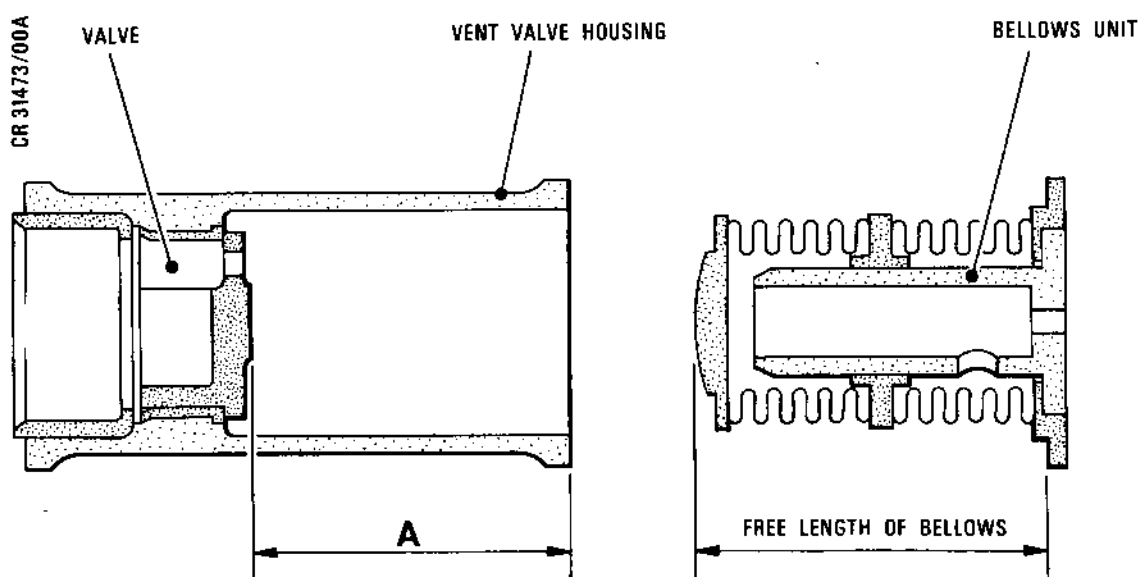
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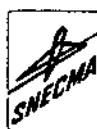
Calculating the Vent Valve Adjusting Washer Size
Figure 507

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- (3) Interpose the spacer (2/95) between bracket and flange then assemble the bolts from the flange side and secure with self-locking nuts (2-80). Ensure the nuts have a minimum locking (run-down) torque of 3.5 lbf in. (0,4 N.m) torque-tighten between 85 and 95 lbf in. (9,6 and 10,7 N.m).
- (4) Assemble the protector (Tool 1044) to the oil return flange.

B. Assemble the Rear Lower Bracket.

- (1) Remove the protector from the oil feed flange, then offer the rear lower mounting bracket (2-230) to the mating face of the flange with the 'D' head bolt locations facing away from the tank.
- (2) Apply lubricant B to the two 'D' headed bolts (2-200) and the two plain bolts (2-220), then install the 'D' headed bolts in the outer holes of the bracket and the plain bolts in the inner holes.
- (3) Assemble the self-locking nuts (2-190) and (2-210) to the bolts. Using the cranked wrench (Tool 1555), ensure the nuts have a minimum locking (run-down) torque of 3.5 lbf in. (0,4 N.m) torque-tighten between 85 and 95 lbf in. (9,6 and 10,7 N.m).
- (4) Assemble the protector (Tool 1045) to the oil feed flange and secure with the three captive bolts.

C. Assemble the Front Lower Link.

- (1) Assemble the front lower link (2-60) to the mounting lug with the larger diameter hole to the lug, chamfer outwards. Insert the hollow pin (2-50) through the link into the mounting lug.
- (2) Apply lubricant 'B' to the retaining bolt (2-40), then pass the bolt through the hollow pin and screw into the mounting lug.

NOTE: This bolt will be torque-tightened on assembly to the engine and should be hand tight at this stage.

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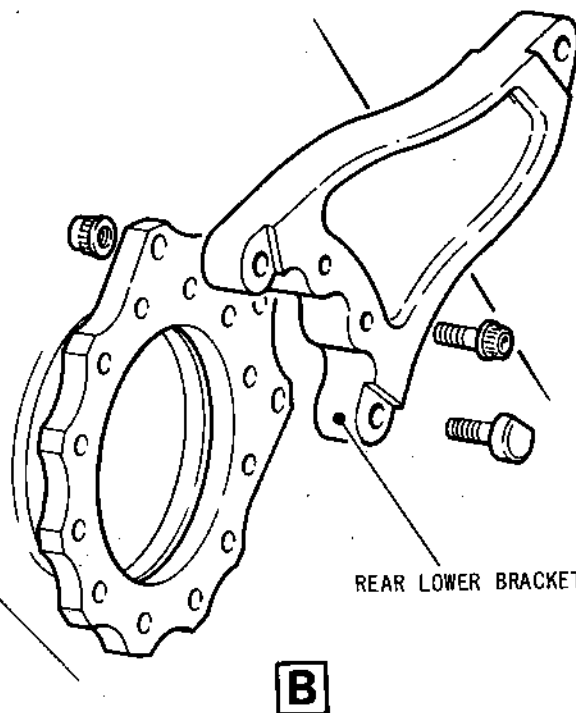
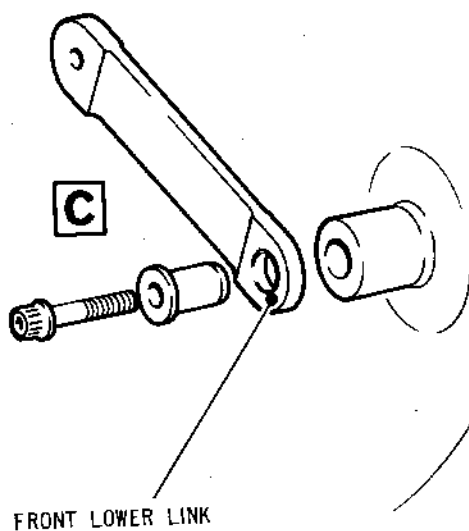
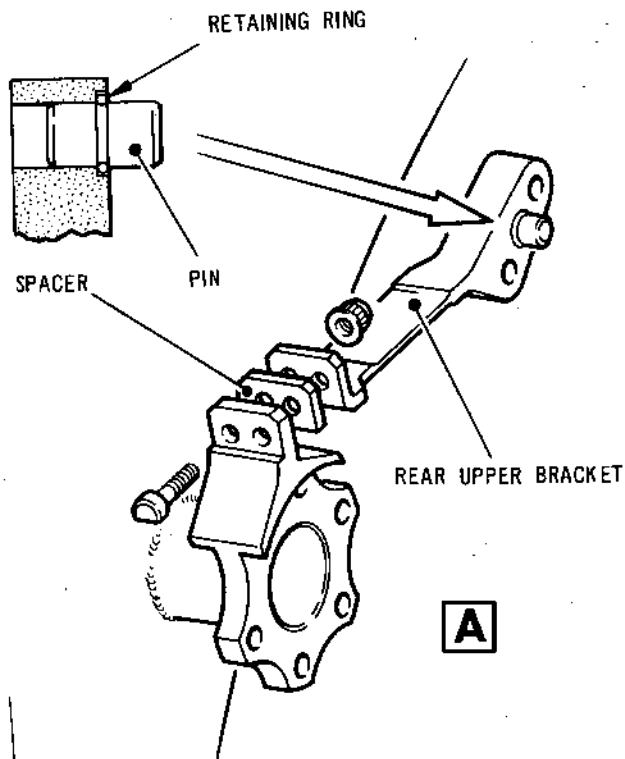
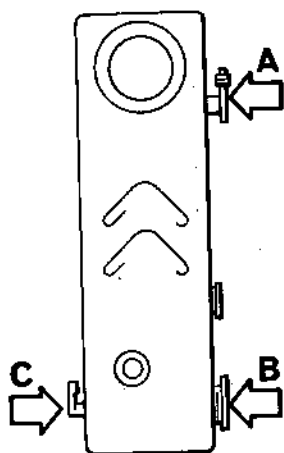


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Assembling Mounting Brackets to Oil Tank
Figure 508

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5. Prepare the Oil Tank for Assembly of Items/Components

A. Assemble the Oil Tank to the Stand (Ref.Fig.509).

NOTE: The stand (Tool 482) for the oil tank is a combined build and pressure test stand. The cradle (Tool 484), which is attached to two support pillars of the stand, will pivot from a horizontal to a vertical position and is secured by a locking pin. An oil tank support frame (Tool 673) is attached to the cradle and secured by four retaining hooks.

- (1) Place the oil tank on the bench with its mounting brackets uppermost.
- (2) Rotate the cradle to the vertical position, insert the locking pin. Unscrew the four hand nuts, to release the retaining hooks securing the support frame to the cradle.
- (3) Lift the support frame out of the cradle and offer the frame to the mounting brackets of the oil tank.
- (4) Secure the frame to the oil tank with a slave nut and bolt at the front and rear lower brackets and two slave bolts at the rear upper bracket.
- (5) Lift the oil tank and support frame, then, with the base (larger end) of the oil tank downwards, locate the support frame over the four retaining hooks on the cradle and tighten the hand nuts.

6. Assemble the Components to the Oil Tank

A. Assemble the Overflow Drain and Oil Sampling Plug SB.79-6 (Ref.Fig.510).

- (1) Unscrew and remove the protector from the overflow drain location.

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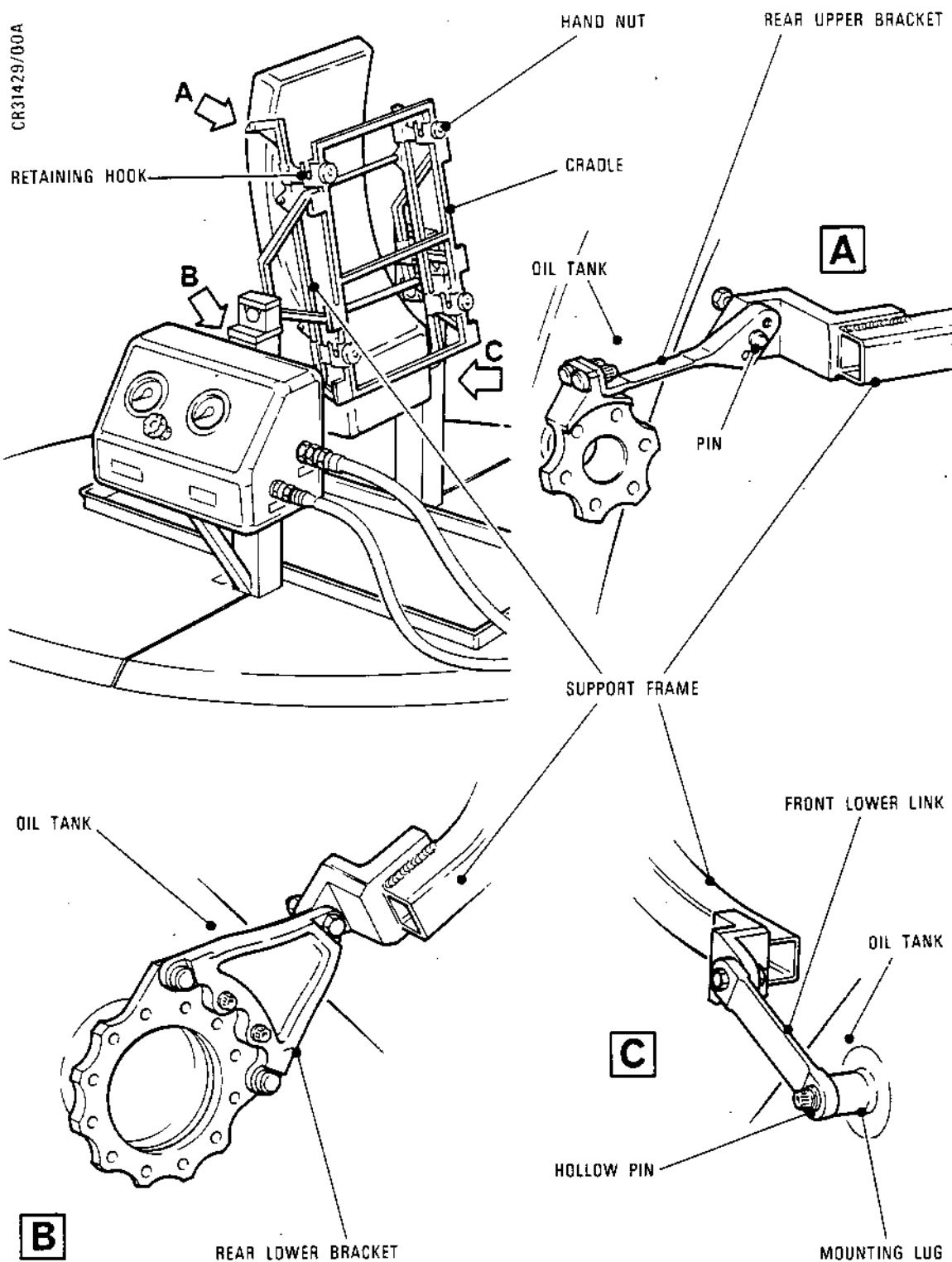
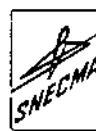
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OVERHAUL



Assembling Oil Tank to Build Stand
Figure 509

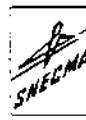
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- (2) Apply lubricant 'A' to the threads of the overflow drain coupling plug (79-11-03/1-25).
- (3) Assemble the corrugated seal (79-11-03/1-30) to the plug then screw the plug into its location and torque-tighten to 390 lbf in. (44,0 N.m). Wire-lock the plug to the tank.
- (4) Apply lubricant 'A' to the threads of the oil sampling plug (79-11-03/1-15).
- (5) Assemble the sealing washer (79-11-03/1-17) to the plug and screw the plug into the overflow drain coupling plug. Torque-tighten to 110 lbf in. (12,0 N.m).

B. Assemble the Filler/Drain Coupling to the Oil Tank
(Ref.Fig.510).

- (1) Assemble the pressure cap (79-11-02/1-10) to the filler/drain coupling (79-11-02/1-60) by turning the outer locking sleeve on the cap counter-clockwise and pulling it back to locate the two pegs into the slots in the sleeve. Press the cap over the coupling and ensure the sleeve returns to the locked position.
- (2) Remove the protector from the filler/drain flange on the oil tank. Assemble the gasket (79-11-02/1-70) and filler/drain coupling to the flange.
- (3) Apply lubricant 'B' to the shorter retaining bolt (79-11-02/1-50) then assemble a wire-locking washer (79-11-03/1-40) to the bolt. Screw the bolt through the coupling and gasket into the flange at the hole furthest from the tank.

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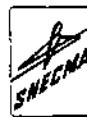
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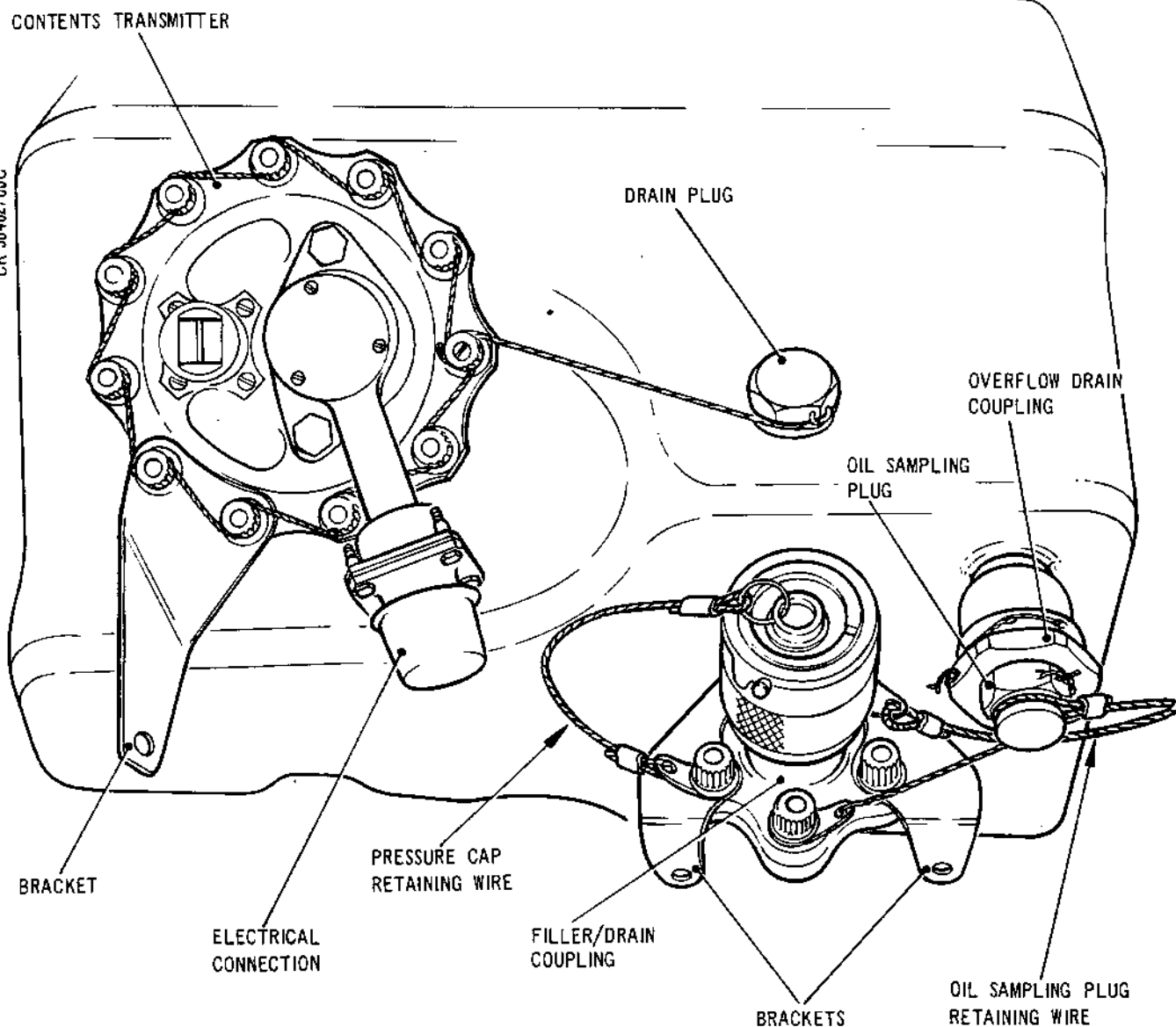
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Assembling Overflow Drain Coupling/Oil Sampling Plug,
Filler/Drain Coupling and Contents Transmitter to Oil Tank
Figure 510

SUB-ASSEMBLY

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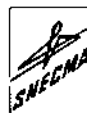
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- (4) Apply lubricant 'B' to the four bolts (79-11-02/1-20). Assemble the two brackets (79-11-02/1-30 and 40) to the filler/drain coupling flange at the remaining bolt positions (Ref.Fig.510). Assemble the four bolts with the oil sampling plug or filler/drain coupling pressure cap retaining wire tag under the heads of two of the bolts.
- (5) Ensure the five bolts have a minimum locking (run-down) torque of 3.5 lbf in. (0,4 N.m) torque-tighten between 67 and 73 lbf in. (7,6 and 8,2 N.m).
- (6) Wire-lock the oil sampling plug to the wire-locking washer.

C. Assemble the Drain Plug to the Oil Tank (Ref.Fig.510).

- (1) Remove the screwed protector from the drain plug location at the base of the oil tank.
- (2) Apply lubricant 'B' to the threads of the drain plug (1-350). Assemble the corrjoint seal (1-360) to the plug then screw the plug into the tank. Torque-tighten between 230 and 250 lbf in. (26,0 and 28,2 N.m).

D. Assemble the Contents Transmitter to the Oil Tank (Ref. Fig.510).

- (1) Remove the protector from the contents transmitter location on the oil tank.
- (2) On engines pre-SB.79-2 carefully insert the contents transmitter (79-31-01/1-10) into its location with the electrical connection downwards.

NOTE: The required position of the transmitter is fixed by an offset bolt-hole.

- (3) Apply lubricant 'B' to the eleven retaining bolts (79-31-01/1-20, 25 and 30), then assemble the bracket (79-31-01/1-100) to the flange of the transmitter as shown (Ref.Fig.510).
- (4) Screw in two bolts (73-31-01/1-25) to secure the transmitter and bracket, then the remaining nine bolts to secure the transmitter.

NOTE: The retaining bolt with the lockwire hole should be positioned nearest to the drain plug.

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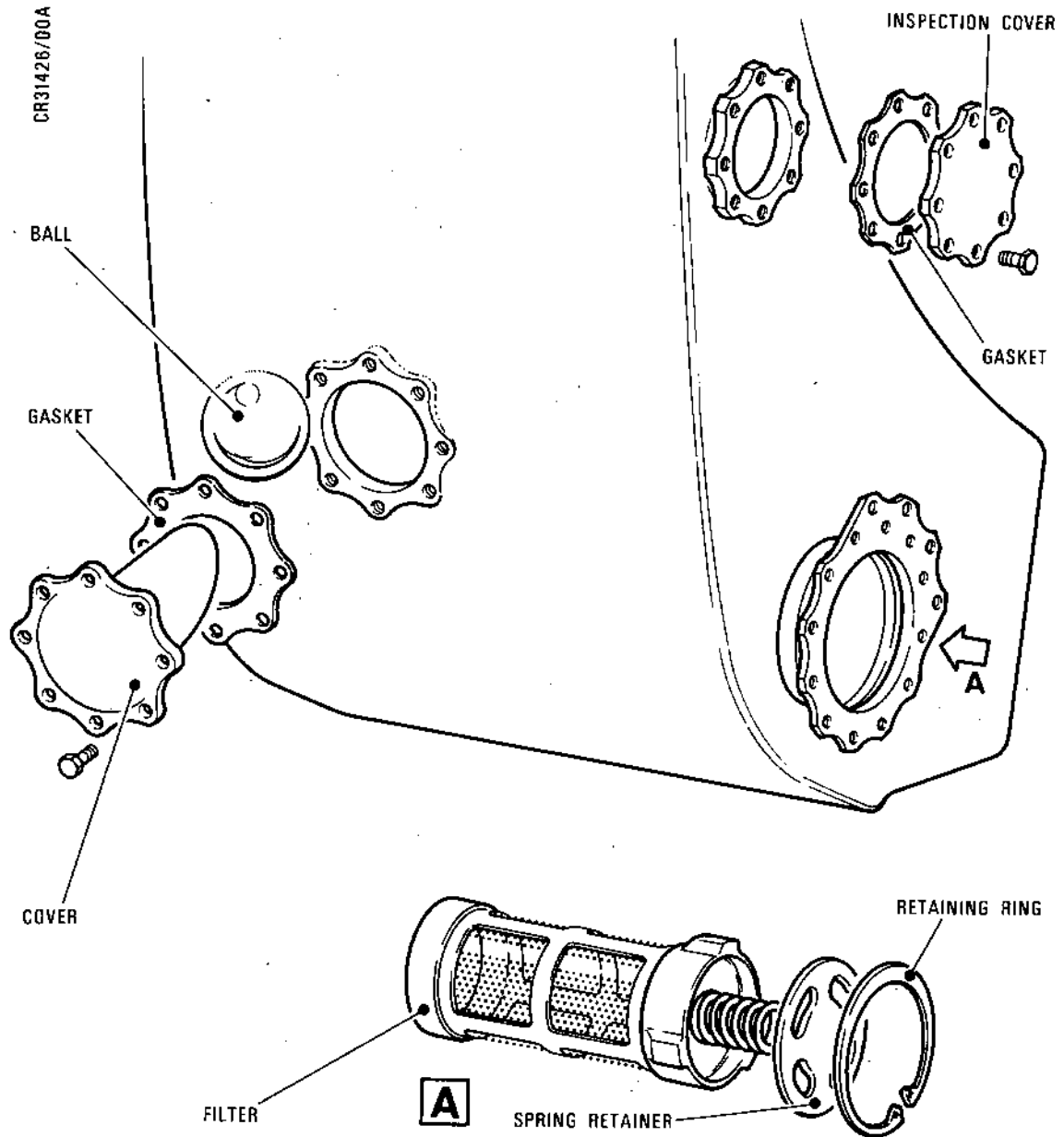
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TN29758



Assembling Filter, Ball Valve and Inspection Cover to Oil Tank
Figure 511

SUB-ASSEMBLY

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OVERHAUL



- (5) On engines embodying SB.79-2 assemble the gasket (79-31-01/1-110) to the contents transmitter flange, then carefully insert the contents transmitter into the tank, with the electrical connection downwards.
 - (6) Assemble the bracket (79-31-01/1-100) to the transmitter flange as shown (Ref.Fig.510). Apply lubricant 'B' to the retaining bolts (79-31-01/1-20B), screw them into the tank to secure the transmitter and bracket.
 - (7) Torque-tighten the bolts between 85 and 95 lbf in. (9,6 and 10,7 N.m), then wire-lock the securing bolts together.
- E. Assemble the Negative 'G' Ball Valve to the Oil Tank (Ref.Fig.511).
- (1) Remove the protector from the negative 'G' ball valve location, then carefully lower the ball (1-280) into the oil tank.
 - (2) Support the top (smaller end) of the oil tank and withdraw the stand locking pin, lowering the top of the oil tank until the ball rolls into its upper location.
 - (3) Assemble the gasket (1-270) to the cover (1-250), then assemble cover/gasket to the tank, the longest side of the tube towards the ball.
 - (4) Apply lubricant 'B' to the eight retaining bolts (1-260), then screw the bolts through the cover into the tank.
 - (5) Return the stand to the horizontal position and insert the locking pin.
 - (6) Ensure the cover securing bolts have a minimum locking (run-down) torque of 3.5 lbf in. (0,4 N.m) torque-tighten between 85 and 95 lbf in. (9,6 and 10,7 N.m).
- F. Assemble the Filter to the Oil Tank (Ref.Fig.511).
- (1) Remove the protector from the oil feed flange of the oil tank. Insert the filter (1-340), with the spring outwards, into the oil tank.

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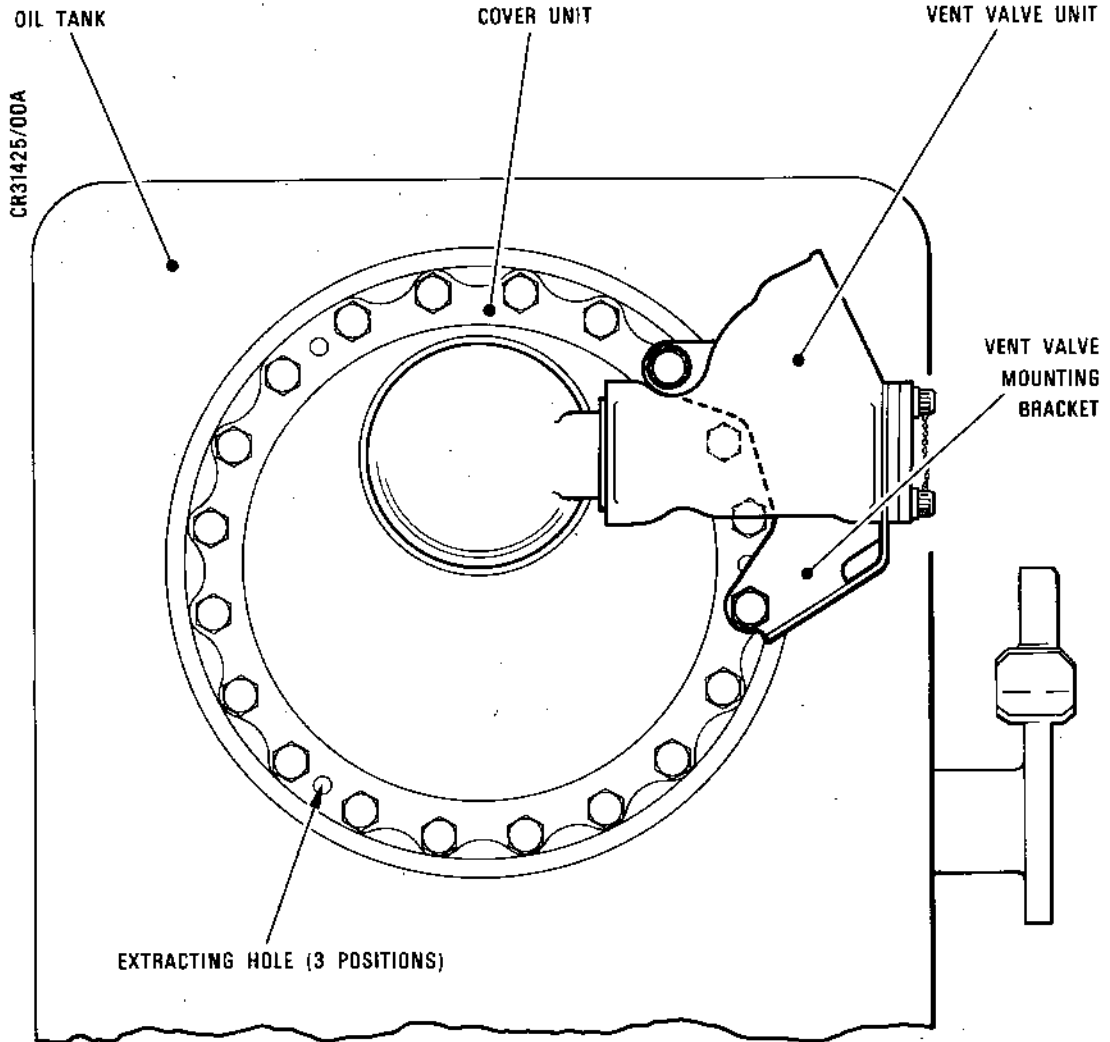


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TN29756

Assembling Vent Valve and Filter Unit to Oil Tank
Figure 512

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- (2) Assemble the spring retainer (1-330) so that the filter spring is located in the boss of the retainer.
- (3) Apply pressure to the retainer, to compress the spring, until the retaining ring groove is visible. Maintain the pressure and assemble the retaining ring (1-320).
- (4) Re-assemble the protector to the flange.

G. Assemble the Inspection Cover to the Oil Tank (Ref.Fig.511).

- (1) Remove the protector from the inspection cover flange on the side of the oil tank.
- (2) Assemble the gasket (1-310) and cover (1-300) to the flange. Apply lubricant B to the bolts (1-290), screw the bolts into the flange to retain the cover. Ensure the bolts have a minimum locking (run-down) torque of 3.5 lbf in. (0,4 N.m) torque-tighten between 67 and 73 lbf in. (7,6 and 8,2 N.m).

H. Assemble the Vent Valve and Filter Cover to the Oil Tank (Ref.Fig.512).

- (1) Remove the protector from the vent valve and filter location, then assemble the gasket (1-240), cover and vent valve unit to the oil tank.
- (2) Apply lubricant 'B' to the 18 cover retaining bolts (1-140), then screw the bolts into all the bolt locations except the two vent valve bracket retaining bolt-holes. Ensure the bolts have a minimum locking (run-down) torque of 3.5 lbf in. (0,4 N.m) torque-tighten between 67 and 73 lbf in. (7,6 and 8,2 N.m).

NOTE: It will be necessary to temporarily remove the vent valve from the cover in order to assemble and torque-tighten the two bolts positioned beneath the bracket.

- (3) Apply lubricant 'B' to the plain bolt (1-150) and double hexagon bolt (1-160), then screw the bolts into the tank to secure the vent valve mounting bracket. Ensure both bolts have a minimum locking (run-down) torque of 3.5 lbf in. (0,4 N.m) then torque-tighten the plain bolt between 67 and 73 lbf in. (7,6 and 8,2 N.m) and the double hexagon bolt between 85 and 95 lbf in. (9,6 and 10,7 N.m).

NOTE: The double hexagon bolt has been provided to allow clearance between the bolt head and the vent valve housing when using a socket type wrench.

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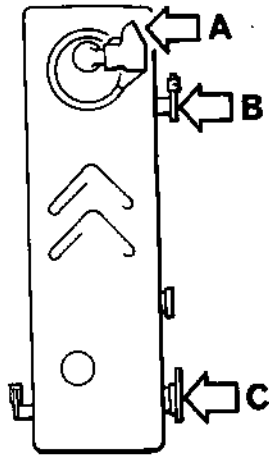
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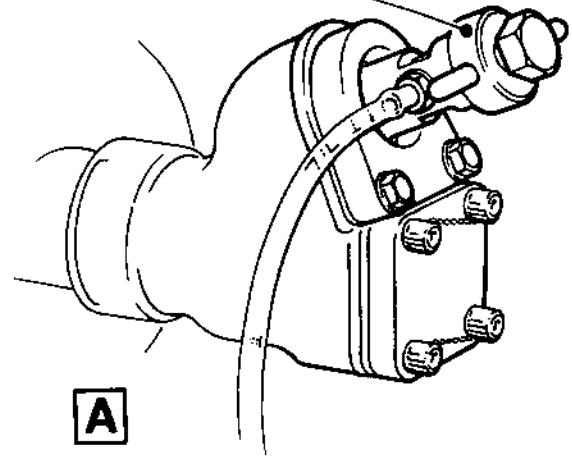


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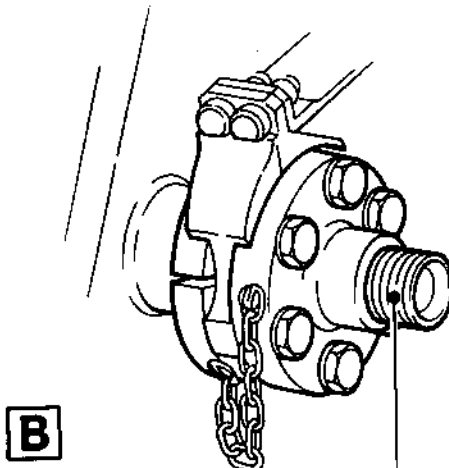


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BLEED VALVE FIXTURE

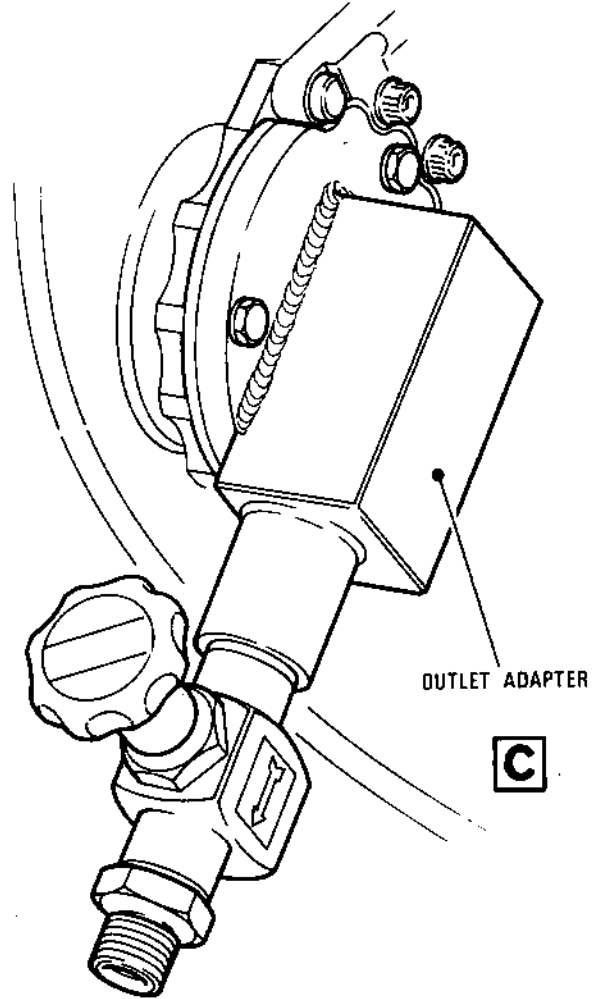


A



B

INLET ADAPTER



OUTLET ADAPTER

C

Assembling Pressure Test Adapters to Oil Tank
Figure 513

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OVERHAUL



7. Pressure Test the Oil Tank

NOTE: This pressure test must be carried out if any of the joint faces have been disturbed.

A. Assemble the Pressure Test Adapters to the Oil Tank (Ref.Fig.513).

- (1) Remove the protector from the oil return flange and assemble the oil inlet adapter (Tool 675). Screw the six retaining bolts through the adapter and flange into the clamp pad of the adapter.
- (2) Remove the protector from the oil feed flange and assemble the oil outlet adapter (Tool 674) with the scallops of the adapter matching those of the rear lower mounting bracket, screw in and tighten the three retaining bolts.
- (3) Insert the bleed valve fixture (Tool 984) into the breather location of the vent valve and secure the retaining plate with two bolts.
- (4) Attach approx. 5 ft (1524,0 mm) of 0.187 in. (4,75 mm) bore clear polythene pipe to the bleed valve nipple and position the free end of the pipe in the oil tray under the oil tank.

B. Assemble the Pressure Test Equipment (Ref.Fig.514). Alternative equipment to that described and illustrated (Tool 583) (Ref.Fig.505) and (Tool 554) (Ref.Fig.509) may be used.

- (1) Couple the oil delivery pipe from the test rig to the regulating valve.
- (2) Couple the oil return pipe from the test rig to the quick release coupling of the oil outlet adapter on the oil tank.
- (3) Couple the oil delivery pipe (Tool 659) (part of Tool 482) from the regulating valve to the inlet adapter on the oil tank.
- (4) Couple the oil relief pipe (Tool 660) (part of Tool 482) from the regulating valve to the supply rig.
- (5) Connect an air supply pipe to the air inlet connection of the regulating valve.
- (6) Position two sets of screens (Tool 829) around the stand.

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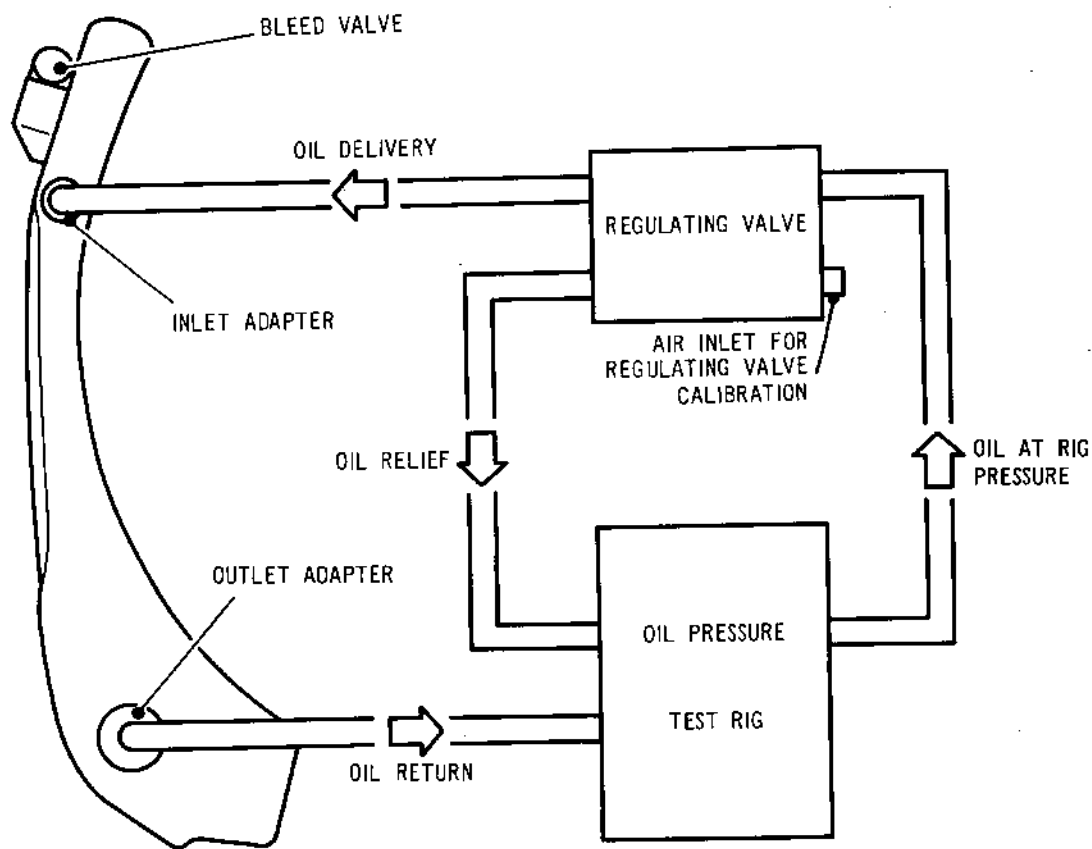
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Diagrammatic Layout of Pressure Test Equipment
Figure 514

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OVERHAUL



C. Pressure Test Procedure.

WARNING: PROTECTIVE CLOTHING MUST BE WORN AND ENSURE ADEQUATE ROOM VENTILATION.

- (1) The pressure test is carried out with oil, lubricant 'A', at a temperature of 120 ± 5 deg C and pressure of 6 psig (41,5 kPA).
- (2) Withdraw the locking pin and rotate the oil tank to the vertical position, replace the locking pin.
- (3) Check that the pressure test rig (Tool 583) contains the correct amount of oil, shown by the dipstick.
- (4) Connect the rig to the mains power supply, switch ON the heater and allow the oil temperature to reach 120 ± 5 deg C.
- (5) Open the bleed valve (Tool 984) at the tank vent valve breather location and close the drain valve at the tank outlet adapter.
- (6) Open the pressure test rig delivery and return stop valves and drain valve.
- (7) Turn on the air supply and operate the regulating valve control to provide only sufficient oil pressure to fill the tank then switch on the test rig oil circulating pump.
- (8) Allow the tank to vent thoroughly, via the bleed valve, then close the valve and open the tank drain valve allowing oil to flow through the tank until the temperature stabilises at 120 ± 5 deg C (20 min approx.).
- (9) Close the drain valve and open the bleed valve to ensure no air remains in the tank.
- (10) Close the bleed valve then operate the regulating valve control to slowly increase the oil pressure to 6 psig. Maintain the pressure to tank for 15 min checking continuously for leaks from all tank joint faces, no leakage is permissible.

CAUTION: ENSURE THAT AS THE PRESSURE IS INCREASED THE REGULATING VALVE IS SEEN TO BE OPERATING AND DOES NOT EXCEED THE 6 PSIG TEST LIMIT.

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- (11) On completion of a satisfactory test or in the event of a leak, switch off the test rig circulating pump and open the tank return stop valve and bleed valve. Allow the oil in the tank to drain back to the test rig.
- (12) Switch OFF the electrical supply to the test rig and the air supply to the regulating valve.

D. Rectification of Leakage.

- (1) Check the torque loading of the component securing bolts.
- (2) Remove the component, from which the leakage was observed, from the oil tank. Examine the oil tank and component mating faces. Rectify any defects then reassemble the component to the tank using a new gasket or sealing ring. Torque-tighten the component securing bolts in accordance with the relevant portion of this chapter.
- (3) Repeat the pressure test procedure (Ref. para. 7.C.) until a satisfactory result is obtained.

E. Remove the Pressure Test Equipment.

NOTE: Wherever a pipe is uncoupled a quantity of trapped oil will drain, therefore ensure that before disconnecting, a suitable container is positioned beneath the coupling. Return all clean, drained oil to the pressure test rig.

- (1) Uncouple the quick release coupling of the return pipe from the outlet adapter, open the drain valve and drain the oil tank contents.
- (2) Completely drain the oil tank by removing the drain plug. Replace the drain plug with the seal and torque-tighten between 230 and 250 lbf in. (26,0 and 28,2 N.m).
- (3) Uncouple the oil delivery pipe from the regulating valve, then remove the pipe from the union of the inlet adapter on the oil tank.
- (4) Uncouple the oil relief pipe from the regulating valve, then remove the pipe from the union on the pressure test rig.

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- (5) Uncouple the test rig oil delivery pipe from its union at the regulating valve.
- (6) Unscrew the retaining bolts and remove the inlet and outlet adapters from the oil tank.
- (7) Assemble the protector (Tool 1044) to the oil return flange, then assemble the protector (Tool 1045) to the oil feed flange.
- (8) Unscrew the bolts securing the bleed valve retaining plate and withdraw the valve. Assemble the protector (Tool 664) to the vent valve breather location.

8. Remove the Oil Tank from the Stand and Prepare for Installation

A. Remove the Oil Tank from the Stand.

- (1) Unscrew the four hand nuts which secure the support frame to the cradle.
- (2) Lift the support frame and oil tank from the cradle and carefully place them on the bench with the support frame uppermost.
- (3) Remove the nuts and bolts securing the support frame to the oil tank mounting brackets, then remove the support frame.

B. Wire-lock the Drain Plug and Overflow Drain Valve (Ref. Fig.510).

- (1) Wire-lock the drain plug to the nearest bolt on the contents transmitter flange.
- (2) Wire-lock the overflow drain valve to the filler/drain coupling flange.

C. Prepare the Oil Tank for Installation.

- (1) Wipe all oil from the oil tank exterior with a clean cloth and cleaning agent.
- (2) Place the oil tank into its container (Tool 84).

NOTE: The oil tank is now complete and can be despatched for assembly to the engine.

NOTE: All protectors except those attached to the oil feed and return flanges (Tools 1044 and 1045) should be returned to the disassembly area.

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**OLYMPUS 593**MK.610-14-28
OVERHAULMAIN OIL TANK - SPECIAL TOOLS, FIXTURES AND EQUIPMENT1. General

- A. The special tools, fixtures and equipment listed in Table 1001 and 1002 are those required to disassemble and assemble/test the main oil tank.
- B. The tools have been listed in order of usage, and the Tool Ref.No. is the number quoted in the text. Tools marked with an * are used in more than one aspect of overhaul and will be duplicated in the tables.
- C. The tools are not illustrated in the manual except in operation (as required) in the appropriate section. For identification and leading particulars of the tools, refer to the Illustrated Tools and Equipment Manual.

2. Main Oil Tank Disassembly Tools

TOOL REF.NO.	MANUFACTURER PART NO.	DESCRIPTION
* 482	P3C.1086838	Stand, oil tank
* 673	P3C.1089232	Support frame part of 482
* 918	P3C.1223103	Protector, drain plug location
* 919	P3C.1223104	Protector, negative 'G' ball valve location
* 677	P3C.1089237	Protector, vent valve filter location
* 678	P3C.1089238	Protector, inspection cover location
* 680	P3C.1089240	Protector, filler/drain coupling location
* 681	P3C.1089241	Protector, overflow drain/oil sampling plug location
* 917	P3C.1223100	Protector, contents transmitter
* 676	P3C.1089236	Protector, oil feed flange
* 916	P3C.1223098	Protector, oil return flange

Disassembly Tools
Table 1001

SPECIAL TOOLS ETC.

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**OLYMPUS 593**MK.610-14-28
OVERHAUL**3. Main Oil Tank Assembly Tools**

TOOL REF.NO.	MANUFACTURER PART NO.	DESCRIPTION
* 681	P3C.1089241	Protector, overflow drain valve location
* 918	P3C.1223103	Protector, drain plug location
* 676	P3C.1089236	Protector, oil feed flange
* 677	P3C.1089237	Protector, vent valve filter location
* 678	P3C.1089238	Protector, inspection cover location
* 680	P3C.1089240	Protector, filler/drain coupling location
* 916	P3C.1223098	Protector, oil return flange
* 917	P3C.1223100	Protector, contents transmitter
* 919	P3C.1223104	Protector, negative 'G' ball valve location
898	P3C.1212300	Mobile cleaning tank, oil tank
899	P3C.1223003	Cleaning fixture, tank (898)
84	P3C.1212929	Container, oil tank
970	P3C.1234428	Holder, oil tank
983	P3C.1234462	Blanking fixture, oil pressure test
* 583	P3C.1089071	Test rig, oil pressure
554	PJ.1086899	Pressure regulating valve, oil pressure test (482)
581	P3C.1089051	Protector, oil filter deflector cover
1555	P3C.1223027	Cranked ring wrench, lower rear attachment bracket
1044	PJ.1255595	Protector, oil return flange
1045	PJ.1255596	Protector, oil feed flange
* 482	P3C.1086838	Stand, oil tank, assembly/pressure test
* 484	PJ.1086832	Cradle, stand (482)
* 673	P3C.1089232	Support frame, oil tank
675	P3C.1089235	Adapter, oil pressure test, inlet connection
674	P3C.1089233	Adapter, oil pressure test, scavenge connection
984	P3C.1234463	Bleed valve fixture, oil tank valve
659	PJ.1089208	Pipe, oil delivery (482)
660	PJ.1089209	Pipe, oil relief (482)
829	P3C.1094755	Protection screen, oil pressure test
664	P3C.1262697	Protector, vent valve breather

Assembly Tools
Table 1002

SPECIAL TOOLS ETC.

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OVERHAUL



FILL DRAIN CONNECTION - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

CLEANING

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL	-	B	-	-

Cleaning Processes
Table 201

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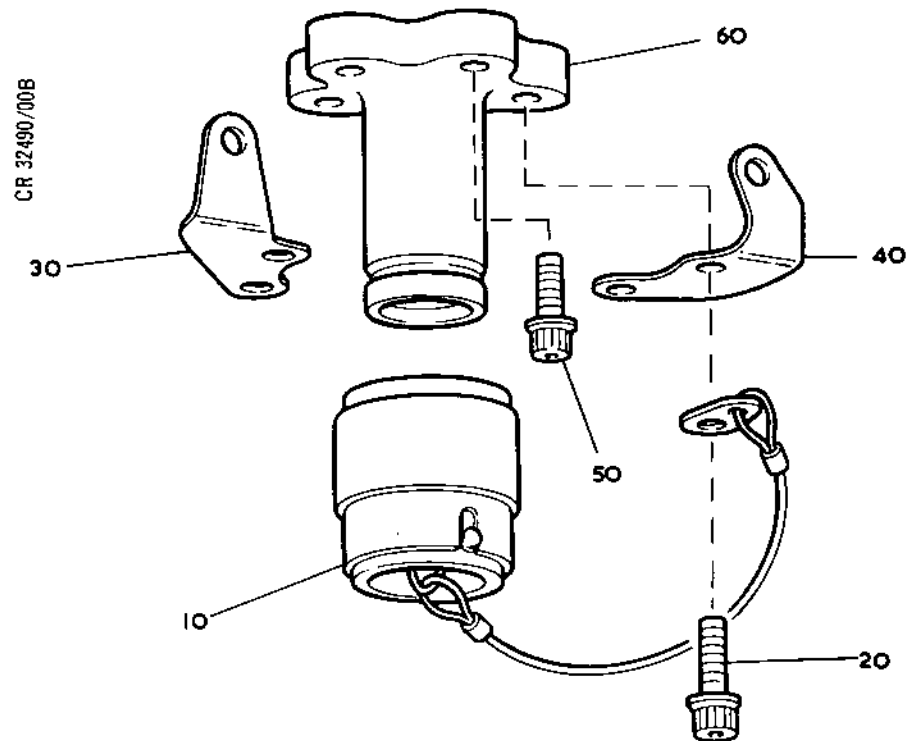


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Oil Tank Fill Drain Connection
Figure 201

CLEANING
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OVERHAUL



OVERFLOW DRAIN COUPLING - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.



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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL	-	B	-	-

Cleaning Processes
Table 201

TN15792



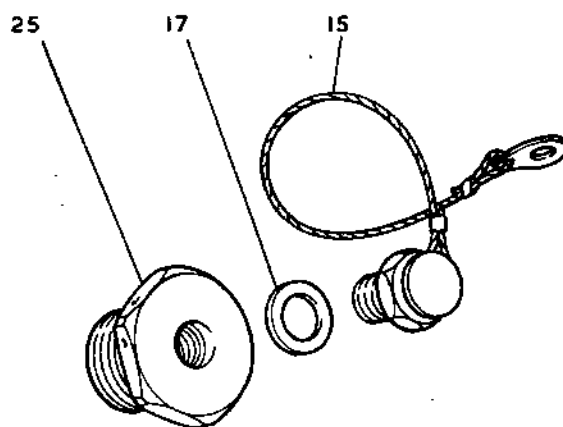
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Oil Tank Overflow Valve
Figure 201



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OIL SYSTEM DISTRIBUTION - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

(1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

No current requirement

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

302	40	Flanged Pin	F1A
302	80	Flanged Pin	F1A
302	120	Flanged Pin	F1A
303	10	Tube	F1A
303	80	Tube	F1A
304	10	Tube	F1A
304	190	Tube	F1A
305	10	Tube	F1A
305	250	Tube	F1A
306	150	Tube	F1A
307	80	Tube	F1A
307	180	Tube	F1A
308	80	Tube	F1A
309	230	Tube	F1A
309	240	Tube	F1A
310	150	Tube	F1A
310	330	Tube	F1A
311	40	Magnetic Screwed Plug	F1A
311	50	Drain Valve Body and Housing	F1A

Items to be Fluorescent Dye Crack Tested
Table 302

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No current requirement

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Crack Detection Test Diagram
Figure 301

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FIG.NO.	ILLUSTRATED PARTS CATALOGUE EQUIPMENT
---------	---------------------------------------

301	Not applicable	
302	79-21-01	Fig.1
303	79-22-01	Fig.1
304	79-22-02	Fig.1
305	79-22-02	Fig.2
306	79-22-02	Fig.3
307	79-22-02	Fig.4
308	79-22-03	Fig.1
309	79-22-04	Fig.1
310	79-22-04	Fig.2
311	79-23-01	Fig.1

Cross References to Illustrated Parts Catalogue
Table 303

4. Fuel Cooled Oil Cooler (302-10)

A. Inspect in Accordance with the Vendors Overhaul Manual
(Ref.79-21-03).

5. Flanged Pins (302-40, 80 and 120)

A. Inspect Pins.

(1) Nicks and burrs.

Accept, if repair
preserves profile
for location.

6. Link (302-250)

A. Inspect Link.

(1) Distortion or cracks.

Reject.

(2) Nicks and burrs.

(a) At bolt bore and bolt
trap face, or less than
0.010 in. (0,250 mm) deep
at flanged pin location
bore.

Accept, if repair
retains profile
and surface
flatness.

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7. Tubes (303-10/80, 304-10/190, 305-10/250, 306-150, 307-80/180, 308-80, 309-230/240 and 310-150/330)

A. Inspect all Tubes and Threaded Components (Ref.72-09-00 Inspection/Check).

B. Inspect all Flanged End Gasket Abutment Faces.

(1) Scores.

(a) Less than 0.030 in.
(0,760 mm) deep, but
not extending more
than half-way across
face.

Accept, if repair
preserves surface
flatness and
sealing capability
and is within 5
per cent reduction
of flange thick-
ness.

(2) Nicks and burrs.

Accept, if repair
preserves surface
flatness and
sealing capability
and is within 5
per cent of flange
thickness.

(3) Wear and fretting.

(a) Flange thickness reduced
more than 5 per cent.

Reject.

(b) Bolt holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

C. Inspect Gasket Abutment Face at Thermometer Flange on
303-80.

(1) Apply inspection standards as detailed in para.B.

D. Inspect Drain Valve Metallic Seal Abutment Face on 304-10.

(1) Apply inspection standards as detailed in para.B.

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8. Brackets (302-220, 303-55/110, 304-270 and 310-180)

A. Inspect Brackets.

- (1) Distortion. Accept, if repair preserves shape without cracking.
- (2) Wear and fretting.
 - (a) Bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.
- (3) Nicks and burrs. Accept after repair.

9. Magnetic Screwed Plug (311-40)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Magnet.

- (1) Magnet damage, or insecure. Reject.

C. Check Magnetic Capability.

- (1) Clean the magnet thoroughly, using trichloroethane (Ref.); dry off thoroughly. Similarly treat three steel balls of 0.5 in. (12,7 mm) diameter.
- (2) Check that the magnet will lift and support the three balls.
 - (a) Magnet will not support load. Reject.
 - (b) Magnet will support load. Accept.
- (3) Fit a protective cover to the magnet and store the plug in a transit case.

10. Drain Valve and Body Assembly (311-50)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

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B. Inspect Gasket Abutment Face, Metallic Seal Location and Body Locating Diameter.

(1) Nicks and burrs.

Accept, if repair preserves flatness, profile and sealing capability.

(2) Scores.

Accept, if repair preserves surface flatness and sealing capability.

(3) Wear and fretting.

(a) Bolt holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

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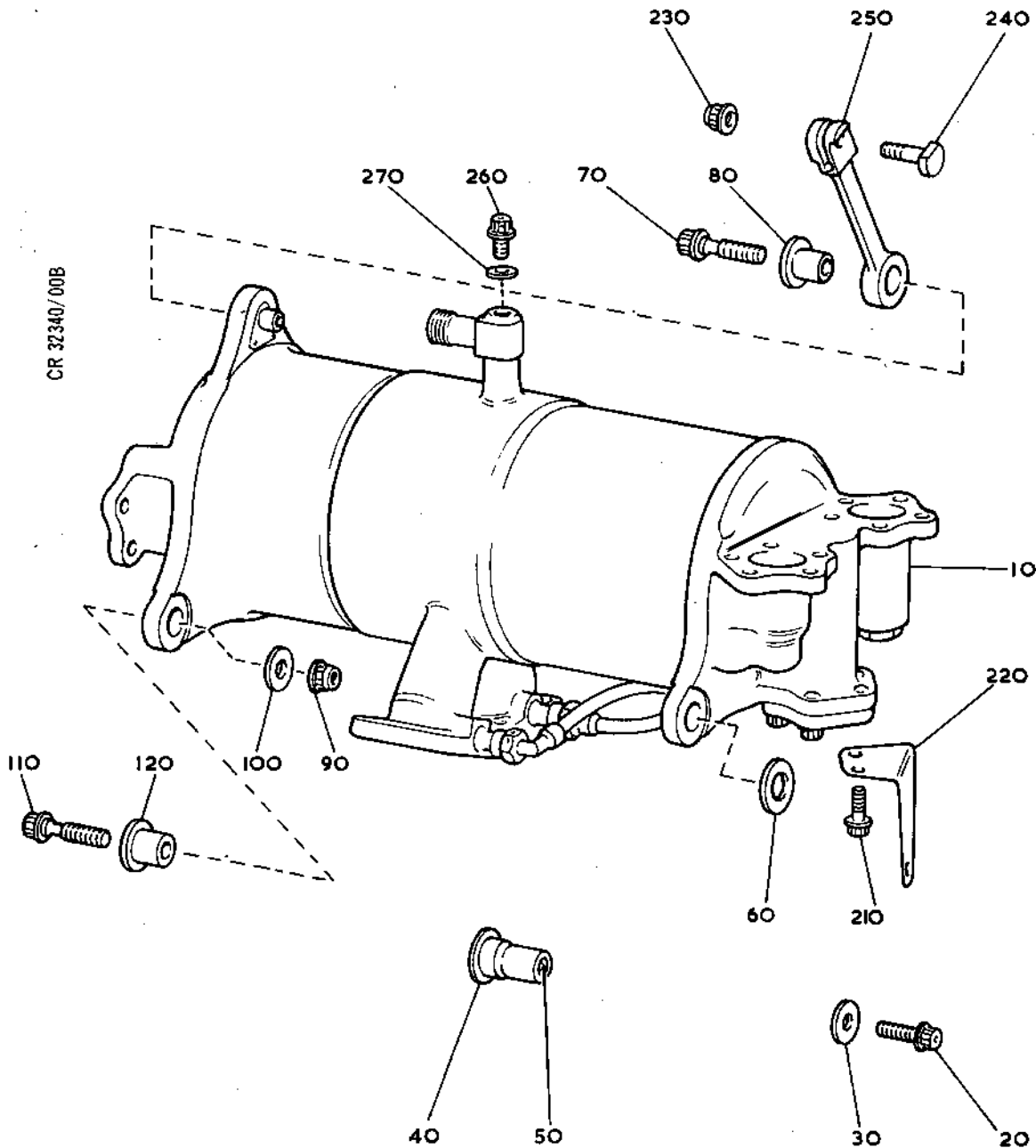
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TN42303

Fuel Cooled Oil Cooler
Figure 302

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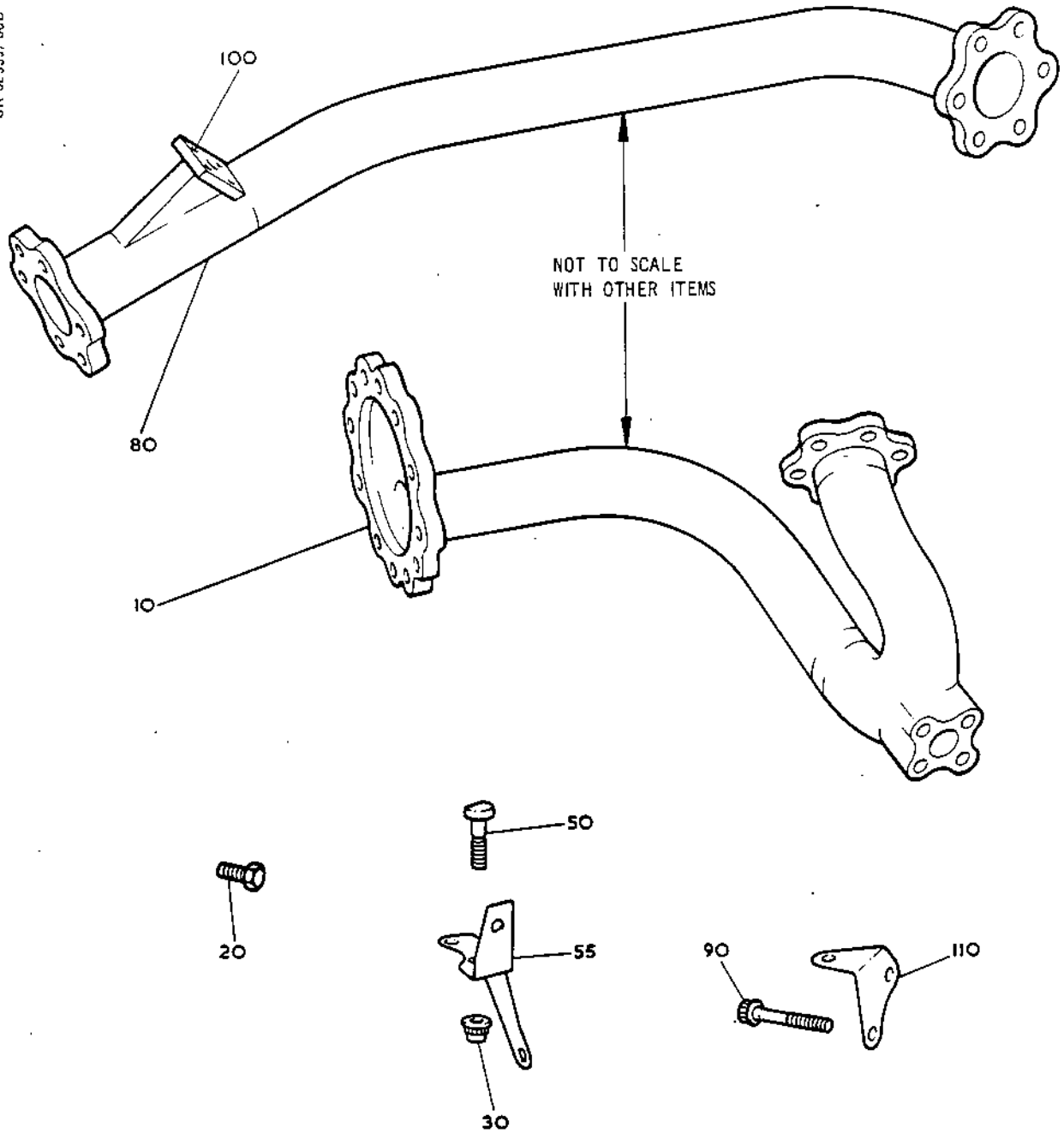
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Oil Supply Tubes, Tank to Pump
and Anti-drain Connection
Figure 303

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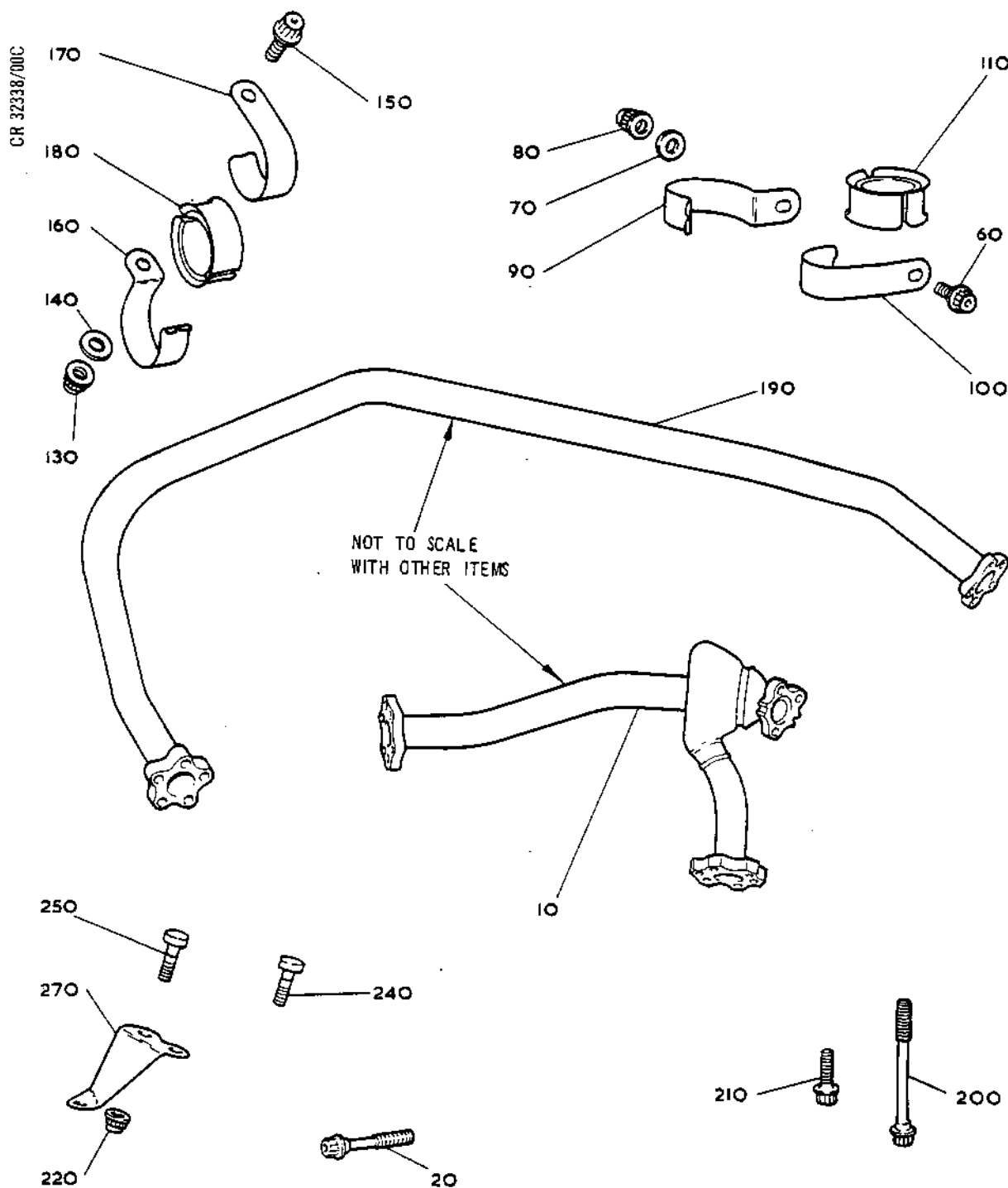
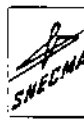
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Oil Return Tubes, Pump and RH Gearbox to Tank (Part 1 of 4)
Figure 304

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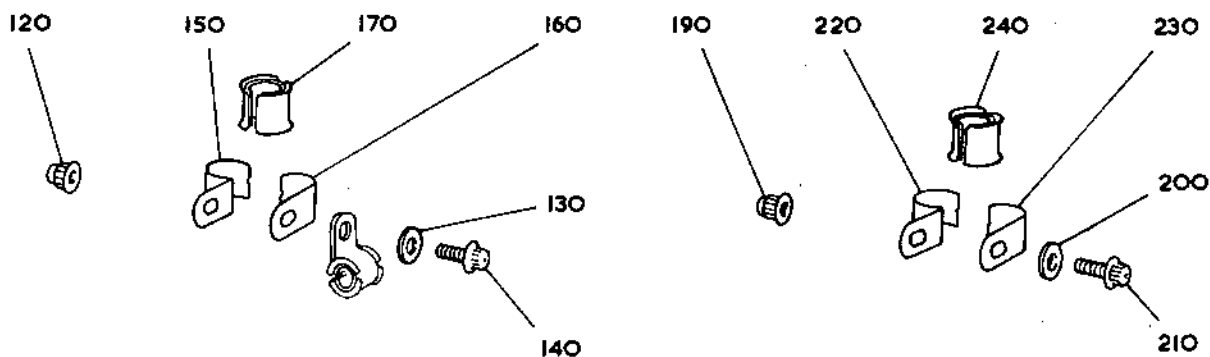
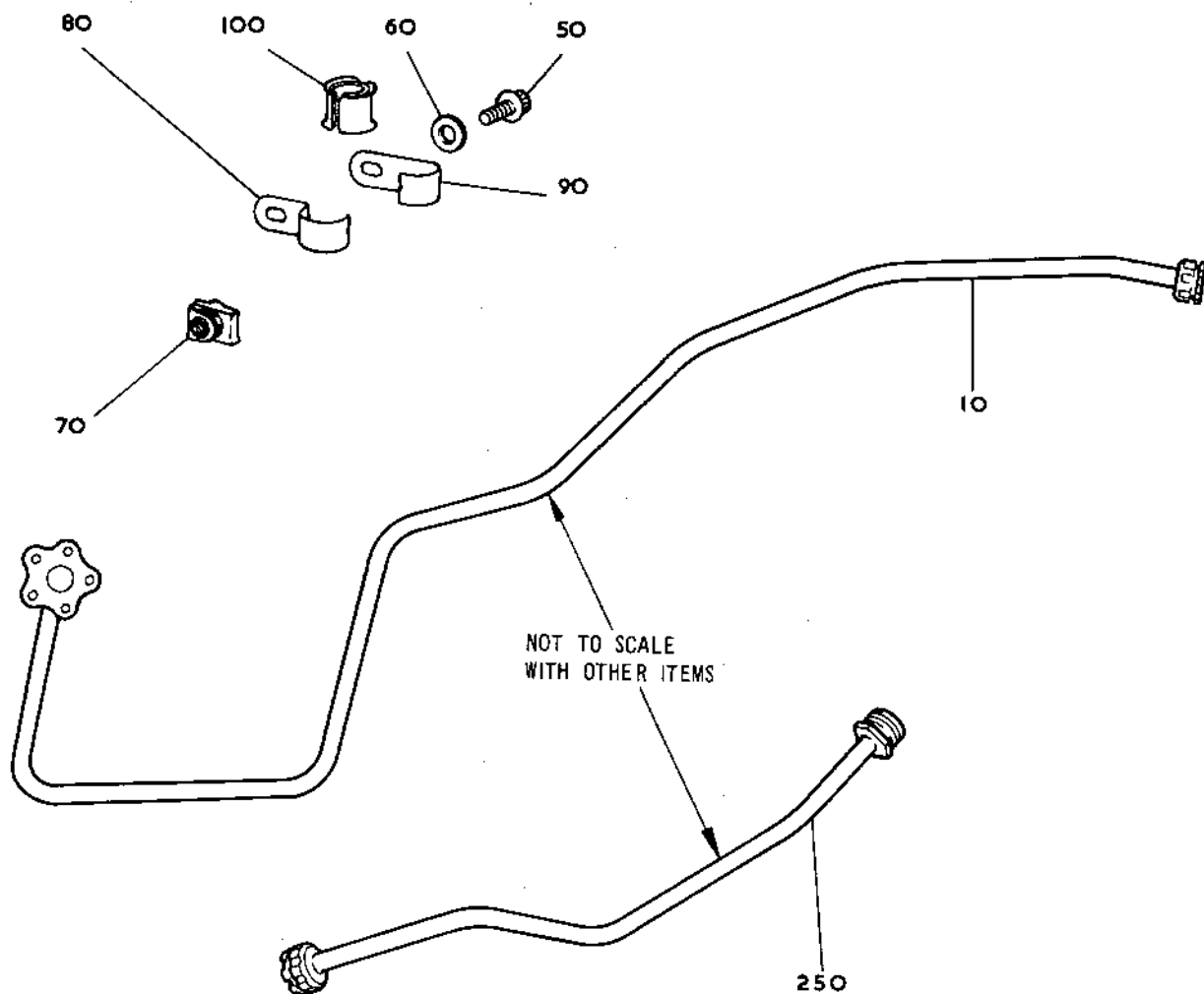
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Oil Return Tubes, Pump and RH Gearbox to Tank (Part 2 of 4)
Figure 305

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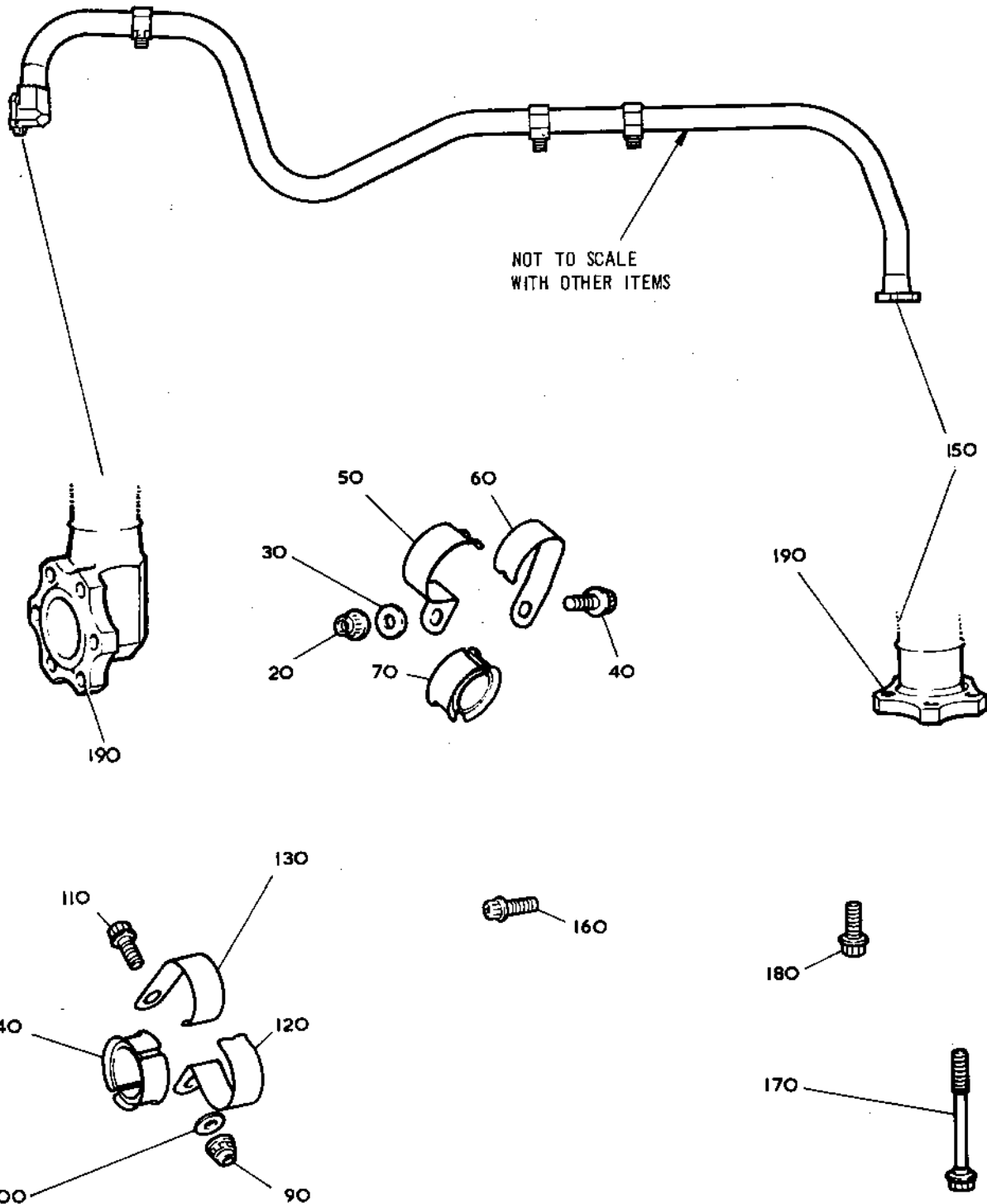


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Oil Return Tubes, Pump and RH Gearbox to Tank (Part 3 of 4)
Figure 306

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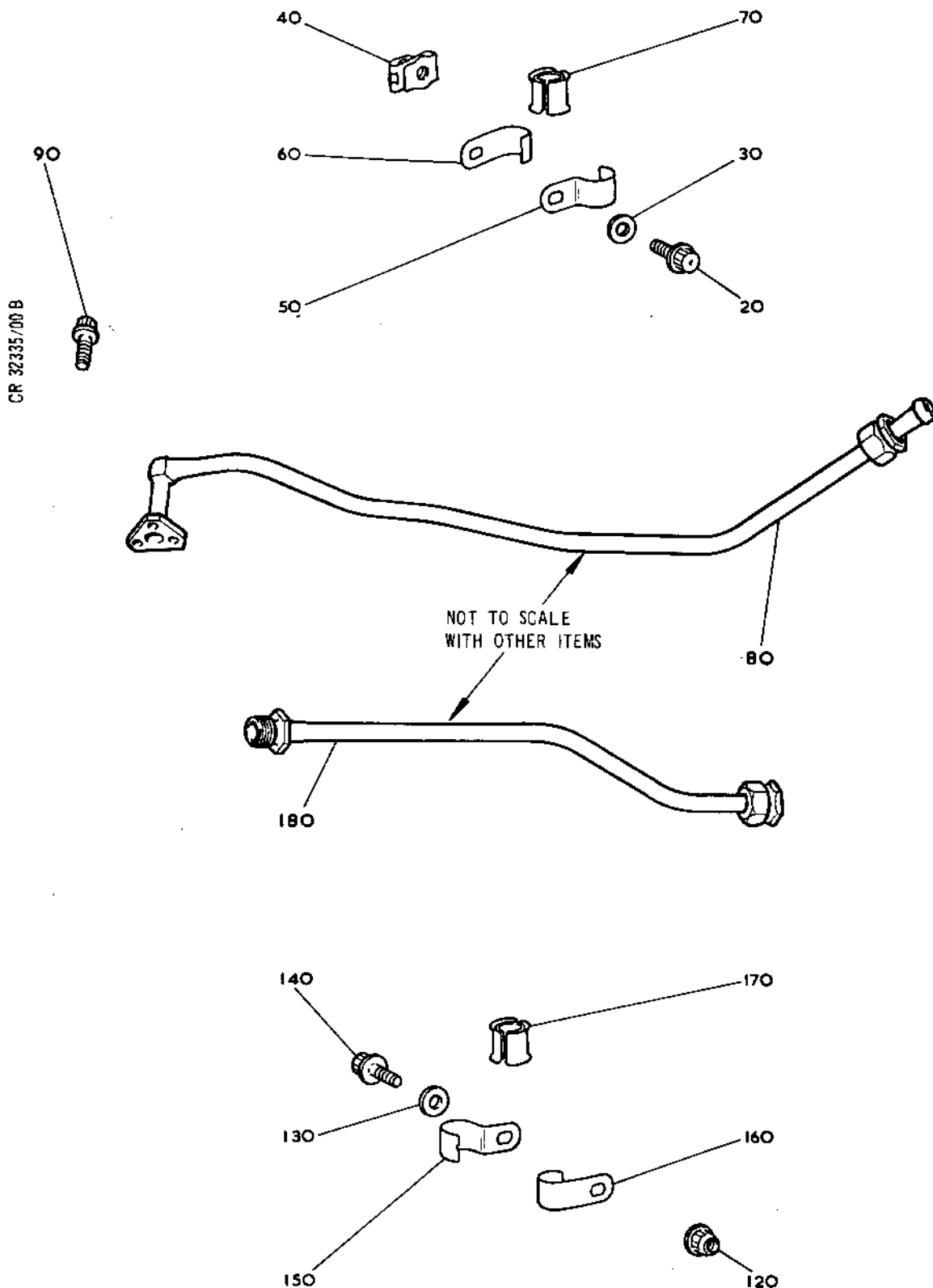
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Oil Return Tubes, Pump and RH Gearbox to Tank (Part 4 of 4)
Figure 307

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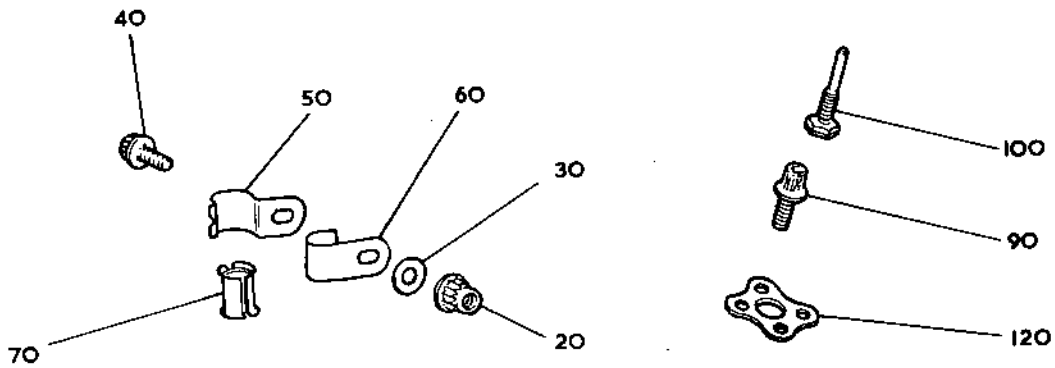
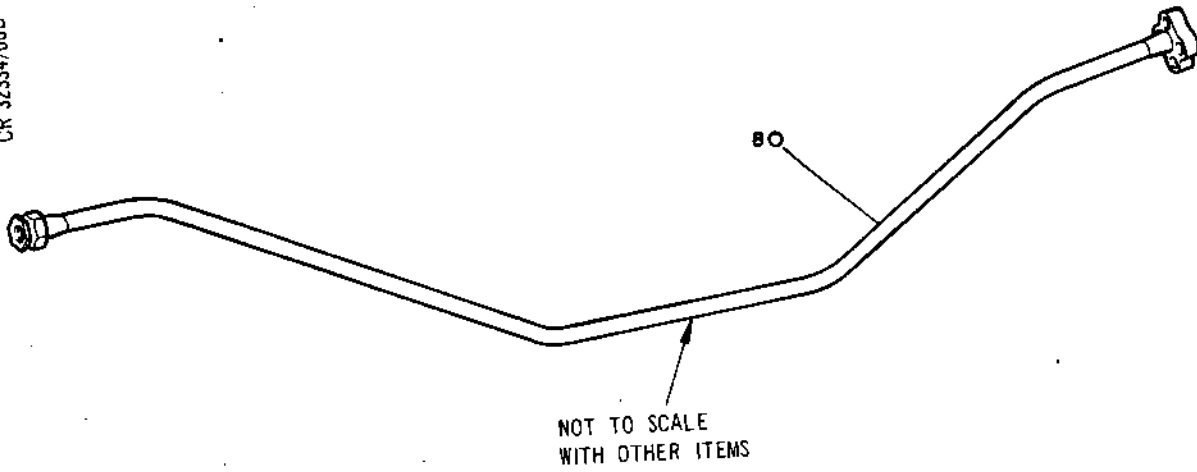


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Oil Tubes, Anti-drain Connection, Cooler to Tank
Figure 308

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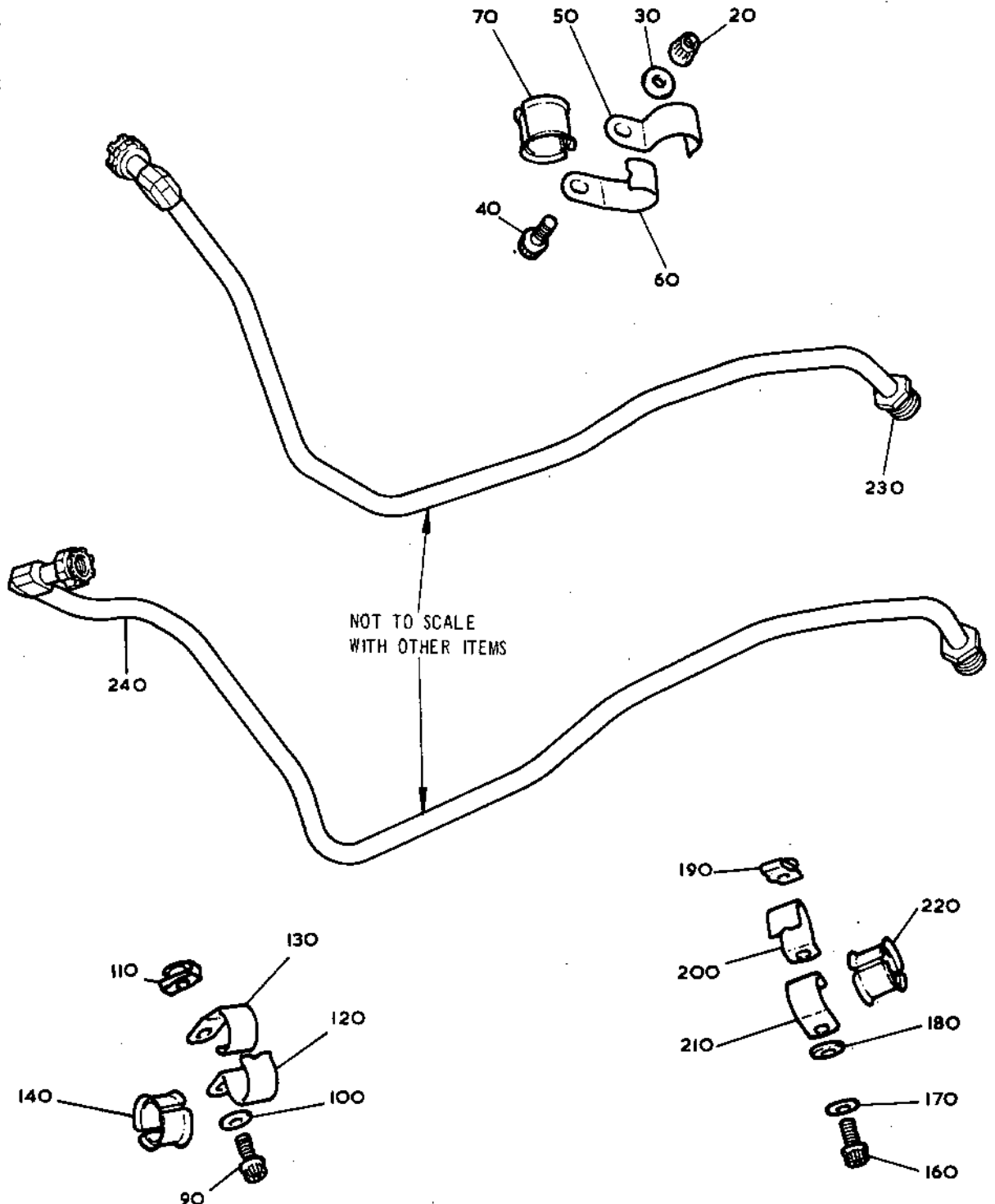
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Oil Tubes, IDG Supply and Return to
Oil Cooler (Part 1 of 2)
Figure 309

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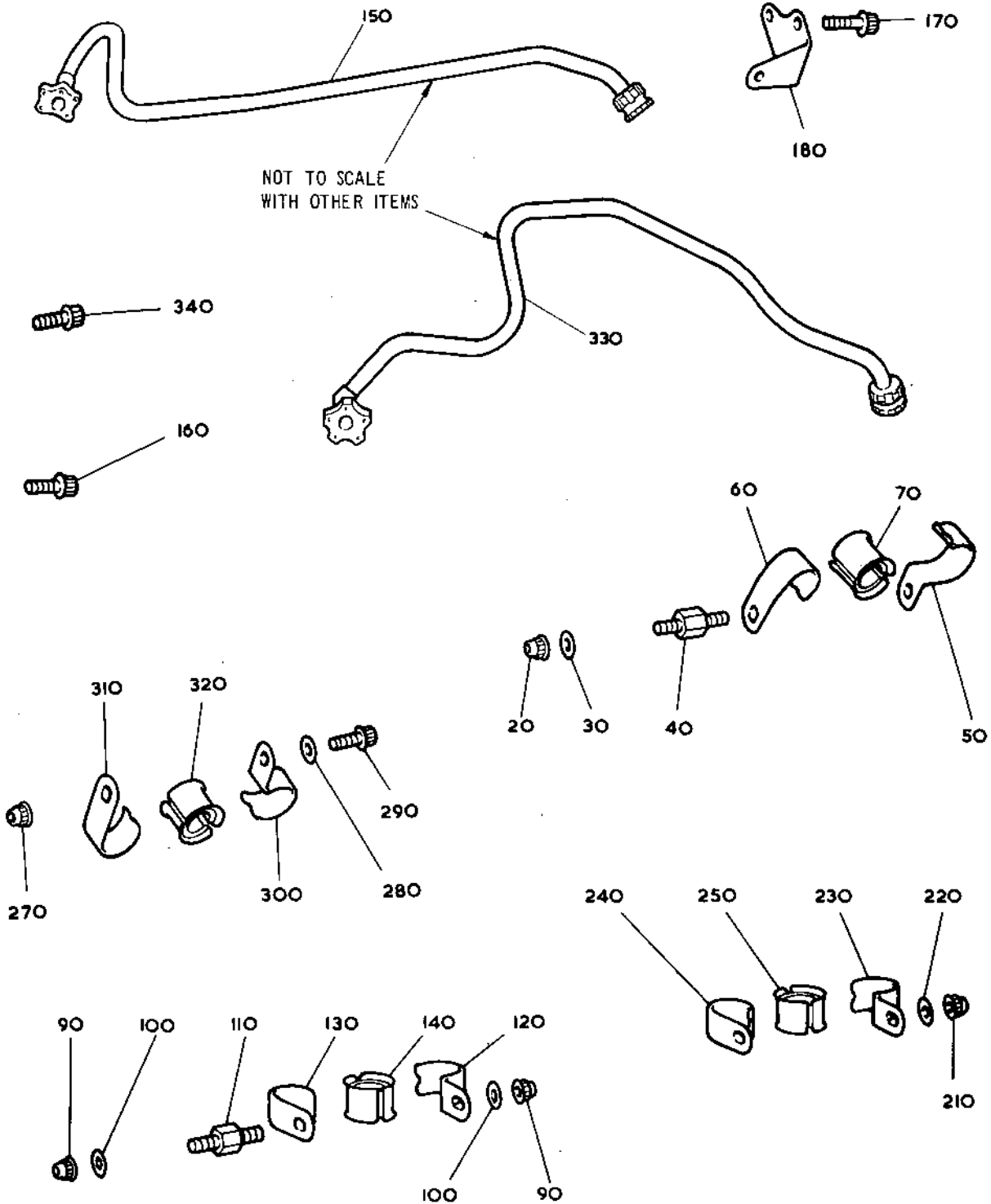
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Oil Tubes, IDG Supply and Return to
Oil Cooler (Part 2 of 2)
Figure 310

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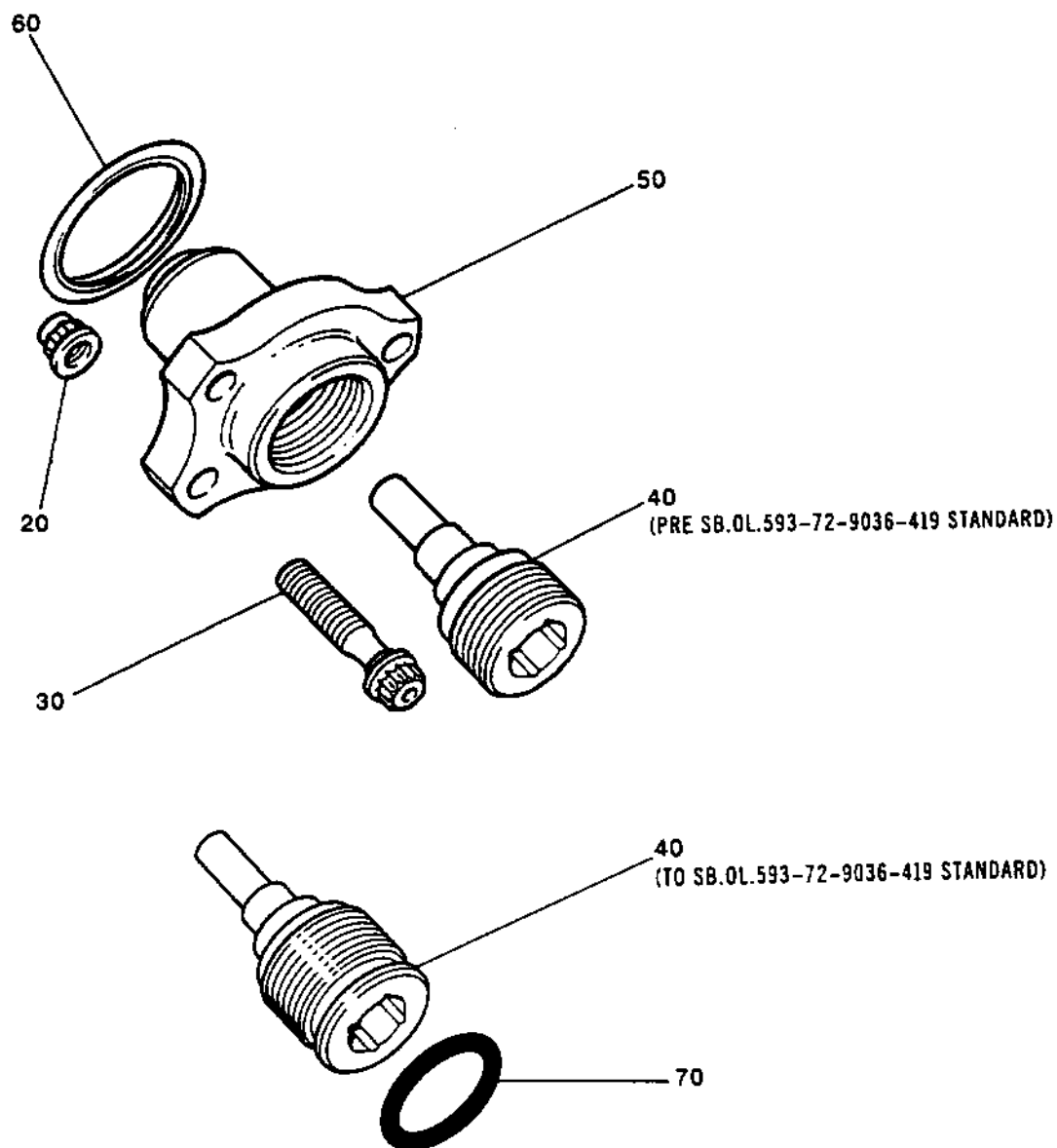
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sneema



Drain Valve and Master Magnetic Plug
Figure 311

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OIL COOLER - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

CLEANING

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	-	-
	except				
	10	Oil cooler	B	-	For cleaning details refer to vendors overhaul manual.

Cleaning Processes
Table 201

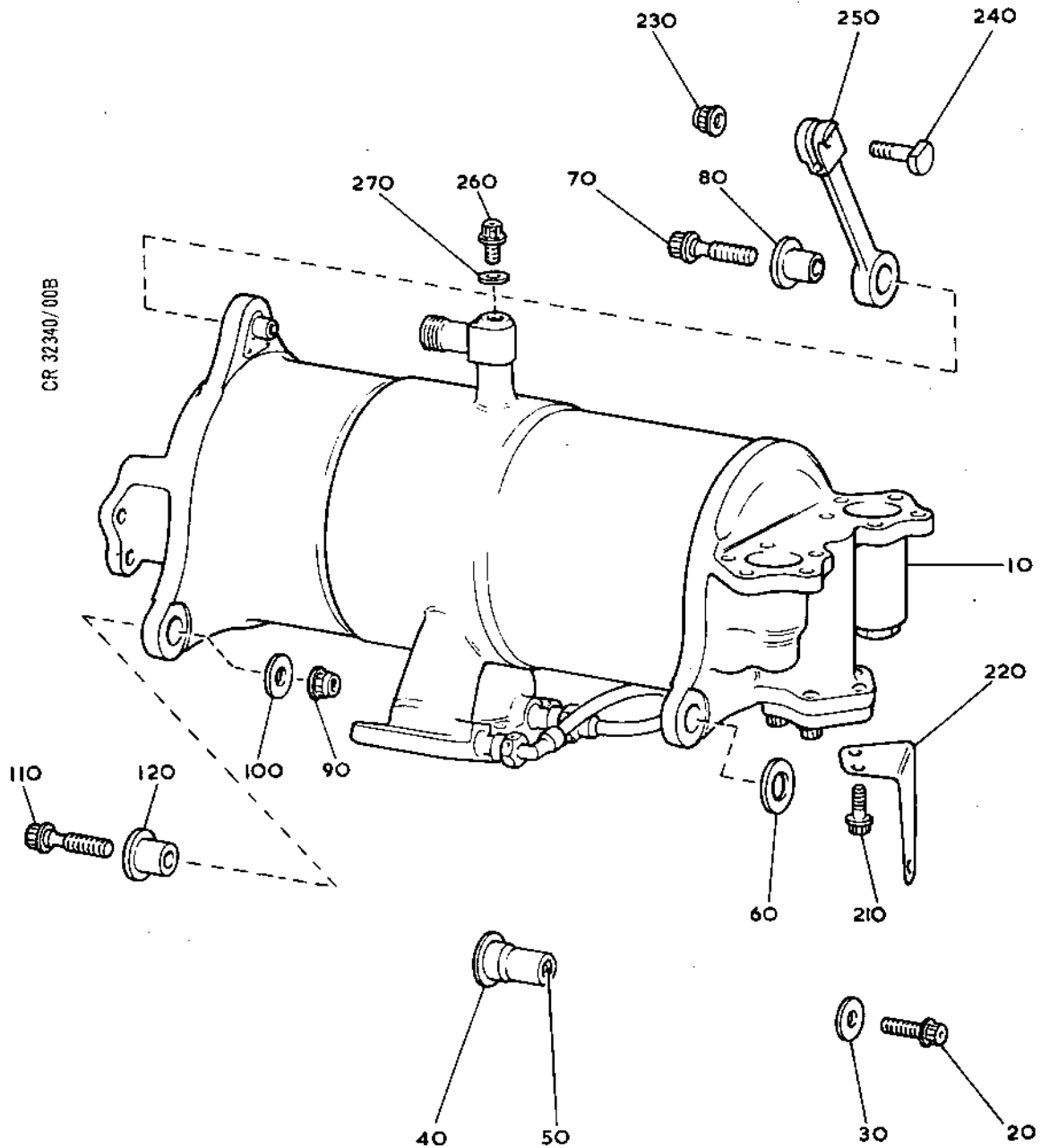
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TN44892

Oil Cooler
Figure 201

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TUBES - OIL SUPPLY, TANK TO PUMP AND
ANTI-DRAIN CONNECTION - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	-	-

Cleaning Processes
Table 201

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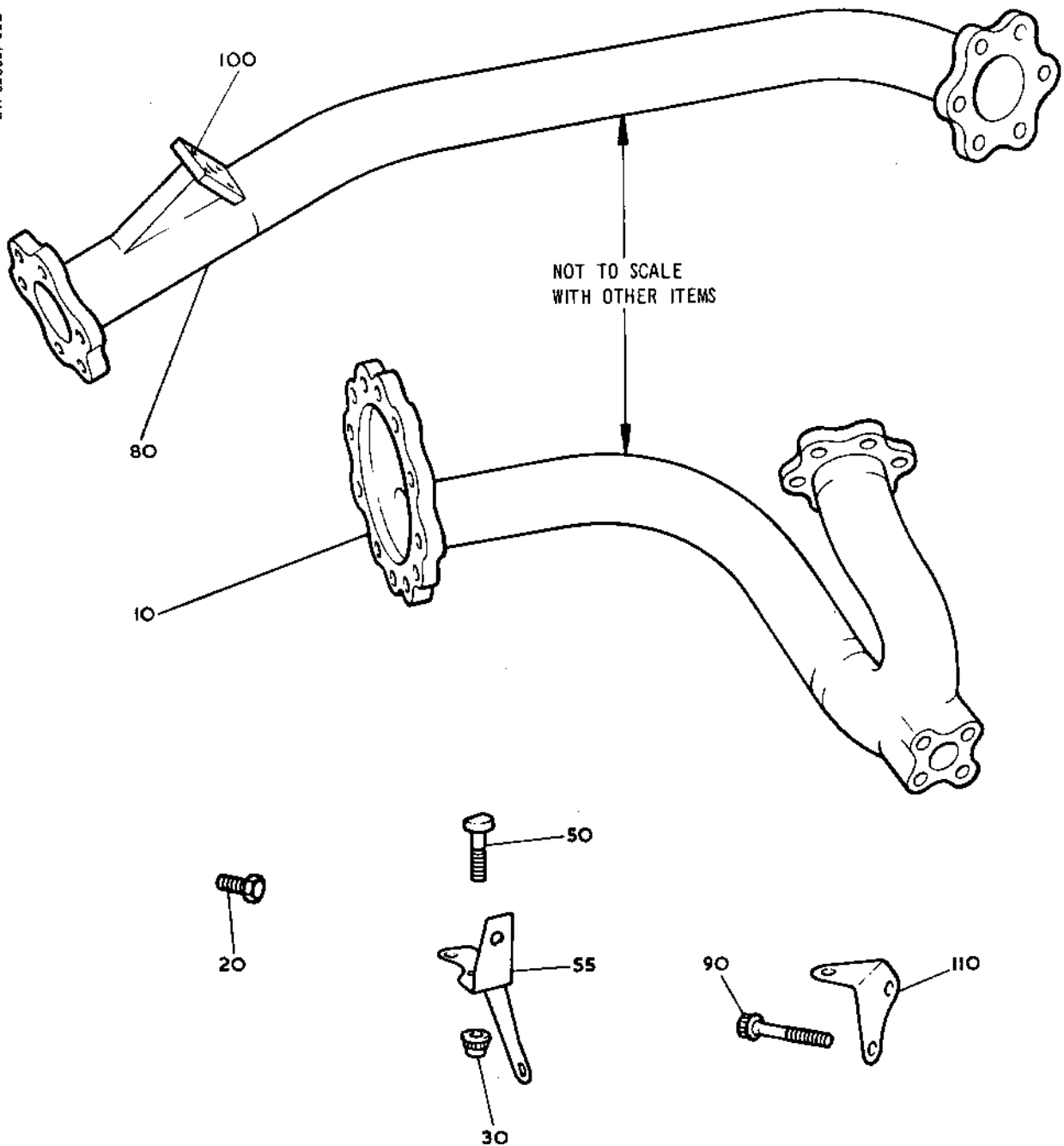
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CR 32339/00B



Tubes, Oil Supply, Oil Tank to Oil Pump
and Anti-Drain Connection
Figure 201

CLEANING
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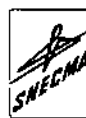
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TUBES - OIL RETURN, OIL PUMP AND RH GEARBOX
TO OIL TANK - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

CLEANING

79-22-02

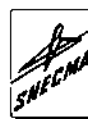
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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	10	Container assembly	A or B	J	-
202	ALL		A or B	-	-
203	ALL		A or B	-	-
204	ALL		A or B	-	-

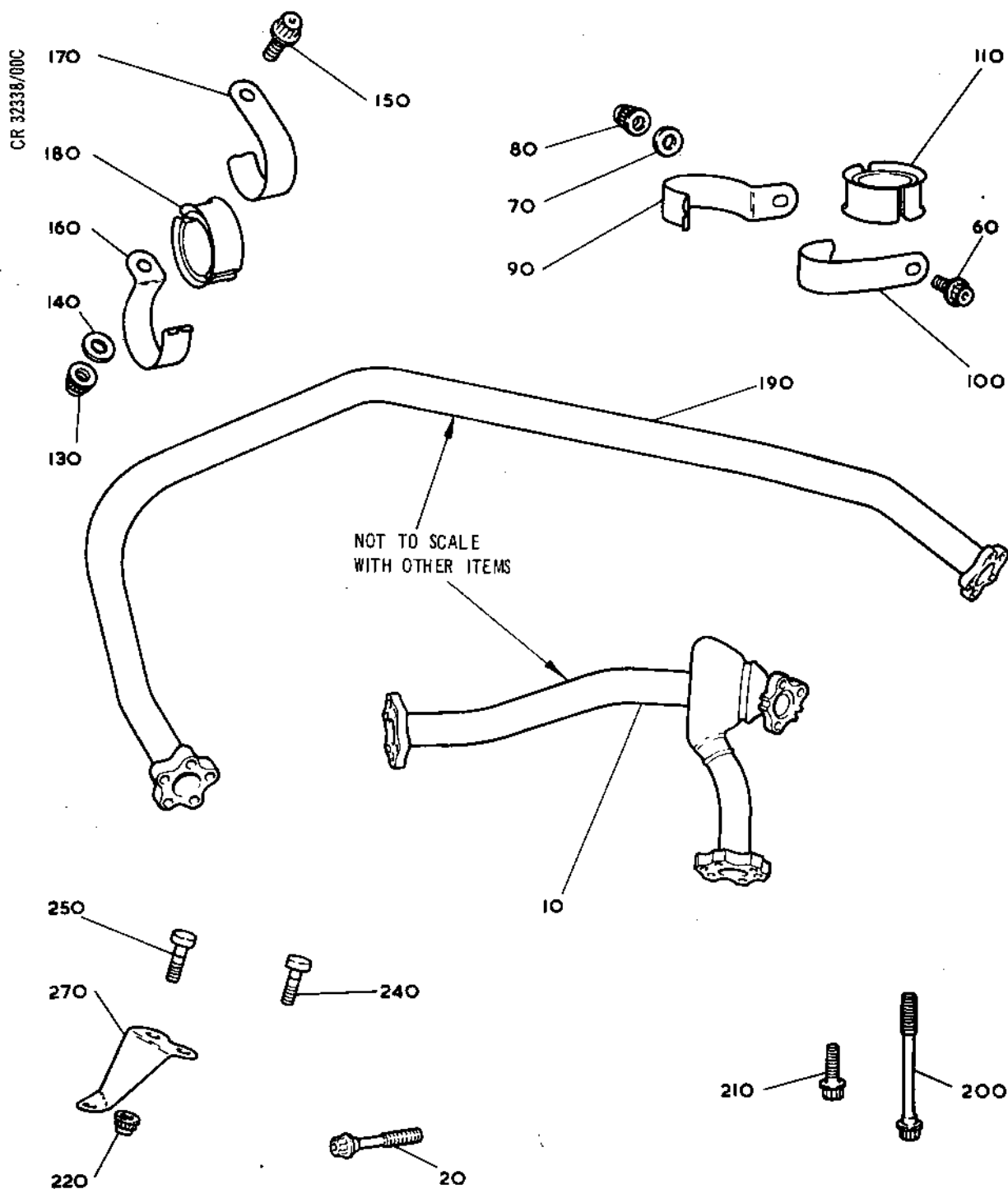
Cleaning Processes
Table 201



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MK. 610-14-28
OVERHAUL



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Tubes, Oil Return, Oil Pump and RH
Gearbox to Oil Tank
Figure 201

TN19787



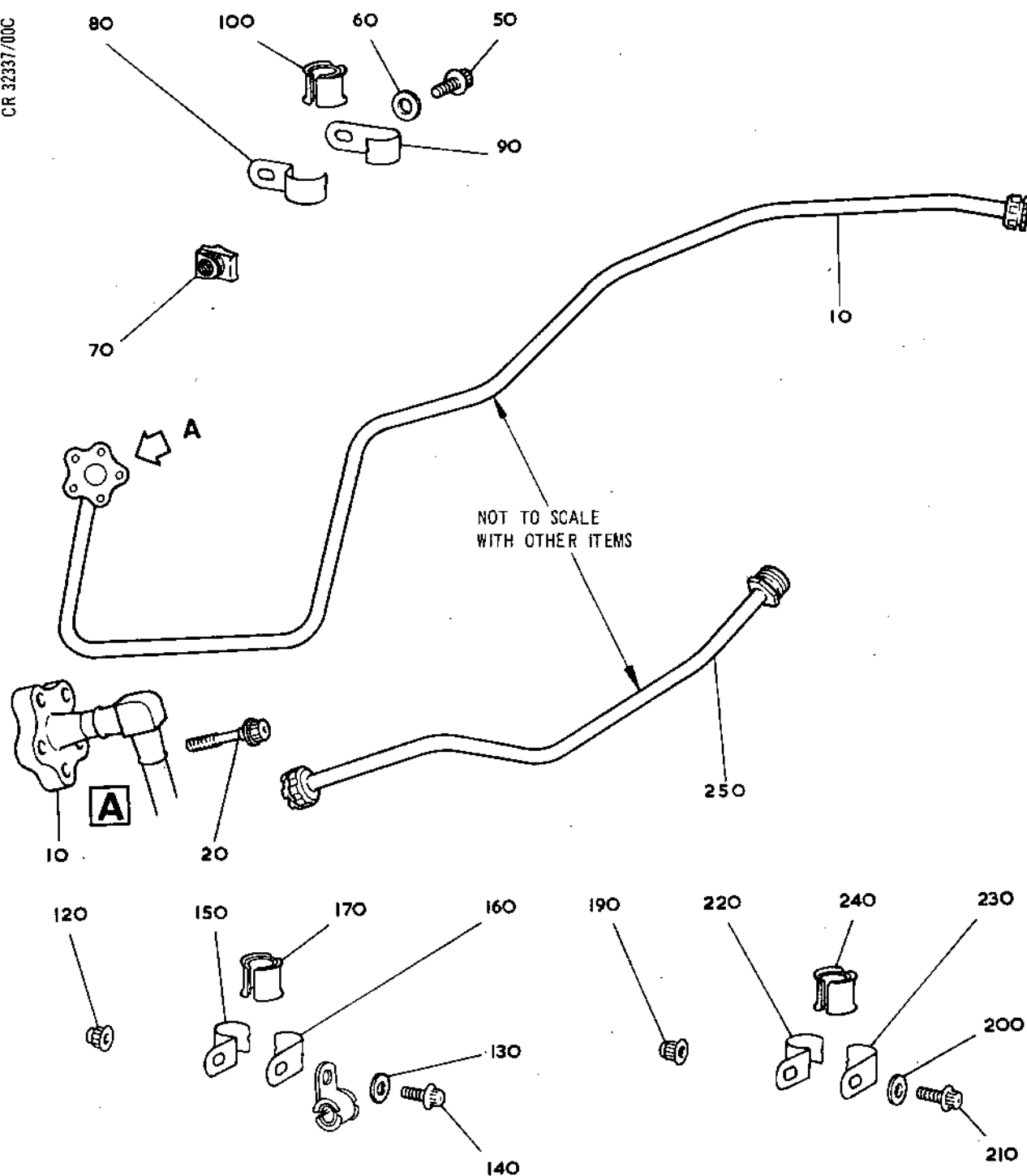
OLYMPUS 593

MK.610-14-28

OVERHAUL



CR 32337/00C



Tubes, Oil Return, Oil Pump and RH
Gearbox to Oil Tank
Figure 202

TN19788

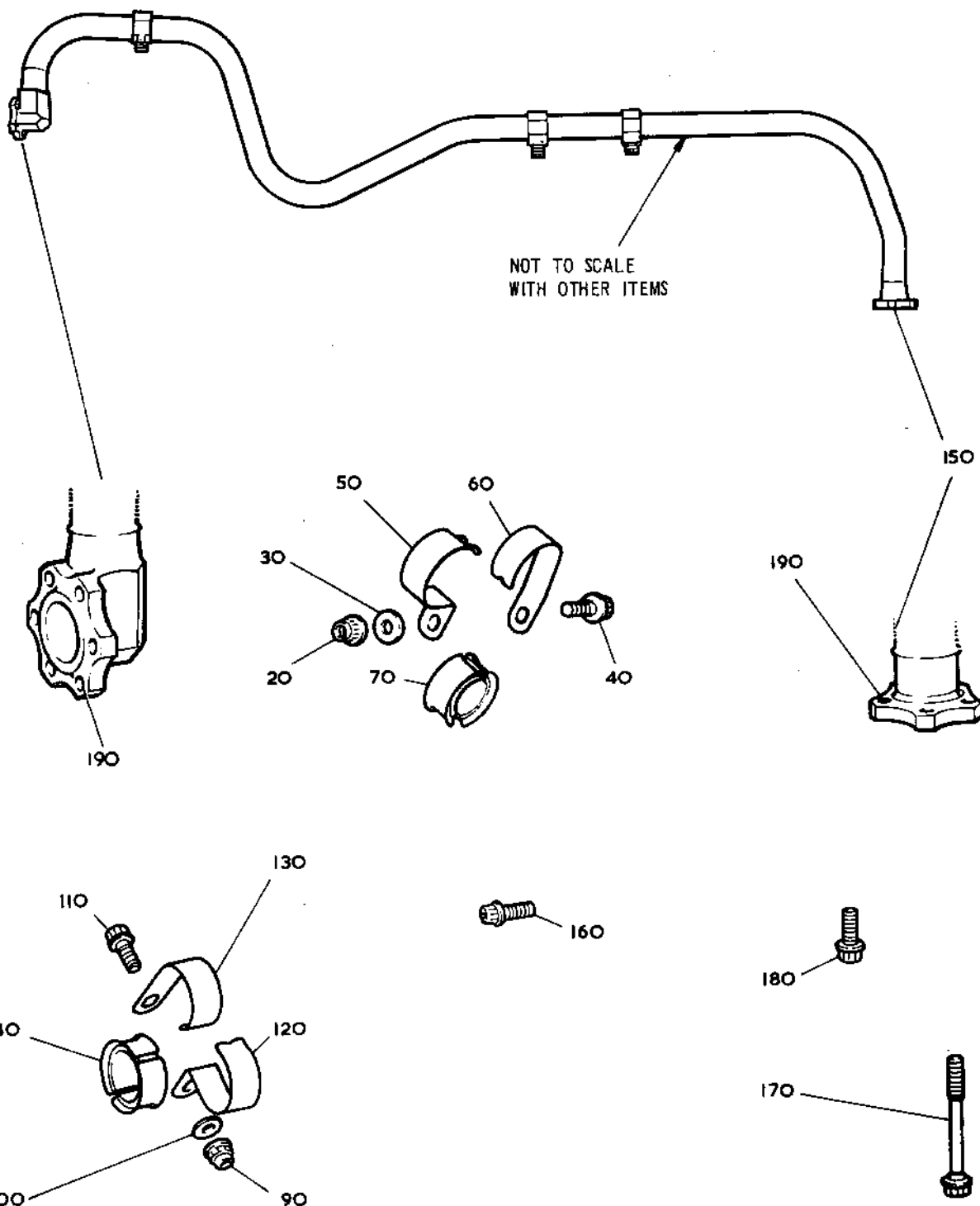
CLEANING
79-22-02
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MK. 610-14-28
OVERHAUL



CR 32336/00B



Tubes, Oil Return, Oil Pump and RH
Gearbox to Oil Tank
Figure 203

TN19789



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MK. 610-14-28
OVERHAUL



CR 32335/00 B

90



40



70



60



30



50

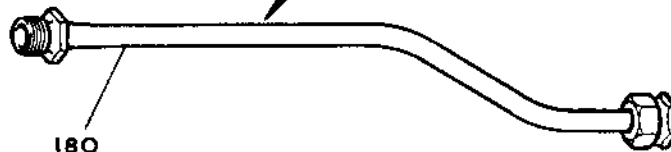


20



NOT TO SCALE
WITH OTHER ITEMS

80



180

140



170



130



160



150



120



Tubes, Oil Return, Oil Pump and RH
Gearbox to Oil Tank
Figure 204

TN19790



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TUBES - OIL RETURN, OIL PUMP AND RH GEARBOX
TO OIL TANK - REPAIR

TABLE OF CONTENTS

Repair No.

Title

Scheme No.

1

Repair of fretting/damage by
inert gas arc welding.

B.514566

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REPAIR

79-22-02

Contents 1

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TUBE A/O, OIL
REPAIR OF FRETTING/DAMAGE BY INERT GAS ARC WELDING

REPAIR B.514566

1. EFFECTIVITY

IPC	Fig./Item	Part No.
79-22-02	02/010A	B.480820

2. REPAIR LIMITATIONS

Refer to Overhaul Manual 72-09-29 Repair.

3. GENERAL

Refer to Overhaul Manual 72-09-29 Repair.

4. REPAIR PROCEDURE

REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

(1) Weld repair

Refer to Overhaul Manual
72-09-29 Repair.

(2) Mark SAL B.514566
or R1 adjacent
normal assy. of
number using the
electro-chemical
marking or vibro-
percussion engraving
techniques.

Refer to Overhaul Manual
72-09-00 Repair.

5. MATERIAL

COMPONENT

MATERIAL

RR CODE

B.480820

MSRR 6524

EBS

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OVERHAUL



6. DATA

PRESSURE TEST REQUIREMENTS:

<u>PART NO.</u>	<u>PRESSURE TEST</u>	<u>MIN. GAUGE</u>
B.480820	NOT REQUIRED	0.027 (0,69)

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE.		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			

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TUBE - ANTI-DRAIN CONNECTION TO CONNECTION ON
TUBE, OIL COOLER TO OIL TANK - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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OVERHAUL



- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	-	-

Cleaning Processes
Table 201

TN19778



OLYMPUS 593

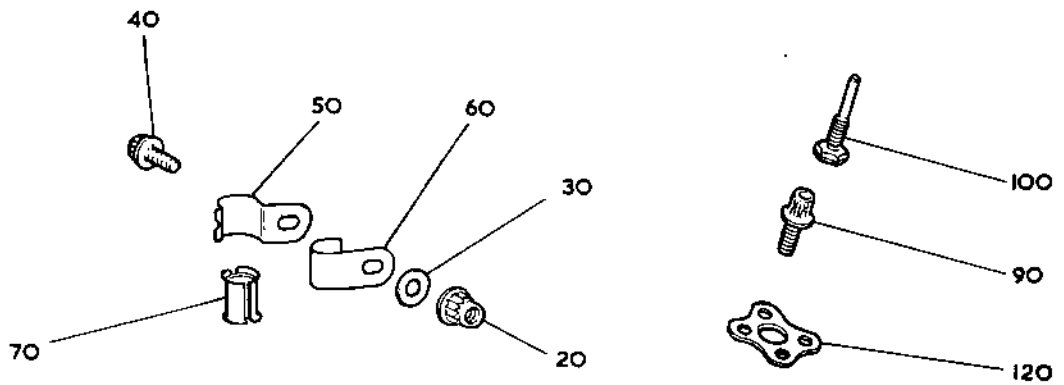
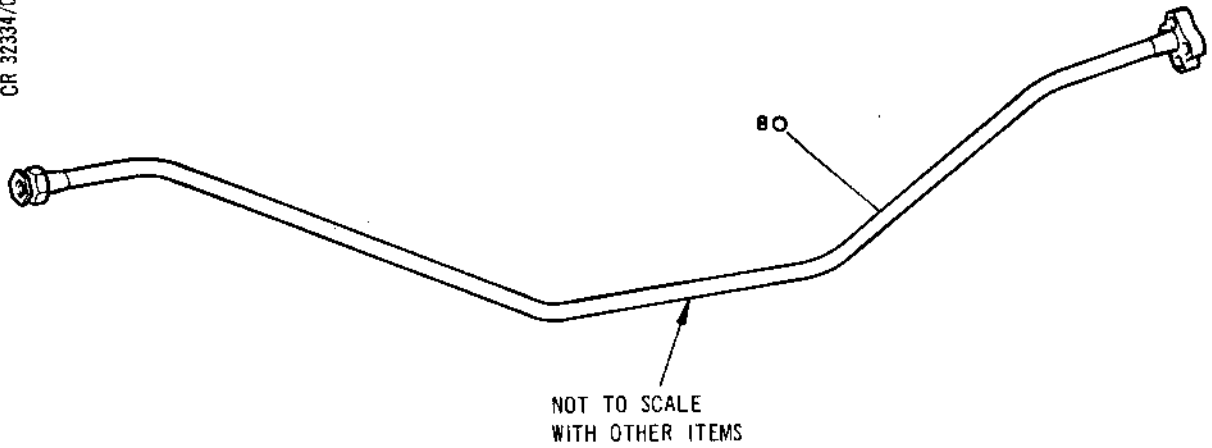
MK:610-14-28

OVERHAUL



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CR 32334/00B



Tubes, Oil, Anti-Drain Connection on Tube,
Oil Cooler to Oil Tank
Figure 201

TN19780



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MK.610-14-28
OVERHAUL



TUBES - IDG SUPPLY AND RETURN TO
OIL COOLER - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

CLEANING

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	-	-
202	ALL		A or B	-	-

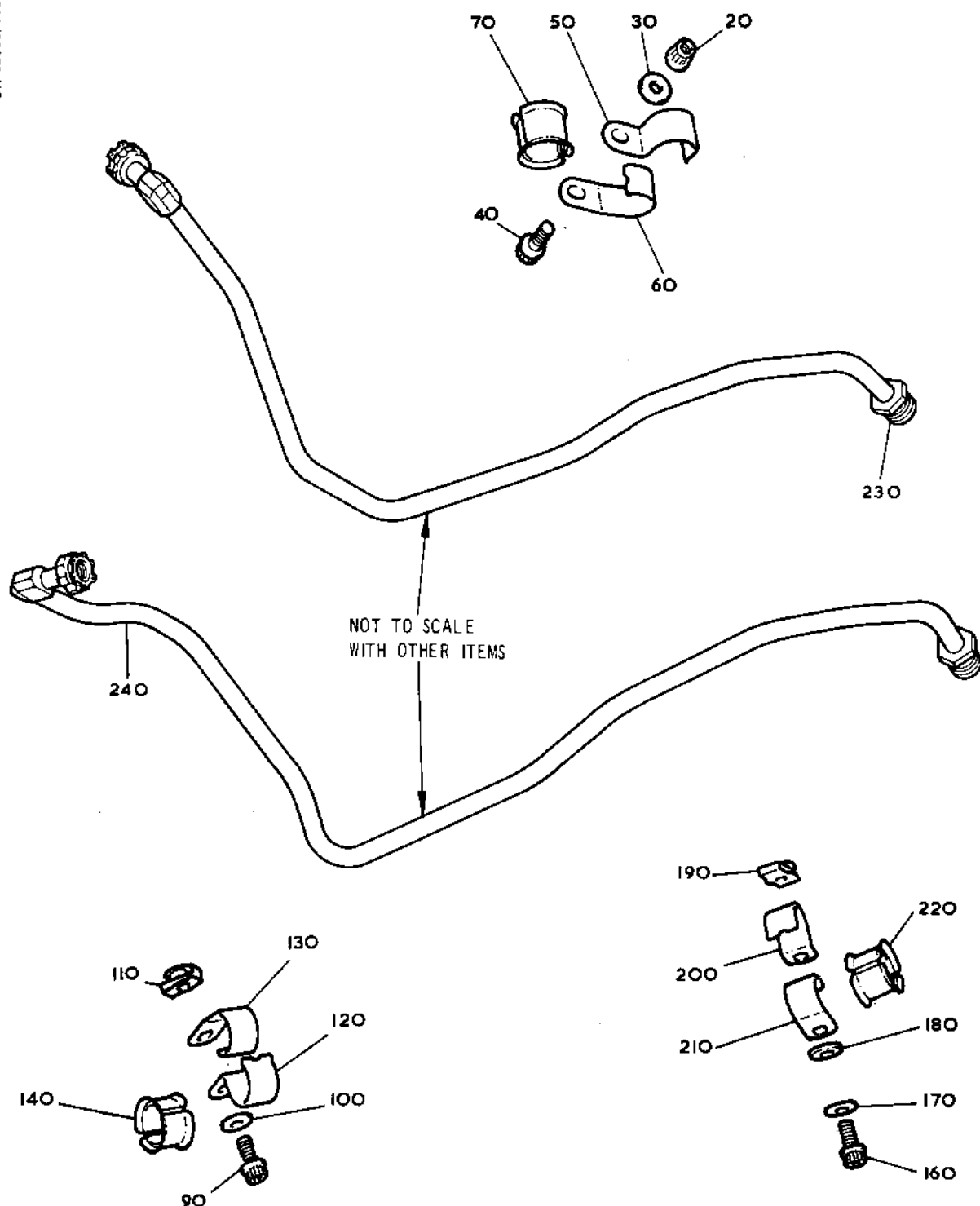
Cleaning Processes
Table 201

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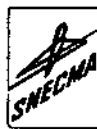


Tubes, Oil, CSD Supply and
Return to Oil Cooler
Figure 201

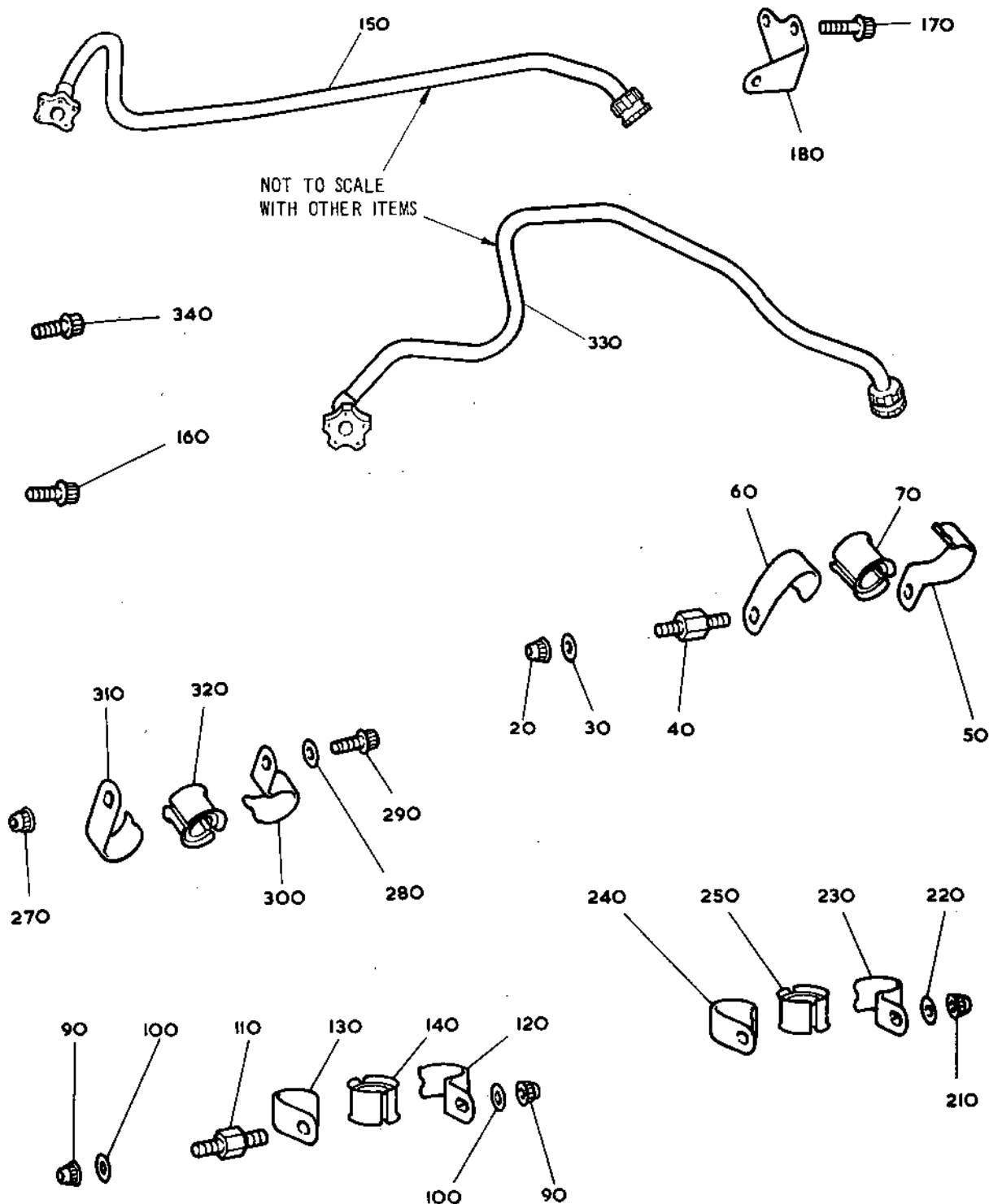
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79-22-04



OLYMPUS 593
MK. 610-14-28
OVERHAUL



CR 32332/008



TN20867

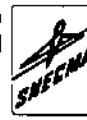
Tubes, Oil, IDG Supply and
Return to Oil Cooler
Figure 202

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TUBES - IDG SUPPLY AND RETURN TO OIL COOLER
- REPAIR

TABLE OF CONTENTS

Repair No.

Title

Scheme No.

1

Repair of fretting/damage by
inert gas arc welding.

B.514566

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REPAIR

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TUBE A/O, OIL
REPAIR OF FRETTING/DAMAGE BY INERT GAS ARC WELDING

REPAIR B.514566

1. EFFECTIVITY

IPC	Fig./Item	Part No.
79-22-04	01/230A	B.476776
	01/240A	B.476781

2. REPAIR LIMITATIONS

Refer to Overhaul Manual 72-09-29 Repair.

3. GENERAL

Refer to Overhaul Manual 72-09-29 Repair.

4. REPAIR PROCEDURE

REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

(1) Weld repair

Refer to Overhaul Manual
72-09-29 Repair.

(2) Mark SAL B.514566
or R1 adjacent
normal assy. of
number using the
electro-chemical
marking or vibro-
percussion engraving
techniques.

Refer to Overhaul Manual
72-09-00 Repair.

5. MATERIAL

COMPONENT

MATERIAL

RR CODE

B.476776

MSRR 6524

EBS

B.476781

MSRR 6524

EBS

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**6. DATA****PRESSURE TEST REQUIREMENTS:****TEST MEDIUM TO BE WATER**

<u>PART NO.</u>	<u>PRESSURE TEST</u>	<u>MIN. GAUGE</u>
B.476776	600 lbf/sq.in. (4,14 MPa) for 2 mins.	0.027 (0,69)
B.476781	600 lbf/sq.in. (4,14 MPa) for 2 mins.	0.027 (0,69)

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE.		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			

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Repair No.1

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DRAIN VALVE AND MASTER MAGNETIC PLUG - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	-	-

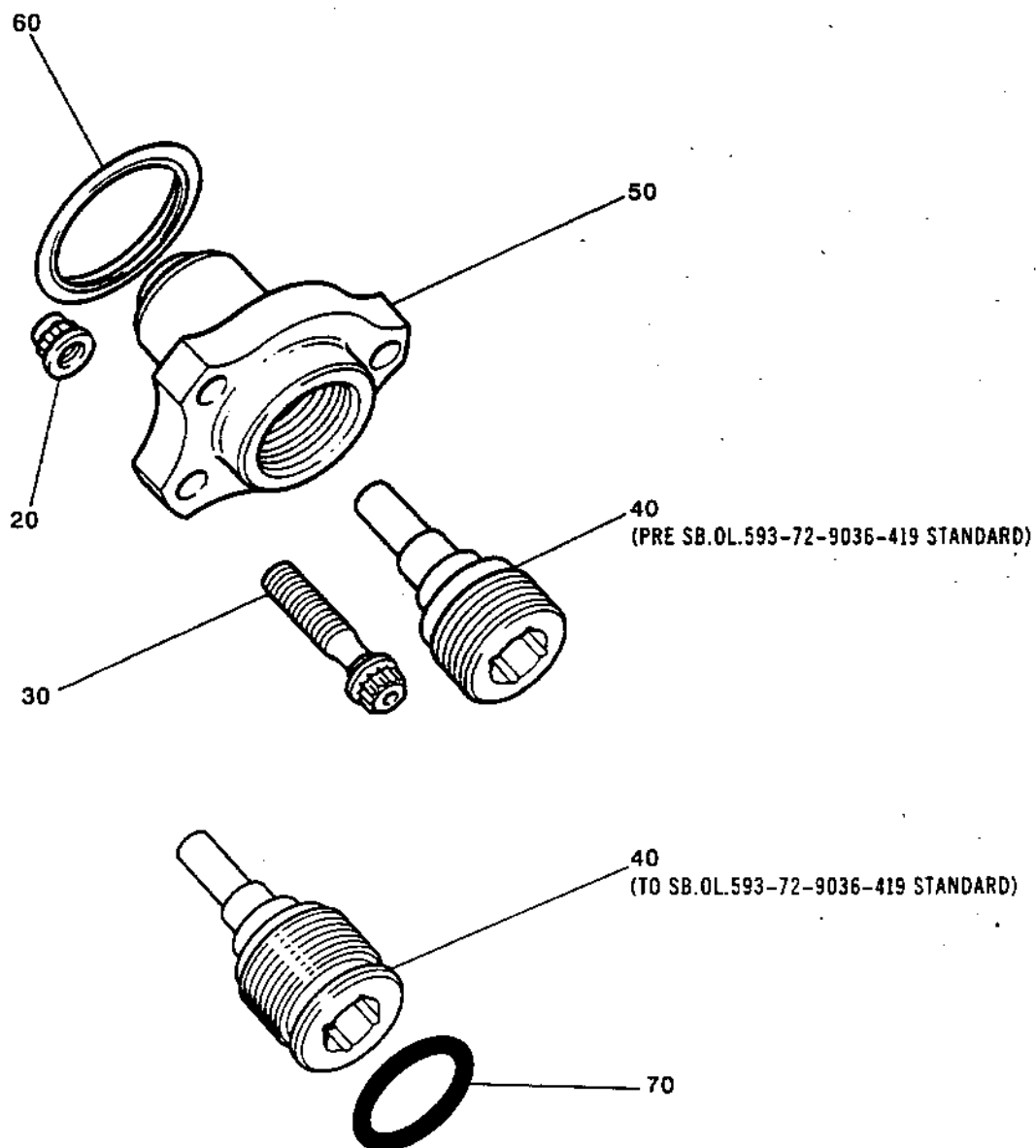
Cleaning Processes
Table 201

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Master Magnetic Plug
Figure 201

**OLYMPUS 593**

MK.610-14-28

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OIL SYSTEM INDICATION - INSPECTION/CHECKTABLE OF CONTENTS

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2. General Inspection... ..	301
3. Crack Detection	301
A. Magnetic Particle Crack Detection	301
B. Fluorescent Dye Crack Detection	302
4. Contents Transmitter and Overfill Switch	304
5. Thermometer	304
6. Pressure Differential Transmitter	304
7. Pressure Switch	304
8. Pressure Differential Transmitter	304
9. Pressure Switch	305
10. Blank Covers	305
A. Inspect Abutment Faces	305
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A. Inspect Brackets	305

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INSPECTION/CHECK

79-30-00

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OIL SYSTEM INDICATION - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

		No current requirement	
--	--	------------------------	--

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection - Deleted.

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No current requirement

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Crack Detection Test Diagram
Figure 301

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	79-31-01	Fig.1
303	79-32-01	Fig.1
304	79-33-01	Fig.1
305	79-33-02	Fig.1
306	79-34-01	Fig.1
307	79-34-02	Fig.1

Cross References to Illustrated Parts Catalogue
Table 303

4. Contents Transmitter and Overfill Switch (302-10)

- A. Inspect in accordance with the vendor's Overhaul Manual
(Ref.OH79-31-02).

5. Thermometer (303-10)

- A. Inspect in accordance with the vendor's Overhaul Manual
(Ref.OH31-09-41/98).

6. Pressure Differential Transmitter (304-10)

- A. Inspect in accordance with the vendor's Overhaul Manual
(Ref.OH79-30-07).

7. Pressure Switch (305-10)

- A. Inspect in accordance with the vendor's Overhaul Manual
(Ref.OH79-30-06).

8. Pressure Differential Transmitter (306-10)

NOTE: This item is deleted by Modification MPN OL.7854. For
engines which embody this modification, refer to para.10.

- A. Inspect in accordance with the vendor's Overhaul Manual
(Ref.OH79-30-07).

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79-30-00

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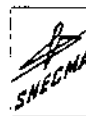
Aug 14/75



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9. Pressure Switch (307-10)

NOTE: This item is deleted by Modification MPN OL.7854. For engines which embody this modification, refer to para.10.

A. Inspect in accordance with the vendor's Overhaul Manual (Ref.OH79-30-06).

10. Blank Covers (72-63-00) (305-460)

NOTE: These items are introduced by Modification MPN OL.7854 and are now covered in Chapter 72-63-00, page block 301. For engines that do not have this modification embodied, refer to paras.8 and 9.

11. Brackets (302-100 and 303-40)

A. Inspect Brackets.

(1) Wear and fretting.

(a) Attachment face thickness not reduced by more than 10 per cent. Accept.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm) Accept after repair.

(2) Scoring.

(a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing material thickness is not reduced by more than 10 per cent.

(3) Nicks and burrs. Accept after repair.

(4) Distortion. Accept if compatibility is preserved.

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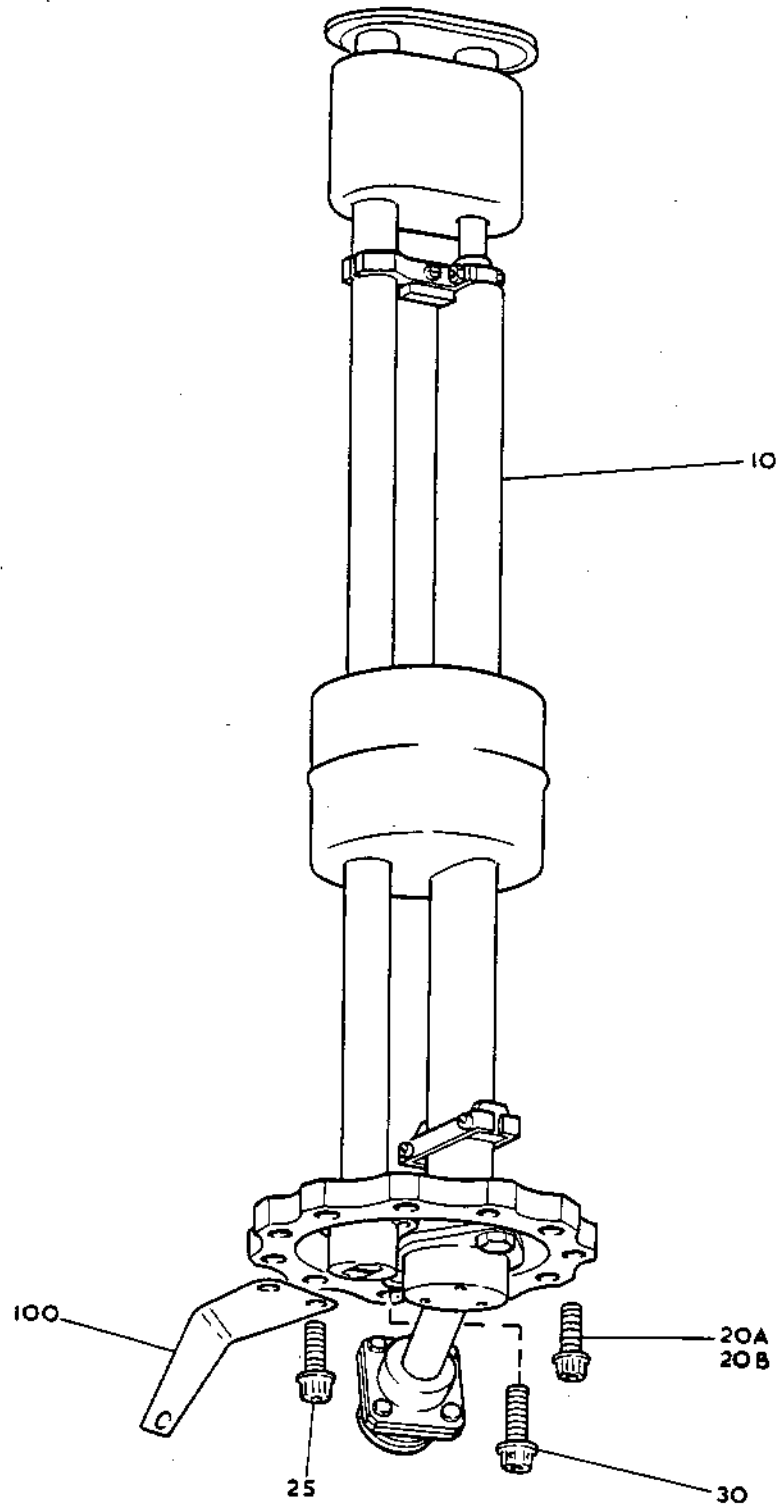


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OVERHAUL



CR 32493/00B



IN 31596

Oil Tank Contents Transmitter and Overfill Switch
Figure 302

INSPECTION/CHECK

79-30-00

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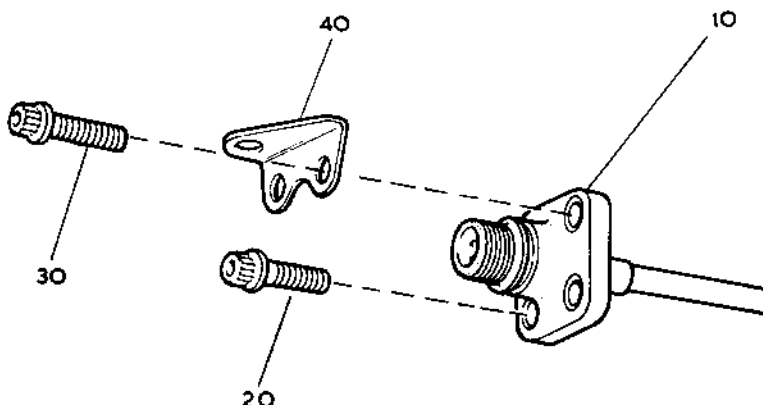
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CR 32331/008



OLYMPUS 593

MK.610-14-28
OVERHAUL



Engine Oil Inlet Thermometer
Figure 303

INSPECTION/CHECK

79-30-00

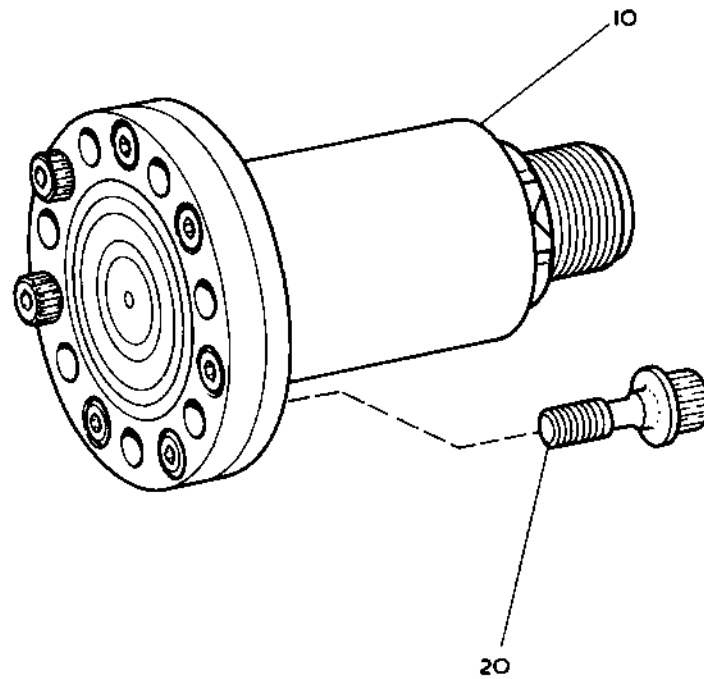
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Engine Oil Pressure Transmitter
Figure 304

INSPECTION/CHECK

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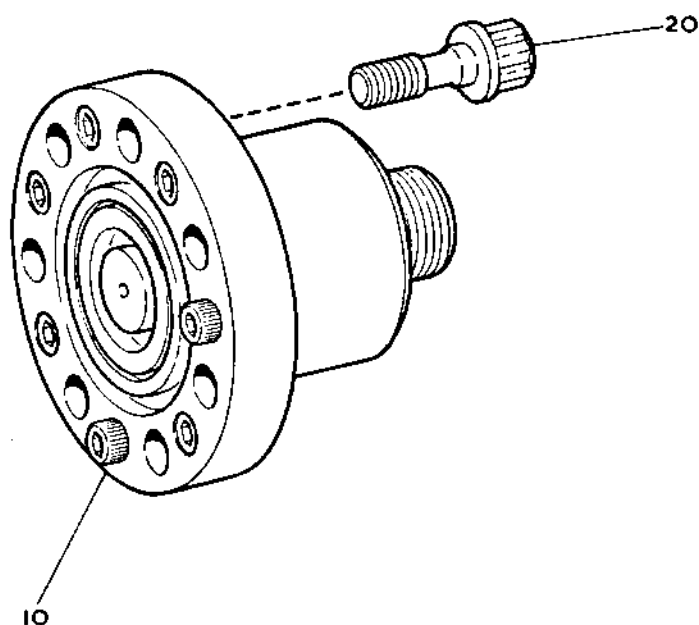
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Engine Oil Pressure Switch
Figure 305

INSPECTION/CHECK

79-30-00

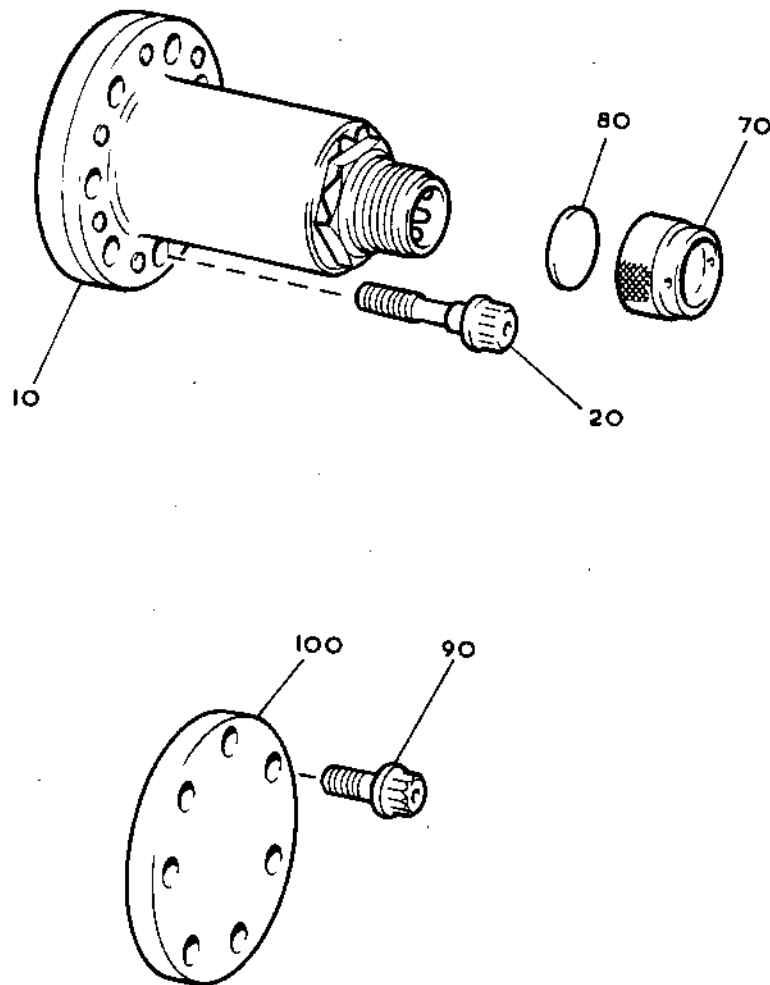
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RH Gearbox Oil Pressure Transmitter
Figure 306

INSPECTION/CHECK

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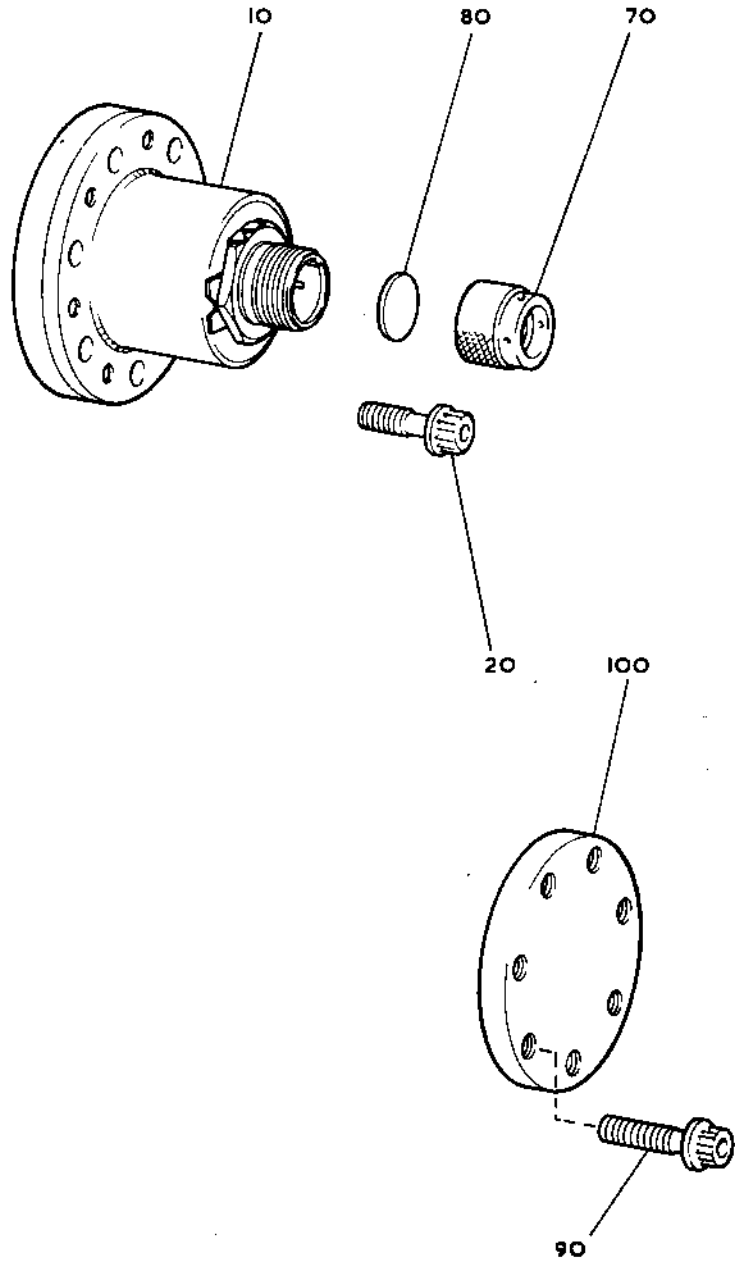
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RH Gearbox Oil Pressure Switch
Figure 307



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OIL TANK CONTENTS TRANSMITTER AND OVERFULL SWITCH - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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TN19795



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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	10	Oil tank contents transmitter and overfill switch	B	-	For cleaning details refer to vendors overhaul manual.

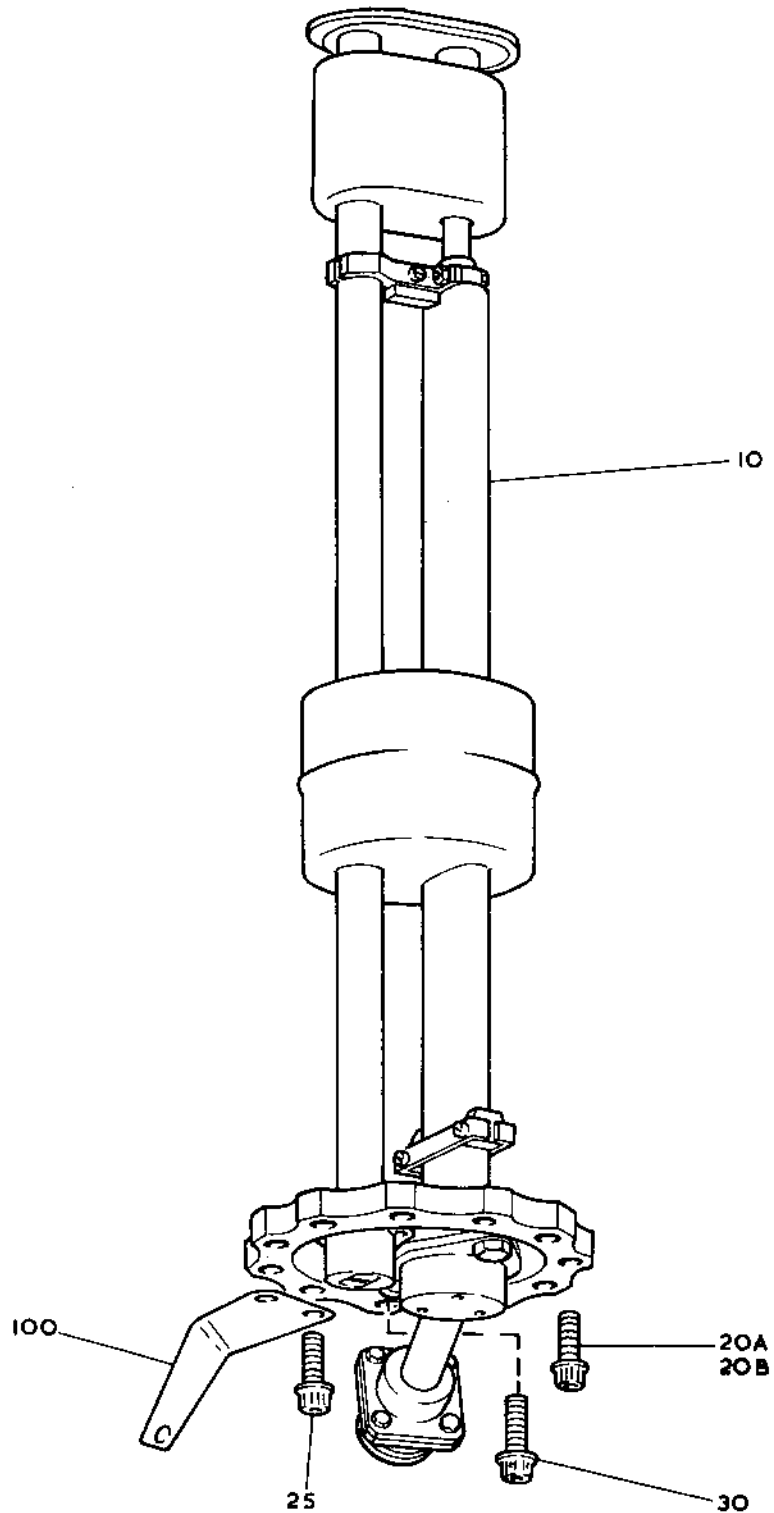
Cleaning Processes
Table 201

TN19798



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Transmitter, Oil Tank Contents
and Overfill Switch
Figure 201



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ENGINE OIL INLET THERMOMETER - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	10	Thermometer	B	-	For cleaning details refer to vendors overhaul manual.

Cleaning Processes
Table 201

TN19802



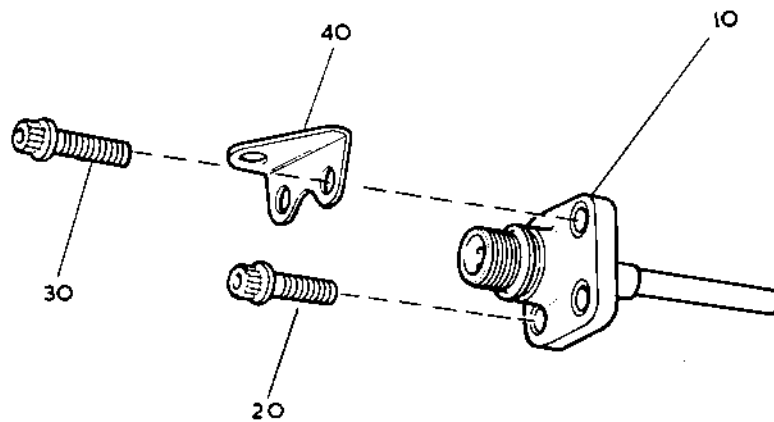
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TN32375

Thermometer, Engine Oil Inlet
Figure 201

CLEANING
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ENGINE OIL PRESSURE TRANSMITTER - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	10	Transmitter, oil pressure differential	B	-	For cleaning details refer to vendors overhaul manual

Cleaning Processes
Table 201

TN32377



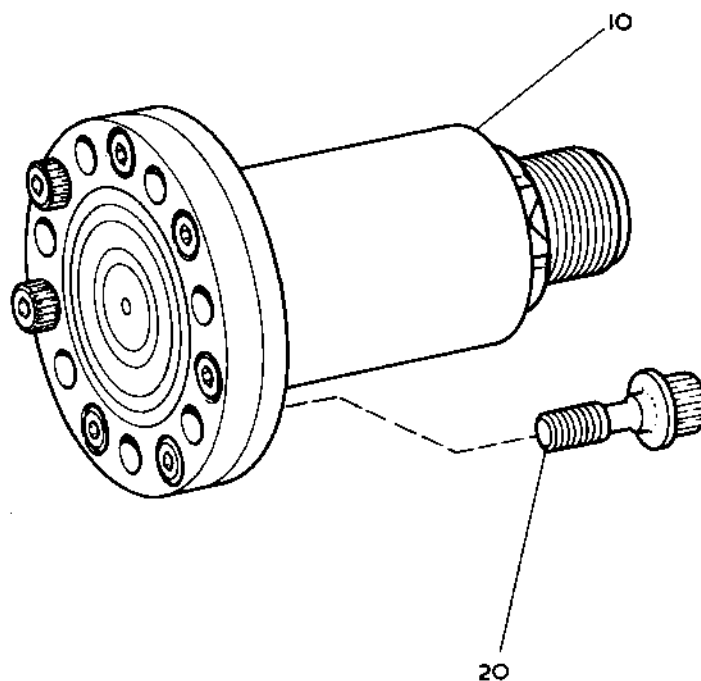
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TN32379

Transmitter, Engine Oil Pressure
Figure 201



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ENGINE OIL PRESSURE SWITCH - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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CLEANING

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	20	Bolt	A or B	-	-
	10	Switch, oil pressure differential	B	-	For cleaning details refer to vendors overhaul manual.

Cleaning Processes
Table 201

TN32381



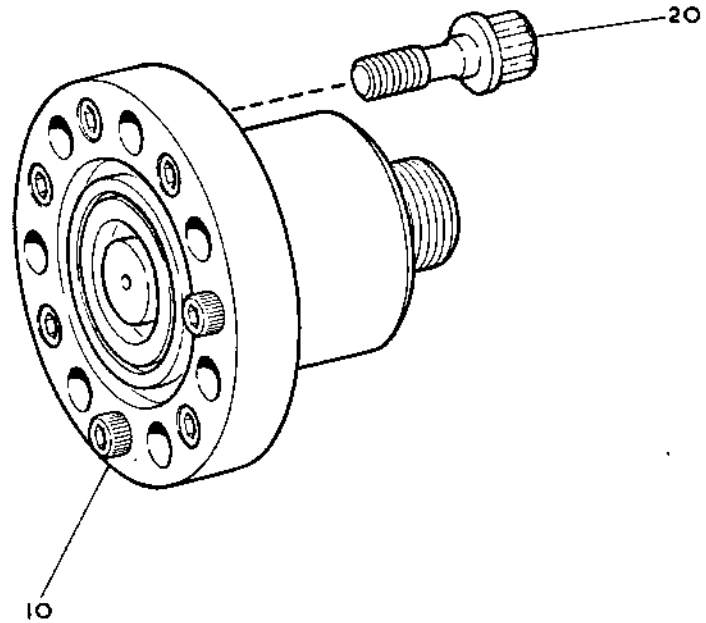
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TN32383

Switch, Engine, Oil Pressure
Figure 201

CLEANING
79-33-02
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OVERHAUL



RH GEARBOX OIL PRESSURE TRANSMITTER - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except 10	Transmitter, oil pressure differential	A or B B	- -	- For cleaning details refer to vendors. overhaul manual

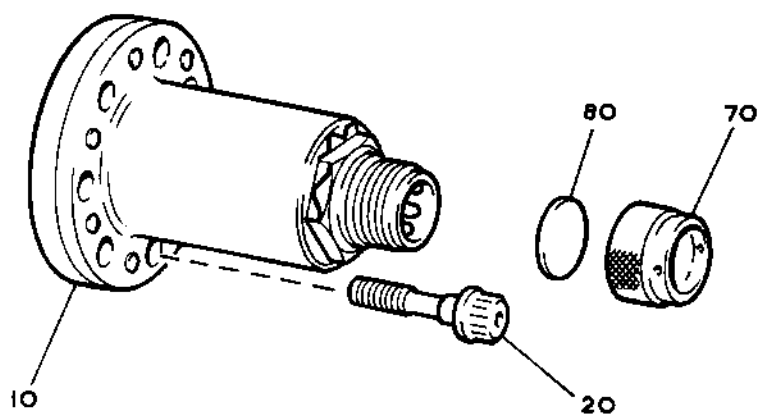
Cleaning Processes
Table 201

TN31578



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OVERHAUL



TN31580

Transmitter, RH Gearbox Oil Pressure
Figure 201



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RH GEARBOX OIL PRESSURE SWITCH - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.



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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	10	Switch, oil pres- sure differential	B	-	For cleaning details refer to vendors overhaul manual.

Cleaning Processes
Table 201

TN32385

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TN32387



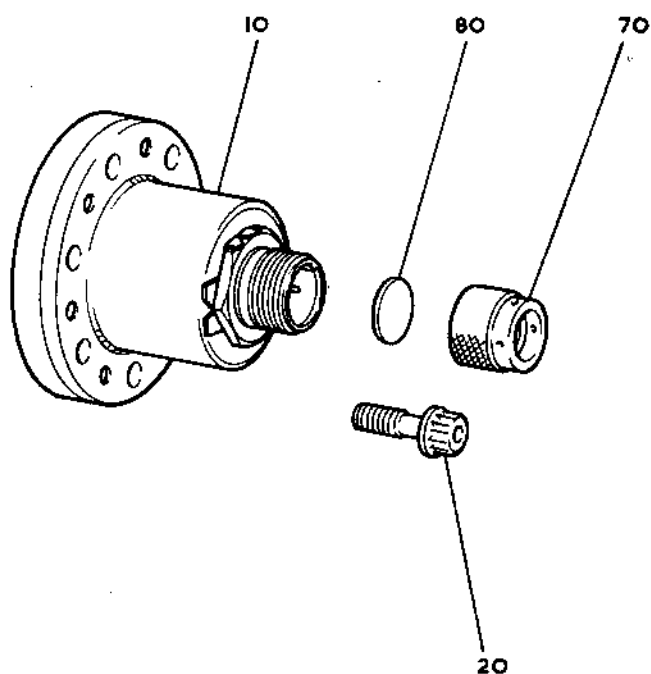
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CR 32329/00C



Switch, RH Gearbox, Oil Pressure
Figure 201

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CHAPTER 72

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	206B	Dec 1/96			

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CLEANING

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OIL TUBE FILTERS - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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72-01-01

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OLYMPUS 593



MK.610-14-28 sheema
OVERHAUL

- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL	-	A or B	-	-
	except				
	10	Filter,	Q	-	-
		assembly of			
	50	Filter,	Q	-	-
		assembly of			

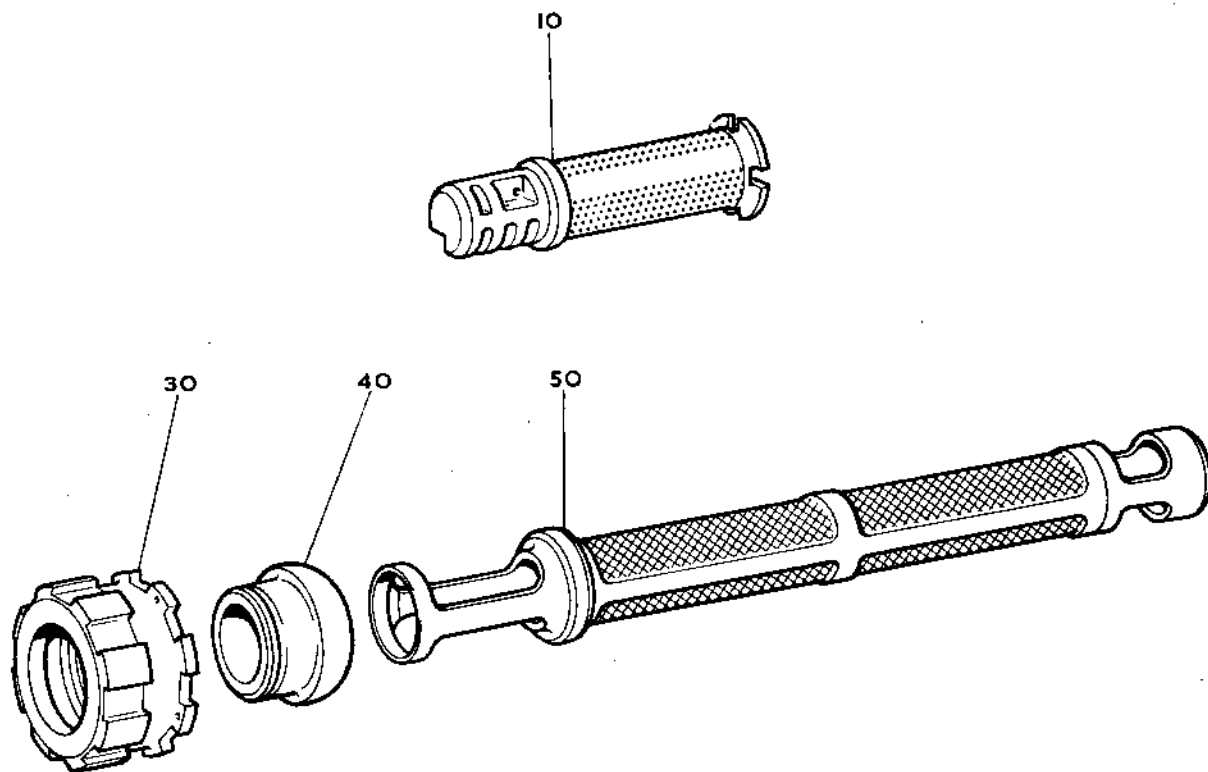
Cleaning Processes
Table 201

CR 32507/00B



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Filters, Engine Lubrication System
Figure 201



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MK.610-14-28
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TUBES - OIL FEED, PUMP TO BEARINGS - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except 270	Tube	A or B A or B	- G	- Use process G only if light cleaning fails to remove con- tamination. Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion.
202	ALL except 70 80 240	Tube Tube Tube	A or B A or B A or B	- G G G	- Use process G only if light cleaning fails to remove con- tamination. Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion.

Cleaning Processes
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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
203	ALL		A or B	-	-
	except				
	150	Tube	A or B	G	Use process G only if light cleaning fails to remove contamination. Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion.
	250	Tube	A or B	G	
204	ALL		A or B	-	-
	except				
	70	Tube	A or B	G	Use process G only if light cleaning fails to remove contamination. Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion.
	330	Tube	A or B	G	
205	ALL		A or B	-	-
	except				
	230	Tube	A or B	G	Use process G only if light cleaning fails to remove contamination. Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion.
	280	Elbow	A or B	G	

Cleaning Processes
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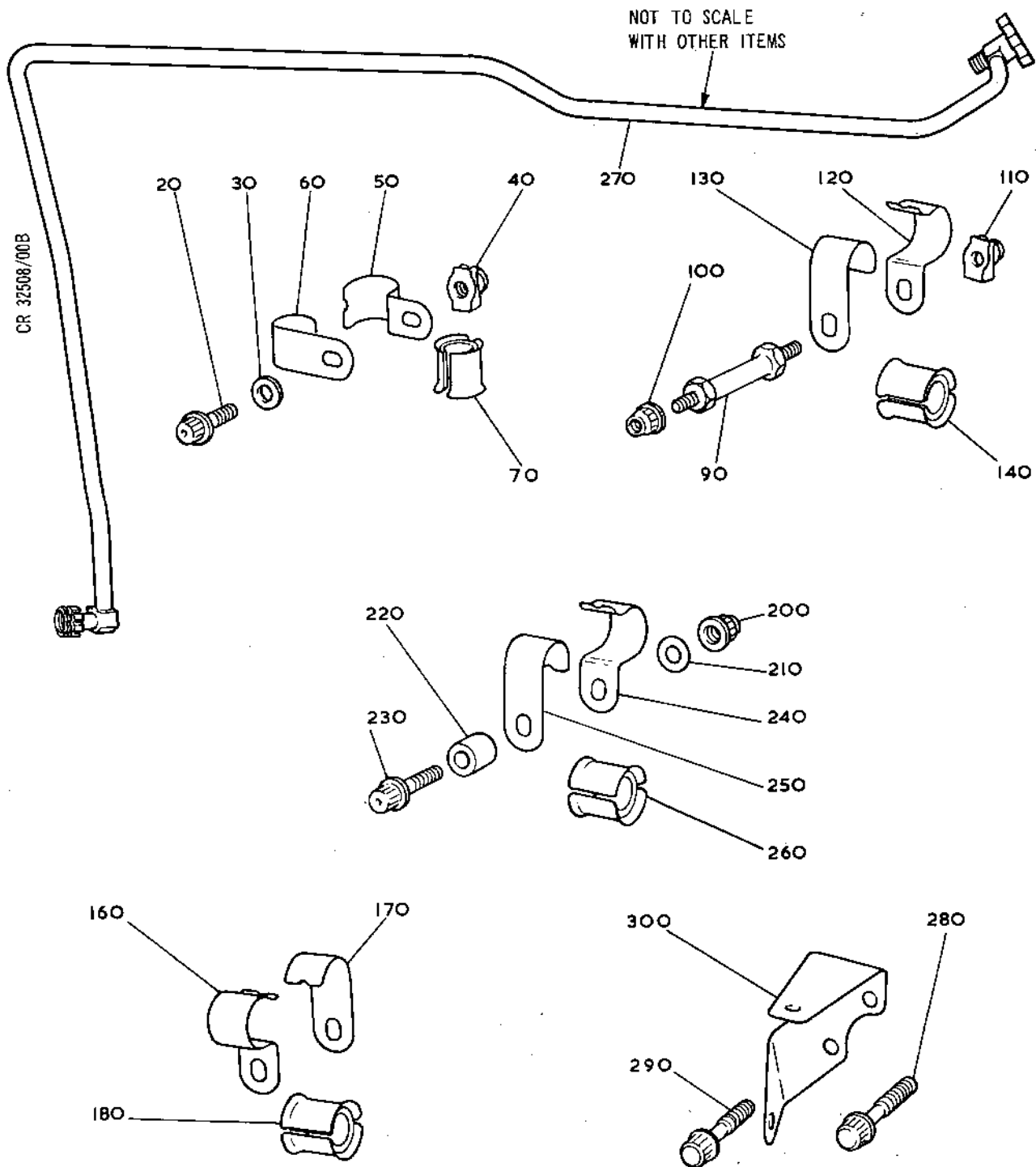
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Tubes, Oil Feed, Pump to Bearing
(LP Compressor, Front)
Figure 201

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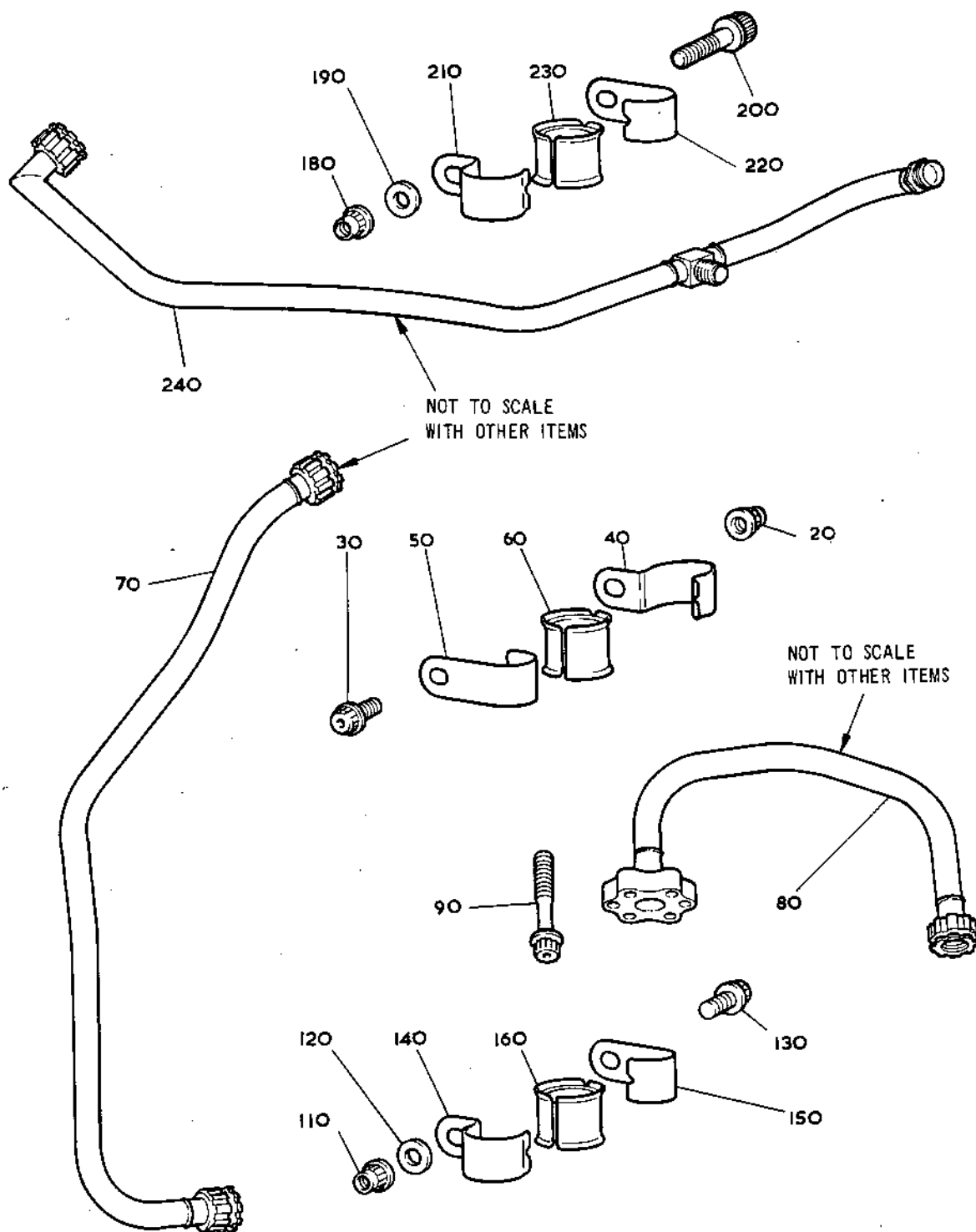
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Tubes, Oil Feed, Pump to Bearings
(LP and HP Compressor Thrust)
and Accessory Oil Pump
Figure 202

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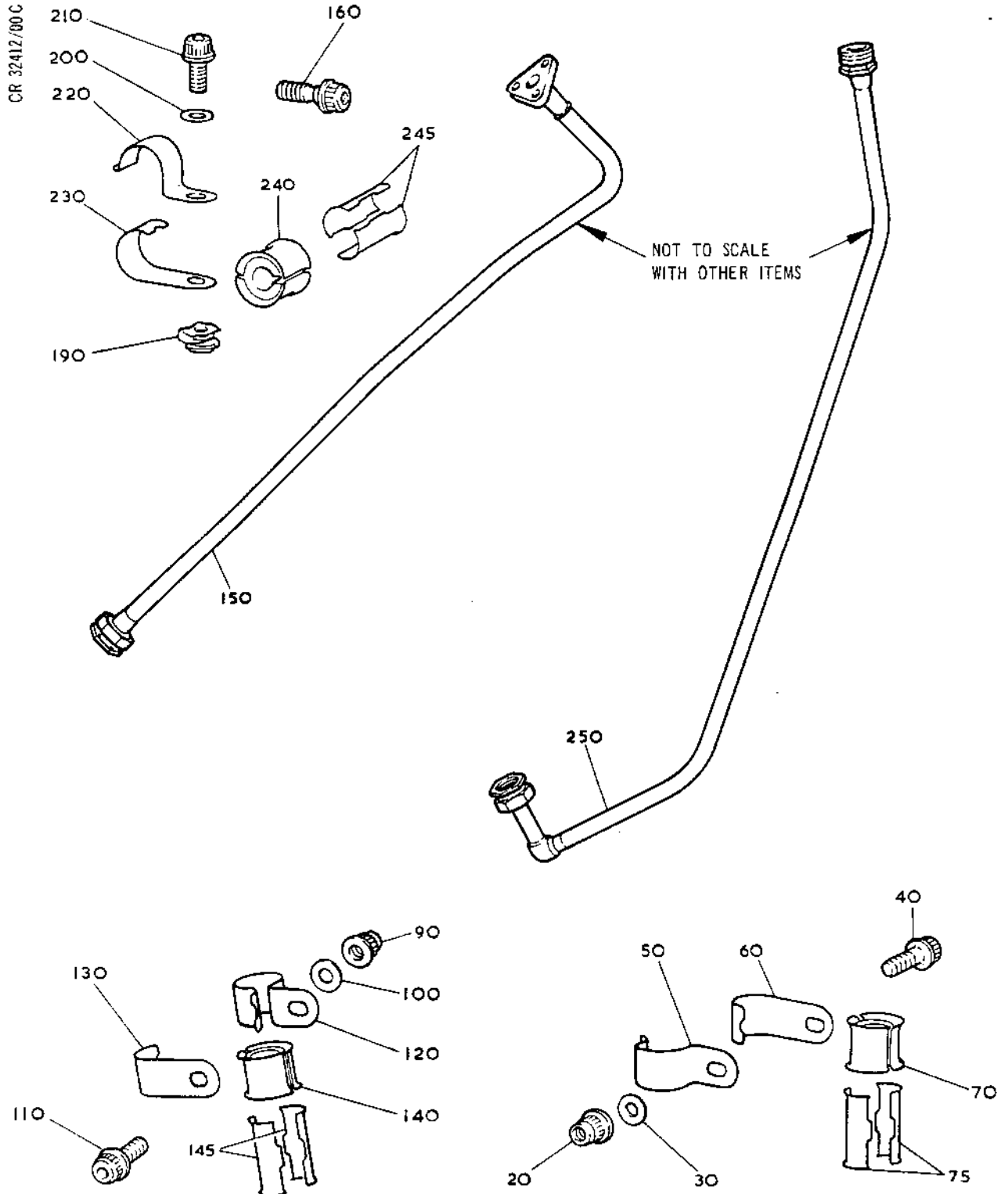


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Tubes, Oil Feed, Pump to Bearing
(LP and HP Compressor Thrust)
Oil Failure Warning
Figure 203



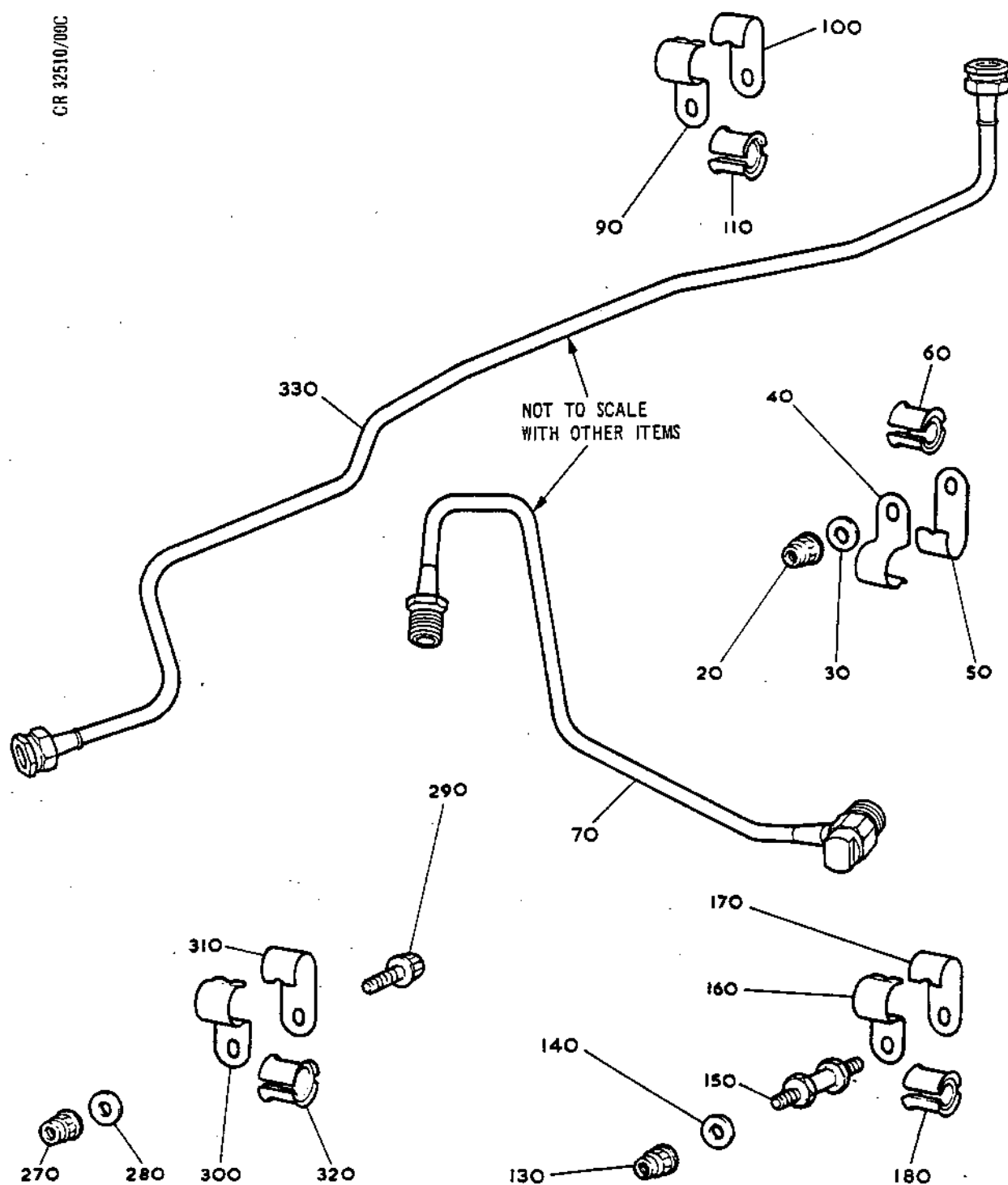
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Tubes, Oil Feed
Pump to Bearing (LP Turbine)
Figure 204

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TN32507

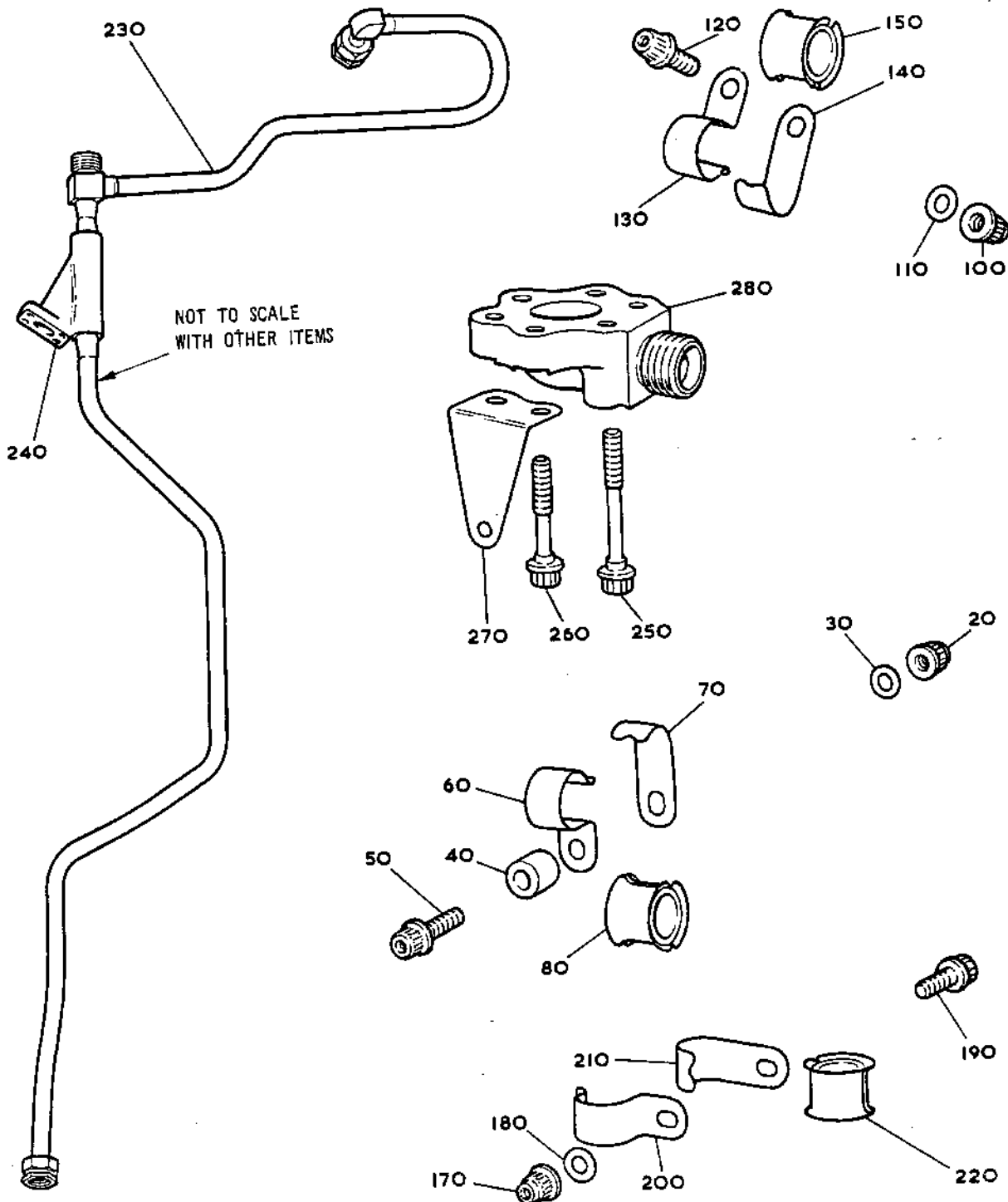


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CR 32436/00B



TN32508

Tubes, Oil Feed, Pump to Bearing
(HP and LP Turbine)
Figure 205

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TUBES - OIL SCAVENGE, BEARINGS TO PUMPS - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	160	Tube	A or B	G	Use process G only if light cleaning fails to remove contamination. Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion.
	240	Tube	A or B	G	
	260	Flange assembly	A or B	G	
202	ALL except		A or B	-	-
	60	Tube	A or B	G	Use process G only if light cleaning fails to remove contamination. Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion.

Cleaning Processes
Table 201 (Continued)

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
203	ALL		A or B	-	-
	except				
	110	Tube	A or B	G	Use process G only if light cleaning fails to remove con- tamination. Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion.
	350	Tube	A or B	G	
204	ALL		A or B	-	-
	except				
	10	Tube	A or B	G	Use process G only if light cleaning fails to remove con- tamination. Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion.
	90	Tube	A or B	G	

Cleaning Processes
Table 201 (Concluded)

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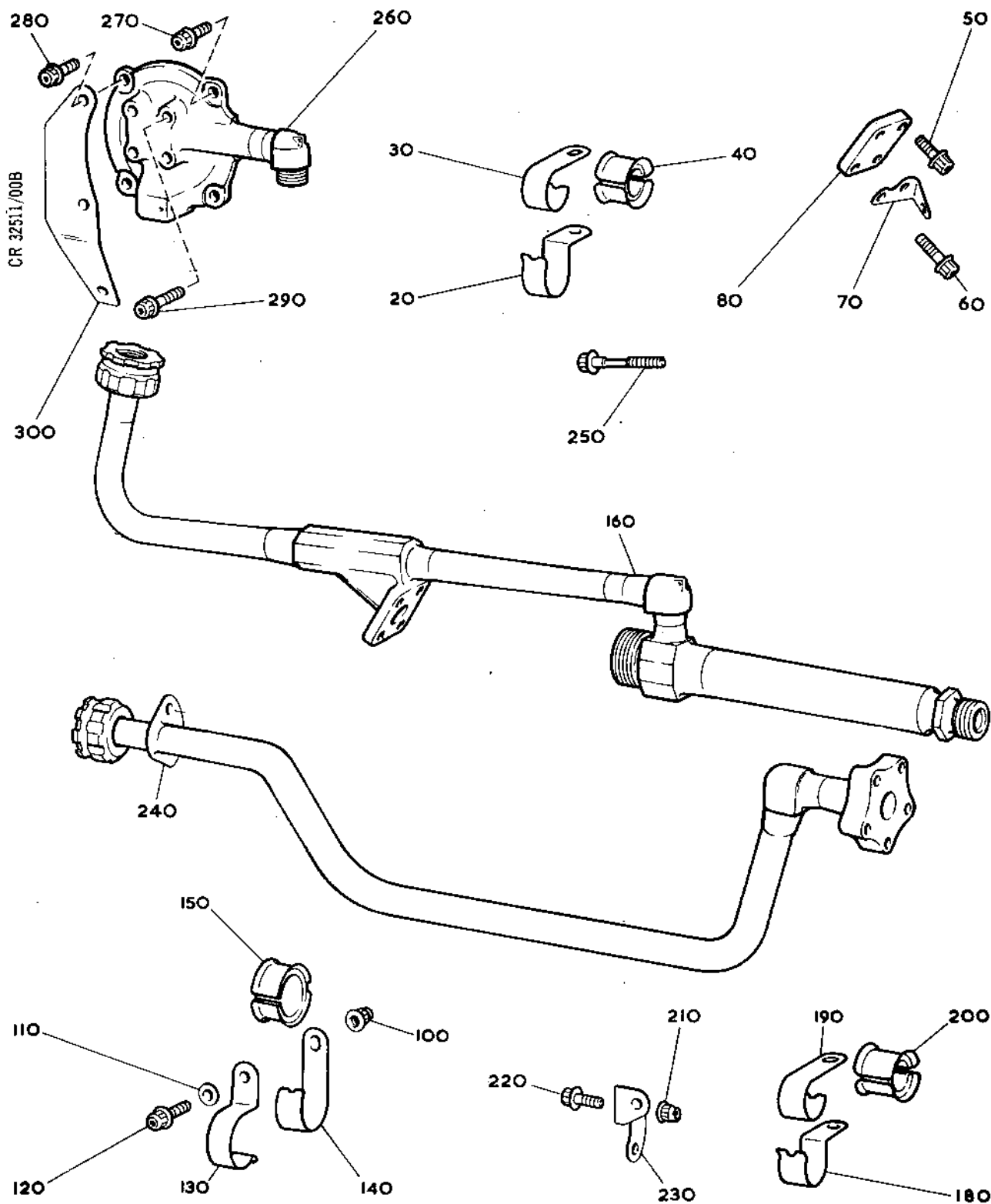
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Tubes, Oil Scavenge, Bearing
(LP Compressor, Front) to Pump
Figure 201

TN29111

CLEANING

72-01-04

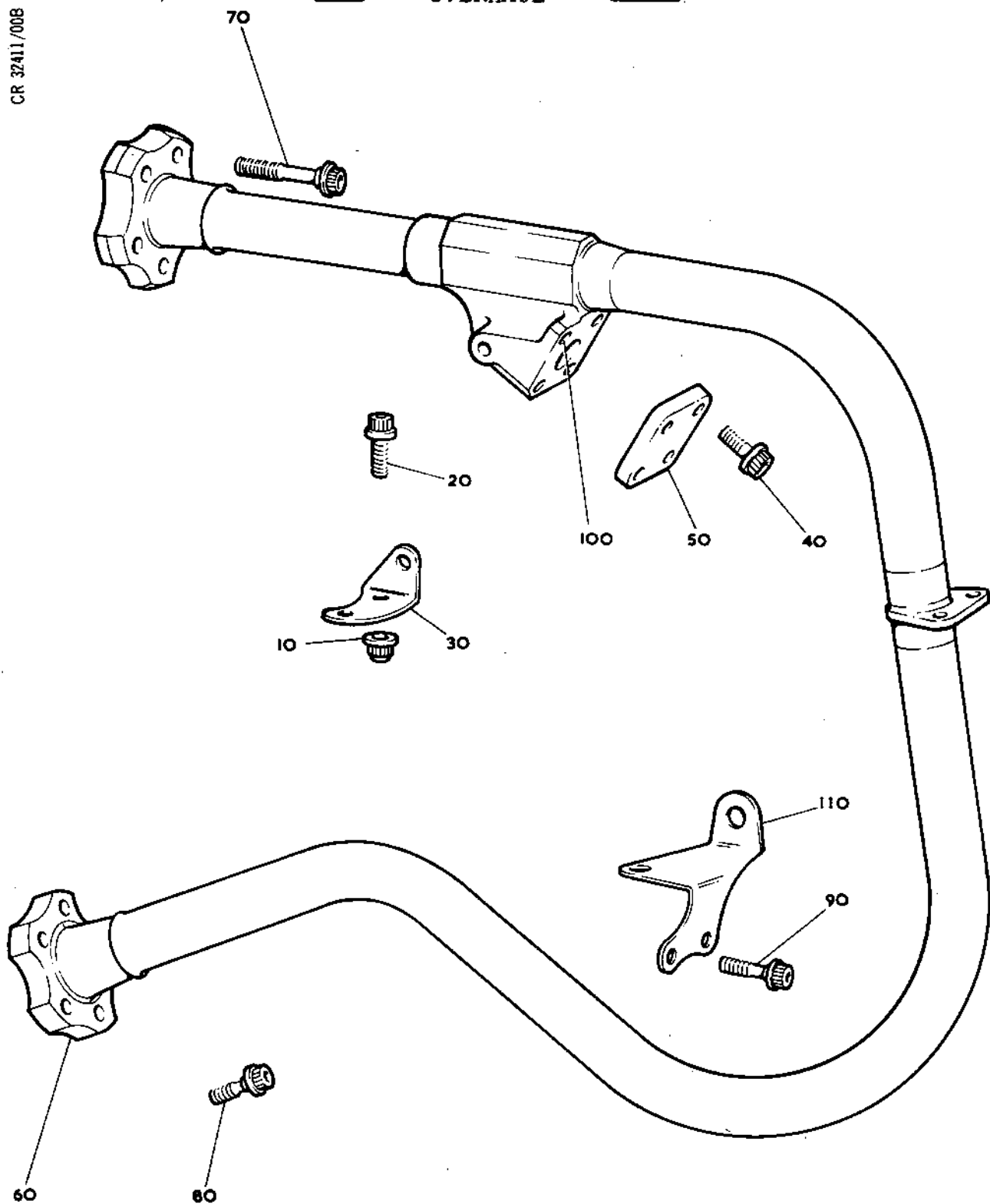
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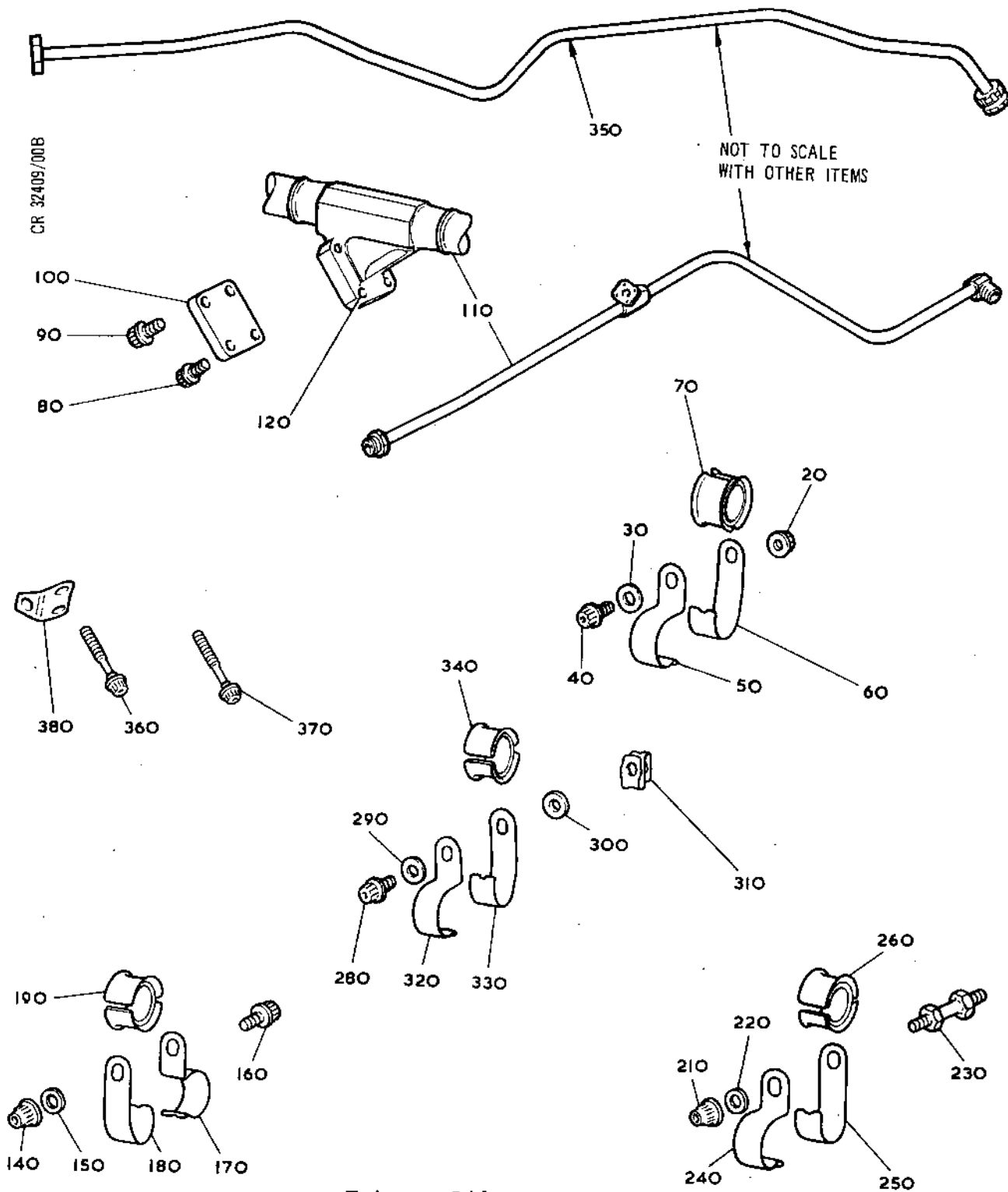
TN29112

Tubes, Oil Scavenge Bearing
(LP and HP Compressor Thrust) to Pump
Figure 202



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Tubes, Oil Scavenge,
Bearing (LP Turbine) to Pump
Figure 203

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TN29113

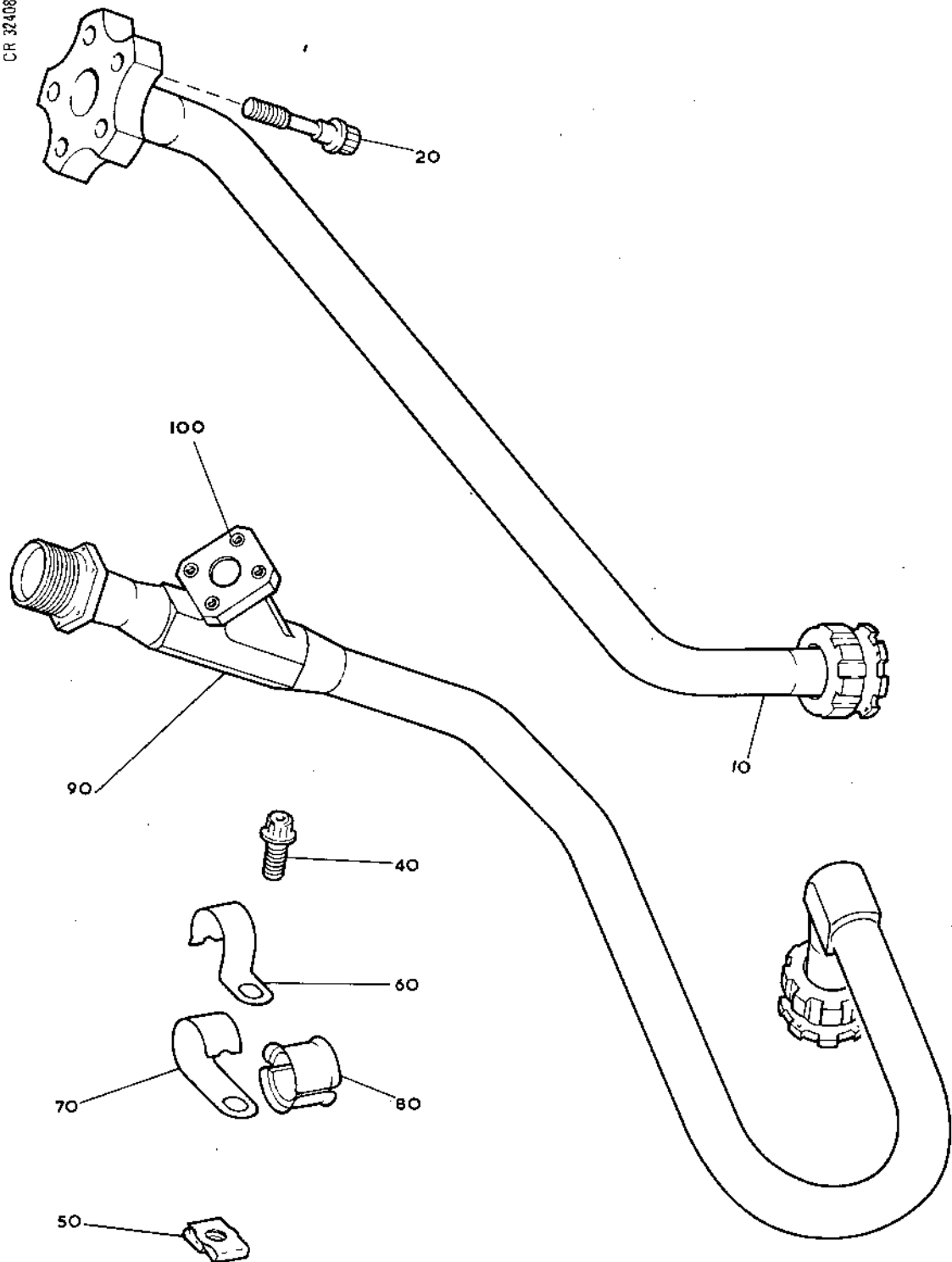


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CR 32408/00B



Tubes, Oil Scavenge,
Bearing (HP Turbine) to Pump
Figure 204

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STANDARD PRACTICES - CLEANING

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Jun 1/96

British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

TEMPORARY REVISION No. 72-510
Insert in 72-09-00 before Page 201

REASON FOR ISSUE:

Alternative cleaning technique for stainless steel rigid tubing (MRA 60).

ACTION

In addition to cleaning processes already given for specific stainless steel rigid tubes, the following heavy cleaning processes are approved for all stainless steel rigid tubes if heavy cleaning is deemed necessary.

Process H

Or

Ardrox 690 followed by Ardrex 607 and Kerosine.

NOTE: Ardrex 690 will damage silver plating and short immersion times are advised.



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STANDARD PRACTICES - CLEANING

1. General

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF PLASMA SPRAY COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

THE FOLLOWING COATINGS ARE AT RISK:

MSRR 9507/1	-	METCO 73
/2	-	METCO 81
/4	-	METCO 404
/5	-	METCO 450
/6	-	SHERITT GORDON NICKEL GRAPHITE (75/25)
/16	-	SHERITT GORDON NICKEL GRAPHITE (85/15)
/29	-	METCO 51
/35	-	METCO 447
/101	-	METCO 405
/103	-	METCOLOY 2
/105	-	METCO S.F. AL
/111	-	SPRABRONZE

METCO 447, 450 AND 405 ARE SOMETIMES USED AS BOND COATINGS.

- A. The processes detailed in this Chapter cover general cleaning of the engine components and do not include processes for stripping pack aluminizing, plating, plasma coating and chemical conversion coatings.
- B. Cleaning processes are sub-divided into light and heavy. Light cleaning will remove light surface soiling only, whereas heavy cleaning will remove paint, corrosion, scaling, etc. Where a high degree of cleanliness is required for certain components an ultrasonic cleaning process can be used under the control of the local laboratory.
- C. A letter is assigned to each process to facilitate identification. All components to be cleaned are tabulated in the relevant assembly cleaning Chapter, together with their recommended processes.

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- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval of the engine manufacturers. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table in the appropriate Chapter.
- E. Individual components of ball and roller bearings should be kept together in matched sets during cleaning procedures and outer races of assembled bearings rotated relatively to the inner races at frequent intervals.
- F. Only clean blanks, etc, shall be installed on cleaned components to avoid contaminating the components.
- G. Protect cleaned components against corrosion and place in containers for protection against damage during transit between operations (Ref.72-09-20 Repair).

2. Safety Precautions

- A. When handling chemicals, the precautions in the appropriate industrial regulations of the country concerned shall be observed. When proprietary products are used, the manufacturer's instructions shall be strictly followed.
- B. Operators must avoid contact with cleaning solutions and shall wear appropriate protective clothing and use barrier cream.
- C. In the event of an accident, operators must be aware of the immediate actions to be taken.
- D. Any skin contamination must receive immediate medical attention.



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CLEANING

72-09-00

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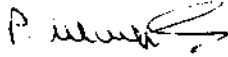
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OLYMPUS 593 OVERHAUL MANUAL

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2



for Chief Engineer (Technical & Quality Services) CAA Design Approval No. DA1/8566/78

TEMPORARY REVISION NO. 72-585

Insert in 72-09-00 facing page 204

REASON FOR ISSUE

Amendment to Process G

ACTION

Process G - third box delete Sodium meta-silicate

1 Aug 1986

TR 72-585
72-09-00
TR Page 1 of 1

CR 32220/00E
BS 00014788/1

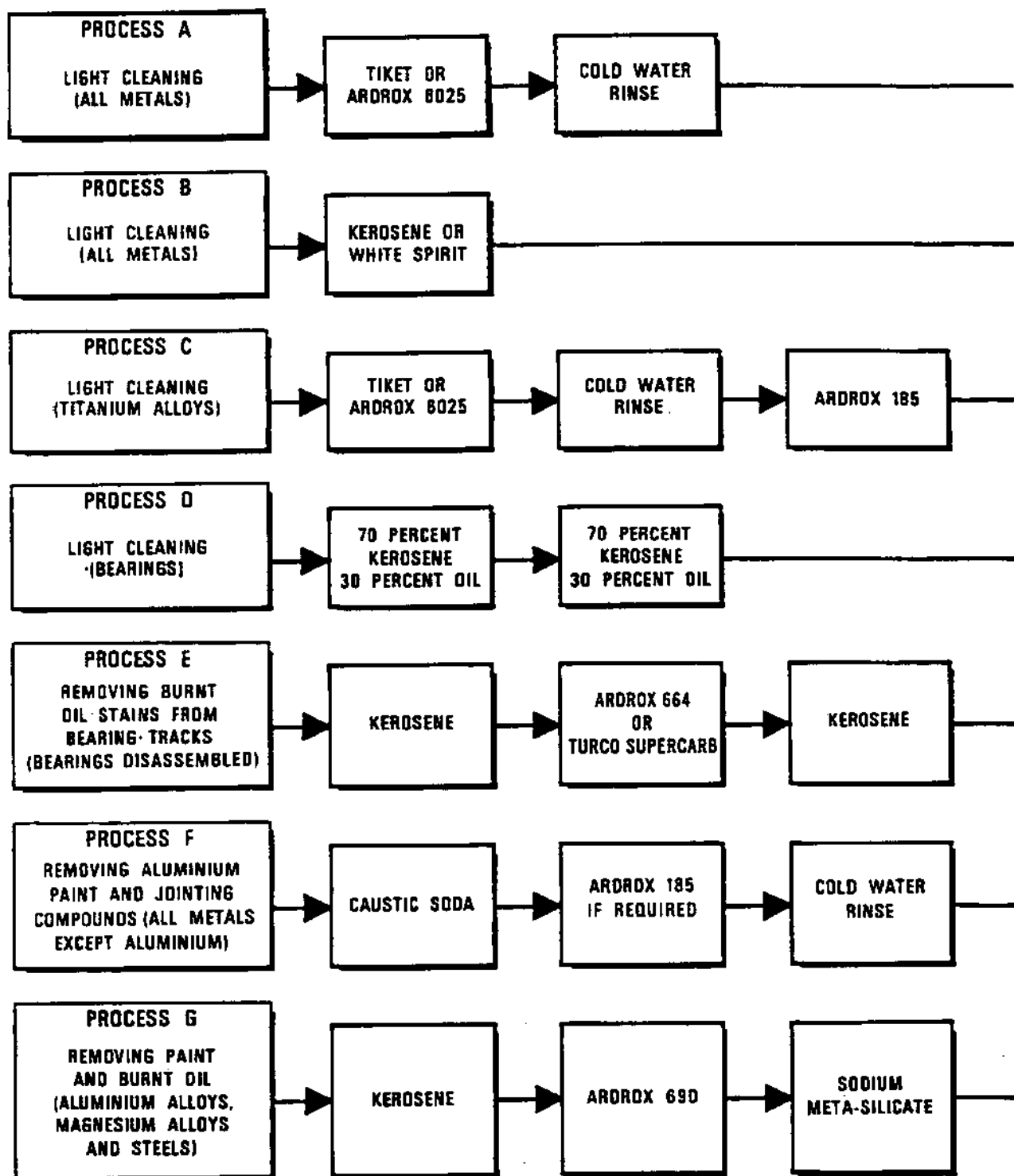


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OVERHAUL



sneema



Process Control Chart
Figure 201 (Sheet 1 of 6)

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OLYMPUS 593 OVERHAUL MANUAL

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

P. Munn

for Chief Engineer (Technical & Quality Services) CAA Design Approval No. DA1/8566/78

TEMPORARY REVISION NO.72-586

Insert in 72-09-00 before page 205

REASON FOR ISSUE

Amendment to Process G

ACTION

Delete box for Chromic acid.

1 Aug 1986

TR.72-586
72-09-00
TR Page 1 of 1



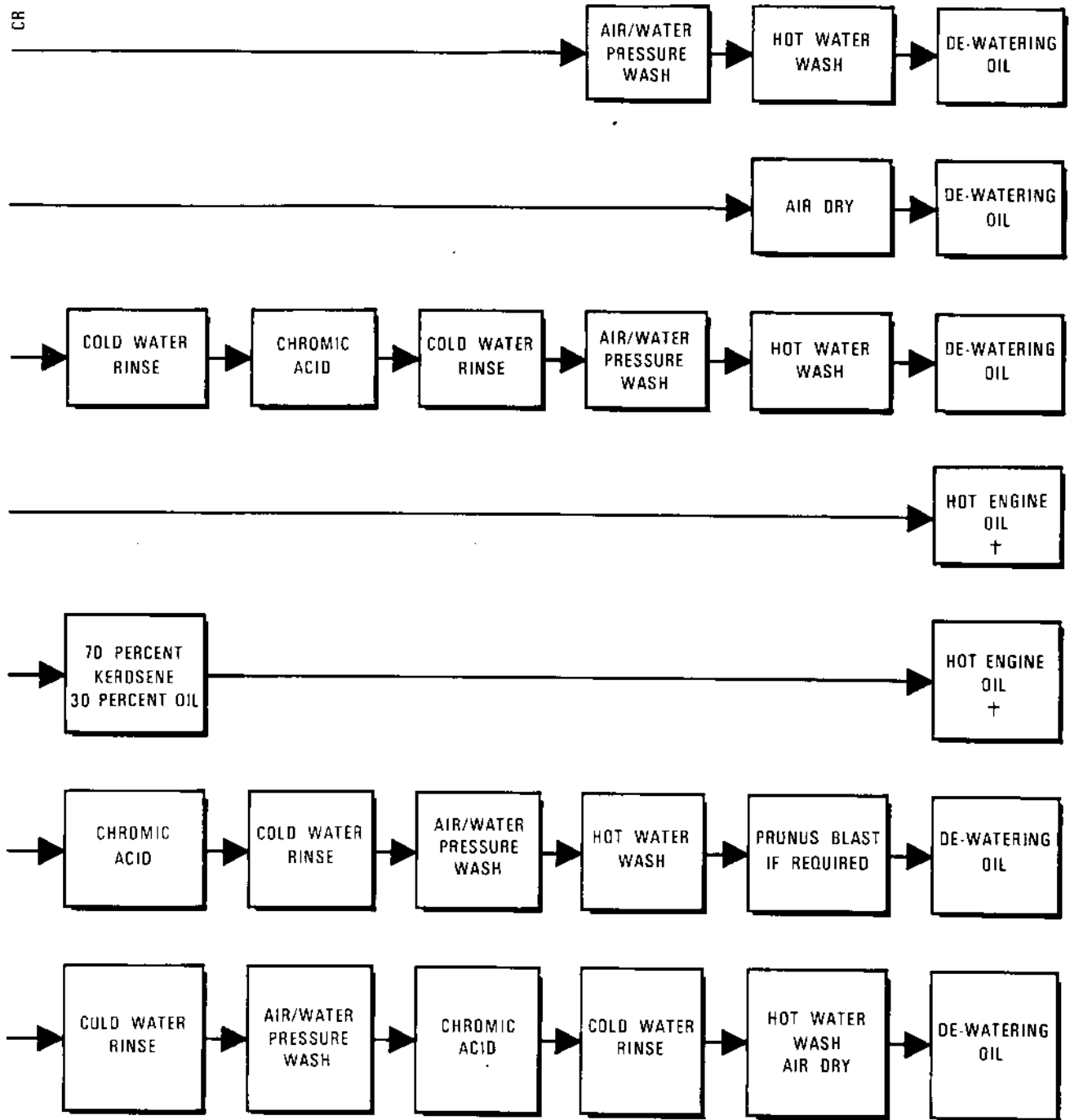
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† USE THE RECOMMENDED ENGINE OIL

Process Control Chart
Figure 201 (Sheet 2 of 6)

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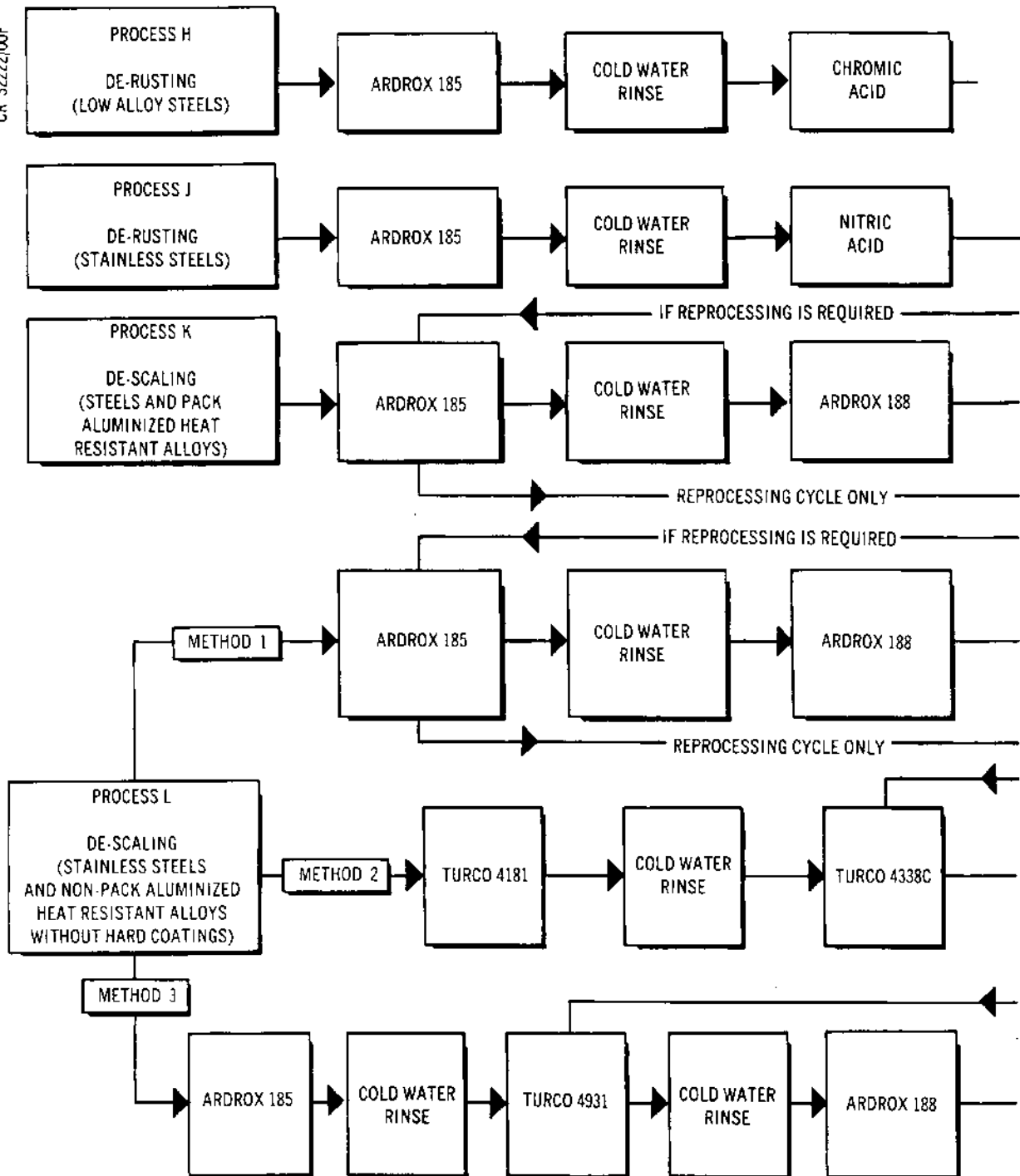
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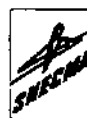
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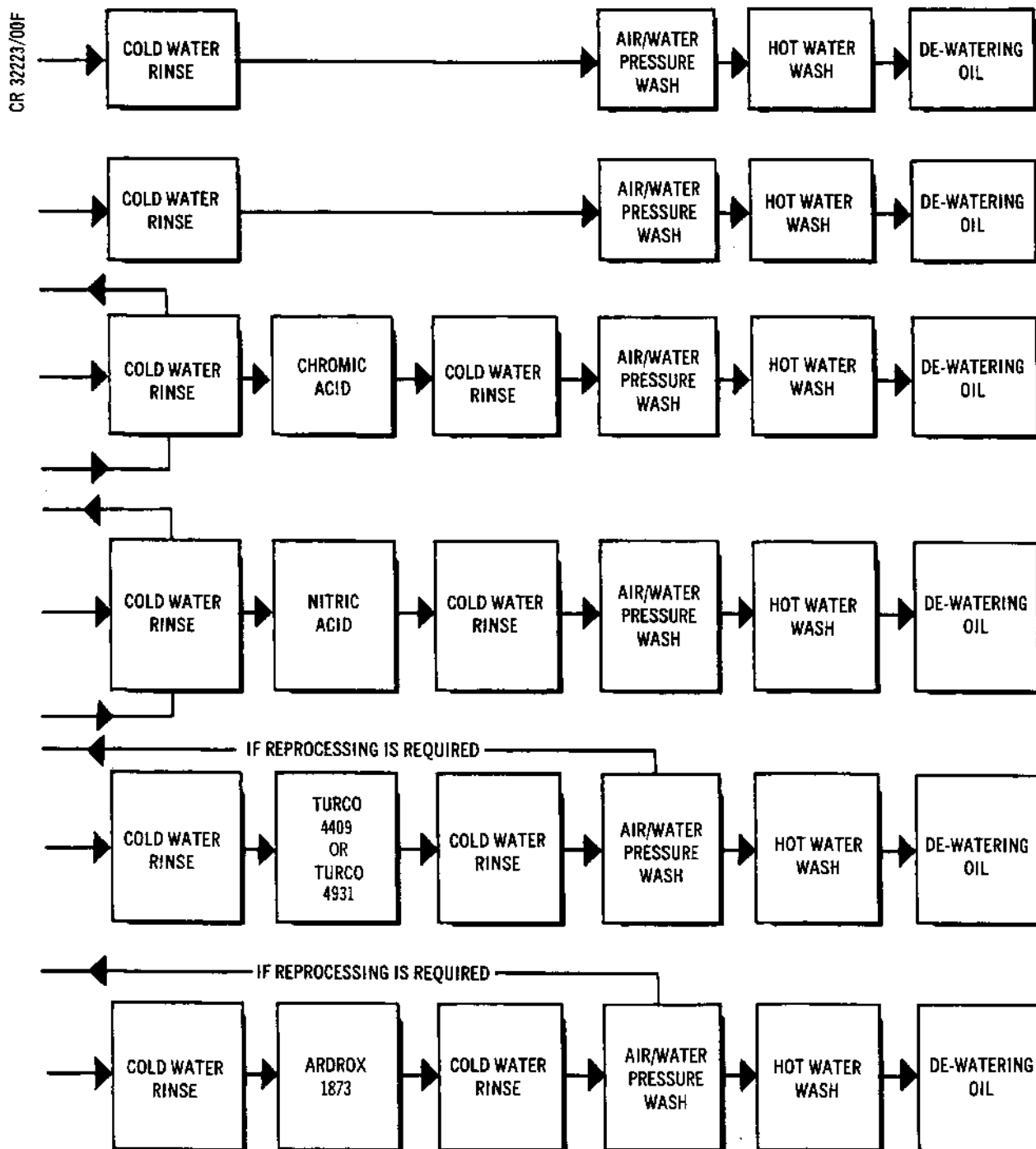
Process Control Chart
Figure 201 (Sheet 3 of 6)



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Process Control Chart
Figure 201 (Sheet 4 of 6)



OLYMPUS 593



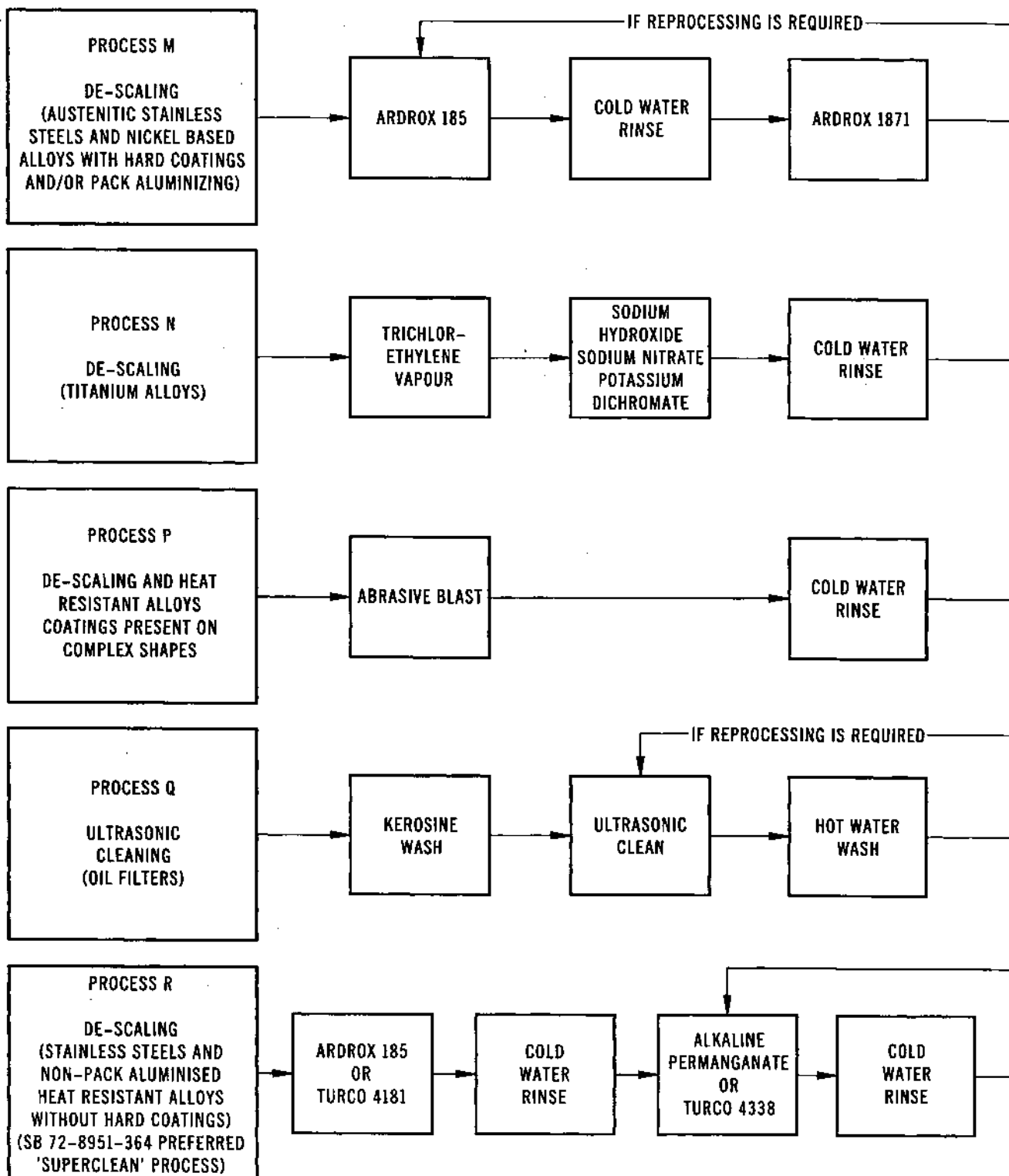
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Process Control Chart
Figure 201 (Sheet 5 of 6)



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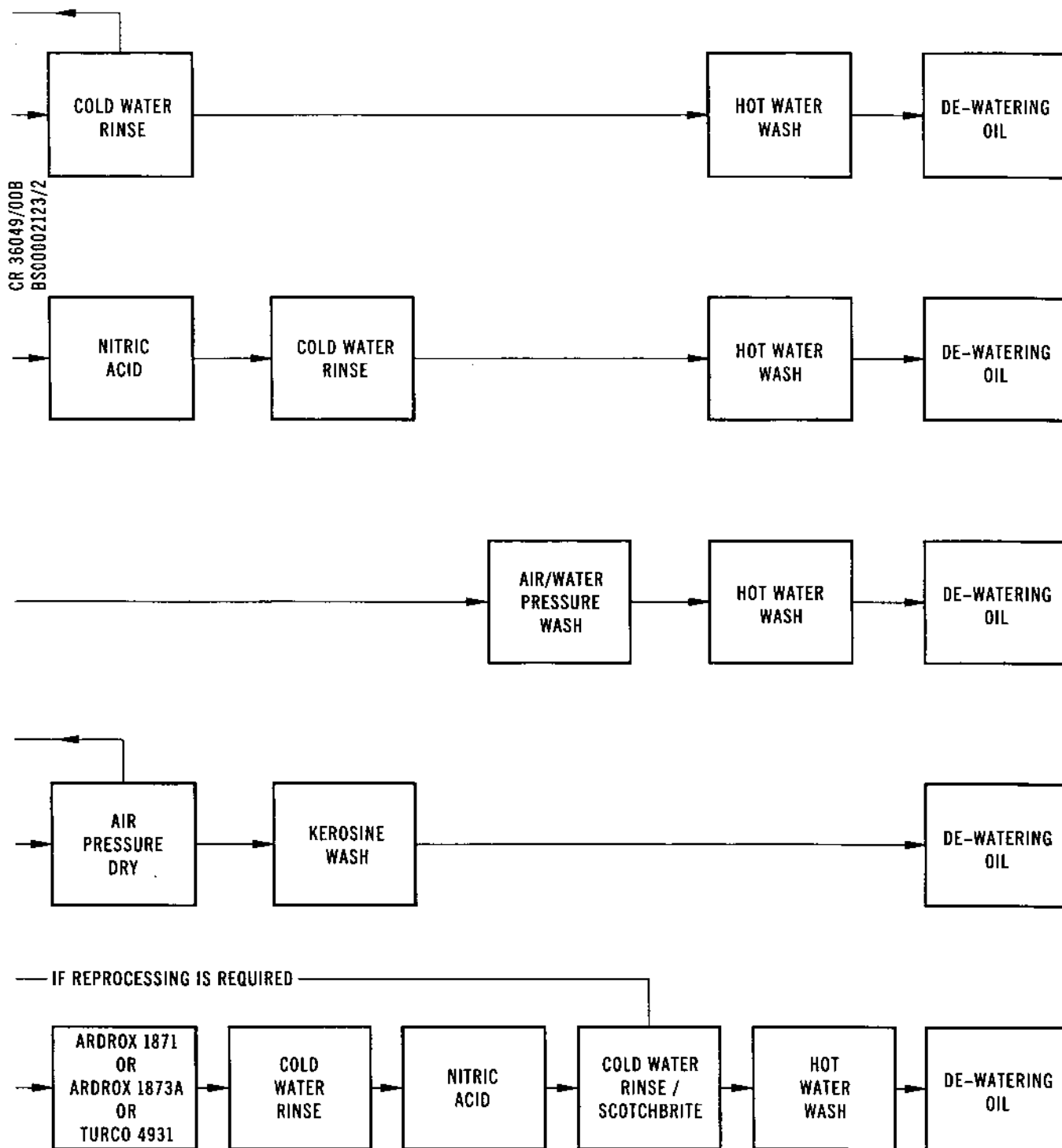


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Process Control Chart
Figure 201 (Sheet 6 of 6)

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3. Cleaning Processes

- A. The recommended cleaning processes are tabulated subsequently and are also shown in the Process Control Chart (Ref.Fig.201). Cleaning solutions specified in the processes are detailed in para.4.

SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	Tiket or Ardrox 6025	15-60 min	Tiket: 65 Ardrox 6025: Room
2	Cold water rinse	Water	As req'd	Room
3	Air/water pressure wash	Compressed air/water	As req'd	Room
4	Hot water wash	Water	As req'd	90-95
5	Temporary protection	De-watering oil	As req'd	Room

Process A - Light Cleaning (All Metals) Table 201

SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	Kerosene or White Spirit	As req'd	Room
2	Air dry	Compressed air blast	As req'd	Room
3	Temporary protection	De-watering oil	As req'd	Room

Process B - Light Cleaning (All Metals) Table 202

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for Chief Engineer (Technical & Quality Services) CAA Design Approval No. DA1/8566/78

TEMPORARY REVISION NO.72-587

Insert in 72-09-00 after page 210.

REASON FOR ISSUE

1. BEOL NOTE added after Table 201 sequence 1.

ACTION

BEOL NOTE: Kerosene with Ardrex 607 or Kerosene with Ardrex 36
are approved alternatives to Tikek/Ardrex 6025.

2. BEOL NOTE added after Table 202 sequence 1

BEOL NOTE: Kerosene with Ardrex 607 or Kerosene with Ardrex 36
are approved alternatives to Kerosene or White
Spirit.

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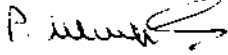
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TEMPORARY REVISION NO. 72-588

Insert in 72-09-00 before page 211

REASON FOR ISSUE

BEOL NOTE

ACTION

After sequence 1 add the following NOTE:

NOTE: Kerosene with Ardrox 607 or Kerosene with Ardrox 36 are approved alternatives to Tiket/Ardrox 6025

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	Tiket or Ardrox 6025	1 h	Tiket: 65 Ardrox 6025: Room
2	Cold water rinse	Water	As req'd	Room
3	Cleaning	Ardrox 185	2 min (max)	95
4	Cold water rinse	Water	As req'd	Room
5	Neutralizing	Chromic Acid	5 min	65-75
6	Cold water rinse	Water	As req'd	Room
7	Air/water pressure wash	Compressed air/water	As req'd	Room
8	Hot water wash	Water	As req'd	90-95
9	Temporary protection	De-watering oil	As req'd	Room

Process C - Light Cleaning (Titanium Alloys)
Table 203

SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
*1	Primary cleaning	70% Kerosene 30% Oil	As req'd	75-85
2	Drain	-	As req'd	-
*3	Final cleaning	70% Kerosene 30% Oil	As req'd	75-85
4	Drain	-	As req'd	-

Process D - Light Cleaning (Bearings)
Table 204 (Continued)

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
5	Temporary protection (14 days)	Engine Oil	As req'd	105-110
6	Extended protection (3 months)	Petroleum Jelly JSD PX.7 or Shell S.4181	As req'd	105-120
*NOTE: Sequences 1 and 3 shall be carried out in separate tanks.				

Process D - Light Cleaning (Bearings)
Table 204 (Concluded)

SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning (if req'd)	Kerosine	As req'd	Room
2	Removing stains	Ardrox 664 or Turco Supercarb	As req'd	Room
*3	Cleaning	Kerosine	As req'd	75-85
4	Drain	-	As req'd	-
*5	Final cleaning	70% Kerosine 30% Oil	As req'd	75-85
6	Drain	-	As req'd	-
7	Temporary protection (14 days)	Engine Oil	As req'd	105-110
* NOTE: Sequences 3 and 5 shall be carried out in separate tanks.				

Process E - Removing Burnt Oil Stains from Bearing Tracks
(Bearings Disassembled)
Table 205 (Continued)

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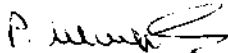
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TEMPORARY REVISION NO. 72-589

Insert in 72-09-00 after page 212

REASON FOR ISSUE

To overcome difficulties experienced in cleaning main line bearing cages. (MRA 67)

ACTION

Add a NOTE to Process E as follows:

NOTE: When mainline bearing cages fail to clean to a standard acceptable for crack detection, it is permissible to use Process H on the cage.

Process E - Sequence 2 - delete completely.

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TEMPORARY REVISION NO.72-590

Insert in 72-09-00 before page 213

REASON FOR ISSUE

Amendment to Table 206

ACTION

Process F - Table 206 delete sequence 8 and read the following:-

8. Vapour blast at 15 to 20 psi using 320/400 mesh aluminium oxide grit.

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
8	Extended protection (3 months)	Petroleum Jelly JSD PX.7 or Shell S.4181	As req'd	105-120

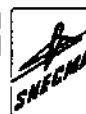
Process E - Removing Burnt Oil Stains from Bearing Tracks
(Bearings Disassembled)
Table 205 (Concluded)

SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	Caustic Soda or Turco 4181	As req'd As req'd	80-100 90-95
2	Cleaning (if req'd)	Ardrox 185	As req'd	95
3	Cold water rinse	Water	As req'd	Room
4	Neutralizing	Chromic Acid or Turco 4409	5 min As req'd	65-75 Room
5	Cold water rinse	Water	As req'd	Room
6	Air/water pressure wash	Compressed Air/Water	As req'd	Room
7	Hot water rinse	Water	As req'd	90-95
8	Prunus blast (if req'd)	20 mesh Grit	As req'd	-
9	Temporary protection	De-watering Oil	As req'd	Room

Process F - Removing Aluminium Paint and Jointing Compounds
(All Metals Except Aluminium)
Table 206

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Pre-cleaning	Kerosene	As req'd	Room
2	Paint stripping	Ardrox 690	As req'd (6 h max)	60-65 (90 max for difficult deposits)
3	Cold water rinse (aluminium alloys only)	Water	As req'd	Room
4	Hot alkaline cleaning	Sodium Meta-silicate	10 min	65-85
5	Cold water rinse	Water	As req'd	Room
6	Air/water pressure wash	Compressed Air/Water	As req'd	Room
7	Neutralizing	Chromic Acid	1 min	60-70
8	Cold water rinse	Water	As req'd	Room
9	Hot water wash/ air dry	Water and Compressed Air	As req'd	Water: 90- 95, air: room
10	Temporary protection	De-watering Oil	As req'd	Room

Process G - Removing Paint and Burnt Oil
(Aluminium Alloys, Magnesium Alloys and Steels)
Table 207

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Insert in 72-09-00 after page 214

REASON FOR ISSUE

Amendment to Table 207

ACTION

Process G Table 207 delete sequence 4 and 7.

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	Ardrox 185	As req'd	95 (for max removal rate)
2	Cold water rinse	Water	As req'd	Room
3	Neutralizing	Chromic Acid	10-15 min	65-70
4	Cold water rinse	Water	As req'd	Room
5	Air/water pressure wash	Compressed Air/Water	As req'd	Room
6	Hot water wash	Water	As req'd	90-95
7	Temporary protection	De-watering Oil	As req'd	Room

Process H - De-rusting (Low Alloy Steels)
Table 208

SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	Ardrox 185	As req'd	95 (for max removal rate)
2	Cold water rinse	Water	As req'd	Room
3	De-rusting and stain removing	Nitric Acid	30 min	Room
4	Cold water rinse	Water	As req'd	Room
5	Air/water pressure wash	Compressed Air/Water	As req'd	Room

Process J - De-rusting (Stainless Steels)
REFER TO CAUTION IN PARAGRAPH 1
Table 209 (Continued)

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
6	Hot water wash	Water	As req'd	90-95
7	Temporary protection	De-watering Oil	As req'd	Room

Process J - De-rusting (Stainless Steels)
REFER TO CAUTION IN PARAGRAPH 1
Table 209 (Concluded)

SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	Ardrox 185	30-60 min	95 (for max removal rate)
2	Cold water rinse	Water	As req'd	Room
3	De-scaling	Ardrox 188	As req'd (1-12 h)	90-105
4	Cold water rinse	Water	As req'd	Room
5	Neutralizing	Chromic Acid	5 min	65-75
6	Cold water rinse	Water	As req'd	Room
7	Air/water pressure wash	Compressed Air/Water	As req'd	Room
8	Hot water wash	Water	As req'd	90-95
9	Temporary protection	De-watering Oil	As req'd	Room

Process K - De-scaling (Steels and Pack
Aluminized Heat Resistant Alloys)
Table 210

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NOTE: Table 211 (Process L) is divided into three parts, each containing a separate process for de-scaling stainless steels and non-pack aluminized heat resistant alloys without hard coatings.

SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	Ardrox 185	As req'd	95 (for max removal rate)
2	Cold water rinse	Water	As req'd	Room
3	De-scaling	Ardrox 188	As req'd (1-12 h)	90-105
4	Cold water rinse	Water	As req'd	Room
5	Neutralizing and stain removal	Nitric Acid	30 min	Room
6	Cold water rinse	Water	As req'd	Room
7	Air/water pressure wash	Compressed Air/Water	As req'd	Room
8	Hot water wash	Water	As req'd	90-95
9	Temporary protection	De-watering Oil	As req'd	Room

Process L - METHOD 1
De-scaling (Stainless Steels and Non-pack
Aluminized Heat Resistant Alloys Without Hard Coatings)
REFER TO CAUTION IN PARAGRAPH 1
Table 211 - PART 1

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	TURCO 4181	3-30 min	90 (for max removal rate)
2	Cold water rinse	Water	As req'd	Room
3	Scale conditioning	TURCO 4338C	30-60 min	88-93
4	Cold water rinse	Water	As req'd	Room
5	De-scaling	TURCO 4931 or TURCO 4409	15-60 min 15-30 min	49-54 Room
6	Cold water rinse	Water	As req'd	Room
7	Air/water pressure wash	Compressed Air/Water	As req'd	Room
8	Hot water wash	Water	As req'd	90-95
9	Temporary protection	De-watering oil	As req'd	Room

Process L - METHOD 2

De-scaling (Stainless Steels and Non-pack
Aluminized Heat Resistant Alloys Without Hard Coatings)

REFER TO CAUTION IN PARAGRAPH 1

Table 211 - PART 2

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	Ardrox 185	30-60 min	95 (for max removal rate)
2	Cold water rinse	Water	As req'd	Room
3	De-scaling	TURCO 4931	15-60 min	49-54
4	Cold water rinse	Water	As req'd	Room
5	De-scaling	Ardrox 188	As req'd (1-12h)	90-105
6	Cold water rinse	Water	As req'd	Room
7	De-scaling	Ardrox 1873 or Ardrox 1873A	15-30 min	75-85
8	Cold water rinse	Water	As req'd	Room
9	Air/water pressure wash	Compressed air/water	As req'd	Room
10	Hot water wash	Water	As req'd	90-95
11	Temporary protection	De-watering oil	As req'd	Room

Process L - METHOD 3
De-scaling (Stainless Steels and Non-pack
Aluminized Heat Resistant Alloys Without Hard Coatings)
REFER TO CAUTION IN PARAGRAPH 1
Table 211 - PART 3

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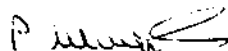
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TEMPORARY REVISION NO.72-592

Insert in 72-09-00 before page 220

REASON FOR ISSUE

Amendment to Table 212

ACTION

Process M - Table 212 sequence 1 solution column - add - or
Turco 4781-7.

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	Ardrox 185	30-60 min	95 (for max removal rate)
2	Cold water rinse	Water	As req'd	Room
3	De-scaling	Ardrox 1871 or Ardrox 1873A	1-3 h	80-85
4	Cold water rinse	Water	As req'd	Room
5	Hot water wash	Water	As req'd	90-95
6	Temporary protection	De-watering Oil	As req'd	Room

Process M - De-scaling (Austenitic Stainless Steels and Nickel Based Alloys with Hard Coatings and/or Pack Aluminizing)
Table 212

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Degreasing	Magnus 663X	15 min	90-95
2	De-scaling	Sodium Hydroxide, Sodium Nitrate, Potassium Dichromate or Turco 6316	30 min 10-30 min	138-143 138-143
3	Cold water rinse	Water	As req'd	Room
4	Bloom and stain removing	Nitric Acid	30 min	Room
5	Cold water rinse	Water	As req'd	Room
6	Hot water wash	Water	As req'd	90-95
7	Temporary protection	De-watering oil	As req'd	Room

Process N - De-scaling (Titanium Alloys)
REFER TO CAUTION IN PARAGRAPH 1
Table 213

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Removal of scale or coating	Abrasive blasting	Minimum time for complete removal	Room
2	Cold water rinse	Water	As req'd	Room
3	Air/water pressure wash	Compressed air/water	As req'd	Room
4	Hot water wash	Water	As req'd	90-95
5	Temporary protection	De-watering oil	As req'd	Room

Process P - De-scaling Steels and Heat Resisting Alloys
and Removal of Coatings on Complex Shapes
Table 214

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Wash	Kerosine	As req'd	Room
*2	Ultrasonic cleaning	20% ZOK27 or Control ICD177 or Turbo Clean or Ardrox 6345 or Decon 75 or Decon 90 80% Water	15 min	100
3	Wash	Water	As req'd	100
4	Air pressure dry	Compressed air	As req'd	Room
5	Wash	Kerosine	As req'd	Room
6	Temporary protection	Engine oil (lubricant A)	As req'd	Room

- * NOTE:
1. Degas ultrasonic cleaner using 10% wash fluid, 90% water solution for five minutes, prior to use.
 2. Immerse filter in a beaker filled with 20% solution, then place in ultrasonic cleaner.
 3. Cleaning frequency should be 50 KHz pulsed at twice the supply frequency.

Process Q - Ultrasonic Cleaning (Oil Filters)
Table 214A

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SEQUENCE	DESCRIPTION	SOLUTION	TIME	TEMP (deg C)
1	Primary cleaning	Androx 185 or Turco 4181	1 hour 1 hour	95 90
2	Cold water rinse	Water	As req'd	Room
3	Scale conditioning	Alkaline Permanganate or Turco 4338	1 hour 1 hour	85-95 88-93
4	Cold water rinse	Water	As req'd	Room
5	De-scaling	Androx 1871 or Androx 1873A or Turco 4931	1 hour 1 hour 1 hour	80-85 80-85 49-54
6	Cold water rinse	Water	As req'd	Room
7	Neutralizing and stain removal	Nitric acid	20 min	Room
8	Cold water rinse	Water	As req'd	Room
9	Scotchbrite/ cold water		As req'd	
10	Hot water wash	Water	As req'd	90-95
11	Drain	-	As req'd	
12	Temporary protection	De-watering oil	As req'd	Room

Process R - De-scaling (Stainless Steels and Non-pack
Aluminized Heat Resistant Alloys without Hard Coatings)
(SB.72-8951-364 Preferred 'Superclean' Process)
Table 214B

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4. Cleaning Solutions

A. Ardrox 185.

- (1) This is a hot immersion type cleaner based on sodium hydroxide and sodium glucanate. It is used essentially on steels and heat resistant alloys for de-rusting and scale modifying purposes.
- (2) The solution should be made up to a concentration of 2-3 lb of Ardrox 185 per gal (Imp.) (200-300 g/l) of water. The tank should be filled with tap water and the required amount of powder added slowly with constant stirring. Alternatively, an aqueous solution may be made up as follows:

Sodium Hydroxide	16-36 oz/gal (Imp.) (100-200 g/l)
Sodium Glucanate	4-36 oz/gal (Imp.) (25-200 g/l)
Lissapol 'N'	0.5 oz/gal (Imp.) (3 g/l)

The concentration of the constituents can be varied according to the type of work. For the maximum rust removal rate, the solution should be used at 95 deg C and the sodium hydroxide/sodium glucanate ratio should be 1:1. The ratio may be as low as 4:1 provided a slower removal rate can be tolerated.

- (3) Application is by immersion.
- (4) The solution should be used to exhaustion. Solution control shall be either by discarding and making up a fresh solution or by laboratory analysis and making the appropriate additions. If the concentration of iron reaches 1/10 of the sodium glucanate concentration the solution shall be discarded.

B. Ardrox 188.

- (1) This is a hot immersion type scale conditioner.

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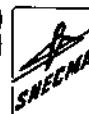
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- (2) The solution should be made up to the manufacturers instructions. Alternatively, an aqueous solution may be made up as follows:

Sodium Hydroxide	16-20 oz/gal (Imp.) (100-125 g/l)
Sodium Carbonate	16-20 oz/gal (Imp.) (100-125 g/l)
Potassium Permanganate	8-16 oz/gal (Imp.) (50-100 g/l)

The solution should be used at 90-105 deg C.

- (3) Application is by immersion.
- (4) The solution should be maintained at a constant level by the addition of water. Control shall be according to the instructions of the controlling laboratory.

C. Ardrex 664.

- (1) This is a methylene chloride type solution and is used for general cleaning, paint stripping and/or light decarbonizing. It is safe for use on aluminium alloys, magnesium alloys and steels for indefinite periods.
- (2) The solution is used as supplied. Because the solution is supplied with a water seal, the entire contents shall be emptied into the tank. Operation should be at room temperature.
- (3) Application is by immersion. The solution can be contained in a mild steel tank located in a well-ventilated area or, alternatively, equipped with a fume extraction system.
- (4) The water seal shall be maintained at a depth of at least 3 in. The alkalinity, inhibitor content and solvent content shall be checked periodically and replenishments made as required. Sludge shall be allowed to settle and shall be removed with a sludge tray or by decantation.

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4. Cleaning Solutions

A. Ardrox 185.

- (1) This is a hot immersion type cleaner based on sodium hydroxide and sodium glucanate. It is used essentially on steels and heat resistant alloys for de-rusting and scale modifying purposes.
- (2) The solution should be made up to a concentration of 2-3 lb of Ardrox 185 per gal (Imp.) (200-300 g/l) of water. The tank should be filled with tap water and the required amount of powder added slowly with constant stirring. Alternatively, an aqueous solution may be made up as follows:

Sodium Hydroxide	16-36 oz/gal (Imp.) (100-200 g/l)
Sodium Glucanate	4-36 oz/gal (Imp.) (25-200 g/l)
Lissapol 'N'	0.5 oz/gal (Imp.) (3 g/l)

The concentration of the constituents can be varied according to the type of work. For the maximum rust removal rate, the solution should be used at 95 deg C and the sodium hydroxide/sodium glucanate ratio should be 1:1. The ratio may be as low as 4:1 provided a slower removal rate can be tolerated.

- (3) Application is by immersion.
- (4) The solution should be used to exhaustion. Solution control shall be either by discarding and making up a fresh solution or by laboratory analysis and making the appropriate additions. If the concentration of iron reaches 1/10 of the sodium glucanate concentration the solution shall be discarded.

B. Ardrox 188.

- (1) This is a hot immersion type scale conditioner.



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D. Ardrox 690.

- (1) This is a hot immersion type cleaner and paint stripper which contains orthodichlorobenzene, cresol, emulsifier, water and inhibitor. It is suitable for use on aluminium alloys, magnesium alloys and steels. The solution is used with an inhibited water seal.
- (2) The solution comprises three parts by volume of Ardrox 690 to one part by volume of water containing three per cent by weight inhibitor. It should be made up by adding the inhibitor powder to the water and stirring until dissolved, then adding the Ardrox solution and mixing thoroughly. The normal operating temperature should be 60-65 deg C, but up to 90 deg C is permissible for difficult deposits.
- (3) Application is by immersion below the water seal for a maximum period of six hours. The solution shall be contained in a mild steel tank equipped with a heating facility, lid, fume extraction system and a sludge tray.
- (4) The water seal shall be maintained at a depth of at least 4 in. The alkalinity, inhibitor content and solvent content shall be checked periodically and replenishments made as required. Sludge shall be allowed to settle and shall be removed with the sludge tray.

E. Ardrox 1871.

- (1) This is a de-scaling solution for nickel and/or cobalt based materials. It is not suitable for use on low alloy steels or high chromium content steels. It has no effect on pack aluminizing and only slight effect on chromium carbide plasma coatings.
- (2) The solution comprises one part by volume of compound to four parts by volume of water and should be used at 80-85 deg C. Components should be free from oil and carbonaceous deposits.
- (3) Application is by immersion.



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- (4) Solution control consists of determination of the concentration of Ardrox 1871 by titration with N/1 KOH to a pH value of 11.5.

F. Ardrox 1873.

- (1) This is an acidic de-scaling solution for nickel base alloy and corrosion resistant steels. It is not suitable for use on low alloy steels or high chromium content steels. Parts coated with sprayed metal or electroplate will be affected, and coatings must be renewed.
- (2) The solution comprises one part by volume of compound to four parts by volume of water, and should be used at 80-85°C. Components should be free from oil and carbonaceous deposits.
- (3) Application is by immersion. The solution should be contained in a stabilised stainless steel tank provided with a vapour exhaust system.
- (4) Solution control consists of maintaining the pH value between 3.0 and 3.2. If the pH value is high, add concentrated nitric acid to reduce it. If the pH value is low, add potassium hydroxide to raise it. An analysis must be carried out to determine the concentration of Ardrox 1873 in accordance with laboratory instructions. The solution should be discarded after 6 months use.

G. Ardrox 6025.

- (1) This is a cold emulsion liquid cleaner containing mild alkalies, surfactants and corrosion inhibitors. It is suitable for use on most metallic materials, including painted components.
- (2) The solution comprises one part by volume of Ardrox 6025 to nine parts by volume of water and should be used at room temperature.
- (3) Application is by immersion. The solution should be contained in a mild steel tank.
- (4) The solution should be renewed when it is no longer effective.



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H. Caustic Soda.

- (1) This is hot alkaline immersion solution and is normally used in conjunction with Chromic Acid for stripping certain paints, lubricants and jointing compounds from steel and/or magnesium components. It must not be used on aluminium. In particular it is used for stripping aluminium pigmented heat resistant paints and phenolic varnishes. It can also be used for removing aluminium spatter. Alternatively, caustic glucanate can be used where caustic soda tanks are not available.
- (2) The solution comprises 10-20 per cent by volume sodium hydroxide in water, with the optional addition of 0.1 per cent by volume of a suitable wetting agent such as Shell Teepol P.40 or Lissapol 'N'. The sodium hydroxide should be added slowly to the water whilst stirring vigorously. The normal operating temperature should be 80-100 deg C, but for stripping thick deposits of aluminium the temperature may be lowered.
- (3) Application is by immersion.
- (4) The level of the solution should be maintained by the addition of water. The solution should be renewed when it is no longer effective.

J. Chromic Acid.

- (1) This is a hot immersion solution with inhibition properties. It is used to assist in the stripping of paints and jointing compounds, and the neutralization of alkaline residues from previous cleaning operations.
- (2) The solution comprises 10 per cent W/V chromic acid and 0.25 per cent W/V barium chromate dissolved in demineralized or distilled water. Operating temperature should be 65-75 deg C.
- (3) Application is by immersion.
- (4) The level of the solution should be maintained by the addition of demineralized or distilled water. Control should be by laboratory analysis and replenishing as required to maintain the chromic acid content at 7.5-10 per cent by volume.

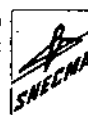
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K. Kerosine.

- (1) This is a light hydrocarbon cleaner used cold for the removal of oil, light oil sludge deposits and loose soils. It may also be used as a final wash off and flushing medium, prior to assembling components. It is satisfactory for use on all metals and organic finishes.
- (2) Kerosine should be used as supplied.
- (3) Application is by immersion, flush, spray or brush.
- (4) The kerosine should be discarded when contaminated.

L. Kerosine/Oil.

- (1) This solution is used solely for cleaning ball and roller bearings.
- (2) The solution comprises 70 per cent by volume Aviation Kerosine and 30 per cent by volume oil to D.Eng. R.D.2490 or the recommended engine oil. The operating temperature shall be 80-85 deg C.
- (3) Application is by immersion. Tanks should be of mild steel and equipped with a heating system. Thermostatic temperature control is essential.
- (4) The operating temperature shall be maintained at all times including shut-down periods to avoid water vapour contamination. The primary cleaning tank should be drained, cleaned and filled with fresh solution after cleaning approximately 100 bearings, or earlier if the solution is excessively contaminated. The secondary cleaning tank should be controlled similarly, except that its cleaning life may be extended and the solution level maintained by the addition of clean, fresh kerosine/oil.

M. Nitric Acid (Refer to CAUTION in paragraph 1).

- (1) This is a cold immersion solution and is used after scale and oxide modification solutions. In addition it is used for stain removal on aluminium, stainless steels and heat resistant alloys.

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- (2) The solution comprises 30 per cent by volume nitric acid (sp. gr. 1.42) and 70 per cent by volume water and should be used at room temperature.
- (3) Application is by immersion.
- (4) Control is by laboratory analysis and replenishing as required to maintain the nitric acid content at 25-30 per cent by volume.

N. Sodium Hydroxide, Sodium Nitrate, Potassium Dichromate.

- (1) This solution is used for de-scaling titanium.
- (2) It is an aqueous solution containing:

Sodium Hydroxide (NaOH)	160 oz/gal (Imp.) (1000 g/l)
Sodium Nitrate (NaNO ₃)	2 oz/gal (Imp.) (12.5 g/l)
Potassium Dichromate (K ₂ Cr ₂ O ₇)	2 oz/gal (Imp.) (12.5 g/l)

The solution should be made up by adding the sodium hydroxide to the water and stirring until dissolved, then adding the sodium nitrate and potassium dichromate. It is essential that the sodium hydroxide is completely dissolved. The operating temperature shall be 138-143 deg C.

- (3) Application is by immersion. The solution should be contained in a shallow, mild steel tank equipped with a heating facility and a fume extraction system.
- (4) The solution is controlled by its boiling point in the range 138-143 deg C. If the boiling point rises above the top limit, water shall be added to reduce the boiling point to within the specified limits. Conversely, if the boiling point drops below the bottom limit, sodium hydroxide shall be added to restore the boiling point to within the specified limits. Any additions shall be made when the solution is cold and must be mixed in thoroughly to avoid eruptions.

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P. Sodium Meta-silicate.

- (1) This is a hot immersion, mild alkaline cleaner which is used in conjunction with Ardrex 690 to assist in paint stripping and rinsing.
- (2) The solution comprises 3 per cent by volume sodium meta-silicate and 97 per cent by volume water. The operating temperature shall be 65-85 deg C.
- (3) Application is by immersion. The solution should be contained in a mild steel tank equipped with a heating facility and a fume extraction system.
- (4) The solution should be maintained at a constant level by the addition of water and shall be discarded when no longer effective.

Q. Tiket.

- (1) Diversey Tiket is a primary cleaner containing wetting agents, alkali detergents and a solvent. It is safe for use on most surfaces except cellulose and perspex.
- (2) The solution normally comprises one part by volume Tiket and eight parts by volume water, but other strengths may be used as required. The operating temperature should be 65 deg C for immersion and room temperature for brushing or spraying.
- (3) Application is by immersion, brush or spray.
- (4) The solution should be maintained at a constant level by the addition of water and shall be discarded when contaminated or when no longer effective.

R. White Spirit.

- (1) This is a light hydrocarbon cleaner used cold as an alternative to kerosine where cleaner surfaces and quicker drying properties are required.
- (2) White spirit should be used as supplied.
- (3) Application is by spray, brush or swabs.
- (4) The white spirit should be discarded when contaminated.



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S. Turco 4181.

- (1) This is a hot immersion alkaline cleaner and rust remover. It is suitable for use on steel and titanium metals.
- (2) The solution is generally used at a concentration of 2 lb per gallon (Imp.) (200 g/l) of water, but may be used at any concentration between 0.5 and 3.5 lb per gallon (Imp.) (50 and 350 g/l). The operating temperature should be between 82 and 90°C (185 and 195 °F).
- (3) Application is by immersion. The solution can be contained in a mild steel tank equipped with temperature control, agitation and a vapour exhaust system.
- (4) The solution should be renewed when it is no longer effective.

T. Turco 4338-C.

- (1) This is a strongly alkaline, highly oxidising, hot immersion type scale conditioner.
- (2) The solution is used at a concentration of 2 to 2.5 lb per gallon (Imp.) (200 to 250 g/l) of water. The operating temperature should be between 88 and 93 °C.
- (3) Application is by immersion. The solution can be contained in a stainless steel tank equipped with temperature control, agitation and a sludge tray.
- (4) The solution should be maintained at a constant level by the addition of water. The concentration of the solution can be restored by cooling the solution, then carefully sprinkling on the powder whilst agitating the tank. Control shall be according to the instructions of the controlling laboratory.

U. Turco 4931.

- (1) This is an acidic de-scaling solution for stainless steels and high temperature alloys.
- (2) The solution is used at a concentration of 14.4 oz per gallon (Imp.) (90 g/l) of water. The operating temperature should be between 49 and 54°C.

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- (3) Application is by immersion. The solution should be contained in a suitable acid resistant tank provided with a vapour exhaust system.
- (4) The solution should be renewed when it is no longer effective. Control shall be according to the instructions of the controlling laboratory.

V. Alkaline Permanganate.

- (1) This is a hot immersion type scale conditioner based on sodium hydroxide and potassium permanganate. It is used essentially on steels and heat resistant alloys for scale modifying purposes.

- (2) An aqueous solution should be made up as follows:

Sodium Hydroxide ... 0.8-1.2 lb/gall (80-120 g/l)

Potassium Permanganate ... 0.3-0.6 lb/gall (30-60 g/l)

The tank should be half filled with water and the required amount of Sodium Hydroxide added slowly and with constant stirring. When fully dissolved add the required amount of Potassium Permanganate and mix well. When fully dissolved fill tank to working level with water. The solution should be maintained between 85-95 deg.C.

- (3) Application is by immersion.
- (4) Solution control should be as follows:

Temperature check Daily.

Tank level check Beginning of each application.

Concentration check Weekly or when efficiency is reduced.

NaOH 0.8-1.2 lb/gall (80-120 g/l)

KMnO₄ 0.3-0.6 lb/gall (30-60 g/l)



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5. Vapour Degreasing

A. General.

(1) Vapour degreasing is a cleaning method where the component (at room temperature) is suspended in solvent vapour and the condensing vapour carries away oil and grease from the component surfaces. When the component reaches the vapour temperature the degreasing action ceases. If further degreasing is necessary the component must be removed from the vapour, allowed to cool to room temperature, then re-inserted in the vapour.

(2) Degreasing of aluminium and its alloys with chlorinated hydrocarbon solvents can, under certain conditions, lead to immediate local breakdown of the solvent with subsequent attack at metallic interfaces.

Risk of attack can be minimised by the use of non-metallic supports e.g. Polypropylene hooks, slings and baskets, prevention of contact interfaces as far as possible and the damping of all sources of vibration.

(3) The approved solvents for vapour degreasing are:

(a) Trichlorethylene (Triklone N) to BS.580:1963, Type 2.

(b) 1.1.1. Trichloroethane (Chlorothene VG) to MIL-T-81533A.

(c) Trifluorotrichloroethane to BS.4849.

(4) The degreasing plant shall be a standard vapour or liquid/vapour degreasing unit. Operation shall be in accordance with the manufacturers instructions. There must be a suitable indication of which type of solvent is contained in the plant. The solvent type shall not be changed without approval from the controlling laboratory.

(5) Control of the solvent shall be in accordance with the instructions of the controlling laboratory.

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B. Safety Precautions.

- (1) Operators shall wear protective clothing, including gloves and goggles or a face shield.
- (2) Personnel shall not inhale the vapours or smoke in the vicinity of the plant. Welding equipment, naked lights, steam cleaning equipment or other similar heat or flame generating equipment shall not be used in the vicinity of the plant.
- (3) In the event of accidental contamination of the skin or eyes, medical attention shall be sought immediately.

C. Procedure.

NOTE: Components manufactured from titanium alloy containing 5 per cent Al and 2.5 per cent Sn may require stress relieving prior to vapour degreasing. Such components shall be referred to the controlling laboratory.

- (1) Remove any gross contamination from the component using kerosine.
- (2) Load the component into a basket or a suitable sling, ensuring that any blind holes, cavities, etc are positioned to be self draining.

CAUTION: DO NOT PLACE WET, MOIST OR WARM COMPONENTS IN THE VAPOUR.

- (3) Lower the component slowly into the vapour.

CAUTION: DO NOT IMMERSE TITANIUM COMPONENTS IN THE VAPOUR FOR LONGER THAN 30 MIN TOTAL IN ANY ONE DEGREASING OPERATION, AND REMOVE ALL TRACES OF SOLVENT IMMEDIATELY AFTER REMOVING THESE COMPONENTS FROM THE VAPOUR.

- (4) When condensation ceases slowly remove the component from the vapour and allow to cool to room temperature.
- (5) Mop up any remaining traces of solvent using a clean, dry, lint-free cloth.
- (6) Repeat the preceding sequence of operations (preferably suspending the component in a different attitude each time) until all traces of contamination are removed.

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6. Swab Degreasing

A. General.

- (1) Swab degreasing is a method for cleaning specific areas of a component by means of a swab soaked with unheated approved solvent.
- (2) The list of approved solvents for swab degreasing are given in Table 214C - Approved Solvents.

B. Safety Precautions.

- (1) Operators shall wear protective clothing, including gloves and goggles or a face shield.
- (2) Personnel shall not inhale the vapour or smoke in the vicinity of the degreasing area. Welding equipment, naked lights, steam cleaning or other similar heat or flame generating equipment shall not be used in the vicinity of the degreasing area.
- (3) In the event of accidental contamination of the skin or eyes, medical attention shall be sought immediately.

C. Procedure.

- (1) Moisten a clean lint-free cloth with cold approved solvent (Ref. Table 214C).

NOTE: Use of a dispenser that allows the degreasing agent to run on to the cloth is recommended to avoid contaminating the bulk of the liquid.

- (2) Swab the area to be degreased with the moistened cloth and use a fresh cloth for each separate degreasing operation.
- (3) Dispose of soiled cloths after use.

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MATERIAL	SPECIFICATION	APPROVED BRANDS
<u>Solvents</u>		
Group 1	OMat No.1/257	Desoclean 45 (PD680 Type 1)
	OMat No.1/257A	Desoclean 20
	OMat No.1/257B	Applied 8-300
	OMat No.1/257C	Applied 8-000
	OMat No.1/257D	Ardrox 5548
	OMat No.1/257E	MS 38
	OMat No.1/257F	MS 56
	OMat No.1/257G	Lotoxane
	OMat No.1/257H	Lotoxane Fast
	OMat No.1/260 (Odourless Kerosine)	-
	OMat No.102A	Stoddards Solvent (PD-680 Type 1)
	OMat No.102B	Safranor
	OMat No.1/270	Turco 6646
	OMat No.1/270A	Ardrox 161-K
	OMat No.1/267	Lemsolv
Group 2	OMat No.150 (Acetone)	-
	OMat No.135 (M.E.K.)	-
Group 3	OMat No.1/257J	Primaclean 3650
Group 4	OMat No.1/140A (Isopropyl alcohol)	-
	OMat No.155A (Methylated spirits)	-
Group 5	OMat No.169 (Methylene chloride)	-

Approved Solvents
Table 214C

1

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7. Temporary Protection of Bearings

A. General.

- (1) A 14 day temporary corrosion protection should be applied to all bearings after cleaning then placed in clean polythene or PVC bags with date and identification.
- (2) Bearings which have been subject to unavoidable delays and the temporary protection limit expired shall be referred to Inspection before proceeding with the cleaning operation. For periods greater than 14 days and less than 3 months protect the bearings as detailed in table 204 sequence 6 and 205 sequence 8.
- (3) Bearings and journals which are not disassembled from their shafts shall receive the same protective treatment, but as it is not always possible to immerse the complete shaft in a protective solution it can be applied by brush.

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8. Ultrasonic Cleaning

A. General.

- (1) The ultrasonic cleaning process supplements the normal, conventional cleaning methods and is employed as a final stage in the cleaning of parts where a high degree of cleanliness is required on all metals and other hard surface materials.
- (2) The controlling laboratory must be referred to for process approval as some of the chemicals and processes may be hazardous to health and/or safety.

B. Cleaning Solutions.

Cleaning solutions are classified as either solvent, aqueous or alkaline types. Where components carry a high risk of debris entrapment a digestive type of solution, ammoniated citric acid solution is recommended (refer to para.D). The Controlling Laboratory must be consulted as to the type of cleaning solution to be used for a component.

(1) Solvent Type.

- (a) Trichloroethylene (TRIKLONE N) BS580 type 2.
- (b) White spirit.

(2) Aqueous Detergent Type.

- (a) 1% max v/v Synperonic N in water.



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(3) Alkaline.

(a) 1 to 3% v/v Ardrex 185 in water.

NOTE: Alternative solutions may be used with the written approval of the Controlling Laboratory.

C. Procedure.

- (1) The ultrasonic cleaning plant shall be operated strictly in accordance with the manufacturers instructions.
- (2) The preferred cleaning frequency shall be in the 20 Kcs range.
- (3) Components shall be suspended in the solution so as to ensure that internal passages are filled by the cleaning solution and positioned so that the main passages are vertical to the base of the transducer tank. Where a passage varies in size the larger diameter should be positioned facing the transducer.
- (4) Only one layer of components should be cleaned at any one time as ultrasonic waves will be absorbed in large masses.
- (5) Components shall be subjected to the cleaning process for approximately 2/10 minutes, depending on the size and complexity.
- (6) Reposition those components having more than one internal passage to ensure they have been in the vertical position for at least one cleaning period.
- (7) After cleaning, components which have been immersed in non-aqueous solvents may be allowed to air dry. Components cleaned in alkaline or detergent type solutions shall be washed in water to remove all traces of solution, then air dried after immersion in hot water heated to 90 deg.C minimum temperature.

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- (8) Ultrasonically cleaned components shall then be protected against further contamination and corrosion by wrapping the component in VP1 paper enclosed in a polythene bag. If the components are not required for immediate use also enclose the part number.

D. Ammoniated Citric Acid Solution.

- (1) Grant and West 650.
(2) Oakite MOR.

These concentrates are used at a strength between 5 and 10% by volume, the diluent shall be distilled or demineralised water. Ammonium hydroxide shall be used to adjust the pH value of the solutions to between 3.5 and 4.0.

- (3) SDG.3.

This is an aqueous solution containing, Citric Acid
($\text{HOC/CH}_2\text{CO}_2\text{H H}_2\text{O}$) 2.0 g/l
Ethylene Diamine Tetra (Acetic Acid-EDTA)
($\text{CH}_2\text{N}(\text{CH}_2\text{COOH})_2$) 2 1.0 g/l
Non-ionic Surface Active Agent 1.0 ml/l
i.e. Synperonic N containing 20%
active agent 5.0 ml/l
(Ammonium Hydroxide (NH_4OH) or) sufficient to adjust
(Sodium Carbonate (Na_2CO_3)) pH value to between
3.5 and
4.0

Distilled or de-ionised water for balance.

E. Procedure.

- (1) One litre of the solution shall be made up as follows:
Heat 900 ml of water to 45/50 deg.C. Add 2g of Citric Acid stirring until dissolved, then 1g of Edta stirring until dissolved. Add 5 ml of Synperonic N, stirring until dispersed.
- (2) Cool the solution to room temperature and adjust the pH value by the addition of ammonium hydroxide or sodium carbonate solution. Adjust the volume to 1 litre with water.
- (3) Temperature.

For maximum efficiency the solutions used should be hot but a maximum temperature of 60 deg.C should not be exceeded for Grant and West 650 or Oakite MOR, and 65/70 deg.C for SDG3.

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F. Control.



Solutions must be analysed and maintained by suitable additions including controlling the pH value within the recommended limits. Alternatively the solution may be discarded at the discretion of the local Controlling Laboratory.

9. Coating Identification Markings

A. General.

- (1) Coating symbols are used to identify engine components that have been salvaged by using a hard coating or plating to restore them to a serviceable condition. Unless coatings are identified, cleaning fluids that can safely be used on uncoated components could remove or degrade the coating, making the component unserviceable.
- (2) Table 215 contains a list of coatings used for repair and the codes used to identify them. Table 216 contains a list of suitable cleaning processes for various combinations of coating and component material.
- (3) When the component cannot satisfactorily be cleaned using a process as listed in Table 216, then it may be necessary to employ one likely to affect the coating. Therefore it must be assumed that the coating will be damaged and must be replaced. Where instructions are not included in the manual, the advice of Rolls-Royce plc must be sought.
- (4) The effect of the cleaning process specified for the component must be assessed before cleaning (Refer to Table 216).

B. Application.

- (1) The existence of a coating is denoted by a diamond symbol .
- (2) A two-letter code inside the diamond identifies the coating (Ref. Tables 215 and 216). For example,  denotes a nickel chromium aluminium coating (Metco 443).

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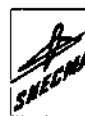
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CODE	COATING TYPE	PROPRIETARY NAME
AB	Aluminium/Bronze	Metco 445
AL	Aluminium	Aluminium
CC	Cobalt/Chromium Carbide	Tribomet
CM	Cobalt/Molybdenum/Chromium	LDT 400
CN	Chromium Carbide/Nichrome	LC18
CO	Cobalt Base Alloy	Stellite 31
CR	Chromium	Electroplated Chromium
CU	Copper	Electroplated Copper
EA	Alumina	Metco 105
FS	13% Chromium Steel	Metcoloy 2
GA	Aluminium Graphite	Metco 313
HA	Nickel Aluminide	Metco 405, 447, 450
HC	Nickel Chromium Aluminium	Metco 443
HD	Filled Epoxy Resin	Eccobond 104
KA	Nickel Chromium	Nichrome
MC	Co Ni Cr AL Y	Amdry 995/47, 963
MO	Molybdenum	Metco 63NS
NC	Nickel/Cobalt	Brush Plated Nickel Cobalt
NG	Nickel Graphite	Sherrit Gordon
NI	Nickel	Electroplated Nickel
NP	Nickel Phosphorus	Electroless Nickel Plate
WC	Tungsten Carbide-Cobalt	Metco 72NS, 73F, LWIN40
ZR	Zirconium	

Table 215

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CODE	COATING TYPE	COMPONENT MATERIAL	CLEANING PROCESSES
AB	Aluminium/Bronze	Aluminium Alloy	A, B, G
AL	Aluminium	Aluminium Alloy	A, B, G
CC	Cobalt/Chromium Carbide	Steel, Heat Resisting Alloy	A, B, G
CC	Cobalt/Chromium Carbide	Aluminium	A, B, G
CM	Cobalt/Molybdenum/Chromium	Waspaloy	H, K
CN	Chromium Carbide/Nichrome	Steel, Heat Resisting Alloy	A, B, F, G, H, J, M
CO	Cobalt Base Alloy	Steel, Heat Resisting Alloy	A, B, F, G, H, J, K, M
CR	Chromium Plating	Steel, Heat Resisting Alloy	A, B, F, G, H, J, M
CU	Copper Plating	Steel, Heat Resisting Alloy	A, B, G
EA	Alumina	Steel	A, B, G
FS	13% Chromium Steel	Heat Resisting Alloy	A, B, G
GA	Aluminium Graphite	All Materials	A, B
HA	Nickel Aluminide	Steel, Heat Resisting Alloy	A, B, F, G, H, K
HA	Nickel Aluminide	Titanium	A, B, C
HC	Nickel Chromium Aluminium	Steel, Heat Resisting Alloy	A, B, G
HD	Filled Epoxy Resin	Magnesium and Aluminium Alloy	A, B

Cleaning Processes
Table 216 (continued)CLEANING
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CODE	COATING TYPE	COMPONENT MATERIAL	CLEANING PROCESSES
KA	Nickel Chromium	Heat Resisting Alloy	A, B, F, G, H, J
MC	Co Ni Cr Al Y	Heat Resisting Alloy	A, B, G
MO	Molybdenum	Heat Resisting Alloy	F, H
NC	Nickel/Cobalt	Heat Resisting Alloy	A, B, G, L (Method 3)
NG	Nickel Graphite	Steel	A, B, G
NI	Nickel Plating	Steel, Heat Resisting Alloy	A, B, G, L (Method 3)
NP	Nickel Phosphorus	Steel, Heat Resisting Alloy	A, B, G, L (Method 3)
WC	Tungsten Carbide Cobalt	Steel	A, B, F, G, H, J
WC	Tungsten Carbide Cobalt	Titanium	A, B, C
ZR	Zirconium	Steel	A, B, F, G, H, J, L (Method 1)

Cleaning Processes
Table 216 (concluded)CLEANING
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AIR INTAKE FAIRING - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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sneema

OVERHAUL

- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	-	Fairings fitted with damper springs must have all the glass cloth tape removed from the flare of the plunged hole in the inner skin

Cleaning Processes
Table 201

CLEANING

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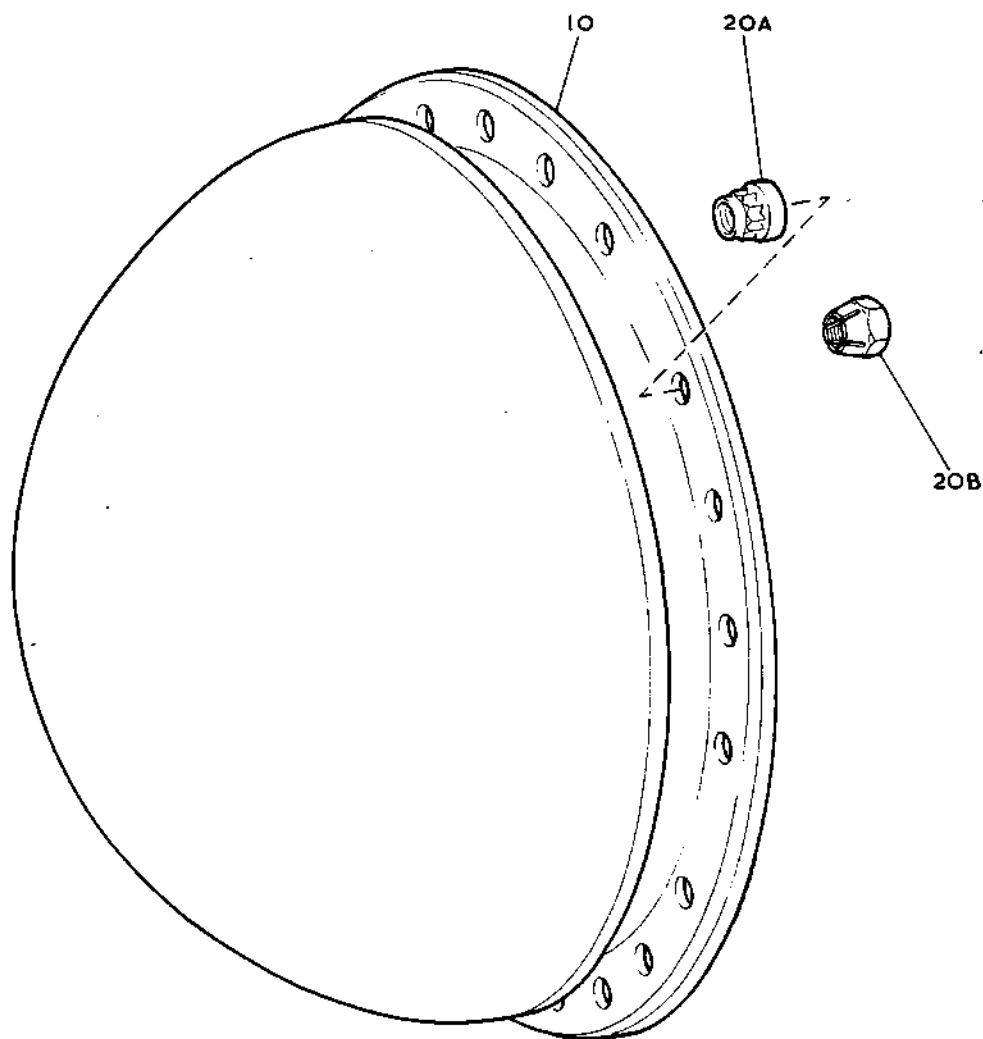
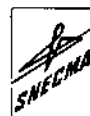
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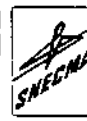
Fairing - Air Intake
Figure 201



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AIR INTAKE CASE - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00
Cleaning for details of the cleaning processes referred
to in Table 201.
- B. To ensure that all items within this breakdown that
require cleaning and subsequent Inspection/Check are
recognized, and identified by their Part Number, figures
are provided which equate with the Illustrated Parts
Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with
the relevant Figure and Item Number in the same breakdown
in the I.P.C. Items illustrated in the I.P.C. which are
not illustrated in this breakdown, are those items which
are either discarded at overhaul, or are normally assembled
to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the
figures, Table 201 does not list all items, but deals
collectively with the items requiring the same cleaning
process.
- D. On receipt of the items from disassembly, all protective
blanks, covers etc. deemed necessary for the protection
of the items will have been assembled and, in addition,
many of the items will arrive in containers. Any special
containers, blanks, covers etc. are listed in Table 202
by their Tool Ref. No. (Tool 123). For the manufacturer's
Part No. refer to the appropriate Table in Special Tools,
Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N,
INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COM-
PONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY
COATINGS. THE NITRIC ACID USED IN PROCESSES J, L
AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME
TYPES OF COATING, MAKING REPLACEMENT OF THE COATING
NECESSARY.

- A. All blanks, covers etc. must be removed from the items
prior to cleaning and reassembled immediately afterwards.
Items received in special cleaning containers should remain
therein during the cleaning procedures unless otherwise
stated.

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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	-	-
	except				
	40	Flange	B	C or N	-
	110	Baffle	B	C or N	-
	60	Baffle	A or B	L	-
202	ALL		A or B	-	-
	except				
	10	Flange	A or B	L	-
	50	Tube	A or B	L	-
	70	Clamp, seal	A or B	L	-
	150	Tube	A or B	L	-
	180	Tube	A or B	L	-
	190	Tube	A or B	L	-
203	10	Case assembly	B	C or N	-

Cleaning Processes
Table 201 (Continued)

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
204	All except		A or B	-	-
	50	Bracket	B	C or N	-
	80	Bracket	B	C or N	-
	110	Bracket	B	C or N	-
	140	Bracket	B	C or N	-
	170	Bracket	B	C or N	-
	200	Bracket	B	C or N	-
	210	Bracket	B	C or N	-
	240	Bracket	B	C or N	-
	290	Bracket	B	C or N	-

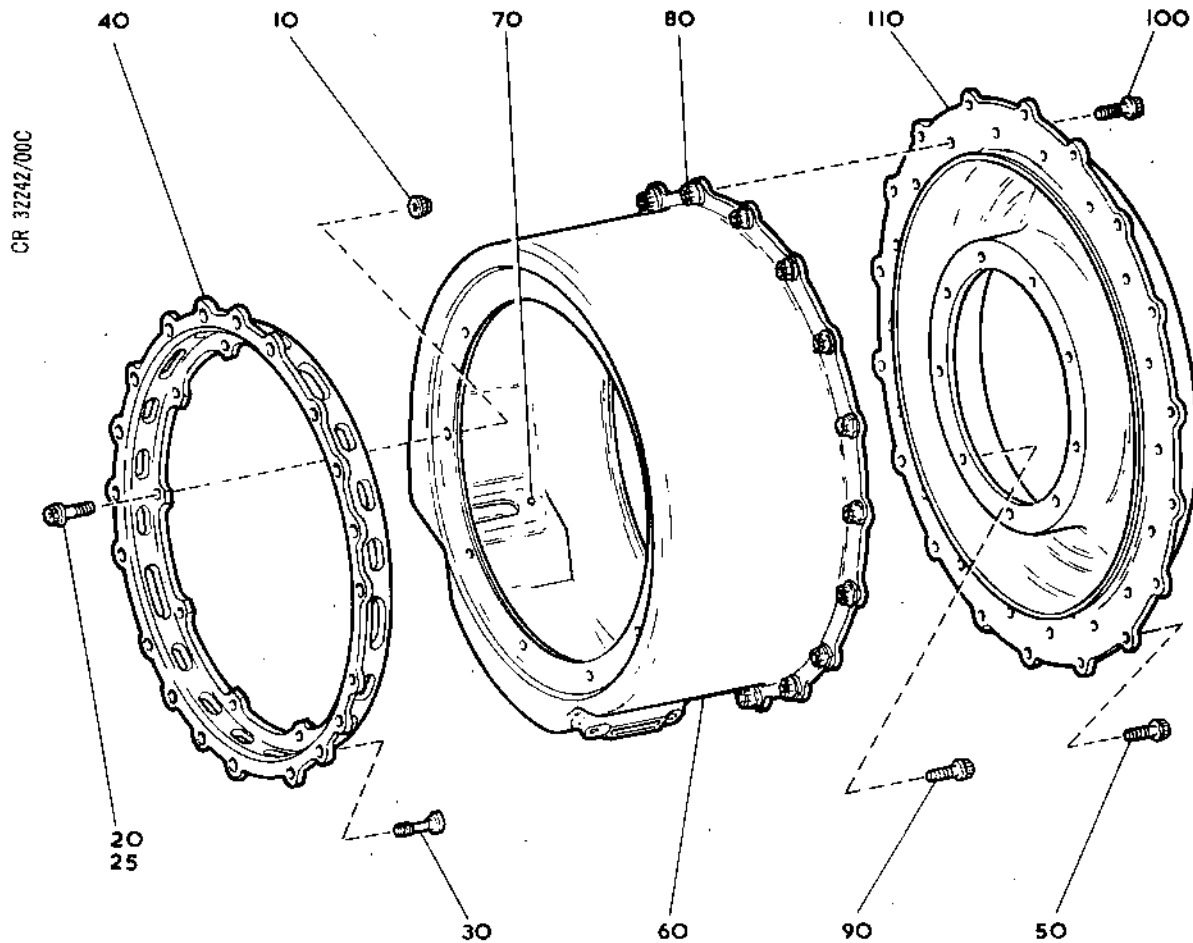
Cleaning Processes
Table 201 (Concluded)

FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
203	10	Case, air intake	1446	-

Cleaning and Storage Tools
Table 202



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Baffles and Flange - Air Intake Case
Figure 201

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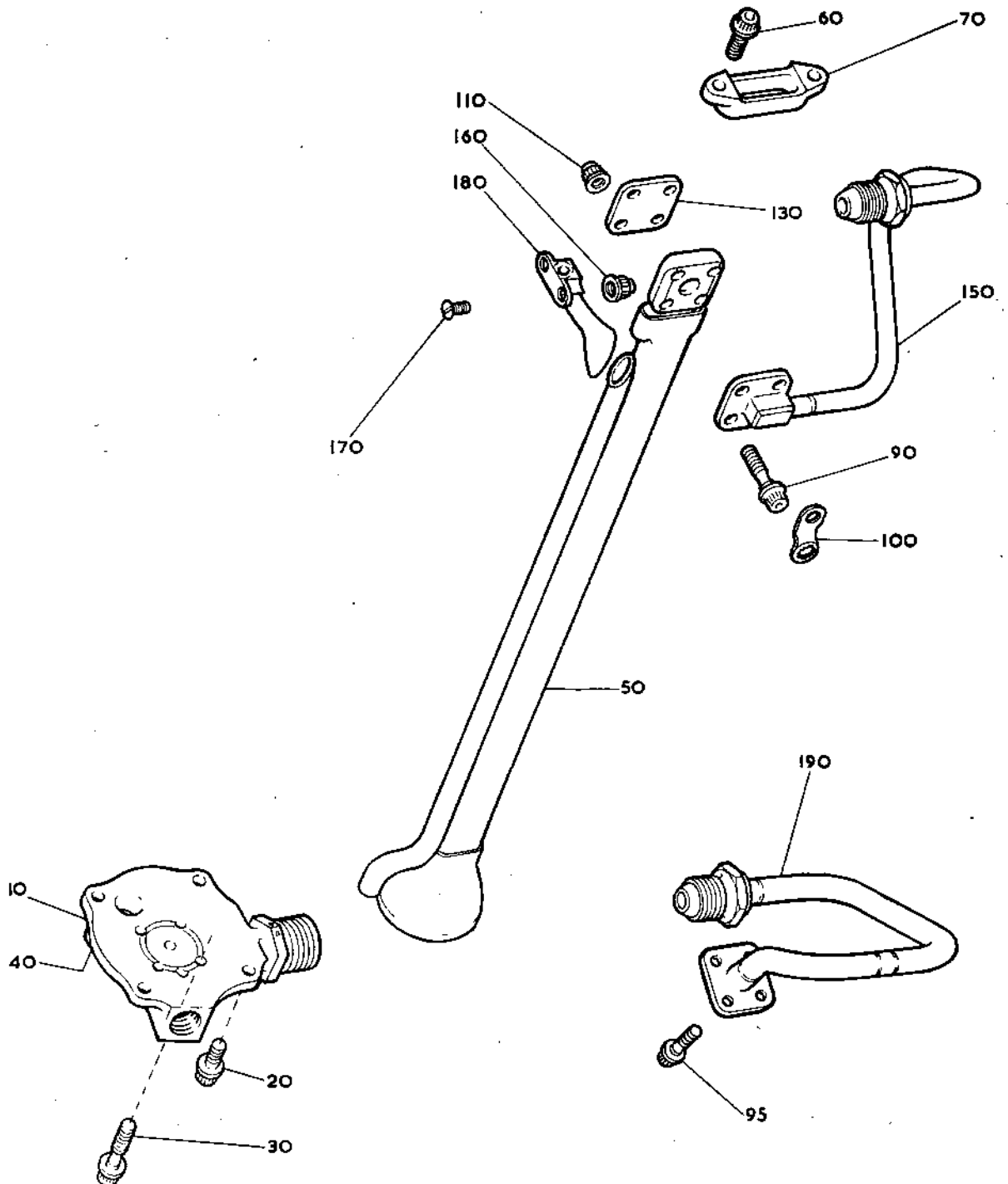
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Oil Tubes - Air Intake Case
Figure 202

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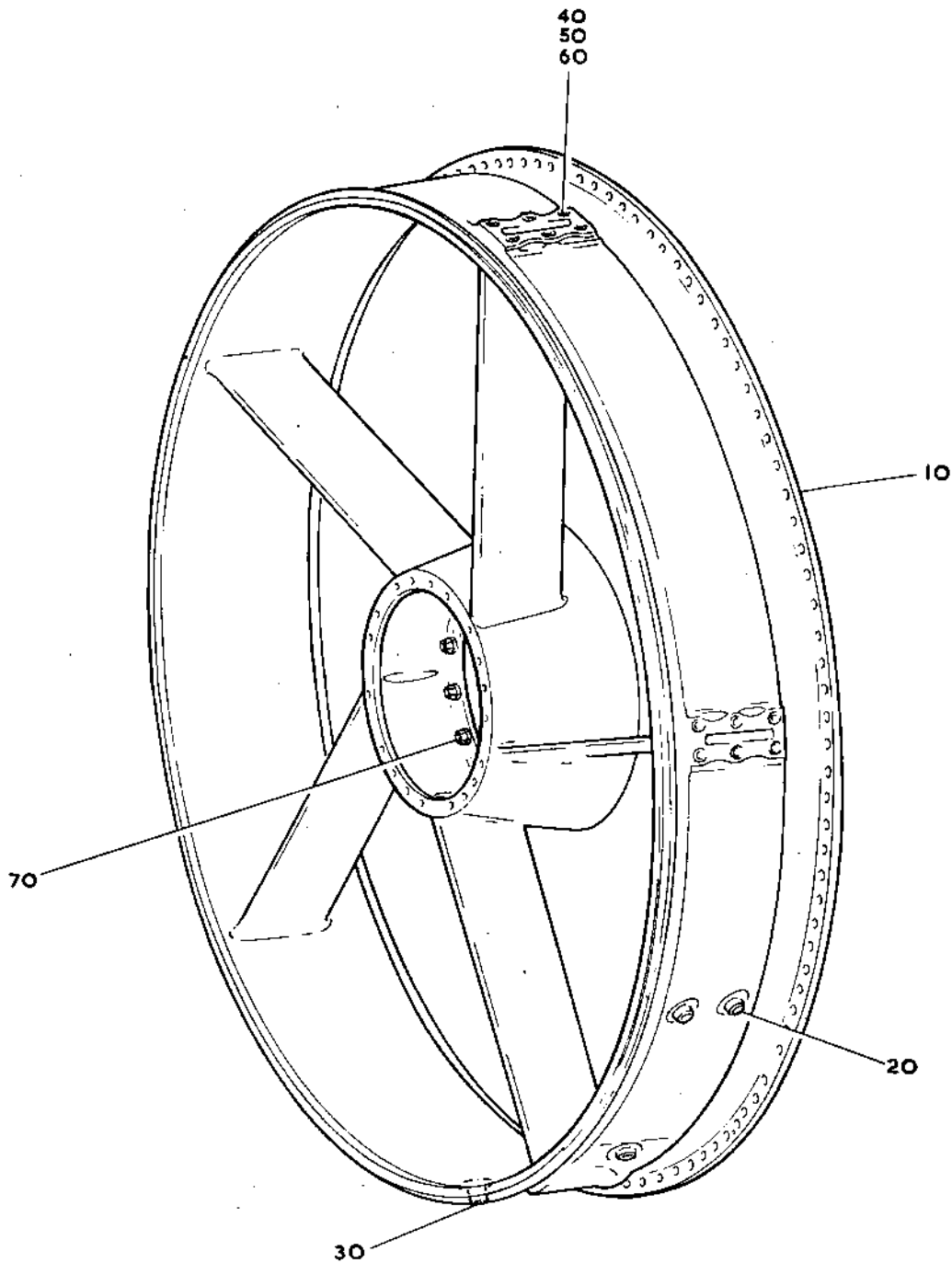


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Case - Air Intake
Figure 203

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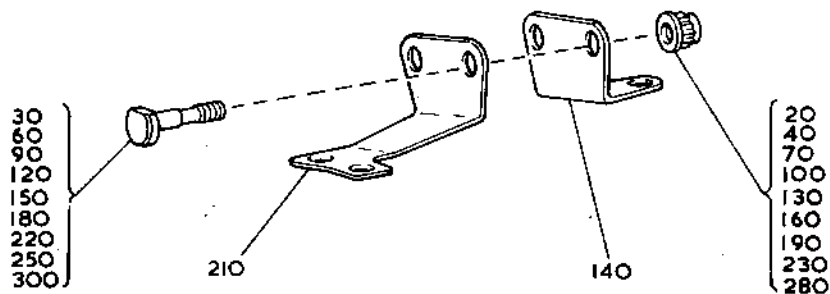
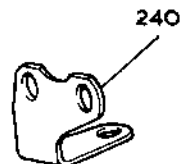
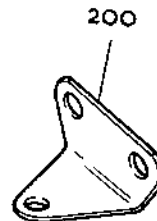
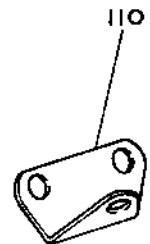
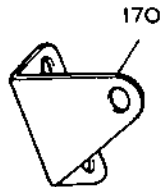
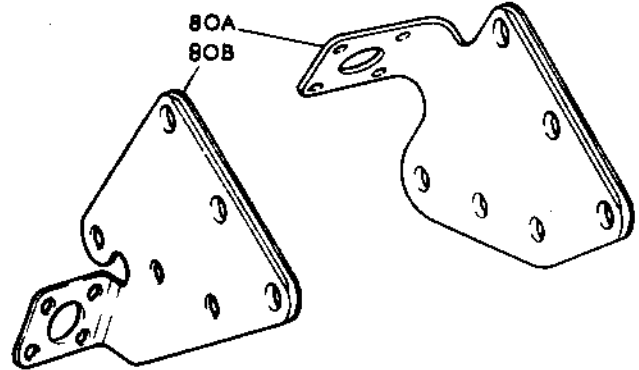
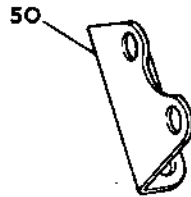
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Attaching Parts - Air Intake Case
Figure 204

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LP COMPRESSOR ROTOR FRONT BEARING SUPPORT - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	-	-
	except 80	Bearing, outer, LP compressor rotor front	D	E	-

Cleaning Processes
Table 201

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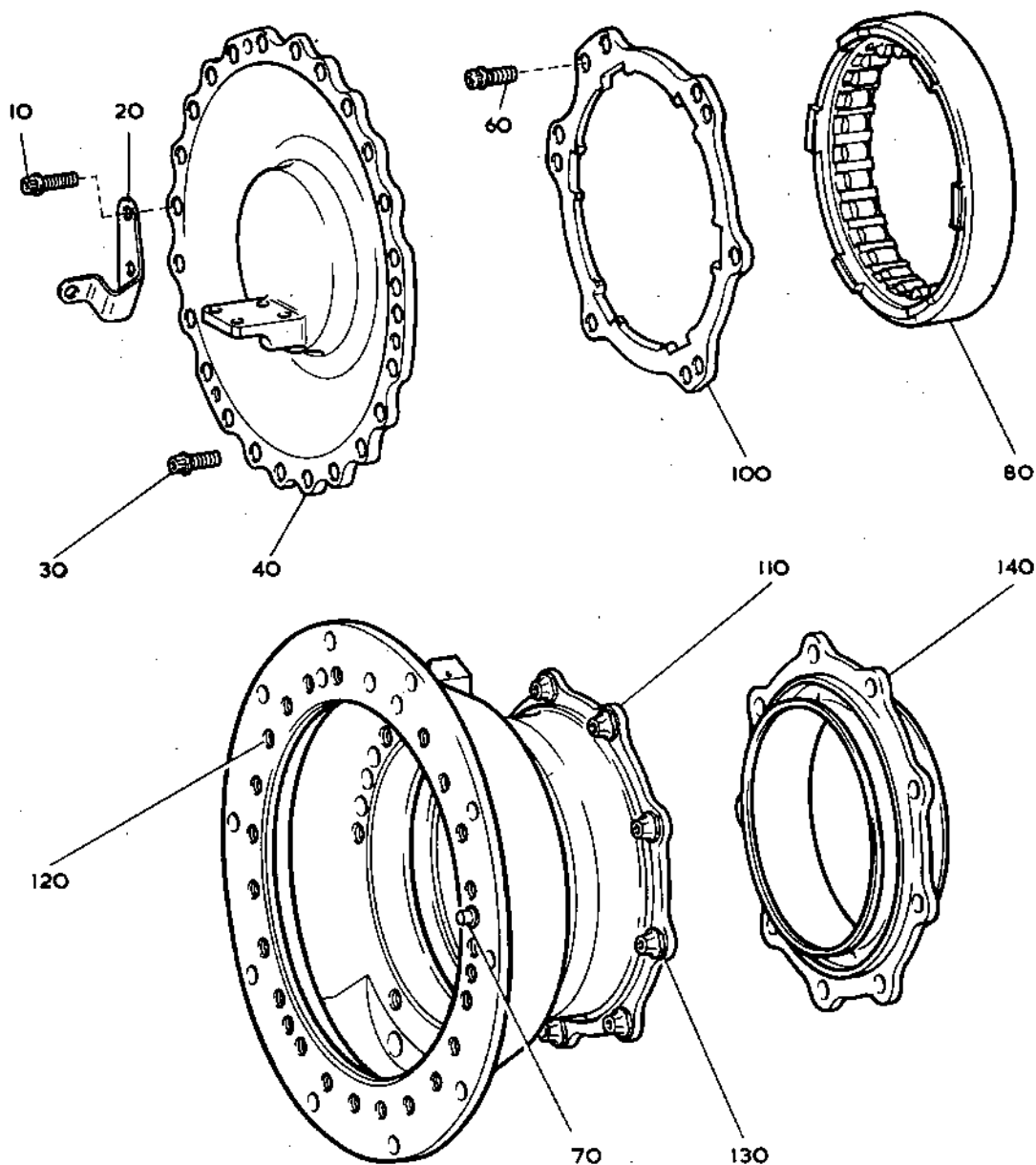
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LP Compressor, Rotor Support Front Bearing
Figure 201

CLEANING

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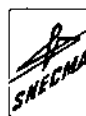
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LP COMPRESSOR CASE AND VANES - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00
Cleaning for details of the cleaning processes referred
to in Table 201.
- B. To ensure that all items within this breakdown that
require cleaning and subsequent Inspection/Check are
recognized, and identified by their Part Number, figures
are provided which equate with the Illustrated Parts
Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with
the relevant Figure and Item Number in the same breakdown
in the I.P.C. Items illustrated in the I.P.C. which are
not illustrated in this breakdown, are those items which
are either discarded at overhaul, or are normally assembled
to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the
figures, Table 201 does not list all items, but deals
collectively with the items requiring the same cleaning
process.
- D. On receipt of the items from disassembly, all protective
blanks, covers etc. deemed necessary for the protection
of the items will have been assembled and, in addition,
many of the items will arrive in containers. Any special
containers, blanks, covers etc. are listed in Table 202
by their Tool Ref. No. (Tool 123). For the manufacturer's
Part No. refer to the appropriate Table in Special Tools,
Fixtures and Equipment Section.

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CLEANING

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2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	140	Bolt	A or B	G	-
	160	Bolt	A or B	G	-
	330	Bolt	A or B	G	-
	350	Bolt	A or B	G	-
	90	Piece, retaining	C	N	Remove heavy fret- ting by process N. Process N will re- move coatings.
	100	Vane, compressor, LP, stage 1	C	N	
	110	Vane, compressor, LP, stage 1 (bolted)	C	N	
	120	Vane, compressor, LP, stage 1 (probe)	C	N	
	170	Plate, labyrinth retaining	C	N	
	180	Ring, vane fixing	C	N	
	194	Liner, front	A or B	M	
	196	Liner, rear	A or B	M	
202	ALL except		A or B	-	-
	280	Piece, retaining	C	N	

Cleaning Processes
Table 201 (Continued)



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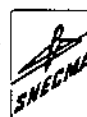


FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
202	290	Vane, compressor, LP stage 2	C	N	
	300	Vane, compressor, LP, stage 2 (bolted)	C	N	
	310	Vane, compressor, LP, stage 2 (probe)	C	N	
	360	Plate, labyrinth retaining	C	N	Remove heavy fretting by process N. Pro- cess N will remove coatings.
	370	Ring, vane fixing	C	N	
	380	Ring, labyrinth	C	N	
	390	Liner, front	A or B	M	
	400	Liner, rear	A or B	M	
203	ALL except		A or B	-	-
	150	Bolt	A or B	G	-
	170	Bolt	A or B	G	-
	350	Bolt	A or B	G	-
	370	Bolt	A or B	G	-
	90	Piece, retaining	C	N	Remove heavy fretting by process N. Pro- cess N will remove coatings.
	100	Vane, compressor, LP, stage 3	C	N	
	110	Vane, compressor, LP, stage 3 (bolted)	C	N	
	120	Vane, compressor, LP, stage 3 (bolted)	C	N	
	130	Vane, compressor, LP, stage 3 (probe)	C	N	
	180	Plate, labyrinth retaining	C	N	
	190	Ring, vane fixing	C	N	
	204	Liner, front	A or B	M	
	206	Liner, rear	A or B	M	
	204	ALL except	A or B	-	-
	290	Piece, retaining	C	N	

Cleaning Processes
Table 201 (Continued)

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
204	300	Vane, compressor, LP, stage 4	C	N	
	310	Vane, compressor, LP, stage 4 (bolted)	C	N	
	320	Vane, compressor, LP, stage 4 (bolted)	C	N	
	330	Vane, compressor, LP, stage 4 (probe)	C	N	
	380	Plate, labyrinth retaining	C	N	
	390	Ring, vane fixing	C	N	
	410	Liner, front	A or B	M	
	420	Liner, rear	A or B	M	
205	ALL except		A or B	-	-
	150	Bolt	A or B	G	-
	170	Bolt	A or B	G	-
	350	Bolt	A or B	G	-
	370	Bolt	A or B	G	-
	90	Piece, retaining	C	N	Remove heavy fret- ting by process N. Process N will remove coatings.
	100	Vane, compressor, LP, stage 5	C	N	
	110	Vane, compressor, LP, stage 5 (bolted)	C	N	
	120	Vane, compressor, LP, stage 5 (bolted)	C	N	
	130	Vane, compressor, LP, stage 5 (probe)	C	N	
	180	Plate, labyrinth retaining	C	N	
	190	Ring, vane fixing	C	N	
	204	Liner, front	A or B	M	
	206	Liner, rear	A or B	M	

CLEANING

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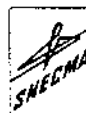
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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
206	ALL except		A or B	-	-
	290	Piece, retaining	C	N	
	300	Vane, compressor, LP, stage 6	C	N	
	310	Vane, compressor, LP, stage 6 (bolted)	C	N	
	320	Vane, compressor, LP, stage 6 (bolted)	C	N	
	330	Vane, compressor, LP, stage 6 (probe)	C	N	
	380	Plate, labyrinth retaining	C	N	
	390	Ring, vane fixing	C	N	
	410	Liner, front	A or B	M	
	420	Liner, rear	A or B	M	
207	ALL except		A or B	-	-
	100	Bracket, angle	B	C or N	-
	125	Bracket, mounting	B	C or N	-
	260	Bracket, plate mounting	B	C or N	-
	490	Bracket	B	C or N	-
	70	Bracket, mounting	A or B	L	-
	320	Connector, flanged	A or B	L	-
	330	Strut, support	A or B	L	-
	430	Bracket	A or B	L	-
	440	Lug, support	A or B	L	-
	460	Bolt, shoulder	A or B	L	-

Cleaning Processes
Table 201 (Continued)

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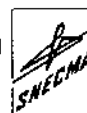


FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
I 208	ALL		A or B	-	-
	except				
	30	Bracket	B	C or N	-
	60	Bracket	B	C or N	-
	110	Bracket	B	C or N	-
	140	Bracket	B	C or N	-
	180	Bracket	B	C or N	-
	190	Bracket	B	C or N	-
	200	Bracket	B	C or N	-
	230	Bracket	B	C or N	-
	300	Bracket	B	C or N	-
	360	Bracket	B	C or N	-
	410	Bracket	B	C or N	-
	530	Bracket	B	C or N	-
	560	Bracket	B	C or N	-
	590	Bracket	B	C or N	-
	420	Bracket	A or B	L	-
	490	Bracket	A or B	L	-
	500	Bracket	A or B	L	-
I 209	ALL		A or B	-	-
	except				
	96	Bracket	B	C or N	-
	220	Bracket	B	C or N	-
	230	Bracket	B	C or N	-
	270	Bracket	B	C or N	-
	280	Bracket	B	C or N	-
	330	Bracket	B	C or N	-
	340	Bracket	B	C or N	-
	410	Bracket	B	C or N	-
	30	Pin	A or B	L	-
	40	Bracket	A or B	L	-
	98	Blanking, plate	A or B	L	-
	100	Case, compressor	A or B	L	-
	120	Retaining, plate	A or B	L	-
	180	Bracket	A or B	L	-
	210	Bracket	A or B	L	-
	380	Bracket	A or B	L	-

Cleaning Processes
Table 201 (Concluded)

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OVERHAUL

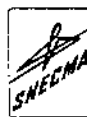


FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	100	Vane, compressor, LP,	1377	
	110	stage 1		
	120			
	180/190	Ring, vane fixing/ labyrinth, stage 1	1440*	
202	290	Vane, compressor, LP,	1376	
	300	stage 2		
	310			
	370/380	Ring, vane fixing/ labyrinth, stage 2	1440*	
203	100			
	110	Vane, compressor, LP,	1375	
	120	stage 3		
	130			
	190/200	Ring, vane fixing/ labyrinth, stage 3	1440*	
204	300			
	310	Vane, compressor, LP,	1391	
	320	stage 4		
	330			
	390/400	Ring, vane fixing/ labyrinth, stage 4	1440*	
205	100	Vane, compressor, LP,	1392	
	110	stage 5		
	120			
	190/200	Ring, vane fixing/ labyrinth, stage 5	1440*	
206	300			
	310	Vane, compressor, LP,	1393	
	320	stage 6		
	330			
	390/400	Ring, vane fixing/ labyrinth, stage 6	1440*	
207	100	Case, compressor, LP	1427	

* Composite container for all stages of rings

Cleaning and Storage Tools
Table 202

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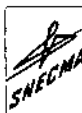
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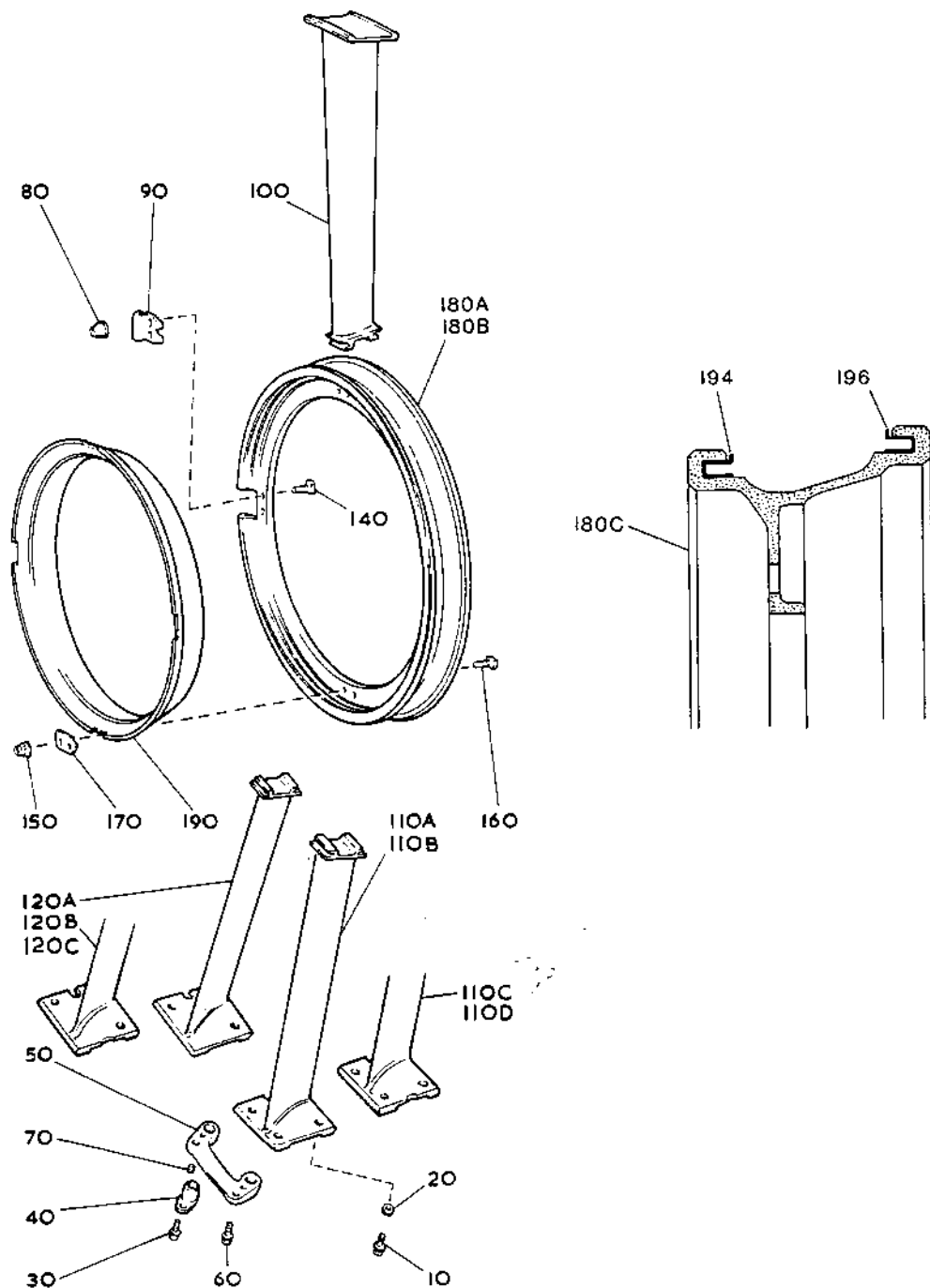
OLYMPUS 593

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CR 32241/000D



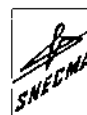
LP Compressor - Case and Vanes.
Vanes, Stage 1
Figure 201



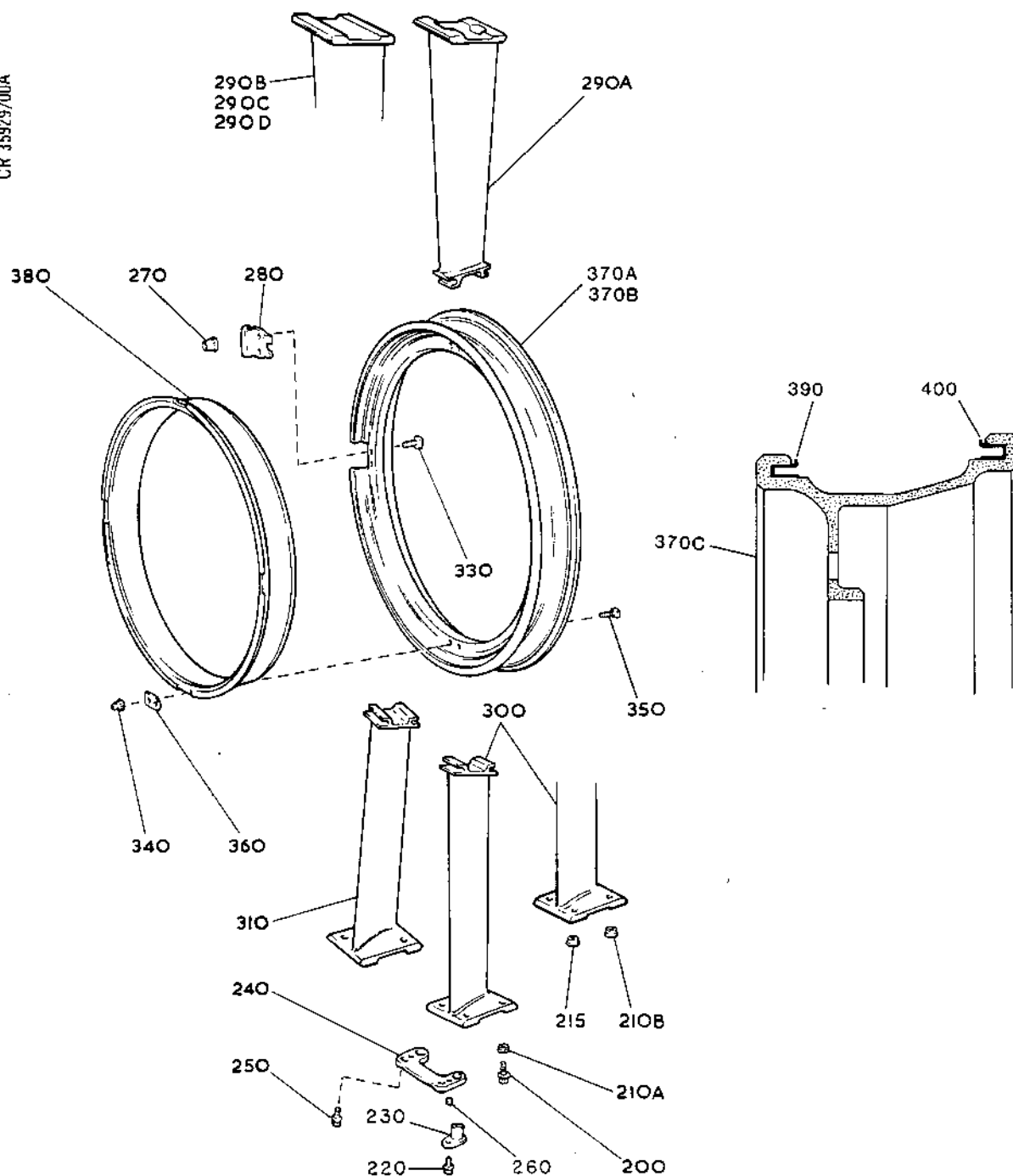
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OVERHAUL



CR 35929/00A



LP Compressor - Case and Vanes.
Vanes, Stage 2
Figure 202

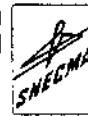
CLEANING
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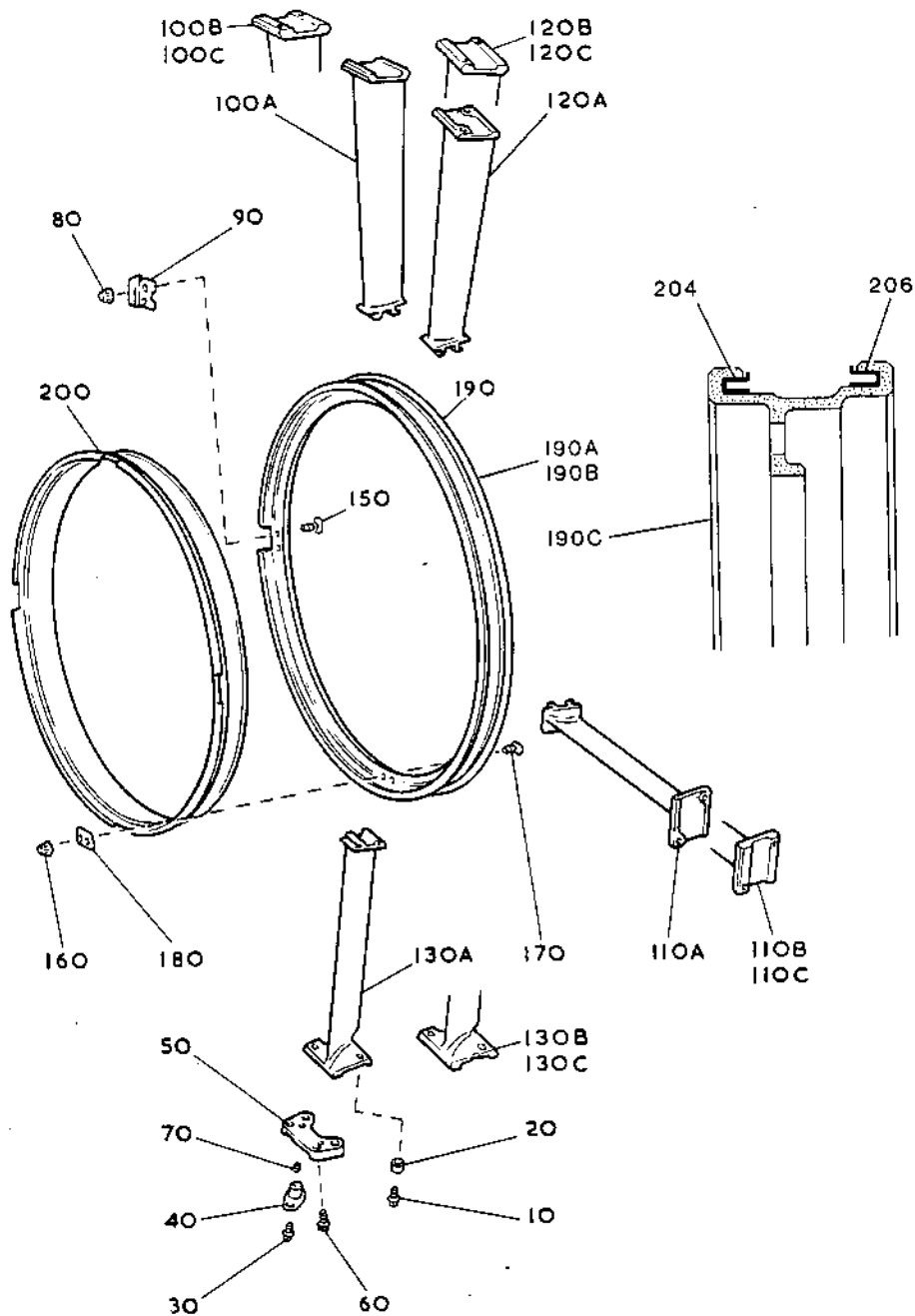


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OVERHAUL



CR 32252/00D



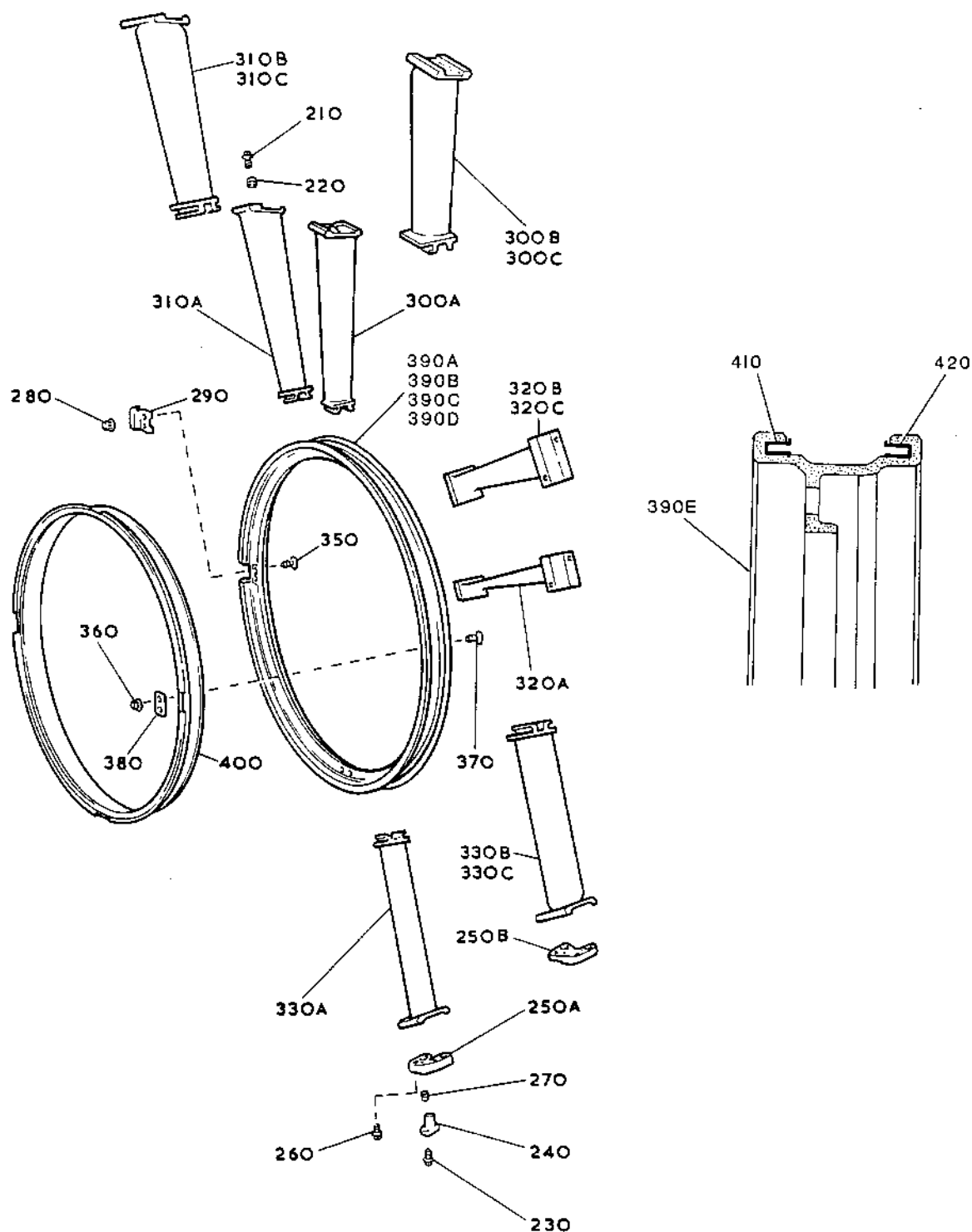
LP Compressor - Case and Vanes.
Vanes, Stage 3
Figure 203

CR 35930/00A



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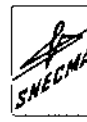
MK.601-14-28
OVERHAUL



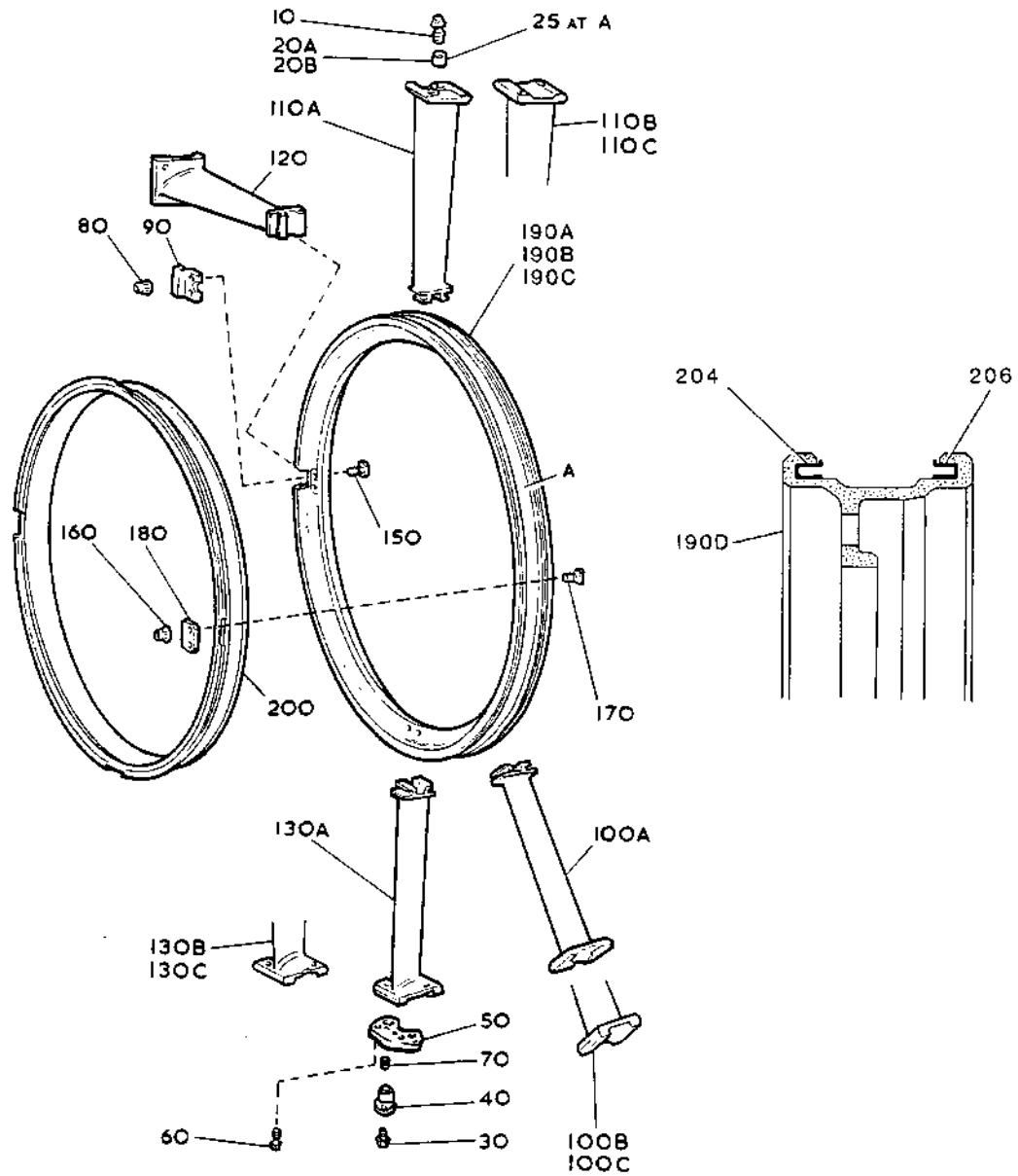
LP Compressor - Case and Vanes.
Vanes, Stage 4
Figure 204



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CR 32251/000



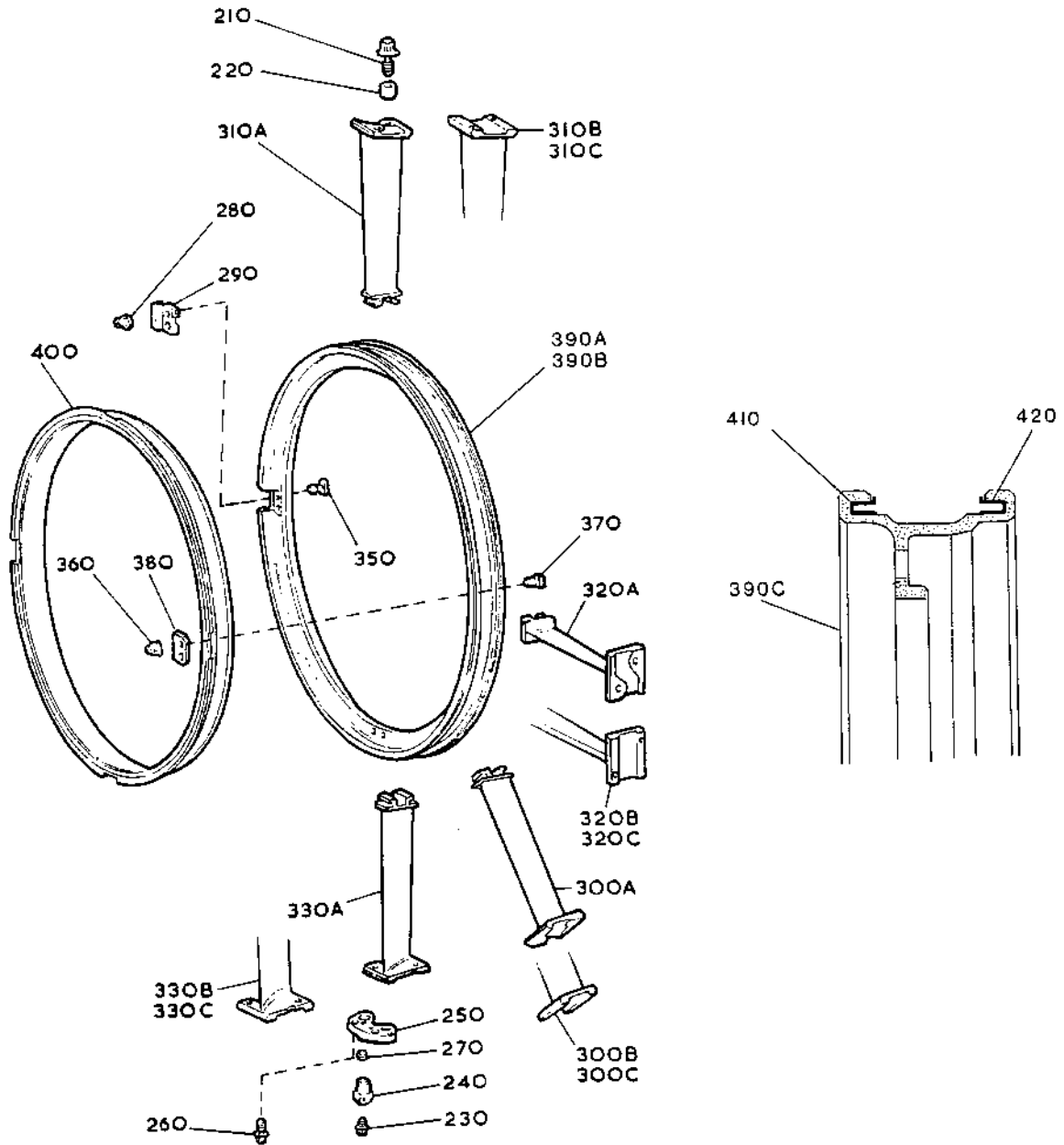
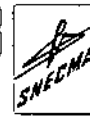
LP Compressor - Case and Vanes.
Vanes, Stage 5
Figure 205

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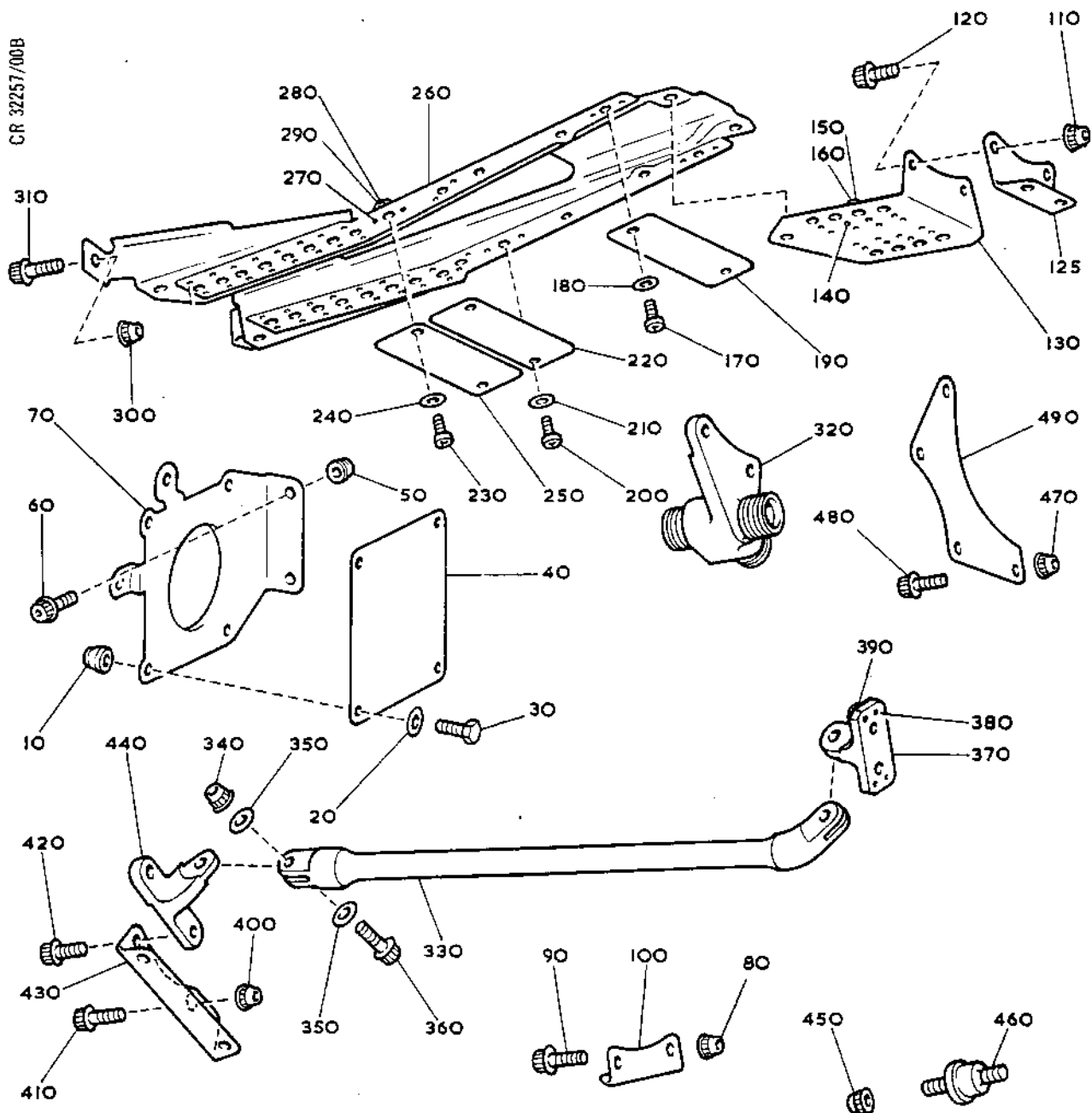
LP Compressor - Case and Vanes.
Vanes, Stage 6
Figure 206



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LP Compressor - Case and Vanes
Front Blow-off Flange Fittings
Figure 207



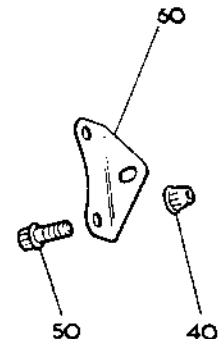
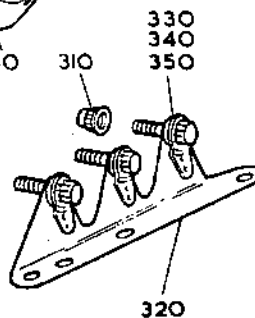
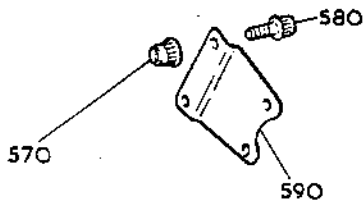
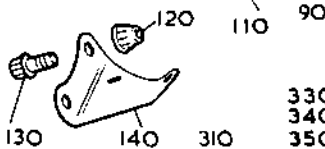
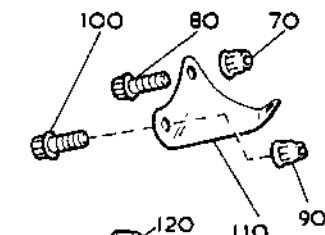
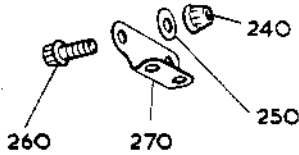
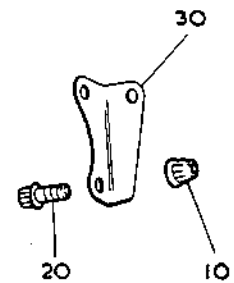
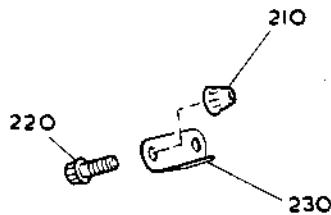
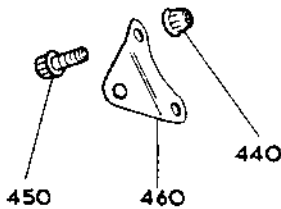
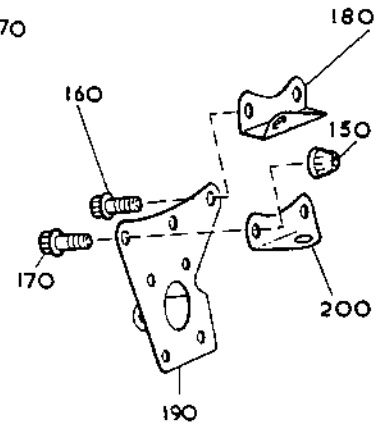
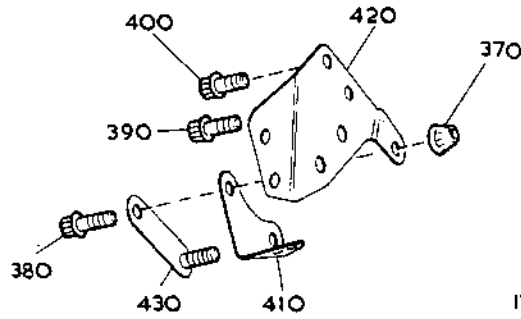
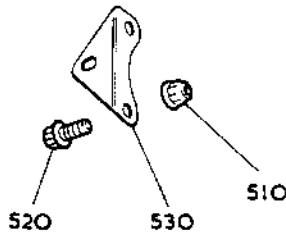
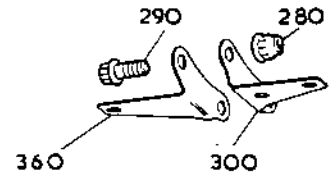
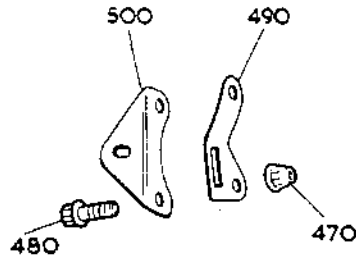
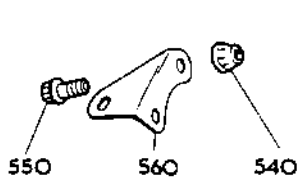
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LP Compressor - Case and Vanes
Rear Blow-off Flange Fittings
Figure 208

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CLEANING

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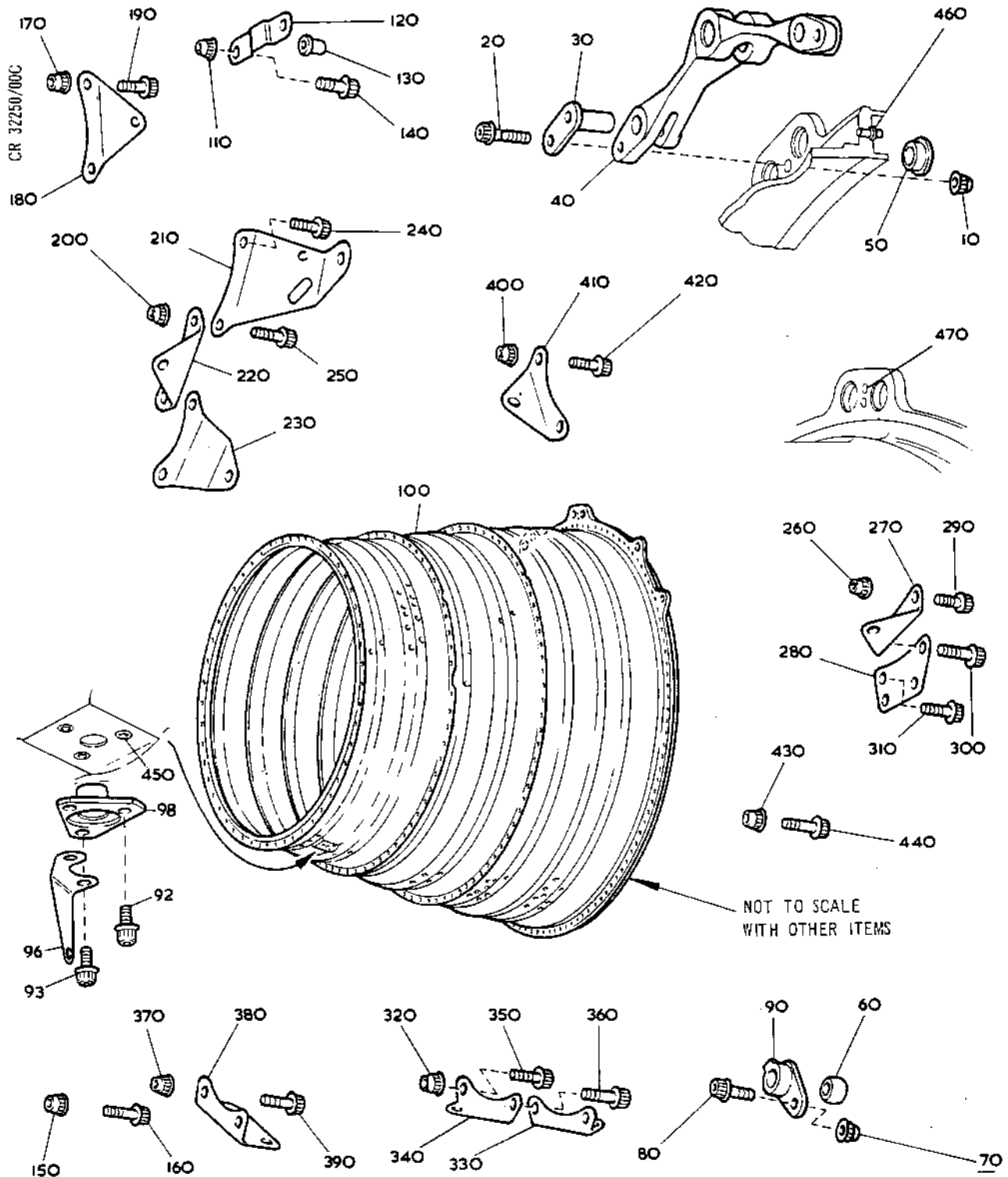
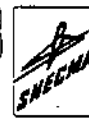
Page 215

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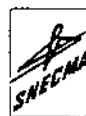
LP Compressor - Case and Vanes
Case Assembly
Figure 209



OLYMPUS 593

MK.610-14-28

OVERHAUL



LP COMPRESSOR EXIT GUIDE CASE AND VANES - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00
Cleaning for details of the cleaning processes referred
to in Table 201.
- B. To ensure that all items within this breakdown that
require cleaning and subsequent Inspection/Check are
recognized, and identified by their Part Number, figures
are provided which equate with the Illustrated Parts
Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with
the relevant Figure and Item Number in the same breakdown
in the I.P.C. Items illustrated in the I.P.C. which are
not illustrated in this breakdown, are those items which
are either discarded at overhaul, or are normally assembled
to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the
figures, Table 201 does not list all items, but deals
collectively with the items requiring the same cleaning
process.
- D. On receipt of the items from disassembly, all protective
blanks, covers etc. deemed necessary for the protection
of the items will have been assembled and, in addition,
many of the items will arrive in containers. Any special
containers, blanks, covers etc. are listed in Table 202
by their Tool Ref. No. (Tool 123). For the manufacturer's
Part No. refer to the appropriate Table in Special Tools,
Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N,
INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COM-
PONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY
COATINGS. THE NITRIC ACID USED IN PROCESSES J, L
AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME
TYPES OF COATING, MAKING REPLACEMENT OF THE COATING
NECESSARY.

- A. All blanks, covers etc. must be removed from the items
prior to cleaning and reassembled immediately afterwards.
Items received in special cleaning containers should remain
therein during the cleaning procedures unless otherwise
stated.

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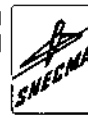
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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	

201	ALL except		A or B	-	-
	60	Ring, retaining	C	N	-
	90	Vane, compressor, LP, exit guide (bolted, RH)	C	N	-
	100	Vane, compressor, LP, exit guide (bolted, LH)	C	N	-
	110	Vane, compressor, LP, exit guide (probe)	C	N	-
	120	Vane, compressor, LP, exit guide	C	N	-
202	ALL except		A or B	-	-
	210	Bracket	C	-	-

Cleaning Processes
Table 201

FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	90	Vane, compressor,	1394	
	100	LP, exit guide		
	110			
	120			

Cleaning and Storage Tools
Table 202

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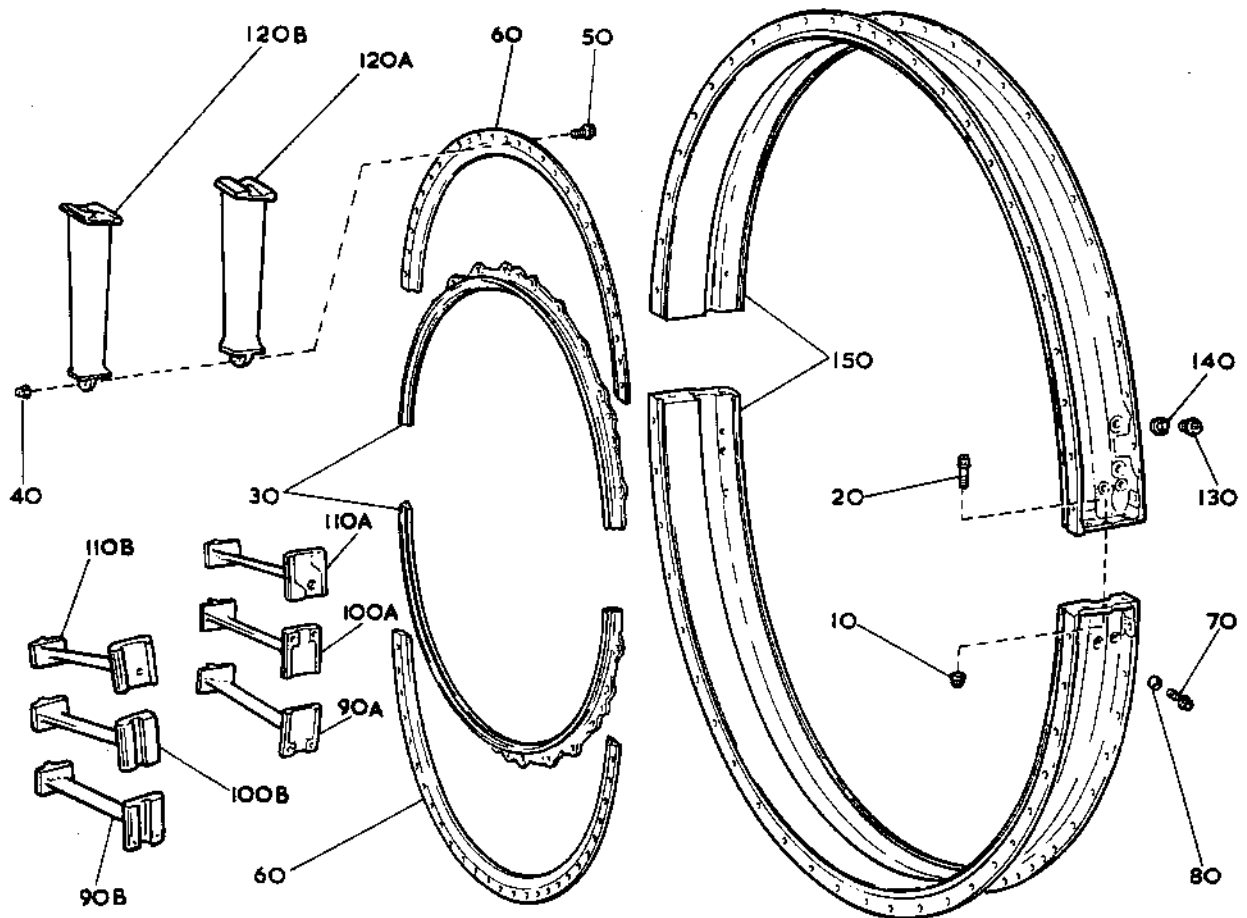


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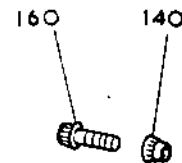
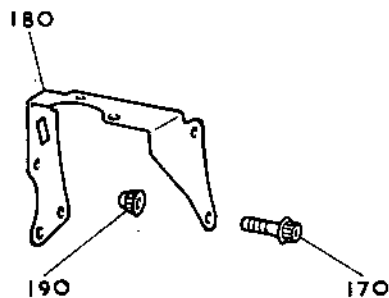
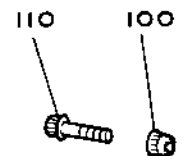
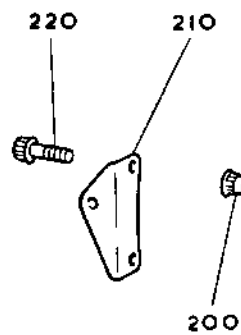
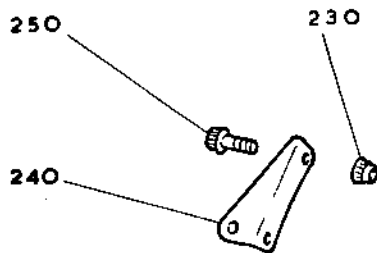
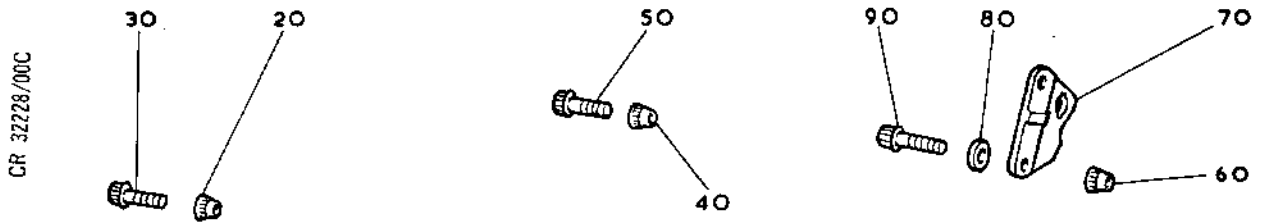
LP Compressor Case and Vanes Exit Guide
Figure 201

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72-31-02
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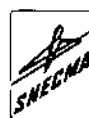
MK.610-14-28
OVERHAUL



LP Compressor Case and Vanes
Exit Guide Case Rear Flange Attaching Parts
Figure 202



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OVERHAUL



LP COMPRESSOR ROTOR - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.



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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	90	Shaft, rotor front	C	N	-
	170	Bolt	A or B	G	-
	260	Bolt	A or B	G	-
	150	Blade, compressor LP, stage 1	C	N	Remove heavy fretting by process N.
	160	Disk, compressor rotor LP, stage 1	C	N	CMT Component. Process N will remove coatings.
	190	Ring, spacer, stage 1-2	C	N	CMT Component
	240	Blade, compressor LP, stage 2	C	N	-
	250	Disk, compressor rotor LP, stage 2	C	N	CMT Component
	280	Ring, spacer, stage 2-3	C	N	CMT Component
	330	Blade, compressor LP, stage 3	C	N	-
	360	Disk, compressor rotor LP, stage 3	C	N	CMT Component
	30	Bearing, inner track, compressor LP, rotor front	D	E	-

Cleaning Processes
Table 201 (Continued)



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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
202	ALL except		A or B	-	-
	10	Bolt	A or B	G	-
	70	Bolt	A or B	G	-
	130	Bolt	A or B	G	-
	30	Ring, spacer, stage 3-4	C	N	CMT Component. Remove heavy fret- ting by process N. Process N will remove coatings.
	40	Blade, compressor LP, stage 4	C	N	CMT Component
	60	Disk, compressor rotor LP, stage 4	C	N	CMT Component
	90	Ring, spacer, stage 4-5	C	N	CMT Component
	100	Blade, compressor LP, stage 5	C	N	-
	120	Disk, compressor rotor LP, stage 5	C	N	CMT Component
	150	Ring, spacer, stage 5-6	C	N	CMT Component
	160	Blade, compressor LP, stage 6	C	N	-
	180	Disk, compressor rotor LP, stage 6	C	N	CMT Component
203	ALL except		A or B	-	-
	10	Nut, retaining	A or B	G	-
	50	Nut, round	A or B	G	-
	250	Bolt	A or B	G	-
	*190	Housing, sleeve	A or B	F	-
	220	Mounting, centre spherical	A or B	F	CMT Component
	*230	Shaft, rotor, rear	A or B	F	CMT Component
	270	Ring, spacer, stage 6-7	C	N	CMT Component. Remove heavy fret- ting by process N. Process N will remove coatings.
	320	Blade, compressor LP, stage 7	C	N	CMT Component
	340	Disk, compressor rotor LP, stage 7	C	N	CMT Component
* Items 190 and 230 are finished in aluminium paint. To enable crack detection to be carried out use process F to remove finish.					

Cleaning Processes
Table 201 (Concluded)

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FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	90	Shaft, rotor, front	1380	
	150	Blade, compressor, LP, stage 1	1395	
	160	Disk, compressor rotor LP, stage 1	1409	
	190	Ring, spacer, stage 1-2	1410*	
	240	Blade, compressor, LP stage 2	1396	
	250	Disk, compressor rotor LP, stage 2	1407	
	280	Ring, spacer, stage 2-3	1410*	
	330	Blade, compressor, LP, stage 3	1397	
	360	Disk, compressor rotor, LP, stage 3	1408	
202	30	Ring, spacer, stage 3-4	1411**	
	40	Blade, compressor, LP, stage 4	1398	
	60	Disk, compressor rotor LP, stage 4	1407	
	90	Ring, spacer, stage 4-5	1411**	
	100	Blade, compressor, LP, stage 5	1399	
	120	Disk, compressor rotor LP, stage 5	1407	
	150	Ring, spacer, stage 5-6	1411**	
	160	Blade, compressor, LP, stage 6	1464	
	180	Disk, compressor rotor LP, stage 6	1407	
203	230	Shaft, rotor rear	1379	
	270	Ring, spacer, stage 6-7	1410*	
	320	Blade, compressor, LP, stage 7	1465	
	340	Disk, compressor, rotor LP, stage 7	1406	

* Composite container for stages 1-2, 2-3 and 6-7

**Composite container for stages 3-4, 4-5 and 5-6

Cleaning and Storage Tools
Table 202

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TN34137



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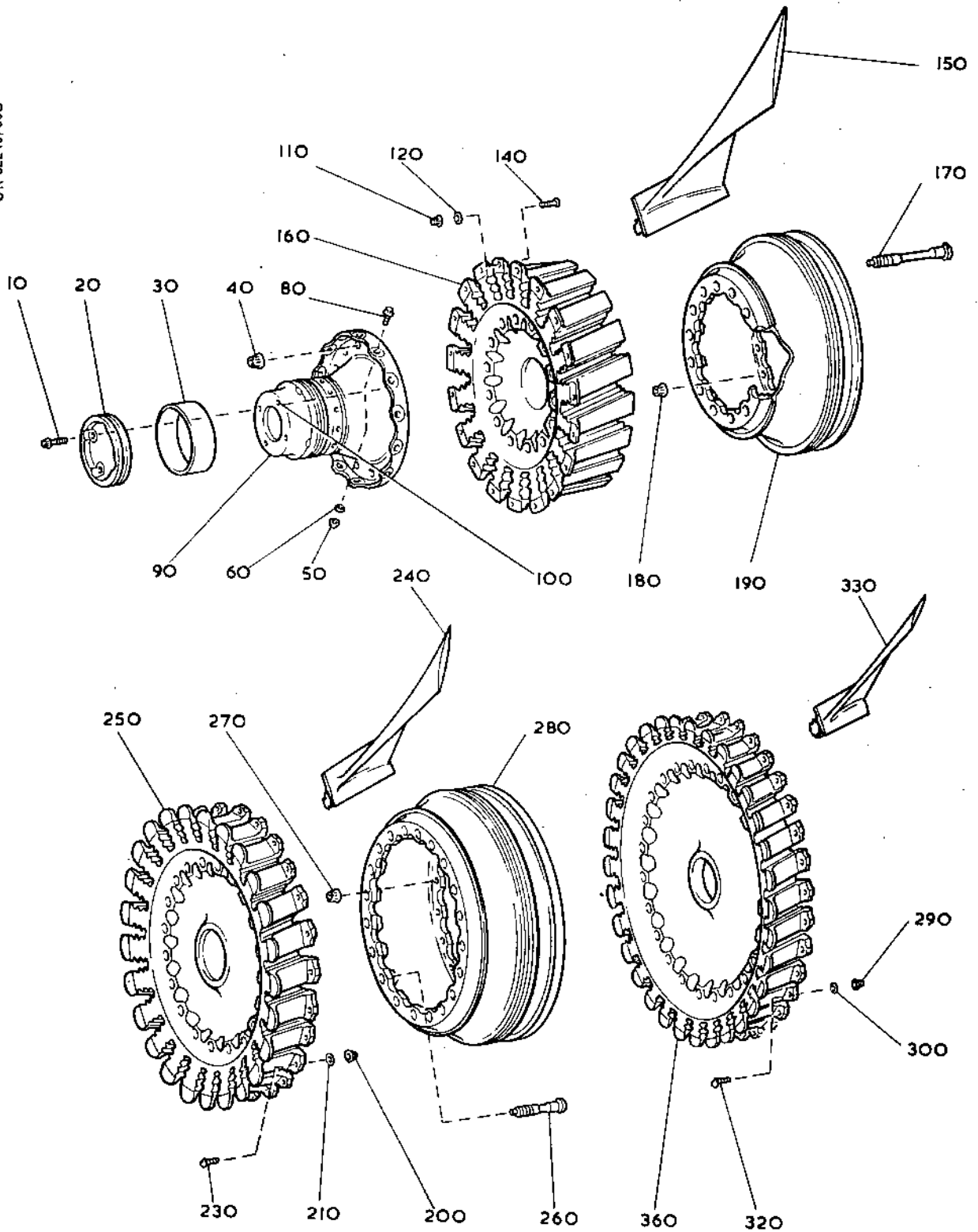
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TN19519



LP Compressor Rotor,
Front Rotor Shaft, Blades and Disks Stages 1, 2 and 3
Figure 201

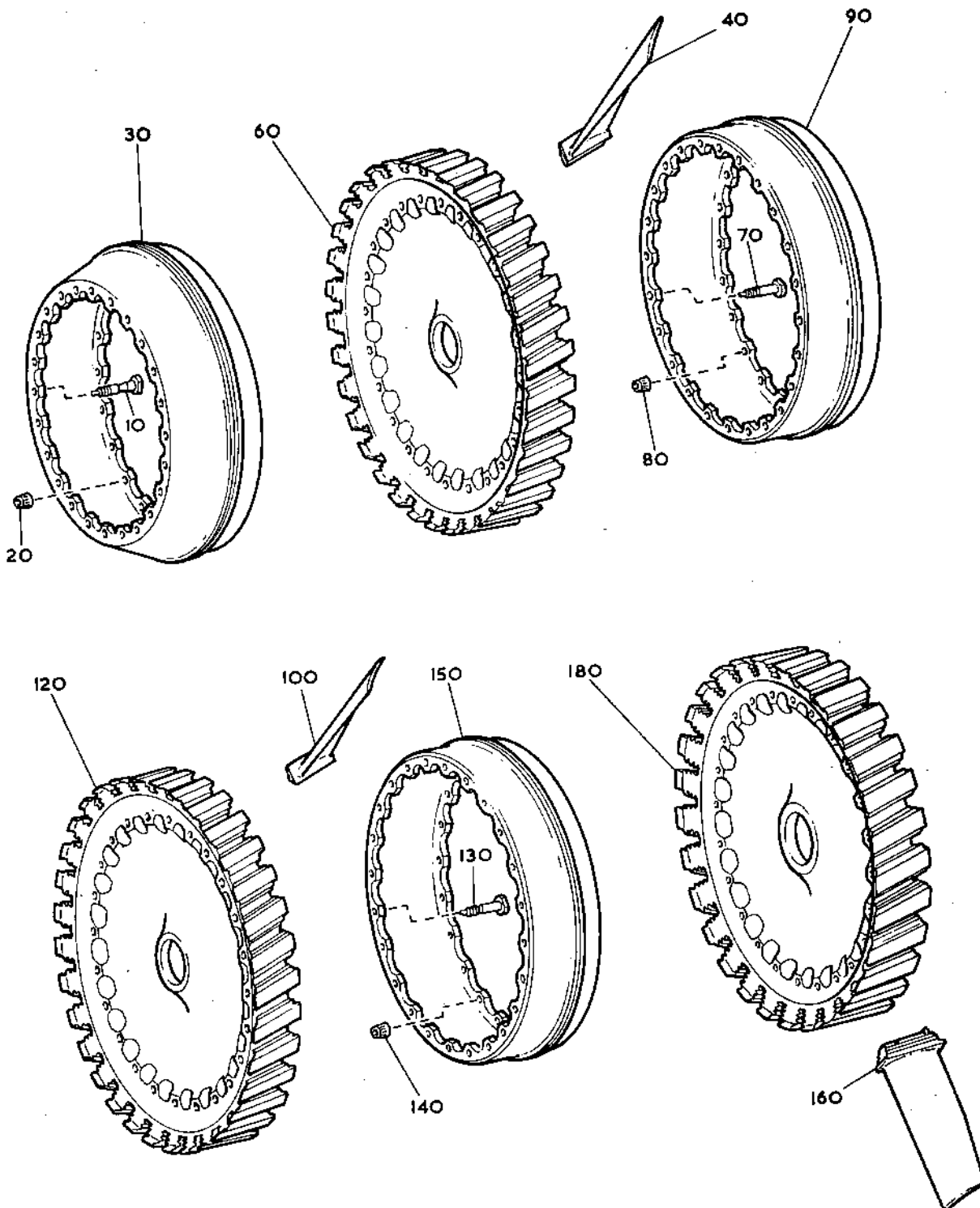
CLEANING
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MK. 610-14-28
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LP Compressor Rotor
Figure 202

TN19520

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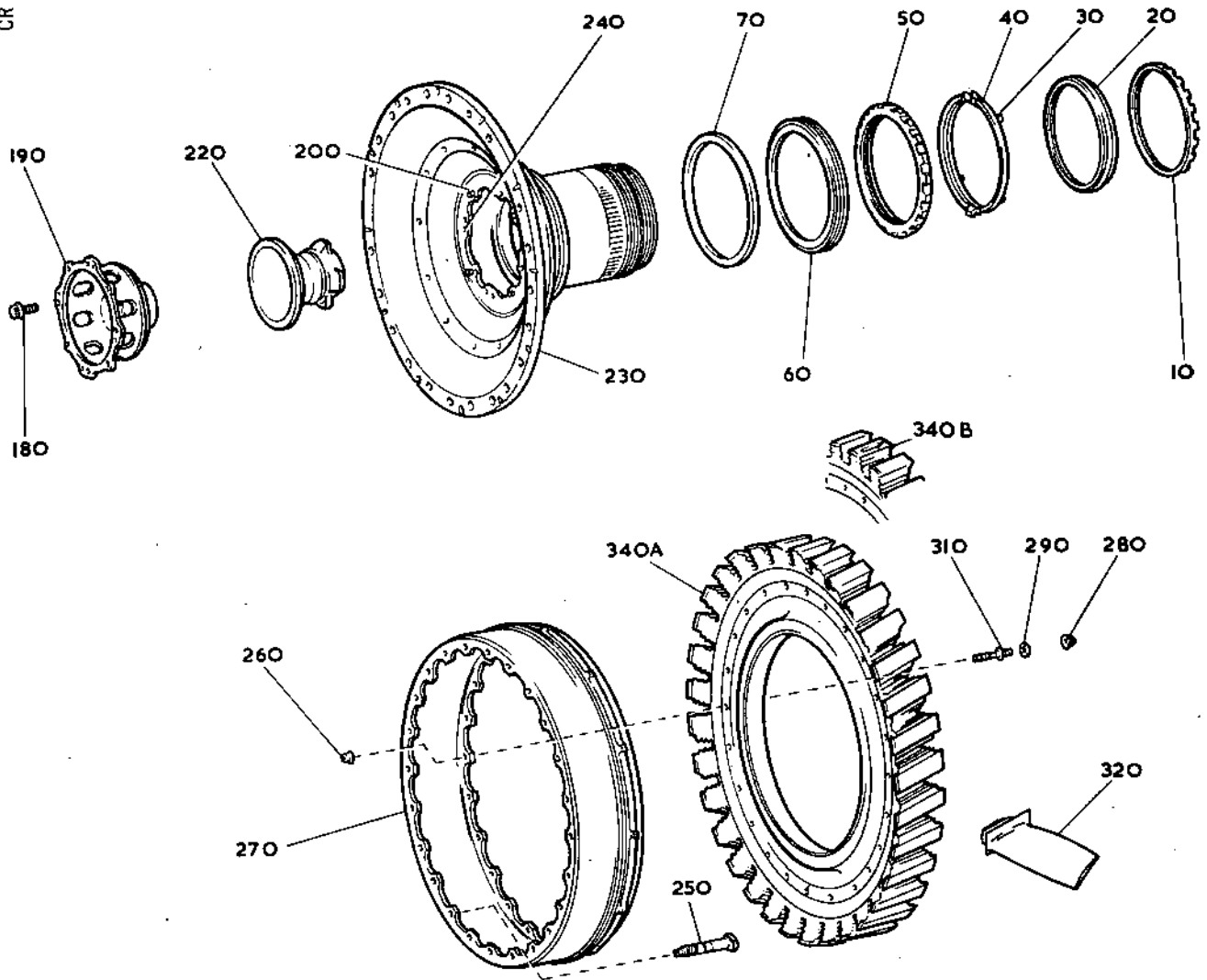
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TN19526

LP Compressor Rotor
Blades and Disk Stage 7 and Rear Rotor Shaft
Figure 203



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LP COMPRESSOR DRIVE SHAFT - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		B	-	-
	*190	Disk, stiffening	B	F	Item 200 must be removed from item 190 before heavy cleaning.
	*210	Shaft, drive, LP compressor	B	F	CMT Component
202	ALL except		B	-	-
	*120	Shaft, drive, rear, LP compressor	B	F	CMT Component
* Items 190, 210 and 120 are finished in aluminium paint. To enable crack detection to be carried out use process F to remove finish.					

Cleaning Processes
Table 201



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FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	210	Shaft, drive, LP compressor	1450	
202	120	Shaft, drive, rear, LP compressor	1451	
	190	Tube, LP shaft signal	1452	

Cleaning and Storage Tools
Table 202

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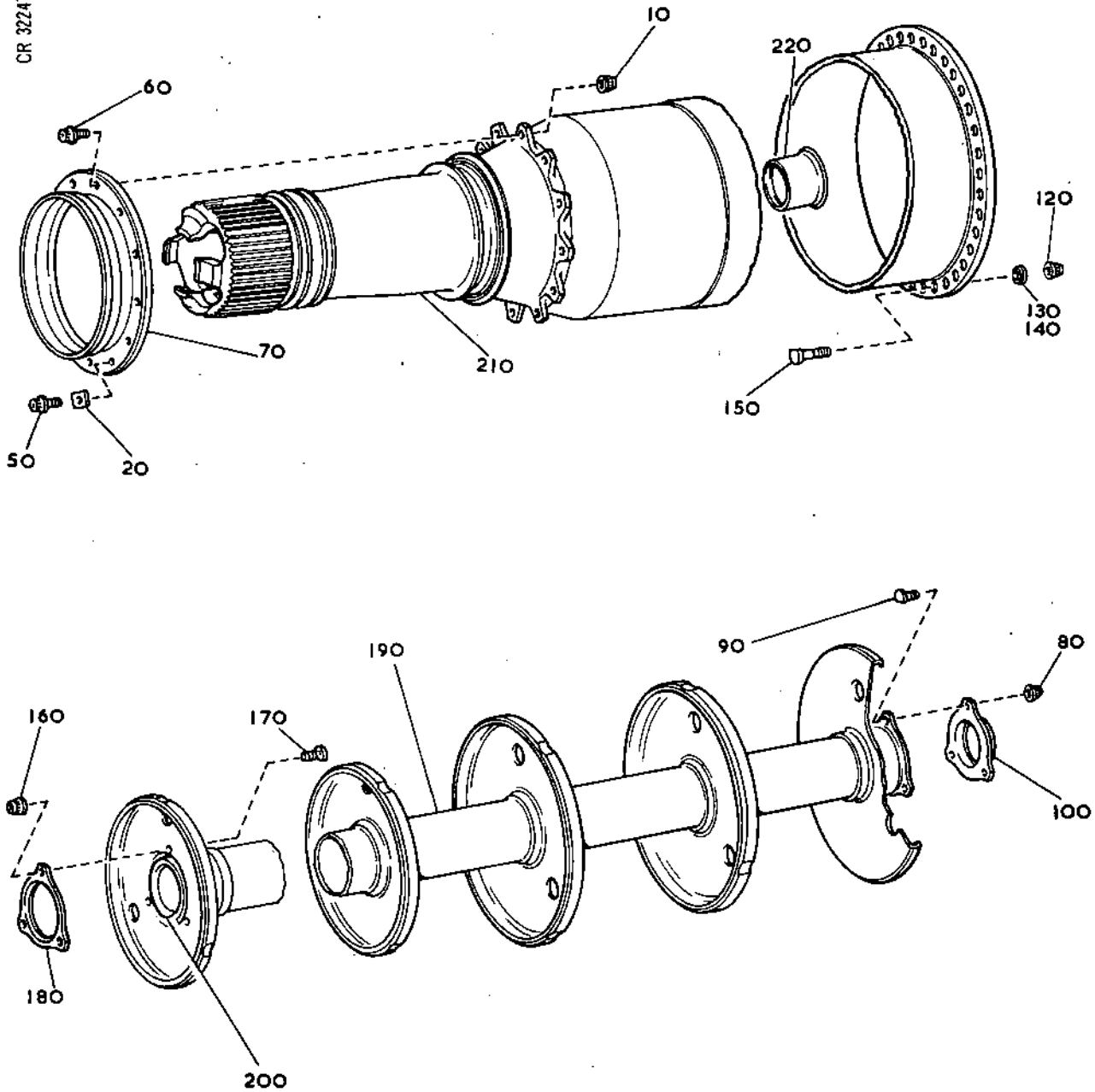


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CR 32247/00B



LP Compressor Driving Shaft
Figure 201

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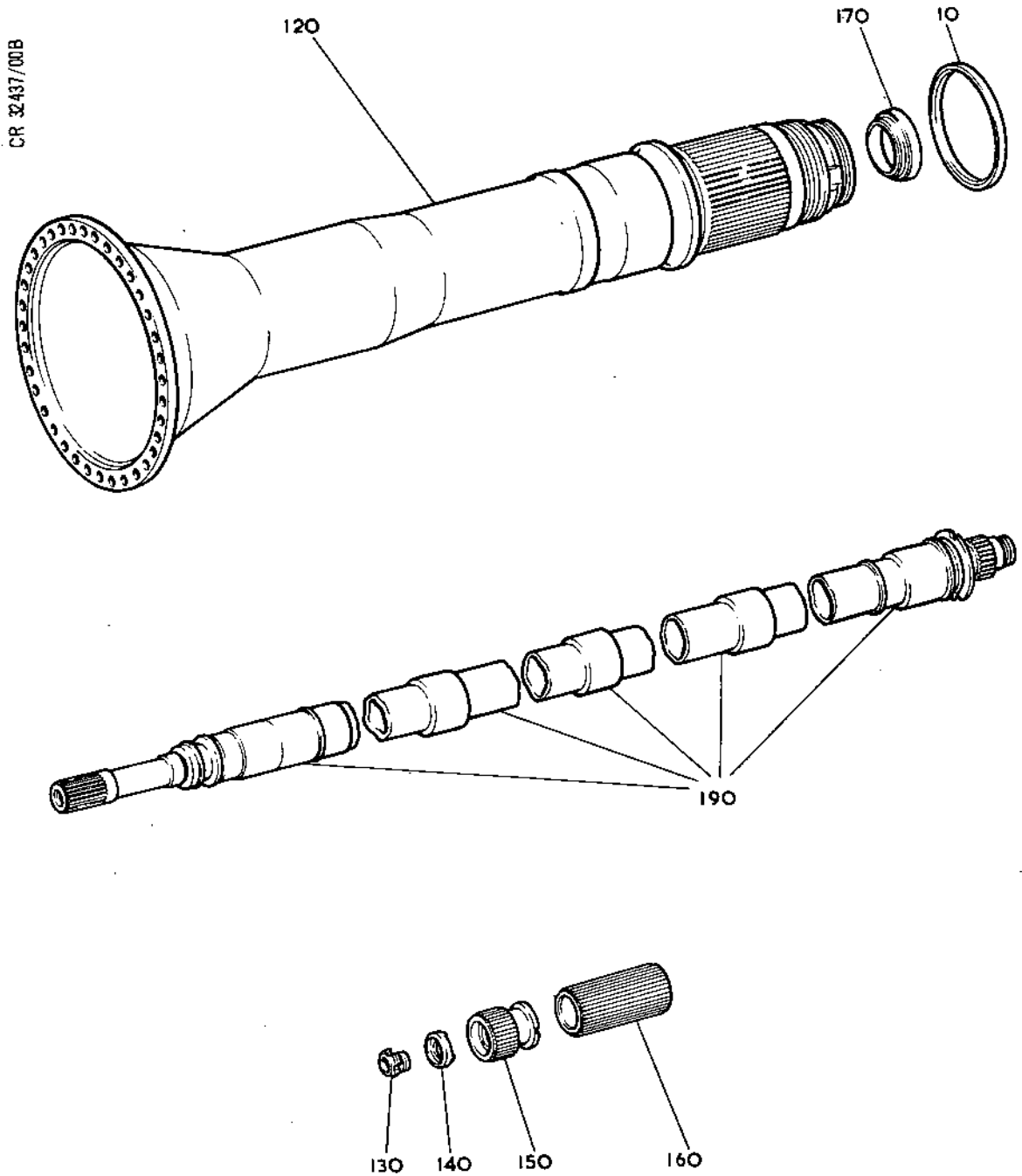


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TN19531

LP Compressor Driving Shaft
Figure 202



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MK.610-14-28
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LP SHAFT SIGNAL GENERATING MECHANISM - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		B	G	-

Cleaning Processes
Table 201

FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	ALL ITEMS		1378	

Cleaning and Storage Tools
Table 202

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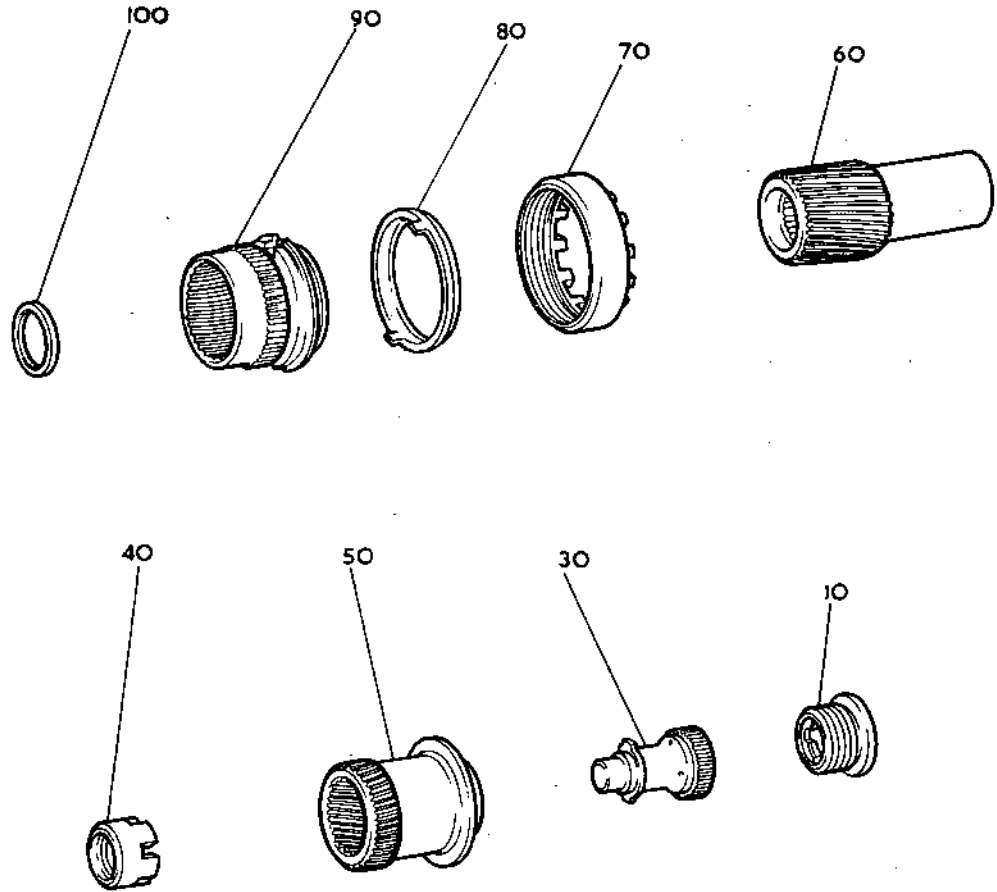
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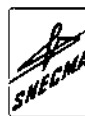
LP Shaft Signal System Generating System
Figure 201

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COMPRESSOR INTERMEDIATE CASE ASSEMBLY - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00
Cleaning for details of the cleaning processes referred
to in Table 201.
- B. To ensure that all items within this breakdown that
require cleaning and subsequent Inspection/Check are
recognized, and identified by their Part Number, figures
are provided which equate with the Illustrated Parts
Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with
the relevant Figure and Item Number in the same breakdown
in the I.P.C. Items illustrated in the I.P.C. which are
not illustrated in this breakdown, are those items which
are either discarded at overhaul, or are normally assembled
to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the
figures, Table 201 does not list all items, but deals
collectively with the items requiring the same cleaning
process.
- D. On receipt of the items from disassembly, all protective
blanks, covers etc. deemed necessary for the protection
of the items will have been assembled and, in addition,
many of the items will arrive in containers. Any special
containers, blanks, covers etc. are listed in Table 202
by their Tool Ref. No. (Tool 123). For the manufacturer's
Part No. refer to the appropriate Table in Special Tools,
Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N,
INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COM-
PONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY
COATINGS. THE NITRIC ACID USED IN PROCESSES J, L
AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME
TYPES OF COATING, MAKING REPLACEMENT OF THE COATING
NECESSARY.

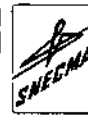
- A. All blanks, covers etc. must be removed from the items
prior to cleaning and reassembled immediately afterwards.
Items received in special cleaning containers should
remain therein during the cleaning procedures unless
otherwise stated.



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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	40	Gear - bevel, zerol, driver	A or B	G	-
	170	Ring, bearing retaining	A or B	G	-
	200	Thrower, oil	A or B	G	-
	300	Washer, thrust	A or B	G	-
	330	Housing, labyrinth, inner	A or B	H	-
	350	Housing, labyrinth, outer	A or B	H	-
	270	Housing, thrust bearing, LP compressor	C	-	-
	340	Air baffle, front inner	C	-	-
	190	Thrust bearing, LP compressor	D	E	-
202	ALL except		A or B	-	-
	20	Air baffle	A or B	H	-
	30	Air baffle, rear outer	A or B	H	-

Cleaning Processes
Table 201 (Continued)



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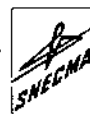


FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
202	40	Air baffle, rear inner	A or B	H	-
	60	Housing, labyrinth, inner	A or B	H	-
	100	Baffle, oil	A or B	G	Use ultrasonic cleaning process prior to final assembly
	110	Housing, bearing,	A or B	G	-
	120	Thrower, oil	A or B	G	-
	80	Housing, thrust bearing, HP compressor	C	-	-
	240	Air baffle	C	-	-
	210	Thrust bearing, HP compressor	D	E	-
203	ALL except		A or B	-	-
	30	Jet, oil	A or B	G	-
	70	Distributor, oil	A or B	G	-
	110	Tube, oil transfer	A or B	G	Use process G only if light cleaning fails to remove contamination. Process G will remove silver plating, therefore it must be used with caution, i.e. short period immersion.
	340	Tube, transfer	A or B	G	
	370	Tube, transfer	A or B	G	
	400	Tube, oil feed and jet	A or B	G	
	410	Distributor, oil	A or B	G	-
204	ALL except		A or B	-	-
	20B/30	Locating plate/cover assembly	A or B	G	-
	50	Nozzle	A or B	G	-
	60	Housing assembly	A or B	G	-
	100	Tube	A or B	G	-
	150	Nut, gland	A or B	G	-
	160	Spacer	A or B	G	-

Cleaning Processes
Table 201 (Continued)



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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
204	170	Ring, sealing	A or B	G	-
	200	Adapter	A or B	G	-
	260	Tube	A or B	G	-
	360	Sump, oil	A or B	G	-
	410B/ 420	Locating plate/ cover assembly	A or B	G	-
	440	Tube	A or B	G	-
205	ALL except		A or B	-	-
	100	Housing	A or B	F	-
	380	Housing	A or B	F	-
	410	Housing	A or B	F	-
	330	Case, inner	B	C or N	-
	420	Case, outer	B	C or N	-
206	ALL except		A or B	-	-
	55	Bracket	C	-	-
	100	Case, assembly	A or B	C	-
207	ALL except		A or B	-	-
	270	Adapter	C	-	-
	310	Bracket mounting	C	-	-
208	ALL except		A or B	-	-
	220	Gearbox mounting assembly	C	-	-

Cleaning Processes
Table 201 (Concluded)



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FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
205	330	Case, inner	1467	-
206	100	Case, intermediate, outer	1449 1402	- -

Cleaning and Storage Tools
Table 202

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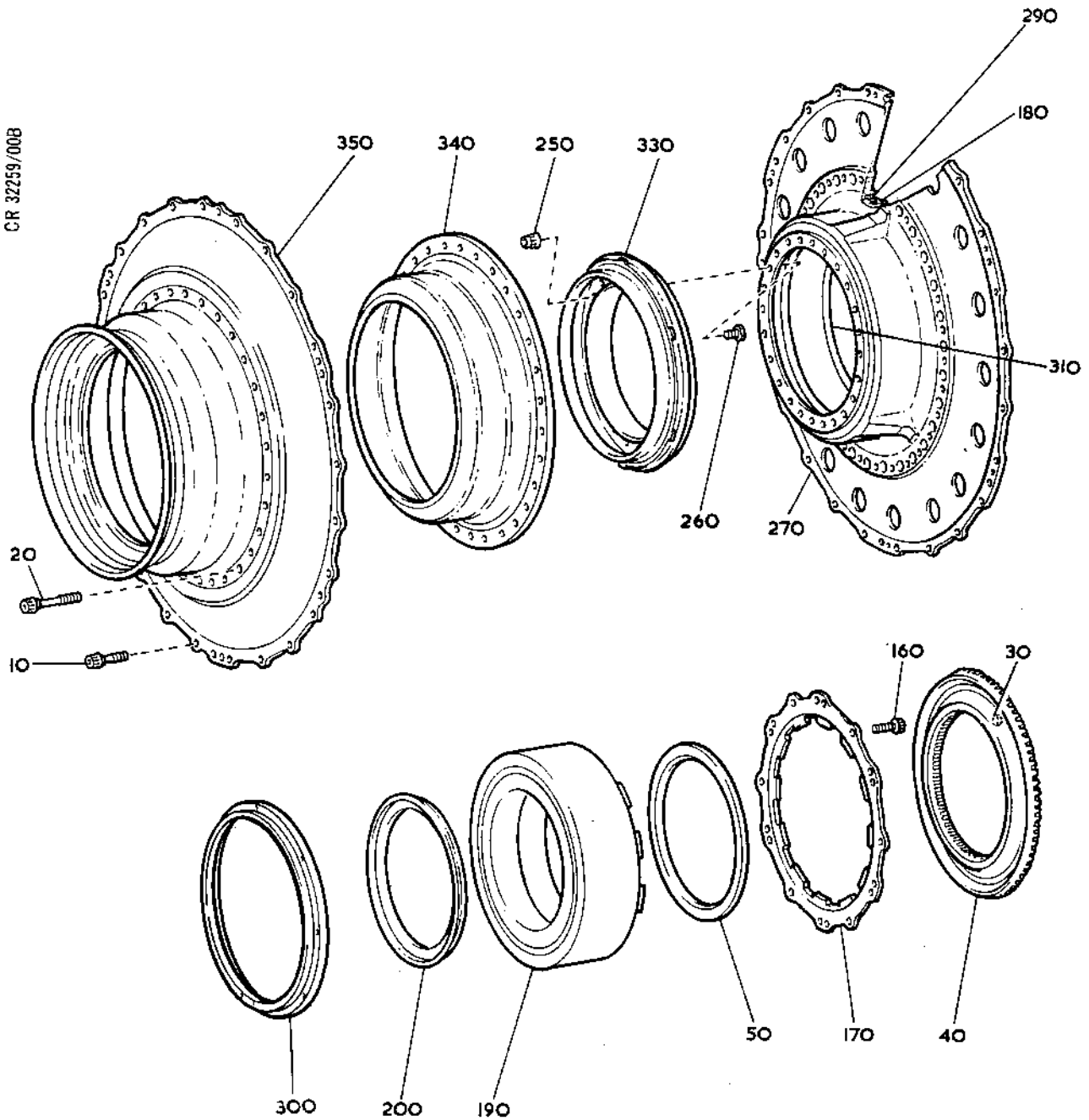


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CR 32259/008



Intermediate Case - Compressor LP Compressor,
Thrust Bearing and Housing
Figure 201



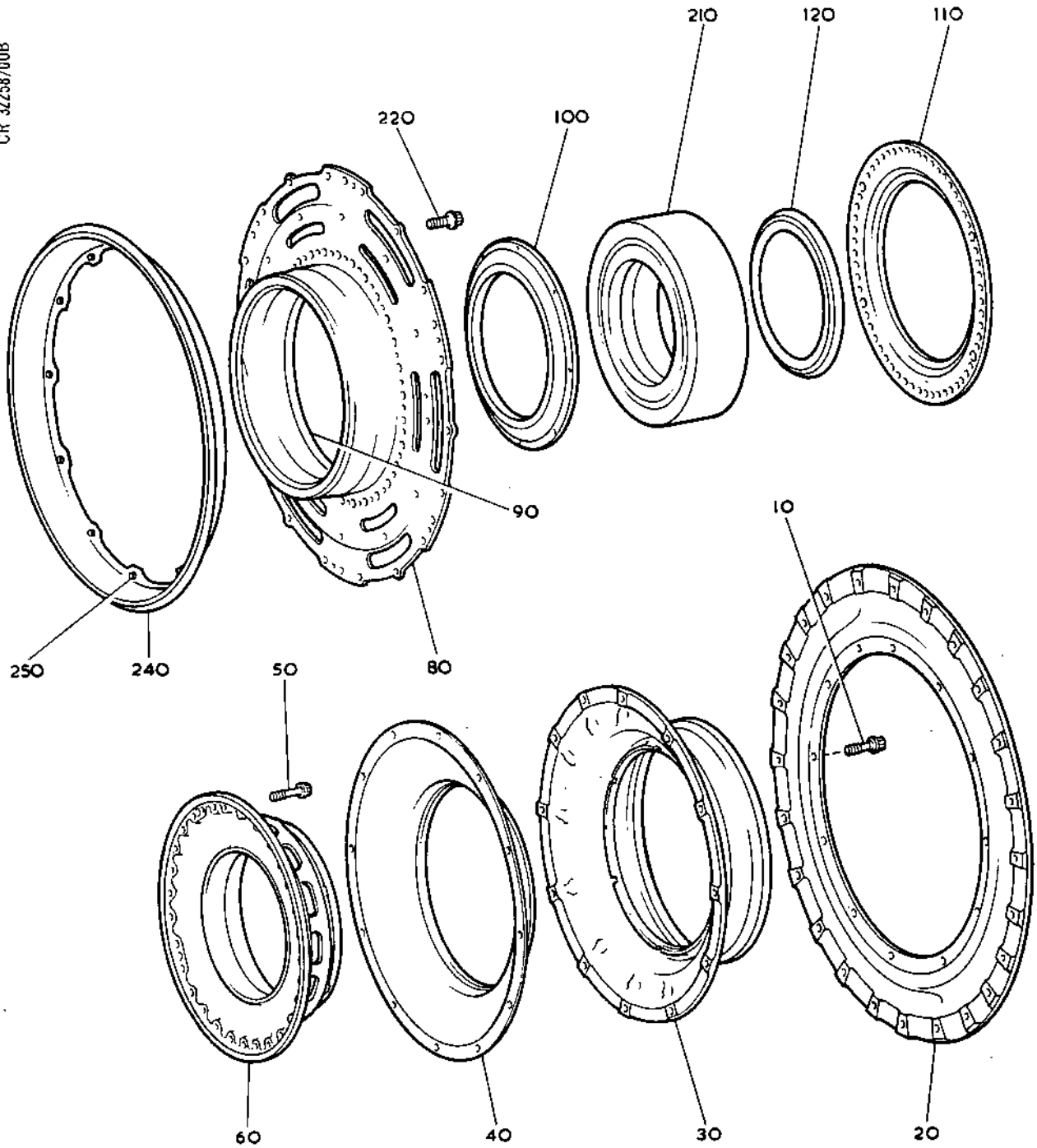
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CR 3258/00B

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Intermediate Case - Compressor HP Compressor,
Thrust Bearing and Housing
Figure 202

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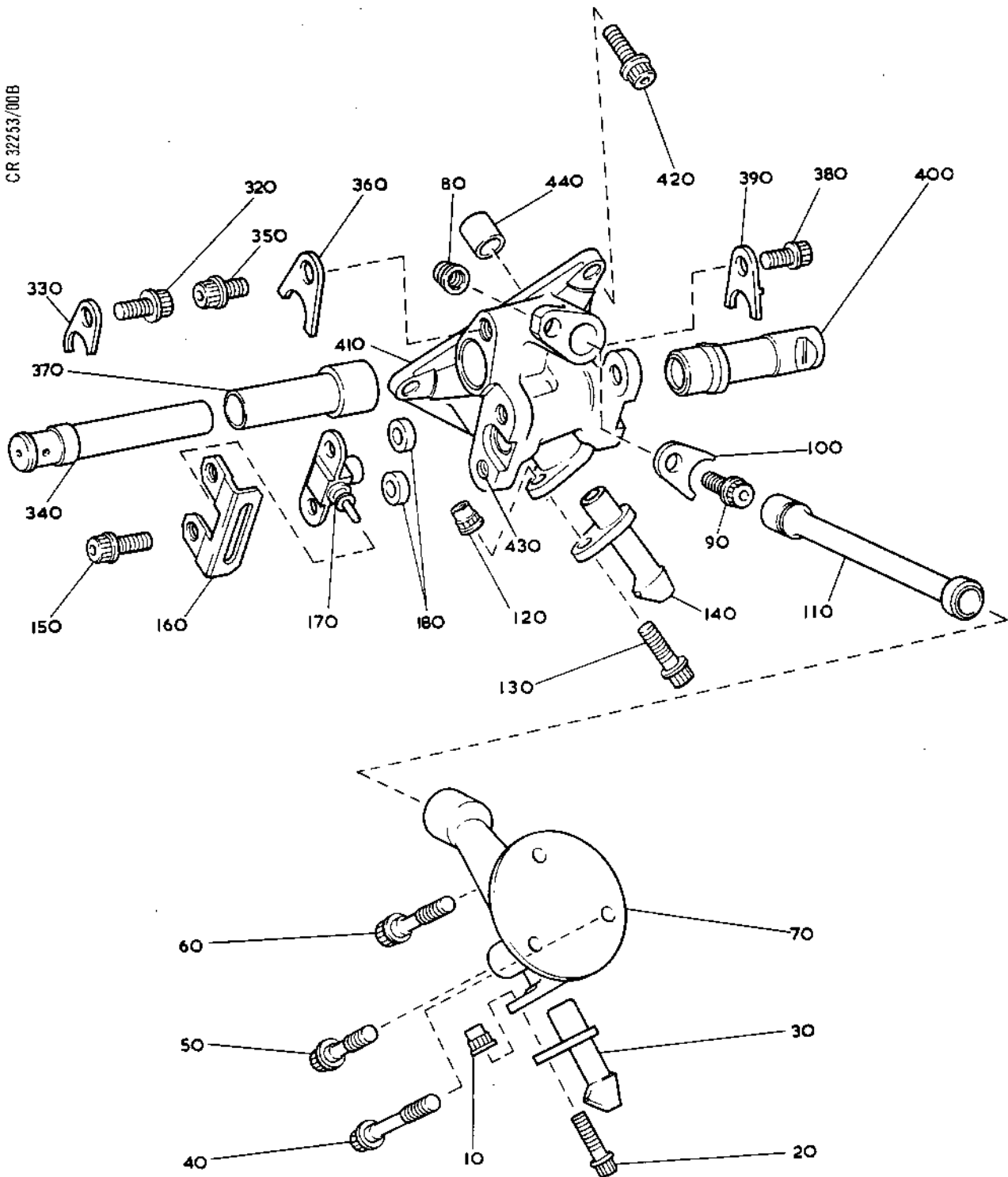


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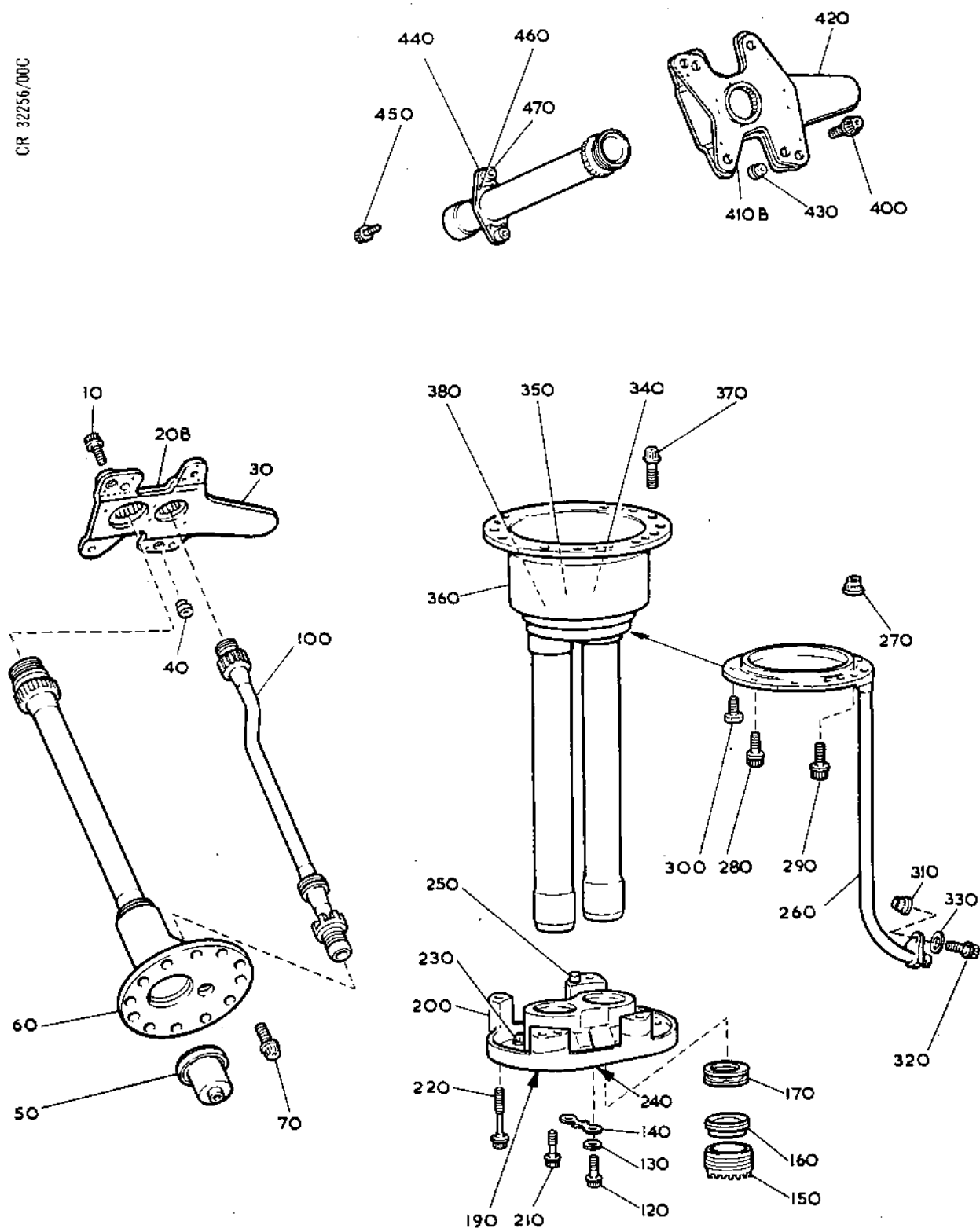
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Intermediate Case - Compressor - Oil Distributors
Transfer Tubes and Jets
Figure 203

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CR 32256/000C



Intermediate Case - Compressor - Tubes (Vanes 2, 4 and 6)
Figure 204

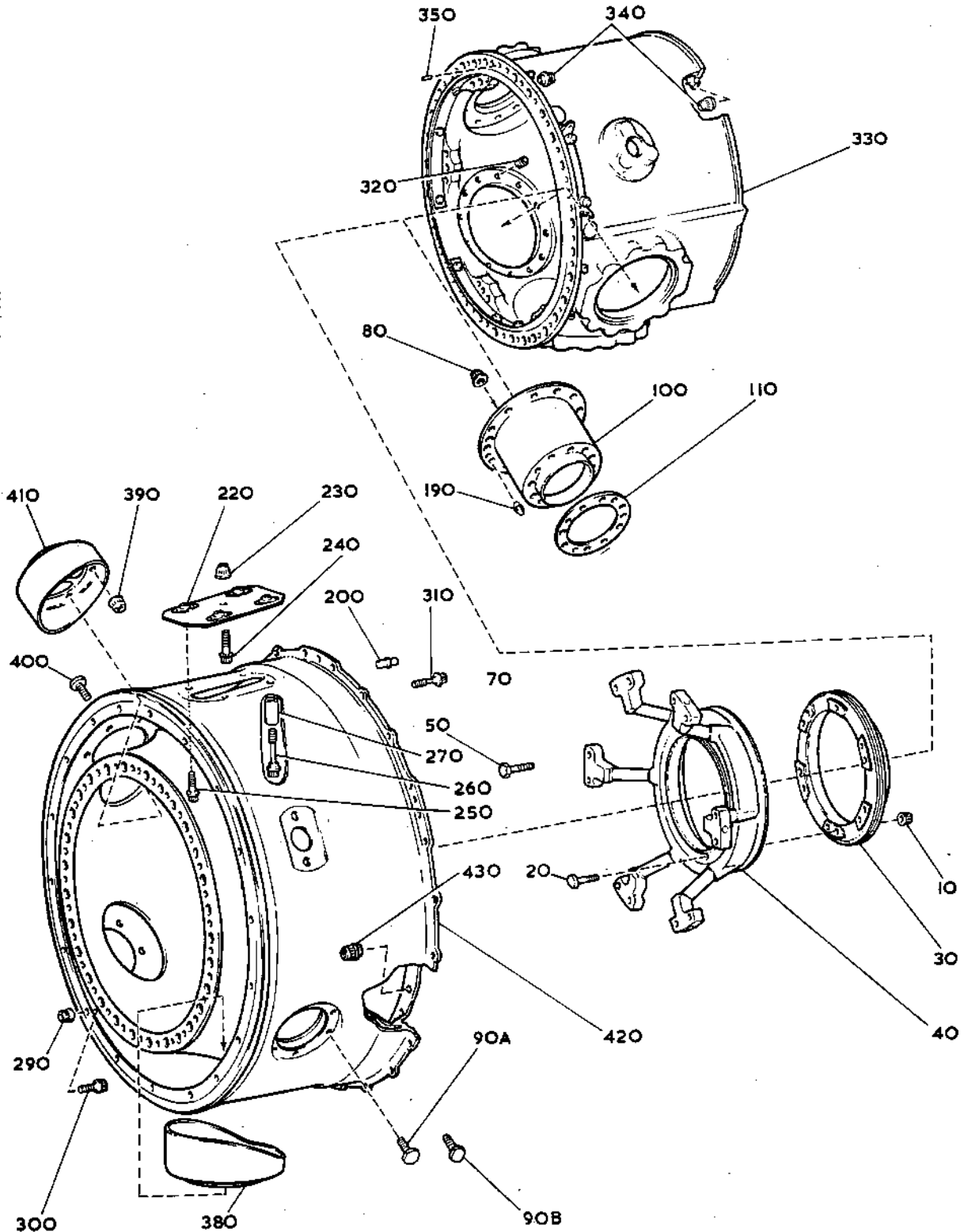


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OVERHAUL



CR 32254/00D



Intermediate Case - Compressor -
Inner Case and Fittings
Figure 205

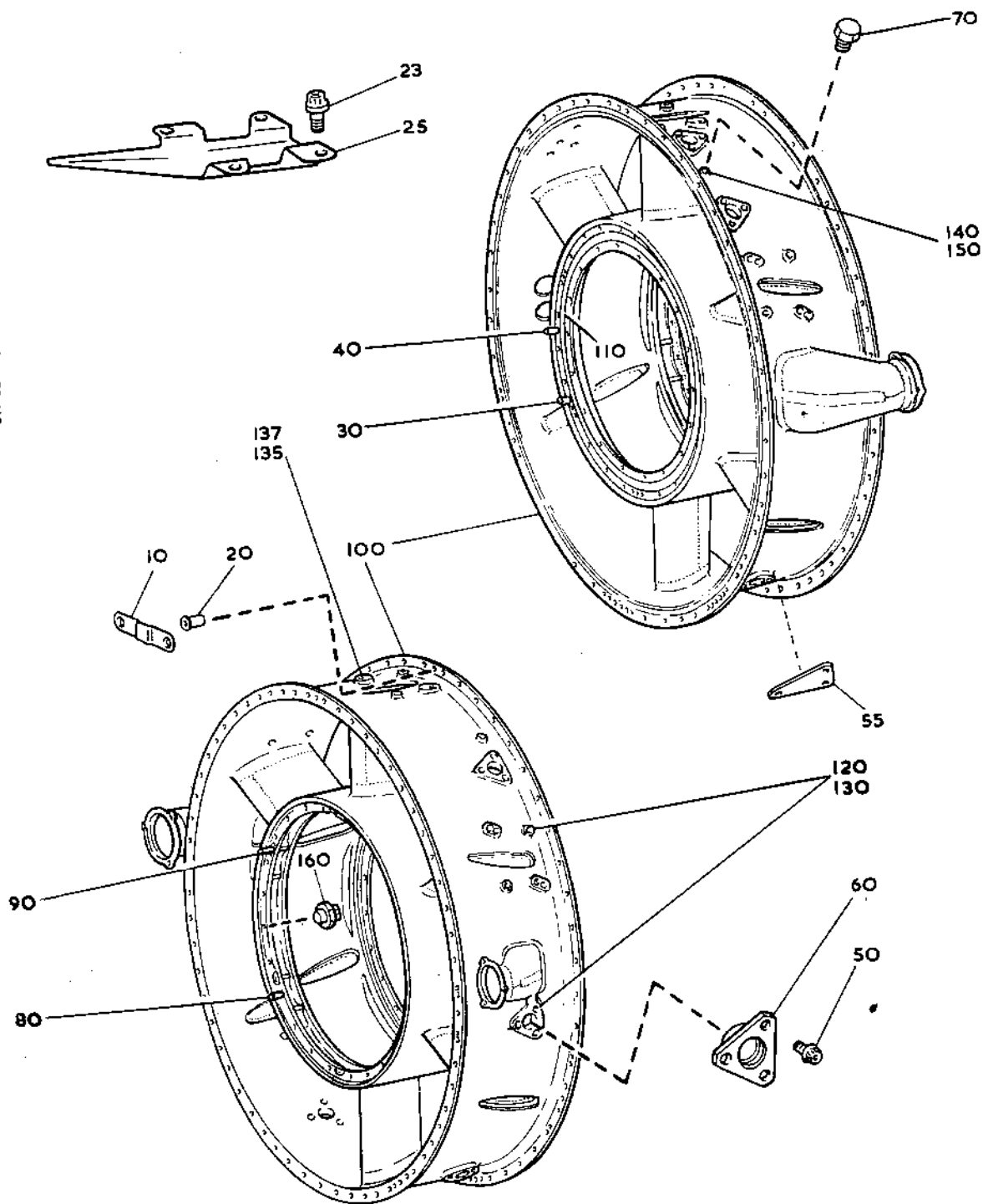
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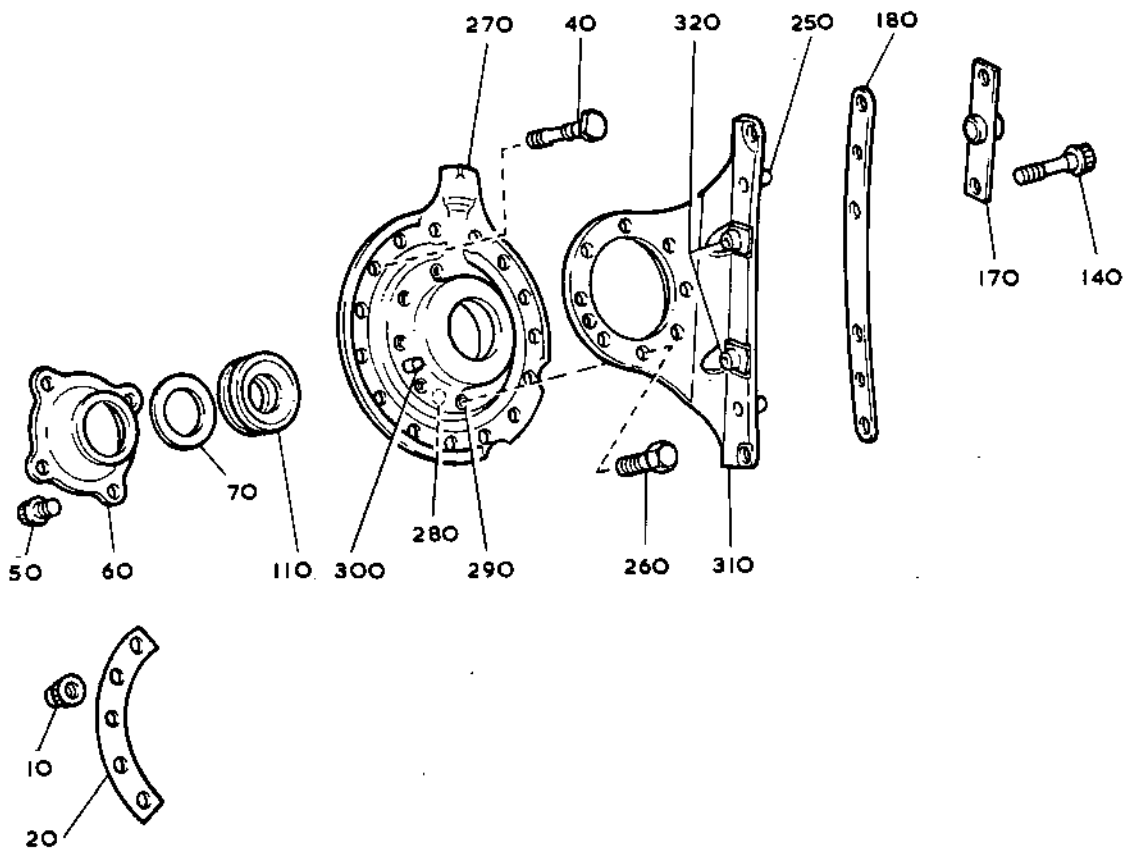
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Intermediate Case - Compressor -
Outer Case and Fittings
Figure 206

CR 34061/00A



Intermediate Case - Compressor -
LH Gearbox Mounting
Figure 207

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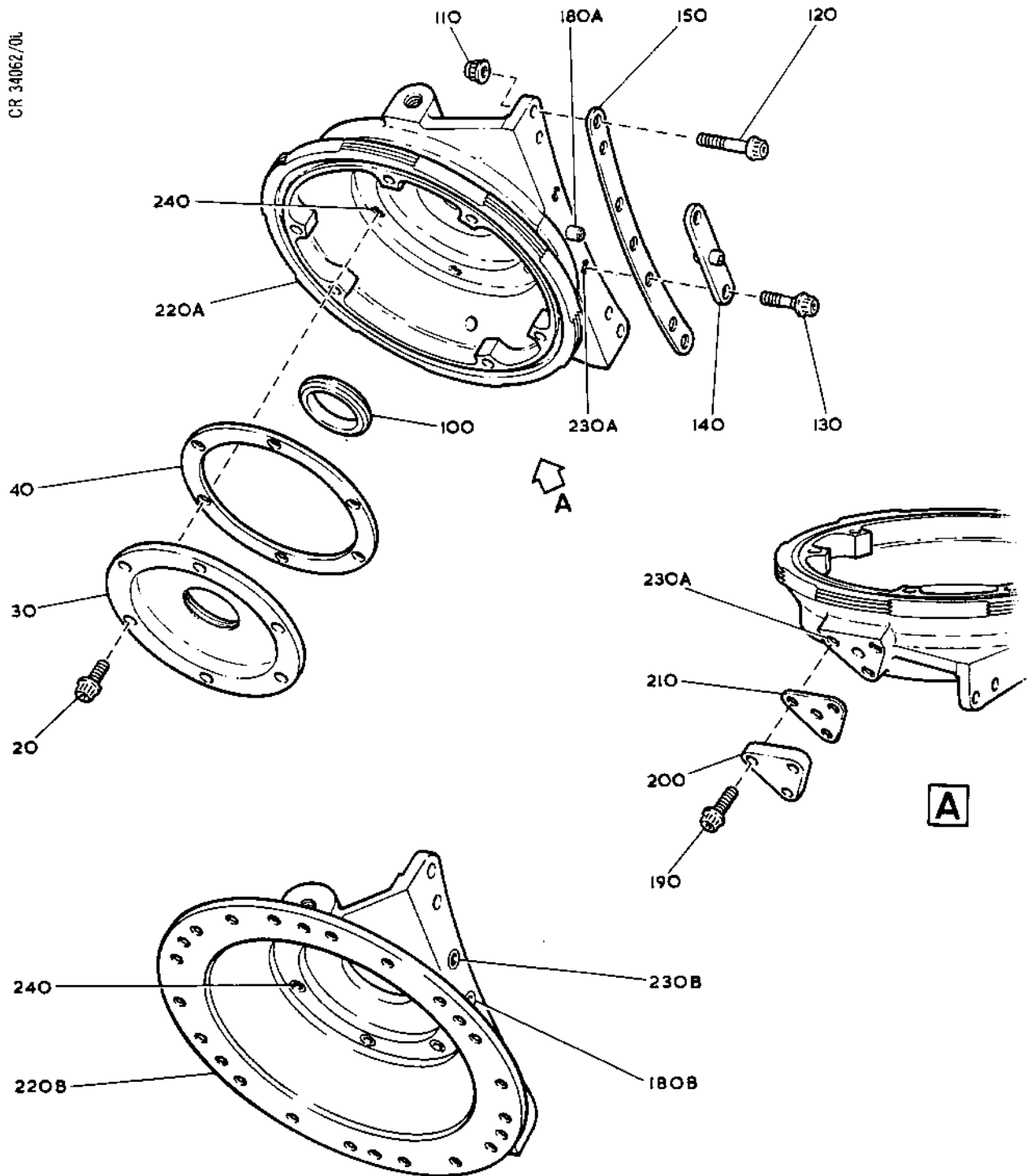
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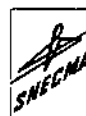
Intermediate Case - Compressor -
RH Gearbox Mounting
Figure 208

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HP COMPRESSOR CASE AND VANES - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

CLEANING

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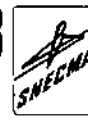
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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	30	Retainer, vane, stage 1	C	N	-
	60	Plate, labyrinth retainer	C	N	-
	80	Ring, inner fixing ring	C	N	-
	90	Ring, labyrinth, stage 1	A or B	H	-
	94	Liner, front	A or B	M	-
	96	Liner, rear	A or B	M	-
	250	Vane, compressor, HP stage 1 (bolted)	C	N	-
	260	Vane, compressor, HP stage 1	C	N	-
	270	Vane, compressor, HP stage 1 (bolted)	C	N	-
	280	Vane, compressor, HP stage 1 (probe)	C	N	-
	310	Retainer, vane, stage 2	C	N	-

Cleaning Processes
Table 201 (Continued)



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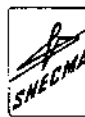
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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	340	Plate, labyrinth retainer	C	N	-
	360	Ring, assembly, vane fixing inner	C	N	-
	370	Ring, labyrinth, stage 2	A or B	H	-
	374	Liner, front	A or B	M	-
	376	Liner, rear	A or B	M	-
	460	Vane, compressor, HP stage 2 (bolted)	C	N	-
	470	Vane, compressor, HP stage 2	C	N	-
	480	Vane, compressor, HP stage 2 (bolted)	C	N	-
	490	Vane, compressor, HP stage 2 (probe)	C	N	-
202	ALL except		A or B	-	-
	60	Block, probe mounting	A or B	L	-
	160	Block, probe mounting	A or B	L	-
	80	Vane, compressor, HP stage 3	A or B	L	-
	90	Vane, compressor, HP stage 3 (bolted)	A or B	L	-
	100	Vane, compressor, HP stage 3 (probe)	A or B	L	-
	170	Vane, compressor, HP stage 4	A or B	L	-
	180	Vane, compressor, HP stage 4 (bolted)	A or B	L	-
	190	Vane, compressor, HP stage 4 (probe)	A or B	L	-
	220	Vane, compressor, HP stage 5	A or B	L	-
	230	Vane, compressor, HP stage 5 (bolted)	A or B	L	-

Cleaning Processes
Table 201 (Continued)

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
202	240	Vane, compressor, HP stage 5 (probe)	A or B	L	-
203	ALL except		A or B	-	-
	30	Vane, compressor, HP stage 6	A or B	L	-
	40	Vane, compressor, HP stage 6 (bolted)	A or B	L	-
	50	Vane, compressor, HP stage 6 (probe)	A or B	L	-
	110	Vane, compressor, HP exit guide	A or B	L	-
	120	Vane, compressor, HP exit guide	A or B	L	-
	130	Vane, compressor, HP exit guide	A or B	L	-
	100	Block, probe mounting	A or B	L	-
204	ALL		A or B	-	-
205	ALL except		A or B	-	-
	440	Case, HP com- pressor, front	A or B	H	Blank off silver plated inserts when using process H.
206	ALL		A or B	-	-
207	ALL		A or B	-	-
208	ALL except		A or B	-	-
	120	Case, HP com- pressor, rear	A or B	J	-

Cleaning Processes
Table 201 (Concluded)CLEANING
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British airways
CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

TEMPORARY REVISION No. 72-502
Insert in 72-33-01 Cleaning after page 204

REASON FOR ISSUE:

To approve alternative method of heavy cleaning of the H.P.
Compressor Front Case (MRA 44).

ACTION:

Amend entry of Item 380 to read:

ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
		Light	Heavy	
380	Case, H.P. Compressor Front	A or B	H	Blank off silver plated inserts when using Process H
			OR L	Approved alternative but replace all silver plated inserts after Process L.

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FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	80/90	Ring, assembly, vane inner fixing	1441*	
	250			
	260	Vane, compressor, HP,	1468	
	270	stage 1		
	280			
	360/370	Ring, assembly, vane inner fixing	1441*	
	460			
	470	Vane, compressor, HP,	1469	
	480	stage 2		
	490			
202	80	Vane, compressor, HP,	1374/1390	
	90	stage 3		
	100			
	170	Vane, compressor, HP,	1373/1390	
	180	stage 4		
	190			
	220	Vane, compressor, HP,	1373/1390	
	230	stage 5		
	240			
203	30	Vane, compressor, HP,	1373/1390	
	40	stage 6		
	50			
	110	Vane, compressor, HP,	1373/1390	
	120	exit guide		
	130			
205	440	Case, compressor, HP, front	1435	

* Composite container for all stages of vane inner fixing rings and spacer rings (Ref.72-33-02, Table 202).

Cleaning and Storage Tools
Table 202

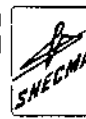
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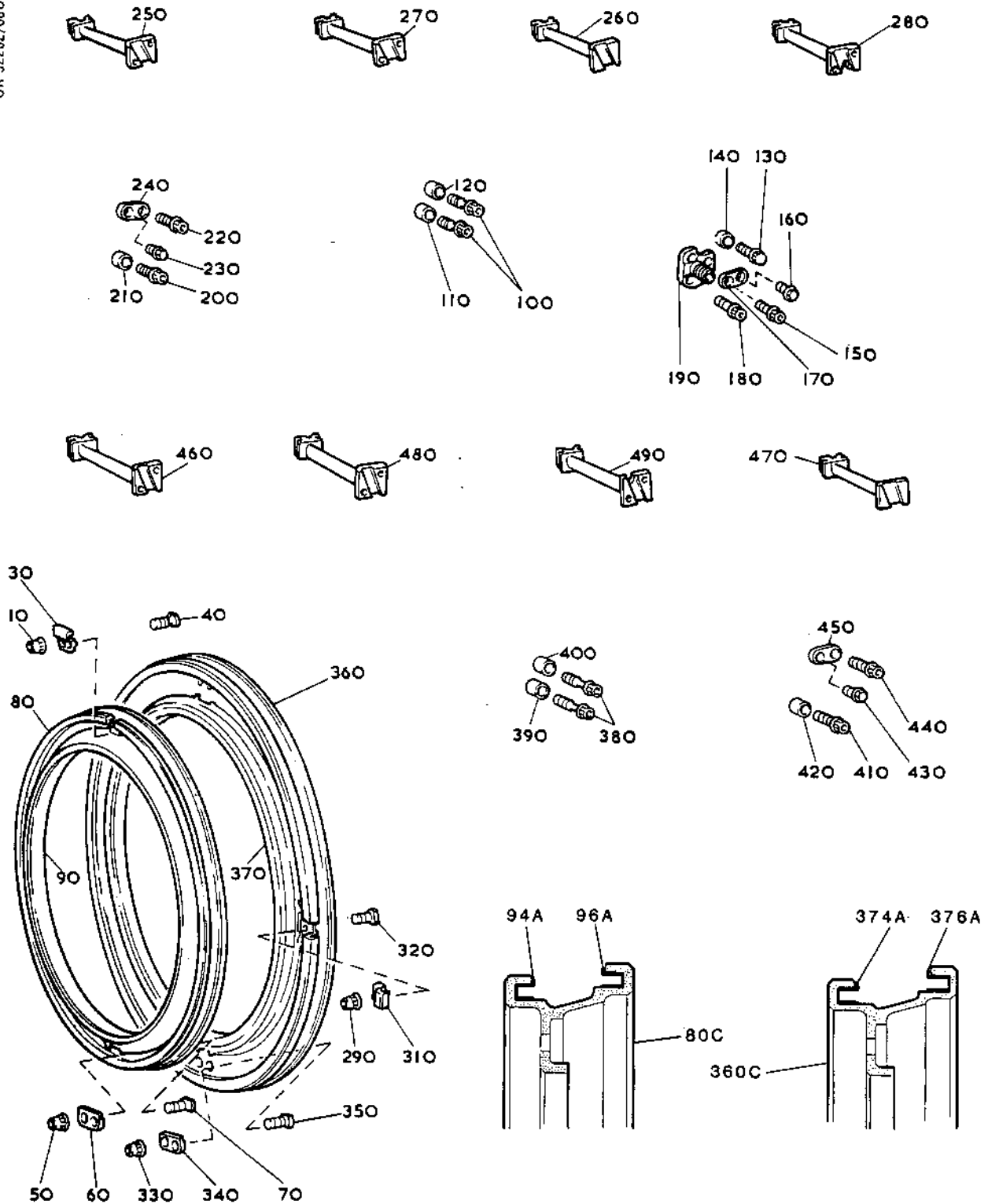
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Case and Vanes, Compressor HP -
Vanes, Stages 1 and 2
Figure 201



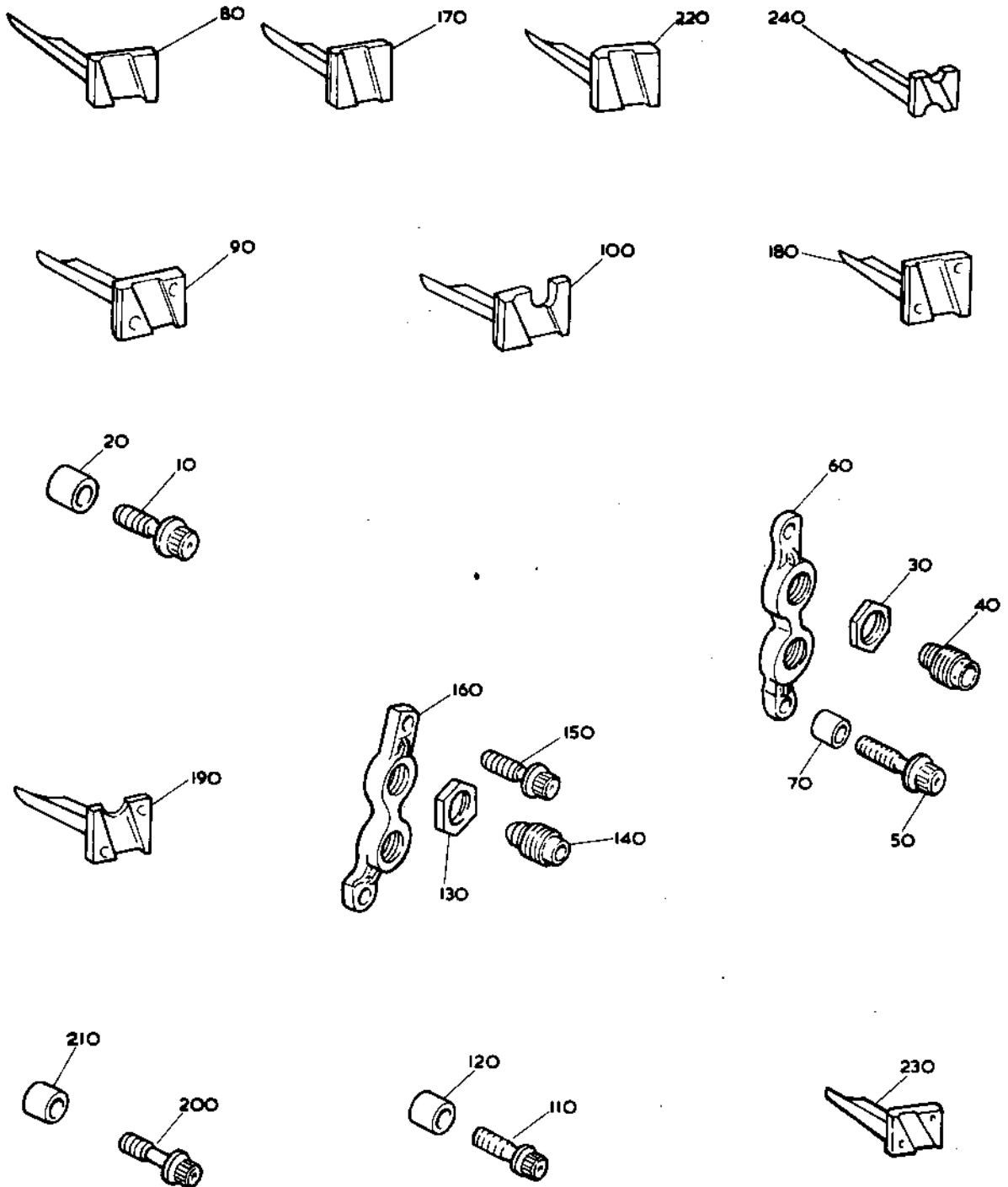
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TN15787

Case and Vanes, Compressor HP -
Vanes, Stages 3, 4 and 5
Figure 202

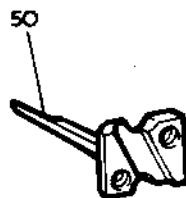
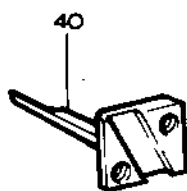
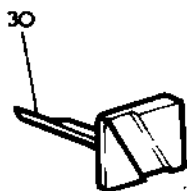


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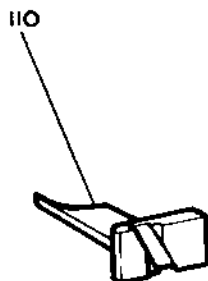


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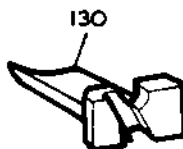


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10

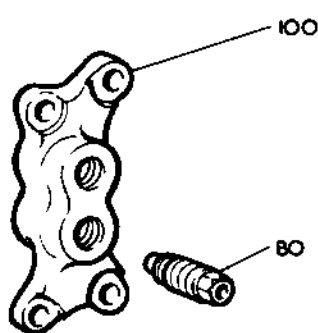


120



70

60



100



80



90

Case and Vanes, Compressor HP -
Vanes, Stages 6 and Exit Guide
Figure 203

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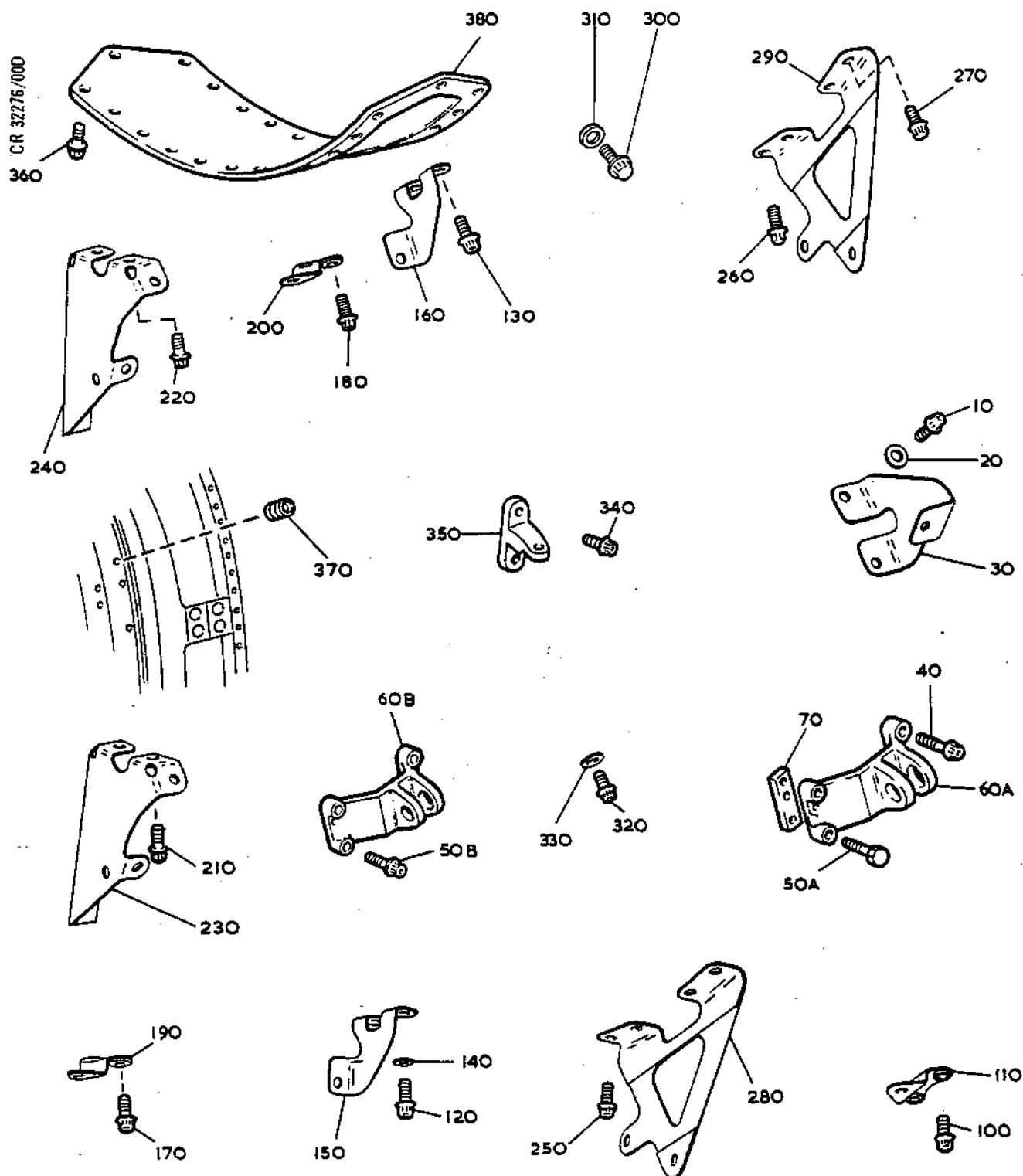
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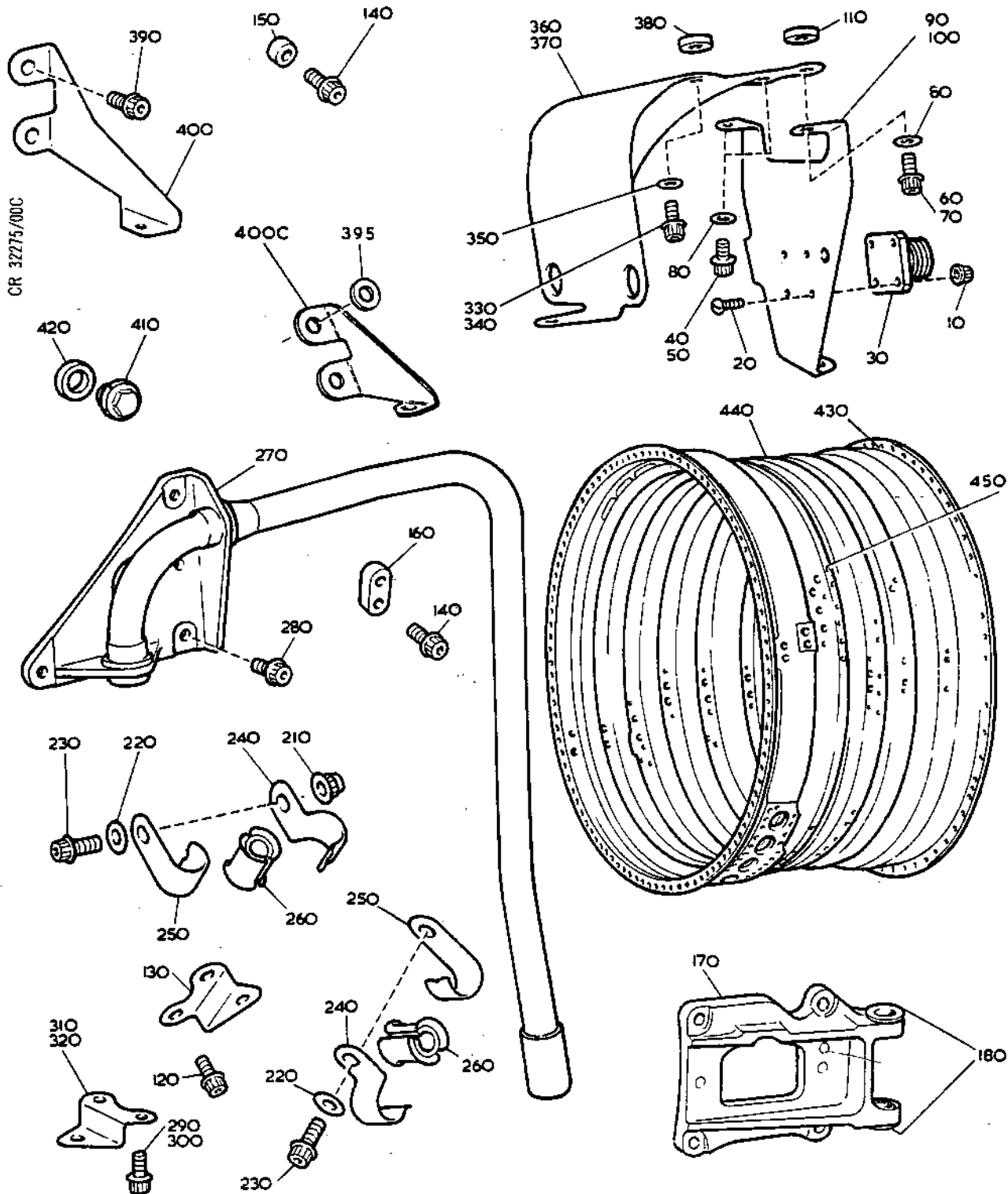


Case and Vanes, Compressor HP -
Front HP Compressor Case
and External Fittings (LH)
Figure 204



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Case and Vanes, Compressor HP -
Front HP Compressor Case
and External Fittings (RH)
Figure 205

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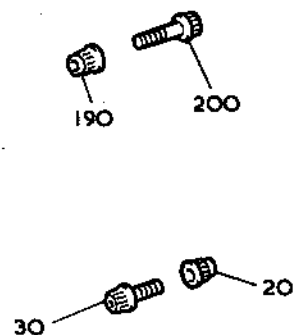
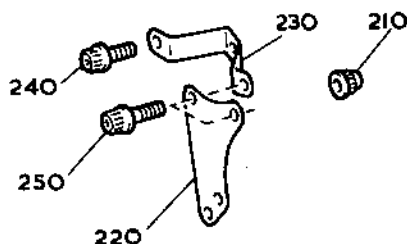
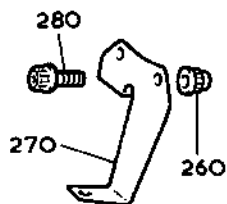
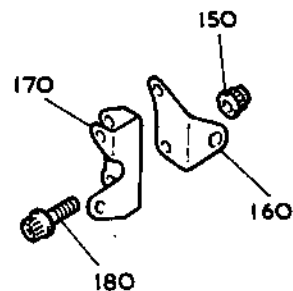
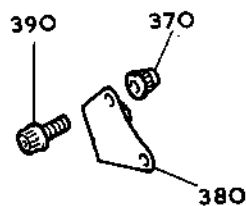
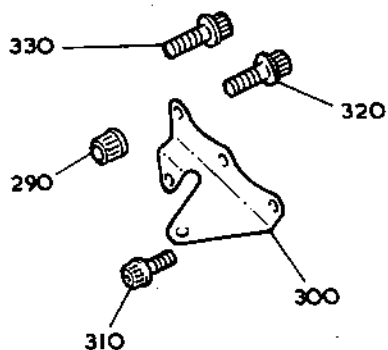
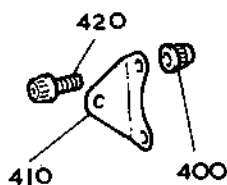
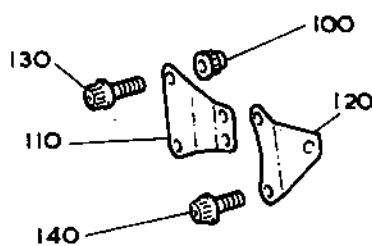
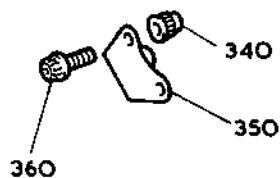
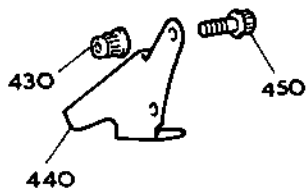
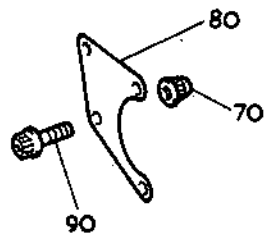
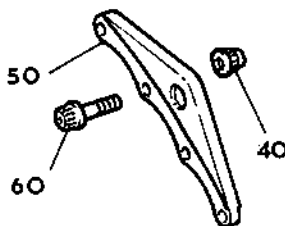
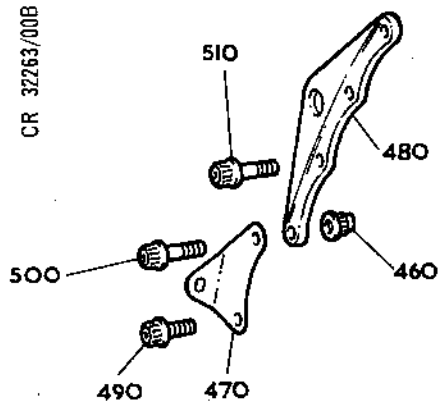


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Case and Vanes, Compressor HP -
Front HP Compressor Case
Front Flange Attaching Parts
Figure 206

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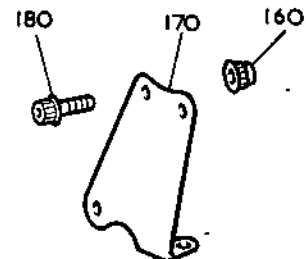
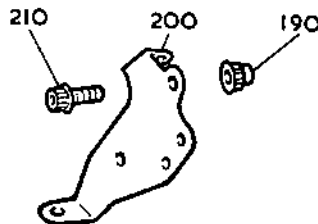
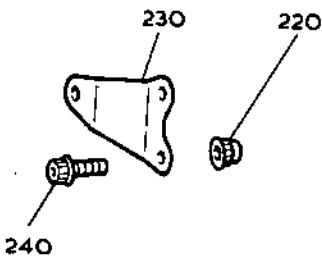
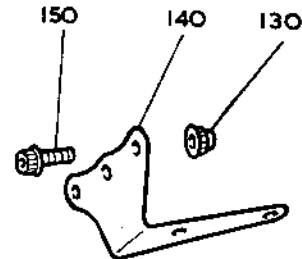
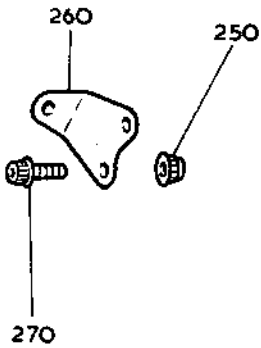
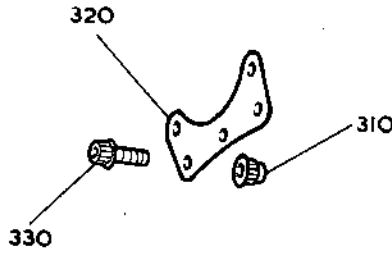
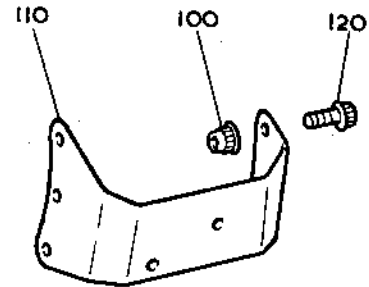
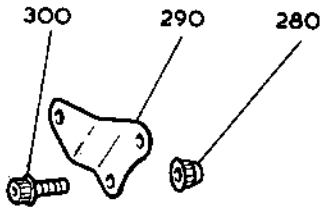
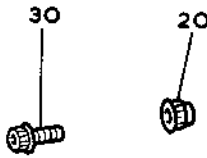
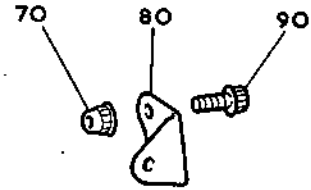
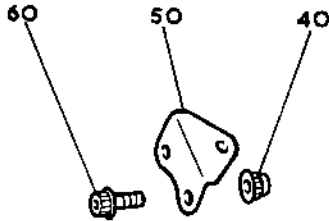


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Case and Vanes, Compressor HP -
Front HP Compressor Case
Rear Flange Attaching Parts
Figure 207

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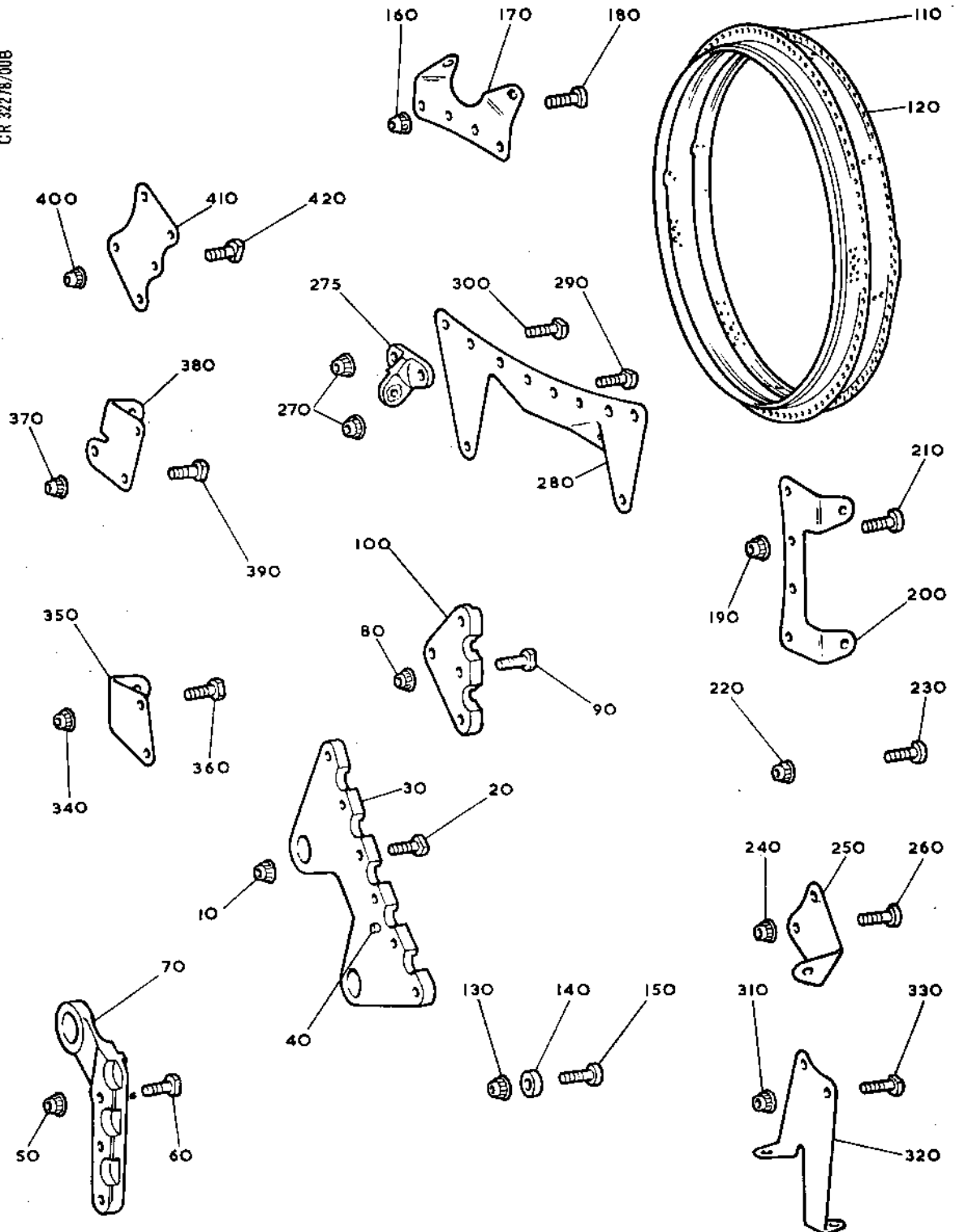
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Case and Vanes, Compressor HP -
Rear HP Compressor Case
Figure 208

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HP COMPRESSOR ROTOR - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Component Manufacturing Technique (CMT) controlled procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.
- E. Clean HP Compressor Drive Shaft.
 - (1) Pre-clean using light process A or B (Refer 72-09-00 Cleaning).
 - CAUTION:** BEFORE INSTALLATION OF TOOLING, THE TOOL SILICONE SEALS MUST BE INSPECTED FOR CONDITION, I.E. DEGRADATION, NICKS AND TEARS ETC. REPLACE SEALS IF FOUND TO BE DEFECTIVE IN ANY WAY.
 - (2) Install masking tool (Ref.Tool Item 3143) to drive shaft (Refer to Fig.204).
 - (3) Clean using the preferred cleaning process shown in Figure 1 of Service Bulletin OL.593-72-8951-364 (Process R).
 - (4) Remove masking tool and inspect for the presence of cleaning fluids in the spigot region of the drive shaft.
 - (5) Report/record any contamination by cleaning fluids found during previously detailed inspection.

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- (6) Hand clean component during final cold water rinse.

NOTE: To obtain the level of cleanliness required for penetrant inspection, the component must be free of any in-service contaminants, especially in the labyrinth mounting bolt holes. The component is considered clean when all blackened areas are removed and a bright metallic surface is evident.

- (a) Clean bolt holes during the final cold water washing operation, using a very fine abrasive pad, such as Scotchbrite grade 447. It must be applied as a hand operation only and must not be accompanied by a power operated aid.
- (b) Inspect resulting surface for cleanliness. If the surface is unsatisfactory for penetrant inspection, repeat the cleaning procedure as many times as is necessary to achieve the desired standard of cleanliness (Ref.72-09-00, Cleaning, Fig.201).

- F. Clean Ring, Spacer, Stages 3-4, 4-5, 5-6, 6-7 and Disk, Compressor, Stages 4, 5, 6 and 7.

- (1) Clean using the preferred cleaning process shown in Figure 1 of Service Bulletin OL.593-72-8951-364 (Process R).

- (2) Hand clean component during final cold water rinse.

NOTE: To obtain the level of cleanliness required for penetrant inspection, the component must be free of any in-service contaminants, especially in the bolt holes, spigot radius and blade root slots. The component is considered clean when all blackened areas are removed and a bright metallic surface is evident.

- (a) Clean the bolt holes, spigot radius and blade root slots during the final cold water washing operation, using a very fine abrasive pad, such as Scotchbrite grade 447. It must be applied as a hand operation only and must not be accompanied by a power operated aid.

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- (b) Inspect resulting surface for cleanliness. If the surface is unsatisfactory for penetrant inspection, repeat the cleaning procedure as many times as is necessary to achieve the desired standard of cleanliness (Ref.72-09-00, Cleaning, Fig.201).

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	10	Washer	A or B	L	-
	200	Bolt	A or B	L	-
	270	Ring, sealing, inner	A or B	L	-
	300	Disk, compressor rotor, HP stage 2	A or B	L	Process L, Method 1 only. CMT Component.
	(* See NOTE at conclusion of this Table)				
	310	Bolt	A or B	L	-
	330	Ring, spacer, stage 2-3	A or B	L	Process L, Method 1 only. CMT Component.
	(* See NOTE at conclusion of this Table)				
	350	Disk, compressor rotor, HP stage 3	A or B	L	Process L, Method 1 only. CMT Component.
	(* See NOTE at conclusion of this Table)				
	360	Bolt	A or B	L	-
	380	Ring, spacer, stage 3-4	-	R	Refer to Para.2.F. for cleaning process
	210	Blade, compressor, HP stage 1	C	N	-
	230	Disk, compressor rotor, HP stage 1	C	N	CMT Component
	260	Shaft, rotor front	C	N	CMT Component
	280	Blade, compressor, HP stage 2	C	N	-
	340	Blade, compressor, HP stage 3	C	N	-

Cleaning Processes
Table 201 (Continued)



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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
202	ALL except		A or B	L	Items 20, 50, 70, 100 and 120 are CMT components
	20	Disk, compressor rotor, HP stage 4	-	R	Refer to Para.2.F. for cleaning process
	40	Nut, self-locking	A or B	-	CMT Components
	50	Ring, spacer, stage 4-5	-	R	Refer to Para.2.F. for cleaning process
	70	Disk, compressor rotor, HP stage 5	-	R	Refer to Para.2.F. for cleaning process
	90	Nut, self-locking	A or B	-	-
	100	Ring, spacer, stage 5-6	-	R	Refer to Para.2.F. for cleaning process
	120	Disk, compressor rotor, HP stage 6	-	R	Refer to Para.2.F. for cleaning process
203	ALL except		A or B	-	Items 330, 370 and 390 are CMT components
	120	Bearing, HP turbine	D	E	-
	300	Labyrinth, No.12	A or B	L	CMT Component
	320	Bolt	A or B	L	-
	330	Shaft, drive, HP compressor	-	R	Refer to Para.2.E. for cleaning process
	360	Blade, compressor HP stage 7	J	L	-
	370	Disk, compressor rotor, HP stage 7	-	R	Refer to Para.2.F. for cleaning process
	380	Bolt	A or B	L	-
	390	Ring, spacer, stage 6-7	-	R	Refer to Para.2.F. for cleaning process
	400	Tube, air transfer	A or B	G	-

* Fig.201 items 300, 330 and 350 are finished in aluminium paint or Sermetel W. If full inspection is to be carried out use process L (Method 1 only) to remove finish. For visual inspection clean using process A or B only.

Cleaning Processes
Table 201 (Concluded)

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FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	210	Blade, compressor, HP, stage 1	1374/1390	
	230	Disk, compressor, rotor, HP, stage 1	1418	
	260	Shaft, rotor front	1420	
	280	Blade, compressor, HP, stage 2	1374/1390	
	300	Disk, compressor rotor, HP, stage 2	1419	
	330	Ring, spacer, stage 2-3	1441*	
	340	Blade, compressor, HP, stage 3	1374/1390	
	350	Disk, compressor rotor, HP, stage 3	1419	
	380	Ring, spacer, stage 3-4	1441*	
202	10	Blade, compressor, HP, stage 4	1374/1390	
	20	Disk, compressor rotor, HP, stage 4	1419	
	50	Ring, spacer, stage 4-5	1441*	
	60	Blade, compressor, HP, stage 5	1373/1390	
	70	Disk, compressor rotor, HP, stage 5	1419	
	100	Ring, spacer, stage 5-6	1441*	
	110	Blade, compressor, HP, stage 6	1373/1390	
	120	Disk, compressor rotor HP, stage 6	1419	

* Composite container for all stages of spacer rings
and vane inner fixing rings (Ref.72-33-01, Table 202).

Cleaning and Storage Tools
Table 202 (Continued)

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FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
203	300	Labyrinth, No.12	1386	
	330	Shaft, drive, HP compressor	1453/3143	
	360	Blade, compressor, HP, stage 7	1373/1390	
	370	Disk, compressor rotor, HP, stage 7	1419	
	390	Ring, spacer, stage 6-7	1441*	
	400	Tube, air transfer	1502	

* Composite container for all stages of spacer rings
and vane inner fixing rings (Ref.72-33-01, Table 202).

Cleaning and Storage Tools
Table 202 (Concluded)



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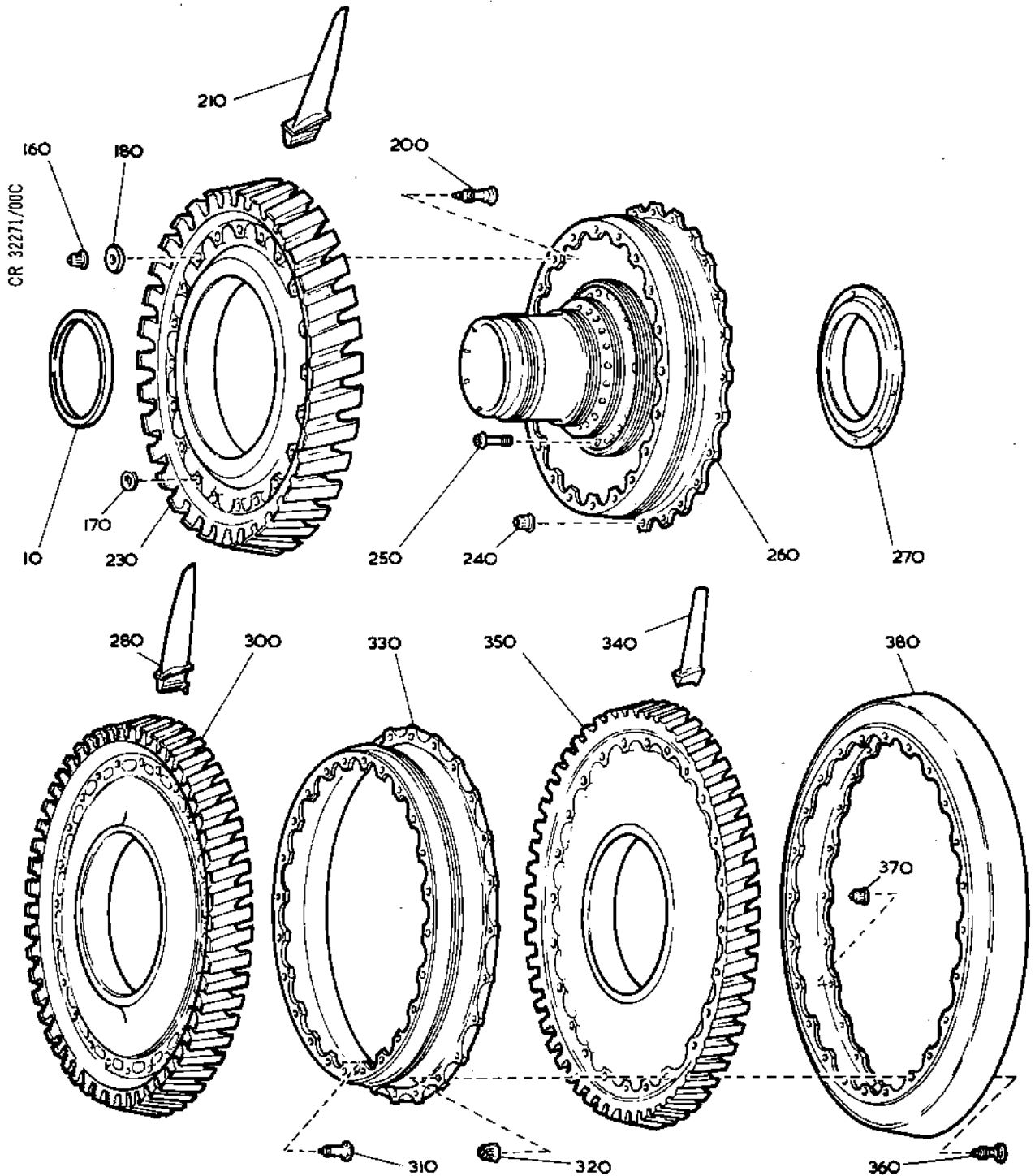
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Rotor, Compressor HP - Front Rotor Shaft, Blades and Disks
Stages 1, 2 and 3
Figure 201

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72-33-02

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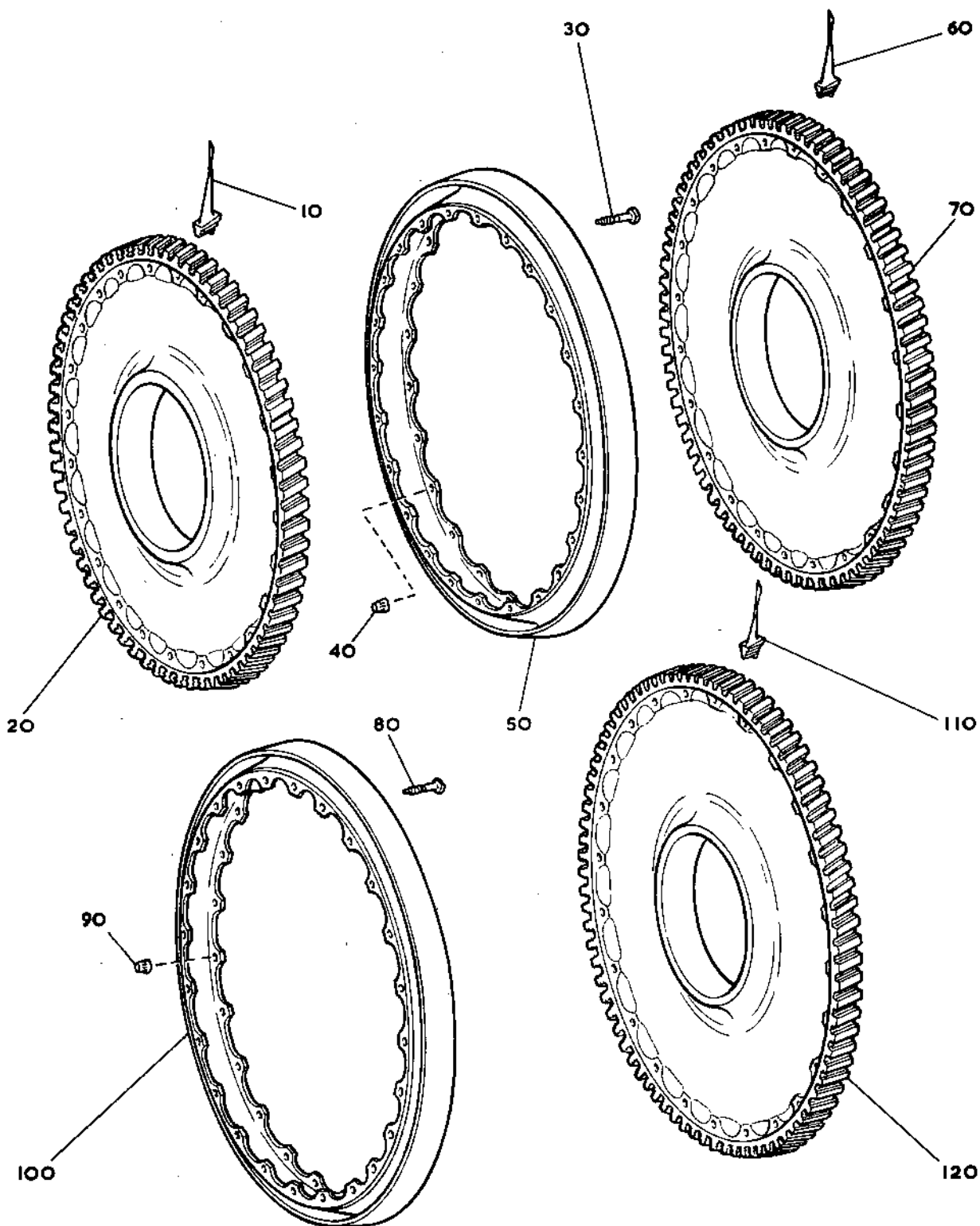


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Rotor, Compressor HP -
Blades and Disks, Stages 4, 5 and 6
Figure 202

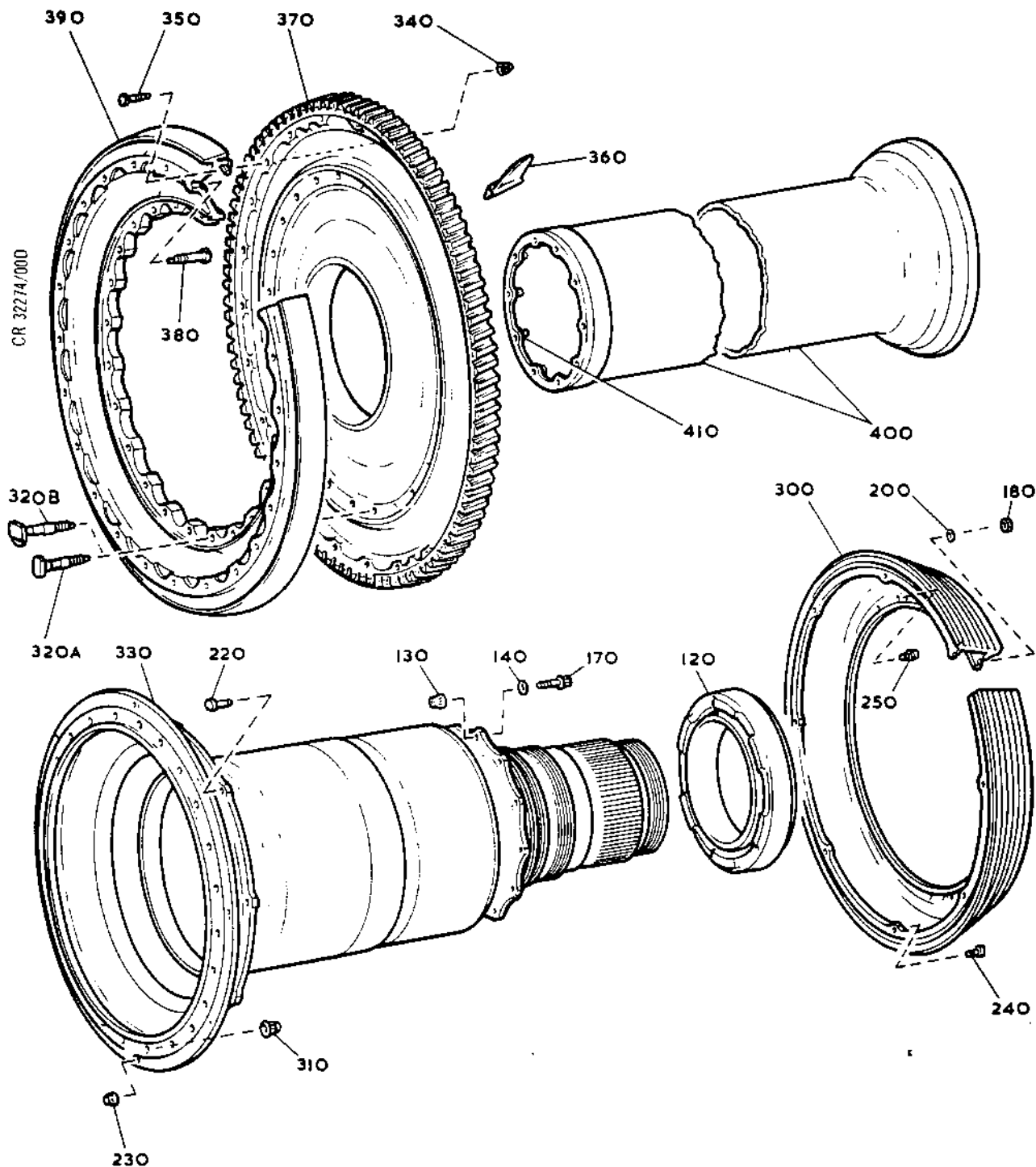
CLEANING
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Rotor, Compressor HP - Blades and Disk, Stage 7
and Drive Shaft
Figure 203

CLEANING

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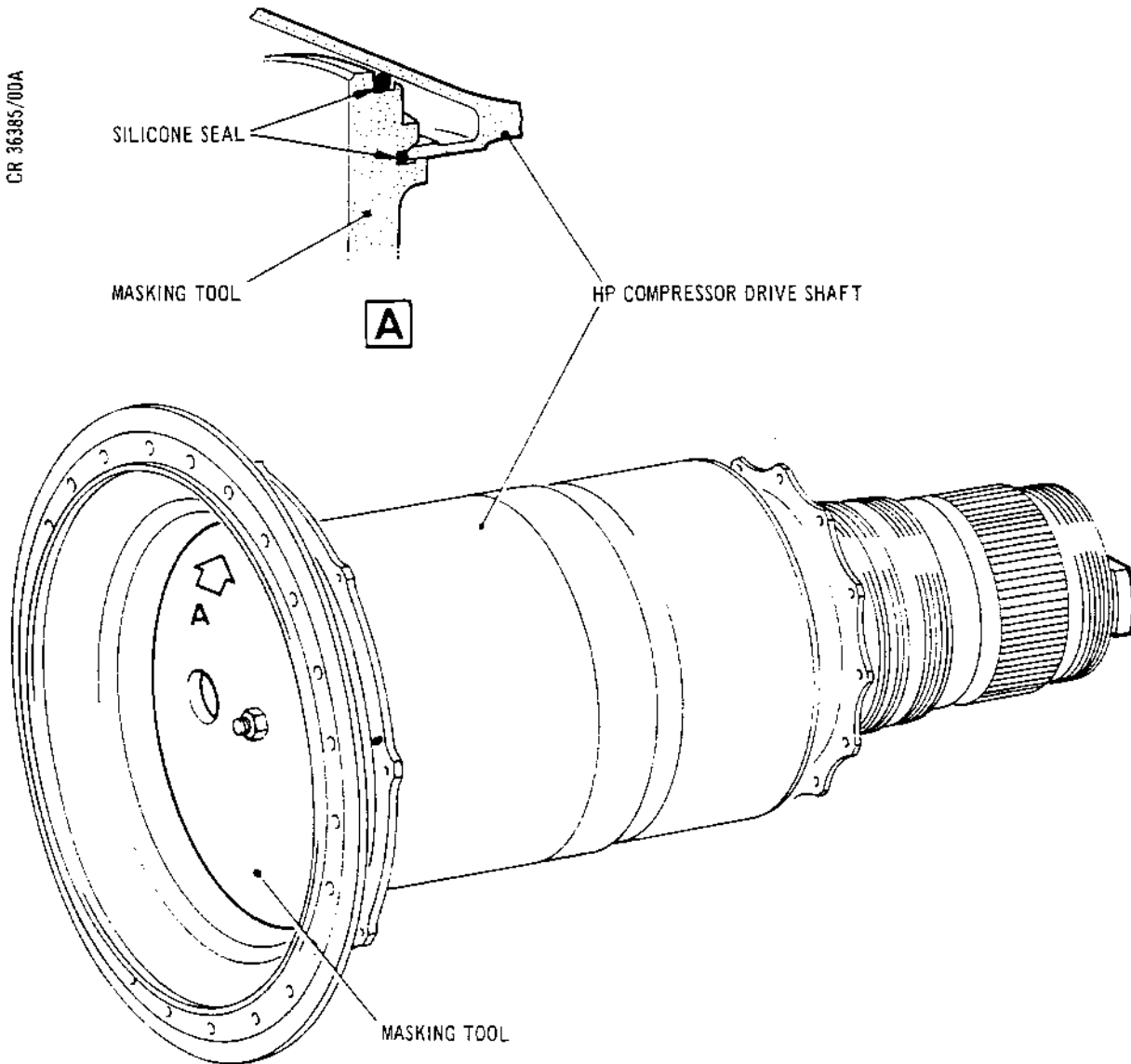
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OVERHAUL



CR 36385/00A



HP Compressor Drive Shaft
Installation of Masking Tool (Ref.Tool item 3143)
Figure 204



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HP COMPRESSOR DIFFUSER CASE ASSEMBLY - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

CLEANING

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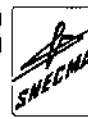
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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

CLEANING

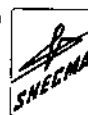
72-34-00

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	80	Tube	-	-	Heat treat and clean in accordance with Process 114 (Refer to Engine Overhaul Processes, TSD 594)
	210	Tube	-	-	
	340	Tube	-	G	
	420	Tube	-	G	Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion
	100 to 130	Insulation	Scotchbrite	-	
	230 to 260	Insulation	Scotchbrite	-	
	360 to 390	Insulation	Scotchbrite	-	-
	440	Insulation	Scotchbrite	-	-
	450	Insulation	Scotchbrite	-	-
202	ALL except		A or B	-	-
	110	Seal, labyrinth No.12	A or B	L	-
	120	Ring	A or B	L	-
	220	Ring	A or B	L	-
203	ALL except		A or B	-	-
	90	Cover	F	L	-
	100	Cover	F	L	-
	250	Cover	F	L	-
	340	Case, diffuser	F	L	Blank off silver plated inserts when using process L

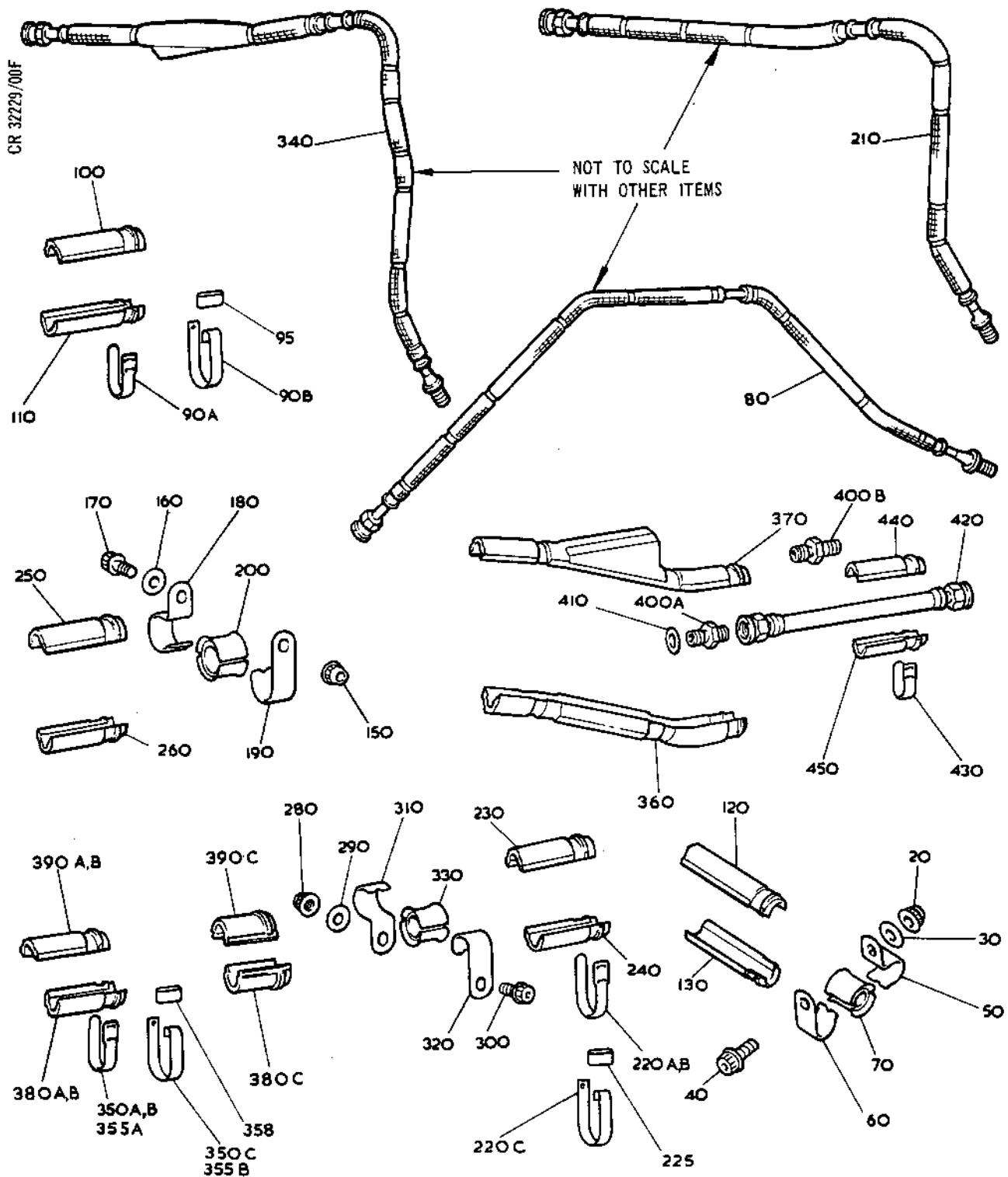
Cleaning Processes
Table 201

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Case - Diffuser Compressor HP - Oil and Air Tubes
Figure 201

CLEANING
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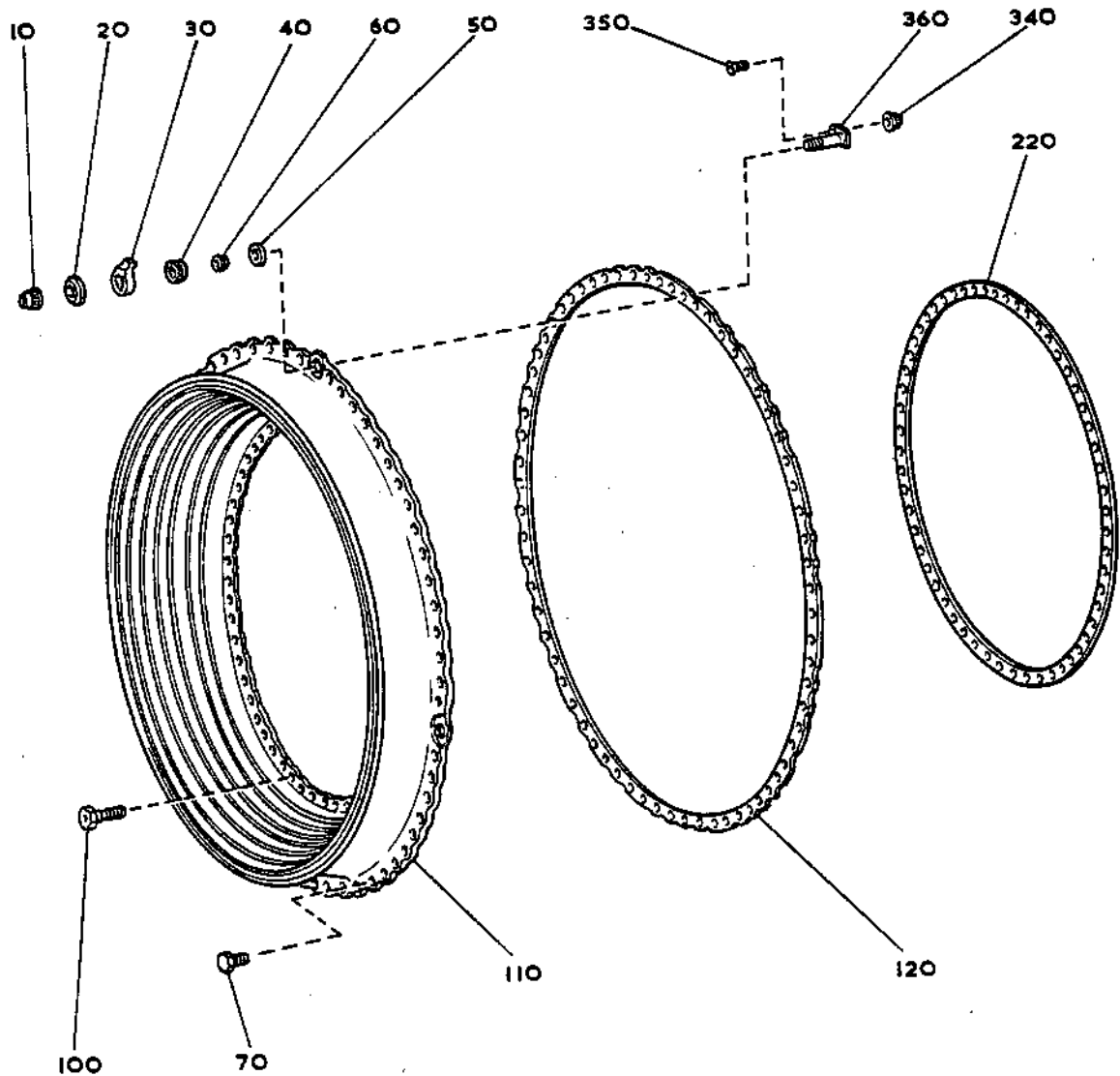
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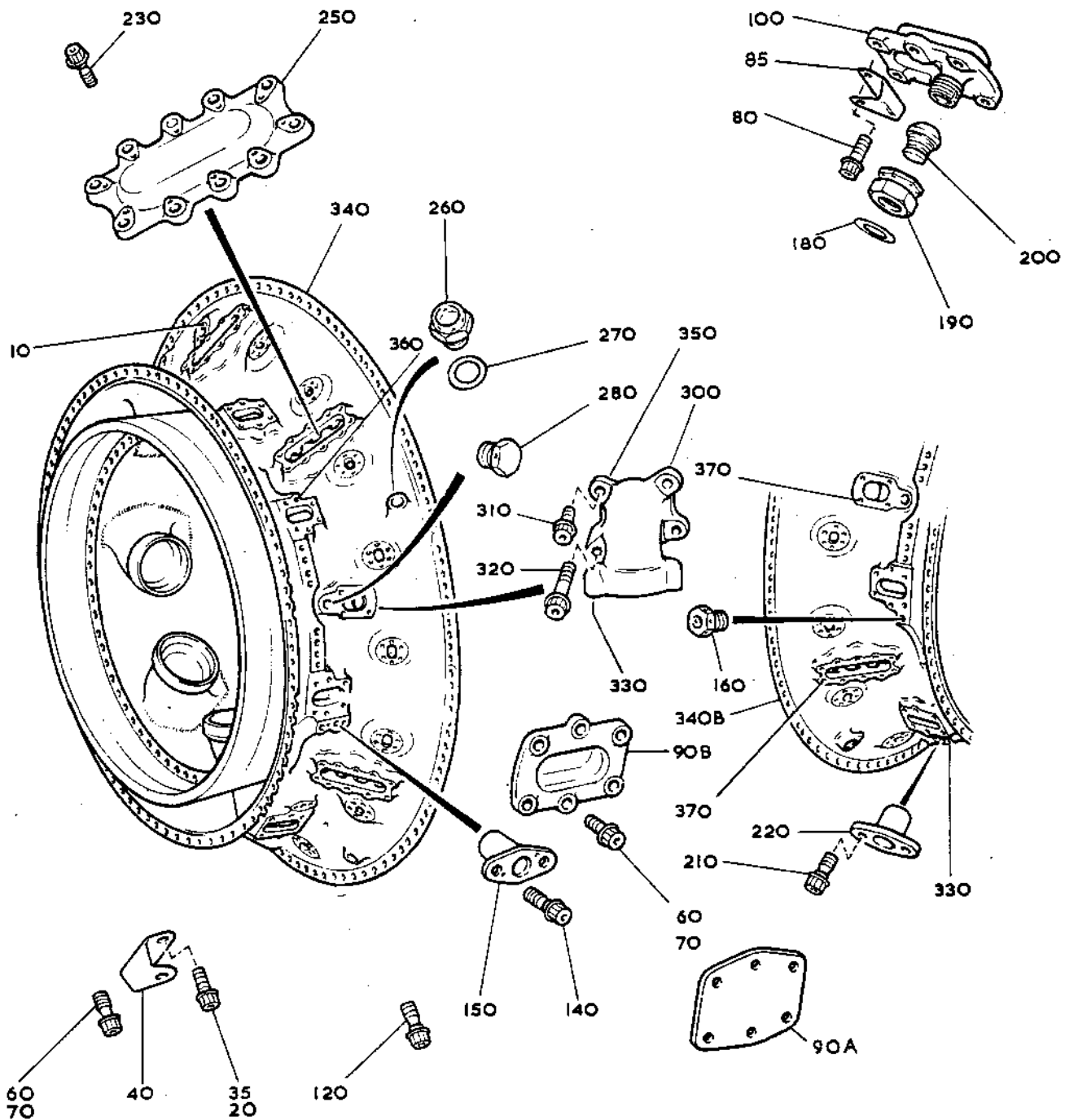
Case - Diffuser Compressor HP - Labyrinth Seal
Figure 202

CLEANING

72-34-00

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Case - Diffuser Compressor HP - Case Assembly
Figure 203

CLEANING

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COMBUSTION CHAMBER - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

CLEANING

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	10	Combustion chamber	G	M	Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion. Process M will necessitate the replacement of all silver plated nuts.

Cleaning Processes
Table 201

FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	10	Combustion chamber	1431	

Cleaning and Storage Tools
Table 202

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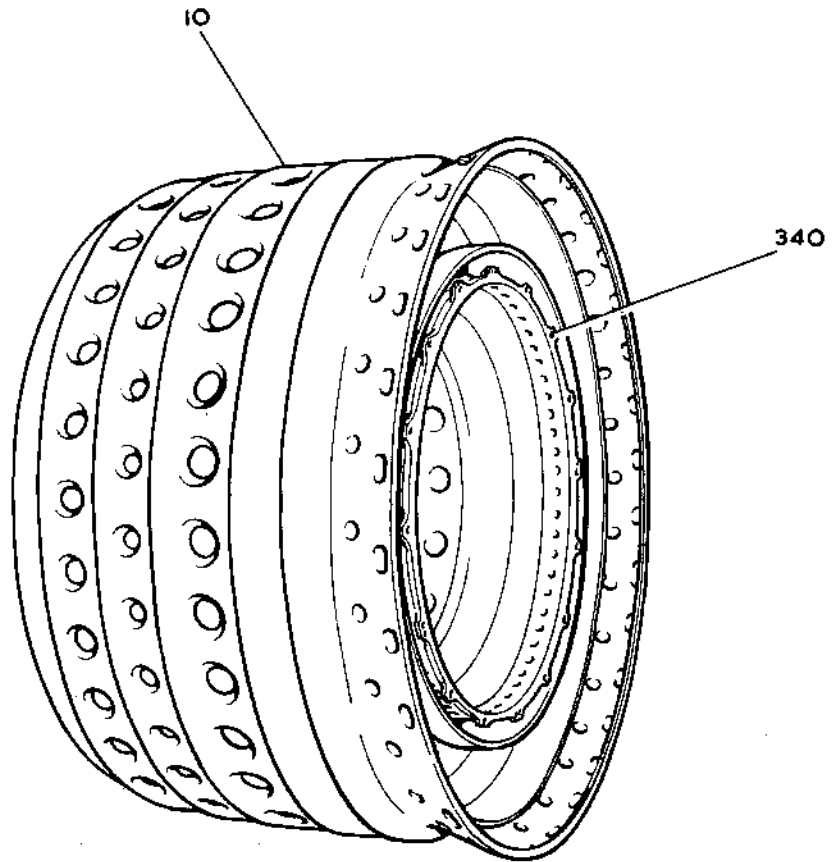
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CR 32146/00A



Combustion Chamber
Figure 201

TN32069

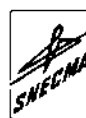
CLEANING
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COMBUSTION CHAMBER OUTER CASE - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

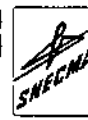
- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.



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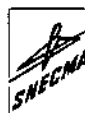
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	230	Tube, support (short)	A or B	G	-
	270	Tube, support	A or B	G	-
	290	Tube, support	A or B	G	-
	10	Bracket	A or B	J	-
	60	Bracket	A or B	J	-
	110	Bracket	A or B	J	-
	160	Bracket	A or B	J	-
	260	Bracket	A or B	J	-

Cleaning Processes
Table 201 (Continued)



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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
202	ALL		A or B	G	-
	except				
	280	Bracket	A or B	J	-
	300	Bracket	A or B	J	-
	30	Block, mounting	F	L	-
	50	Cover, blanking	F	L	-
	80	Pin	F	L	-
	110	Plate, blanking	F	L	-
	170	Cover, blanking	F	L	-
	190	Bracket	F	L	-
	250	Boss, mounting	F	L	-
	340	Plate, blanking	F	L	-
	400	Plate, blanking (Pre SB.72-75)	F	L	-
	410	Case, outer com- bustion chamber	F	L	CMT Component
203	ALL		A or B	G	-
	except				
	50	Bracket	A or B	J	-
	140	Bracket	A or B	J	-
	170	Bracket, rear lifting	A or B	J	-
	230	Bracket	A or B	J	-
	280	Bracket	A or B	J	-
	340	Bracket	A or B	J	-
	350	Bracket	A or B	J	-
	360	Bracket	A or B	J	-
	400	Bracket	A or B	J	-
	470	Bracket, front RH	A or B	J	-
	500	Bracket	A or B	J	-
	530	Bracket, angled	A or B	J	-
204	ALL		A or B	G	-
	except				
	30	Bracket	A or B	J	-
	70	Bracket	A or B	J	-
	120	Bracket	A or B	J	-
	170	Plate	A or B	J	-
	210	Bracket, front LH	A or B	J	-

Cleaning Processes
Table 201 (Continued)

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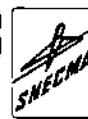


FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
204	220	Bracket	A or B	J	-
	280	Bracket	A or B	J	-
	310	Bracket	A or B	J	-
	360	Bracket	A or B	J	-
	370	Bracket	A or B	J	-
205	ALL except		A or B	G	-
	30	Bracket	A or B	J	-
	110	Bracket	A or B	J	-
	170	Plate	A or B	J	-
	200	Bracket	A or B	J	-
	230	Bracket, rear	A or B	J	-
	300	Lifting Bracket	A or B	J	-
206	ALL except		A or B	-	-
	160	Segment, half	A or B	L	-
	165	Segment, half	A or B	L	-
	190	Segment	A or B	L	-
	195	Segment	A or B	L	-
	197	Spacer	A or B	M	-
	220	Bracket	A or B	M	-
	225	Bracket	A or B	M	-
	230	Bracket	A or B	M	-
	235	Bracket	A or B	M	-

Cleaning Processes
Table 201 (Concluded)



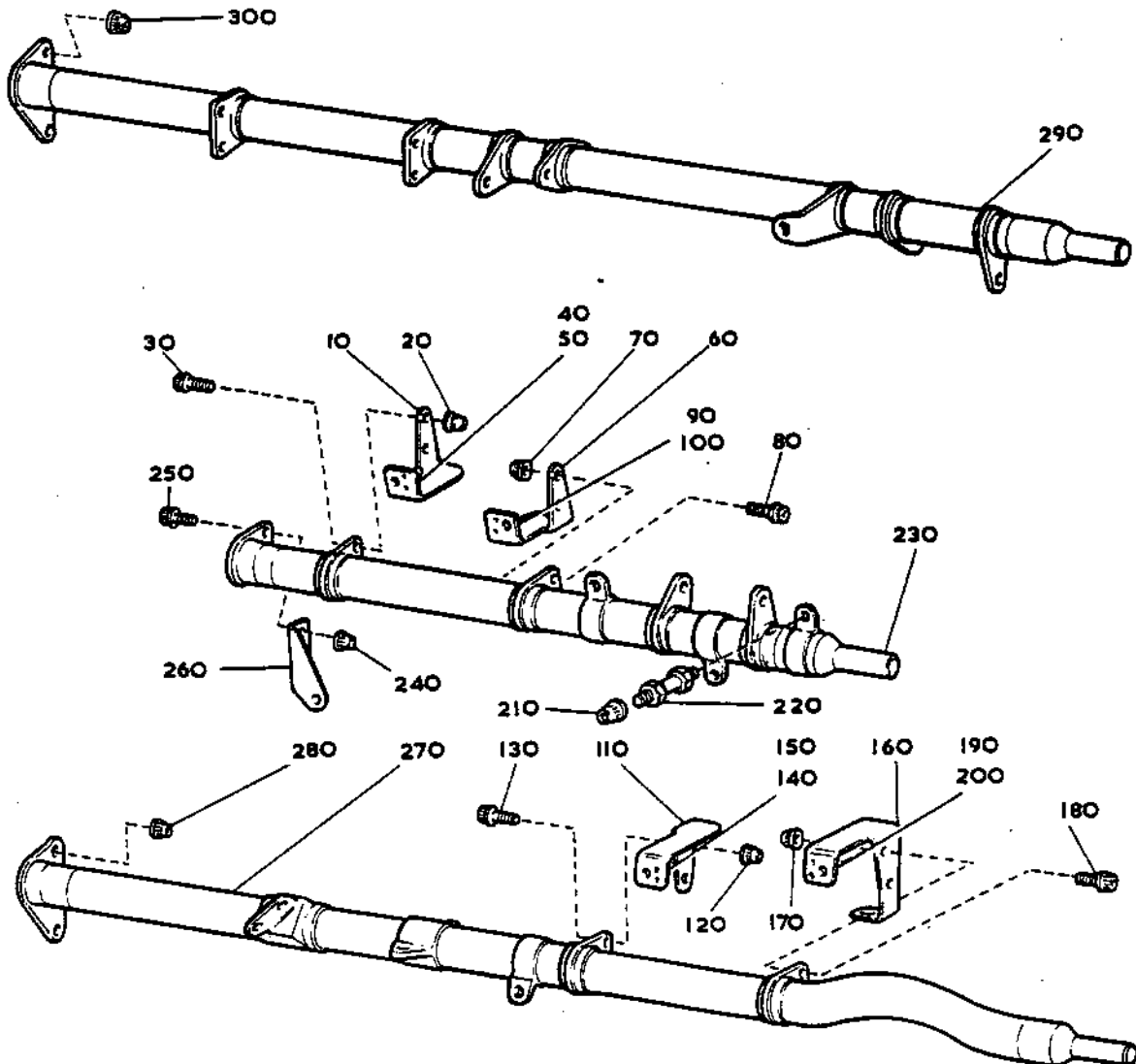
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Combustion Chamber Outer Case -
Support Tubes and Fittings
Figure 201

CLEANING

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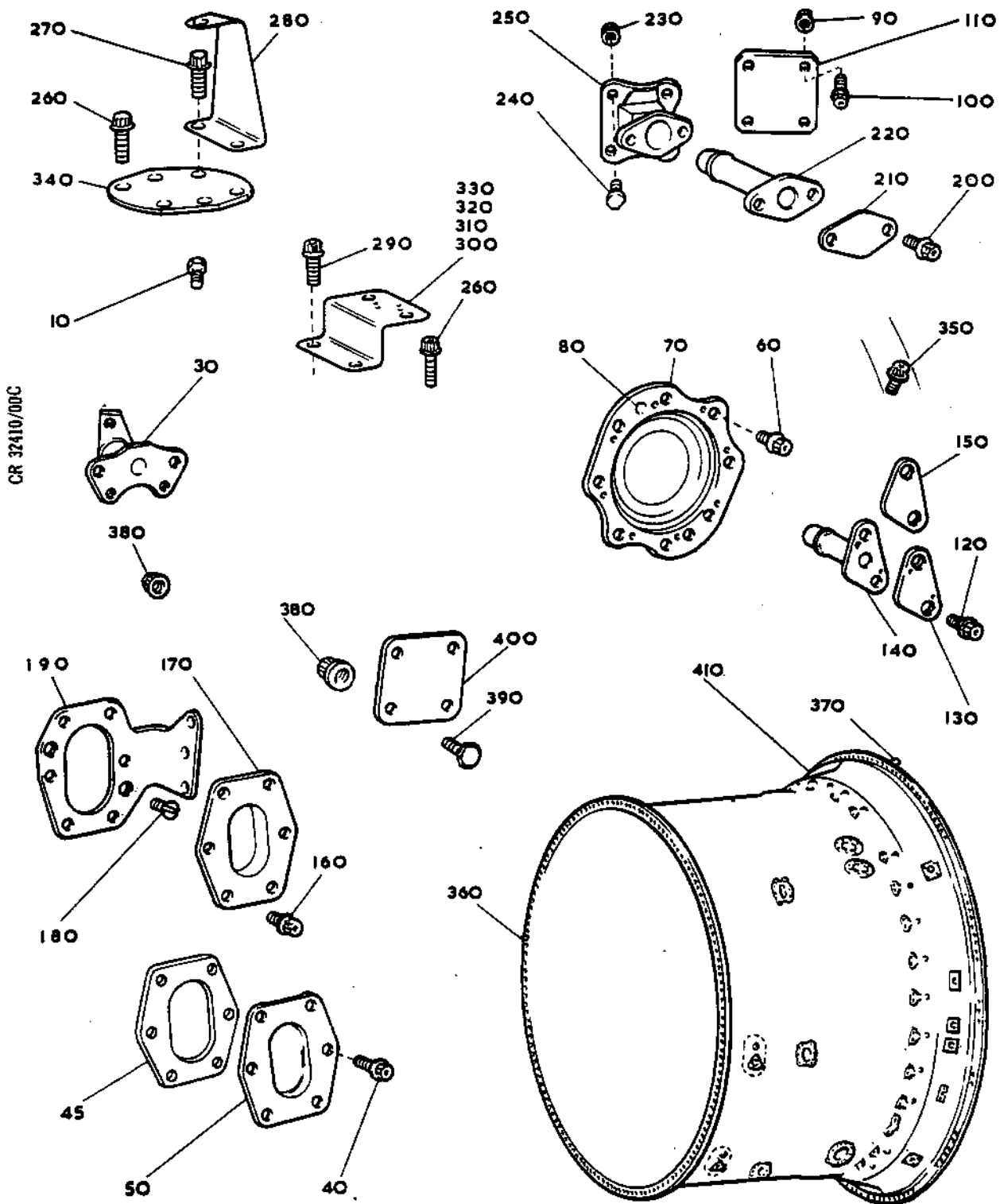
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Combustion Chamber Outer Case
Case Assembly and External Fittings
Figure 202

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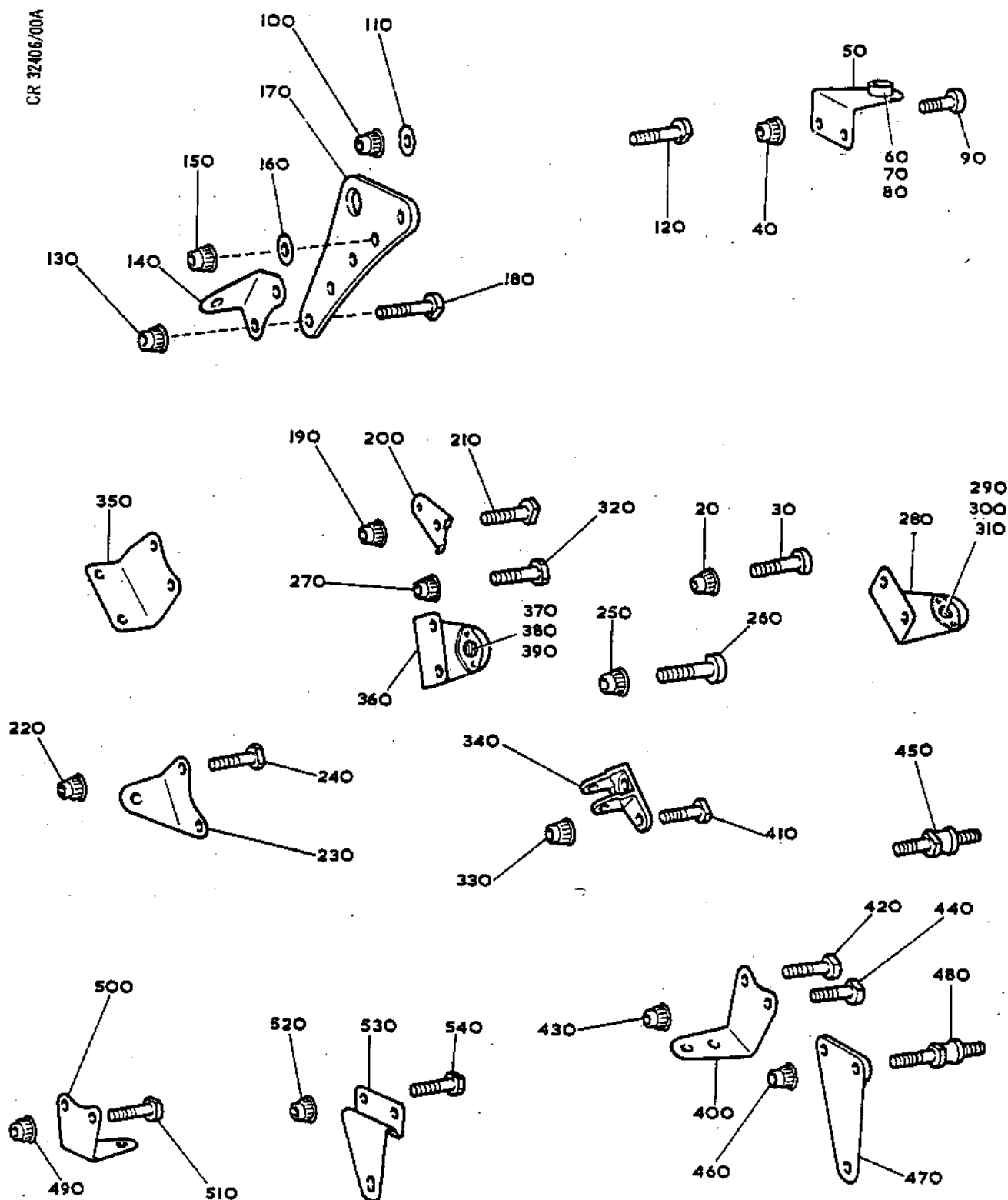


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CR 32406/00A



Combustion Chamber Outer Case -
Case Attaching Parts
Figure 203

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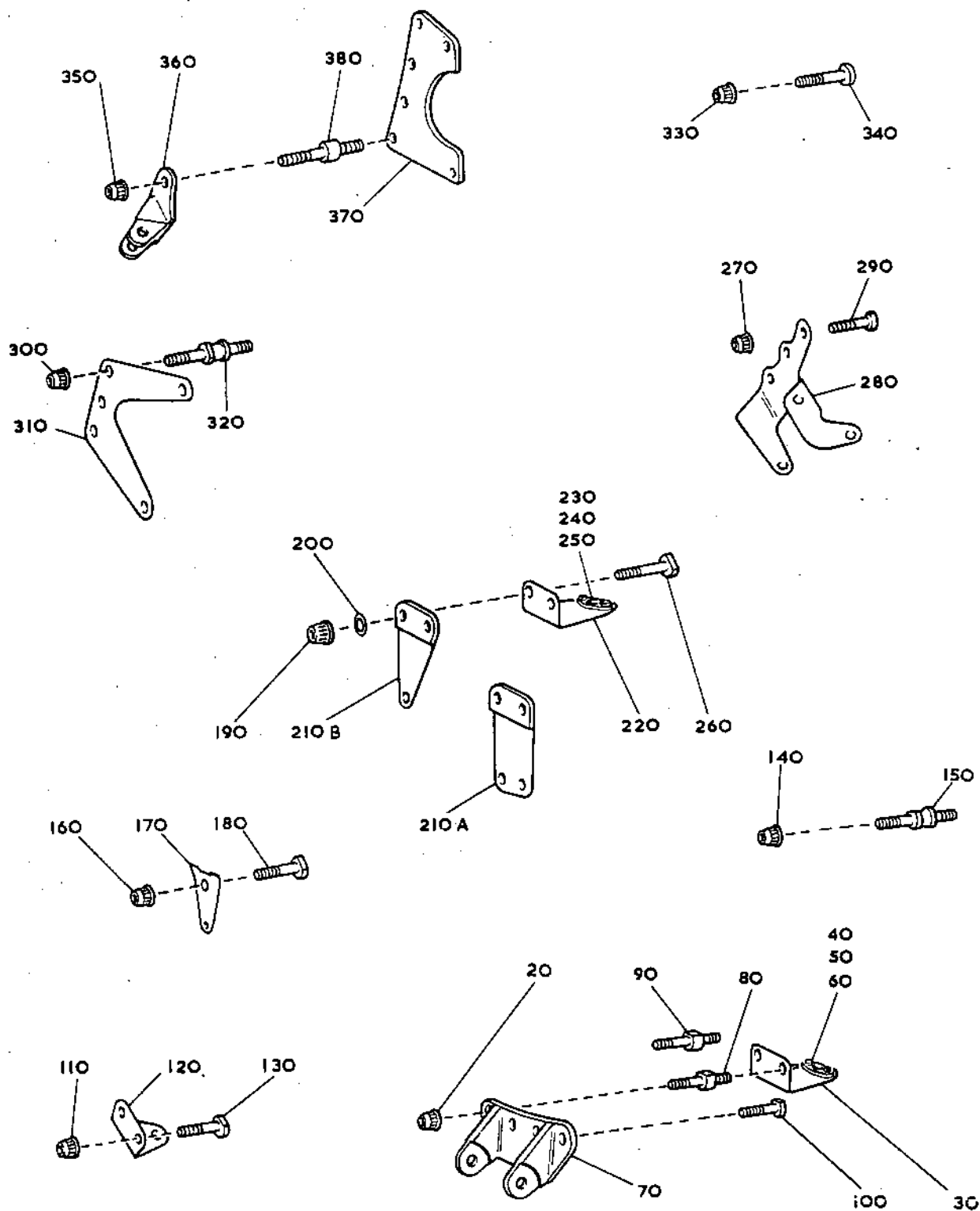


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CR 32328/00C



Combustion Chamber Outer Case -
Case Attaching Parts
Figure 204 .

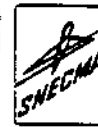
TN32076

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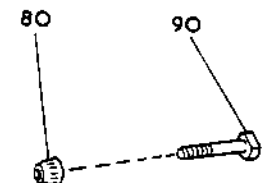
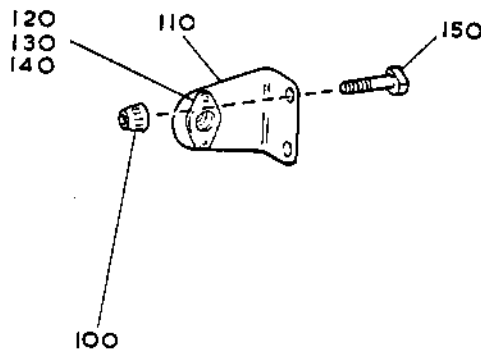
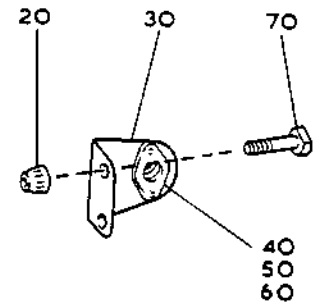
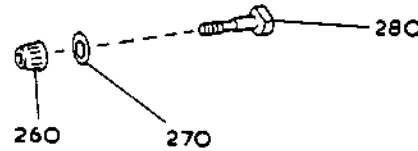
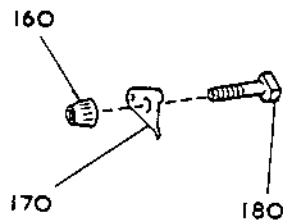
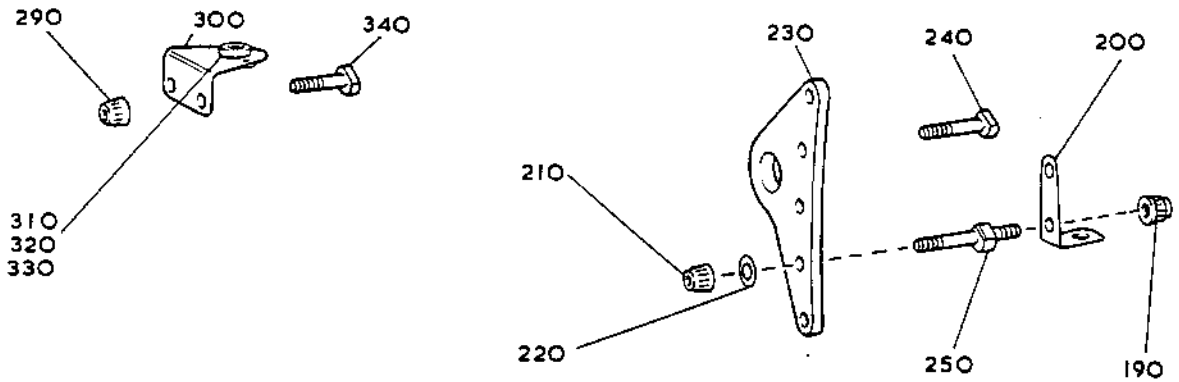


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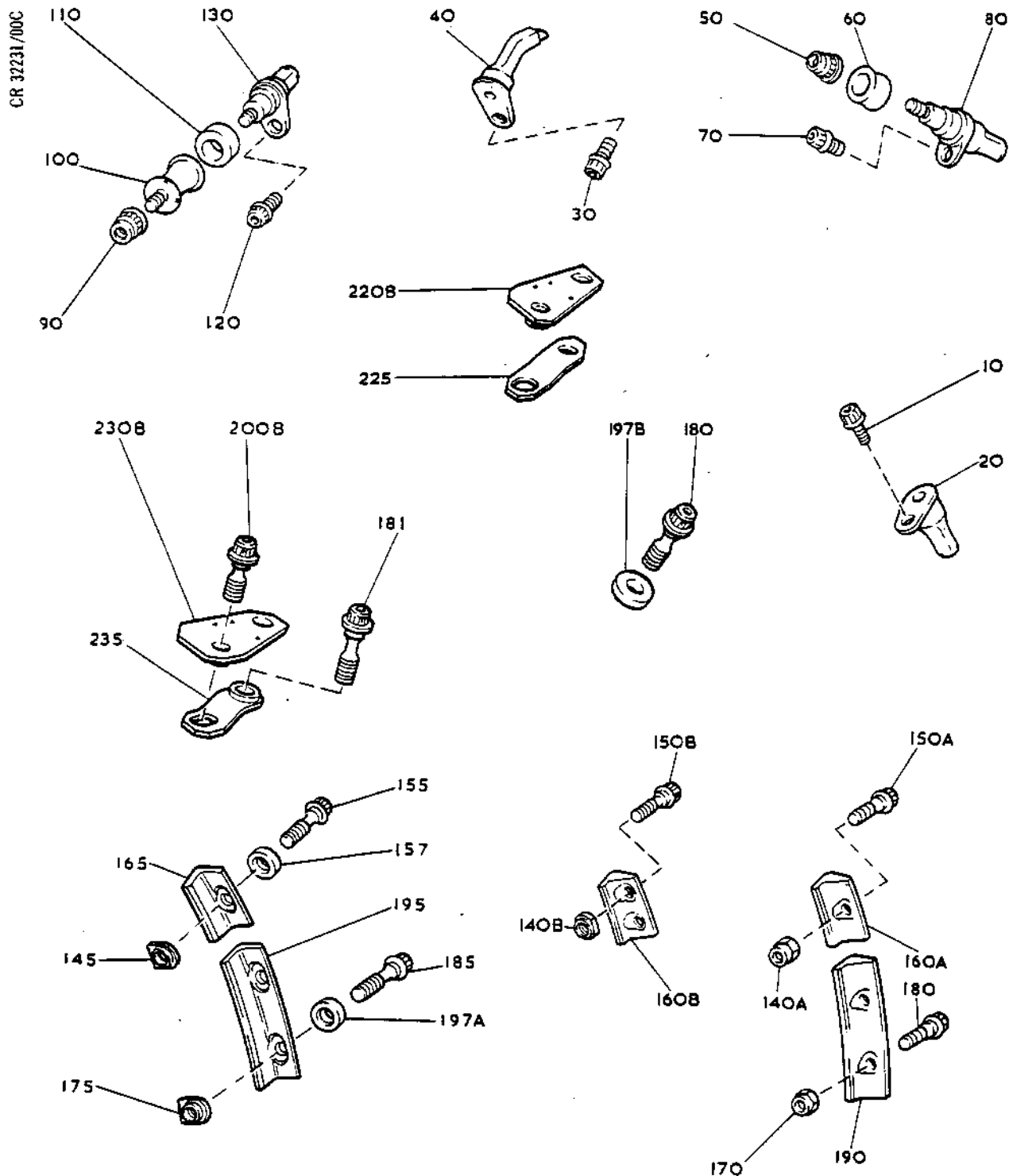


Combustion Chamber Outer Case -
Case Attaching Parts
Figure 205



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Combustion Chamber Outer Case —
Vane Nozzle Abutment Segments and Fittings
Figure 206

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HP TURBINE BEARING SUPPORT - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	-	-
	except				
	50	Coupling assembly	A or B	G	-
	130	Coupling assembly	A or B	G	-
	220	Coupling assembly	A or B	G	-
202	270	Duct assembly, outer	A or B	G	-
	ALL		A or B	-	-
	except				
	10	Ring assembly	A or B	G	-
	50	Coupling	A or B	G	-
	60	Duct assembly	A or B	G	-

Cleaning Processes
Table 201 (Continued)



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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
203	ALL except		A or B	-	-
	30	Tube	A or B	L	-
	70	Tube	A or B	L	-
	140	Elbow	A or B	L	-
	170	Seal, spherical	A or B	L	-
	190	Housing, spherical	A or B	L	-
	210	Tube, end	-	-	Heat treat and clean in accordance with Process 114 (Refer to Engine Overhaul Processes, TSD 594)
	220	Nozzle (SB.72-1 or 72-39)	-	G	-
	240	Adapter, tube	-	G	-
	260	Tube, end	-	-	Heat treat and clean in accordance with Process 114 (Refer to Engine Overhaul Processes, TSD 594)
	50	Insulation	Scotchbrite		These items must not be immersed in liquid.
	60	Insulation	Scotchbrite		
	90	Insulation	Scotchbrite		
	100	Insulation	Scotchbrite		
	193	Insulation	Scotchbrite		
	243	Insulation	Scotchbrite		
204	ALL except		A or B	-	-
	10	Insulation (Pre SB.72-20)	Scotchbrite		These items must not be immersed in liquid.
	20	Insulation	Scotchbrite		
	150	Connector, screwed	-	G	-
	180	Cover assembly	-	G	-
	200	Tube	-	G	-

Cleaning Processes
Table 201 (Continued)

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OVERHAUL



FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
204	230	Ring, labyrinth No.16	-	-	Heat treat and clean in accordance with Process 114 (Refer to Engine Overhaul Processes, TSD 594)
	260	Jet	-	G	-
	380	Housing, HP turbine bearing (Item 390 is fitted in item 380)	-	-	Heat treat and clean in accordance with Process 114 (Refer to Engine Overhaul Processes, TSD 594)
205	ALL except 10	Insulation	A or B	-	-
			Scotchbrite		This item must not be immersed in liquid.
	20	Shroud assembly	A or B	L	-
	40	Bearing support	A or B	L	-
	100	Washer flat (SB.72-86)	A or B	L	-
	200	Washer flat (SB.72-86)	A or B	L	-

Cleaning Processes
Table 201 (Concluded)



OLYMPUS 593

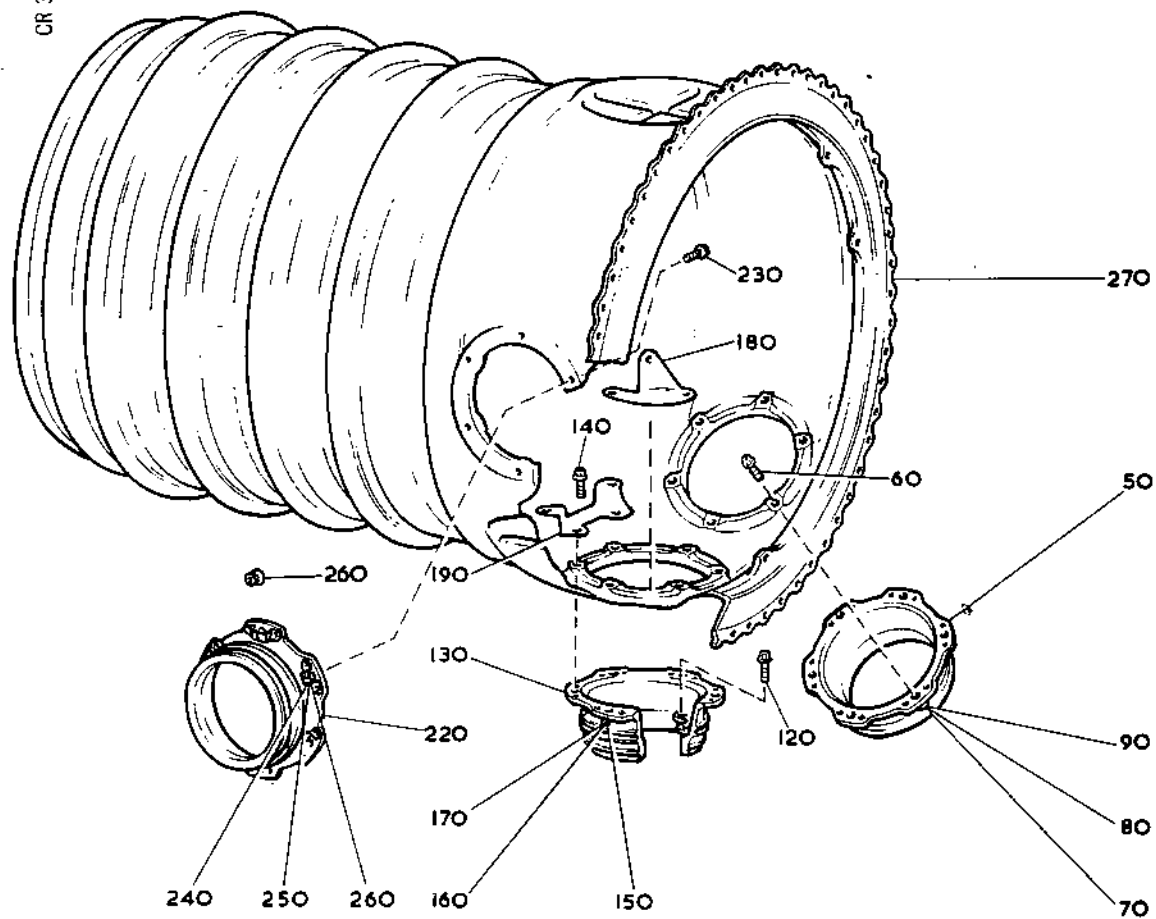
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OVERHAUL



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Outer Air Duct and Couplings
Figure 201

CLEANING

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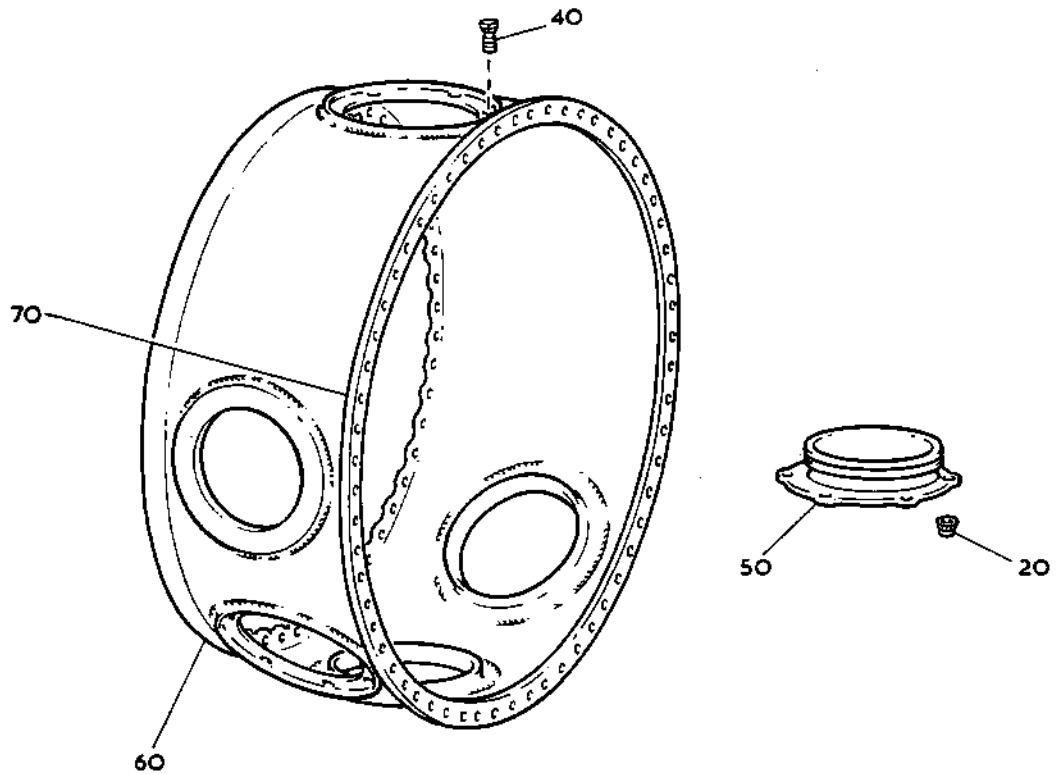
OLYMPUS 593

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OVERHAUL



CR 32270/00B



HP Turbine Bearing Support, Air Duct
Figure 202



OLYMPUS 593

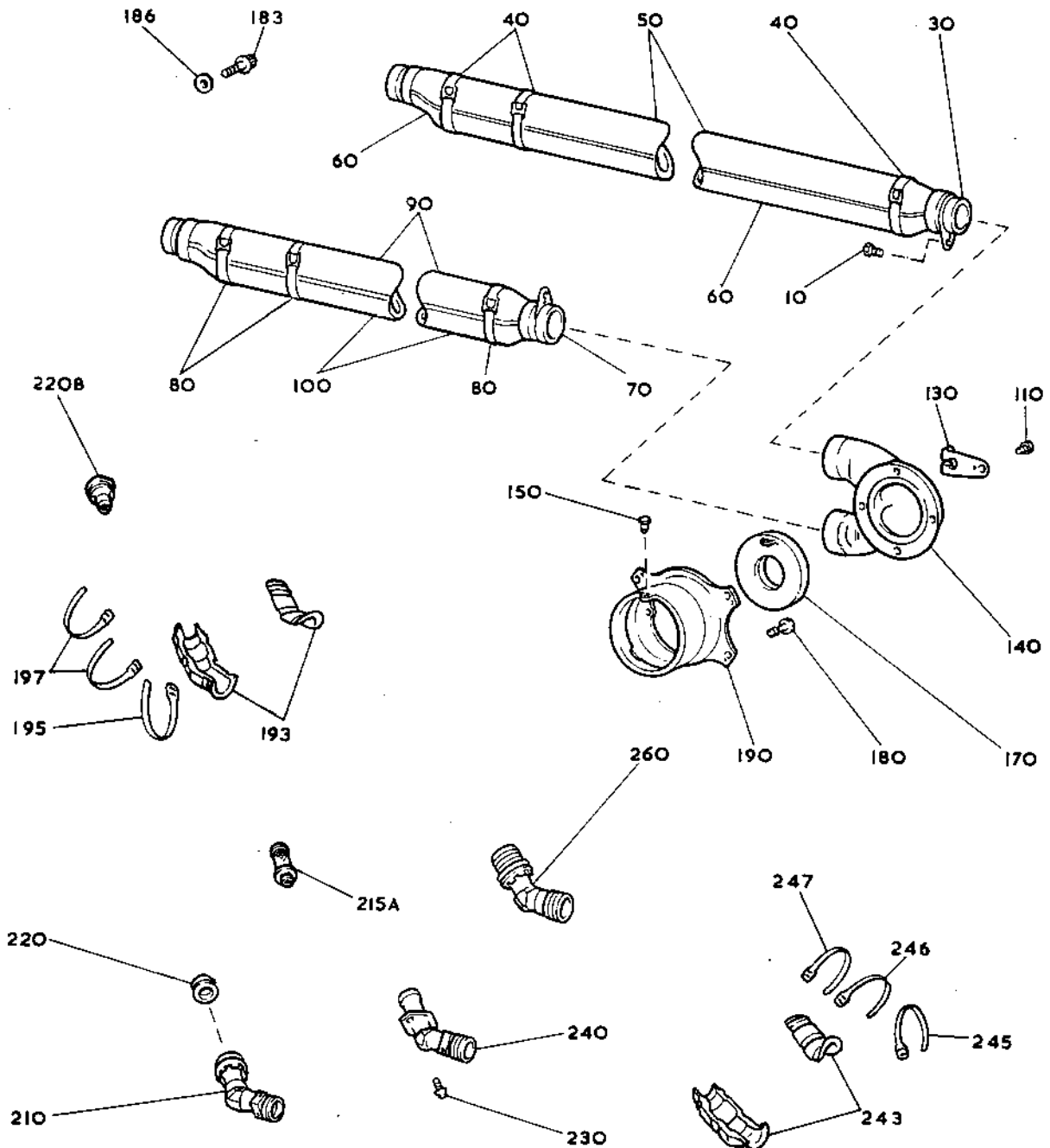
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HP Turbine, Bearing Support,
Tubes and Fittings
Figure 203

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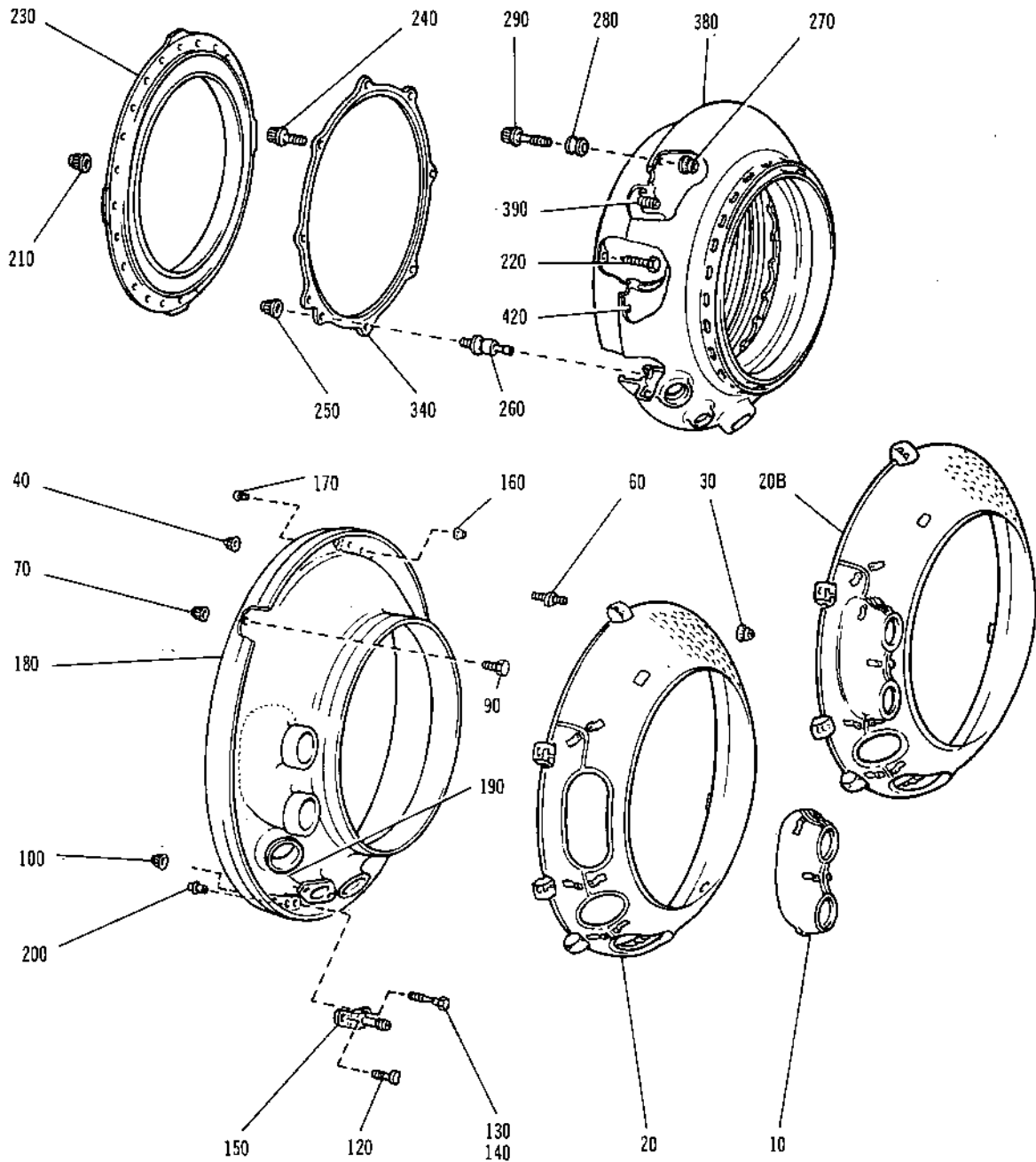
OLYMPUS 593

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OVERHAUL



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HP Turbine, Bearing Support
Bearing Housing and Fittings
Figure 204

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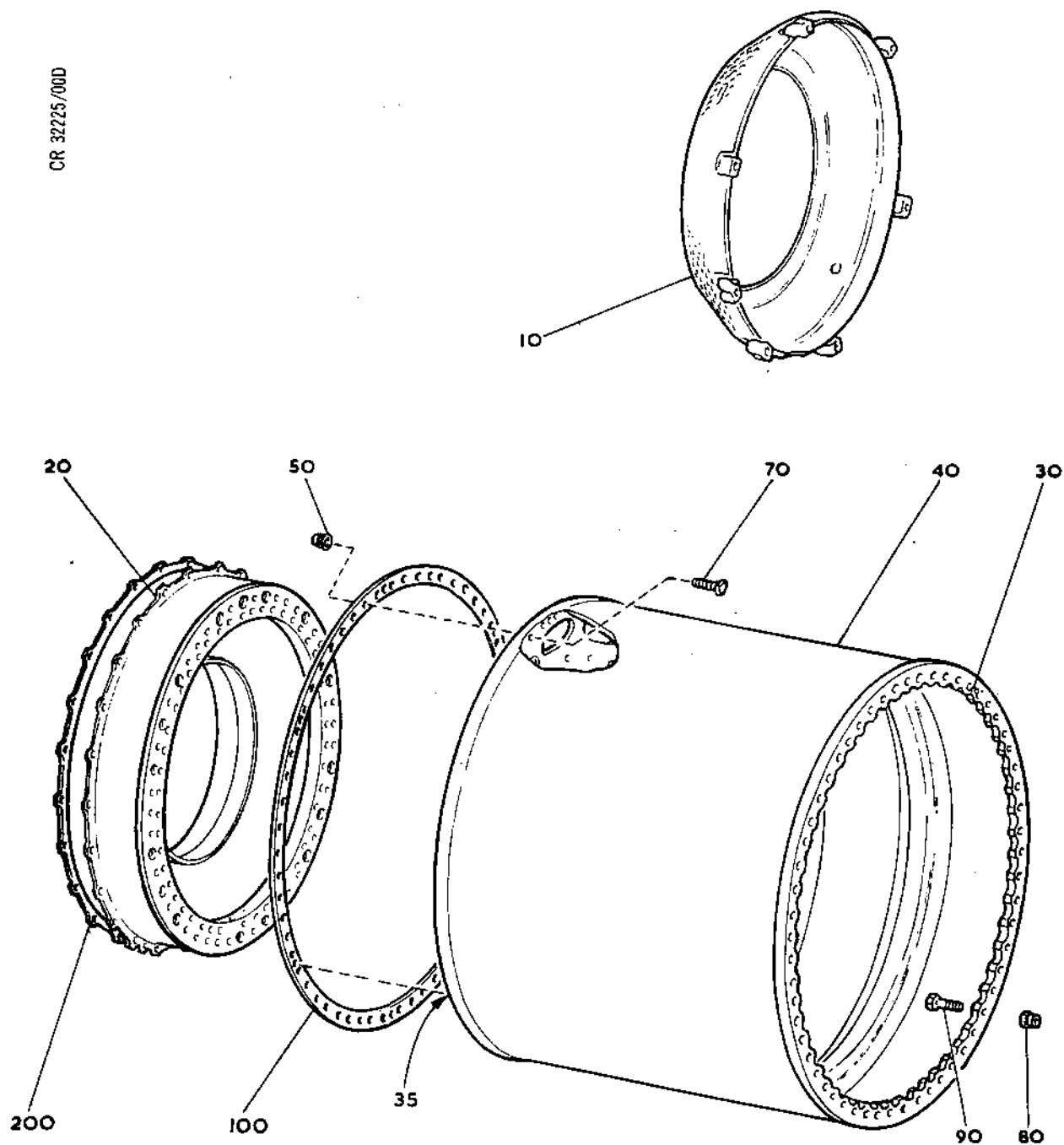
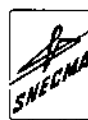
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MK.610-14-28

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HP Turbine, Bearing Support
Figure 205

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HP TURBINE NOZZLES - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	40	Vane assembly	A or B	K or M	-
	50	Vane assembly	A or B	K or M	-
	60	Vane assembly	A or B	K or M	-
	10	Ring assembly	A or B	L	Process L will remove the finish of the shank nuts.
	90	Washer, flat Pre SB.72-86	A or B	L	-
	150	Cone assembly	A or B	L	-
	200	Retaining plate	A or B	L	-
	210	Housing assembly, labyrinth	A or B	L	-
	250	Washer, flat Pre SB.72-86	A or B	L	-

Cleaning Processes
Table 201



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FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	40 50 60	Vane assembly	1372	

Cleaning and Storage Tools
Table 202

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CLEANING

72-51-02

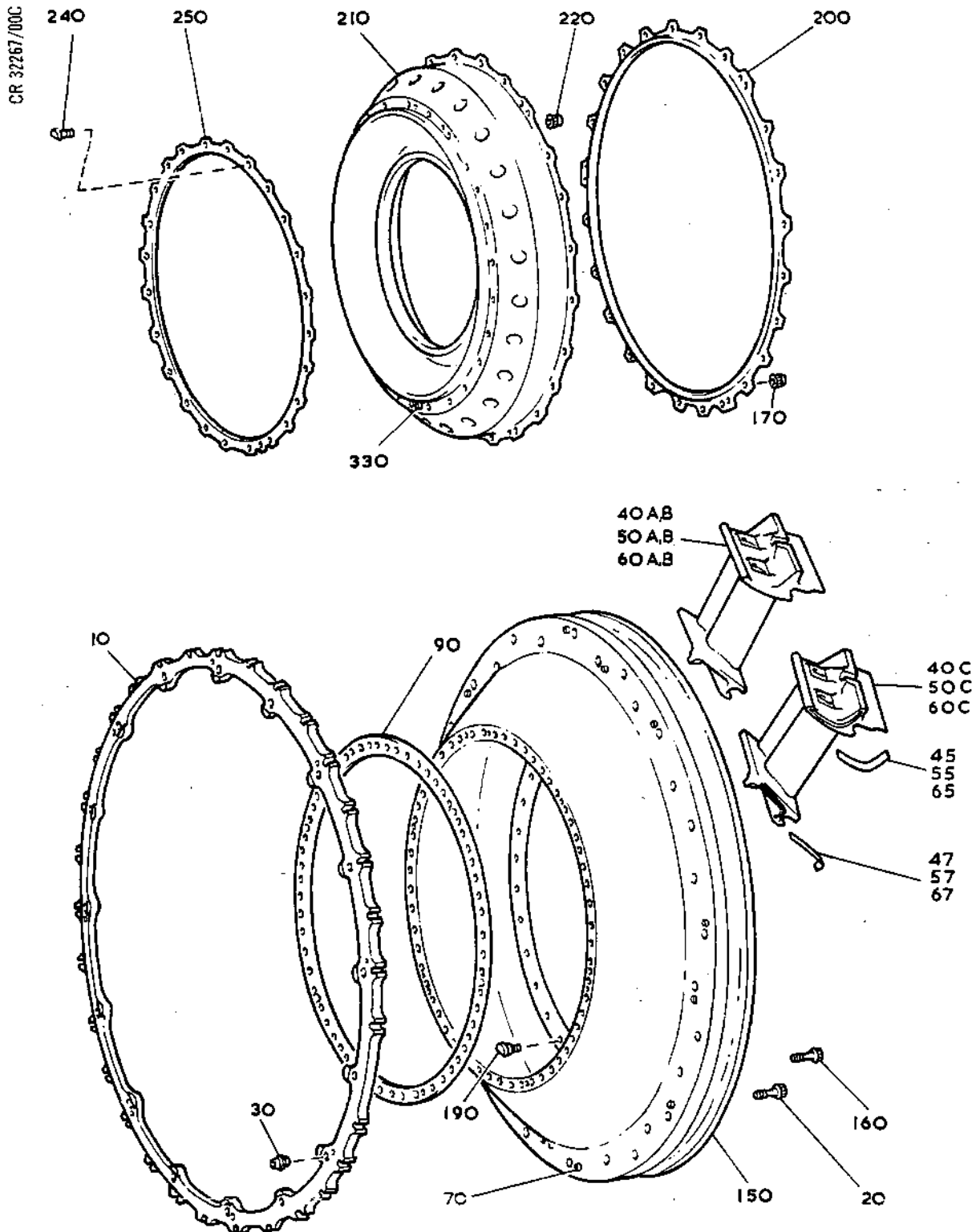
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HP Turbine Nozzles
Figure 201

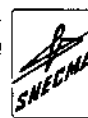
CLEANING
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TN34510



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OVERHAUL



HP TURBINE ROTOR - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

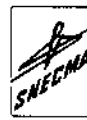
2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

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72-51-03

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OVERHAUL

- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	K	-
	except 70	HP turbine, rotor disk	A or B	L	CMT Component

Cleaning Processes
Table 201

FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	30	HP turbine blade	1425	
	70	HP turbine, rotor disk	1439/1437	

Cleaning and Storage Tools
Table 202CLEANING
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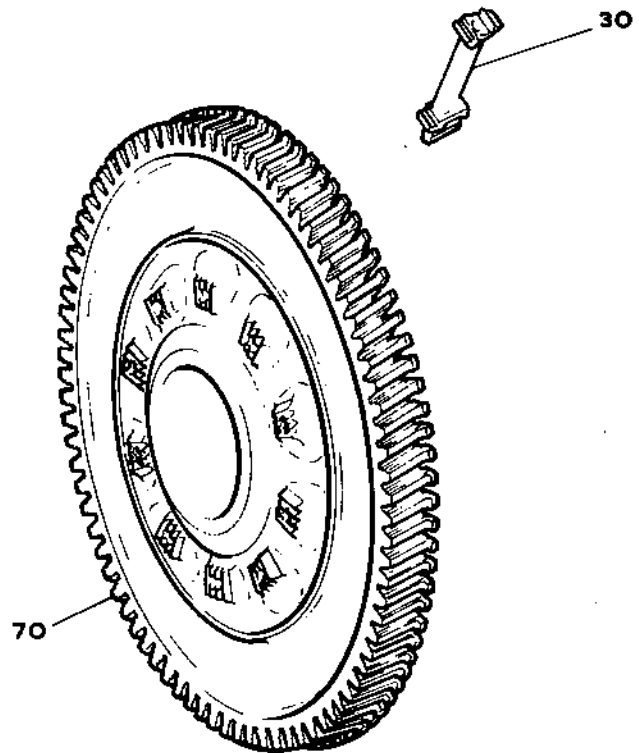
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TN32196

HP Turbine Rotor
Figure 201

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HP TURBINE ROTOR, HUB AND LABYRINTH ASSEMBLIES - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00
Cleaning for details of the cleaning processes referred
to in Table 201.
- B. To ensure that all items within this breakdown that
require cleaning and subsequent Inspection/Check are
recognized, and identified by their Part Number, figures
are provided which equate with the Illustrated Parts
Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with
the relevant Figure and Item Number in the same breakdown
in the I.P.C. Items illustrated in the I.P.C. which are
not illustrated in this breakdown, are those items which
are either discarded at overhaul, or are normally assembled
to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the
figures, Table 201 does not list all items, but deals
collectively with the items requiring the same cleaning
process.
- D. On receipt of the items from disassembly, all protective
blanks, covers etc. deemed necessary for the protection
of the items will have been assembled and, in addition,
many of the items will arrive in containers. Any special
containers, blanks, covers etc. are listed in Table 202
by their Tool Ref. No. (Tool 123). For the manufacturer's
Part No. refer to the appropriate Table in Special Tools,
Fixtures and Equipment Section.

2. Cleaning Components

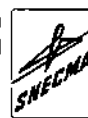
CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N,
INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COM-
PONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY
COATINGS. THE NITRIC ACID USED IN PROCESSES J, L
AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME
TYPES OF COATING, MAKING REPLACEMENT OF THE COATING
NECESSARY.

- A. All blanks, covers etc. must be removed from the items
prior to cleaning and reassembled immediately afterwards.
Items received in special cleaning containers should remain
therein during the cleaning procedures unless otherwise
stated.

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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	10	Nut	A or B	L	Process L will remove the silver paint
	160	Ring, labyrinth, No.24 and 26	A or B	L	-
	250	Ring, labyrinth No.23	A or B	L	-
	300	Hub assembly, HP turbine	A or B	L	CMT Component
	180	Bolts	A or B	L	-

Cleaning Processes
Table 201



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FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	160	Ring, labyrinth No.24 and 26	1414	
	250	Ring, labyrinth, No.23	1415	
	300	Hub assembly, HP turbine	1412	

Cleaning and Storage Tools
Table 202

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CLEANING

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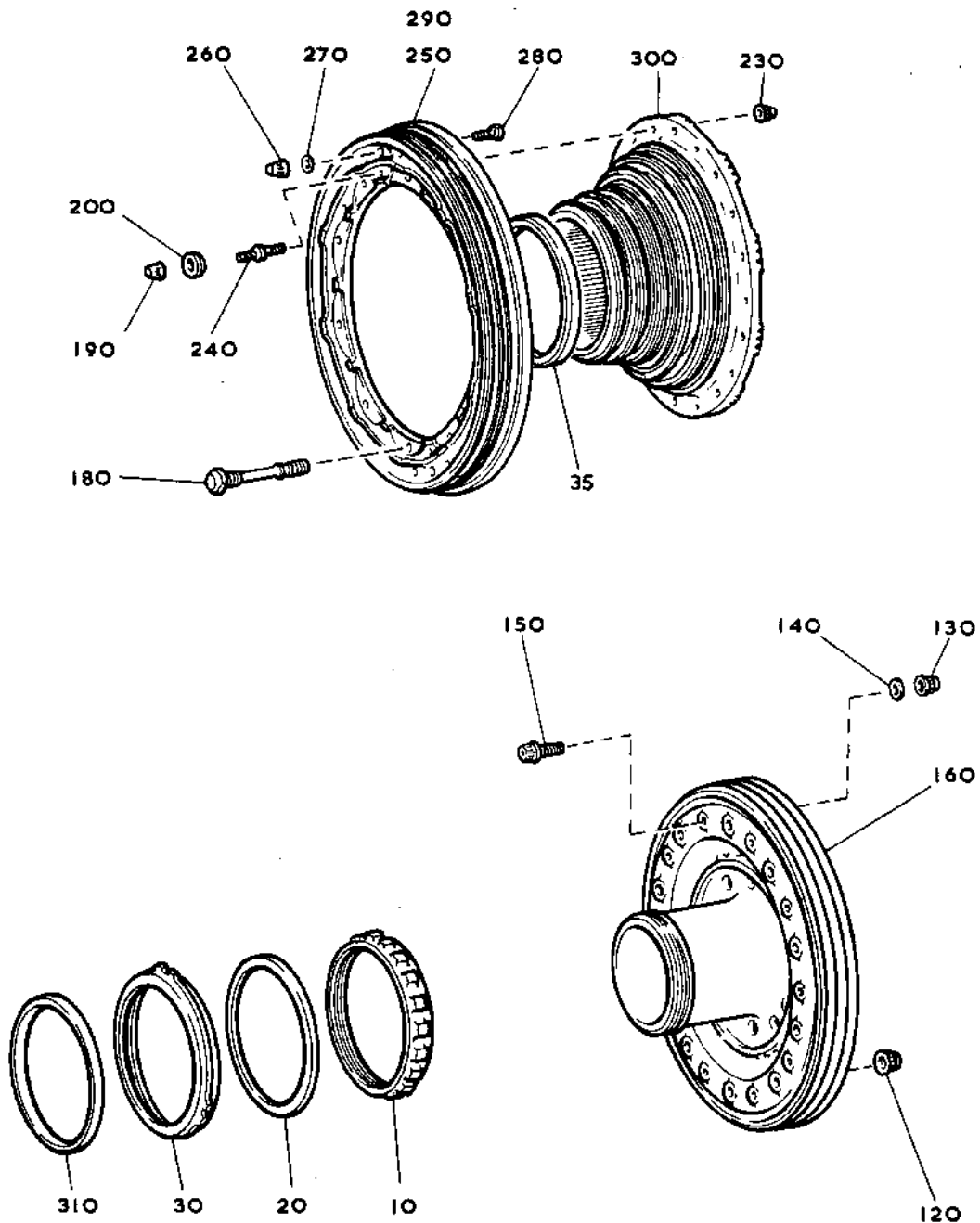


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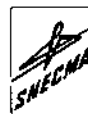
HP Turbine Rotor, Hub and Labyrinth Assemblies
Figure 201



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OVERHAUL



LP TURBINE NOZZLES - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

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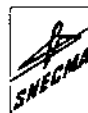
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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	10	Cover assembly	A or B	L	-
	120	Diaphragm assembly, nozzle vane support	A or B	L	-
	*80	Vane assembly, LP	A or B	-	-
	*90	Vane assembly, LP	A or B	-	-
	*100	Vane assembly, LP	A or B	-	-
	*110	Vane assembly, LP	A or B	-	-

* Heavy cleaning processes K or M may be used if required, but failure to ensure complete removal of cleaning fluids may result in damage to vane.

Cleaning Processes
Table 201

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FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	80, 90 100, 110	Vane assembly	1371	

Cleaning and Storage Tools
Table 202

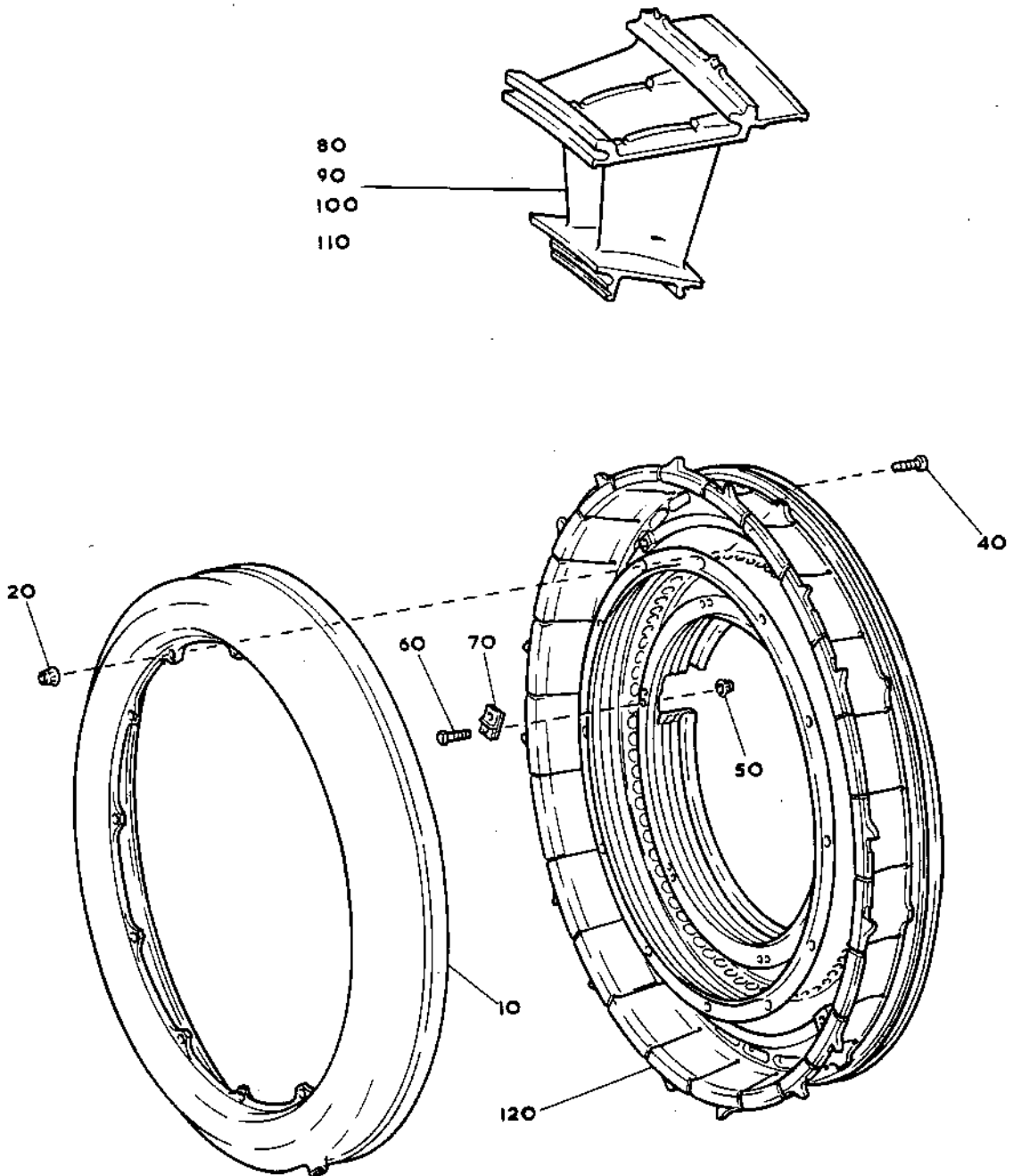
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OVERHAUL



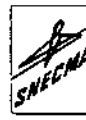
LP Turbine Nozzle
Figure 201



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MK.610-14-28

OVERHAUL



LP TURBINE ROTOR - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

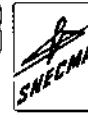
CLEANING
72-52-02

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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

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OVERHAUL



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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except 140		A or B	-	-
	140	Bearing, inner, LP turbine	D	E	-
	100	Ring, labyrinth No.25	A or B	L	-
	110	Housing, labyrinth No.26	A or B	L	-
	200	Flanged duct	A or B	L	-
	210	Hub assembly, LP turbine	A or B	L	CMT Component
	230	Blade assembly, LP turbine	A or B	L	-
	250	Rotor disk, LP turbine	A or B	L	CMT Component
202	120	Bolt	A or B	L	-
	ALL		B	F	-

Cleaning Processes
Table 201

FIG. NO.	ITEM NO.	NOMENCLATURE	TOOL REF. NO.	REMARKS
201	100	Ring, Labyrinth	1503	
	210	Hub assembly, LP turbine	1413	
	230	Blade assembly, LP turbine	1426	
	250	Disk	1438/1439	

Cleaning and Storage Tools
Table 202CLEANING
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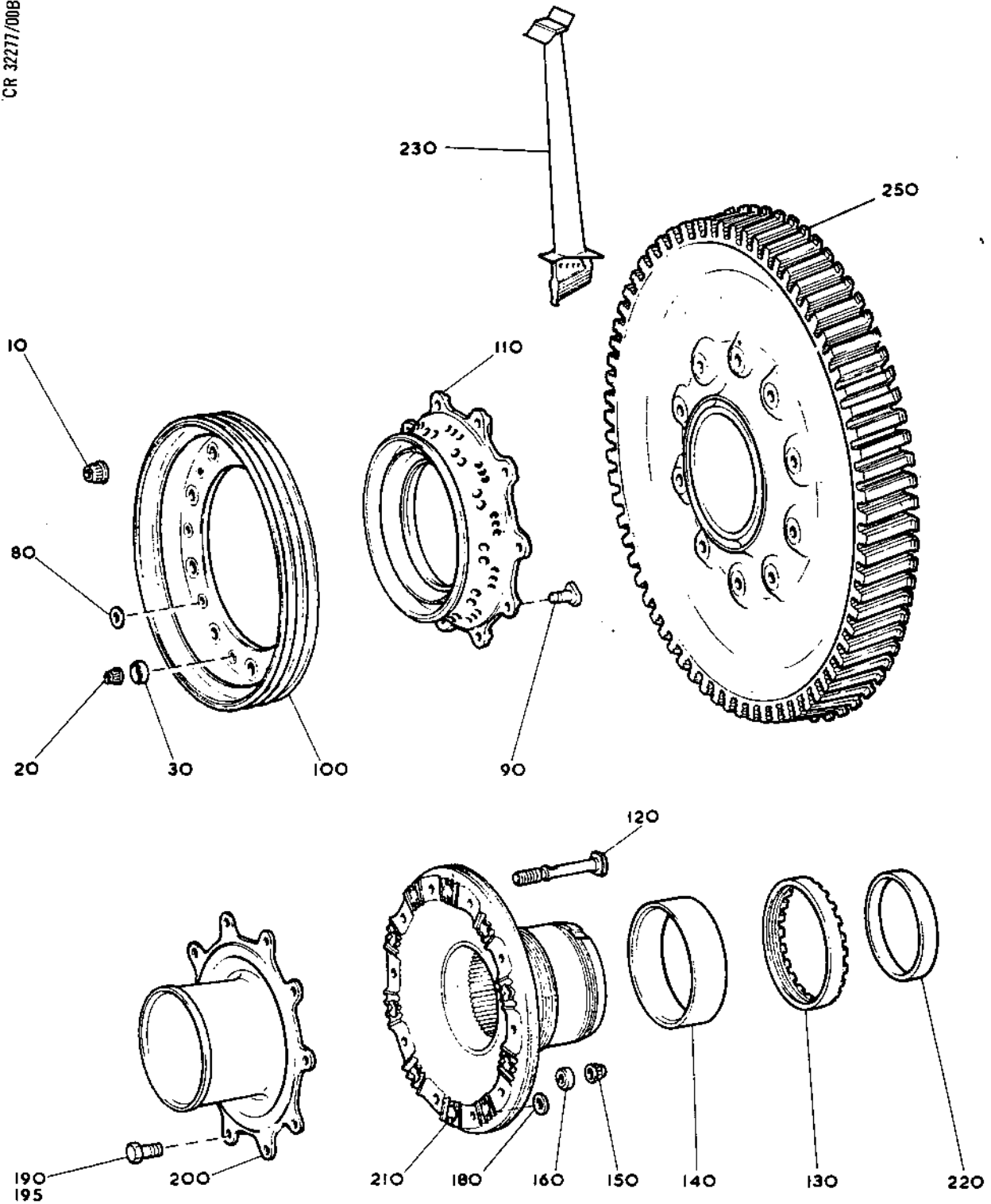


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MK.610-14-28
OVERHAUL



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LP Turbine Rotor
Figure 201

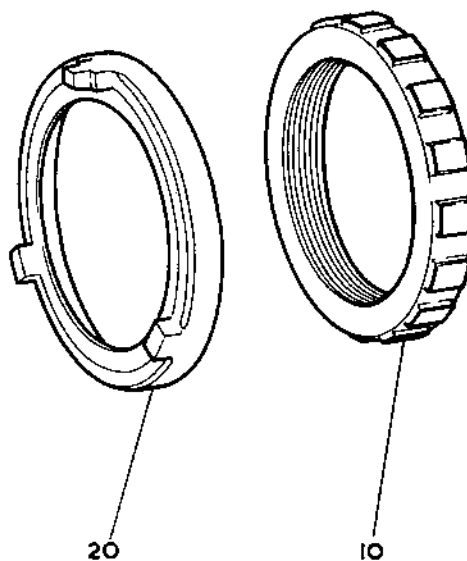
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MK. 610-14-28
OVERHAUL



LP Turbine Rotor
Figure 202

TN32080



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LP TURBINE BEARING SUPPORT - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	G	-
	10	Insulation blanket	Scotchbrite		
	32	Insulation blanket	Scotchbrite		It is essential that these items remain dry (Ref.SB.72-20)
	36	Insulation blanket	Scotchbrite		
	38	Insulation blanket	Scotchbrite		
	40	Insulation blanket	Scotchbrite		
	50	Insulation blanket	Scotchbrite		
202	ALL except		A or B	G	-
	140	LP turbine outer bearing	D	E	Use Process E only if additional cleaning is necessary

Cleaning Processes
Table 201



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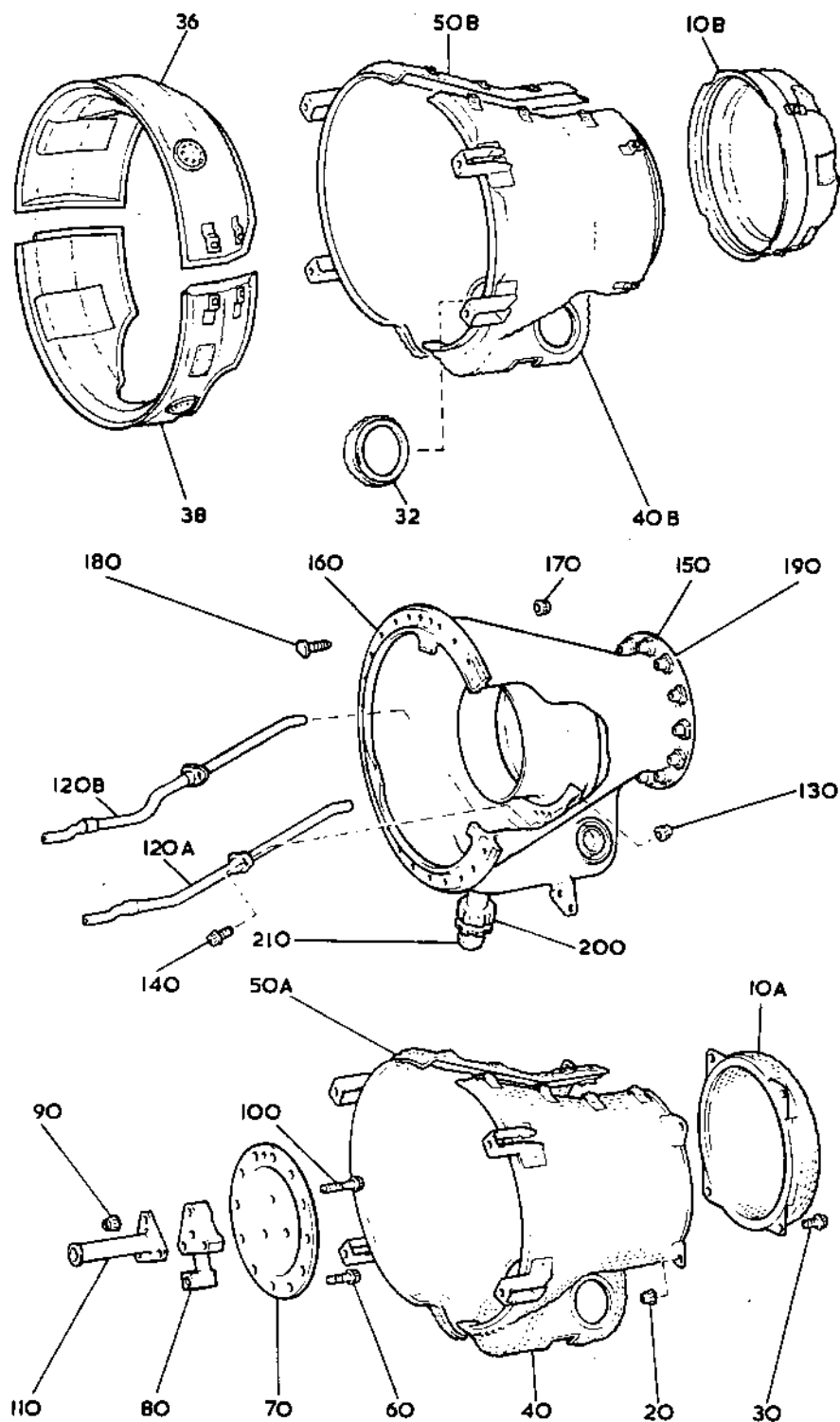
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LP Turbine Bearing Support Rear Cover
Figure 201

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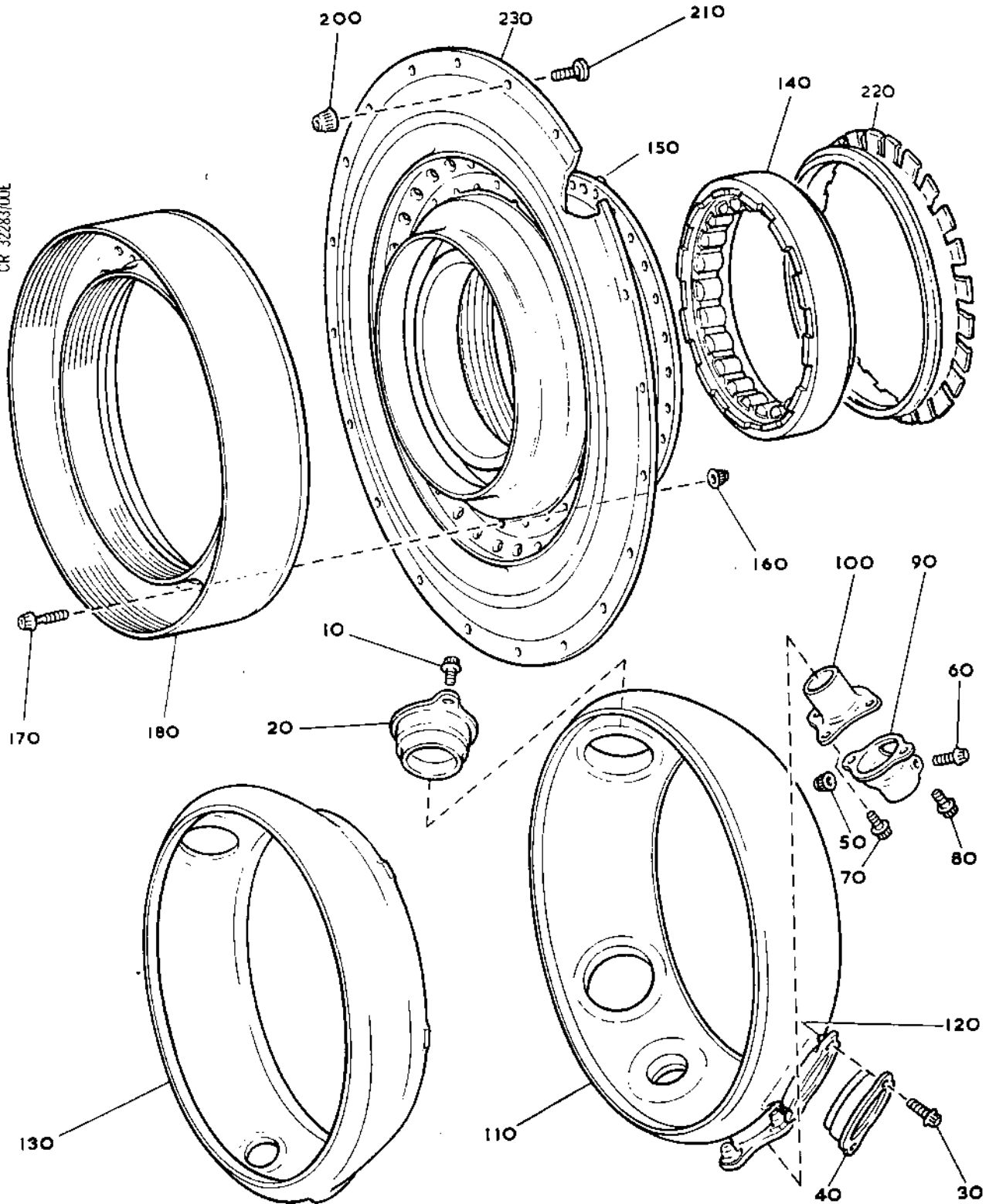
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LP Turbine Bearing Support Rear Cover
Figure 202

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sneema

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TURBINE EXHAUST DIFFUSER ASSEMBLY - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process. The PNC pitot and reheat pressure detector connector cleaning is detailed in 76-13-03.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N, INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COMPONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY COATINGS. THE NITRIC ACID USED IN PROCESSES J, L AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME TYPES OF COATING, MAKING REPLACEMENT OF THE COATING NECESSARY.

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

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72-53-00

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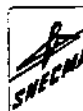
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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	J	-
	10	Nut	A or B	F	Process F will remove silver plating.
	50	Elbow	A or B	F	
	60	Duct	A or B	F	
	90	Seal housing	A or B	F	-
	100	Bolt	A or B	F	-
	220	Elbow	A or B	F	-
	230	Duct	A or B	F	-
	260	Seal housing	A or B	F	-
	320	Union nut	A or B	F	-
	380	Nut	A or B	F	-
	330	Tube assembly	B		This item must not be immersed in liquid. Use process B to flow-clean bore of tube. Use Scotchbrite to clean insulation blanket.
	A, B and C	Pre SB.72-l02	Scotchbrite		

Cleaning Processes
Table 201 (Continued)



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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
202	ALL except		A or B	J	-
	10	Union nut	A or B	F	Process F will remove silver plating.
	50	Nut	A or B	F	
	130	Duct	A or B	G	
	170	Bolt	A or B	F	-
	30	Tube assembly	B		This item must not be immersed in liquid. Use process B to flow-clean bore of tube. Use Scotch- brite to clean in- sulation blanket.
	A, B, C and D	Pre SB.72-102	Scotchbrite		
203	ALL except		A or B	J	-
	30	Containment shield	A	-	There is no heavy cleaning for this item.
204	ALL except		A or B	F	-
	230	Outer case	A or B	L	-
205	ALL except		A or B	-	-
	90	Bracket, rear lifting	A or B	L	-
	130	Bracket, mounting	A or B	L	-
	250	Plate, supporting	A or B	L	-
	320	Bracket, mounting	A or B	L	-
	30	Bolt	A or B	F	-
	100	Bolt	A or B	F	-
	110	Bolt	A or B	F	-
	140	Bolt	A or B	F	-
	170	Bolt	A or B	F	-
	230	Bolt	A or B	F	-
	260	Bolt	A or B	F	-

Cleaning Processes
Table 201 (Continued)

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
205	330	Bolt	A or B	F	-
	340	Bolt	A or B	F	-
206	ALL except		A or B	-	-
	90	Bracket	A or B	L	-
	120	Bracket	A or B	L	-
	250	Bracket	A or B	L	-
	290	Bracket	A or B	L	-
	70	Bolt	A or B	F	-
	100	Bolt	A or B	F	-
	130	Bolt	A or B	F	-
	160	Bolt	A or B	F	-
	190	Bolt	A or B	F	-
	300	Bolt	A or B	F	-
	310	Bolt	A or B	F	-
	320	Bolt	A or B	F	-
	330	Bolt	A or B	F	-
	360	Bolt	A or B	F	-
	420	Bolt	A or B	F	-
	450	Bolt	A or B	F	-
207	ALL except		A or B	-	-
	40	Bracket	A or B	L	-
	80	Plate, mounting	A or B	L	-
	120	Bracket, mounting	A or B	L	-
	220	Bracket, angle	A or B	L	-
	250	Bracket	A or B	L	-
	280	Bracket, mounting	A or B	L	-
	350	Bracket, mounting	A or B	L	-
	60	Bolt	A or B	F	-
	90	Bolt	A or B	F	-
	130	Bolt	A or B	F	-
	140	Bolt	A or B	F	-
	160	Bolt	A or B	F	-
	230	Bolt	A or B	F	-
	260	Bolt	A or B	F	-
	290	Bolt	A or B	F	-
	360	Bolt	A or B	F	-
	370	Bolt	A or B	F	-

Cleaning Processes
Table 201 (Continued)CLEANING
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OVERHAUL



sneema

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
208	ALL except		A or B	-	-
	70	Bracket, mounting	A or B	L	-
	110	Plate, support	A or B	L	-
	240	Bracket, mounting	A or B	L	-
	80	Bolt	A or B	F	-
	90	Bolt	A or B	F	-
	120	Bolt	A or B	F	-
	180	Bolt	A or B	F	-
	260	Bolt	A or B	F	-
	270	Bolt	A or B	F	-
209	ALL except		A or B	-	-
	40	Inner case	A or B	M	-

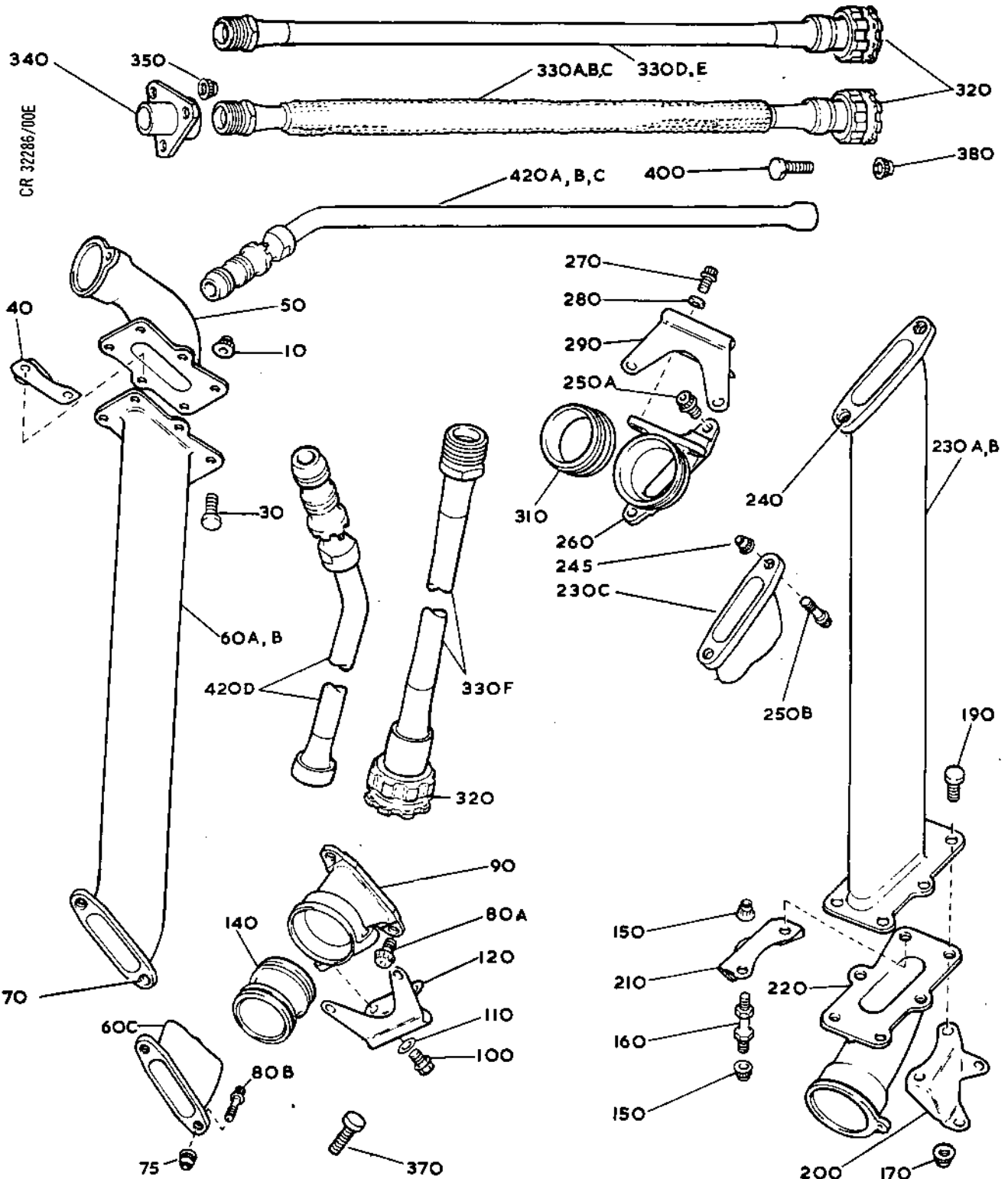
NOTE: It is important that the inner surfaces of the vanes are thoroughly washed with hot water during the cleaning process. This is to ensure the removal of all traces of the cleaning fluids.

Cleaning Processes
Table 401 (Concluded)



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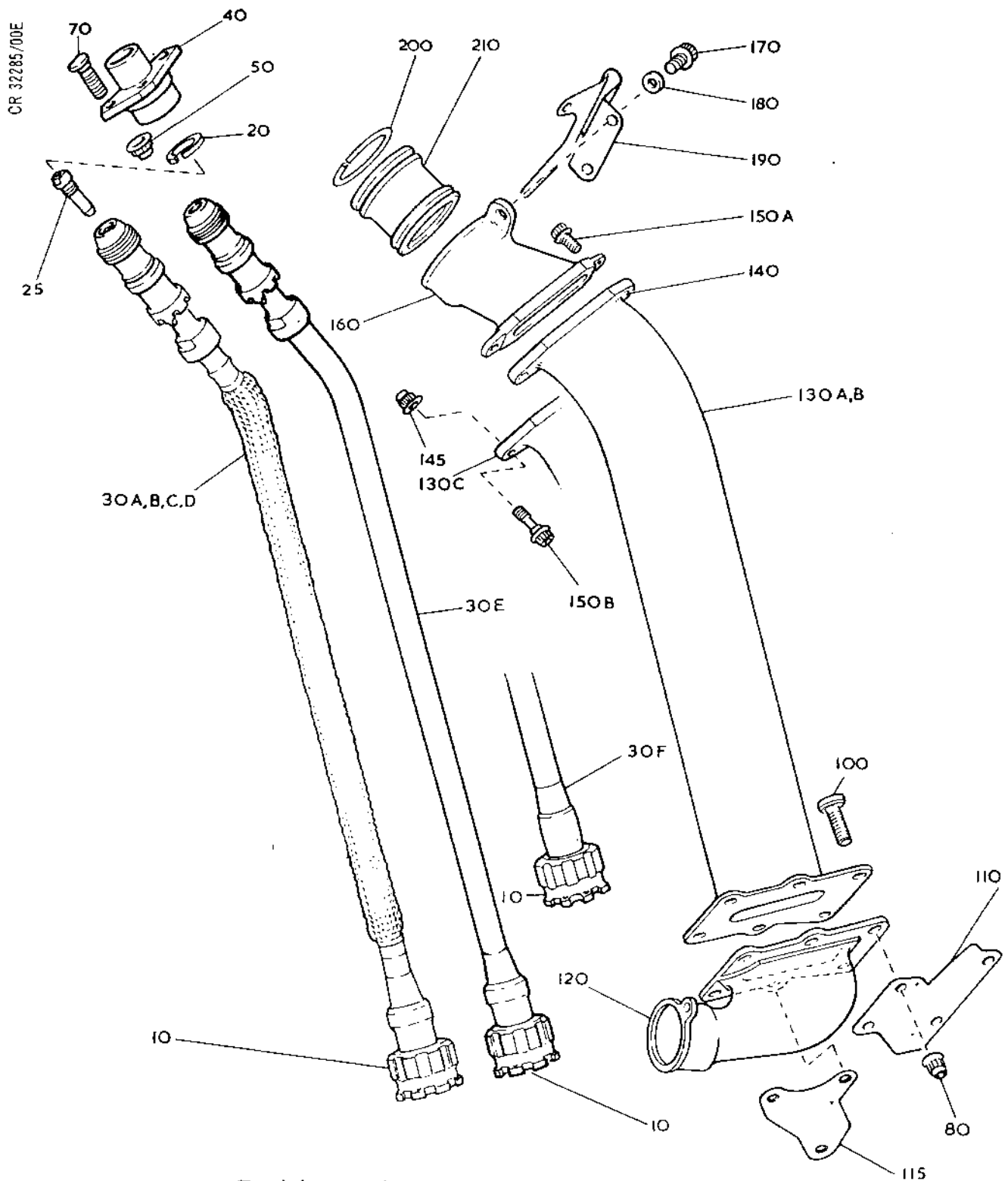


Turbine Exhaust Diffuser Air Duct
and Oil Tubes (Van 2, 4 and 5)
Figure 201



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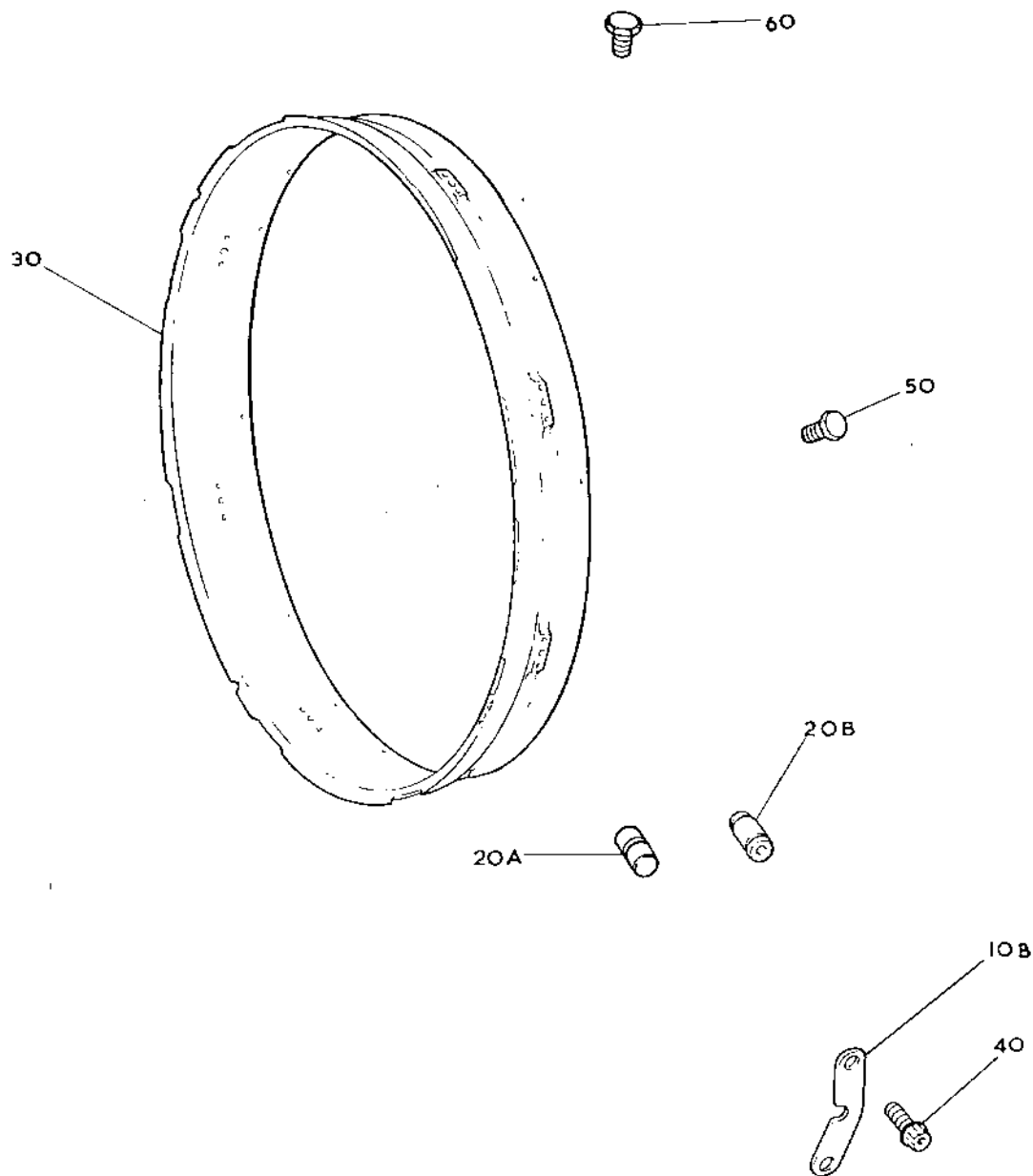
Turbine Exhaust Diffuser Air Duct
and Oil Tube (Van 6 and 7)
Figure 202

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Turbine Exhaust Diffuser
Containment Shield
Figure 203

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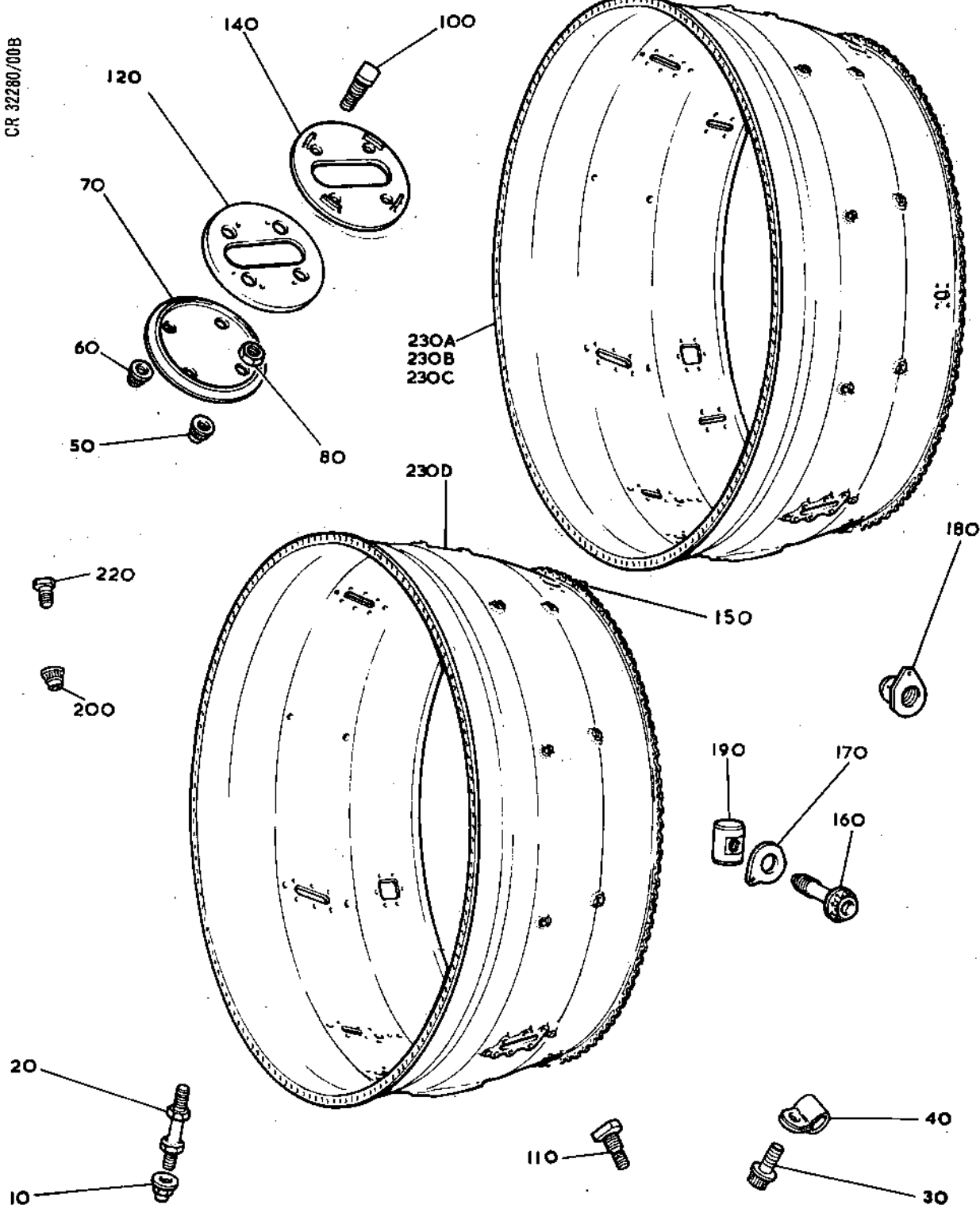
OLYMPUS 593

MK.610-14-28

OVERHAUL



CR 32280/00B



Turbine Exhaust Diffuser Outer
Case and Fittings
Figure 204

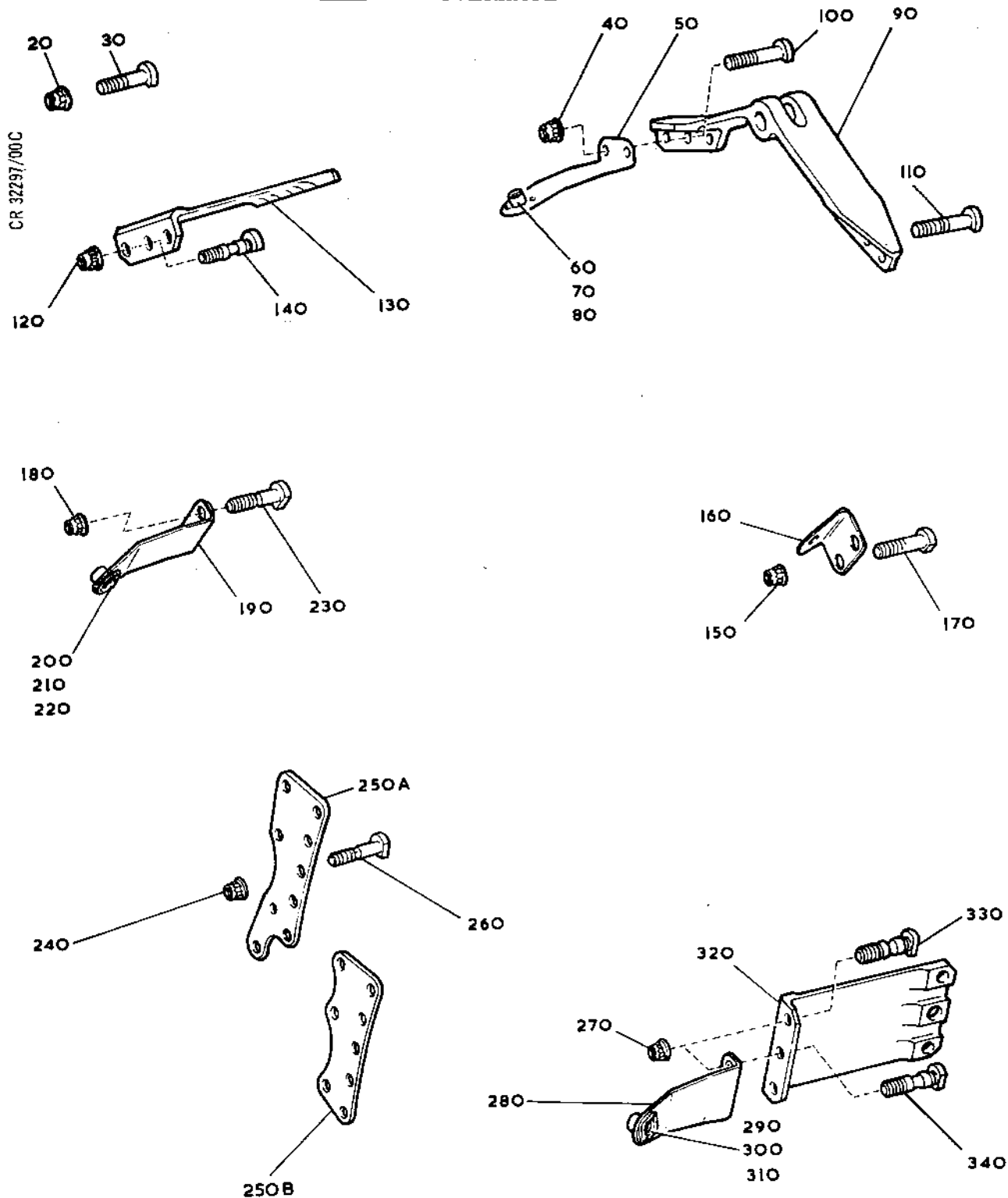
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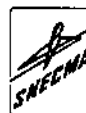
Turbine Exhaust Diffuser Outer
Case Attaching Parts
Figure 205

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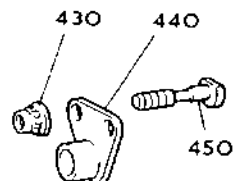
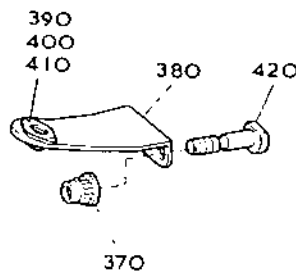
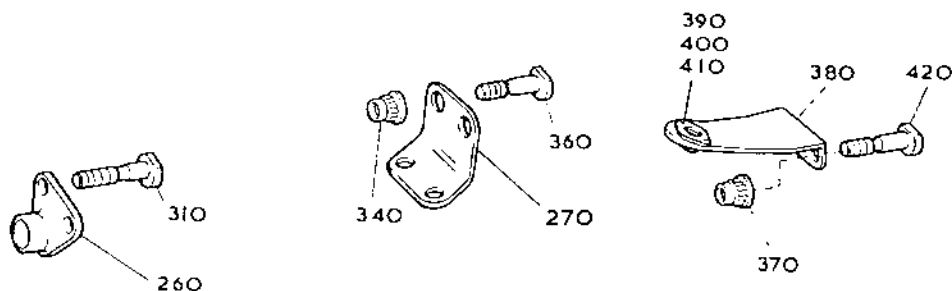
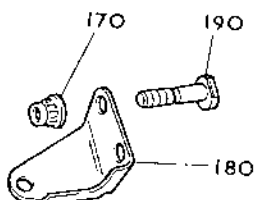
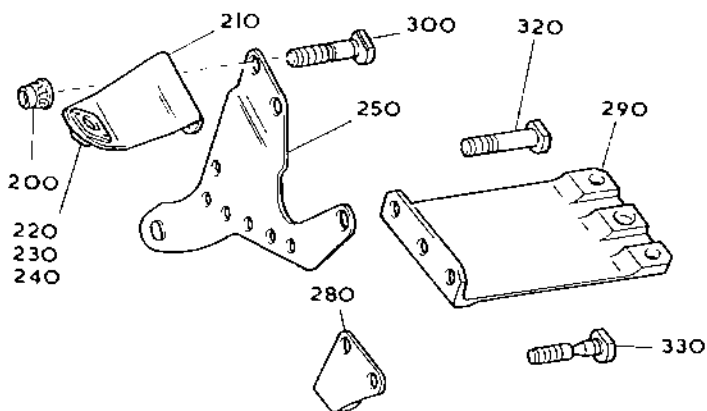
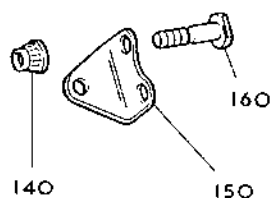
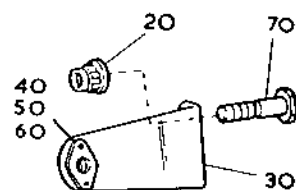
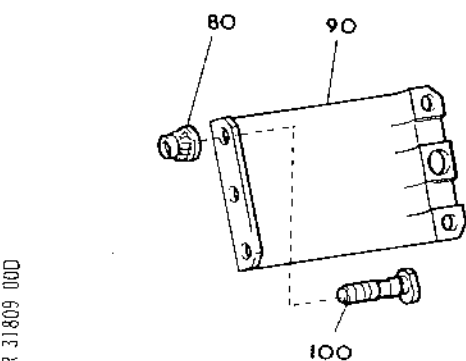


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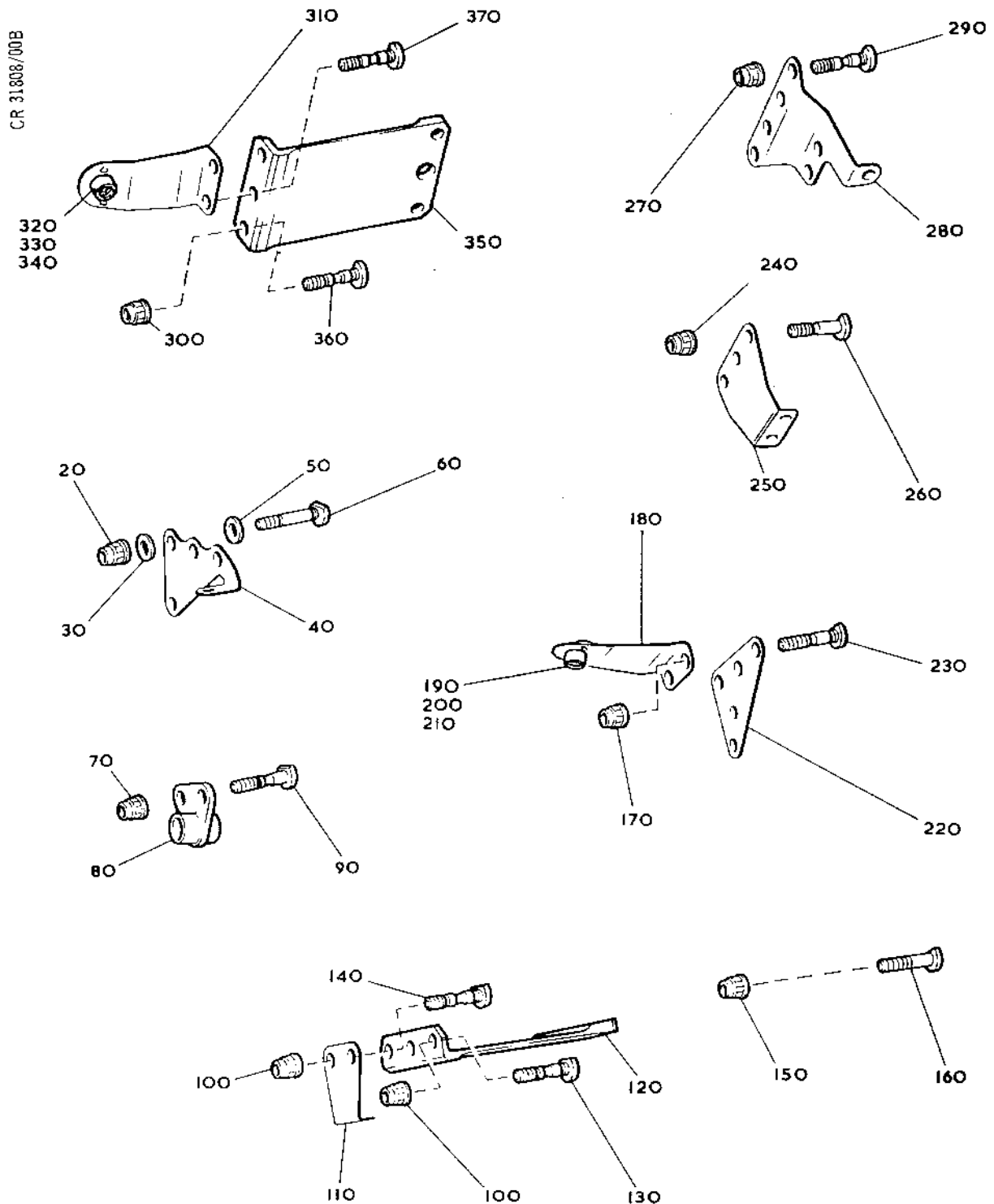
Turbine Exhaust Diffuser Outer
Case Attaching Parts
Figure 206

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Turbine Exhaust Diffuser Outer
Case Attaching Parts
Figure 207

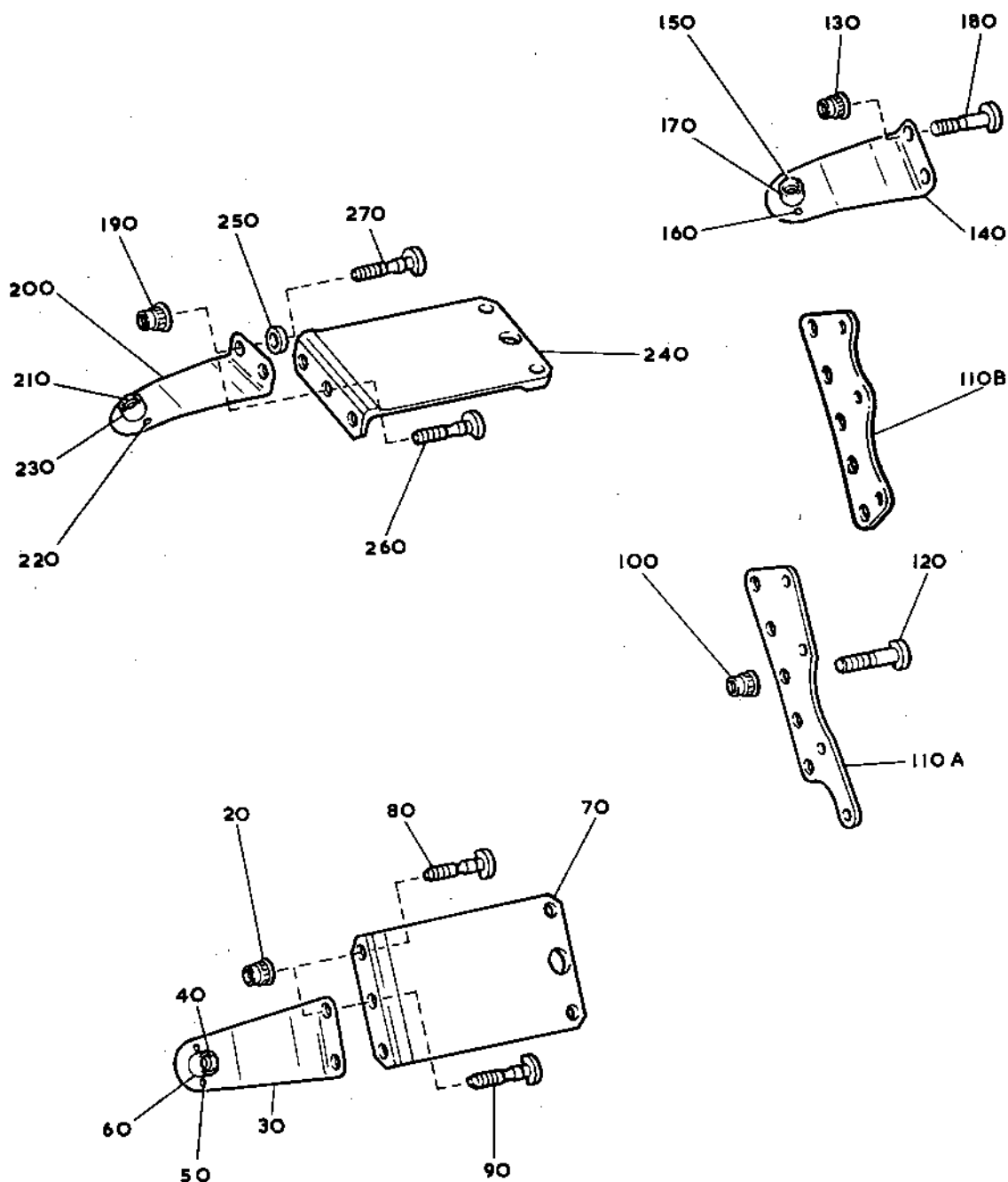


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CR 31807/00 C



Turbine Exhaust Diffuser Outer
Case Attaching Parts
Figure 208

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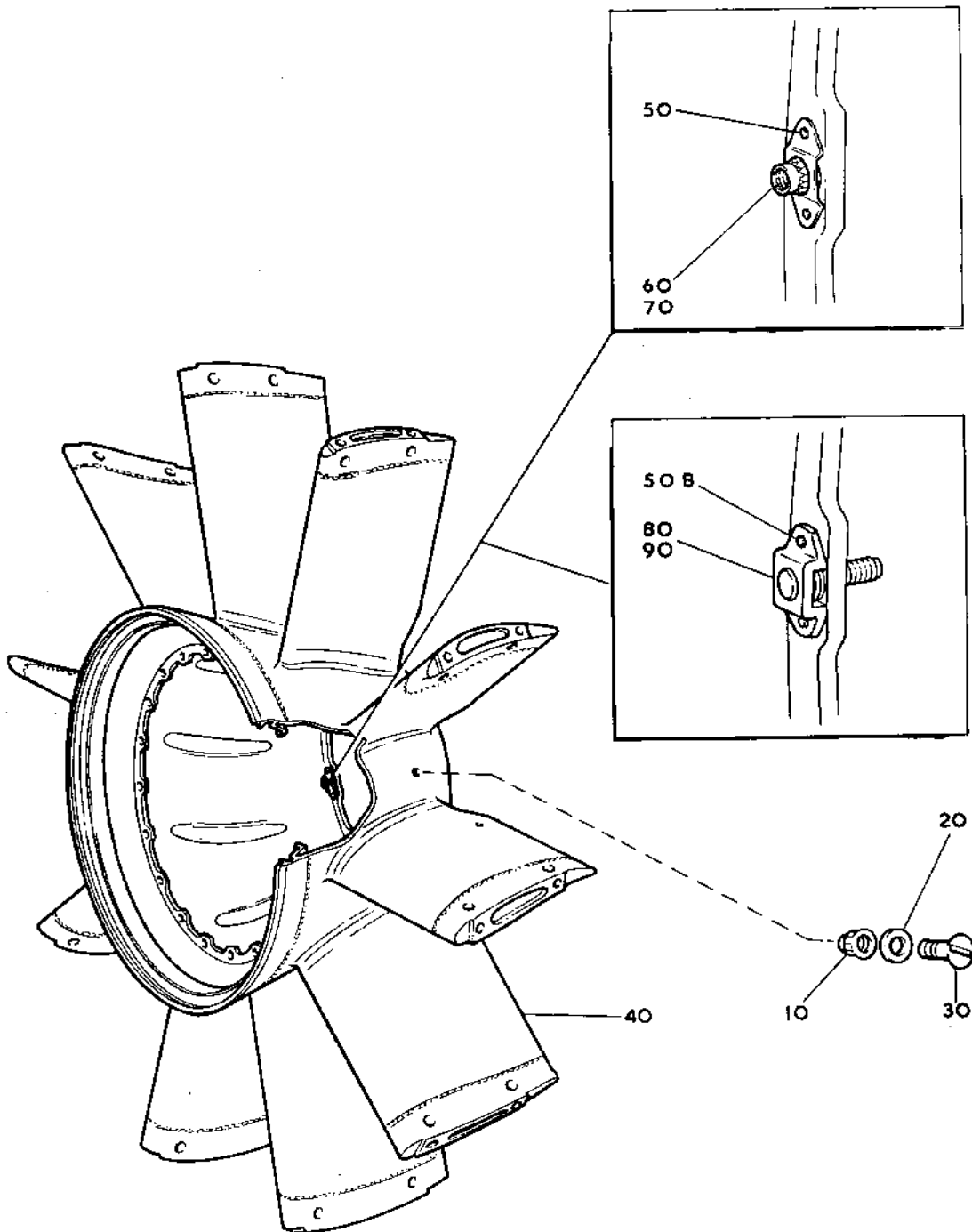


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Turbine Exhaust Diffuser Inner
Diffuser and Mounting Ring
Figure 209

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OVERHAUL



SPHERICAL JOINT FLANGE - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00
Cleaning for details of the cleaning processes referred
to in Table 201.
- B. To ensure that all items within this breakdown that
require cleaning and subsequent Inspection/Check are
recognized, and identified by their Part Number, figures
are provided which equate with the Illustrated Parts
Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with
the relevant Figure and Item Number in the same breakdown
in the I.P.C. Items illustrated in the I.P.C. which are
not illustrated in this breakdown, are those items which
are either discarded at overhaul, or are normally assembled
to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the
figures, Table 201 does not list all items, but deals
collectively with the items requiring the same cleaning
process.
- D. On receipt of the items from disassembly, all protective
blanks, covers etc. deemed necessary for the protection
of the items will have been assembled and, in addition,
many of the items will arrive in containers. Any special
containers, blanks, covers etc. are listed in Table 202
by their Tool Ref. No. (Tool 123). For the manufacturer's
Part No. refer to the appropriate Table in Special Tools,
Fixtures and Equipment Section.

2. Cleaning Components

CAUTION: BEFORE USING HEAVY CLEANING PROCESSES J, L AND N,
INVESTIGATE ALL REPAIRS CARRIED OUT ON EACH COM-
PONENT TO IDENTIFY THOSE HAVING PLASMA SPRAY
COATINGS. THE NITRIC ACID USED IN PROCESSES J, L
AND N WILL ATTACK THE ALUMINIUM CONTENT OF SOME
TYPES OF COATING, MAKING REPLACEMENT OF THE COATING
NECESSARY.

- A. All blanks, covers etc. must be removed from the items
prior to cleaning and reassembled immediately afterwards.
Items received in special cleaning containers should remain
therein during the cleaning procedures unless otherwise
stated.

CLEANING

72-54-01

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- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

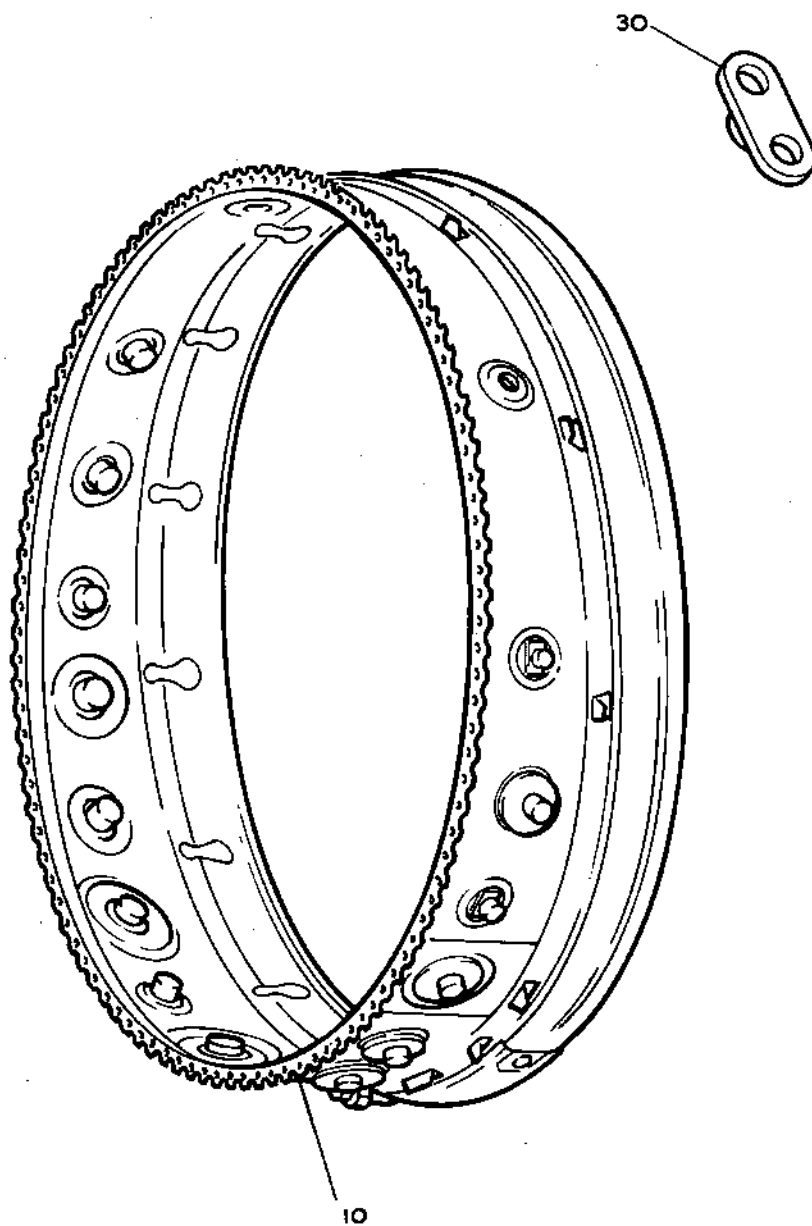
FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL	-	F	L	-
202	ALL	-	-	G	-
203	ALL	-	-	G	-
204	ALL	-	-	G	-
205	ALL	-	-	G	-
206	ALL	-	-	G	-
	except				
	120	Plug	F	L	-
	130	Plug	F	L	-
	140	Plug	F	L	-

Cleaning Processes
Table 201



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OVERHAUL



Spherical Joint Flange
Figure 201

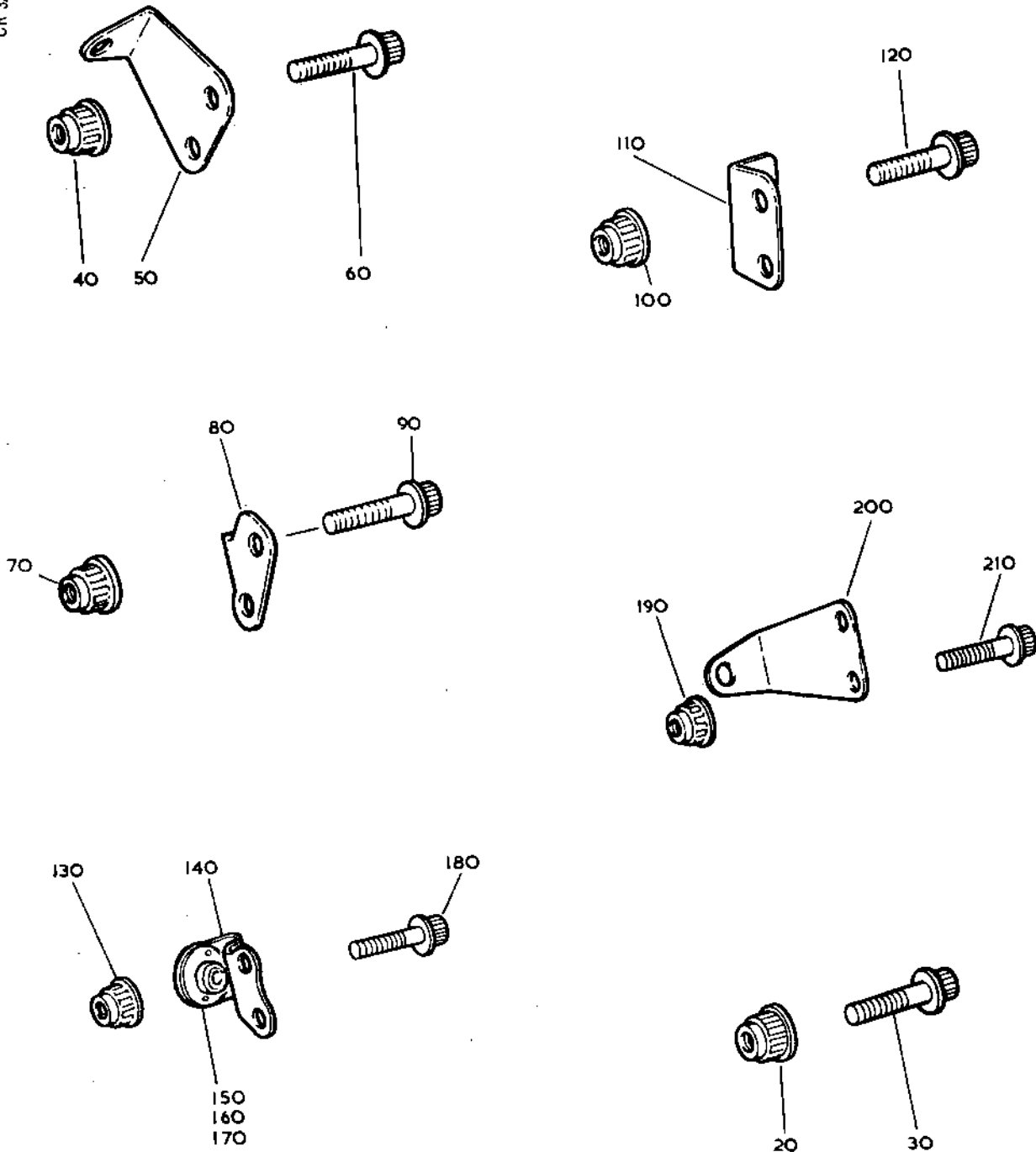


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CR 32542/00B



Spherical Joint Flange
Figure 202

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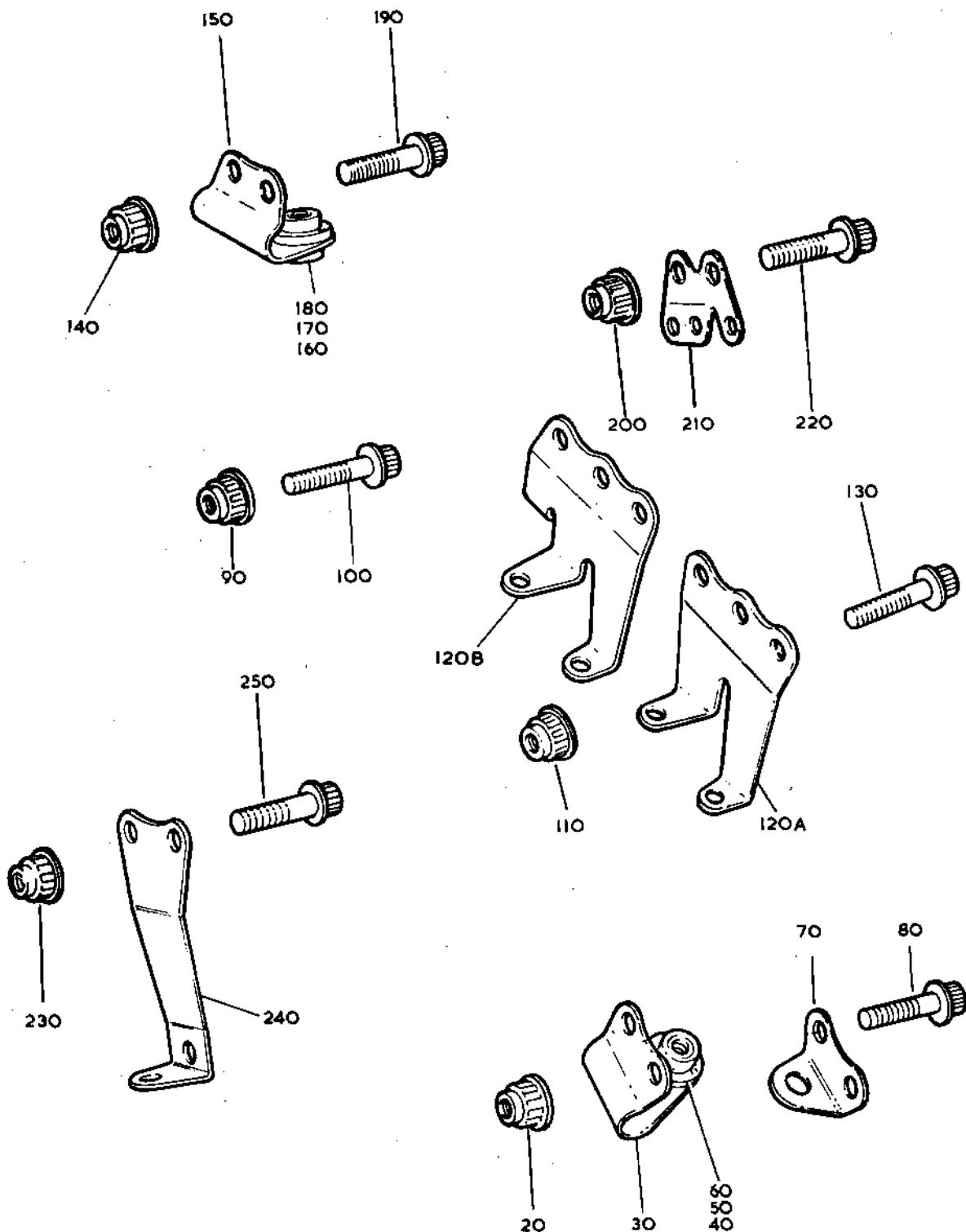
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OVERHAUL



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TN25391

Spherical Joint Flange
Figure 203

CLEANING
72-54-01

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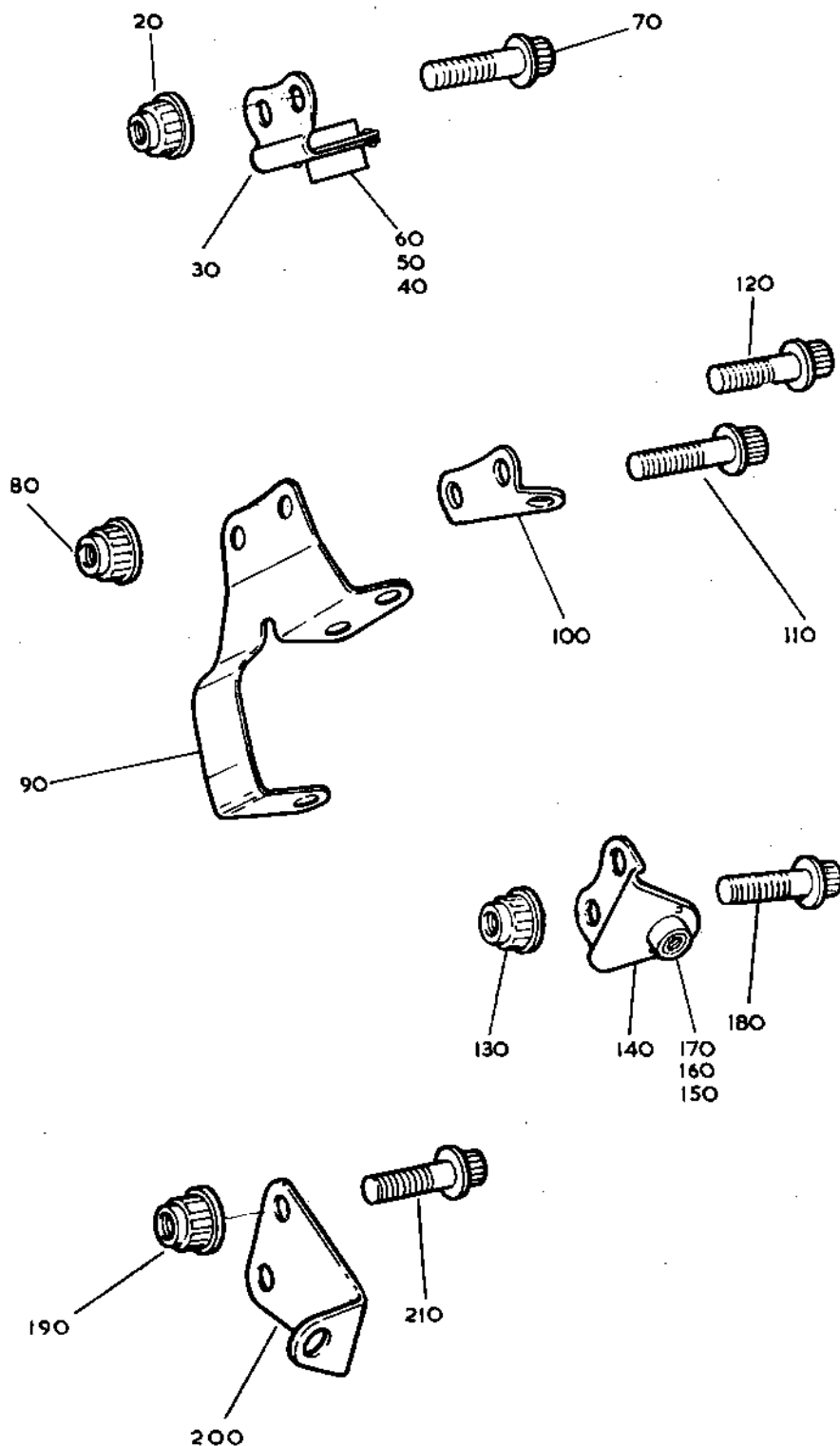


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OVERHAUL



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Spherical Joint Flange
Figure 204

IN4029

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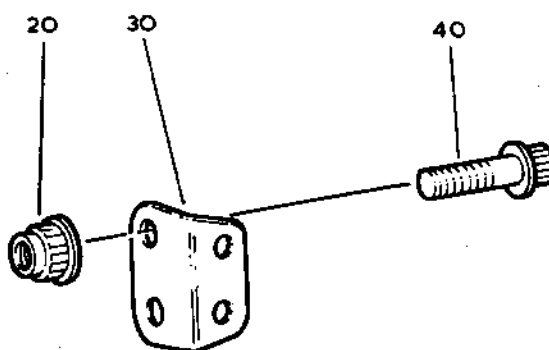
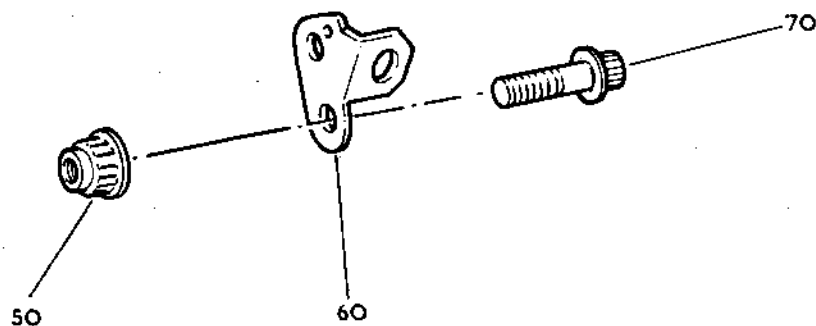
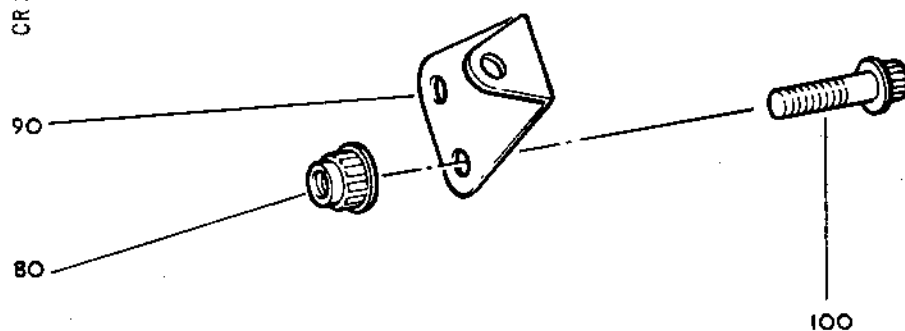
OLYMPUS 593

MK.610-14-28

OVERHAUL



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Spherical Joint Flange
Figure 205

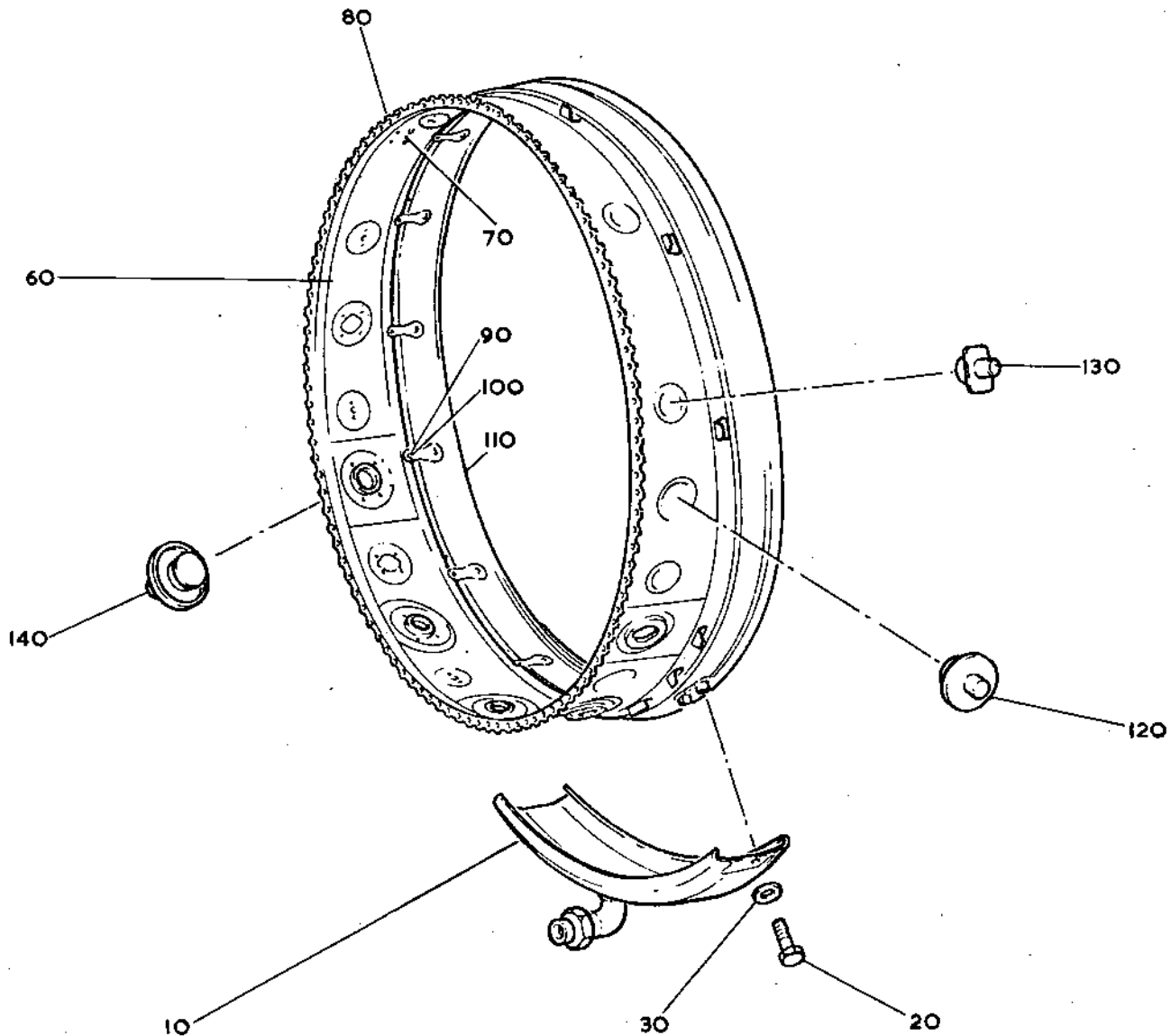


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MK.610-14-28
OVERHAUL



CR 32546/100A



TN1811

Spherical Joint Flange
Figure 206

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OVERHAUL



INTERNAL ACCESSORY DRIVES - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00
Cleaning for details of the cleaning processes referred
to in Table 201.
- B. To ensure that all items within this breakdown that
require cleaning and subsequent Inspection/Check are
recognized, and identified by their Part Number, figures
are provided which equate with the Illustrated Parts
Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with
the relevant Figure and Item Number in the same breakdown
in the I.P.C. Items illustrated in the I.P.C. which are
not illustrated in this breakdown, are those items which
are either discarded at overhaul, or are normally assembled
to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the
figures, Table 201 does not list all items, but deals
collectively with the items requiring the same cleaning
process.
- D. On receipt of the items from disassembly, all protective
blanks, covers etc. deemed necessary for the protection
of the items will have been assembled and, in addition,
many of the items will arrive in containers. Any special
containers, blanks, covers etc. are listed in Table 202
by their Tool Ref. No. (Tool 123). For the manufacturer's
Part No. refer to the appropriate Table in Special Tools,
Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items
prior to cleaning and reassembled immediately afterwards.
Items received in special cleaning containers should remain
therein during the cleaning procedures unless otherwise
stated.
- B. All items contained in this breakdown must be cleaned by
the appropriate processes quoted in the table, to achieve
a cleanliness to enable the Inspection/Check to be carried
out correctly. Where alternative processes are quoted,
the operator must decide what process to use depending on
the amount of contamination of the item. Any item that is
not cleaned satisfactorily must be recleaned by the
appropriate process.

CLEANING

72-61-00

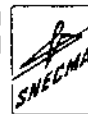
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MK.610-14-28

OVERHAUL



- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	G	Use process G on item 10 only if light cleaning fails to remove contamination. Process G will damage silver plating, therefore it must be used with caution, i.e. short period immersion.
	175	Plate, damping	A or B	-	-
	180	Bolt	A or B	-	-
	205	Ring, oil catcher	A or B	E	-
	310	Ring, retaining	A or B	-	-
	340	Bolt	A or B	-	-
	580	Bolt	A or B	-	-
	290	Bearing, ball, thrust	D	E	-
	320	Bearing, roller	D	E	-
	370	Bearing, roller	D	E	-
	380	Bearing, ball, thrust	D	E	-
	560	Bearing, roller	D	E	-
	565	Plate, damping	A or B	E	-

Cleaning Processes
Table 201 (Continued)

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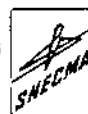


FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
202	ALL		A or B	G	-
	except				
	140	Bearing, roller	D	E	-
	170	Bearing, ball	D	E	-
	130	Ring, retaining	A or B	-	-
	190	Bolt	A or B	-	-
	200	Bolt	A or B	-	-

Cleaning Processes
Table 201 (Concluded)

CLEANING

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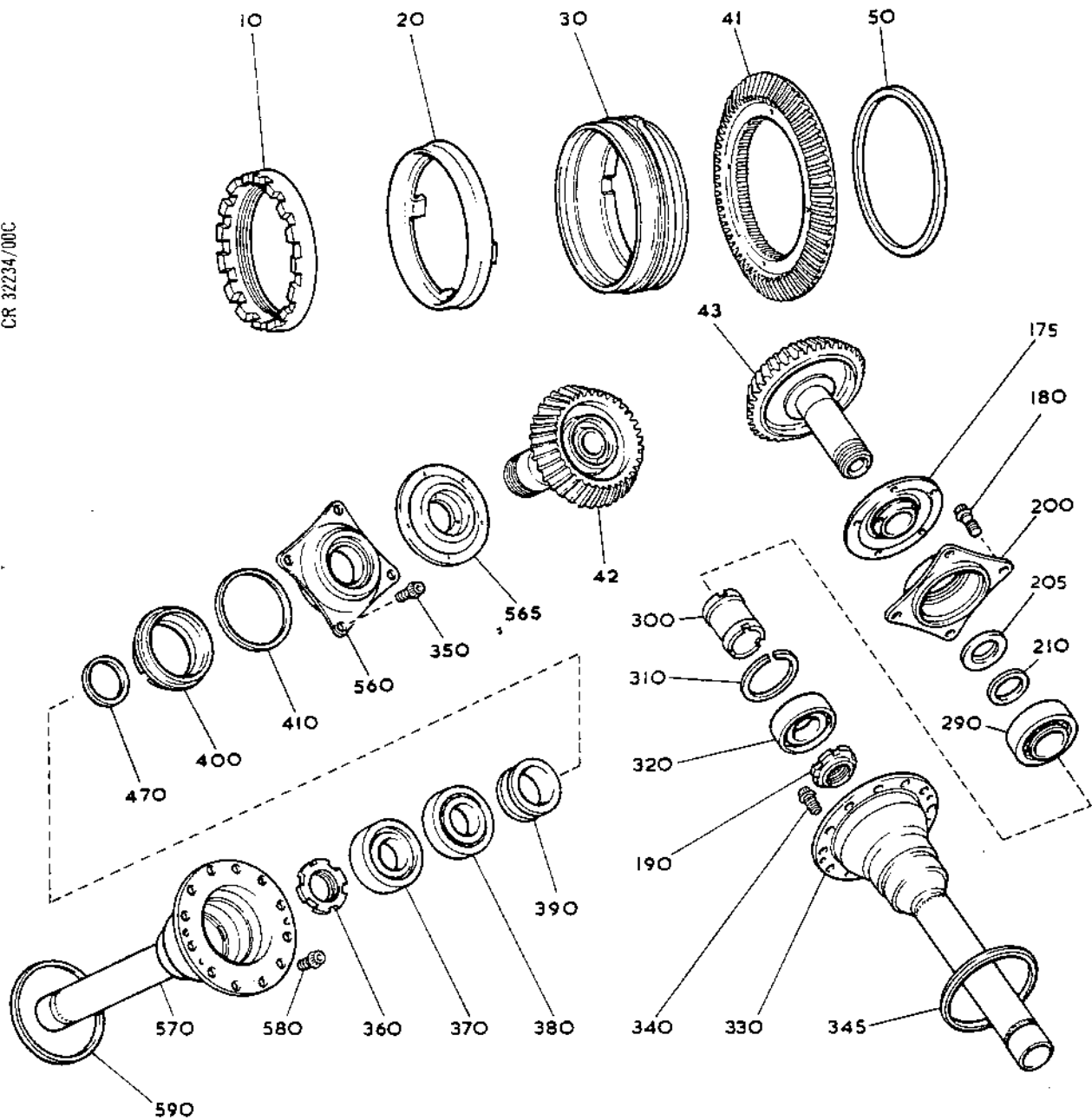


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MK.610-14-28
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CR 32234/00C



Drives - Accessory Internal
L.H. and R.H. Accessory Gearboxes
Figure 201



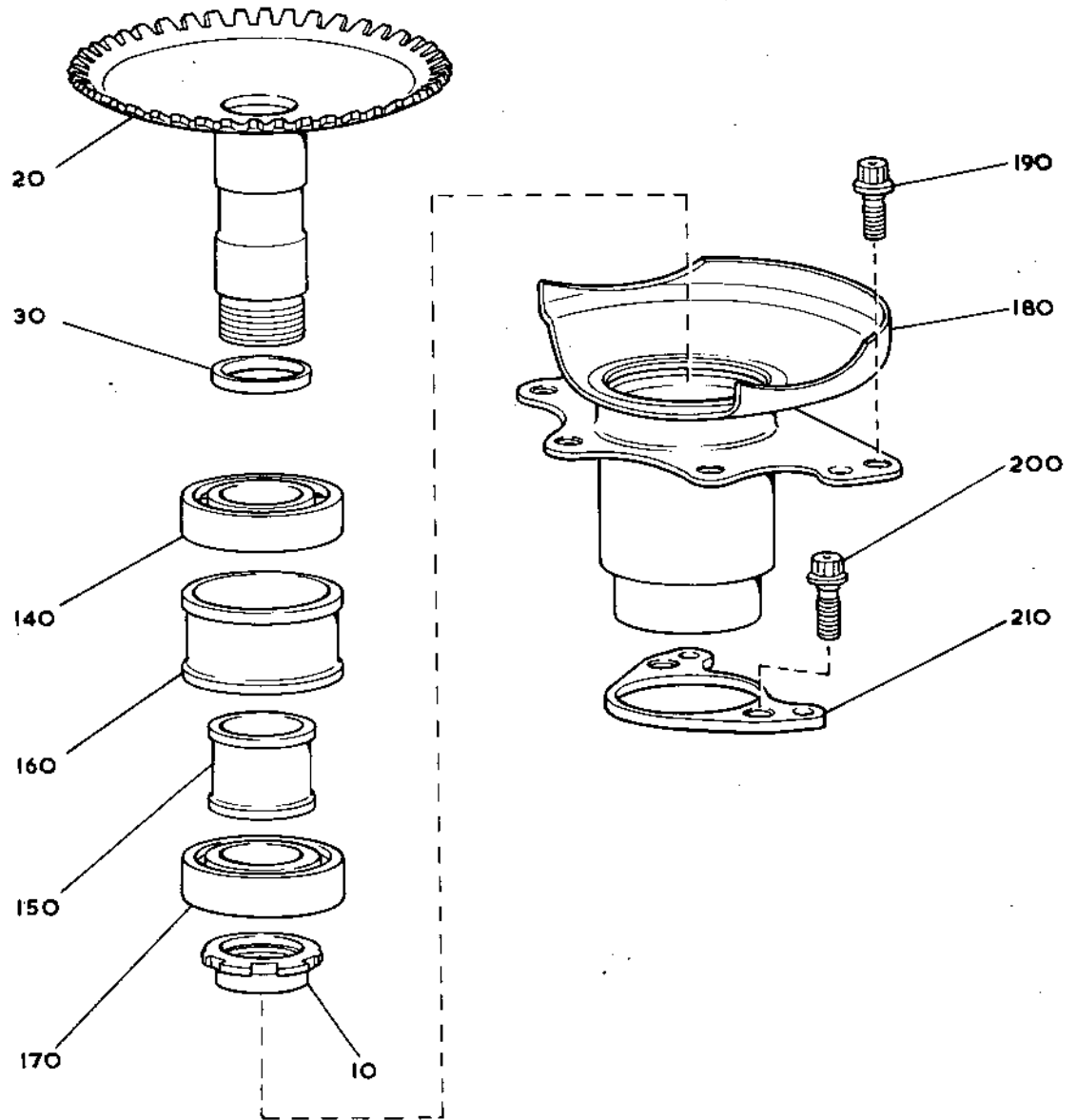
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CR 32235/008



TN12166

Drives - Accessory Internal -
LP Tacho Drive
Figure 202

**OLYMPUS 593**MK.610-14-28 *sneema*
OVERHAULACCESSORY GEARBOX CASE ASSEMBLY, LEFT-HAND - CLEANING1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.
- E. Many parts of the accessory gearbox contain asbestos, refer to DISASSEMBLY 72-09-00 for part identification and details of safety precautions to be followed when handling these parts.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

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OVERHAUL

- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	-	-
202	ALL		A or B	-	-
203	ALL except		A or B	-	-
	340	Track, bearing outer	D	E	-
	410	Track, bearing outer	D	E	-
204	ALL		A or B	-	-
205	ALL except		A or B	-	-
	170	Track, bearing outer	D	E	-

Cleaning Processes
Table 201 (Continued)

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
206	ALL		A or B	-	-
207	ALL		A or B	-	-
208	ALL		A or B	-	-

Cleaning Processes
Table 201 (Concluded)

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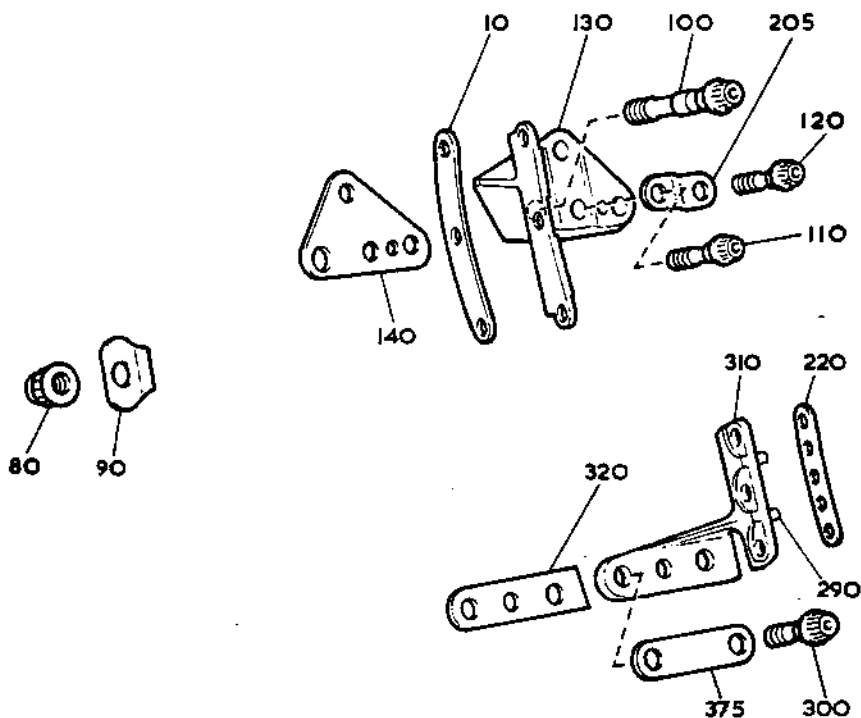


OLYMPUS 593

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OVERHAUL



CR 32444/000



Accessory Gearbox LH -
Installation Fittings
Figure 201

JN12168

CLEANING

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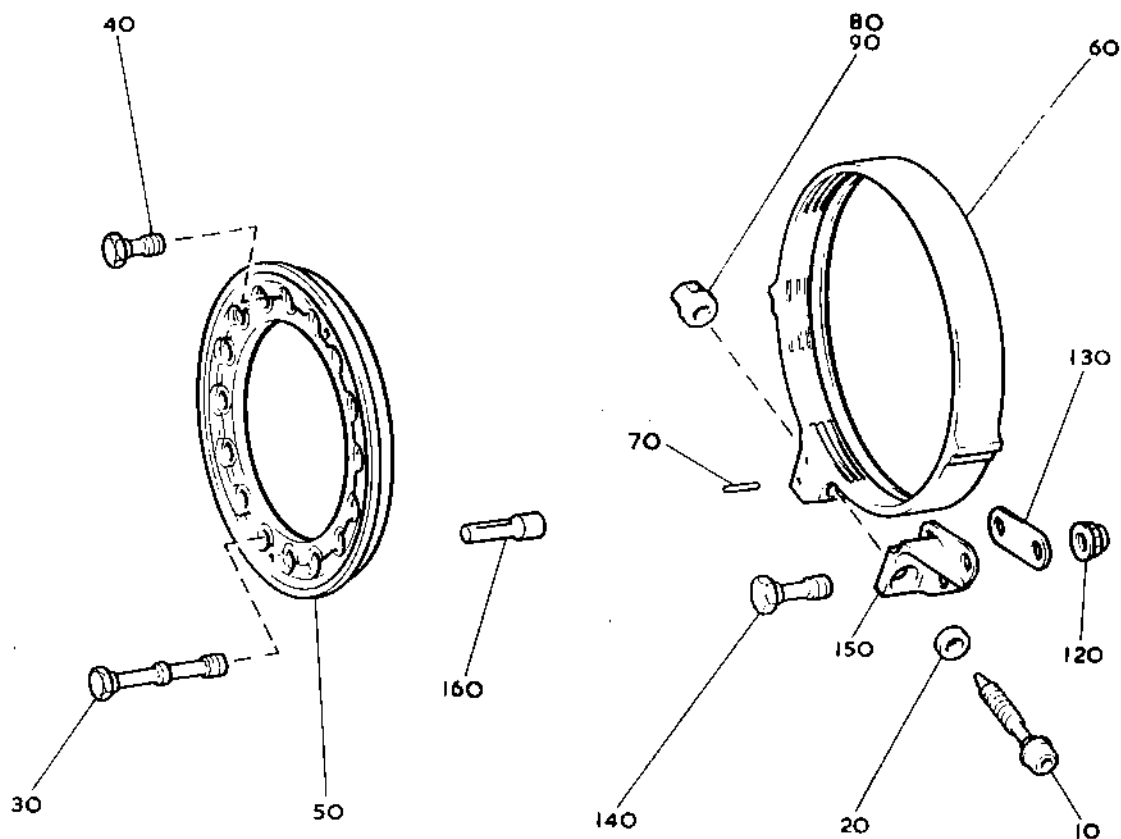


OLYMPUS 593

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CR 32443/00B



TN12169

Accessory Gearbox LH -
1st Stage Fuel Pump Installation Fittings
Figure 202

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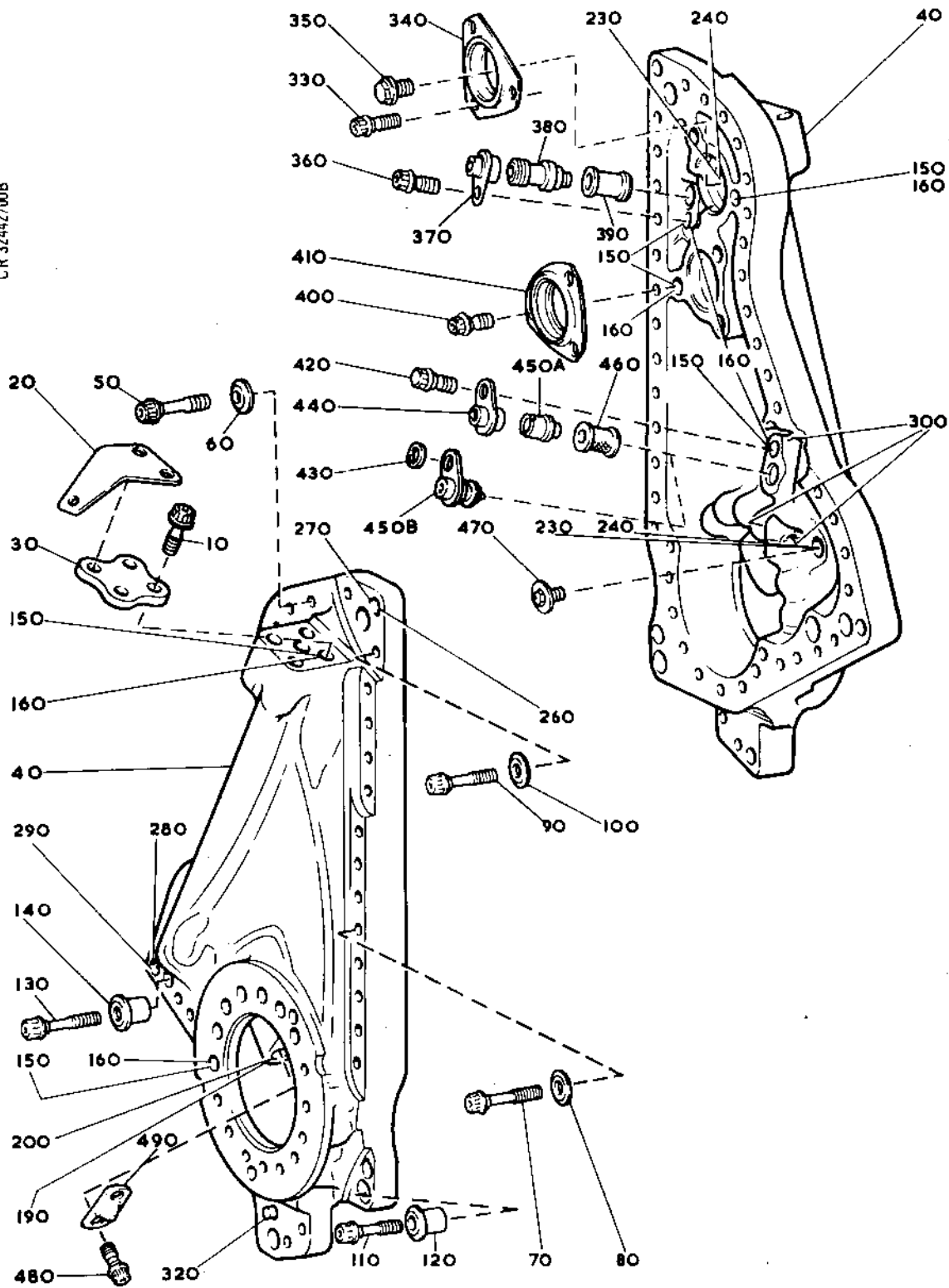


OLYMPUS 593

MK. 610-14-28
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CR 32442/00B



Accessory Gearbox LH -
Front Cover and Fittings
Figure 203

TN12170

CLEANING
72-62-01

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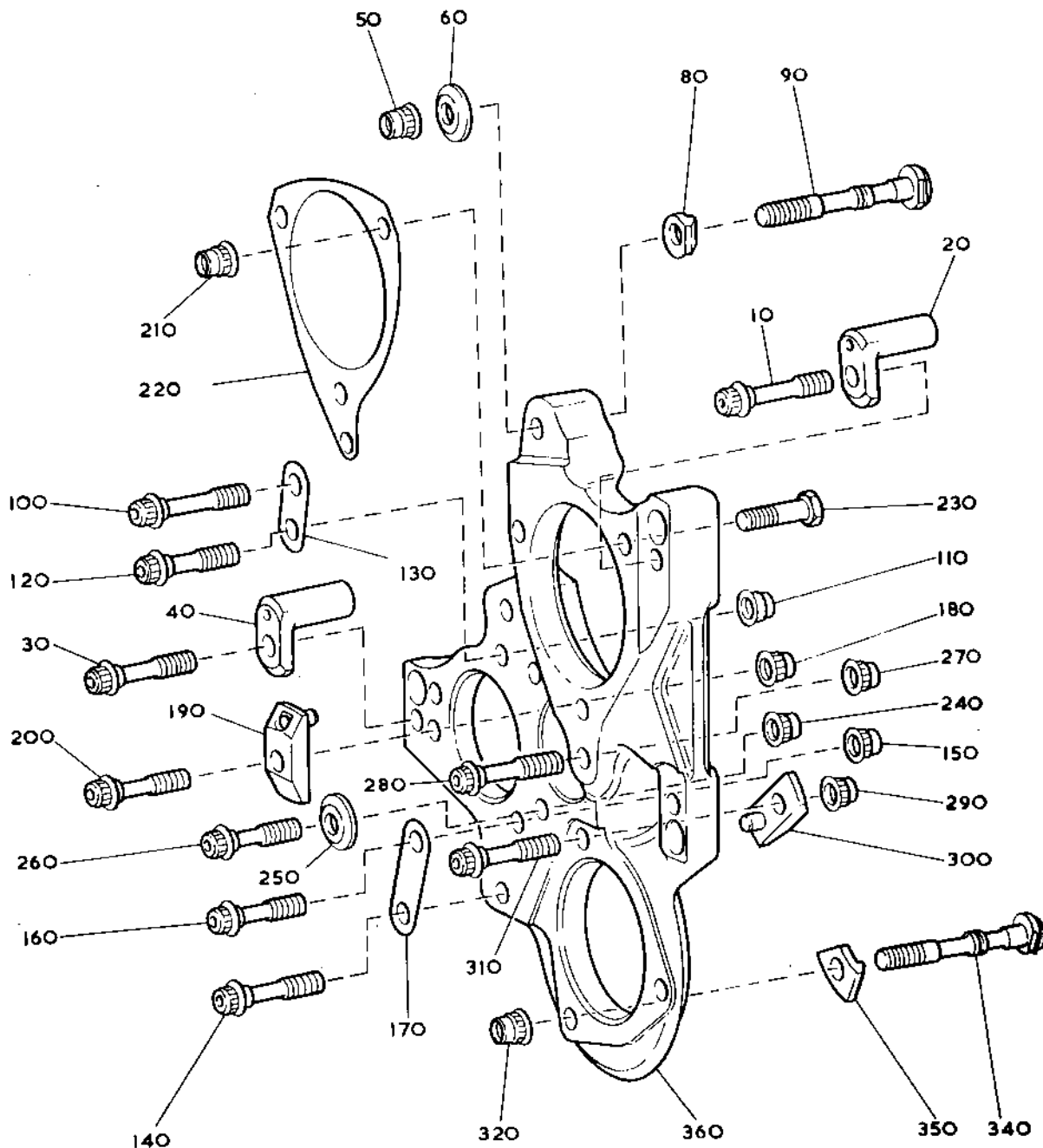
OLYMPUS 593

MK.610-14-28
OVERHAUL



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CR 33020/00A



TN12171

Accessory Gearbox LH -
Diaphragm
Figure 204

CLEANING
72-62-01

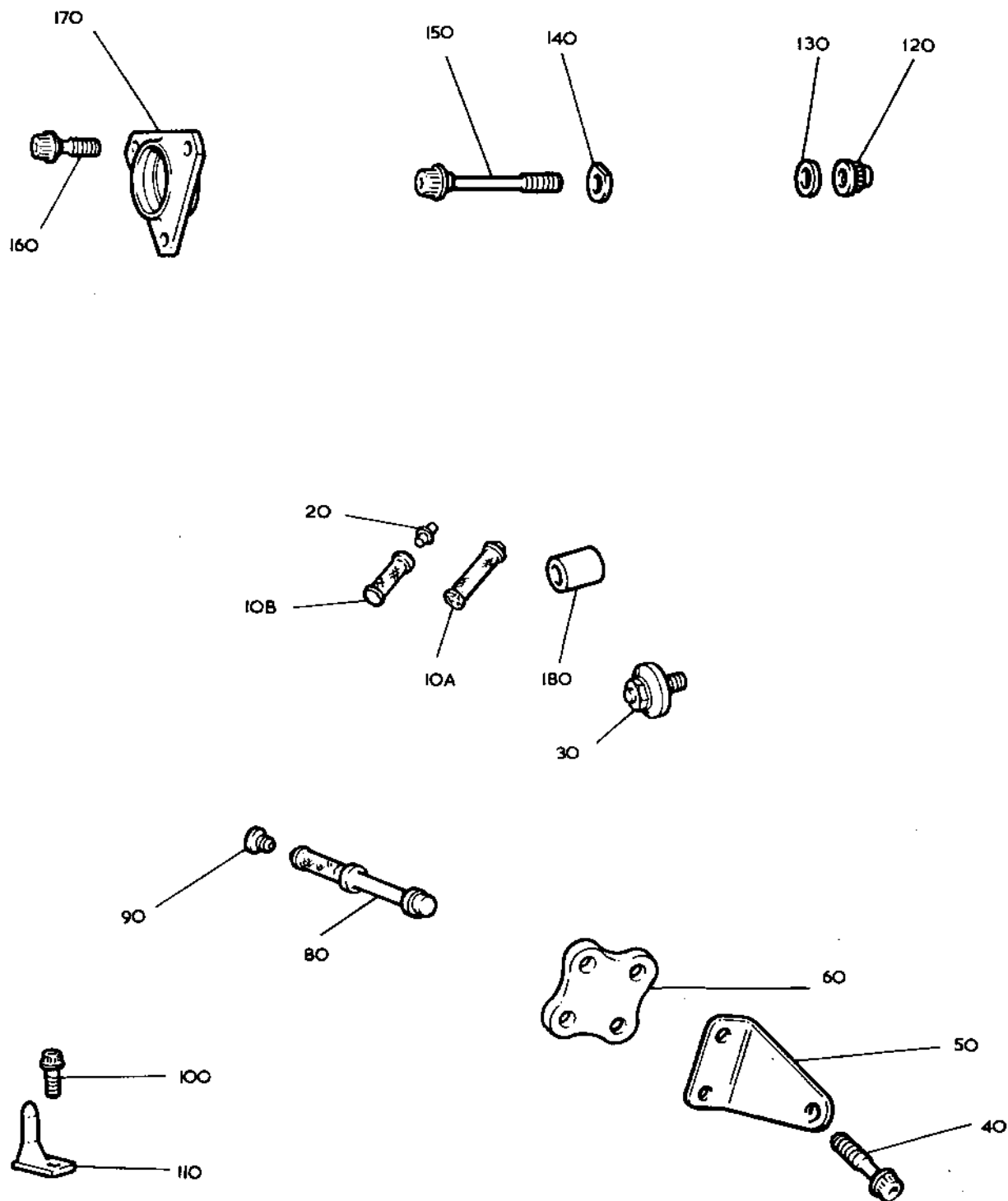
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CR 32236/00B



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MK.610-14-28
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Accessory Gearbox LH -
Oilway Filters and Oil Jets
Figure 205

CLEANING
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TN12172

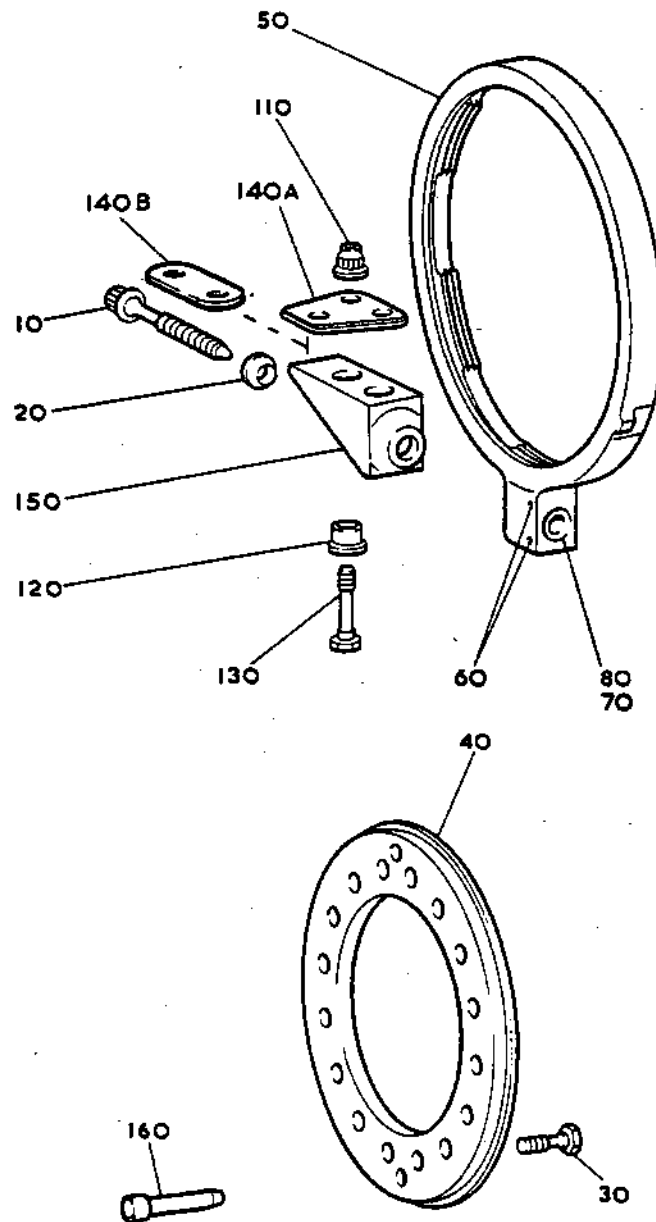


OLYMPUS 593

MK.610-14-28
OVERHAUL



CR 32441/DDC



Accessory Gearbox LH -
F.C.U. Installation Fittings
Figure 206

CLEANING

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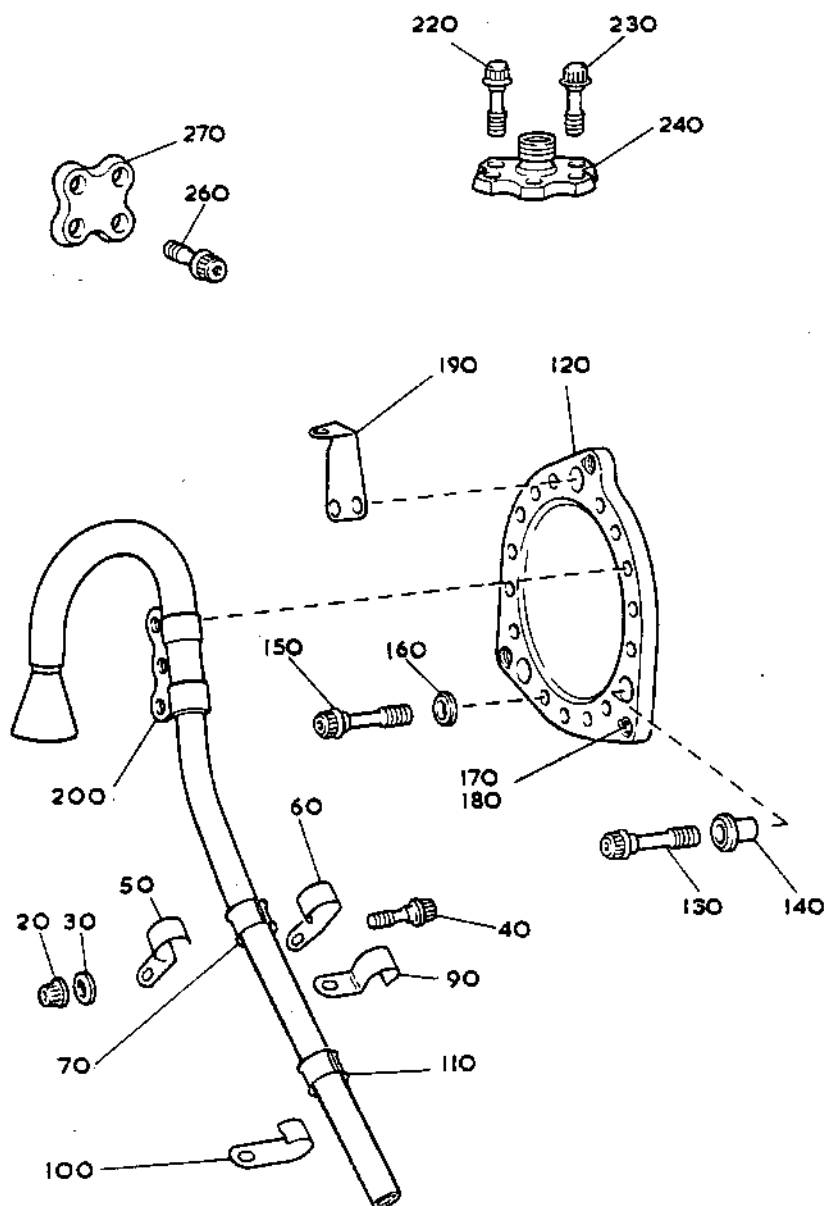


OLYMPUS 593

MK.610-14-28
OVERHAUL



CR 32312/000



Accessory Gearbox LH -
External Fittings
Figure 207

CLEANING

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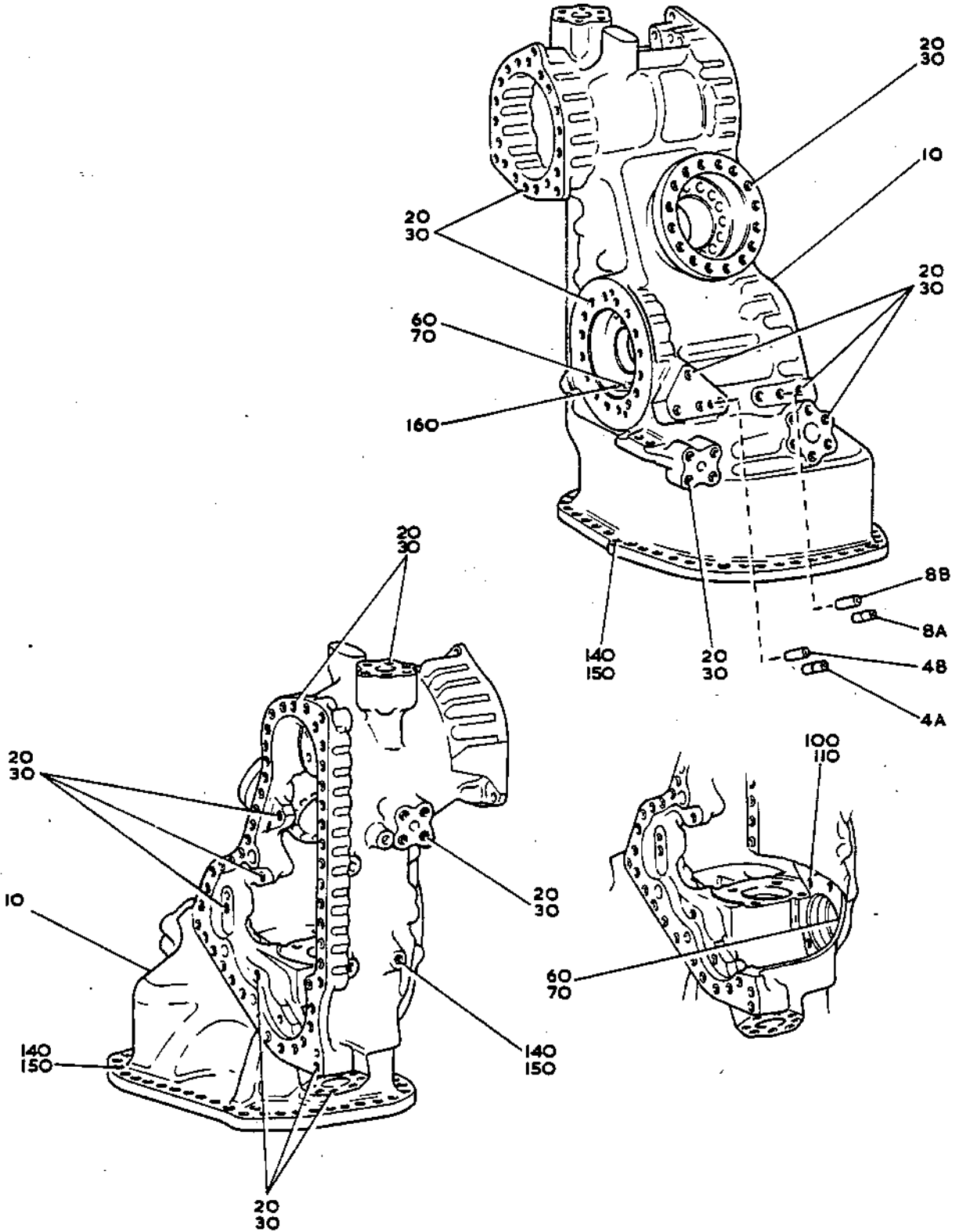
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TN2352



OLYMPUS 593

MK.610-14-28
OVERHAUL



Accessory Gearbox LH -
Case Assembly
Figure 208

CLEANING
72-62-01



OLYMPUS 593

MK.610-14-28
OVERHAUL



MAIN DRIVES ACCESSORY GEARBOX (LEFT-HAND) - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

CLEANING

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OVERHAUL



- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	30	Bearing, ball, journal	D	E	-
	160	Bearing, parallel roller, journal	D	E	-
	260	Bearing, ball journal	D	E	-
	360	Bearing, parallel roller, journal	D	E	-

NOTE: Items deleted by SB.72-9 are not included.

Cleaning Processes
Table 201

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TN18951



OLYMPUS 593

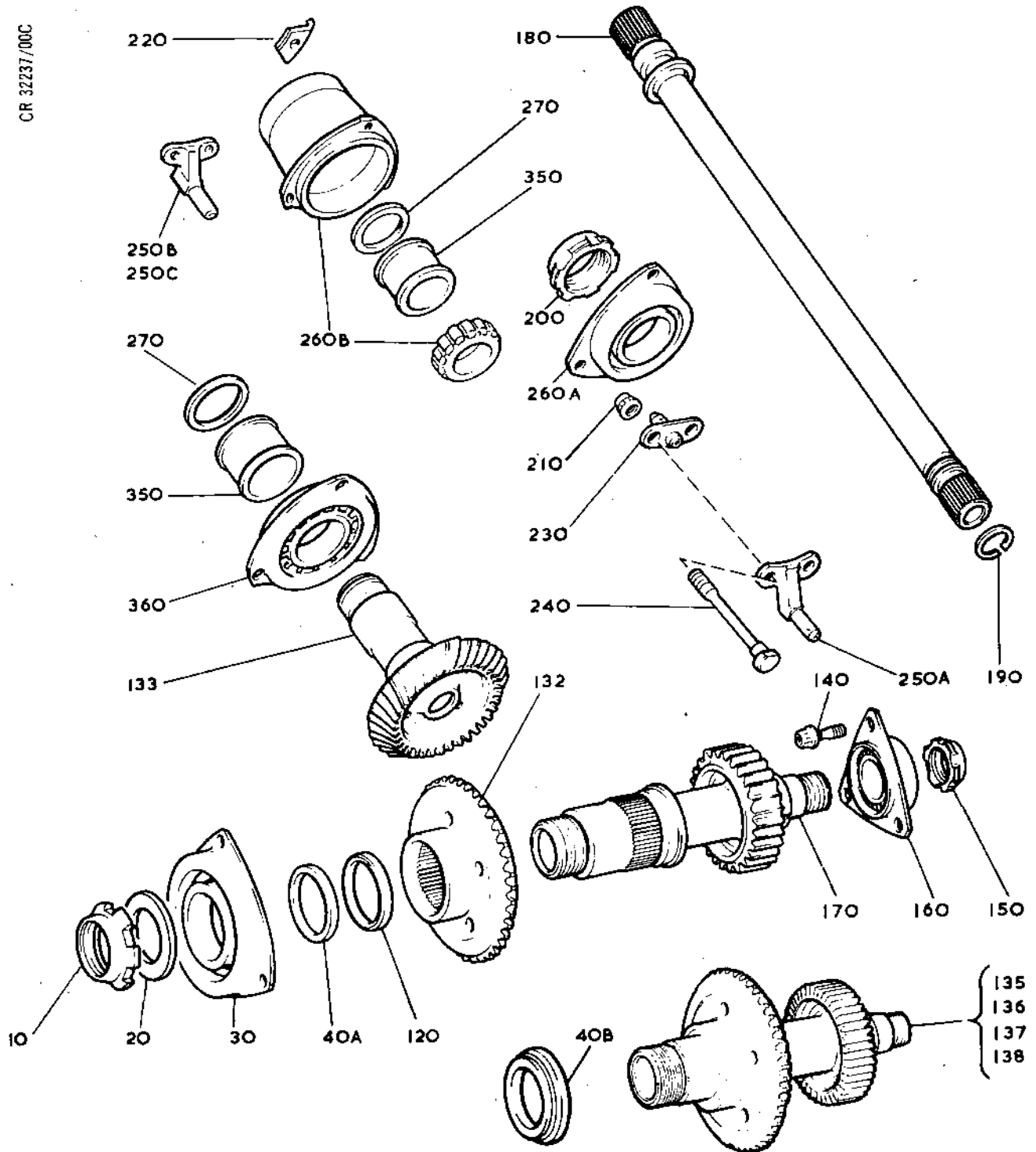
MK.610-14-28
OVERHAUL



CR 32237/00C

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TN18952



Drives - Main, Accessory Gearbox, LH
Figure 201

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72-62-02
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MK.610-14-28
OVERHAUL



FIRST STAGE FUEL PUMP DRIVE AND IDLER GEAR - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	20	Bearing, parallel roller, journal	D	E	-
	50	Bearing, parallel roller, journal	D	E	-
	100	Bearing, ball, journal	D	E	-
	130	Bearing, parallel roller, journal	D	E	-

Cleaning Processes
Table 201

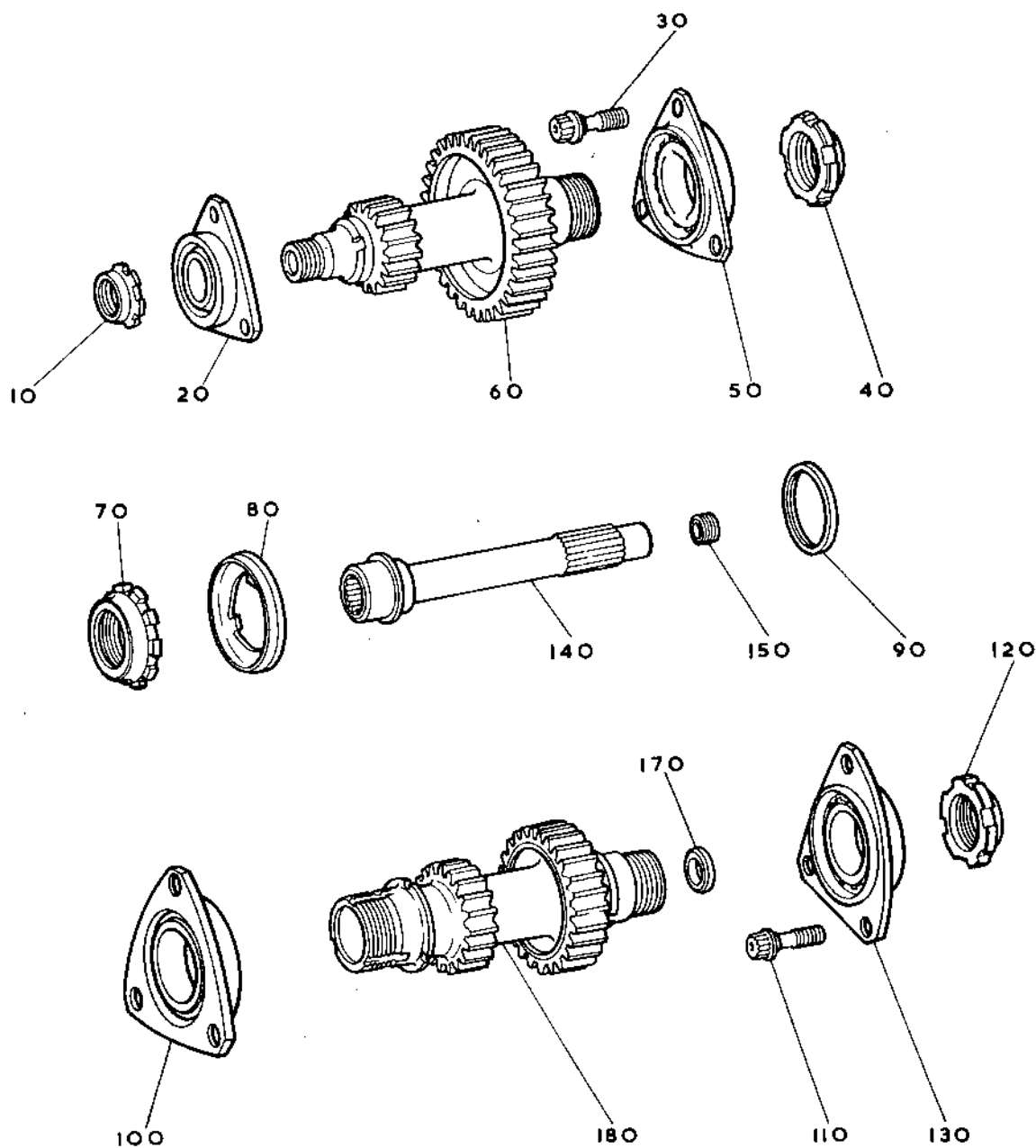
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Drive - 1st Stage Fuel Pump,
and Idler Gear
Figure 201



OLYMPUS 593

MK.610-14-28

OVERHAUL



SCAVENGE OIL PUMP DRIVE AND IDLER GEAR - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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OVERHAUL



- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	40	Bearing, ball, journal	D	E	-
	240	Bearing, parallel roller, journal	D	E	-
	380	Bearing, parallel roller, journal	D	E	-
	410	Bearing, ball, journal	D	E	-

Cleaning Processes
Table 201

TN21374



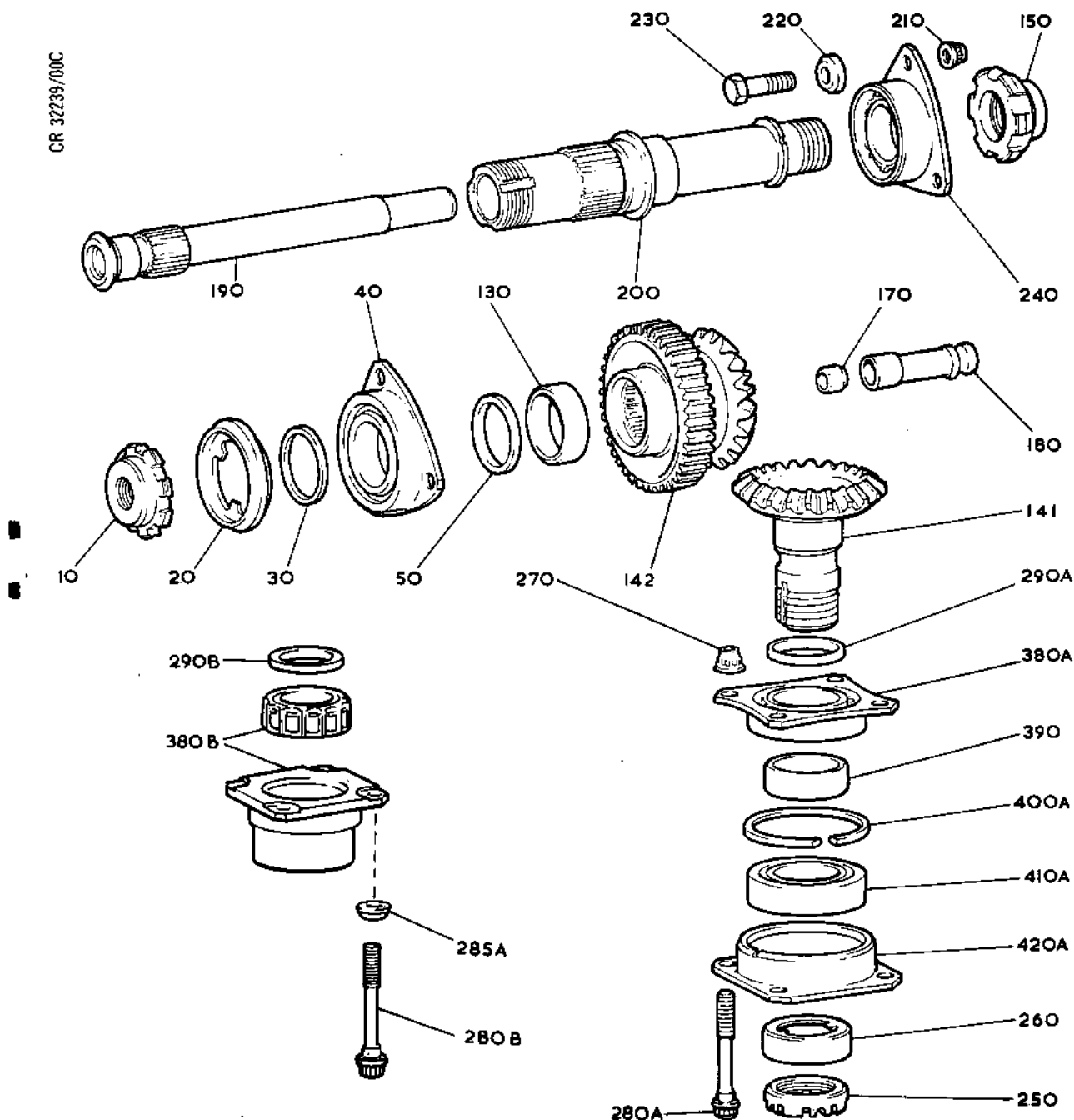
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CR 32239/00C

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Drives - Fuel Control Unit
and Main Oil Pump
Figure 201

TN18953

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MK.610-14-28 *sneema*
OVERHAUL

ACCESSORY GEARBOX CASE ASSEMBLY (RIGHT-HAND) - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.
- E. Many parts of the accessory gearbox contain asbestos, refer to DISASSEMBLY 72-09-00 for part identification and details of safety precautions to be followed when handling these parts.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.

CLEANING

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**OLYMPUS 593**MK.610-14-28 *sneema*
OVERHAUL

- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.
- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		A or B	-	-
202	ALL except		A or B	-	-
	140	Adapter	C	-	-
	180	Filter, assembly of	Q	-	-
	270	Cover assembly	C	-	-
	330	Adapter	C	-	-
	370	Strainer, assembly of, element	Q	-	-

Cleaning Processes
Table 201 (Continued)CLEANING
72-63-01
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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
202A	ALL except		A or B	-	-
	140	Adapter	C	-	-
	180	Filter, assembly of	Q	-	-
	270	Cover assembly	C	-	-
	330	Adapter	C	-	-
	370	Strainer, assembly of, element	Q	-	-
203	ALL except		A or B	-	-
	50	Flange	C	-	-
204	ALL except		A or B	-	-
	420	Ring, bearing outer	D	E	-
205	ALL		A or B	-	-
206	ALL		A or B	-	-
207	ALL except		A or B	-	-
	150	Adapter	C	-	-
208	ALL except		A or B	-	-
	60	Flange	C	-	-
209	ALL except		A or B	-	-
	60A	Strainer, assembly of	Q	-	-
	60B	Strainer, element assembly of	Q	-	-
210	ALL		A or B	-	-

Cleaning Processes
Table 201 (Concluded)

CLEANING

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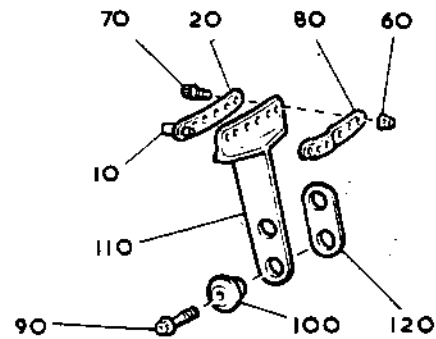
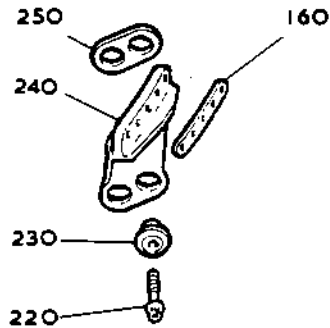


OLYMPUS 593

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OVERHAUL



CR 32310/00E



Case - Accessory Gearbox RH Installation Fittings
Figure 201

CLEANING
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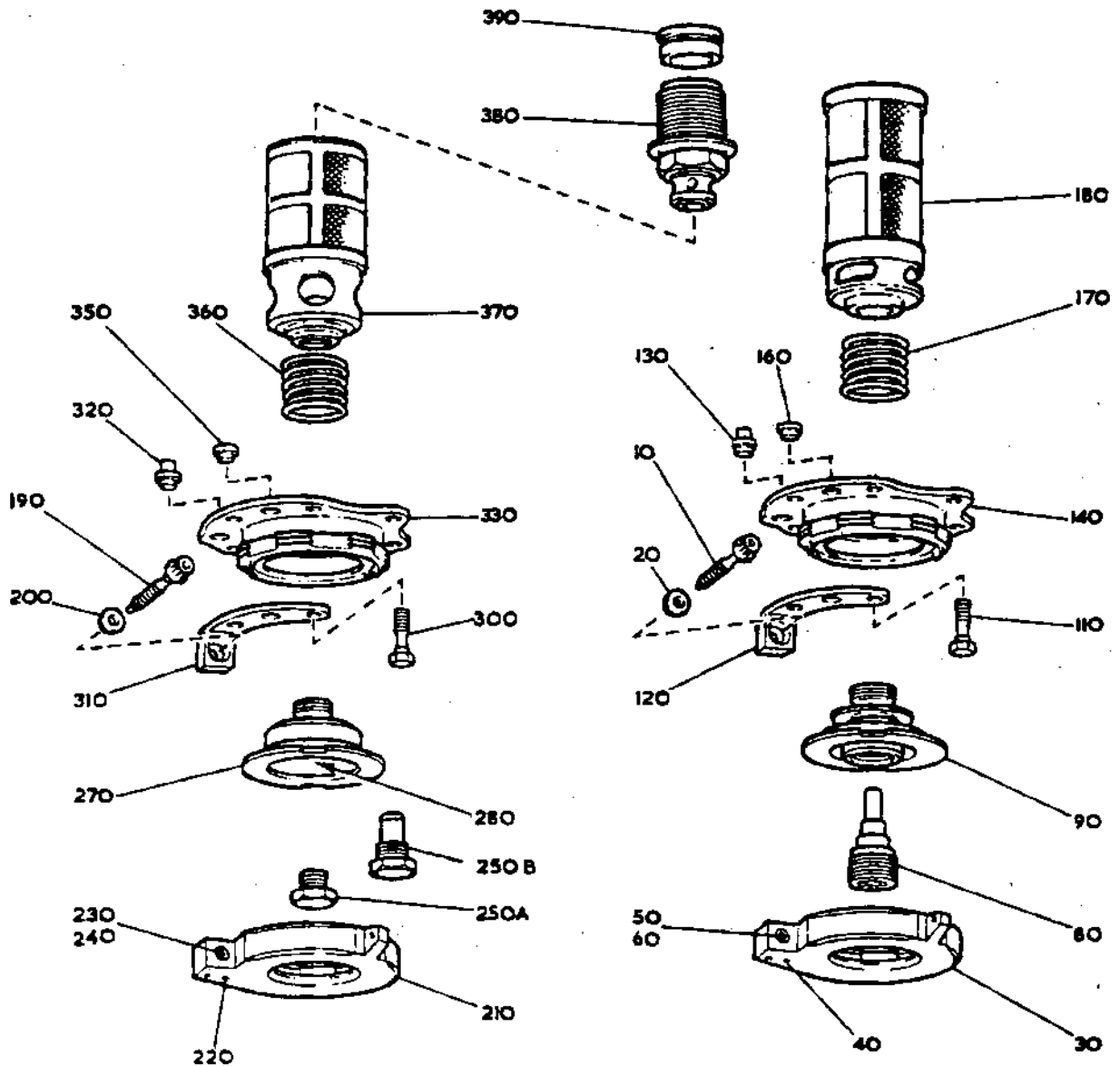


OLYMPUS 593

MK.610-14-28
OVERHAUL



sneema



Case - Accessory Gearbox RH, Oil Pressure and Scavenge Filters,
Drain Valves and Magnetic Plugs
(Pre S.B.OL.593-72-9036-419)

Figure 202



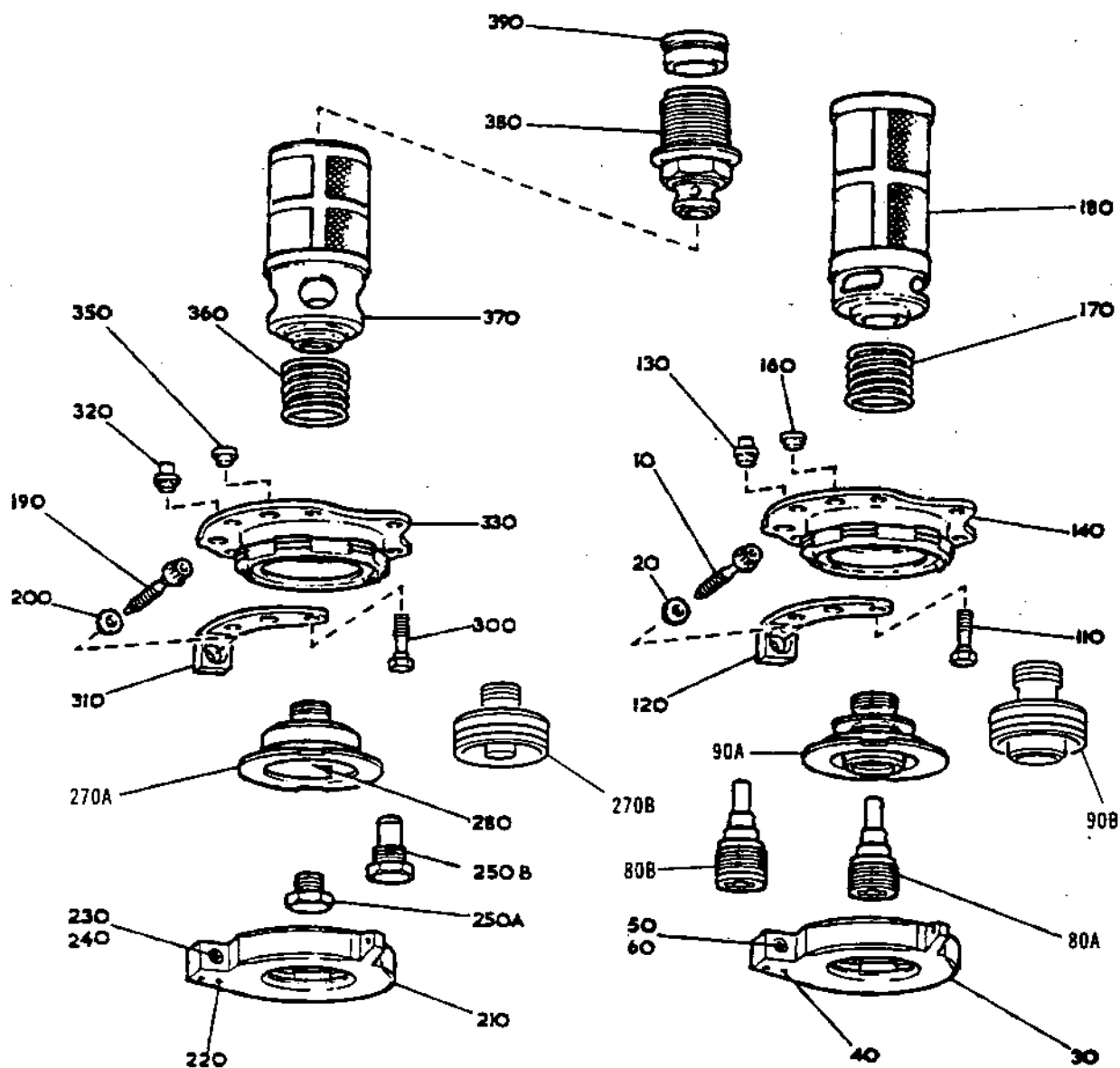
OLYMPUS 593



MK.61D-14-28
OVERHAUL

SNECMA

CR 32309/00D



Case - Accessory Gearbox RH, Oil Pressure and Scavenge Filters,
Drain Valves and Magnetic Plugs
(S.B.OL.593-72-9036-419)

Figure 202A

CLEANING

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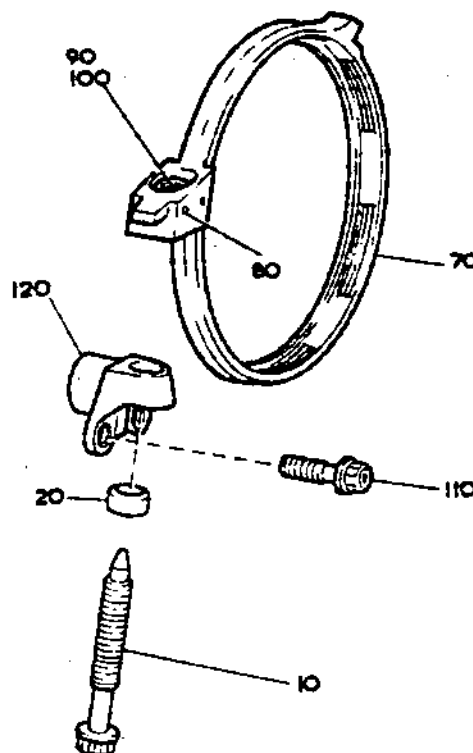
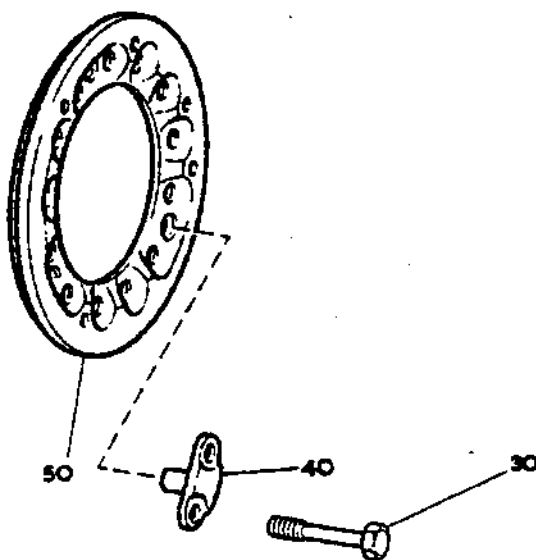


OLYMPUS 593



MK.610-14-28
OVERHAUL

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Case - Accessory Gearbox RH, Air Starter Installation Fittings
Figure 203

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OLYMPUS 593



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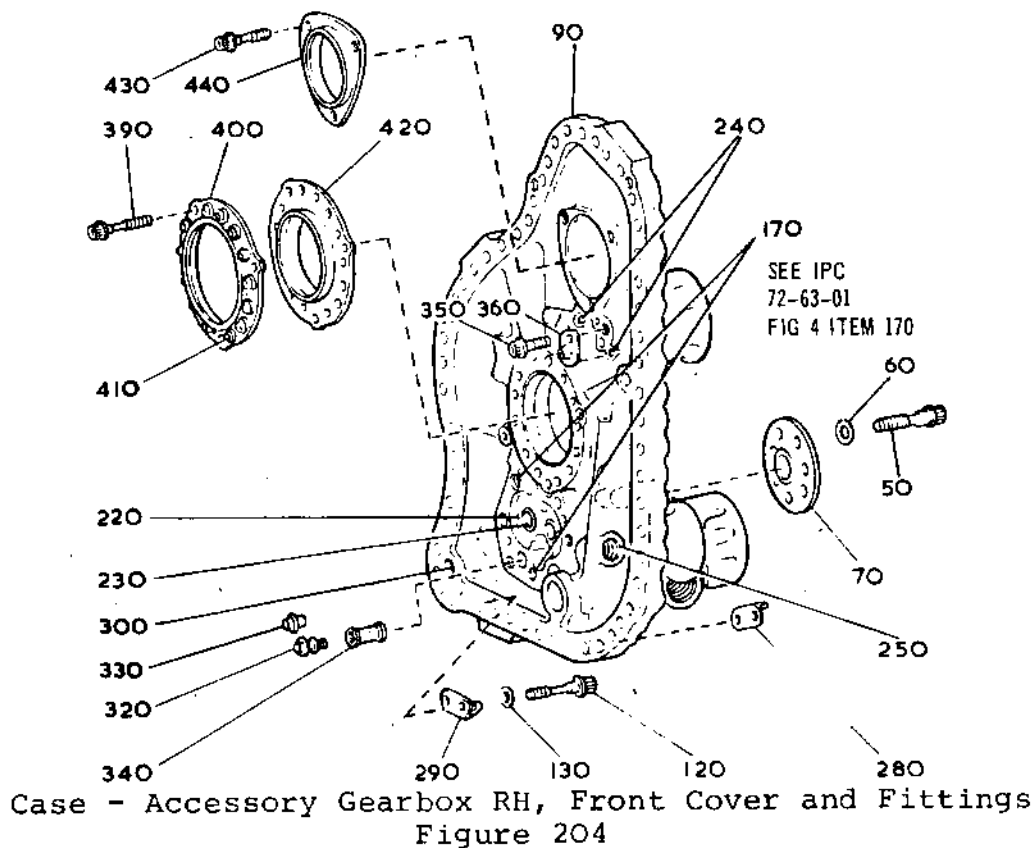
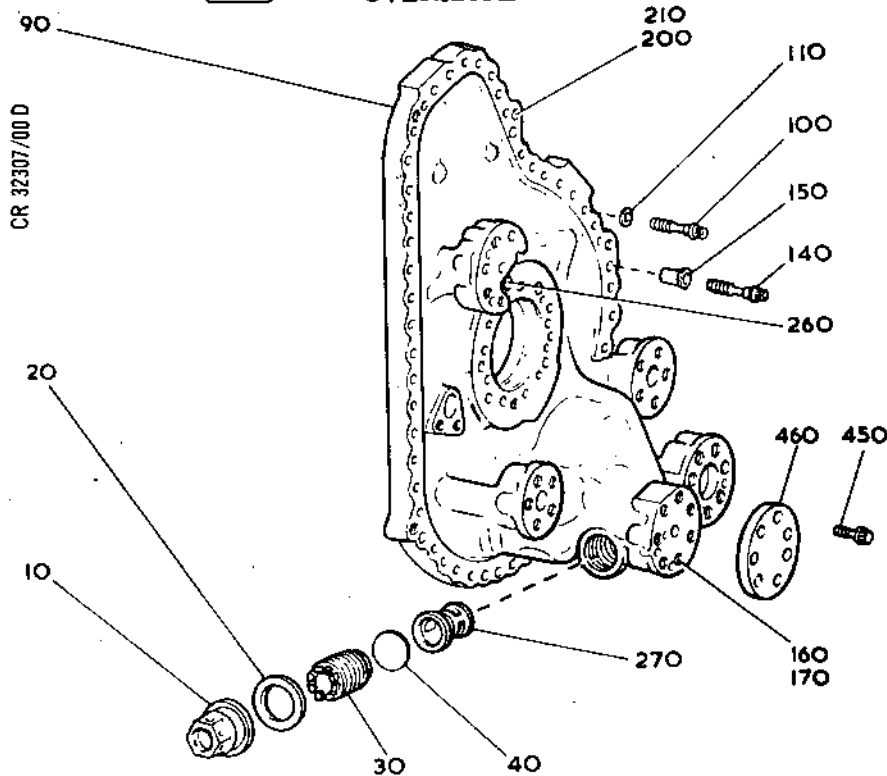
72-63-01

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MK. 610-14-28
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TN30210

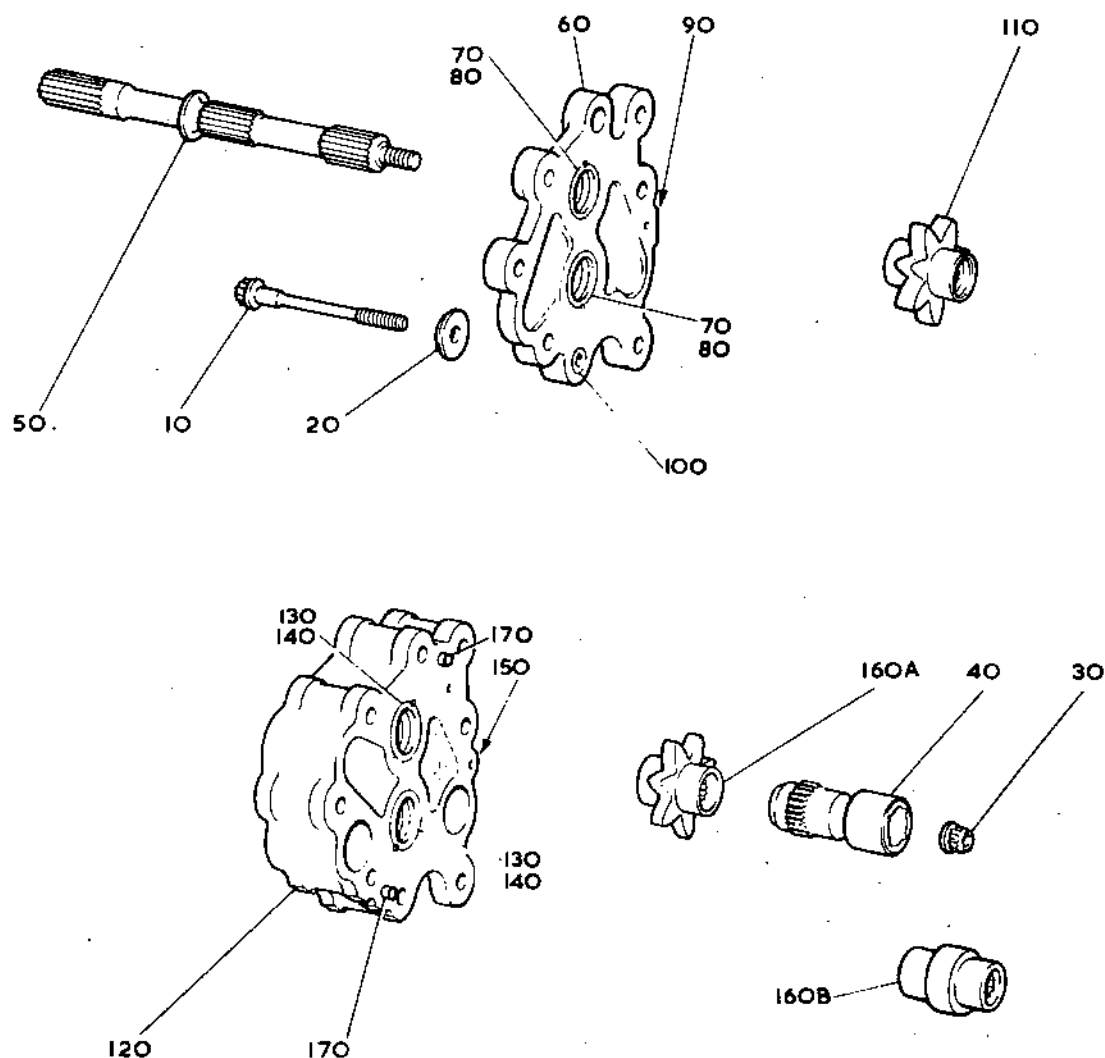


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MK.610-14-28
OVERHAUL



CR 32305/008



TN30209

Case - Accessory Gearbox RH - Oil Pump
Figure 205

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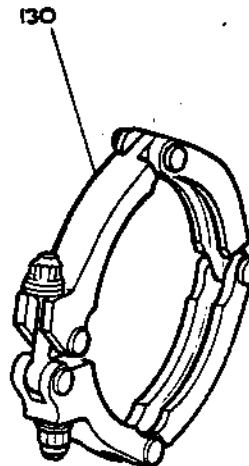
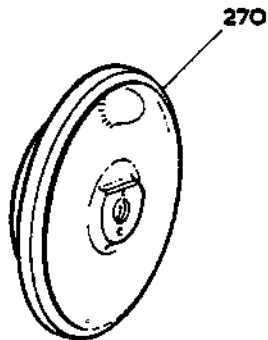
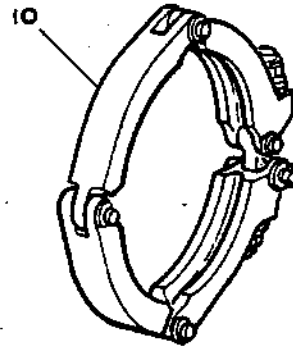
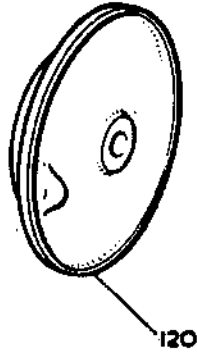


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MK.610-14-28
OVERHAUL



CR 32284/000D



Case - Accessory Gearbox RH, Main and Stand-by
Hydraulic Pump Installation Fittings
Figure 206

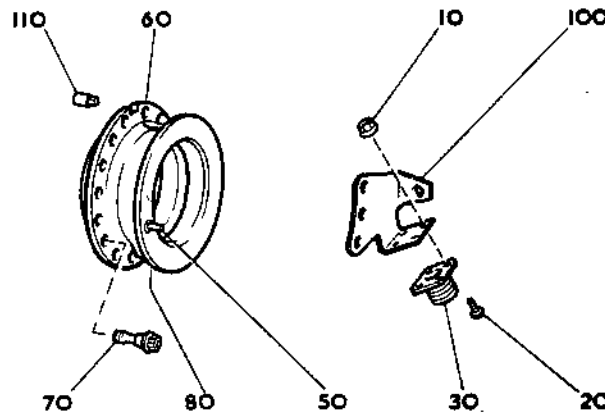
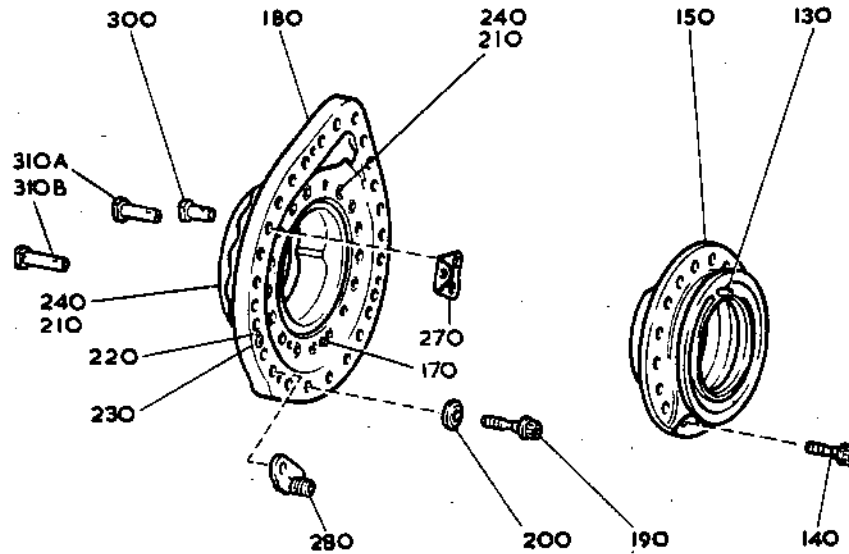


OLYMPUS 593

MK.610-14-28
OVERHAUL



CR 32305/00A



Case - Accessory Gearbox RH, Main and Stand-by
Hydraulic Pump Adapters
Figure 207

CLEANING

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TN30206

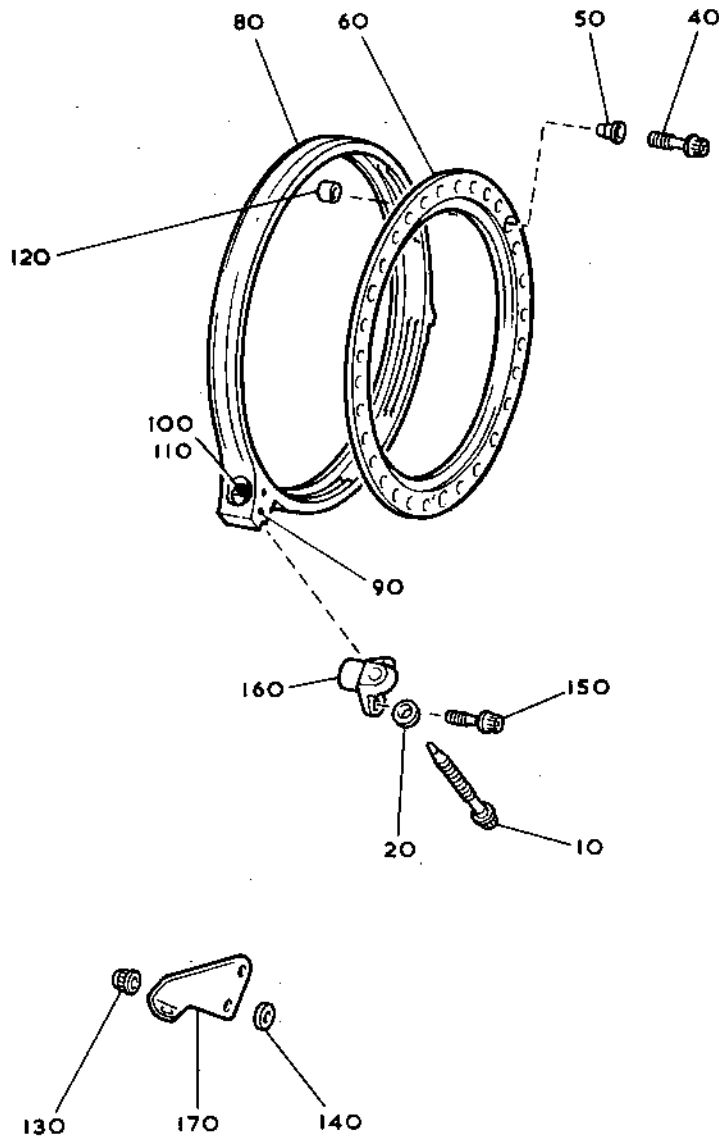


OLYMPUS 593

MK. 610-14-28
OVERHAUL



CR 32304/008



Case - Accessory Gearbox RH, CSD Installation Fittings
Figure 208

CLEANING
72-63-01

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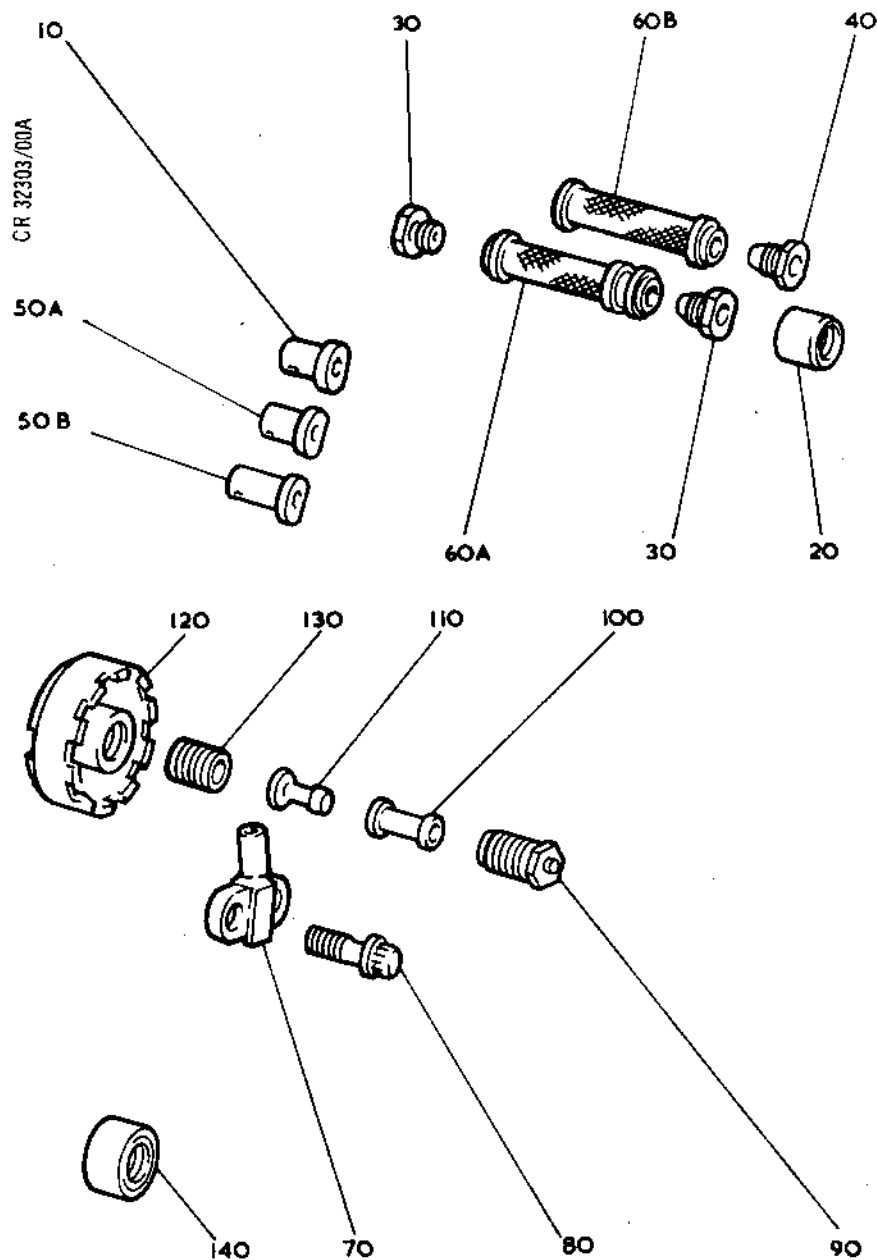
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TN30205



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MK.610-14-28
OVERHAUL



Case - Accessory Gearbox RH, Oilway Filters and Oil Jets
Figure 209

CLEANING
72-63-01
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TN30198



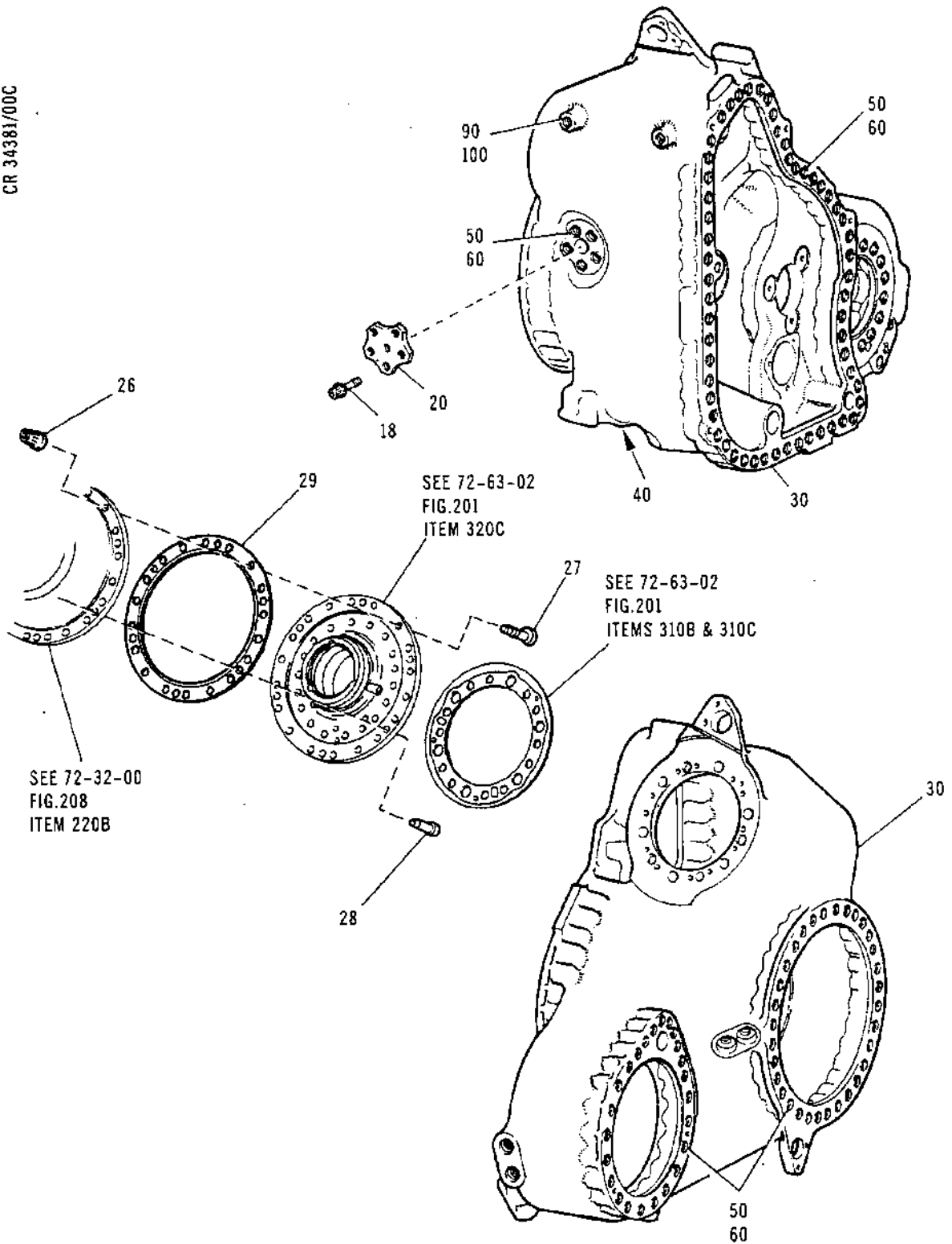
OLYMPUS 593



MK.610-14-28 *sneema*
OVERHAUL

CR 34381/00C

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Case - Accessory Gearbox RH, Case Assembly
Figure 210

CLEANING

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OVERHAUL



MAIN DRIVES - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

CLEANING

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OVERHAUL



- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	90	Bearing, parallel roller, journal	D	E	-
	270	Bearing, ball, journal	D	E	-
	300	Bearing, parallel roller, journal	D	E	-
	430	Bearing, parallel roller, journal	D	E	-
	500	Bearing, ball, journal	D	E	-
	630	Bearing, roller, journal	D	E	-

Cleaning Processes
Table 201

FN32514



OLYMPUS 593

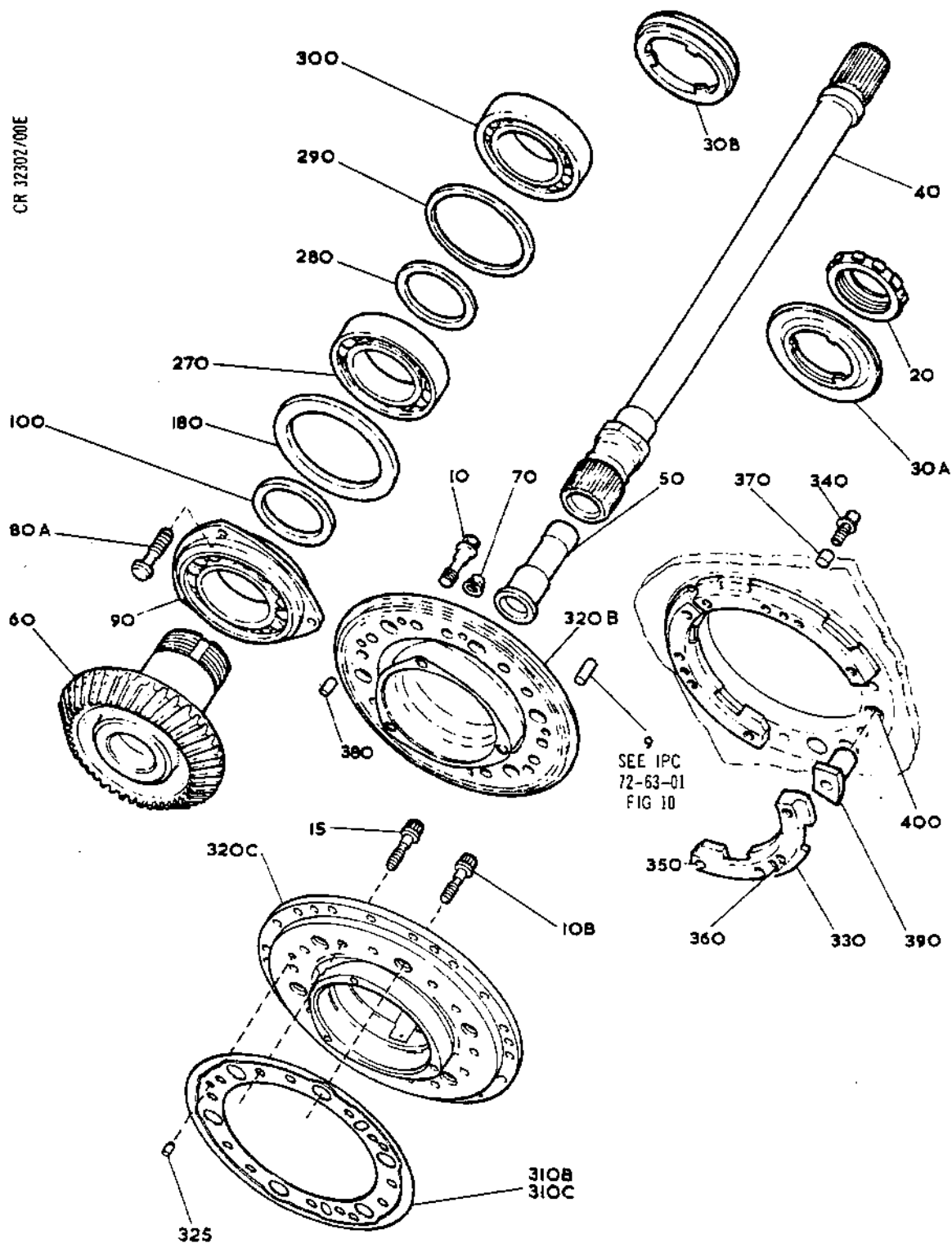


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sneema

CR 32302/00E

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Drives - Main, Accessory Gearbox, RH
Figure 201 (Sheet 1 of 2)

CLEANING

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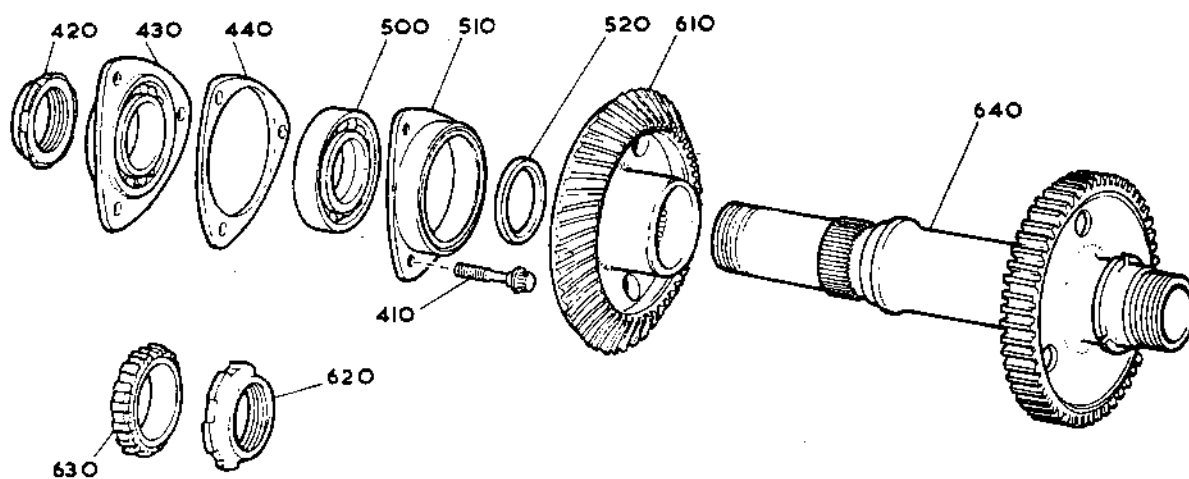


OLYMPUS 593

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OVERHAUL



CR 35640/00A



Drives - Main, Accessory Gearbox, RH
Figure 201 (Sheet 2 of 2)

CLEANING
72-63-02
Page 204
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OLYMPUS 593

MK.610-14-28
OVERHAUL



AIR STARTER DRIVE AND IDG DRIVE - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	190	Bearing, ball, journal	D	E	-
	260	Bearing, roller, journal	D	E	-

Cleaning Processes
Table 201

TN32518



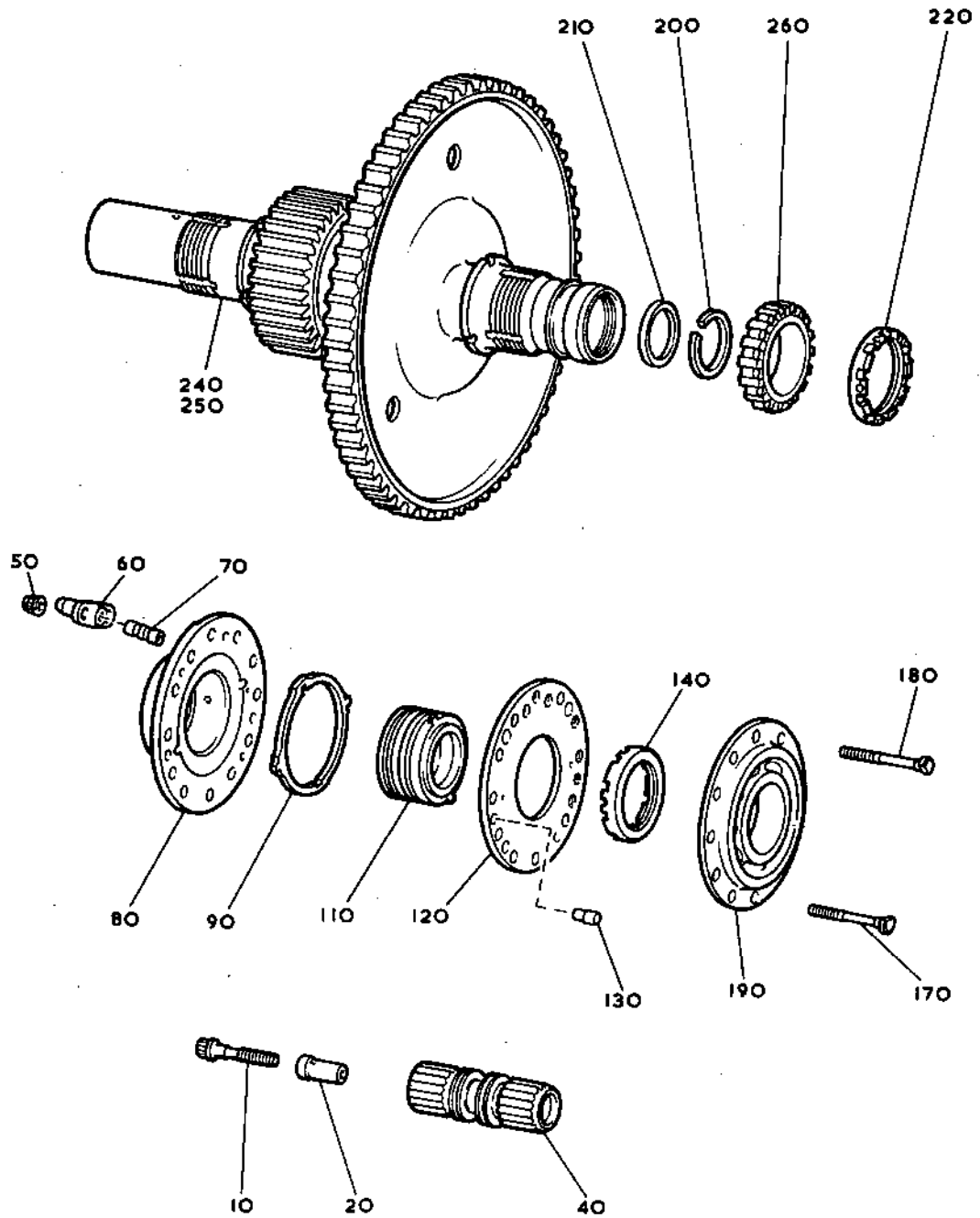
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CR 32300/00B



TN32520

Drives - Air Starter and IDG
Figure 201

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OVERHAUL



SCAVENGE OIL PUMP DRIVE AND IDLER GEAR - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

CLEANING

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OVERHAUL



- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL except		A or B	-	-
	50	Bearing, parallel roller, journal	D	E	-
	100	Bearing, parallel roller, journal	D	E	-
	160	Bearing, parallel roller, journal	D	E	-
	170	Bearing, parallel roller, journal	D	E	-
	60	Gear assembly	A or B	G	-
	110	Shaft, idler	A or B	G	-
	190	Spur gear	A or B	G	-

Cleaning Processes
Table 201

TN32522



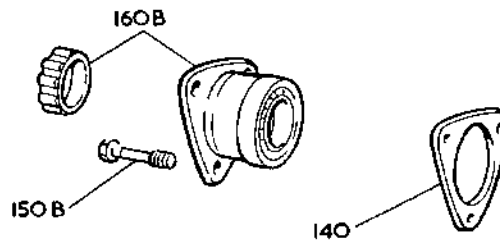
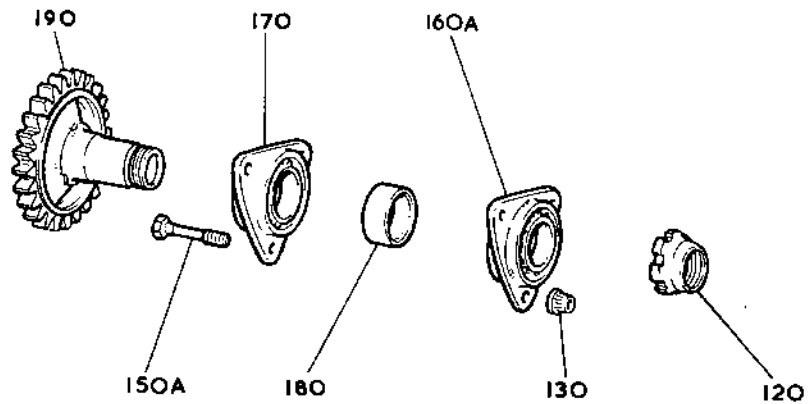
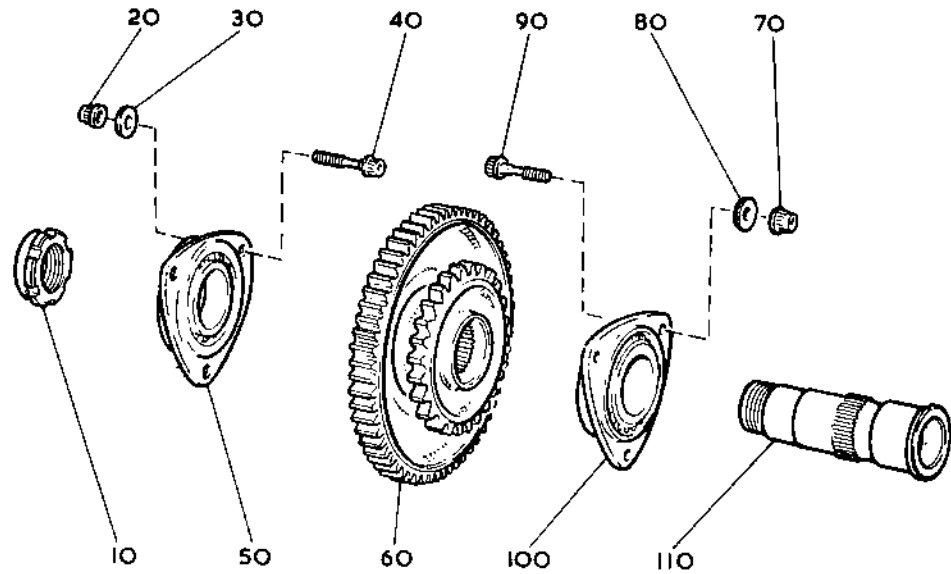
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CR 32240/00B



Drive - Scavenge Oil Pump
and Idler Shaft
Figure 201

TN32524



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MAIN AND STAND-BY HYDRAULIC PUMP DRIVES - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

CLEANING

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**OLYMPUS 593**

MK.610-14-28

OVERHAUL



- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201			A or B	-	-
	110	Bearing, parallel roller, journal	D	E	-
	190	Bearing, ball journal	D	E	-
	70	Seal, sealol	B	-	These seals contain carbon, therefore ensure sealing faces are not damaged
	150	Seal, sealol	B	-	
	200	Spur gear	A or B	G	-

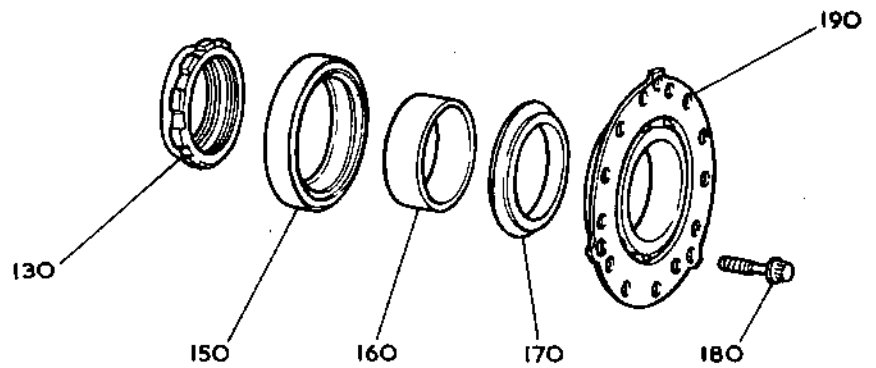
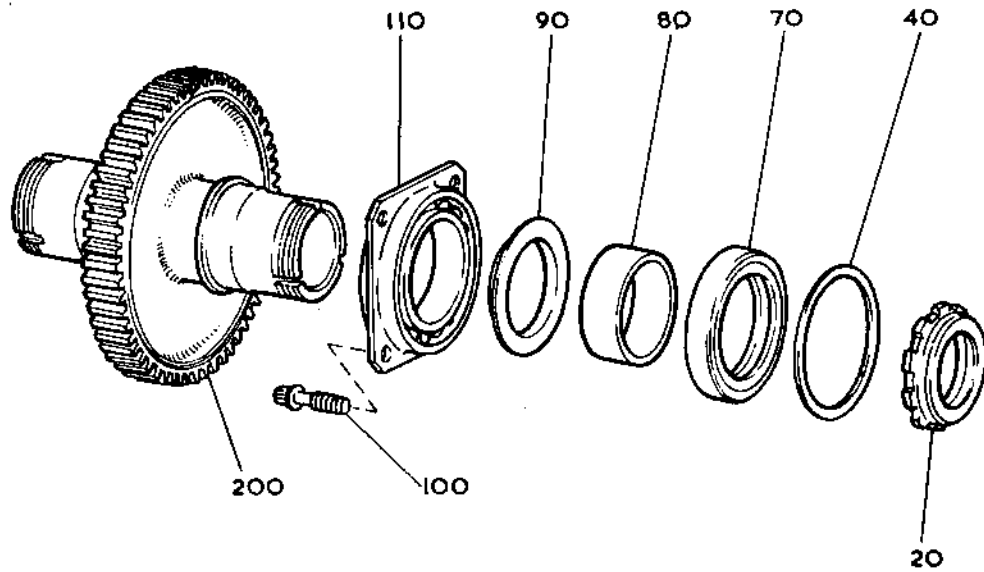
Cleaning Processes
Table 201

TN32526



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Drives - Main and Stand-by
Hydraulic Pumps
Figure 201

CLEANING
72-63-05



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MK.610-14-28
OVERHAUL



DRIVE, PULSE PROBE AND HOUSING - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00
Cleaning for details of the cleaning processes referred
to in Table 201.
- B. To ensure that all items within this breakdown that
require cleaning and subsequent Inspection/Check are
recognized, and identified by their Part Number, figures
are provided which equate with the Illustrated Parts
Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with
the relevant Figure and Item Number in the same breakdown
in the I.P.C. Items illustrated in the I.P.C. which are
not illustrated in this breakdown, are those items which
are either discarded at overhaul, or are normally assembled
to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the
figures, Table 201 does not list all items, but deals
collectively with the items requiring the same cleaning
process.
- D. On receipt of the items from disassembly, all protective
blanks, covers etc. deemed necessary for the protection
of the items will have been assembled and, in addition,
many of the items will arrive in containers. Any special
containers, blanks, covers etc. are listed in Table 202
by their Tool Ref. No. (Tool 123). For the manufacturer's
Part No. refer to the appropriate Table in Special Tools,
Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items
prior to cleaning and reassembled immediately afterwards.
Items received in special cleaning containers should remain
therein during the cleaning procedures unless otherwise
stated.
- B. All items contained in this breakdown must be cleaned by
the appropriate processes quoted in the table, to achieve
a cleanliness to enable the Inspection/Check to be carried
out correctly. Where alternative processes are quoted,
the operator must decide what process to use depending on
the amount of contamination of the item. Any item that is
not cleaned satisfactorily must be recleaned by the
appropriate process.

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OVERHAUL



- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged finish will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL 70	Bearing, ball, journal	A or B D	- E	- -

Cleaning Process
Table 201

TN31810

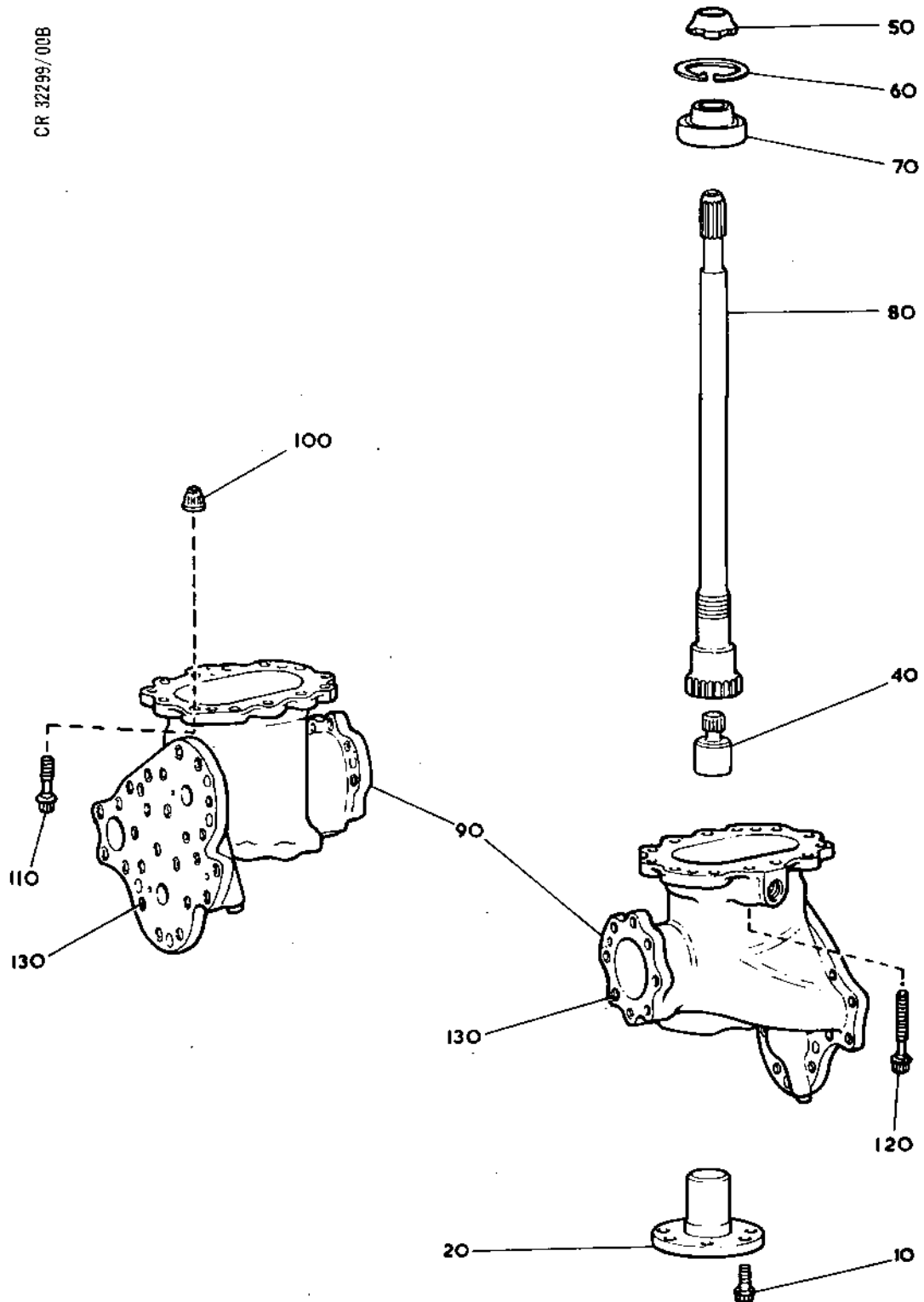


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TN31812

Pulse Probe Drive and Housing
Figure 201

British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

TEMPORARY REVISION 72-578

Insert in 72-65-00 facing page 201

REASON FOR ISSUE

Oil filters - cleaning LHR only (DDA A373/7)

ACTION

Procedure to be used for cleaning Olympus 593 oil filters at LHR.

P/N's B420159 or B489886

and B485947* outer) form an assembly together but should
B485954 inner) be stored seperately.

B493131 or inner) form an assembly together but should

B471714 inner) be stored seperately.

B473874 outer)

Refer to I.P.C. 72-65-00 Fig.2

1. Disassemble filters.
2. Clean all filters EXCEPT B485947 in Ardrox 1854 solution.
Clean for sufficient time to remove carbon and lacquer.
(Use Process spec. BEA No. 43).

NOTE: B485947* MUST be cleaned in Ardrox 690
(Use Process spec. BEA No.121)

3. Heavy cold water rinse.
4. De-water and protect with Ardrox 3961 or applied 8-15.
5. Store in plastic bags.

NOTE: Filters must not be stored as an assembly but stored
seperately. Springs, where fitted are also stored
seperately.



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MK.610-14-28

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MAIN OIL PUMP - CLEANING

1. General

- A. Prior to commencing the cleaning refer to 72-09-00 Cleaning for details of the cleaning processes referred to in Table 201.
- B. To ensure that all items within this breakdown that require cleaning and subsequent Inspection/Check are recognized, and identified by their Part Number, figures are provided which equate with the Illustrated Parts Catalogue (I.P.C.). Thus, Fig.201 Item 10 equates with the relevant Figure and Item Number in the same breakdown in the I.P.C. Items illustrated in the I.P.C. which are not illustrated in this breakdown, are those items which are either discarded at overhaul, or are normally assembled to another item and are only called up by number.
- C. As all items requiring cleaning are illustrated in the figures, Table 201 does not list all items, but deals collectively with the items requiring the same cleaning process.
- D. On receipt of the items from disassembly, all protective blanks, covers etc. deemed necessary for the protection of the items will have been assembled and, in addition, many of the items will arrive in containers. Any special containers, blanks, covers etc. are listed in Table 202 by their Tool Ref. No. (Tool 123). For the manufacturer's Part No. refer to the appropriate Table in Special Tools, Fixtures and Equipment Section.

2. Cleaning Components

- A. All blanks, covers etc. must be removed from the items prior to cleaning and reassembled immediately afterwards. Items received in special cleaning containers should remain therein during the cleaning procedures unless otherwise stated.
- B. All items contained in this breakdown must be cleaned by the appropriate processes quoted in the table, to achieve a cleanliness to enable the Inspection/Check to be carried out correctly. Where alternative processes are quoted, the operator must decide what process to use depending on the amount of contamination of the item. Any item that is not cleaned satisfactorily must be recleaned by the appropriate process.

CLEANING

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MK.610-14-28

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- C. When an assembly item has attached parts that have certain protective finishes e.g. silver plating, the cleaning process for the assembly item may damage the finish of the part. To minimize the effect on the finish of the part, reduce the process immersion time to a minimum. If the finish is damaged, then the damaged coating will have to be replaced or reconditioned.
- D. Certain components are subject to Controlled Manufacturing Technique (CMT) procedures. The cleaning of these components is critical and variations from the specified cleaning procedures and solutions are prohibited without approval from the engine manufacturer. All components to which this applies are identified as such in the Remarks column of the Cleaning Processes Table.

FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
201	ALL		B	-	-
202	ALL		B	-	-
	except				
	50	Strainer, assembly of	Q	-	-
	57	Element, assembly of, outer	Q	-	-
	59	Element, assembly of, inner	Q	-	-
	100	Strainer, assembly of, inner	Q	-	-
	110	Strainer, assembly of, outer	Q	-	-

Cleaning Processes
Table 201 (Continued)

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FIG. NO.	ITEM NO.	NOMENCLATURE	CLEANING PROCESSES		REMARKS
			LIGHT	HEAVY	
202A	ALL		B	-	-
	except				
	50	Strainer, assembly of	Q	-	-
	57	Element, assembly of, outer	Q	-	-
	59	Element, assembly of, inner	Q	-	-
	100	Strainer, assembly of, inner	Q	-	-
	110	Strainer, assembly of, outer	Q	-	-
203	ALL		B	-	-
204	ALL		B	-	-
205	ALL		B	-	-

Cleaning Processes
Table 201 (Concluded)CLEANING
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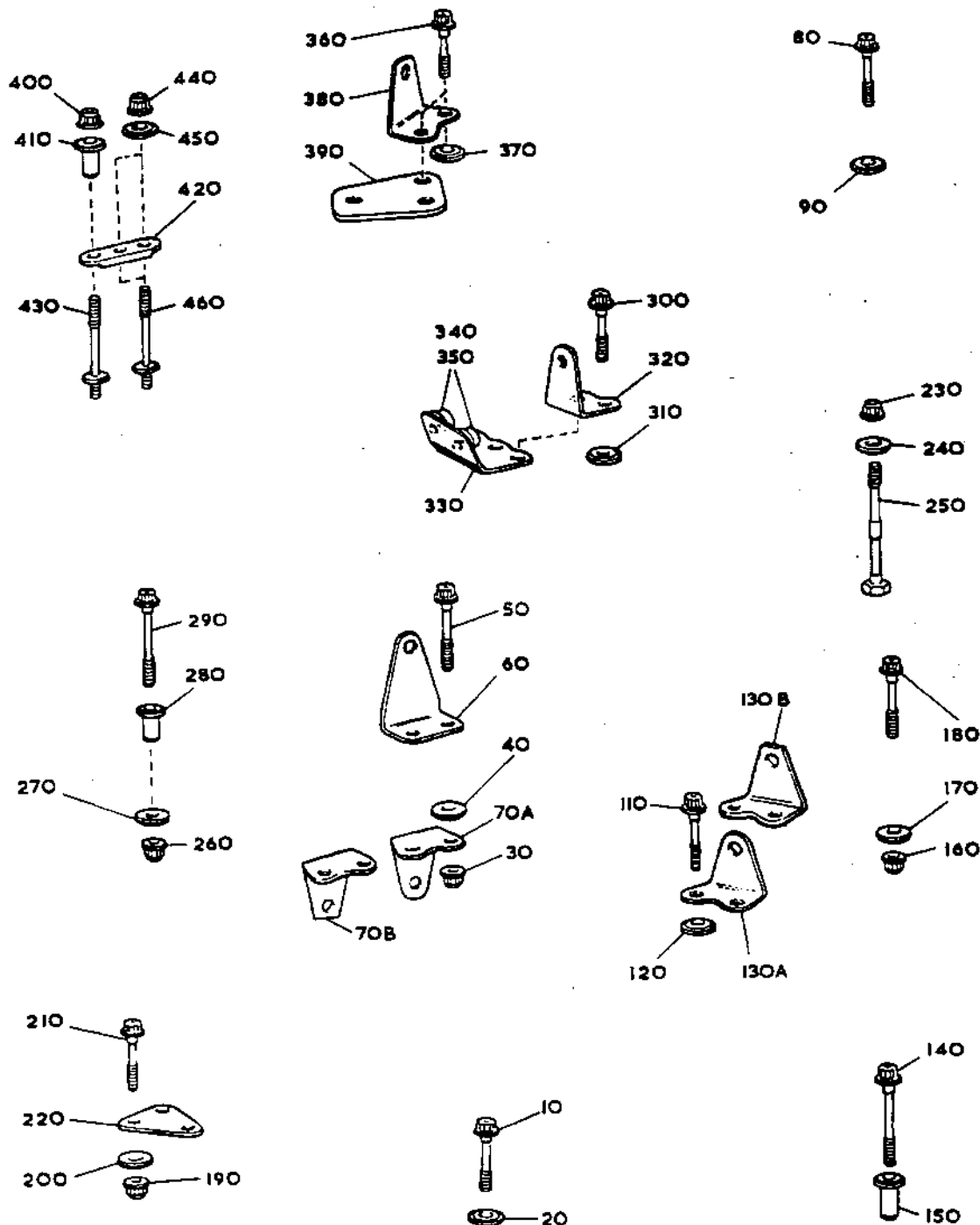


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CR 32298/00C

Main Oil Pump
Figure 201

CLEANING
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CR 32265/000

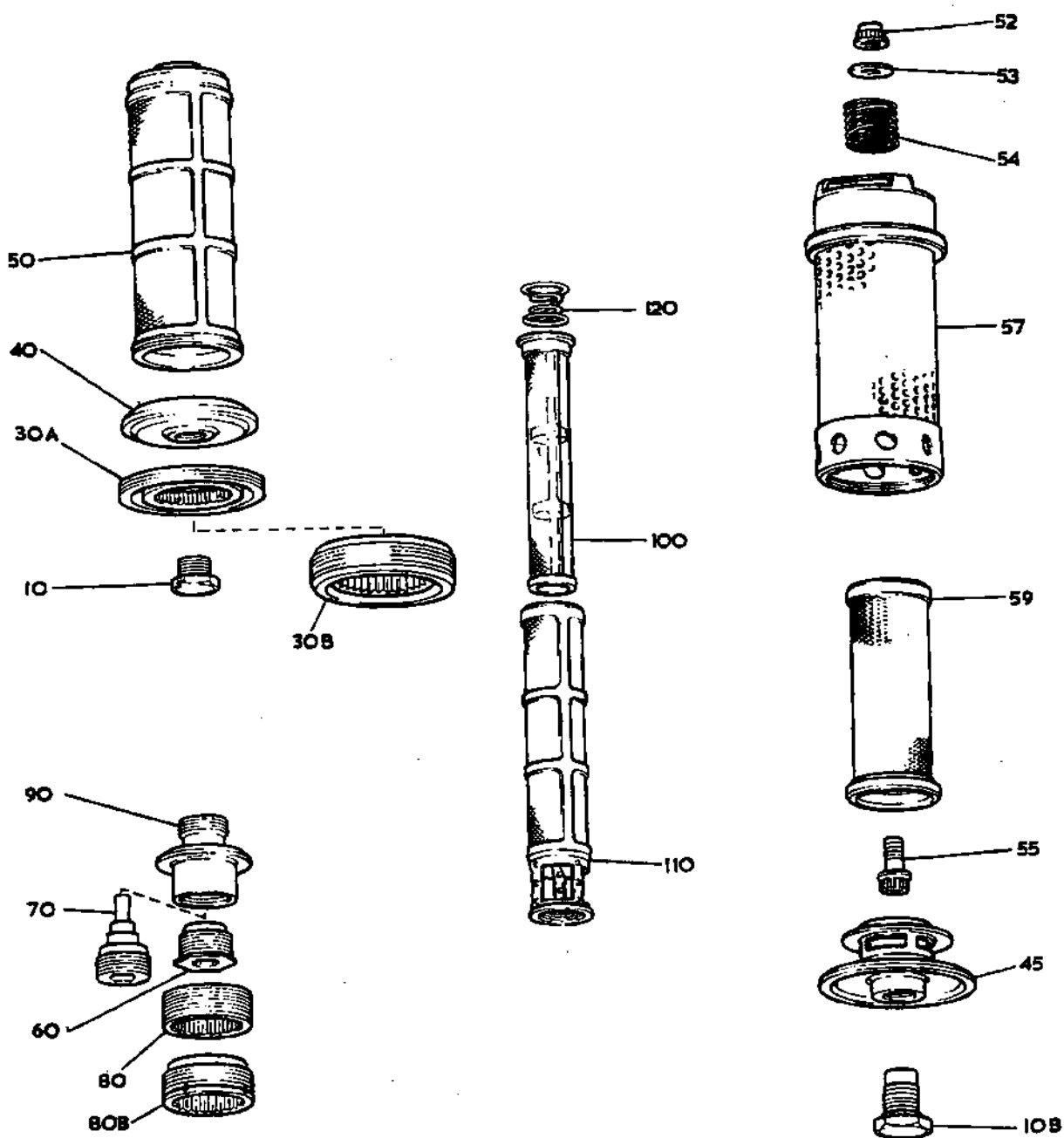


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SNECMA



Main Oil Pump
Strainers, Drain Valves and Magnetic Plug
(Pre S.B.OL.593-72-9036-419)
Figure 202

CLEANING

72-65-00

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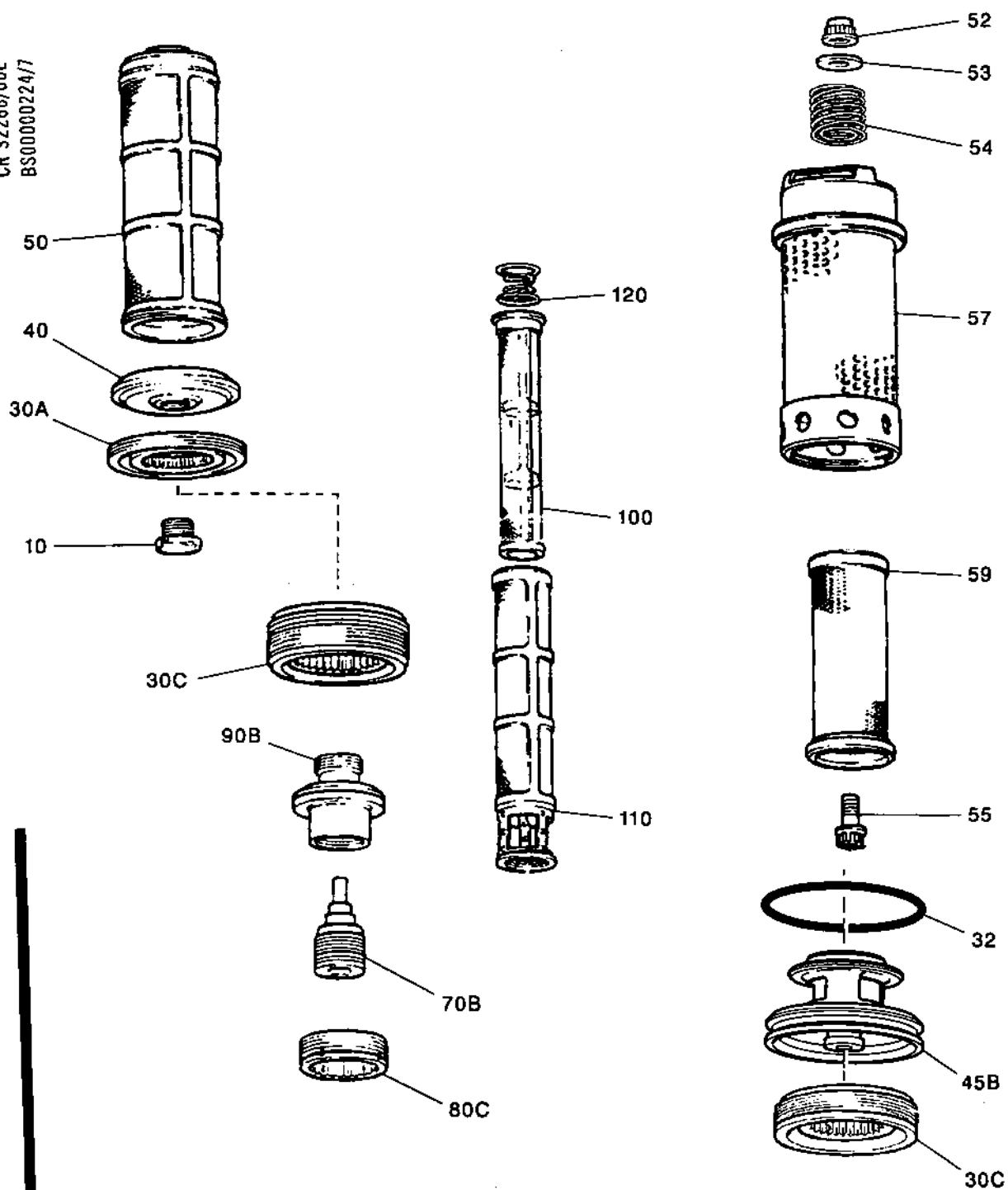
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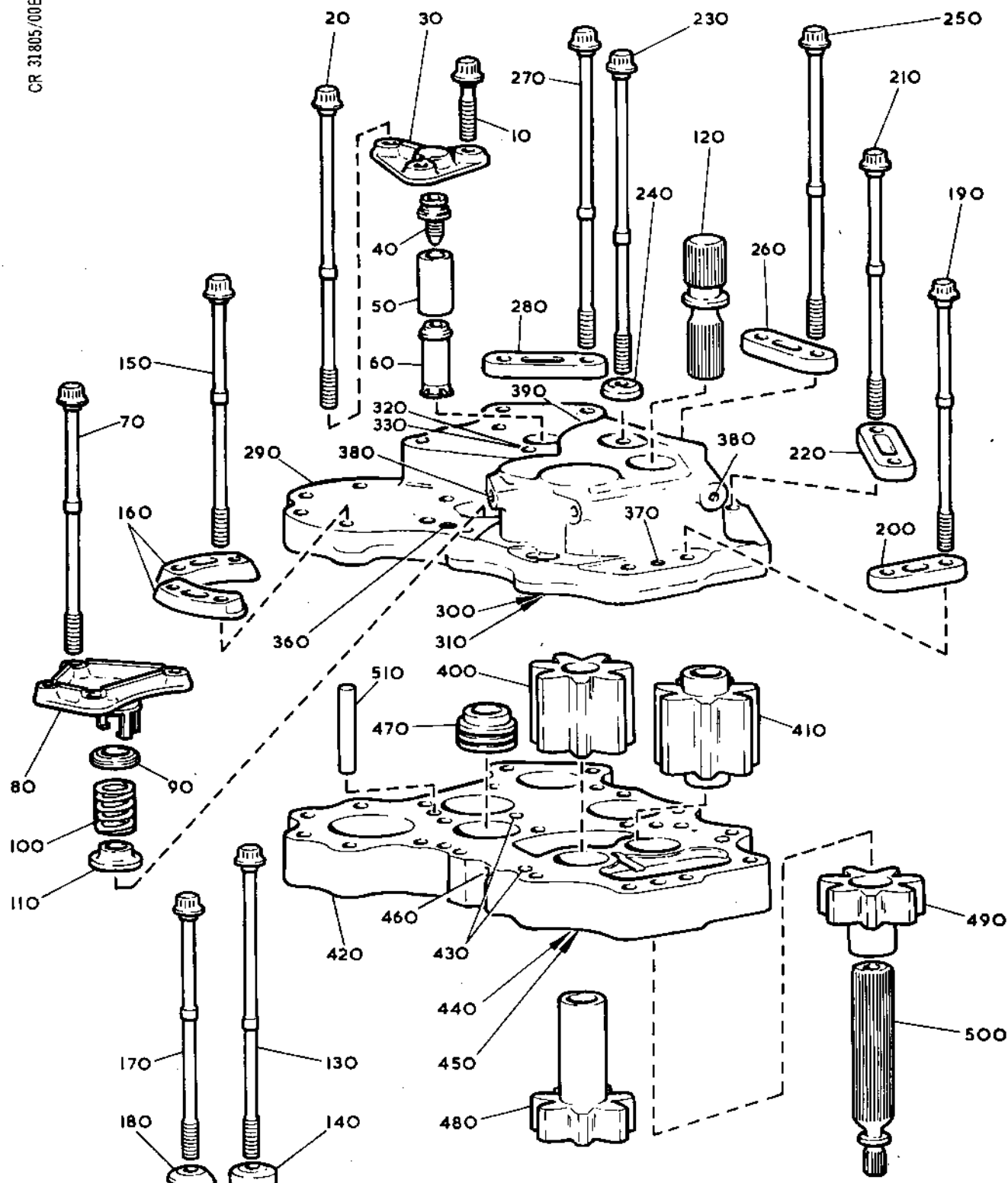


Main Oil Pump
Strainers, Drain Valves and Magnetic Plug
(S.B.OL.593-72-9036-419)
Figure 202A



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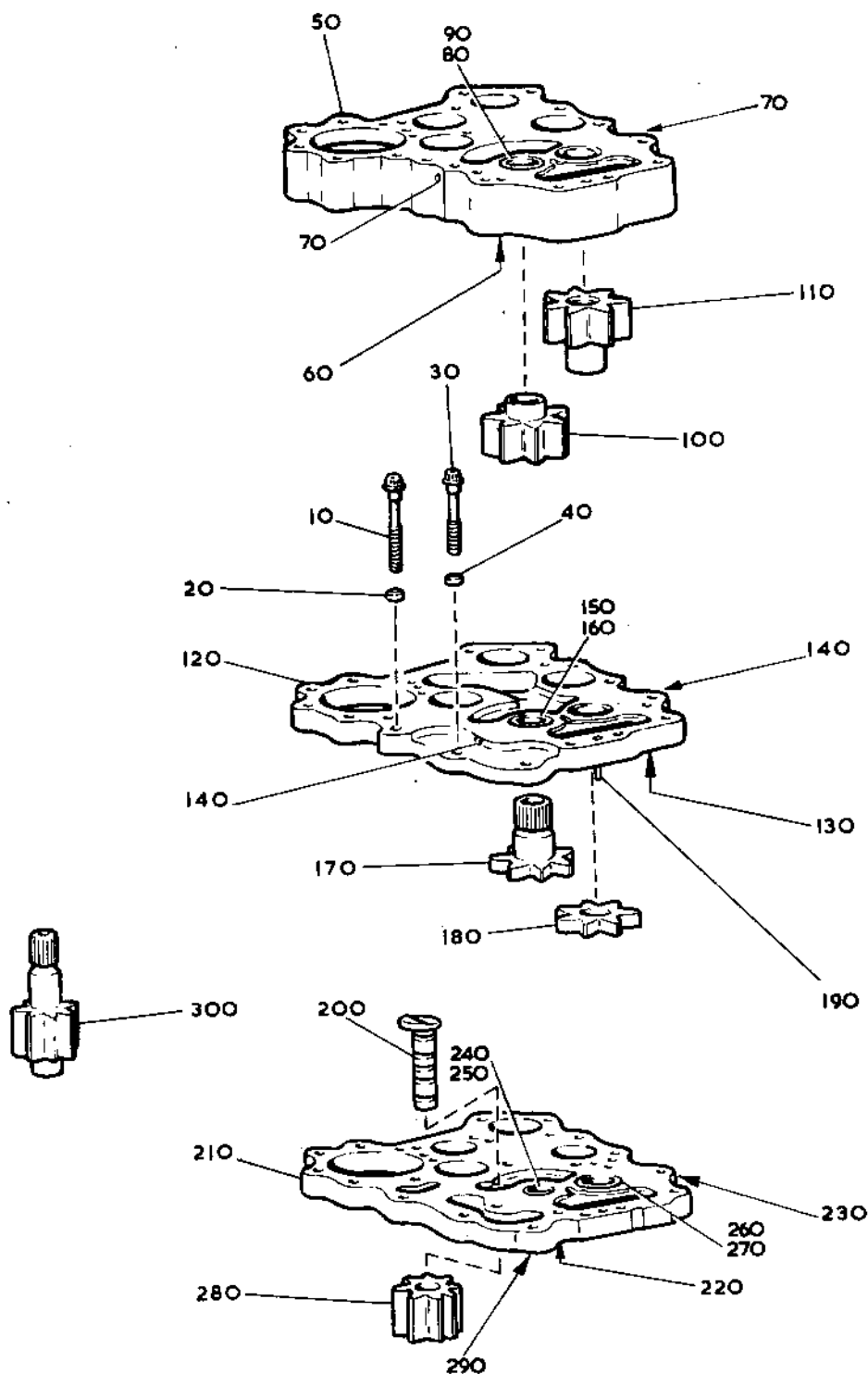


Main Oil Pump
HP and LP Turbine Bearing Scavenge Pump
Figure 203



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Main Oil Pump
LP and HP Compressor Thrust Bearings
and LP Compressor Front Bearing
Scavenge Pumps
Figure 204

TN11830

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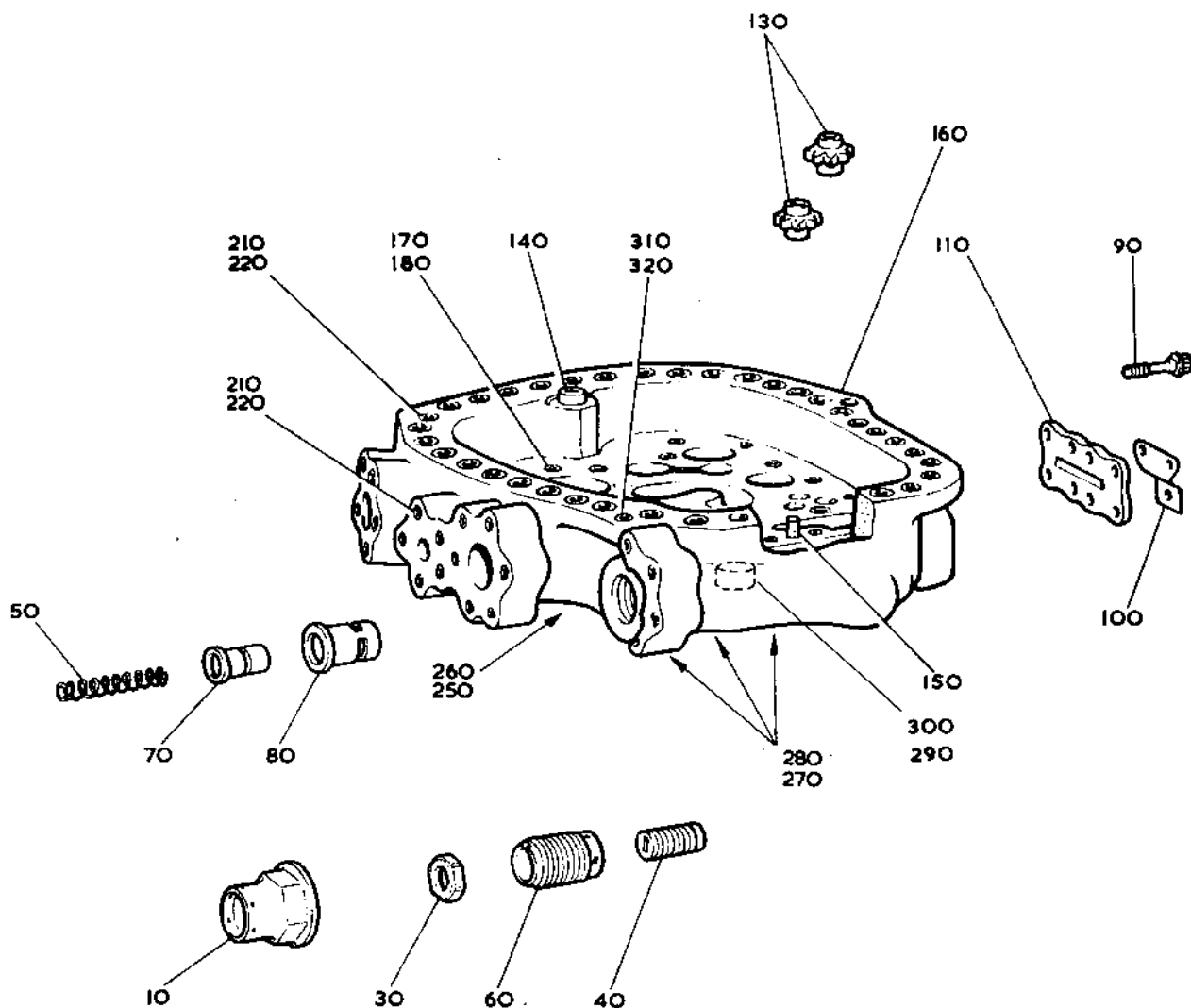
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CR 31803/00B



TN11495

Main Oil Pump
Pressure Pump
Figure 205

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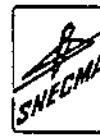
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	145	Aug 14/75			
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	147	Jan 1/76			
	148	Apr 1/77			
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	151	Nov 1/78			
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72-63-03					
	101	Jan 1/76			

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ENGINE - DISASSEMBLY

1. General

- WARNING:** IF CONTAMINATION OF THE ENGINE BY DANGEROUS SUBSTANCES IS SUSPECTED, HEALTH AND SAFETY PRECAUTIONS MUST BE OBSERVED. THAT IS, DISASSEMBLY OF THE ENGINE MUST BE CARRIED OUT IN A CONTROLLED ENVIRONMENT WITH AIR EXTRACTION/FILTRATION AND PERSONNEL WEARING SUITABLE PROTECTIVE CLOTHING/APPARATUS.
- A. Prior to commencing the disassembly, refer to 72-09-00 Disassembly for general information.
 - B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001.
 - C. The procedures detailing the receipt, inspection, oil and fuel draining, the installation of the power plant in the disassembly stand and the removal of all harnesses, tubing and accessories (including the left and right-hand gearboxes), are contained in 71-00-00 Disassembly.
 - D. This chapter details the procedures for disassembling the bare engine into a number of sub-assemblies, which are assembled to mobile stands or pallets ready for transfer to their disassembly sections.
 - E. Sub-assemblies are removed in sequence starting from the top (rear) of the engine. In some instances more than one sub-assembly is removed at a time, as the HP compressor diffuser assembly/combustion section/HP turbine bearing support and nozzles, and the HP compressor assembly/intermediate case assembly.
 - F. The tooling required for removing the HP compressor assembly and the LP compressor assembly, will depend on whether the assemblies require check balancing. Though the tooling is different, the sequence for removing the assemblies is the same whether they require balancing or not.

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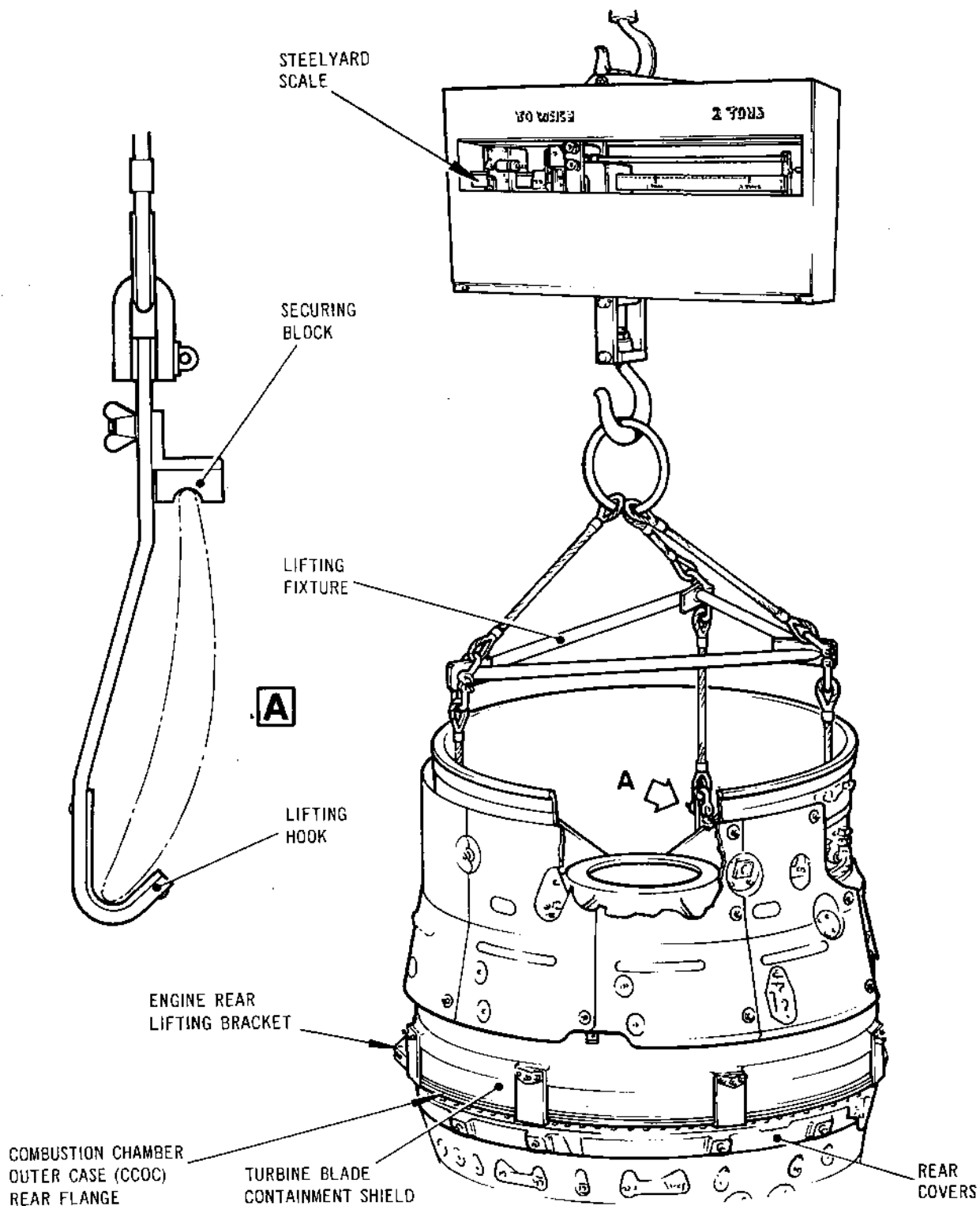
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Removing Turbine Exhaust Diffuser
Figure 101



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sneema

2. Disassemble the Bare Engine to its Sub-assemblies

A. Remove the Turbine Exhaust Diffuser (Ref.Fig.101).

- (1) Set the sliding weights of a steelyard scale (Ashworth Ross, two ton capacity) to 1250 lb (544,3 kg). Attach the scale to a hoist then raise the hoist and attach the lifting equipment (Tool 1973) to the steelyard scale. Ensure the securing blocks, attached to each lifting hook are secured in their uppermost position.

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SNECMA

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- (2) Raise the hoist and position the lifting equipment above the exhaust diffuser then remove the protector from the rear (top) of the diffuser. Locate vanes 3, 7 and 9 of the diffuser. Vanes are numbered in a clockwise direction viewed from the rear with vanes 10 and 1 at the TOP position. The TOP position can be determined by the engine rear lifting bracket on the C.C.O.C. rear flange.
- (3) Carefully lower the hoist and engage the hooks of the lifting equipment, from the inward curved side of the vane, beneath their respective vanes. Slide the securing blocks downward to engage the top of the vane then tighten the wingnuts to secure the blocks in position.
- (4) Unscrew and remove the bolts and washers securing the rear covers to the C.C.O.C. heat shields then withdraw or lower the covers to provide access to the C.C.O.C. rear flange. Release and remove the turbine blade containment shield mounting brackets. Remove nuts and any associated brackets from the C.C.O.C./exhaust diffuser flange.

NOTE: Before attempting to raise the exhaust diffuser ensure the hoist is correctly aligned to provide a vertical lift.

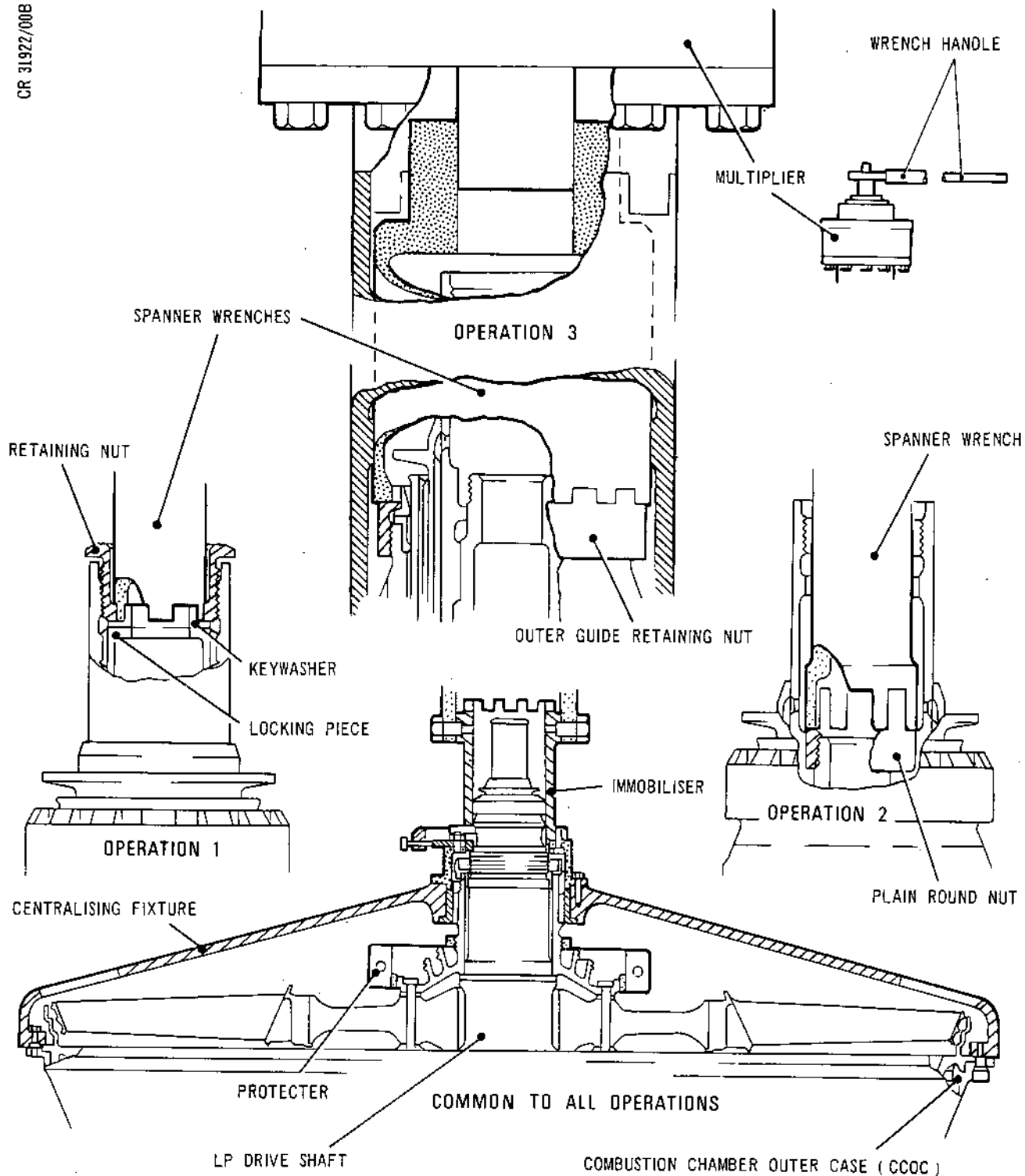
- (5) Carefully raise the hoist to balance the steelyard scales. With the flanges of the C.C.O.C. and exhaust diffuser separated continue to raise the hoist until the assembly is clear of the LP drive shaft.

NOTE: Instantaneous snatch loadings up to a maximum of 2000 lb (907,2 kg) in order to separate the turbine exhaust diffuser from the combustion chamber, are acceptable.

- (6) With the diffuser support (Tool 1230) positioned on a pallet traverse the hoist and lower the diffuser to rest on the support. Release the hooks of the lifting equipment from the vanes and remove the lifting equipment.
- (7) Place the protector (Tool 437) on the rear flange of the diffuser and secure with the protector clamps.
- (8) Transfer the turbine exhaust diffuser to its disassembly section (72-53-00 Disassembly).

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Removing LP Signal Shaft System Generating Mechanism
Figure 102



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B. Remove the LP Signal Shaft System Generating Mechanism (Ref.Fig.102).

- (1) Place the two halves of the protector (Tool 1138) around the LP turbine hub labyrinth and secure with its knurled screws.
- (2) Release the keywashers from the locking piece retaining nut and the outer guide retaining nut.
- (3) Lower the immobilizer (Tool 927) onto the centralizing fixture (Tool 1261) engaging the holes over the studs, and secure with the fixture washers and nuts. Ensure that the two thumbscrews of the immobilizer are unscrewed, and the two sliding dogs withdrawn.
- (4) Attach a hoist to the lifting plate of the immobilizer, then position and lower the centralizing fixture over the LP drive shaft and engage the location pins and studs in the C.C.O.C. flange. Screw the thumbnuts onto the fixture studs and fully tighten. Disconnect the hoist from the immobilizer.
- (5) Turn the LP drive shaft and align the cutaways in the shaft with the dogs in the immobilizer. Engage the immobilizer dogs in the cutaways in the shaft and secure the dogs by tightening the thumbscrews. Engage the spanner wrench (Tool 1513) in the retaining nut (Ref.Fig.102 operation 1), then unscrew the nut. Remove the spanner, then withdraw the retaining nut, keywasher and locking piece.
- (6) Engage the spanner wrench (Tool 1617) in the plain round nut securing the inner guide (operation 2), then unscrew the nut. Remove the spanner, then withdraw the retaining nut.
- (7) If the adapter (Tool 1300) is not assembled to the multiplier (1022), locate the adapter on the multiplier, align the holes, then insert the adapter bolts through the adapter and screw them into the multiplier. Fully tighten the bolts.
- (8) Insert the spanner wrench (Tool 929) into the immobilizer and engage the spanner in the outer guide retaining nut (operation 3). Lower the adapter/multiplier onto the immobilizer, turning the multiplier drive (if necessary) to engage the adapter dogs in the immobilizer, and the multiplier drive in the spanner. Engage the wrench handle (Tool 1651) in the multiplier, then unscrew the nut.

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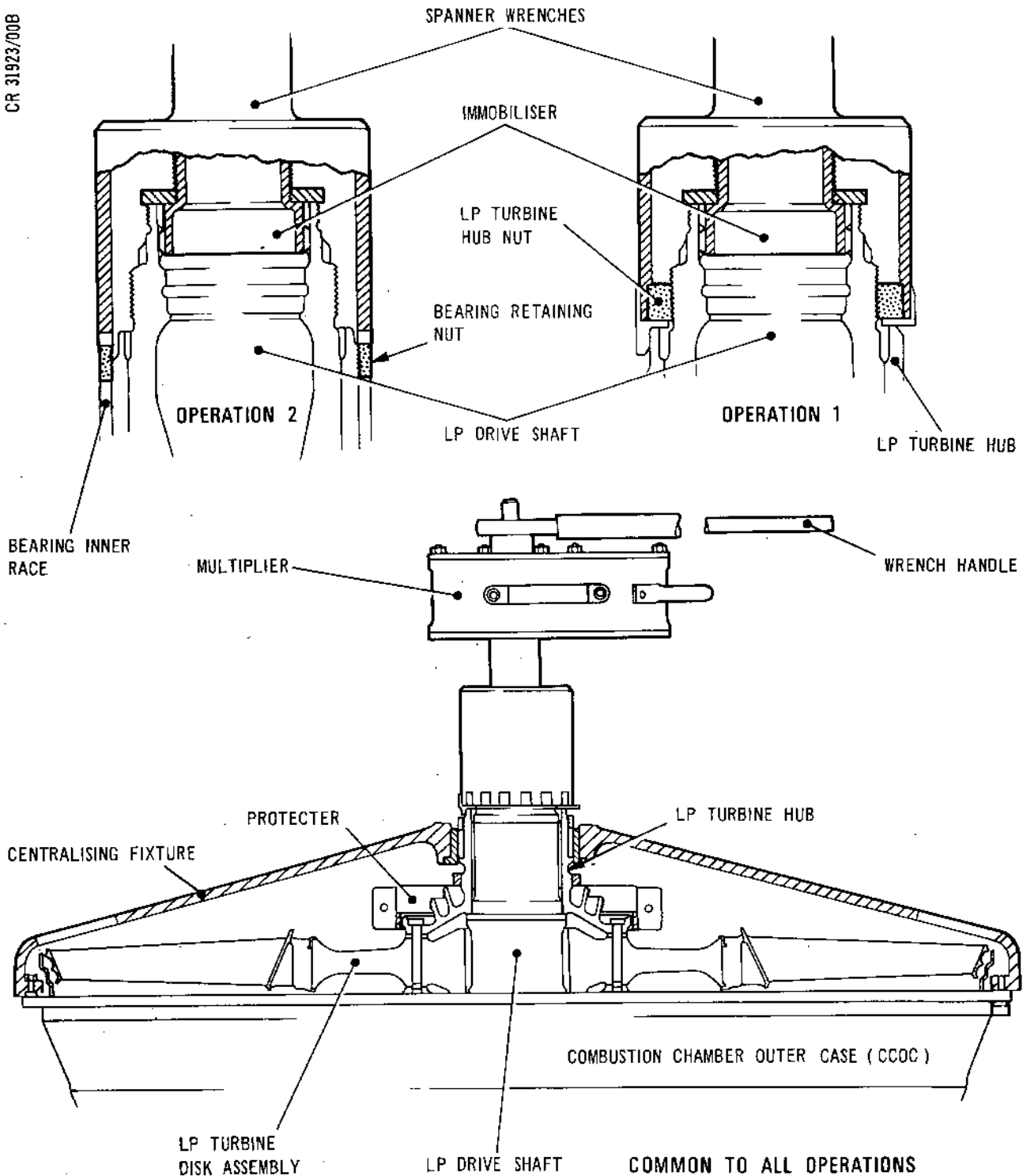


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Removing LP Turbine Hub and Bearing Retaining Nuts
Figure 103

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- (9) Withdraw the handle, multiplier/adaptor and the spanner from the immobilizer. Release the thumbnuts and withdraw the dogs from the LP drive shaft, then remove the nuts and washers securing the centralizing fixture to the immobilizer. Lift the immobilizer from the centralizing fixture and LP drive shaft and place on a suitable surface.
- (10) Withdraw the outer guide retaining nut, then withdraw the inner/outer guide/helical spline nut/keywasher as a unit, followed by the adjusting washer. Separate the items and place them in container (Tool 1378).
- C. Remove the LP Turbine Hub and Bearing Retaining Nuts (Ref.Fig.103).
- (1) Release the cupwasher from the LP turbine hub retaining nut.
- (2) Locate the immobilizer (Tool 862) in the end of the LP drive shaft engaging the splines of the immobilizer in those of the shaft, and resting the immobilizer plate on the end of the shaft.
- (3) Slide the spanner wrench (Tool 1578) over the immobilizer and engage the spanner in the turbine hub retaining nut (operation 1).
- (4) Attach a suitable strop and hoist to the torque multiplier (Tool 1647), then position and lower the multiplier onto the immobilizer/wrench turning the drive of the multiplier (if necessary) until it is engaged in both items. Release the hoist and strop.
- (5) Engage the wrench handle (Tool 1651) in the multiplier, then turn the handle counter-clockwise to unscrew the nut.
- (6) When the nut is loose, withdraw the immobilizer and continue unscrewing the nut using the wrench. Withdraw the wrench, then remove the retaining nut and cupwasher from the LP drive shaft.
- (7) Slide the spanner wrench (Tool 1616) over the immobilizer and engage the spanner in the bearing retaining nut (operation 2).
- (8) Position and lower the multiplier (Tool 1647) onto the immobilizer/wrench turning the drive of the multiplier (if necessary) until it engages in both items.

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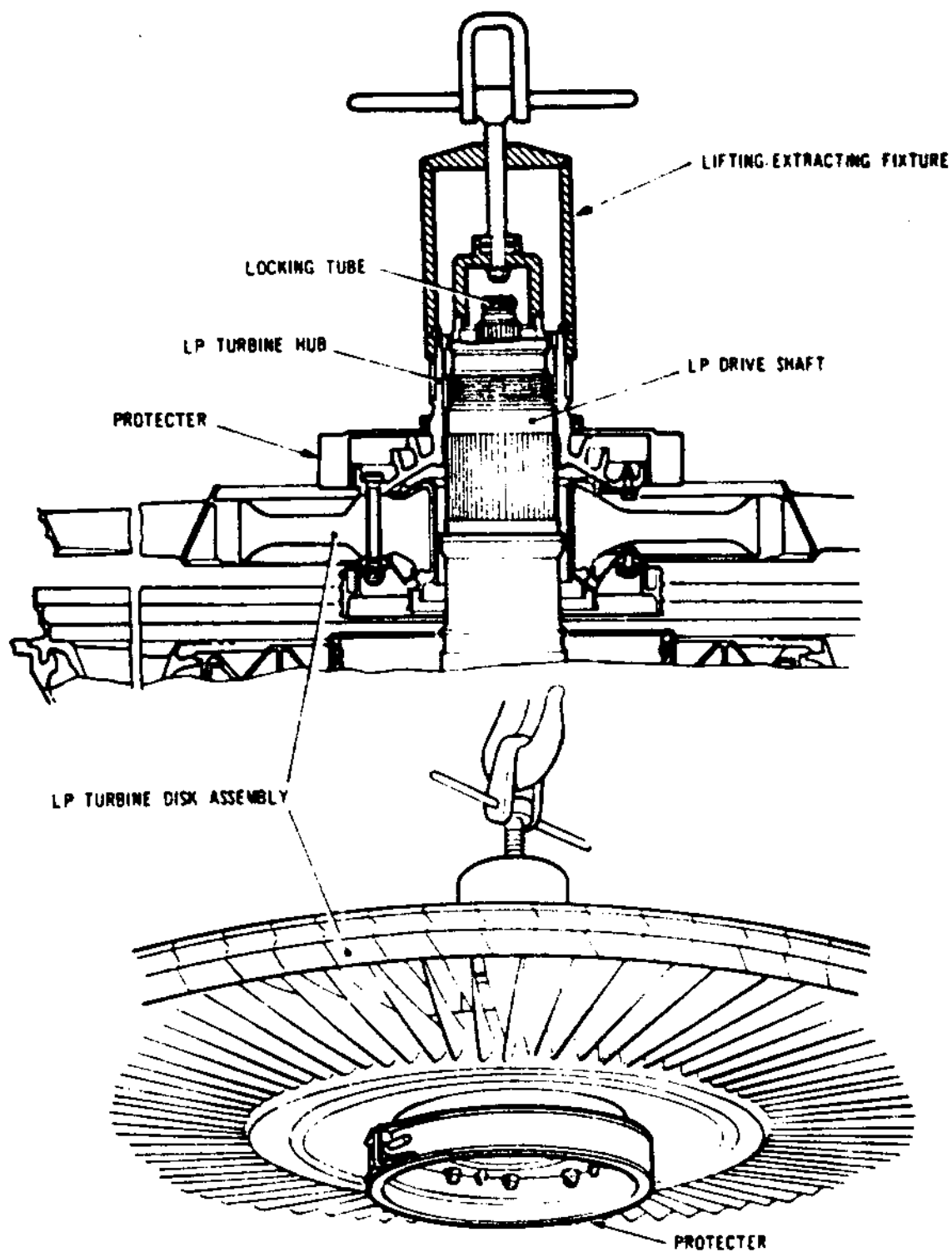


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Removing LP Turbine Hub and Wheel
Figure 104

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- (9) Engage the wrench handle (Tool 1651) in the multiplier, then turn the handle counter-clockwise to unscrew the nut.
- (10) When the nut is loose, withdraw the immobilizer and continue unscrewing the nut using the wrench. Withdraw the wrench and spanner, then remove the nut.
- (11) Lower the immobilizer (Tool 927) over the LP drive shaft and onto the centralizing fixture (Tool 1261), engaging the holes over the studs and secure with the fixture washers and nuts. Remove the nuts and washers securing the centralizing fixture to the C.C.O.C. Connect a hoist to the lifting plate of the immobilizer, then raise the centralizing fixture clear of the LP drive shaft. Position and lower the fixture onto a suitable surface, disconnect the hoist, then release and remove the immobilizer from the centralizing fixture.
- (12) If the disassembly is not to be continued immediately, place the protector (Tool 1180) on the rear flange of the C.C.O.C. and secure the protector with its bolts, washers and nuts.

D. Remove the LP Turbine Hub and Wheel (Ref.Fig.104).

- (1) If assembled, release and remove the protector from the C.C.O.C. rear flange. Unscrew the tommy bar of the lifting/extracting fixture (Tool 1142) to withdraw the inner housing. Lower the fixture over the LP drive shaft and engage the internal thread of the fixture with the hub thread. Screw the fixture onto the hub until the thread is fully engaged, then screw in on tommy bar and engage the fixture housing with the LP drive shaft.
- (2) Attach a hoist to the lifting link of the fixture, then screw in on the tommy bar to draw the hub off the drive shaft. When the hub is released, raise the hoist and guide the hub off the shaft. Place the two halves of the protector (Tool 1134) around the front (bottom) labyrinth and secure with the knurled screws. Place the (wooden) support (Tool 1012) on the pallet (Tool 1014), then position and lower the LP turbine onto the support. Disconnect the hoist, then unscrew and remove the fixture from the hub.

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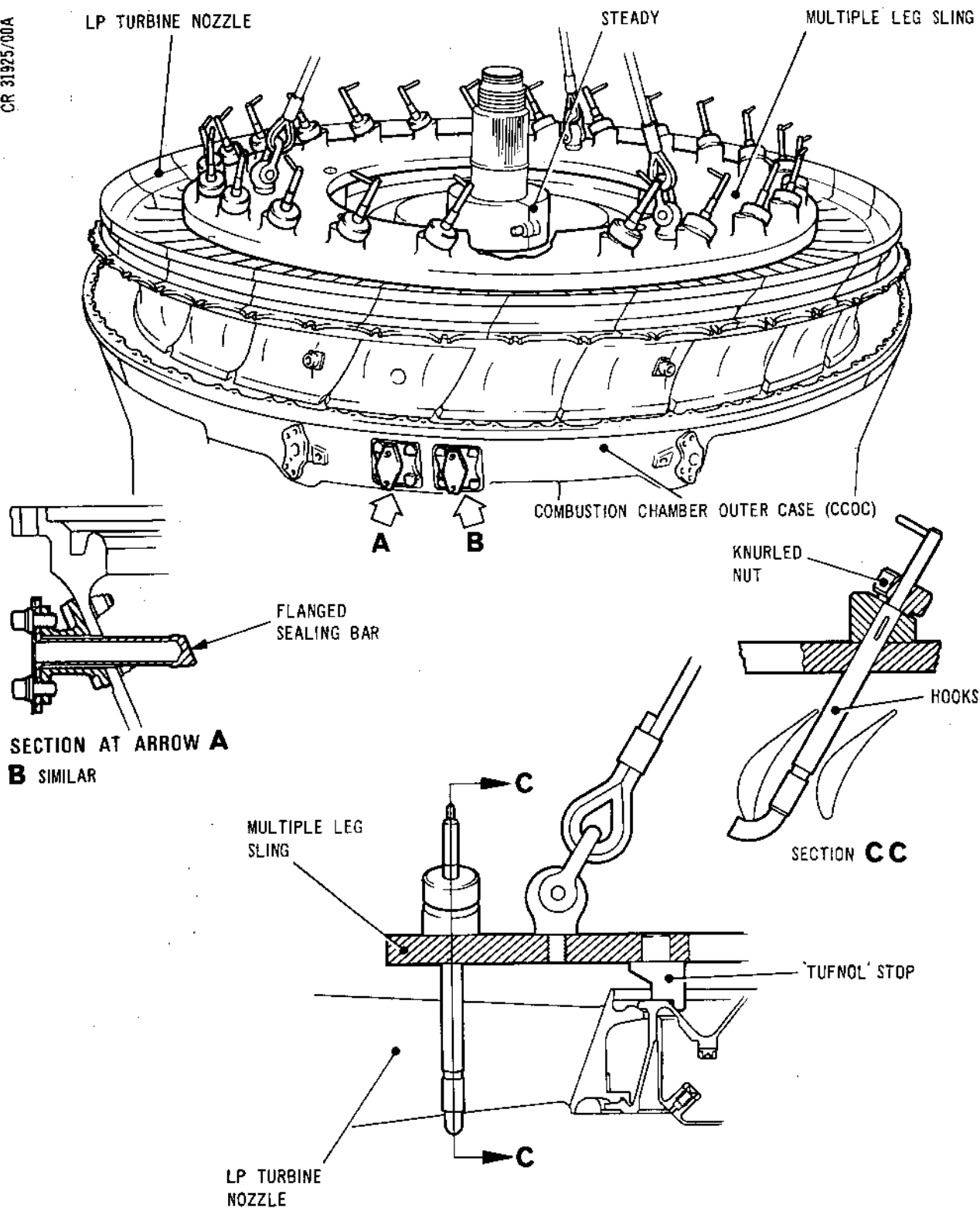


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Removing LP Turbine Nozzle
Figure 105

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- (3) Withdraw the LP turbine adjusting washer from the LP shaft then assemble the two halves of the steady (Tool 1013) around the HP turbine rear labyrinth and the LP drive shaft and secure with the two slave screws.
- (4) Transfer the LP turbine hub and wheel to its disassembly section (72-52-02 Disassembly).
- E. Remove the LP Turbine Nozzle (Ref.Fig.105).
- (1) Unscrew and remove the two bolts securing each of the two cover plates/flanged sealing bars to the mounting bosses on the bottom left-hand side of the C.C.O.C. near the rear flange, then remove the cover and withdraw the sealing bar.
- (2) Ensure that the knurled nuts of the multiple leg sling (Tool 1192) are released and that the hooks are pushed downwards with the tommy bars pointing inwards. Attach a hoist to the lifting ring, then position the sling over the nozzle. Ensuring that the hooks pass in between the vanes, lower the sling until the stops rest on the diaphragm.
- (3) Turn the tommy bars to the left to position the retaining hooks under the vanes, then pull up on the hooks and lock with the knurled nuts. Steadily raise the nozzle until clear of the engine, then position and lower onto a suitable pallet. Release the hoist, but do not release the sling (at this stage) otherwise the vanes will fall out of the diaphragm.
- (4) Place the two halves of the protector (Tool 1061) around the rear labyrinth of the HP turbine and secure with the knurled screws (Ref.Fig.106).
- (5) Transfer the LP turbine nozzle to its disassembly section (72-52-01 Disassembly).
- F. Remove the HP Turbine Wheel (Ref.Fig.106 and 107).
- (1) Position the immobilizer (Tool 1354) across the C.C.O.C. rear flange, engaging the spring plunger in one of the HP turbine rear labyrinth air holes, and securing the ends of the immobilizer to the C.C.O.C. flange with slave nuts, washers and bolts. Release the HP turbine hub/disk/labyrinth nuts in the sequence of No.1, 6, 3, 8, 2, 7, 4, 9, 5 and 10 using the

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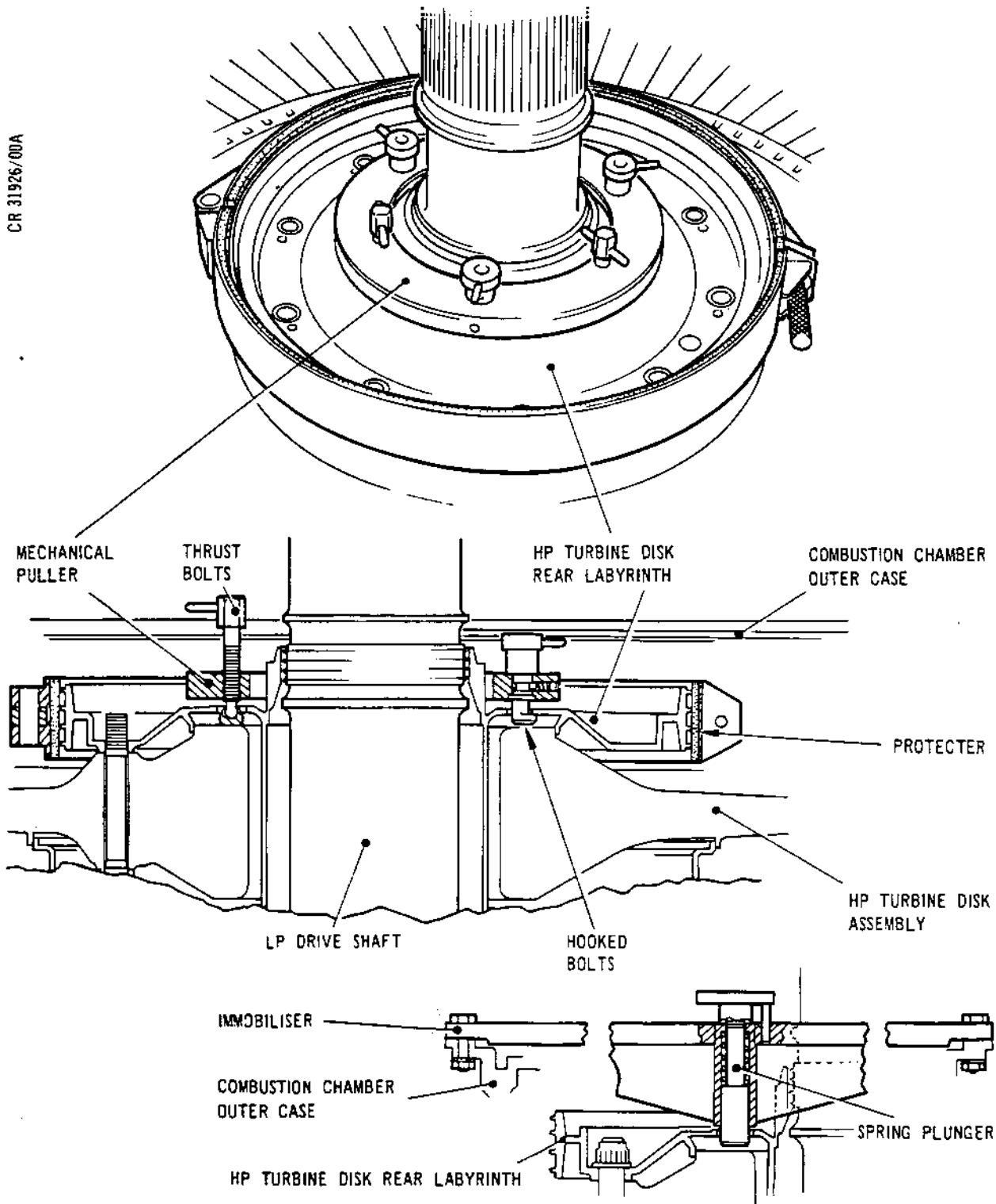


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Removing HP Turbine Rear Labyrinth
Figure 106

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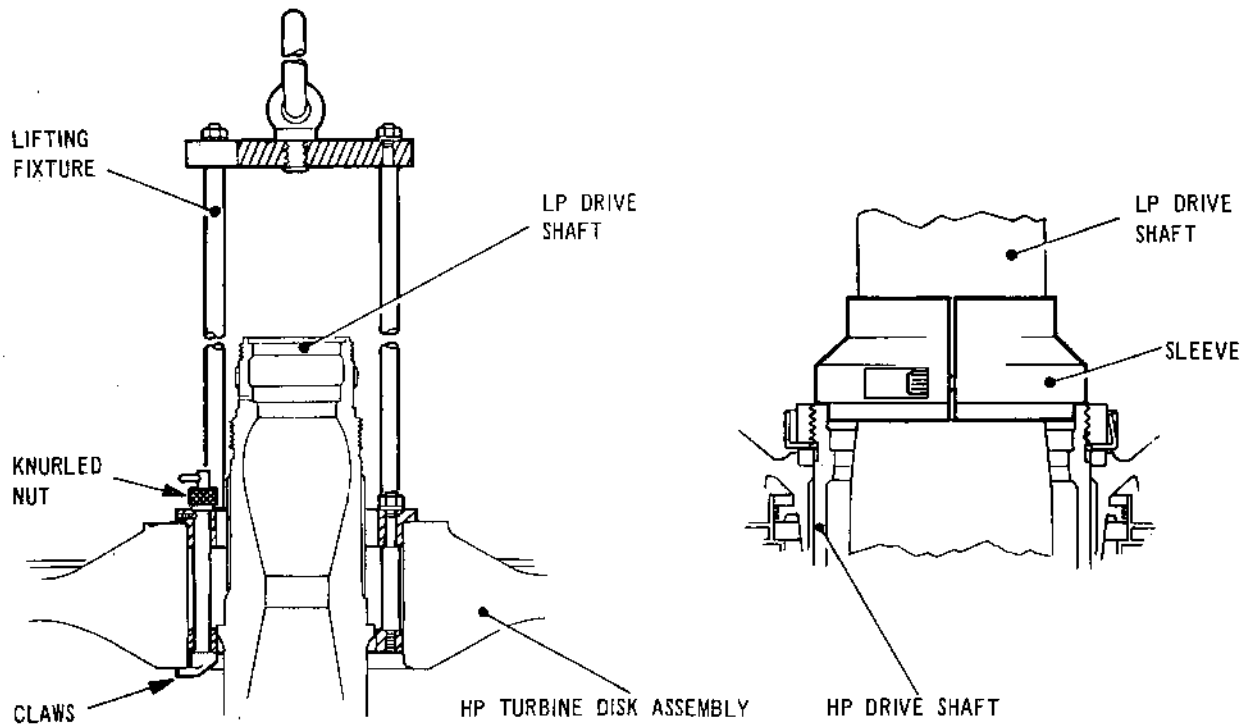
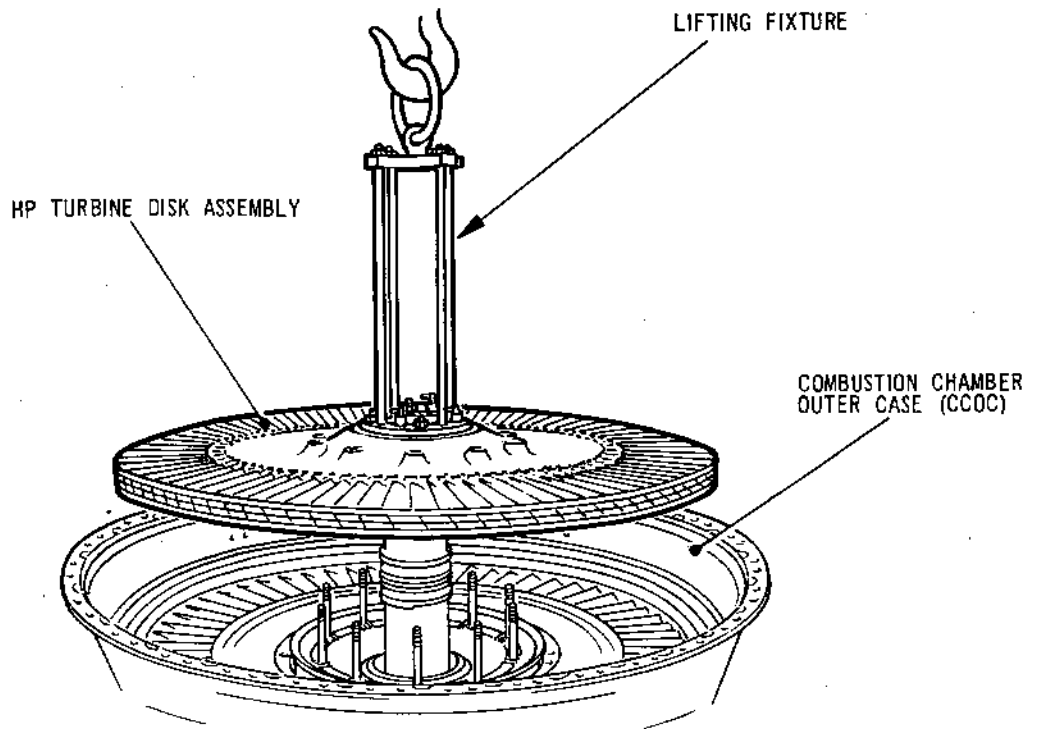
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Removing HP Turbine Wheel
Figure 107

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cranked spanner wrench (Tool 1630), then remove the nuts. Release and remove the immobilizer from the C.C.O.C. flange.

- (2) Ensure that the thrust bolts of the mechanical puller (Tool 1247) are unscrewed, and that the tommy bars of the hooked bolts are pointing to 'FREE'. Release and remove the split steady from the HP rear labyrinth and LP drive shaft.
- (3) Lower the mechanical puller over the LP drive shaft and locate the hooked bolts in the air holes of the rear labyrinth. Turn the tommy bar of each hooked bolt to the 'LOCK' position, then screw down on the thrust bolts until they contact the HP turbine disk. Screw in on the thrust bolts in equal progressive increments until the labyrinth is released. Remove the labyrinth/puller and place on a suitable surface. Turn the tommy bars of the hooked bolts to the 'FREE' position, then withdraw the puller from the labyrinth.
- (4) Ensure that the knurled nuts of the lifting fixture (Tool 1120) are unscrewed, and the tommy bars of the claws are pointing to 'UNLOCK'. Attach a hoist to the ring of the lifting fixture, then position and lower the fixture over the LP drive shaft and guide the fixture into the disk until the flange of the top location ring rests on the disk. Turn the tommy bars of the claws to the 'LOCK' position engaging the claws under the disk, then tighten the knurled nuts to lock the claws (Ref.Fig.107).
- (5) Taking care to guide the disk, raise the wheel clear of the LP drive shaft. Place the (wooden) support (Tool 979) on the pallet (Tool 1014), then position and lower the HP turbine wheel onto the support.
- (6) Release the knurled nuts of the fixture, then turn the claw tommy bars to the 'UNLOCK' position. Raise the hoist and guide the fixture out of the disk. Lower the fixture onto a suitable surface and release the hoist.
- (7) Assemble the two halves of the sleeve (Tool 1058) in between the LP and HP drive shafts and secure with the two slave screws.
- (8) Transfer the HP turbine wheel to its disassembly section (72-51-03 Disassembly).

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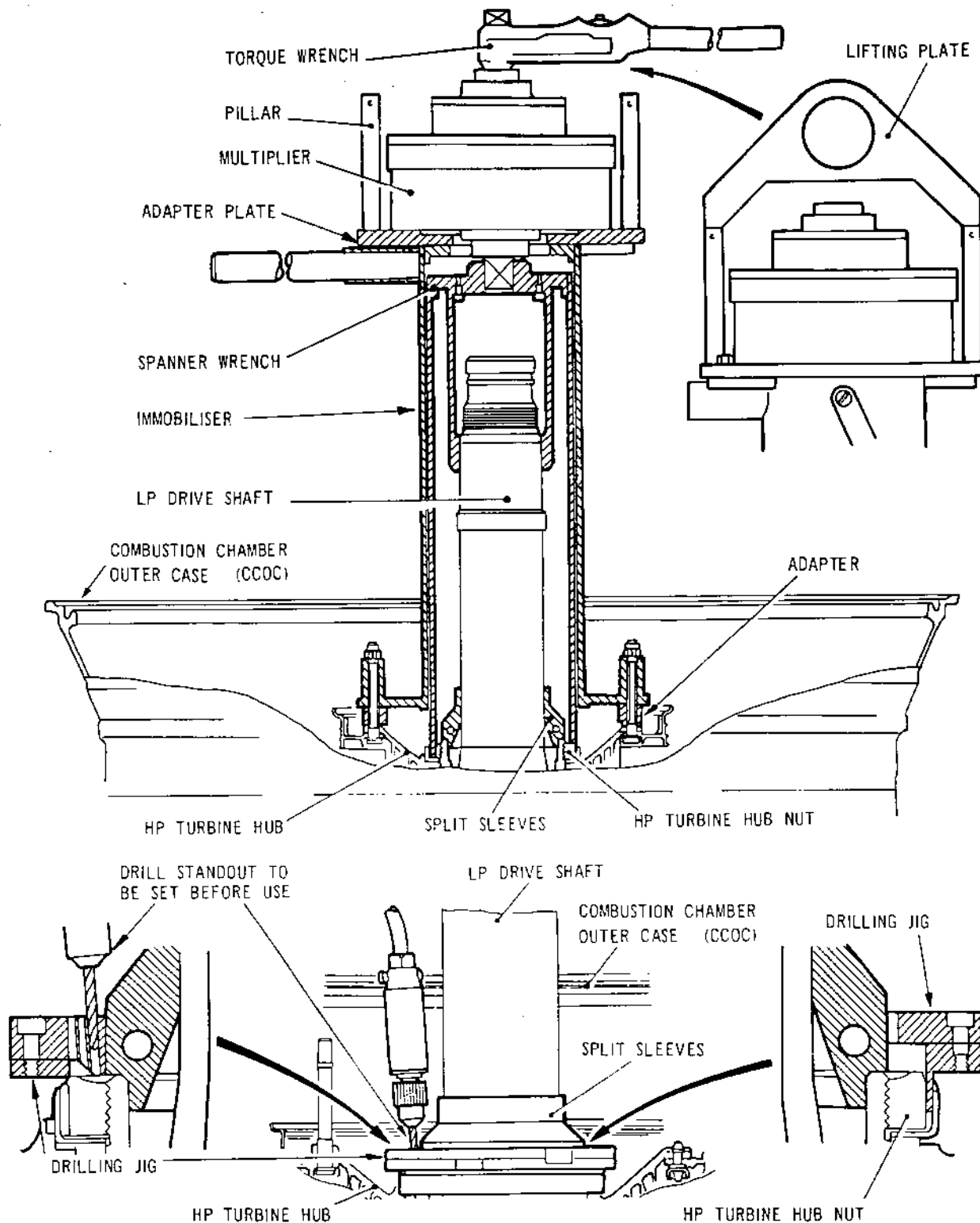
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Removing HP Turbine Hub Retaining Nut
Figure 108

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sneema

G. Remove the HP Turbine Hub Retaining Nut (Ref.Fig.108).

(1) Release the HP turbine hub retaining nut cupwasher.

(2) Assemble the torque multiplier and adapters to the immobilizer.

NOTE: This instruction is only applicable if the items have been separated.

- (a) Locate the multiplier (Norbar Model No.10-25 to 1) on the pillar side of the adapter plate (Tool 106), align the holes in both items, then insert the cap screws into the plate and screw them into the multiplier. Fully tighten the bolts. Position the lifting plate on the pillars then insert the screws through the pillars and plate and screw them into the tapped side of the pillars.
 - (b) Locate the multiplier/adapter on the handle end of the immobilizer (Tool 105) engaging the keys in the slots. Assemble a washer to each of the two bolts, then insert the bolts into the adapter plate and screw them into the immobilizer. Fully tighten the bolts.
 - (c) Locate the adapter (Tool 1315) on the flanged end of the immobilizer, and engage it on the dowels with the Hirth serrations facing away from the immobilizer. Insert the immobilizer cap screws into the adapter and screw them into the tapped holes in the immobilizer. Fully tighten the screws.
- (3) Lower the spanner wrench (Tool 107) over the LP drive shaft and engage it in the nut. Attach a hoist to the lifting plate of the multiplier, then position and lower the tool over the spanner. Align the Hirth serrations on the tool with the Hirth serrations and bolts of the hub, then lower the tool over the bolts until it abuts the spanner. Turn the drive of the multiplier (if required) to engage it with the spanner, then continue lowering the tool until the Hirth serrations engage and abut. Screw slave nuts onto the hub bolts and fully tighten the nuts. Release the hoist, then release and remove the lifting plate from the pillars of the adapter plate.

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- (4) Use a torque measuring wrench (20 to 600 lbf ft. (30 to 800 N.m)) and unscrew the hub nut ensuring that the torque used is not greater than 12500 lbf ft. (16950 N.m) (500 lbf ft. (678 N.m) registering on the wrench gauge because of the 25 to 1 multiplier). If the nut is not released at 12500 lbf ft. (16950 N.m), the nut must be drilled off (Ref.para.(6)).
- (5) Remove the torque wrench, then assemble the lifting plate to the pillars of the adapter plate and secure the plate with bolts. Attach a hoist to the lifting plate, then release and remove the slave nuts from the hub bolts. Raise the hoist until the tool is clear, then position and lower onto a suitable surface and release the hoist. Withdraw the spanner from the LP drive shaft, then remove the hub nut, washer and keywasher (if released).
- (6) If the hub nut was not released and is still assembled, proceed as follows (Ref.Fig.108).
- (a) Prepare a suitable drill gun and hardened drill of 0.125 in. (3 mm) diameter. Assemble a suitable collar to the drill and secure it to give a dimension of 1.500 in. (38 mm) from the tip of the drill to the face of the collar.
 - (b) Lower the drilling jig (Tool 1297) over the LP drive shaft and insert the three location fingers in between the keywasher and the slots in the nut. Ensure that the jig is correctly assembled abutting the nut. Drill through the hub nut using the nine guide holes.
 - (c) On completion of the drilling, remove the drill jig, then remove all swarf. Remove the hub nut from the shaft by whatever method is suitable, dependent on the result of the drilling. The nut may be loosened by a drift and hammer and unscrewed by hand, or it may be necessary to assemble the spanner, multiplier and adapter and proceed as detailed in para.(3) to (5).

H. Remove the HP Turbine Hub (Ref.Fig.109).

- (1) Release and remove the split sleeve (Tool 1058) from the LP and HP drive shaft.

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LIFTING/EXTRACTING
FIXTURE

CYLINDER

PROTECTERS

COMBUSTION
CHAMBER OUTER
CASE (CCOC)

LP DRIVE
SHAFT

CYLINDER

SLAVE NUTS

PILLARS

HUB BOLTS

HP DRIVE SHAFT

LIFTING/EXTRACTING
FIXTURE

HP TURBINE
HUB

SECTION SHOWING ATTACHMENT OF FIXTURE

Removing HP Turbine Hub
Figure 109

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- (2) Unscrew the tommy bar to retract the cylinder of the lifting/extracting fixture (Tool 1057), then attach a hoist to the lifting handle of the fixture. Position and lower the fixture over the LP drive shaft and engage the hub bolts in the pillars and holes in the fixtures plate. With the fixture plate abutting the hub, screw slave nuts onto the hub bolts and fully tighten the nuts. Release the hoist then screw in the tommy bar and engage the fixture cylinder in the HP drive shaft.
- (3) Attach the hoist to the lifting handle, then screw in on the tommy bar and draw the hub off the HP drive shaft. With the hub released, raise the hoist and guide the hub off the shafts. Open the protector (Tool 1063) and position it around the hub outer labyrinth, then secure the protector with the retaining screw. Position the two halves of the protector (Tool 1062) around the inner series of labyrinths, then secure the protector with the two retaining screws. Position and lower the hub onto a suitable surface, then remove the slave nuts and withdraw the fixture. Lower the fixture onto a suitable surface and disconnect the hoist.
- (4) Withdraw the adjusting washer from the HP drive shaft, then lower the guide sleeve (Tool 1202) over the LP drive shaft and position it on the HP drive shaft. If the disassembly is not to be continued immediately, place the protector (Tool 1180) on the rear flange of the C.C.O.C. and secure the protector with its bolts, washers and nuts.

J. Remove the Compressor Diffuser/Combustion Chamber Outer Case Assembly (Ref.Fig.110).

- (1) Release the wire-locking from the bolts securing the HP compressor stage 7 bolted vanes on the exit guide blade case, then remove the eight rear (top) bolts and sleeves from the case.
- (2) Release the wire-locking from the HP compressor stage 7 blank plug assemblies in the probe mounting block, then remove the plugs from the block. Release and remove the bolts securing the mounting block and remove the block.

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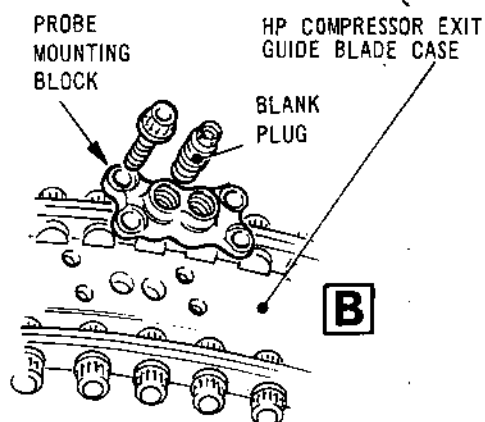
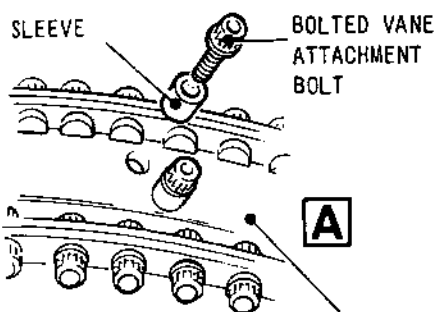
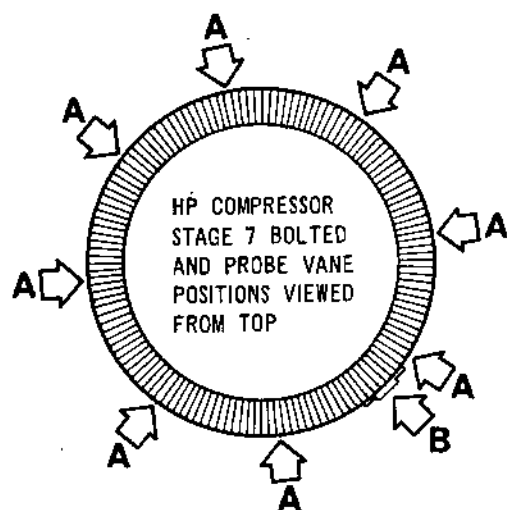
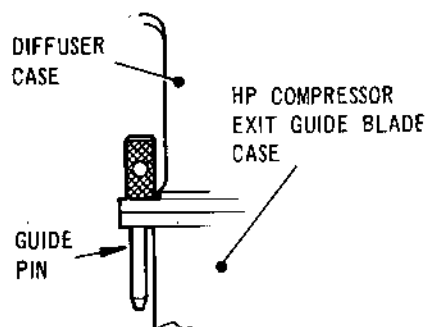
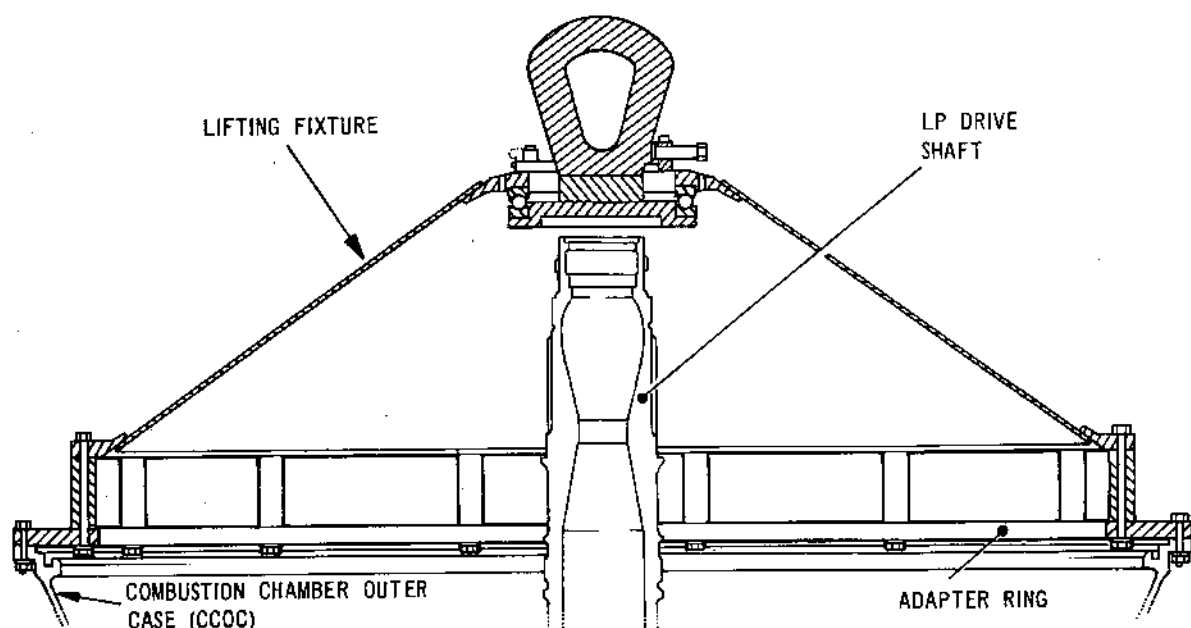


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Removing Compressor Diffuser/C.C.O.C.
Figure 110



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- (3) If the lifting fixture (Tool 1310) is not assembled to the adapter ring (Tool 1183), position the lifting fixture on the adapter ring, interpose the fixture spacers between the two and secure the two together with the fixture bolts, washers and nuts.
- (4) Release and remove the protector (Tool 1180) (if assembled), from the rear of the C.C.O.C. Attach a hoist to the lifting eye of the fixture, then raise the hoist, position and lower the fixture onto the C.C.O.C., aligning the dowel hole in the adapter plate with the dowel on the C.C.O.C. rear flange, and guiding the plate bolts into the C.C.O.C. flange. Assemble adapter washers and nuts to the bolts, and fully tighten the nuts.
- (5) Using the extension bar (Tool 1974) and socket release and remove the nuts, bolts and brackets from the diffuser case/HP compressor unit guide blade case flanges, then evenly dispose and insert the four guide pins (Tool 1304) into the diffuser/exist guide blade flanges.
- (6) Raise the hoist and guide the C.C.O.C./diffuser off the HP compressor case and clear of the LP drive shaft. Remove the guide pins from the diffuser flange, then position and lower the C.C.O.C./diffuser onto the pallet (Tool 1661). Remove the nuts and washers securing the adapter plate to the C.C.O.C. flange, then remove the lifting equipment/adapter from the C.C.O.C., lower onto a suitable surface and disconnect the hoist. Remove the guide sleeve from the HP drive shaft. If the disassembly of the engine is not to continue immediately, lower the protector (Tool 1237) over the HP drive shaft and secure the protector to the HP compressor flange.
- (7) Remove the knurled nuts from the protector (Tool 1180), lower the protector onto the C.C.O.C. flange guiding the studs through the flange bolt-holes, then screw the nuts onto the studs.
- (8) Transfer the compressor diffuser/combustion chamber outer casing to the disassembly section (72-00-51 Disassembly).

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K. Remove the LP Signal Shaft Tube (Ref.Fig.111A).

- (1) Locate the extractor (Tool 3165) onto the LP drive shaft and screw onto the end of the LP signal shaft tube.
- (2) Operate the hand pump to release the LP signal shaft tube.
- (3) Unscrew and remove the extractor (Tool 3165).
- (4) Screw the lifting fixture (Tool 1323) onto the end of the LP signal shaft tube, then attach a hoist to the fixture.
- (5) Raise the hoist sufficient to enable the halves of the split sleeve (Tool 609) to be inserted in the LP drive shaft and around the signal tube. Carefully raise the tube until it is clear of the LP drive shaft, then position and lower it into its fixture (Tool 1452). Unscrew and remove the fixture from the tube.
- (6) Transfer the LP signal shaft tube to its disassembly section (72-31-04 Disassembly).

NOTE : Should the HP compressor rotor require a check balance proceed to para.L. For normal engine disassembly proceed to para.M.

L. Assemble Slave Bearing Inner Track to HP Drive Shaft (Ref.Fig.112).

- (1) Remove engine bearing inner track from HP drive shaft.
 - (a) Ensure the three extraction claws (Tool 1979) are assembled to the mechanical puller (Tool 1019) and the hydraulic cylinder is assembled between the two triangular plates (Ref.Fig.111).
 - (b) Using a hoist raise and position the puller above the LP drive shaft. Ensure each extraction claw is withdrawn then lower the puller and screw the end fitting fully onto the HP shaft.
 - (c) Adjust the puller and align the claws with the recesses under the bearing inner track, screw in the claws and lock by tightening the locknuts.

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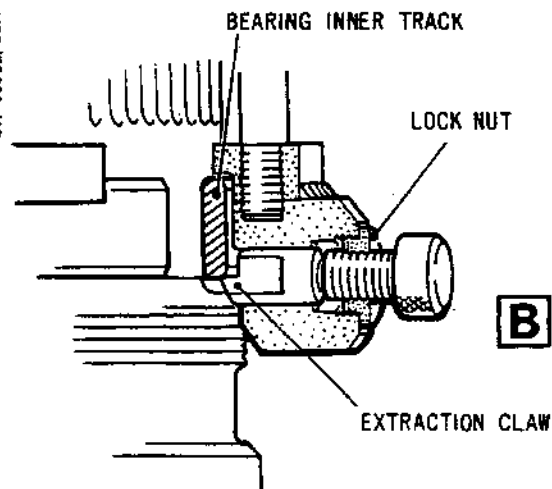
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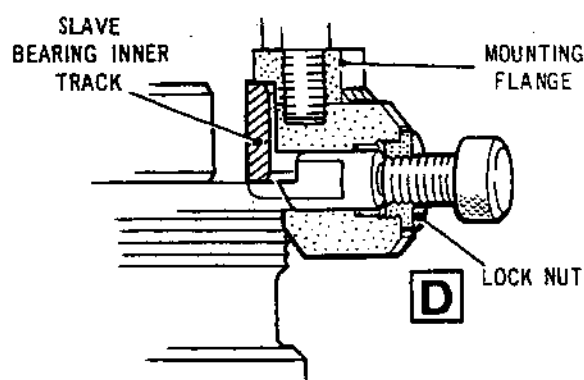


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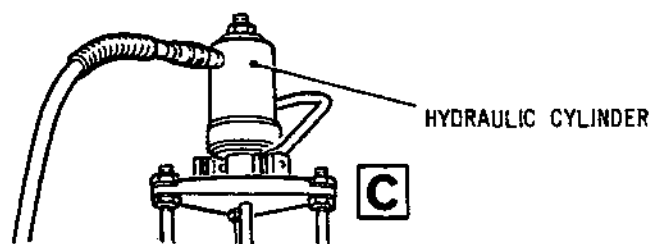
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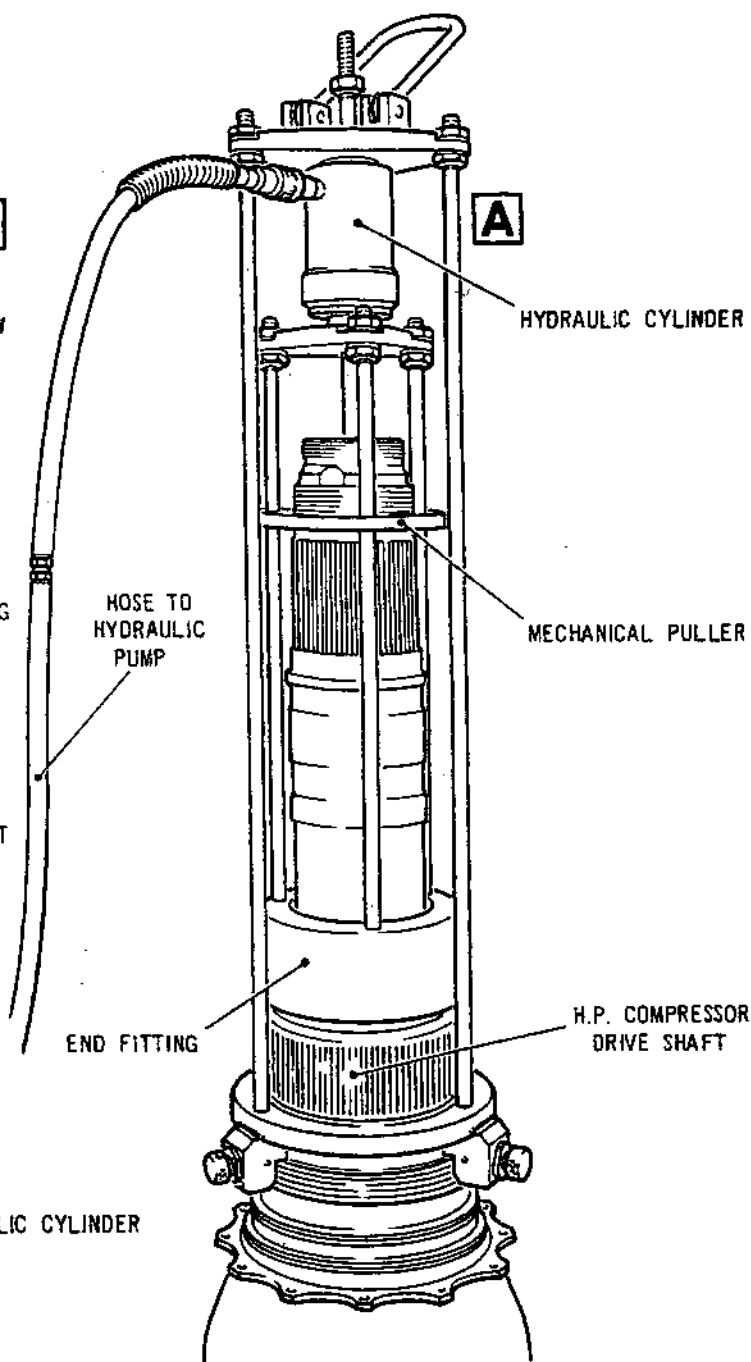
DETAIL OF AN EXTRACTION CLAW
FULLY ENGAGED WITH BEARING
INNER TRACK



DETAIL OF AN EXTRACTION CLAW
FULLY WITHDRAWN AND SLAVE BEARING
INNER TRACK PRESSED INTO POSITION



HYDRAULIC CYLINDER POSITIONED
TO INSTALL SLAVE BEARING INNER TRACK



HYDRAULIC CYLINDER POSITIONED
TO REMOVE BEARING INNER TRACK

Assembling Slave HP Turbine Bearing Inner Track
Figure 111

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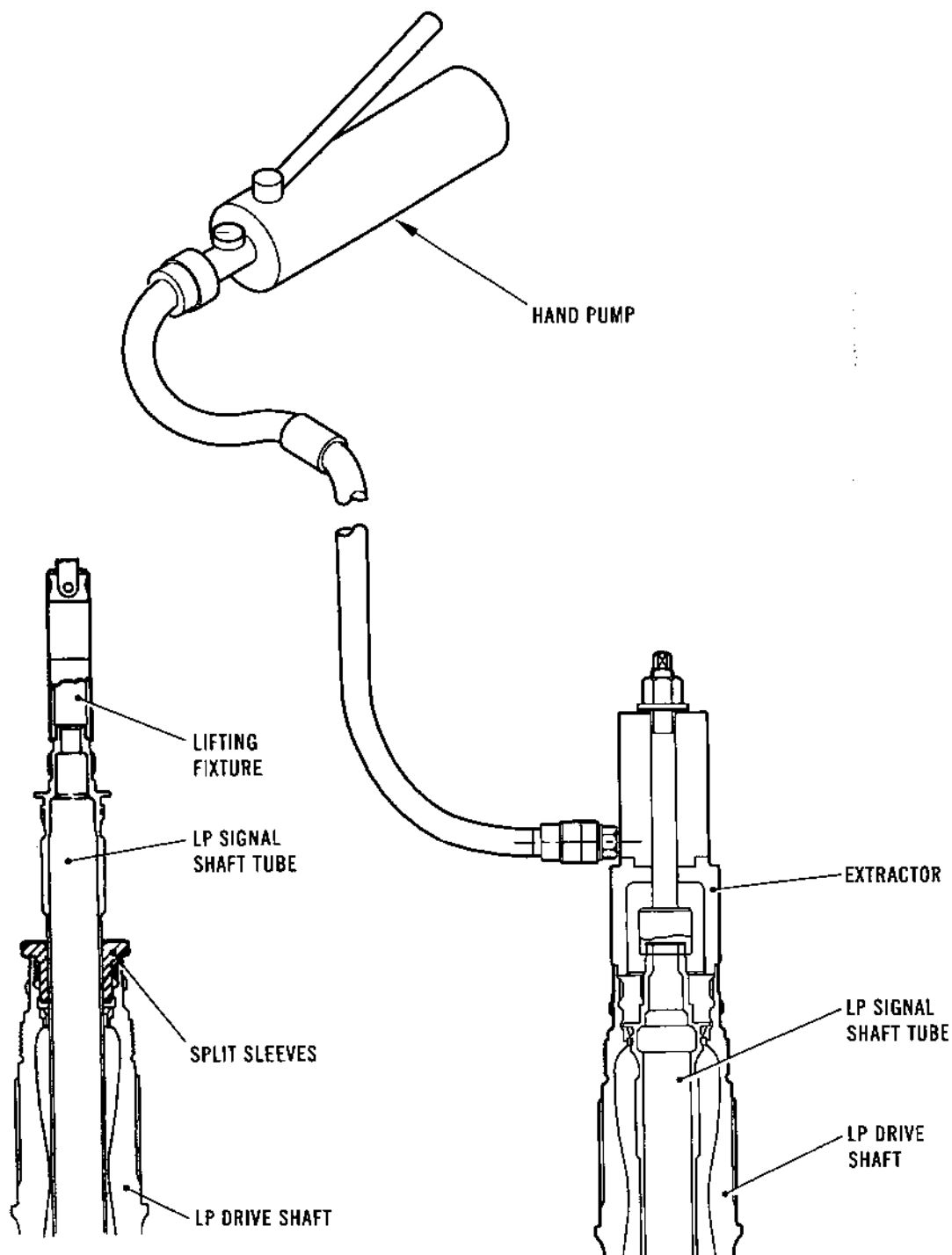


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Releasing LP Signal Shaft Tube
Figure 111A



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- (d) Connect the feed pipe from a hand operated hydraulic pump to the hydraulic cylinder then operate the pump until the track is released. Withdraw the extraction claws, disconnect the feed pipe from the hydraulic cylinder then release and remove the puller. Remove and identify the bearing inner track.
- (2) Assemble slave bearing (Tool 248) inner track to HP drive shaft.
 - (a) Ensure the three extraction claws of the puller (Tool 1019) are fully withdrawn, locked in position and the hydraulic cylinder is assembled above the top plate (Ref.detail C).
 - (b) Using a hoist raise and position the puller above the LP drive shaft. Position the slave bearing inner track on the HP drive shaft. Lower the puller and screw the end fitting fully onto the HP shaft. Adjust the length of the puller until the extraction claw mounting flange is located on the bearing track.
 - (c) Connect the hand operated hydraulic pump to the hydraulic cylinder. Operate the pump until the bearing track is pressed fully into position on the HP shaft. Disconnect the hydraulic pump release and remove the puller.
 - (d) Assemble the split sleeves (Tool 1058) between the HP and LP drive shafts.

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M. Unlock the LP Drive Shaft (Ref.Fig.112).

CAUTION: FAILURE TO CORRECTLY POSITION THE LP DRIVE SHAFT
MAY ENTAIL DAMAGE TO THE BEARING FAILURE PROBE.

- (1) Turn the LP drive shaft to position its master spline at the engine (normal) top vertical centre line position.

NOTE: The static LP bearing failure probe is located in the oil distributor block assembly, positioned in the inner case of the intermediate case in line with No.2 vane (60 deg from the top vertical position on the right-hand side). The probe operating ring on the LP rotor shaft rear has a grooved lug which is aligned with the master spline on the LP rotor and drive shaft. The probe ring (normally) rotates around the probe, and to ensure that the lug does not strike the probe (and damage it), during any movement of the LP rotor, drive shaft or intermediate case, the master splines must be correctly positioned.

- (2) Slide the setting pointer (Tool 973) over the LP drive shaft and engage the locating pin in the master spline of the shaft.

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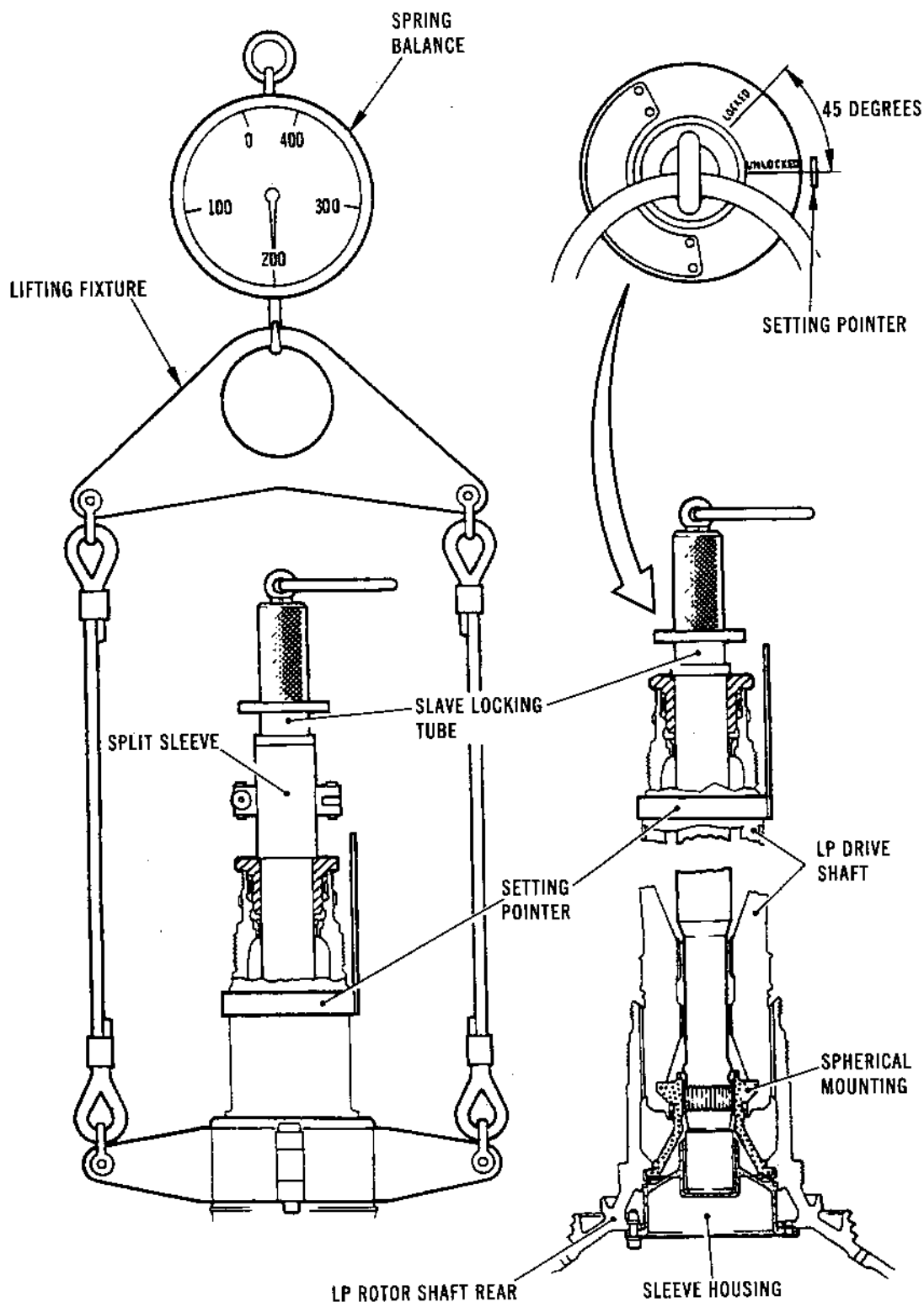


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Unlocking LP Drive Shaft
Figure 112

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- (3) Attach a hoist to the slave locking tube (Tool 579), then position and lower the tube into the LP drive shaft until the tube flange is (approx.) 7 in. (180 mm) from the end of the shaft. Release and open the split sleeve (Tool 980), then position it around the slave tube and resting on the split sleeve in the shaft. Secure the sleeve with its swing bolt and knurled nut. Lower the slave tube onto the split sleeve, then disconnect the hoist from the tube.
- (4) Release and open the lifting fixture (Tool 981), then position it around the LP drive shaft in between the two shoulders on the shaft. Close the fixture and secure it with the swing bolt and star knob. Attach a spring balance (Salter 0-400 lb) to the hoist, then attach the lifting hook of the fixture to the spring balance.
- (5) Raise the hoist until the weight of the shaft is taken by a loading of 200-lb (90 kg) on the spring balance. Take the weight of the slave tube, then release and remove the split sleeve (Tool 980) supporting it. Ensuring that the 'LOCKED' mark on the tube is in line with the setting pointer (Tool 973), lower the slave tube and feed the splines on the (lower) end of the slave tube through the splines in the LP drive shaft, turning the tube slightly (if required), to engage the splines of both items. Lower the tube further (ensuring that it is not turned) and engage the splines on the slave tube with the spherical mounting, turning the tube slightly (if necessary) to engage the two. The (bottom) end of the shaft will now be resting on the rotor shaft rear, with the smaller flange at the top of the tube (approx.) in line with the split sleeves in the LP drive shaft.

NOTE: The weight of the LP drive shaft is taken to enable the spherical mounting to be turned.

- (6) Turn the slave tube 45 deg to align the 'UNLOCKED' mark on the tube with the setting pointer (Tool 973).

NOTE: The turning of the tube turns the spherical mounting aligning its lands with the cut-away in the LP drive shaft, which will allow the withdrawal of the shaft.



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- (7) Raise the slave tube (approx.) 1.50 in. (38 mm) (ensuring that it is not turned), to disengage the tube from the spherical mounting, then turn the tube back 45 deg to align the 'LOCKED' mark (and the master spline) on the tube with the setting pointer (and the drive shaft master spline). Lift the tube up, turning the tube slightly (if necessary) and engage the splines of the tube and drive shaft, then raise the shaft sufficiently to enable the split sleeve (Tool 980) to be assembled. Position the sleeve around the slave tube and secure the sleeve with its swing bolt and knurled nut, then rest the tube on the sleeve.
- (8) Lower the hoist sufficient to disconnect the spring balance from the hoist then lower both spring balance and lifting equipment to rest. Connect the hoist to the lifting ring of the slave tube, then carefully raise the tube until clear of the drive shaft. Position and lower the slave tube into its container (Tool 580), then disconnect the hoist from the tube. Release and remove the split sleeve from the slave tube, then withdraw the split sleeve and setting pointer from the LP drive shaft.
- (9) Connect the spring balance to the hoist and ensure that the lifting equipment is attached to the balance. Raise the hoist sufficient to enable the split sleeve (Tool 402) to be assembled, ensuring that a loading of 200 lb (90 kg) (as indicated on the scale) is not exceeded. Insert the split sleeve into the end of the HP drive shaft, then lower the LP drive shaft and rest it on the sleeve. Release and remove the lifting equipment from the LP drive shaft, then disconnect the equipment from the balance and the balance from the hoist. If the LP drive shaft will not lift up under the loading of 200 lb (90 kg), the shaft must still be partially locked. Use the slave tube and ensure that the master spline of the spherical mounting is offset by 45 deg from the master spline of the LP drive shaft, using the tooling in the manner previously quoted to check the following.
 - (a) Lower the slave tube and engage in the splines at the bottom of the LP drive shaft.
 - (b) Check the position of the tube relative to the setting pointer, then lower the tube to disengage it from the shaft. Turn the tube 45 deg and engage it in the spherical mounting, turning the tube as necessary to engage.

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- (c) Turn the tube as required to set the spherical mounting 45 deg from the position noted when the tube was engaged in the shaft.
- (d) Ensuring that the tube is not turned, withdraw the tube from the spherical mounting, turn it back 45 deg and draw it through the drive shaft splines. The spherical mounting and LP drive shaft are now aligned for disengagement.

N. Assemble the Lifting Equipment to the HP Compressor Assembly.

NOTE: Though there is only one method of removal, the tooling to be assembled for removal is dependent on whether the assembly requires a check balance of the rotating assembly or whether it is to be disassembled in the normal manner. The procedure for both tooling arrangements are detailed under their own titles as follows.

- (1) Release and remove the protector (Tool 1237) (if assembled), from the rear of the HP compressor.
- (2) Prepare and assemble the (normal) lifting equipment to the HP compressor assembly (Ref.Fig.113).
 - (a) Release and remove the HP compressor rear (No.12) labyrinth from the HP drive shaft.
 - (i) Release and remove the nuts, keywashers and flat washers from the rear (top) bolts securing the labyrinth to the HP drive shaft, then unscrew and remove the nuts using the cranked ring wrench (Tool 1574) from the front bolts (hidden under the labyrinth), securing the labyrinth to the shaft.
 - (ii) On engines Pre.SB.0L.72-8305-154, screw pullers (Tool 1668) into the tapped extractor holes in the rear (top) of the labyrinth until they contact the HP drive shaft flange, then screw in the pullers in equal progressive increments until the labyrinth is released.

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- (iii) On engines to SB.0L.72-8305-154, install the hydraulic extractor (Tool 3154) and release the labyrinth.
- (iv) Withdraw the labyrinth from the HP drive shaft, remove (Tool 1668) or (Tool 3154) and the eight bolts from the labyrinth flange. Assemble and secure the protector (Tool 1239) around the labyrinth.

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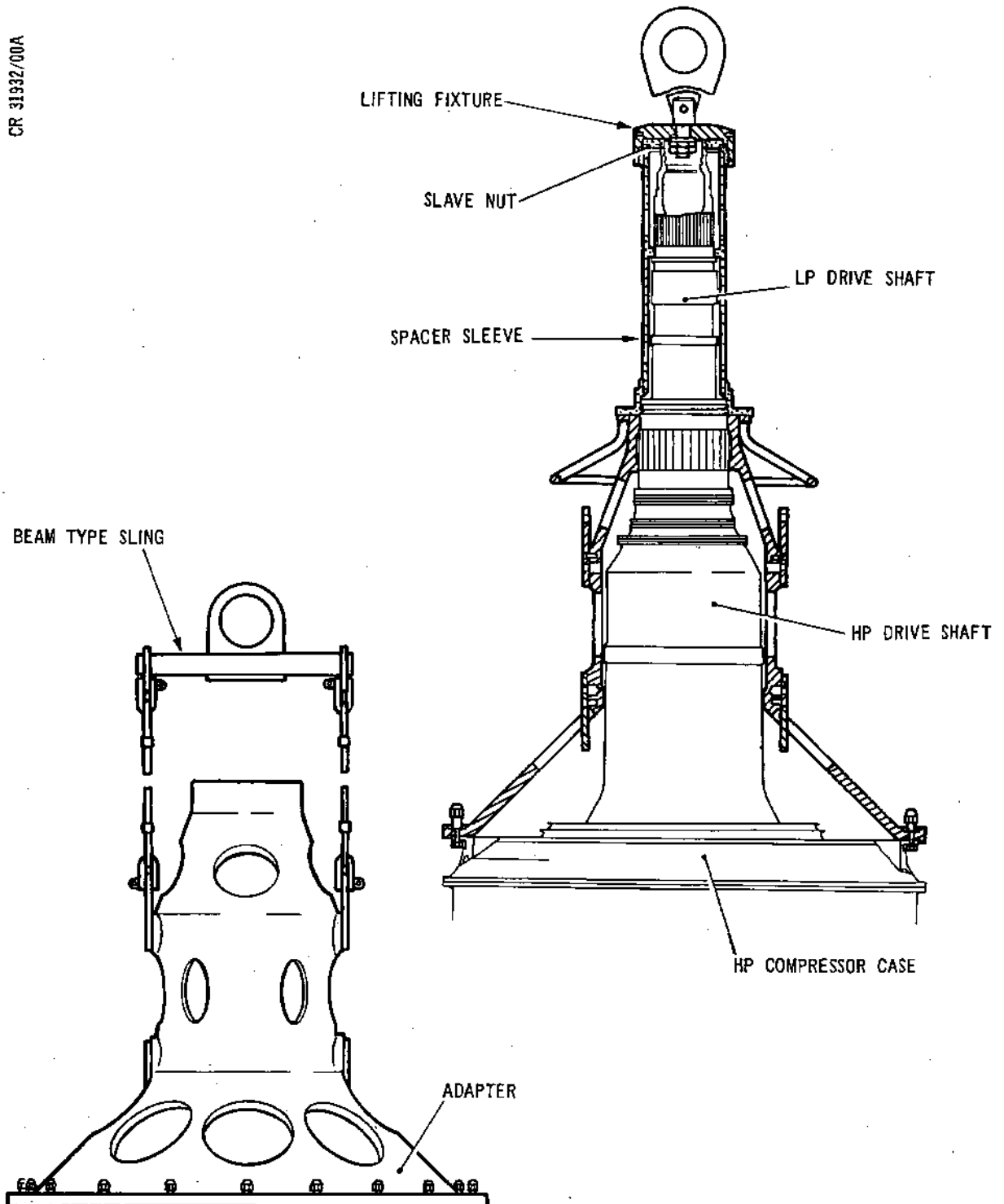


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Normal Lifting Equipment Assembled to HP Compressor Assembly
Figure 113

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- (v) Remove the retaining rings from the eight bolts in the HP drive shaft labyrinth securing flange then remove the bolts.
- (b) Attach the lifting plate of the beam type sling (Tool 1051) to a hoist, then position the hoist over the adapter (Tool 1041). Secure the two whips of the sling to the two lifting plates of the adapter with shackles.
- (c) Raise the hoist and position the adapter over the LP drive shaft. Lower the adapter aligning the bolt holes in both flanges, and locate the adapter pin hole over the HP compressor case locating pin. Insert the adapter slave bolts through the case flange and secure with (special) slave nuts. Fully tighten the nuts. Release the sling from the adapter, then remove the sling from the hoist.
- (d) Lower the spacer sleeve (Tool 391) over the LP drive shaft and screw it onto the HP drive shaft. Screw the slave nut (Tool 1042) onto the LP drive shaft and just tighten against the sleeve.
- (e) Lower the lifting fixture (Tool 1043) over the slave nut and screw the fixture onto the extension sleeve until tight. Attach a hoist to the lifting fixture.
- (3) Assemble the lifting/balancing equipment to the HP compressor assembly (Ref.Fig.114).
 - (a) Ensure that the slave bearing (Tool 248) (outer race and rollers) is assembled in the rear (smaller dia.) end of the rear bearing adapter (Tool 1028) and is secured with the adapter ring. Position the multiple leg sling (Tool 1054) on the rear flange of the adapter, and screw the three captive knurled screws of the sling into the tapped holes in the adapter. Connect a hoist to the lifting ring of the sling.
 - (b) Ensure that the three rollers have been drawn outwards, then raise and position the adapter over the LP drive shaft. Insert a part of the balancing drive belt (129 x 3 in.) into the cut-away part of the adapter, then lower the adapter ensuring that the belt goes around the LP drive shaft. Align the adapter lifting ring with

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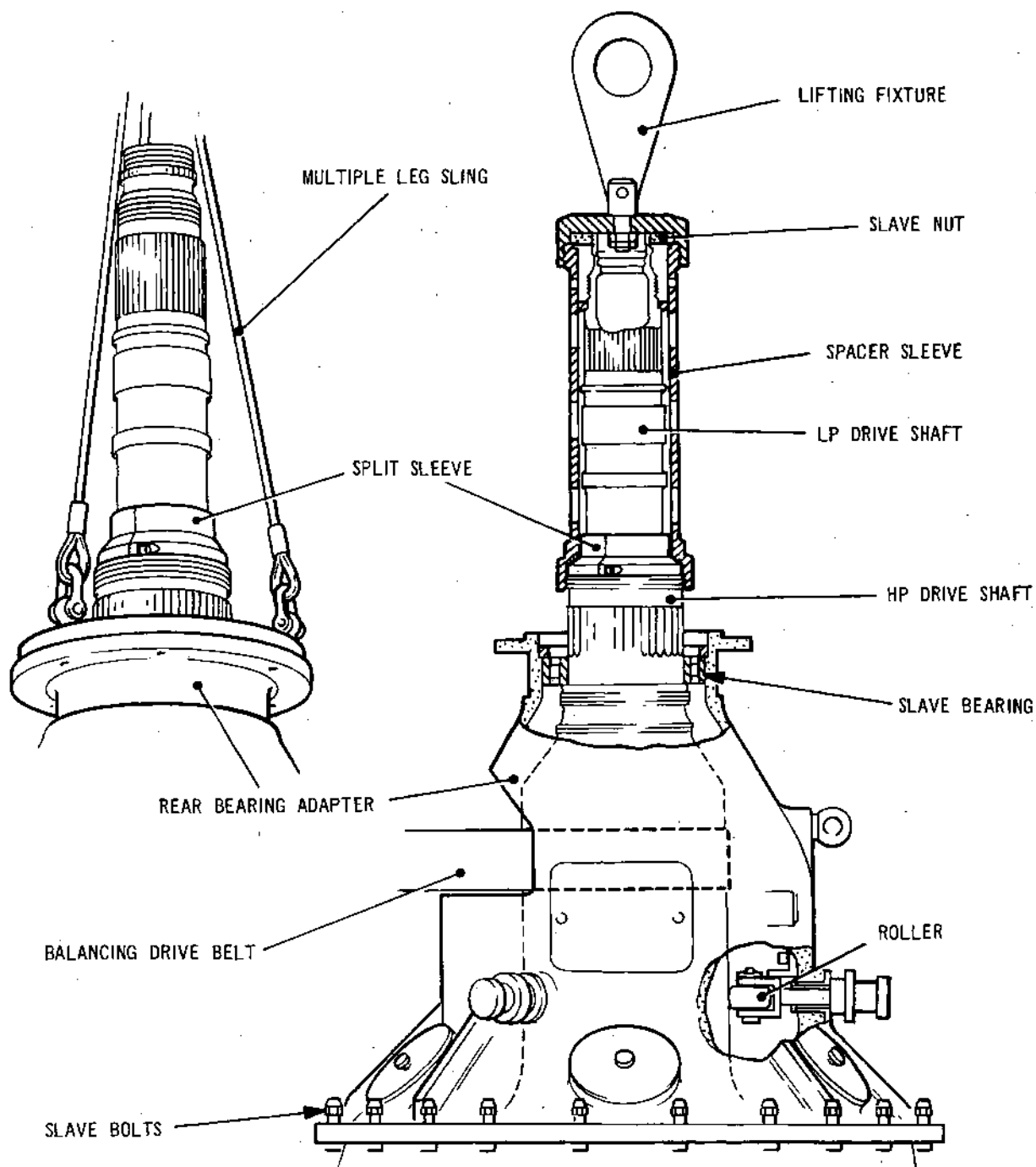
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Balancing/Lifting Equipment Assembled to HP Compressor Assembly
Figure 114

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the (normal) top position of the engine, then continue lowering the adapter aligning the bolt-holes in both flanges, and engaging the locating pin in the HP compressor case flange with the hole in the adapter. Insert the adapter slave bolts through the case flange and secure with (special) slave nuts. Fully tighten the nuts. Release the sling from the adapter, then remove the sling from the hoist.

- (c) Lower the spacer sleeve (Tool 389) over the LP drive shaft and screw it onto the HP drive shaft. Screw the slave nut (Tool 1042) onto the LP drive shaft and just tighten against the sleeve.
- (d) Lower the lifting fixture (Tool 1043) over the slave nut and screw the fixture onto the extension sleeve until tight. Attach a hoist to the lifting fixture.

P. Remove the HP Compressor/Intermediate Case Assembly.

NOTE: View through the lightening holes in the spacer sleeve (Tool 389) surrounding the LP drive shaft rear (top) end, and ensure that the master spline of the shaft is in line with the top position of the LP and HP cases and remains in that position during the removal procedure.

- (1) Ensure that the clamps of the mobile stand (Tool 1036) are drawn outwards. If the assembly is not to be balanced, position the lifting fixture (Tool 1039) in the stand with the lifting plate underneath and the lifting plate pad (at the TOP position), located in the small cut-away in the centre of the brake side of the stand (Ref.Fig.116). Remove the nuts and washers from the studs of the fixture.
- (2) Using the extension bar (Tool 1974) and socket release and remove the nuts, bolts and brackets from the LP compressor case rear flange/exit guide vane case front flange, the exit guide vane case rear flange/intermediate case front flange and the exit guide vane case split line flanges. At the exit guide vane case rear flange/intermediate case front flange bolt positions 31, 32, 33 and 34, check bolt protrusion through nuts before slackening. Note bolts with less than 1.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8404-234).

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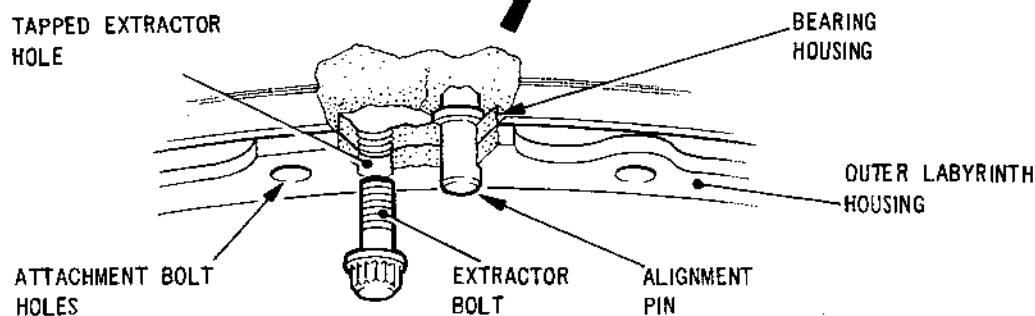
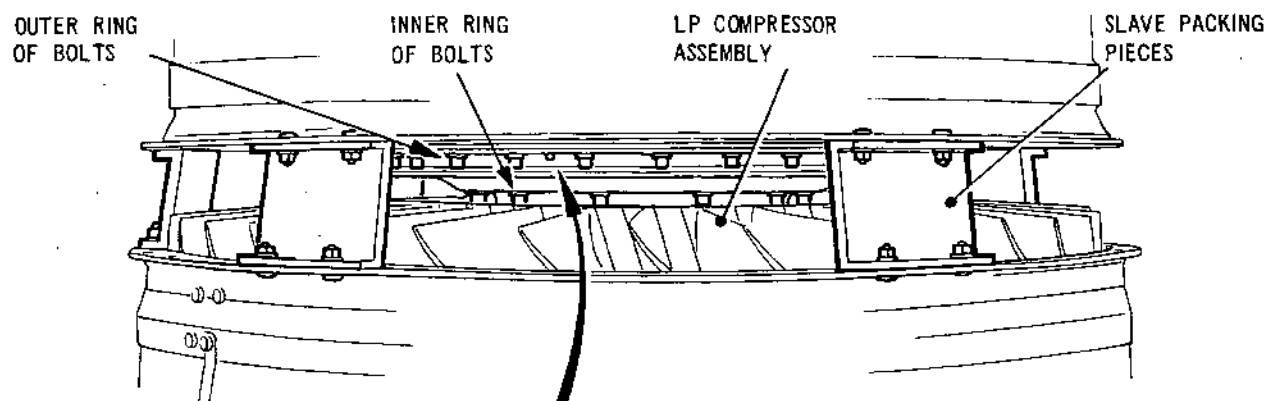
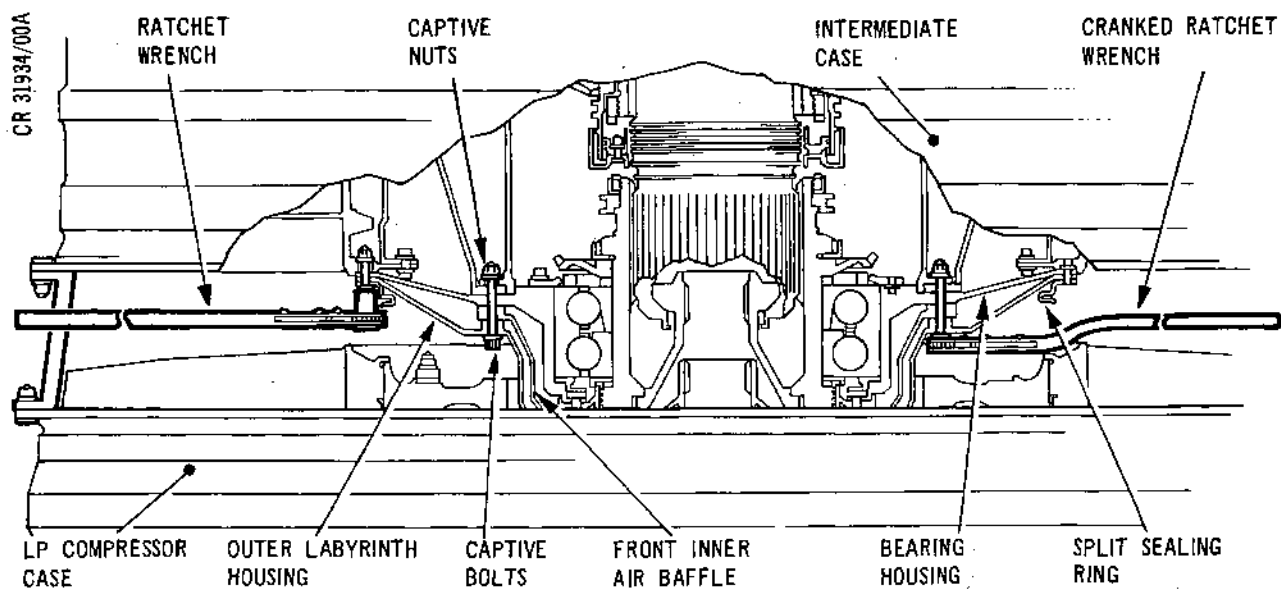
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Releasing LP Rear Bearing Housing Diaphragm
from Intermediate Case
Figure 115



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- (3) Take the weight of the HP compressor assembly on the hoist, then carefully withdraw the top unit guide vane case half. Insert three slave packing pieces (Tool 1200 (2 off) and 1201 (1 off)) (evenly disposed) in place of the case, and loosely hold each piece in place with four nuts and bolts (Ref.Fig.116). Turn the bottom exit guide vane case to clear the gearbox mounting adapters attached to the intermediate case, then withdraw the case. Position and secure three more slave packing pieces (Tool 1200 (2 off) and 1201 (1 off)). Lower the hoist and fully tighten the slave packing piece nuts.
- (4) Screw in on the jacking wheel of the build/strip base (Tool 1244) and raise the jacking pad until it contacts the LP compressor rotor and supports it.
- (5) Unscrew and remove the outer ring of (24) bolts securing the split sealing ring/outer labyrinth housing/bearing housing to the intermediate outer case, using the ratchet wrench (Tool 1569). Remove the split sealing ring when released.
- (6) Unscrew the inner ring of (30) bolts securing the outer labyrinth/front inner air baffle/bearing housing to the intermediate inner case, using the cranked ratchet wrench (Tool 1541), until the bolts are released from the intermediate case anchor nuts, then lower the captive bolts.
- (7) Examine the location of the outer ring of bolt-holes and identify three equi-spaced lugs, each with three holes. Screw a standard 1/4 28-UNF bolt (approx 0.750 in. long) into the vacant extractor hole in each lug.
- (8) Remove the nuts and bolts securing the top of the slave packing pieces to the intermediate case flange.
- (9) Take the weight of the HP compressor/intermediate case on the hoist, then very slowly raise the hoist directly upwards and at the same time screw in the three extractor bolts in equal progressive increments to separate the LP compressor bearing housing assembly from the intermediate case. As the hoist is raised, ensure that the extractor bolts keep in pace, otherwise the LP compressor rotor may be lifted, or alternatively the bearing housing/labyrinth housing may be bowed by the extractor bolts. If the separation of the bearing housing from the intermediate case is not

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even, the extraction bolts are bowing the housing and the LP compressor rotor is being lifted, the locating pins and oil transfer tube (between the LP compressor and intermediate case) are binding. This will be due to the hoist being off centre, causing a slight tilt or sideways movement. Lower the hoist, check and re-adjust the position of the hoist to ensure a direct upward lift of the HP compressor, then slowly raise the hoist and ensure that it is a straight lift by comparing the clearance between the intermediate case bottom flange and the slave packing pieces. Continue the separation until the bearing housing is clear of the intermediate inner case, and the inner case locating pins are withdrawn from the bearing housing.

- (10) Steadily raise the hoist until the intermediate case is clear of the LP compressor, then position the hoist over the mobile stand (Tool 1036). Unscrew the jacking wheel of the support steady (Tool 396), then locate the support pot over the end of the LP drive shaft in the bottom of the intermediate inner case (Ref.Fig.116). Position the steady pin hole over the locating pin and screw the captive bolts into the inner case. Screw in on the jacking wheel until the support pot abuts the LP drive shaft.
- (11) Position and lower the intermediate case onto the lifting fixture in the mobile stand, aligning the top of the case with the 'TOP' of the fixture (at the lifting plate pad), and locating the fixture studs in the bolt-holes in the case flange (Ref.Fig.115). Assemble the slave washers and nuts to the fixture studs and fully tighten the nuts. Position the stand clamps over the case flange, then secure the clamps with their knurled nuts. Release the hoist from the lifting fixture.

NOTE: If the assembly is to be balanced, the lifting fixture will not be assembled to the mobile stand and the text relating to it ignored.

- (12) Release and remove the slave packing pieces from the rear (uppermost) flange of the LP compressor case, then unscrew and remove the three slave jacking bolts from the bearing/labyrinth housing. Remove the bolt and retaining plate securing the oil transfer tube, then withdraw the oil tube from the bearing housing. If the disassembly is not to continue immediately, place the protector (Tool 1227) on the rear flange of the LP compressor and secure the protector with its bolts, washers and nuts.

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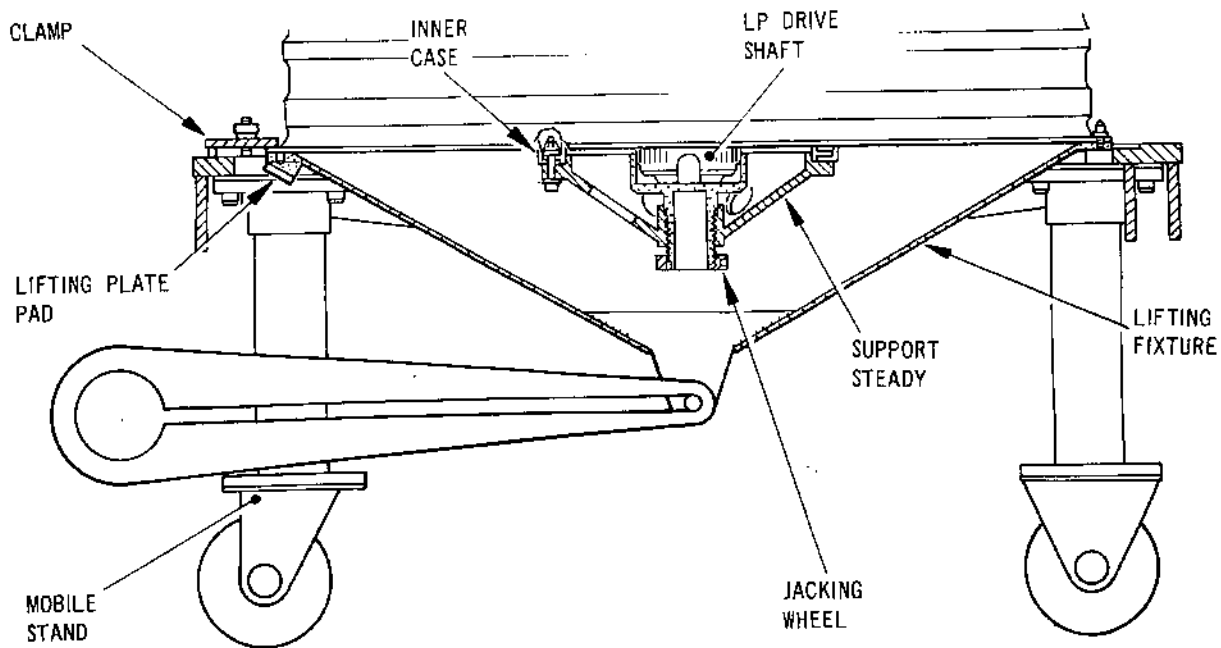
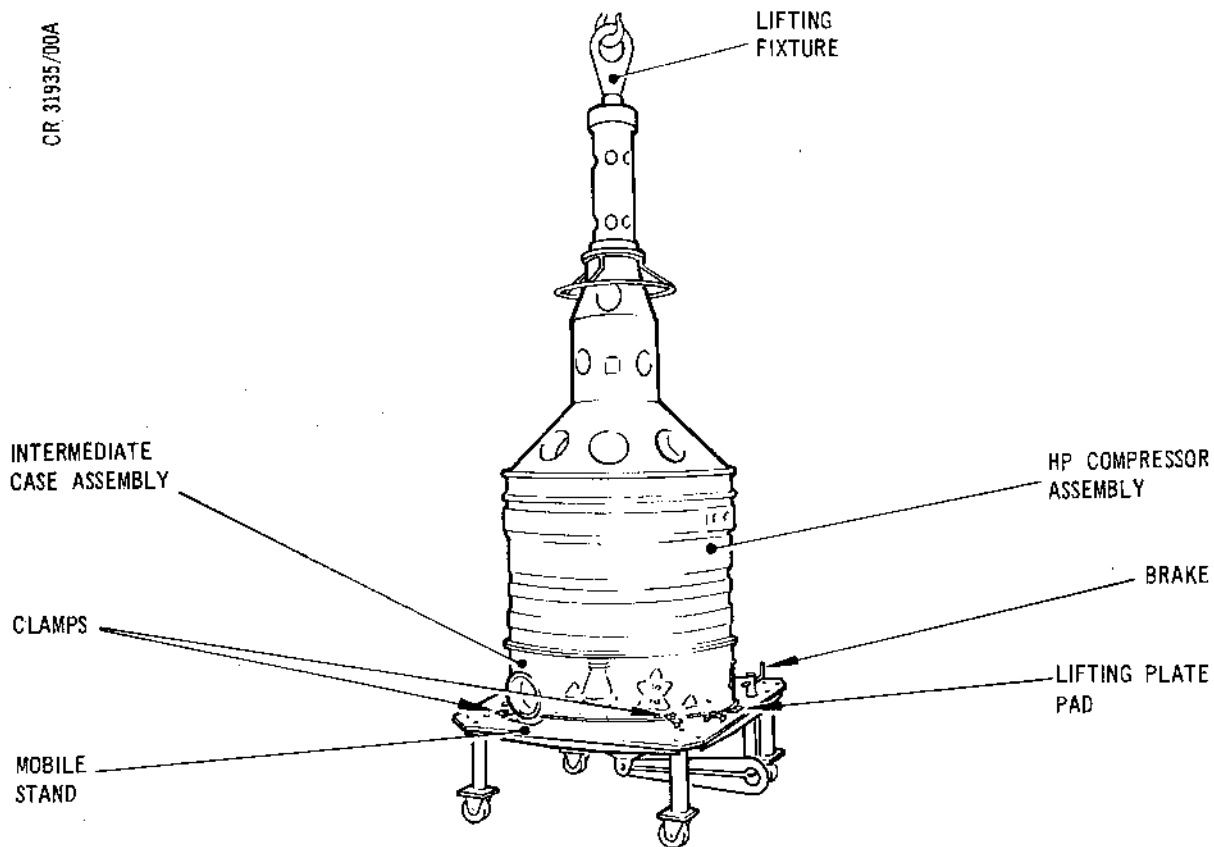


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Assembling HP Compressor/Intermediate Case to Mobile Stand
Figure 116

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(13) Transfer the HP compressor/intermediate case assembly to its disassembly section (72-33-00 Disassembly).

Q. Assemble the Lifting Equipment to the LP Compressor Assembly (Ref.Fig.117).

NOTE: Though there is only one method of removal, the tooling to be assembled for removal is dependent on whether the assembly requires a check balance of the rotating assembly, or whether it is to be disassembled in the normal manner. The procedure for both tooling arrangements are detailed under their own titles as follows.

(1) Assemble the (normal) lifting equipment to the LP compressor assembly.

NOTE: If the rear bearing adapter (Tool 1011) is used, a slave bearing assembly (part of the tool) may be bolted to the bottom of the adapter, which must be unbolted and removed before using the adapter.

NOTE: As an alternative to the method quoted for assembling the adapter, the slave exit guide vane case may be assembled to the adapter, then the joint tool assembled to the LP compressor.

- (a) Position the lifting fixture (Tool 1096) on top of the rear bearing adapter (Tool 344 or 1011), align the offset bolt-hole, then screw the fixtures captive bolts into the adapter. Release and remove the access panels from the adapter.
- (b) Release and remove the protector (Tool 1227) (if assembled) from the rear of the LP compressor. Attach a hoist to the lifting plate of the fixture, then position and lower the adapter over the LP compressor bearing housing, leaving (approx) 0.200 in. (5 mm) between the housing and adapter. Align the inner ring of captive bolts in the bearing housing with the captive nuts in the adapter, then engage 10 of the bolts with the nuts, and screw the nuts onto the bolts until the slack of the bolts is taken up. Do not fully tighten the bolts.

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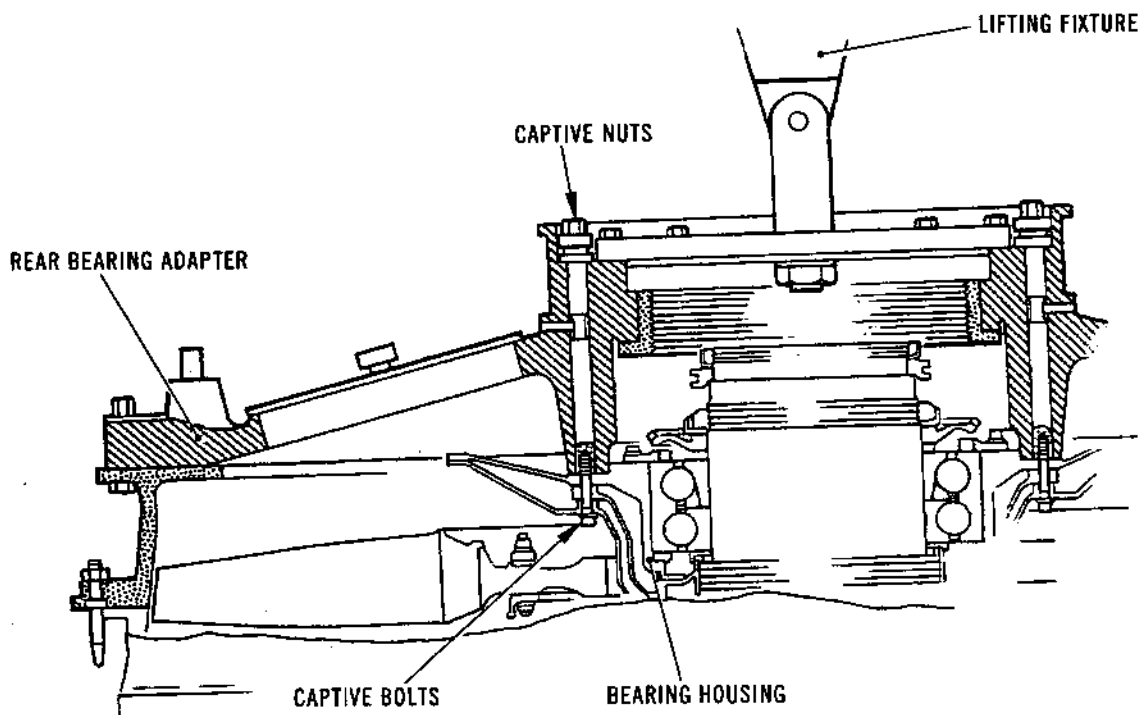
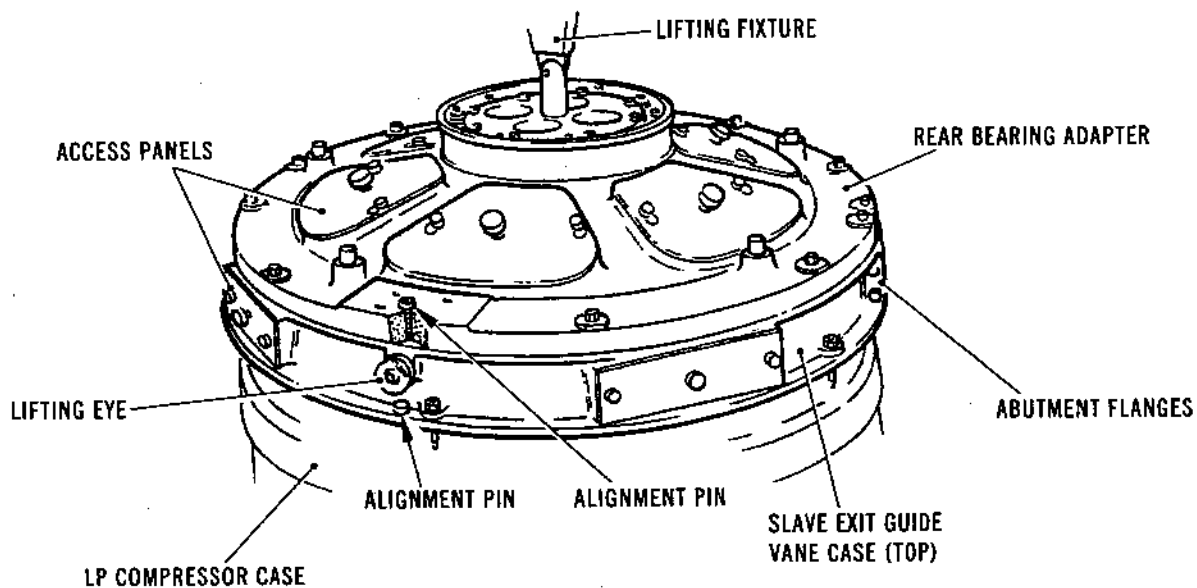
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Normal Lifting Equipment Assembled to the LP Compressor Assembly
Figure 117

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- (c) Slide the 'TOP' half of the slave exit guide vane (E.G.V.) case (Tool 398), identified by the lifting eye, in between the adapter and the LP case at the (normal) top position of the LP case. Engage the screwed alignment pin of the E.G.V. case in the pin hole in the LP case and assemble slave nuts and bolts to the LP and E.G.V. case flanges.
 - (d) Slide the 'BOTTOM' half of the slave E.G.V. case in between the adapter and the LP case and abut the TOP E.G.V. case. Assemble slave nuts and bolts (Tool 559) to the abutment flanges of the E.G.V. cases, and to the LP and E.G.V. case flanges. Remove the access panels from the E.G.V. cases.
 - (e) Align the screwed alignment pin in the adapter with the pin hole in the top position of the E.G.V. TOP case, then lower the adapter onto the slave E.G.V. cases and the bearing housing. Insert the adapter slave bolts into the E.G.V. cases and tighten the adapter captive nuts. Fully tighten the E.G.V. abutment flange nuts and the E.G.V./LP case flange nuts. Fully tighten the bearing housing/adapter nuts and bolts. Replace and secure the access panels to the E.G.V. case and adapter.
- NOTE: If the adapter will not abut the E.G.V. case or the bearing housing, screw in or out on the jacking wheel of the build/strip base as necessary to abut the items.
- (2) Assemble the lifting/balancing equipment to the LP compressor assembly.
 - (a) Release and remove the protector (Tool 1227) (if assembled) from the rear of the LP compressor.
 - (b) Release and remove the operating ring from the LP compressor rotor shaft rear (Ref.Fig.118).

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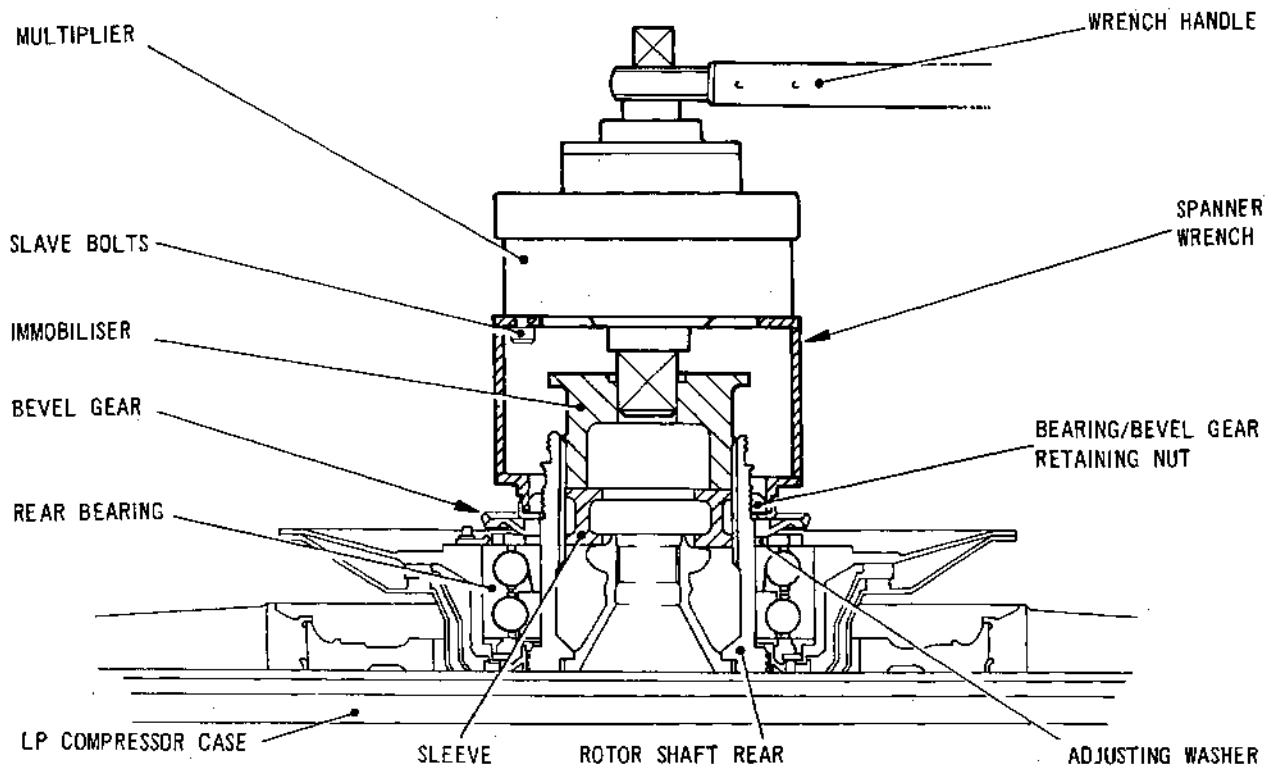
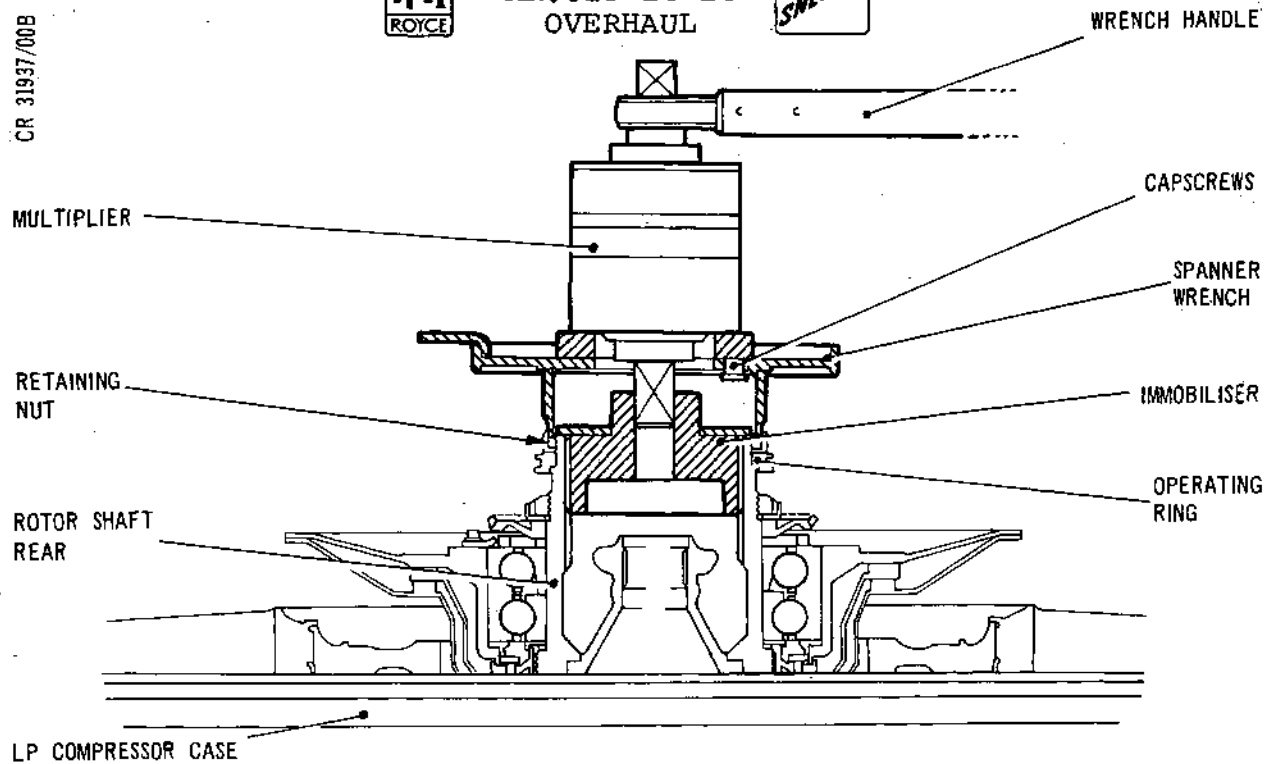


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Releasing LP Compressor Operating Ring
and Bearing Retaining Nut
Figure 118



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- (i) Release the cupwasher from the operating ring retaining nut, then position and lower the immobiliser (Tool 1330) into the LP rotor shaft rear engaging the splines of both items.

NOTE: Before using the multiplier (Tool 1333), turn the input drive and note the direction of rotation of the output drive.

- (ii) Lower the spanner wrench (Tool 325) onto the retaining nut, then lower the multiplier (Tool 1333) onto the spanner, turning the multiplier drive (if necessary) to enable it to engage its drive in the immobiliser and its capscrews into the holes in the spanner.
 - (iii) Engage the wrench handle (Tool 1651) in the multiplier, then unscrew the (right-hand) retaining nut until released, taking into account the direction of rotation of the multiplier output drive.
 - (iv) Remove the handle, multiplier, spanner and immobiliser from the rotor shaft rear, then remove the retaining nut, cupwasher and operating probe ring.
- (c) Release and remove the LP compressor rear bearing assembly (Ref.Fig.118 and 119).
 - (i) Release the cupwasher from the bearing/bevel gear retaining nut, then insert the sleeve (Tool 696) into the LP rotor shaft rear. Lower the immobilizer (Tool 280) into the LP shaft and engage the splines of both items.
 - (ii) If the multiplier (Tool 1022) is not assembled to the spanner wrench (Tool 1594), position the multiplier on the spanner, insert the spanner slave bolts through the spanner and screw them into the multiplier. Fully tighten the bolts.

NOTE: Before using the multiplier (Tool 1022), turn the input drive and note the direction of rotation of the output drive.

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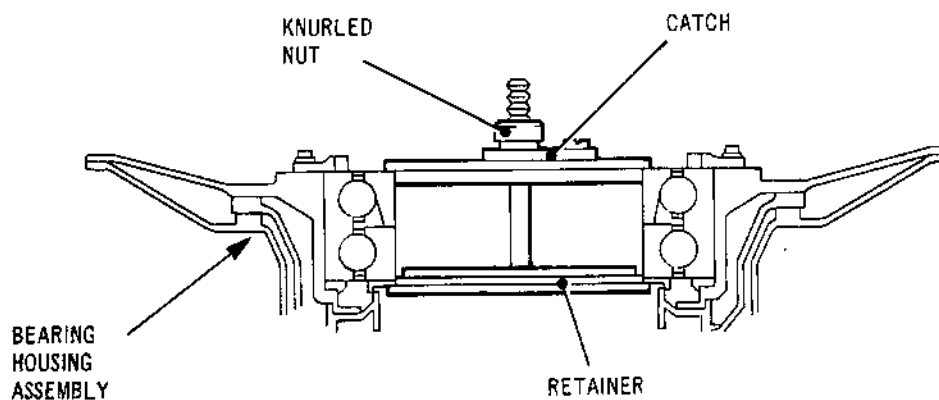
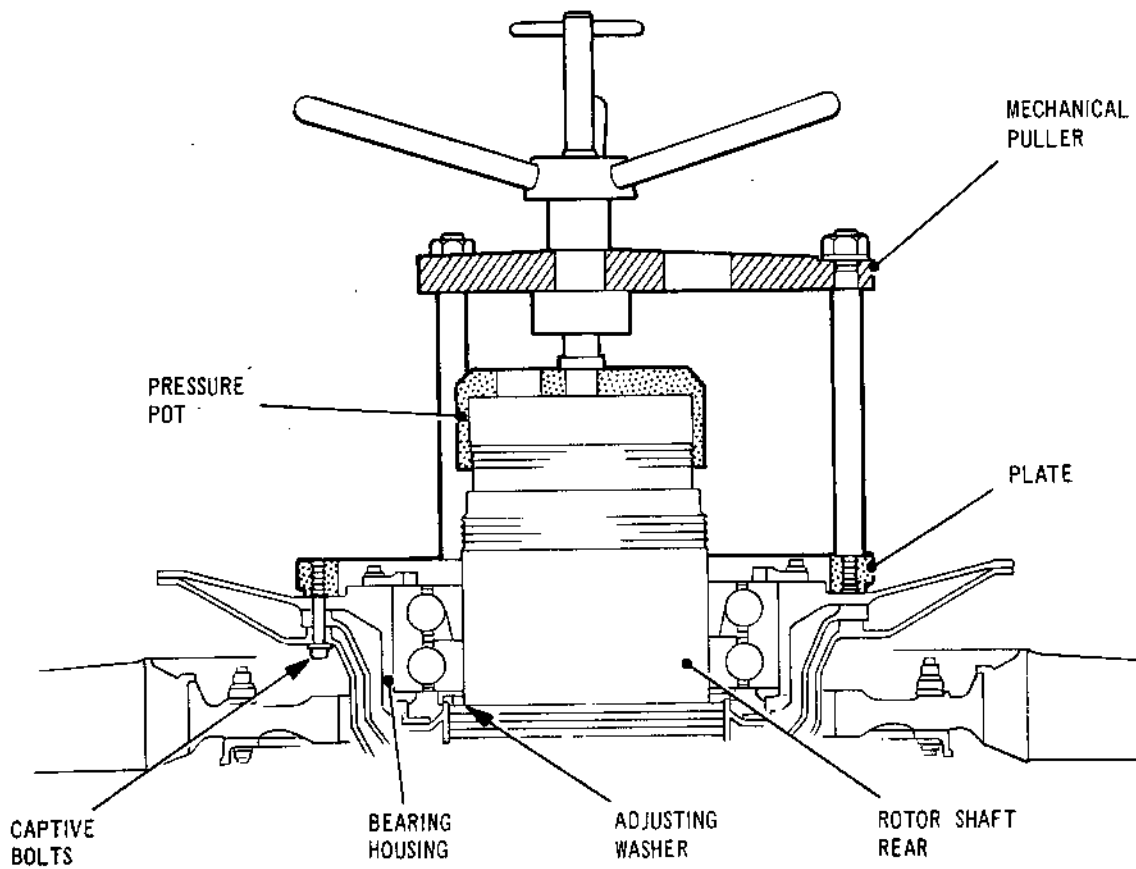


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Removing LP Compressor Assembly
Figure 119

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- (iii) Lower the spanner/multiplier over the rotor shaft rear, and turn the multiplier drive (if necessary) to enable the multiplier to engage in the immobilizer and the spanner in the retaining nut.
- (iv) Engage the wrench handle (Tool 1651) in the multiplier, then release the (right-hand) retaining nut, taking into account the direction of rotation of the multiplier output drive. Withdraw the handle, multiplier/spanner and immobilizer from the rotor shaft rear, then use the hand spanner (Tool 1551) and unscrew the nut until released. Remove the spanner, then withdraw the nut, cupwasher, bevel gear and adjusting washer from the shaft.
- (v) Lower the mechanical puller (Tool 283) over the rotor shaft rear and locate the pressure pot over the shaft. Align the tapped holes in the plate with the inner ring of captive bolts in the bearing housing. Unscrew the large tommy bars of the puller (if required) to allow the puller plate to abut the housing, then screw 10 of the bearing housing bolts into the puller plate. With the small tommy bars held stationary, screw on the large tommy bars and draw the bearing off the rear rotor shaft until released. Unscrew the bearing housing bolts to release the puller, then withdraw the puller from the shaft/bearing housing.
- (vi) Withdraw the bearing housing assembly from the shaft, ensuring that the bearings (loose) inner race does not get displaced. Separate the two plates of the retainer (Tool 1198), then place a plate each side of the bearing. Locate the catch on one plate around the screw of the other plate, then tighten the knurled nut against the catch to secure the retainer to the bearing.

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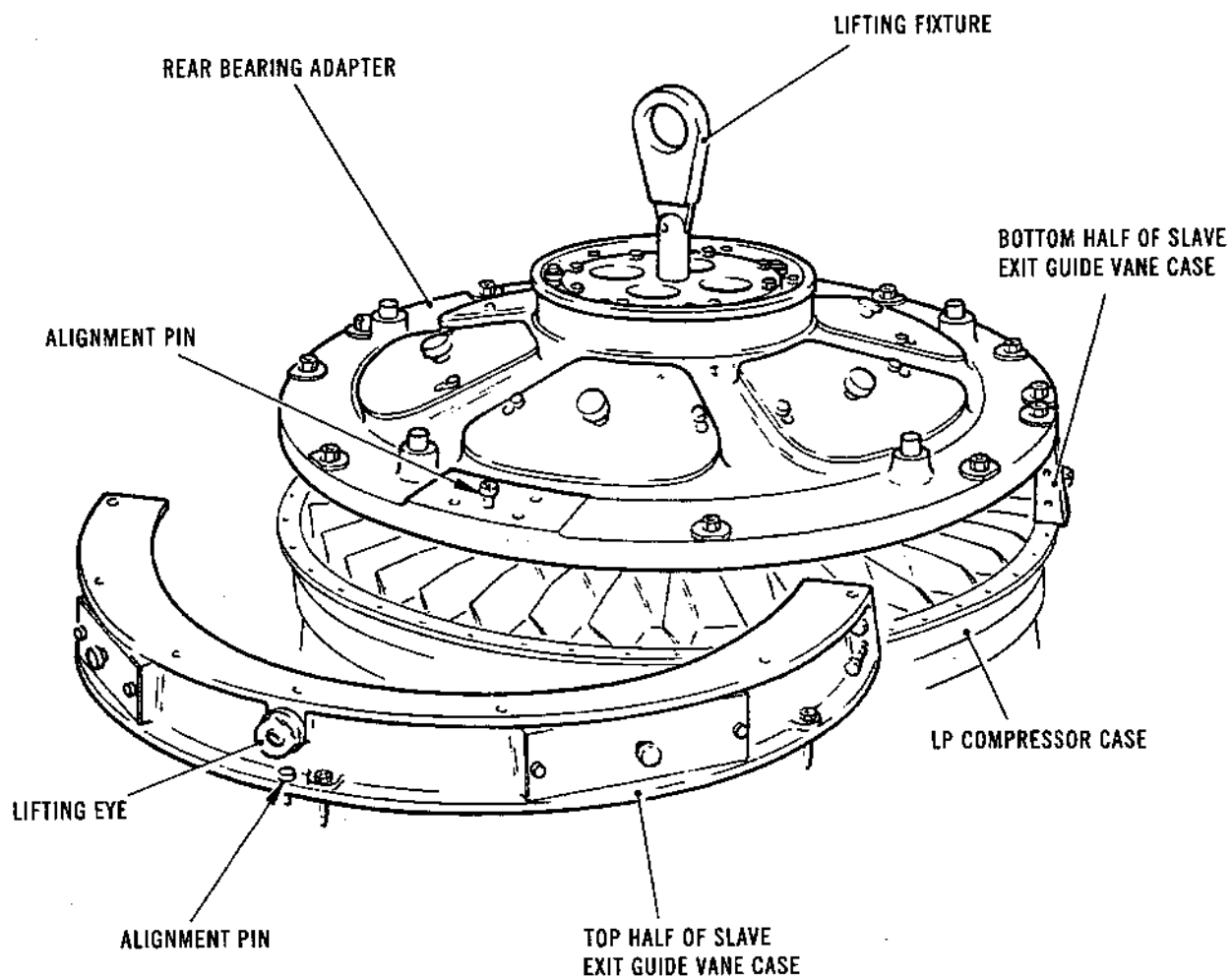
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Balancing/Lifting Equipment Assembled to the
LP Compressor Assembly
Figure 120

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(vii) Withdraw the adjusting washer from the rotor shaft rear, measure its thickness, then select a spacer ring (Tool 345) (from the range), that is nearest to the dimension of the washer and lower the ring over the rotor shaft rear.

(d) Assemble the rear bearing adapter/slave bearing assembly to the LP compressor (Ref.Fig.120 and 121).

NOTE: If the rear bearing adapter (Tool 1011) is used, the slave bearing assembly will be part of the adapter and should be bolted to the bottom of the adapter, but if the rear bearing adapter (Tool 344) is used, the slave bearing assembly will be a separate tool (Tool 346). Whichever tooling is used, the method of assembling the rear bearing adapter, the slave bearing assembly and the slave exit guide vane case to the LP compressor can be carried out by various sequences, assembling all the items together before assembling them to the LP compressor, assembling them individually to the LP compressor, or by the method quoted hereafter.

(i) Ensure that the slave bearing assembly is assembled to the bottom of the rear bearing adapter (Tool 1011) and secured by bolts, or position the slave bearing assembly (Tool 346) on the bottom face of the rear bearing adapter (Tool 344), aligning the bearing captive bolts with the adapter captive nuts and screw the nuts onto the bolts. With the adapter the correct way up, position the lifting fixture (Tool 1096) on top of the adapter, align the offset bolt-hole, then screw the fixture captive bolts into the adapter. Attach a hoist to the lifting plate of the fixture.

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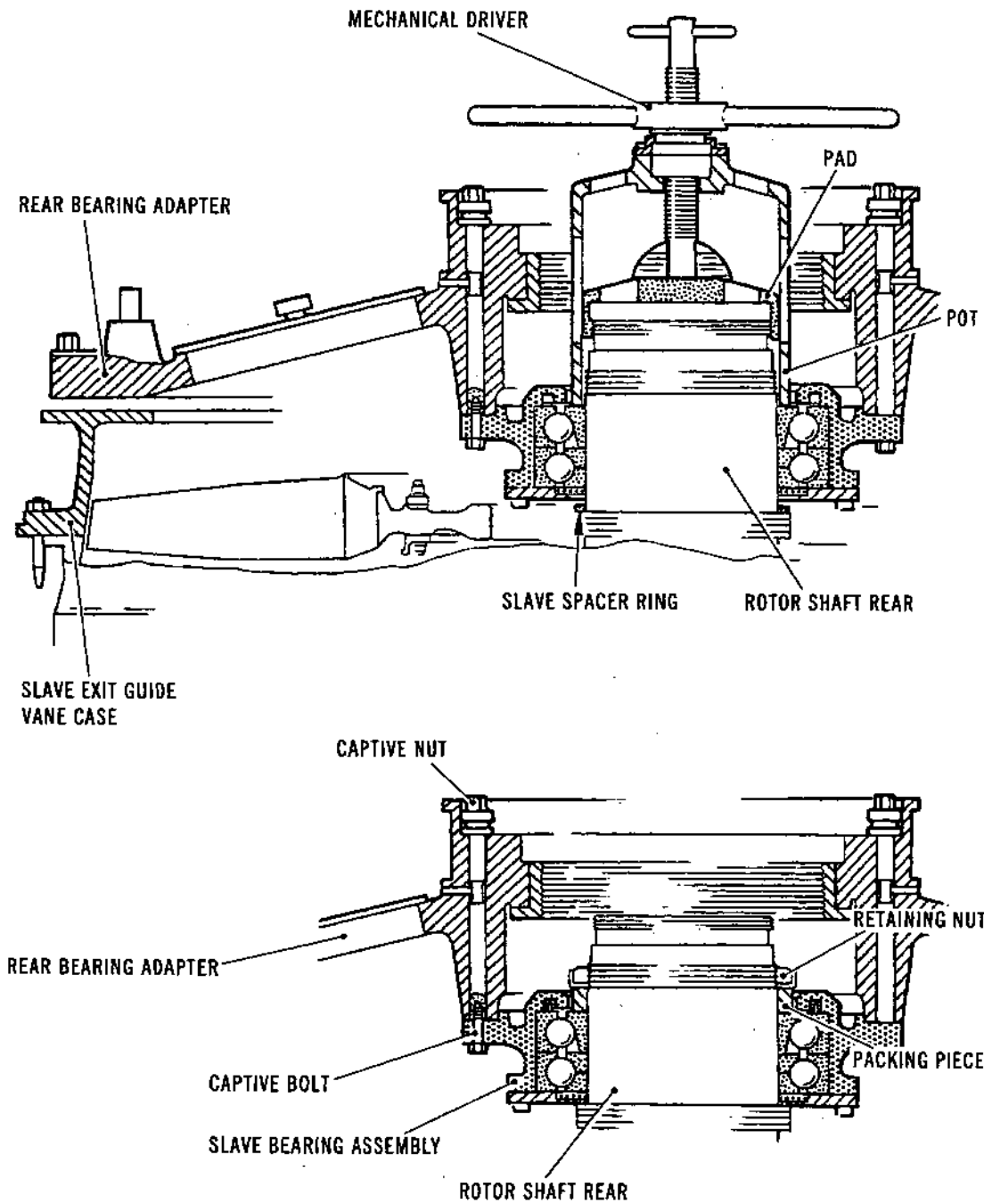
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Assembling Slave Bearing to LP Compressor
Rotor Shaft Rear
Figure 121



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- (ii) Ensure that the slave spacer ring (Tool 345) is assembled to the LP rotor shaft rear, then if adapter (Tool 1011) is being used, slide its spacer ring over the shaft. Position the rear bearing adapter/slave bearing over the rotor shaft rear, align the 'V' markings on the inside face of the bearings (if marked) with each other and the master spline on the shaft, then lower the adapter until the bearing is supported on the shaft. Remove the hoist, then release and remove the lifting fixture.
- (iii) Lower the mechanical driver (Tool 1099) (Ref.Fig.121) over the end of the rotor shaft rear, then screw the driver pad onto the threaded end of the shaft. Screw down on the large tommy bars, engage the driver pot with the bearing, then continue screwing and press the bearing onto the shaft until it abuts the slave ring. Unscrew and withdraw the driver from the shaft.
- (iv) Lower the packing piece (Tool 1100) onto the shaft (in lieu of the bevel gear and washer), then replace the engine cupwasher and screw on the retaining nut using the hand spanner (Tool 1551).
- (v) If the multiplier (Tool 1022) is not assembled to the spanner wrench (Tool 1594), position the multiplier on the spanner, insert the spanner slave bolts through the spanner and screw them into the multiplier (Ref.Fig.118). Fully tighten the bolts.

NOTE: Before using the multiplier (Tool 1022), turn the input drive and note the direction of rotation of the output drive.

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- (vi) Lower the immobilizer (Tool 280) (Ref.Fig. 118) into the rotor shaft rear engaging the splines of both items, then lower the multiplier/spanner over the rotor shaft rear and turn the multiplier drive (if necessary) to enable the multiplier to engage in the immobilizer and the spanner in the retaining nut. Using the torque meter wrench (Tool 1658), torque-tighten the retaining nut between 650 and 700 lbf ft. (881 and 949 N.m) (26 to 28 lbf ft. (35,2 to 37,9 N.m) as indicated on the wrench because of the 25-1 multiplier), taking into account the direction of rotation of the multiplier output drive. Withdraw the wrench, multiplier/spanner and immobilizer from the shaft. Do not lock the retaining nut with its cupwasher.
- (vii) Screw in on the jacking wheel of the build/strip base to raise the LP compressor rotor (approx) 0.125 in. (3 mm). Slide the 'TOP' half of the slave exit guide vane (E.G.V.) case (Tool 398), identified by the lifting eye, in between the adapter and the LP case at the (normal) top position of the LP case. Engage the screwed alignment pin of the E.G.V. case in the pin hole in the LP case and assemble slave nuts and bolts to the LP and E.G.V. case flanges.
- (viii) Slide the 'BOTTOM' half of the slave E.G.V. case in between the adapter and the LP case and abut the 'TOP' E.G.V. case. Assemble slave nuts and bolts to the abutment flanges of the E.G.V. cases, and to the LP and E.G.V. case flanges. Align the screwed alignment pin in the adapter with the pin hole in the top position of the E.G.V. 'TOP' case, then lower the adapter until it abuts the E.G.V. cases by unscrewing the jacking wheel of the build/strip base. Insert the adapter slave bolts into the E.G.V. cases and tighten the adapter captive nuts. Fully tighten the E.G.V. abutment flange nuts and the E.G.V./LP case flange nuts.

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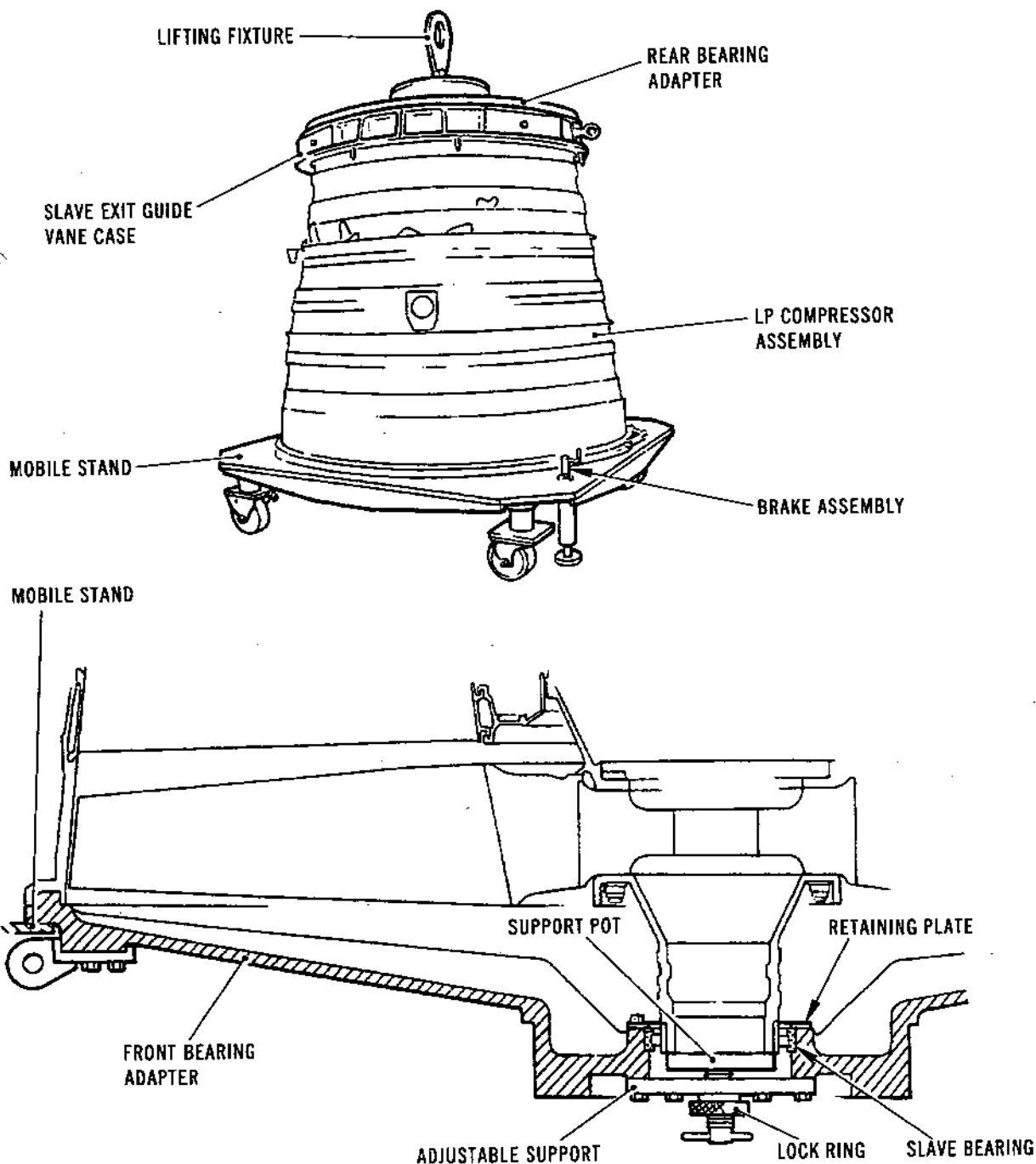


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Assembling LP Compressor Assembly to Mobile Stand
Figure 122



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R. Remove the LP Compressor Assembly (Ref.Fig.122).

- (1) Ensure that the slave bearing (Tool 1288) is assembled to the front bearing adapter (Tool 588) and is secured by the bolted retaining plate. Position the adjustable support (Tool 1106) on the bottom of the adapter, then secure the support by screwing its captive bolts into the adapter. Release the support lock ring and unscrew the support pot. Invert the adapter and position it on the mobile stand (Tool 1105) with the adapter lifting eye positioned in the cut-away in the stand.
- (2) Release and remove the nuts, bolts and brackets from the LP compressor front flange/air inlet section rear flange.
- (3) Position the lifting fixture (Tool 1096) on top of the rear bearing adapter, align the offset bolt-hole, then screw the fixture captive bolts into the adapter. Connect a hoist to the fixture, then raise the LP compressor until clear of the air inlet section. Release and remove the jacking adapter (Tool 319) from the rotor shaft front, then position and lower the LP compressor onto the front bearing adapter in the mobile stand, ensuring that the lifting eyes on both adapters are in line. Secure the LP compressor to the adapter with the slave nuts and bolts of the adapter.
- (4) Screw in on the adjustable support until its pot contacts the LP compressor rotor, then tighten the lock ring. Disconnect the hoist from the lifting fixture.
- (5) Transfer the LP compressor assembly to its disassembly section (72-31-00 Disassembly).

S. Remove the Air Inlet Section.

- (1) Position the lifting fixture (Tool 1236) on the rear flange of the air inlet section and secure with engine bolts and nuts. Attach a hoist to the lifting plate of the fixture, then raise the air inlet section clear of the stand and position and lower onto a suitable pallet.
- (2) Disconnect the hoist, then release and remove the lifting fixture.
- (3) Transfer the air inlet section to its disassembly section (72-22-00 Disassembly).

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TURBINE STATIC - DISASSEMBLY

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TURBINE STATIC - DISASSEMBLY

1. General

- A. Prior to commencing disassembly, refer to 72-09-00 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001.
- C. The turbine static sub-assembly is conveyed to the disassembly area on a transport pallet. A lifting fixture which also serves as a blank is secured to the rear flange of the combustion chamber outer case (C.C.O.C.). The sub-assembly is secured to a disassembly stand which can be rotated to facilitate access for removal of components. Pallets are used for the temporary storage and transportation of components.

2. Prepare to Disassemble Turbine Static Sub-assembly

A. Secure Sub-assembly to Disassembly Stand.

- (1) Ensure that the lifting fixture (Tool 1310) is securely bolted to the rear flange of the C.C.O.C.
- (2) Attach a crane hoist to the lifting fixture and assemble the sub-assembly to the disassembly stand (Tool). Secure the sub-assembly to the stand with slave nuts and bolts.

NOTE: Position the sub-assembly on the disassembly stand to ensure that when the sub-assembly is turned the internal pipes are suitably positioned for removal.

- (3) Remove the nuts and bolts securing the lifting fixture to the C.C.O.C. rear flange, then remove the lifting fixture and lower it onto a suitable container. Disconnect the hoist from the lifting fixture.

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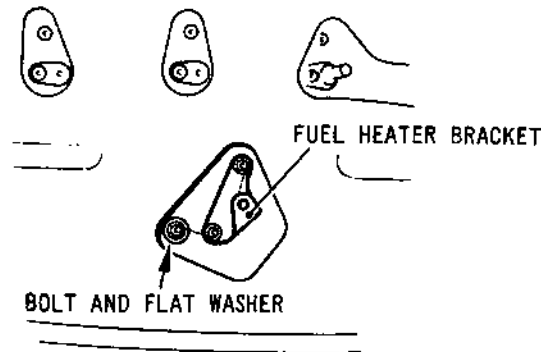


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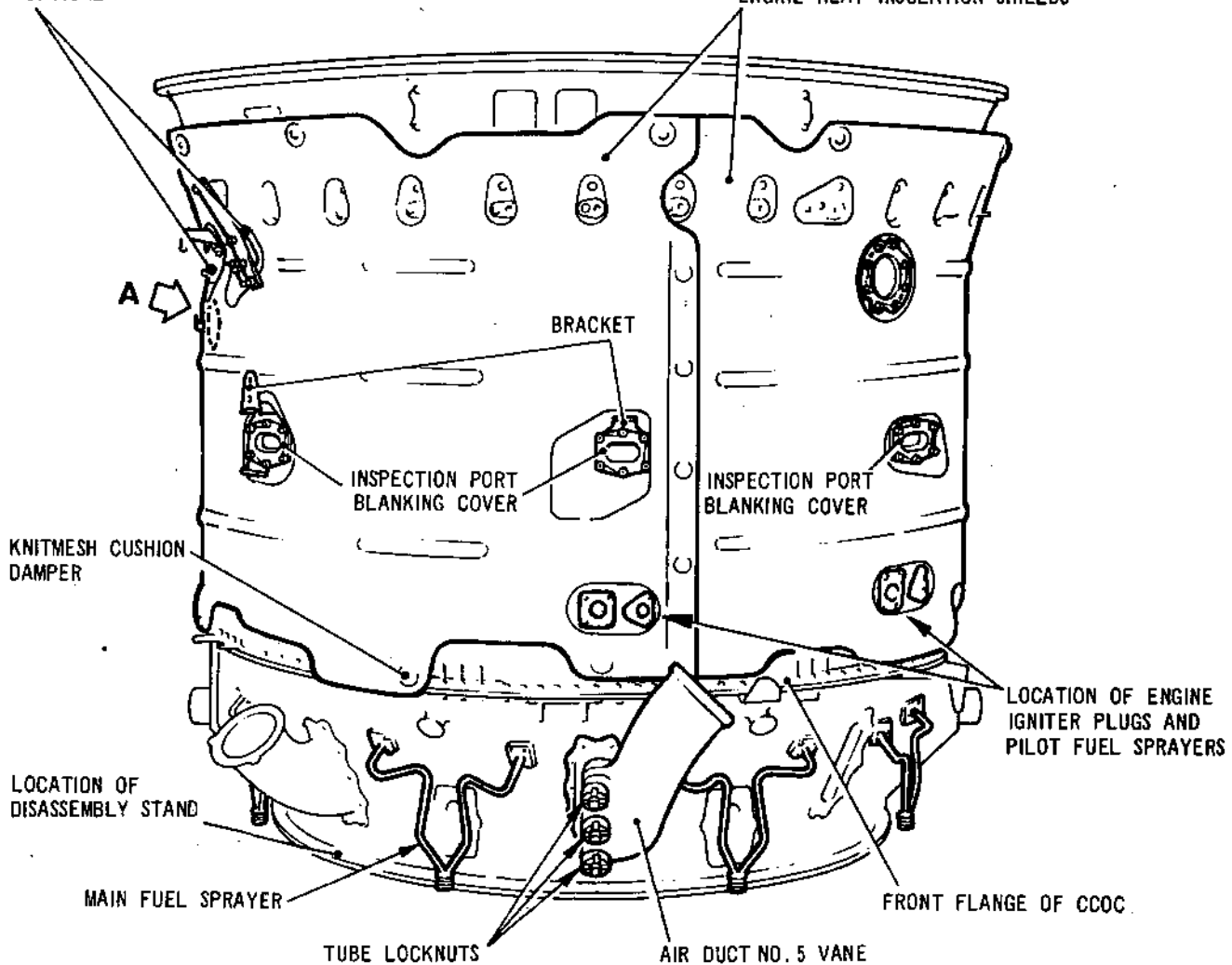
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A

OPTICAL PYROMETER LOCATIONS

ENGINE HEAT INSULATION SHIELDS



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Removing External Components
Figure 101

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3. Disassemble Turbine Static Sub-assembly

A. Remove External Items from C.C.O.C. (Ref.Fig.101).

- (1) Remove the bolts securing the inspection port covers to the C.C.O.C., then remove the covers. On SB.72-8629-256 standard engines remove the spacer from the right-hand port location.
- (2) Unscrew the countersunk screws securing the brackets to the bottom and left-hand inspection port flanges, then remove the brackets and gaskets (SB.72-58).
- (3) Remove the bolts securing the optical pyrometer brackets and blanks to the C.C.O.C., then remove brackets and blanks.
- (4) Remove the bolts securing the fuel heater bracket to the C.C.O.C., then remove the bracket.
- (5) Unscrew and remove the engine igniter plugs and adjusting washers (Pre SB.74-1) from the C.C.O.C.

NOTE: On engines to SB.74-1 the adjusting washers will be released when the retaining plates are removed with the fuel sprayers.

- (6) Remove the bolts securing the pilot fuel sprayers, then withdraw the sprayers and remove the retaining clips (SB.74-1), gaskets (SB.72-58) and adjusting washers. Remove the transfer tube from the inside of each sprayer with the puller (Tool 416). Assemble protectors to each sprayer and place the transfer tubes and sprayers in containers.
- (7) Remove the nuts and bolts securing the heat insulation shield half-sections together. Remove the bolts, knitmesh cushion dampers and washers securing the heat shield to the brackets on the front flange of the C.C.O.C. then lift the heat shields away from the C.C.O.C.

B. Remove Main Fuel Sprayers from Diffuser Case (Ref.Fig.101).

CAUTION: EXERCISE GREAT CARE WHEN REMOVING SPRAYERS.
DO NOT APPLY FORCE TO THE TUBE SECTIONS.

- (1) Remove the bolts securing the brackets and sprayers to the diffuser case. Screw the puller (Tool 416) into the holes in each sprayer flange and remove the sprayers.

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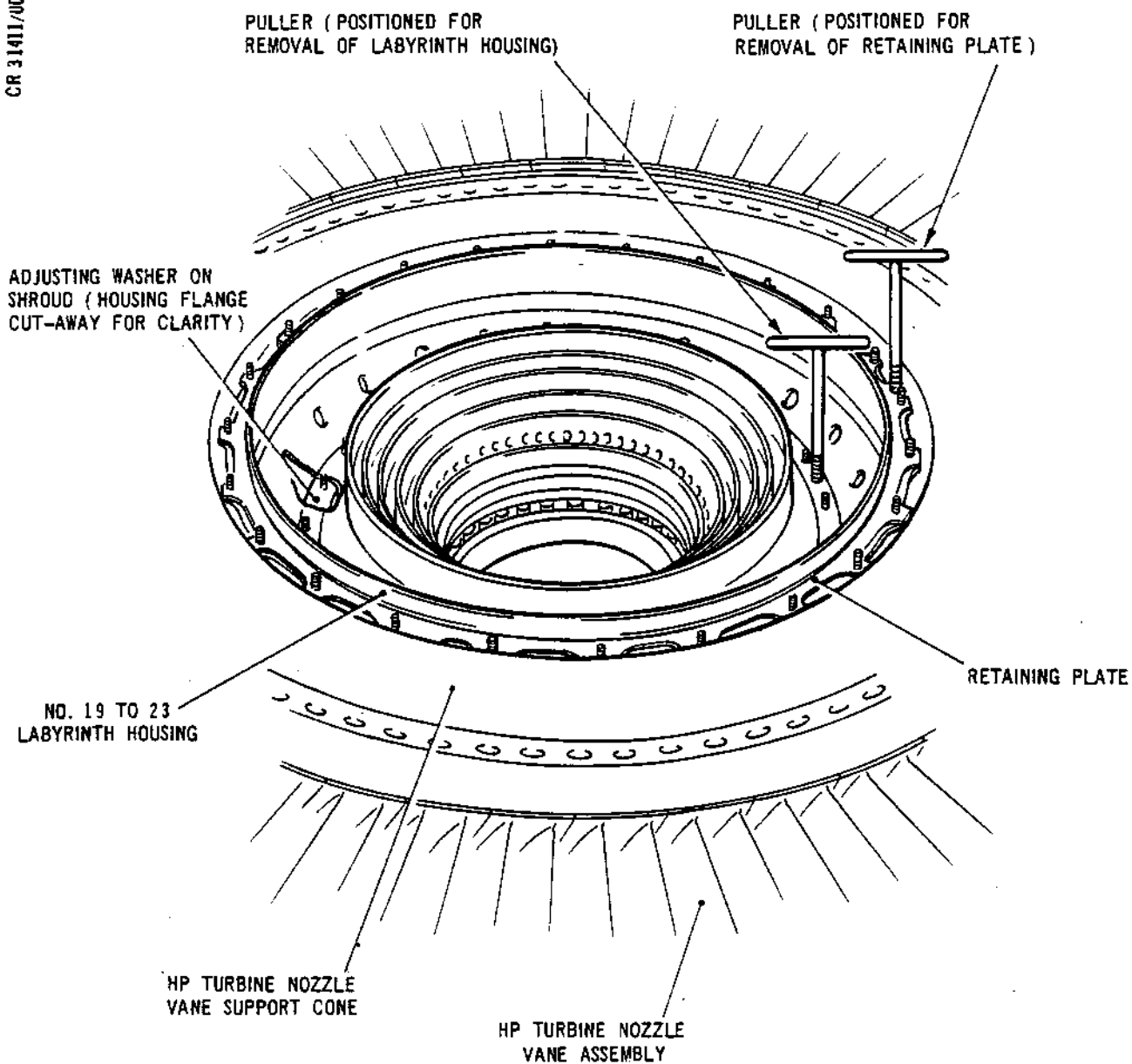


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PART VIEW ON REAR OF SUB ASSEMBLY

Removing 19-23 Labyrinth Housing
Figure 102

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- (2) Protect the fuel inlet and outlet end of each sprayer with plastic protection caps to prevent ingress of foreign matter.
- (3) Place each sprayer in a thick plastic bag and store in tray (Tool 1429).
- C. Remove Air Duct from No.5 Vane of Diffuser Case (Ref. Fig.101).
- (1) Unscrew and remove the following tube locknuts.
- (a) Oil feed, using wrench spanner (Tool 1533).
 - (b) Oil scavenge, using wrench spanner (Tool 1540).
 - (c) Vent, using wrench spanner (Tool 1540).
- (2) Withdraw the locating plate from the three tube ends.
- (3) Using the cranked spanner (Tool 1583), release the bolts securing the air duct to the diffuser case, then remove the bolts, stiffener plates and brackets.
- (4) Withdraw the air duct from the diffuser case.
- D. Remove No.19 to 23 Labyrinth Housing from C.C.O.C. (Ref.Fig.102).
- (1) Remove the nuts securing the labyrinth housing and retaining plate to the HP nozzle vane support cone.
- (2) Screw pullers (Tool 137) into the tapped holes in the retaining plate and withdraw the plate. Remove the pullers.
- (3) Remove the nuts securing the housing to the shroud.
- (4) Screw pullers (Tool 137) into the threaded holes in the labyrinth housing and retaining plate. Remove the pullers, then place the housing in container (Tool 1415) and secure it with the clamps.
- (5) Remove the adjusting washer from the shroud.

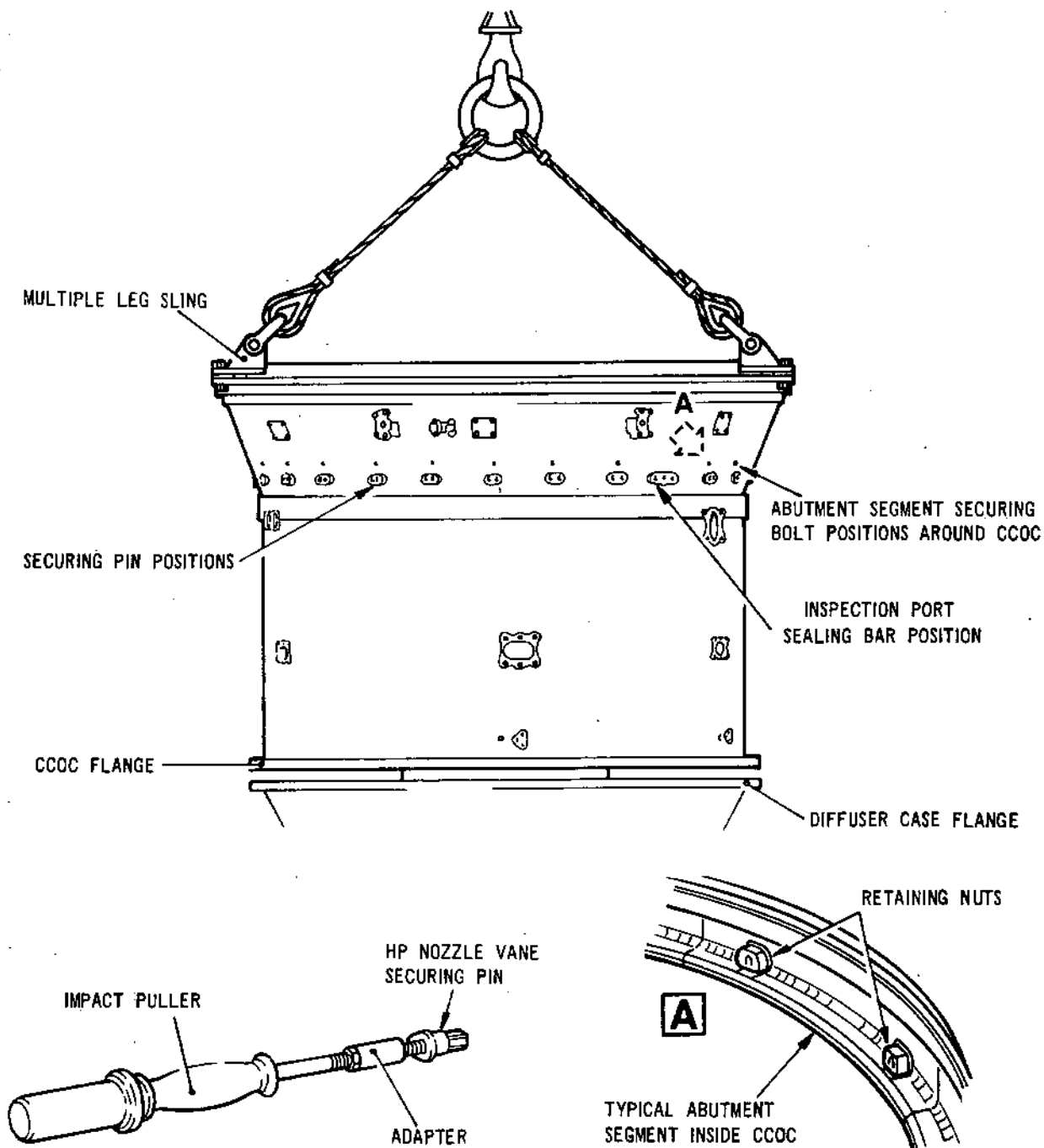


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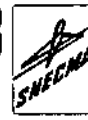
Removing HP Turbine Nozzle Vane Securing Pins and
Abutment Segments
Figure 103

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E. Remove Combustion Chamber and Nozzle Vane Assembly from C.C.O.C.

- (1) Remove vane locking pins (Ref.Fig.103).
 - (a) If retention brackets are installed at nine locations at the top of the C.C.O.C. (Ref. SB.72-8725-269 and 72-8751-283) remove bolts and if installed, spacers, then detach the brackets.
 - (b) Remove bolts securing the locking pins to the C.C.O.C.
 - (c) Withdraw locking pins incorporating internal extraction threads with the impact puller, and those incorporating external threads with the impact puller and adapter (Tools 1653 and 859).
 - (d) Discard the locking pin securing bolts (Ref. SB.72-8648-215).
- (2) Remove the bolts securing the cover plate of the flanged sealing bar to the internal inspection port located between nozzle vane positions 14 and 15, then using the impact puller (Tool 1653) remove the sealing bar.
- (3) Check the engine mounting bracket bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8262-173). Remove the nuts, bolts and brackets securing the C.C.O.C. flange to the diffuser case flange.
- (4) Disassemble nozzle vane abutment segments from C.C.O.C. (Ref.Fig.103).
 - (a) Secure the multiple leg sling (Tool 1190) to the rear flange of the C.C.O.C.
 - (b) Attach the crane hoist to the sling then carefully lift the C.C.O.C. to allow access for the removal of the abutment segments.
 - (c) Remove the nuts, bolts and if installed, spacers retaining the abutment segments, then remove the segments from the C.C.O.C. Discard the abutment segment bolts (Ref. SB.72-8632-206).
 - (d) Lower the C.C.O.C. on to the diffuser case flange and remove the sling from the C.C.O.C. flange.
 - (e) Temporarily secure the C.C.O.C. to the diffuser case flange with nuts and bolts.

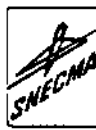
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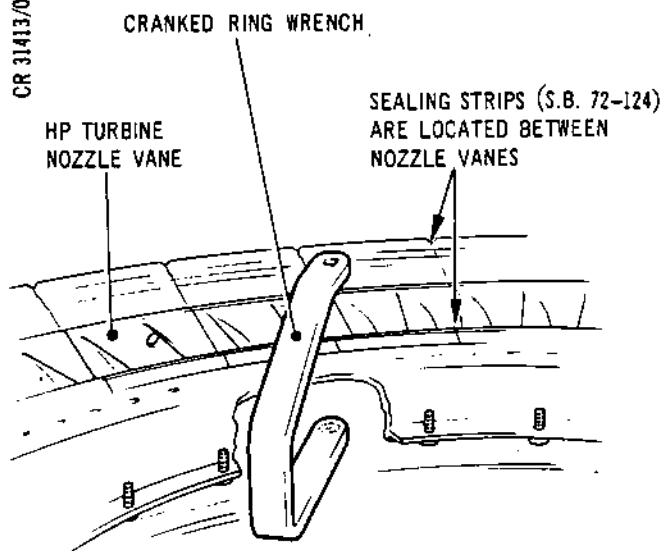


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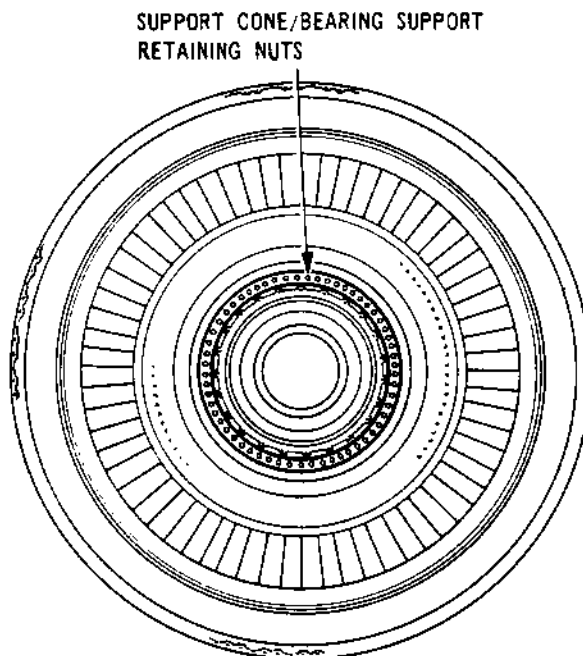
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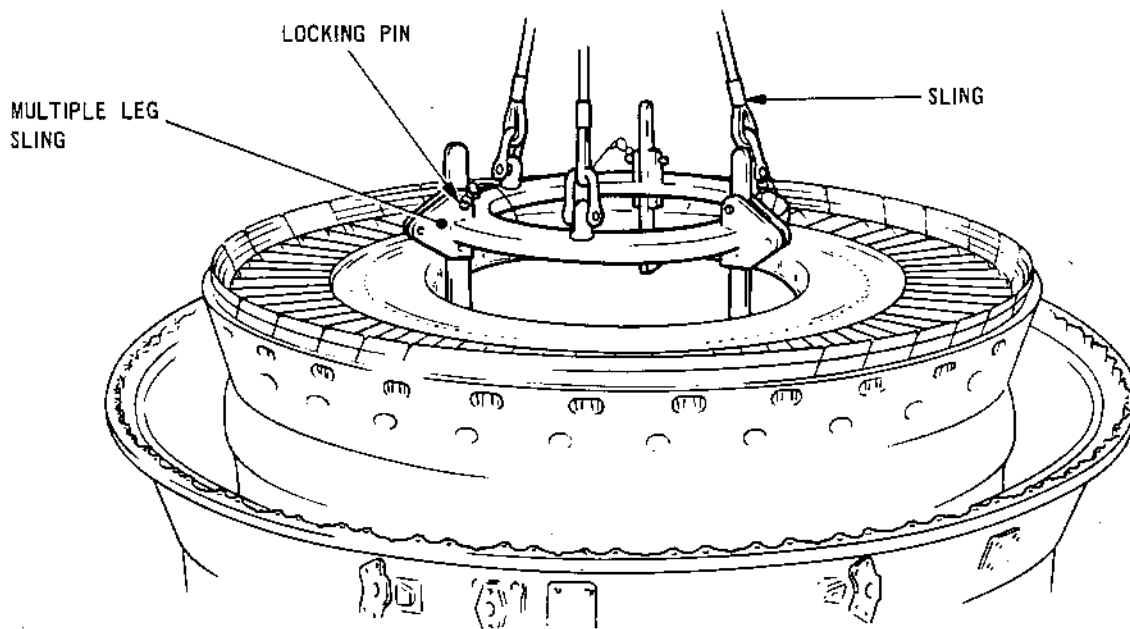
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REMOVAL OF SUPPORT CONE/COMBUSTION
CHAMBER SECURING BOLTS



VIEW ON REAR OF C.C.O.C.



Removing HP Turbine Nozzle Vane Assembly and
Combustion Chamber from C.C.O.C.
Figure 104

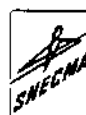
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- (5) Withdraw the nozzle vane assembly and combustion chamber from the C.C.O.C. (Ref.Fig.104).
 - (a) Remove the nuts securing the nozzle vane support cone to the bearing support.
 - (b) Attach the sling (Tool 1645) to the multiple leg sling (Tool 1155), then using a crane hoist, raise the sling assembly and position it centrally over the nozzle vane support cone.
 - (c) Retract the sling legs and carefully lower the sling into the cone. Extend the legs into the support cone and lock the legs in position by inserting pins into the appropriate holes in the tool.
 - (d) Ensure that the lifting sling legs are correctly positioned in the support cone, then carefully raise the assembly clear of the bearing support. Assemble the protector (Tool 1945) Pre SB. standard SB.72-259, 72-264 or 72-282 combustion chamber or, (Tool 3131) SB.72-259, 72-264 or 72-282 combustion chamber, then place on a pallet (Tool 1014).
 - (e) Remove the lifting sling from the support cone.
 - (f) Remove the adjusting washer from the top of the bearing support in the C.C.O.C.
- F. Remove Support Cone and Nozzle Vanes from Combustion Chamber (Ref.Fig.104).
 - (1) Using the cranked ring wrench (Tool 1556), remove the bolts located inside the support cone. If the support cone is not loose, but is held in the combustion chamber, screw bolts (just removed) into the threaded extraction holes interposed between the bolt holes in the support cone until the cone is released, then remove the bolts.
 - (2) Assemble the multiple leg sling (Tool 1155) to the support cone then carefully lift the cone away from the combustion chamber and lower onto a pallet. Remove the sling from the support and hoist, then separate the slings.
 - (3) Remove the nozzle vanes spacing ring(s) pre-SB.72-64 and retaining ring from the combustion chamber, then withdraw the nozzle vanes from the combustion chamber and place into containers (Tool 1372).
 - (4) On engines to S.B.72-124 standard, remove the sealing strips from the nozzle vanes. Place the sealing strips in a clean polythene bag.

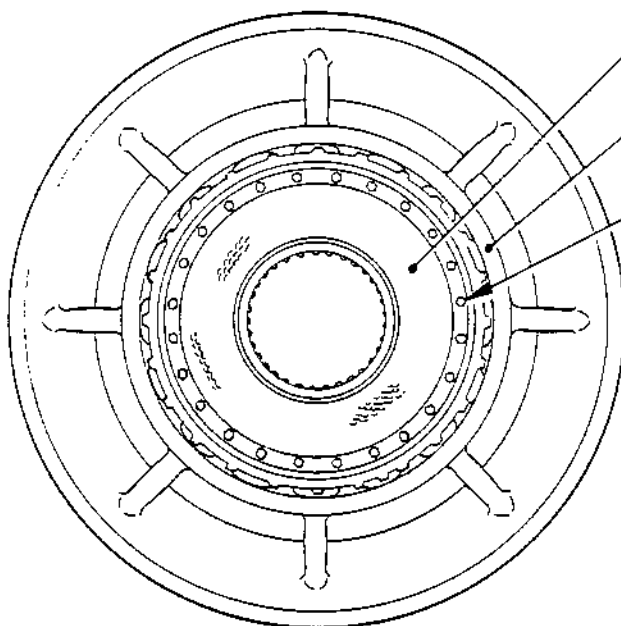


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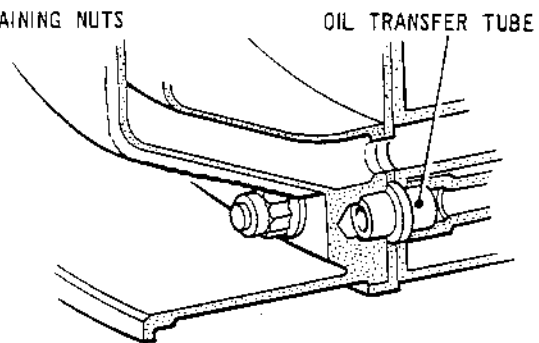


VIEW ON REAR OF BEARING SUPPORT AND SHROUD

SHROUD AND INSULATION BLANKET

BEARING SUPPORT

RETAINING NUTS



OIL TRANSFER TUBE

SECTION THROUGH SHROUD
TO SHOW OIL TRANSFER TUBE

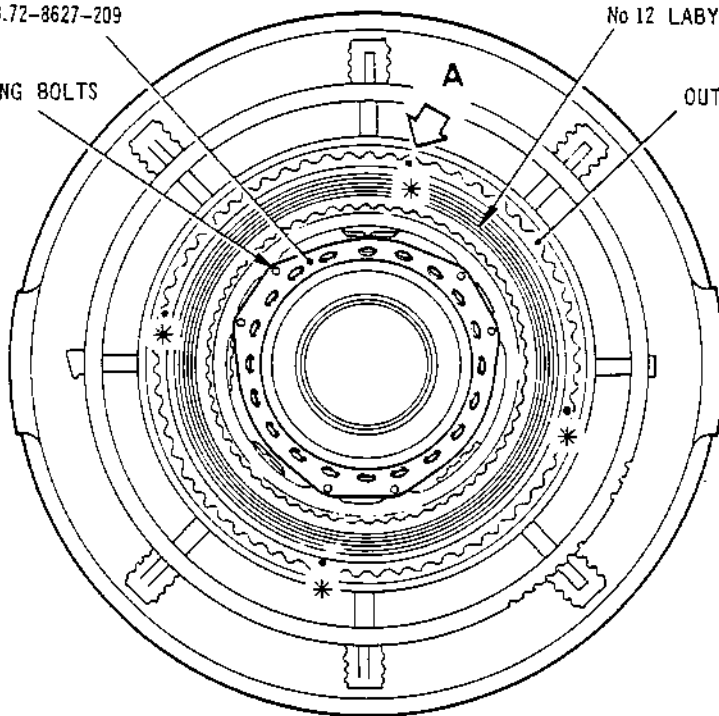
AIR DUCT INNER
PRE SB.72-8627-209

TOP

No 12 LABYRINTH SEAL

SECURING BOLTS

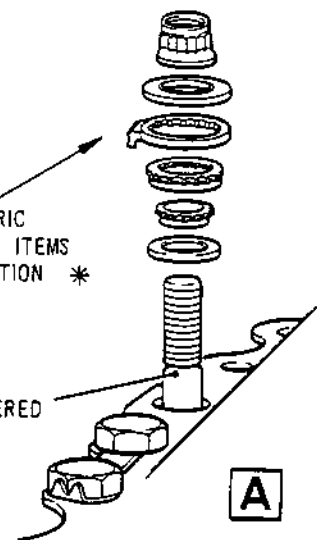
OUTER FLANGE



VIEW ON FRONT OF DIFFUSER CASE

ECCENTRIC
LOCKING ITEMS
AT POSITION *

SHOULDERED
BOLT



A

Removing Shroud/Insulation Blanket and Air Duct Inner
Figure 105

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G. Remove Shroud and Insulation Blanket from Bearing Support (Ref Fig.105).

- (1) Remove the nuts securing the insulation blanket and shroud to the bearing support, then withdraw the insulation blanket and shroud from the support. Remove the oil transfer tube from the bearing support and store in a clean container.

H. Remove Air Duct Inner (Pre SB.72-8627-209) (Ref.Fig.105).

- (1) Rotate the stand to gain access to the front of the assembly.
- (2) Remove the six bolts Pre SB.72-81 or three bolts and three nuts SB.72-81 securing the air duct inner to the air duct outer, then withdraw the air duct inner.

NOTE: The inner air duct is not required for re-assembly as it is deleted by S.B.72-8627-209.

J. Remove No.12 Labyrinth Seal (Ref.Fig.105).

CAUTION: IT IS ESSENTIAL TO USE CORRECT SIZE SPANNER TO RELEASE NUTS. SHEARING OF SERRATIONS COULD OTHERWISE RESULT.

- (1) Remove the nut, then withdraw the eccentric locking items from each of the four bolts.
- (2) Release and remove the bolts and locking plates from the outer flange and the bolts from the inner flange. Withdraw the Labyrinth seal and adjusting washers and place the labyrinth seal in container (Tool 1416) securing it with the clamps.

K. Remove HP Turbine Bearing Oil Feed and Scavenge Tubes from Bearing Housing (Ref.Fig.106).

- (1) On engines to SB.72-8800-311 standard, remove the insulation blankets covering the tube unions.
- (2) Unscrew the union nut of each tube using the cranked wrench spanner (Tool 1552) for the feed tube and spanner (Tool 1546) for the scavenge tube.
- (3) Release the tube bush and clip assemblies from the brackets attached to No.5 vane duct, then withdraw the tubes from the vane. Blank the ends of the tubes.
- (4) Remove the insulation blankets from the tubes.

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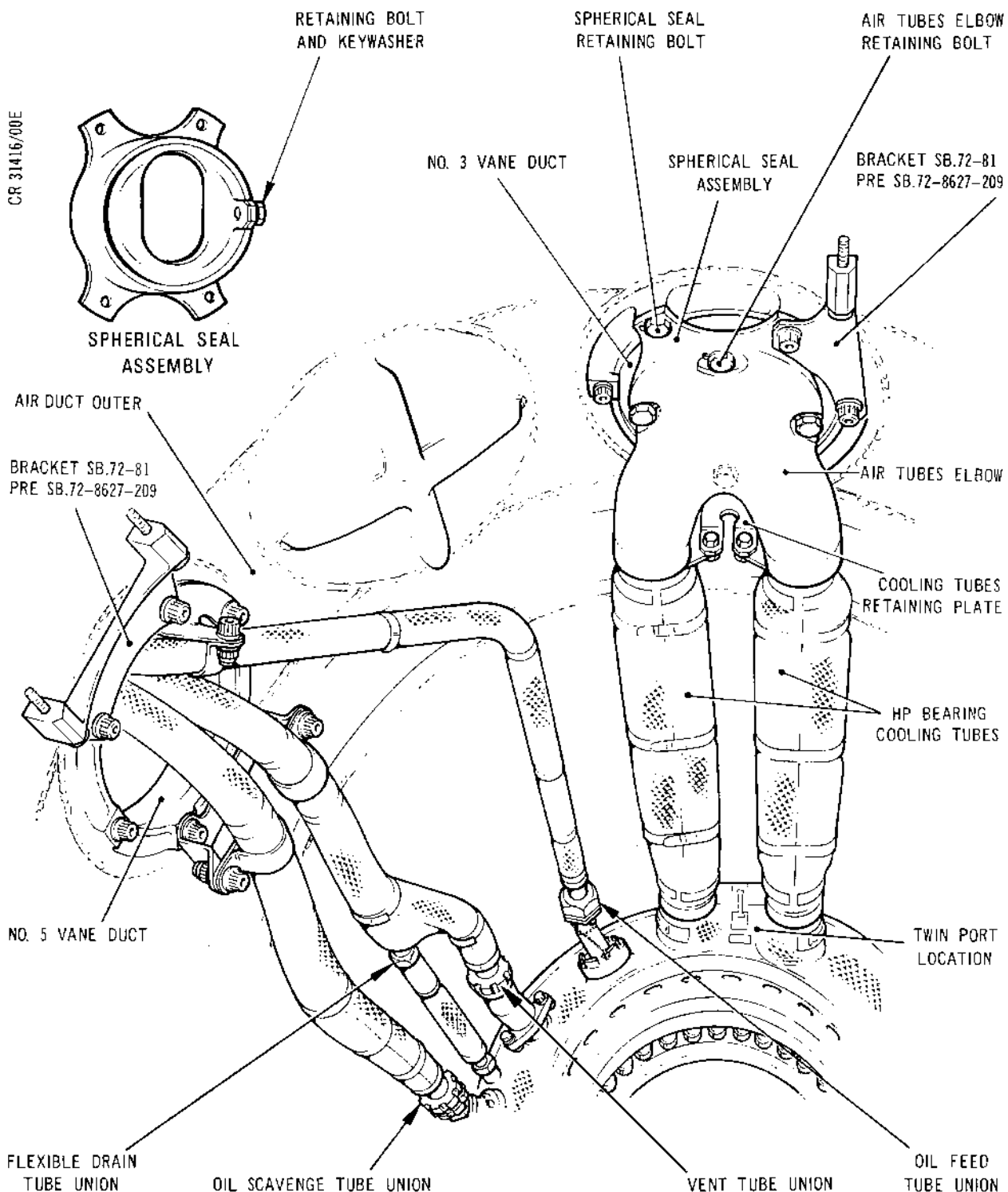
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Removing HP Turbine Bearing Tubes
Figure 106

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L. Remove HP Turbine Bearing Vent Tube and Cooling Tubes from Bearing Housing (Ref.Fig.106).

- (1) Remove the vent tube.
 - (a) Unscrew the flexible drain tube union nut using spanner (Tool 1181), then unscrew the vent tube union nut using spanner (Tool 1545).
 - (b) Release the tube bush and clip assembly from the bracket attached to No.5 vane duct, then withdraw the tube from No.5 vane. Blank the ends of the tubes.
 - (c) Release the straps and remove the insulation blankets from the tubes.
- (2) Remove the flexible drain tube union body and two washers Pre SB.72-82 or union body and washer SB.72-82 Part 1 from the branch tapping in the vent tube. Blank the union body tapping in the drain tube.
- (3) Remove the bolts and brackets from No.5 vane duct, then remove the bolts from No.6 vane duct.
- (4) Remove the cooling tubes.
 - (a) Remove the four bolts securing the air tubes elbow to No.3 vane duct, then disengage and remove the elbow from the tubes.
 - (b) Withdraw the tubes from the sub-assembly, then remove the two bolts and keywashers securing the cooling tubes to the retaining plate.
 - (c) Release the straps and remove the insulation blankets from the tubes.
- (5) Remove the spherical seal assembly and air duct outer.
 - (a) Remove the bolts securing the spherical seal housing and, if installed, the bracket SB.72-81 Pre SB.72-8627-209. Remove the housing and bracket from No.3 vane.
 - (b) Separate the spherical seal from the housing by removing the bolt and keywasher, then manipulate the seal until it can be withdrawn through the flanged end of the housing.

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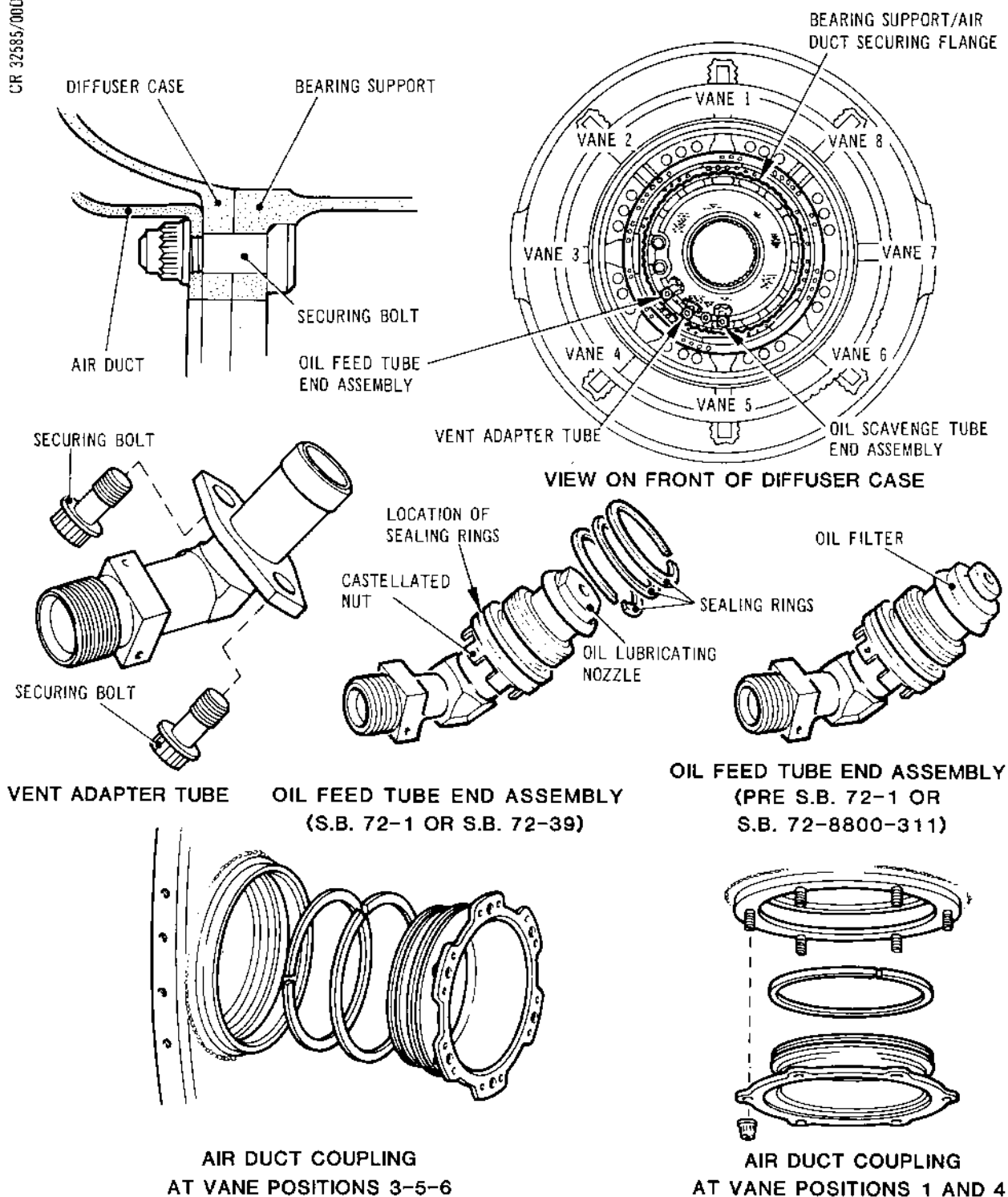


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Removing Bearing Support, Air Duct and Tube Fittings
Figure 107

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OVERHAUL



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(c) Remove the air duct outer.

(6) Remove the shank nuts from the air duct outer (Ref. S.B.72-8627-209).

M. Remove Bearing Support from Diffuser Case (Ref.Fig.107).

(1) Rotate the stand until the bearing support is in a suitable position for removal.

CAUTION: ENSURE THAT BEARING SUPPORT IS ADEQUATELY SUPPORTED DURING REMOVAL PROCEDURE.

(2) Remove the nuts and bolts securing the bearing support air duct and diffuser case together, then carefully remove the bearing support from the diffuser case.

N. Remove Air Duct from Diffuser Case (Ref.Fig.107).

(1) Withdraw the (unsecured) couplings from No.3, 4, 5 and 6 vanes.

(2) Remove the nuts securing the couplings at No.1 and 4 vanes then withdraw the couplings.

(3) Withdraw the air duct from the diffuser case.

(4) Remove the seal rings from the couplings.

P. Remove Tube Fittings from Front Cover Unit (Ref.Fig.107).

(1) Remove the oil feed and scavenge tube end assemblies from the front cover unit.

(a) Unscrew the oil feed tube end assembly castellated nut using the cranked spanner (Tool 1598), then carefully withdraw the tube end assembly from the front cover unit.

(i) On engines to Pre SB.72-1 or SB.72-8800-311 standard, remove the filter assembly from the oil feed tube end assembly. Place the filter in a clean sealed container.

(ii) On engines to SB.72-1 or SB.72-39 standard, unscrew the oil lubricating nozzle from the oil feed tube end assembly and place the nozzle in a clean sealed container.

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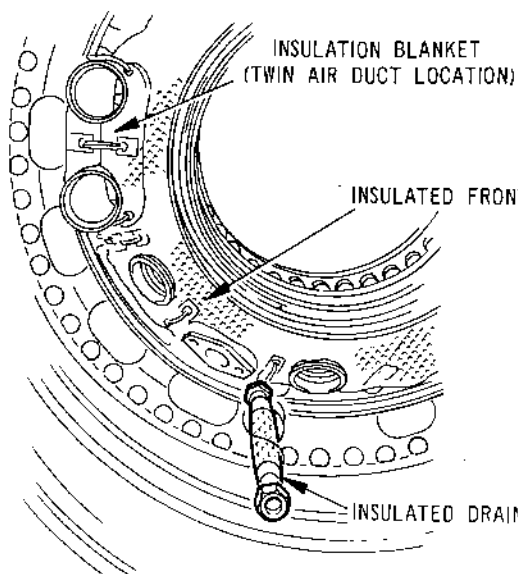
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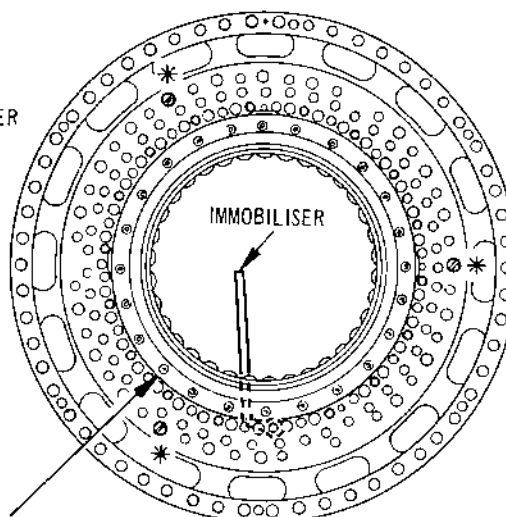


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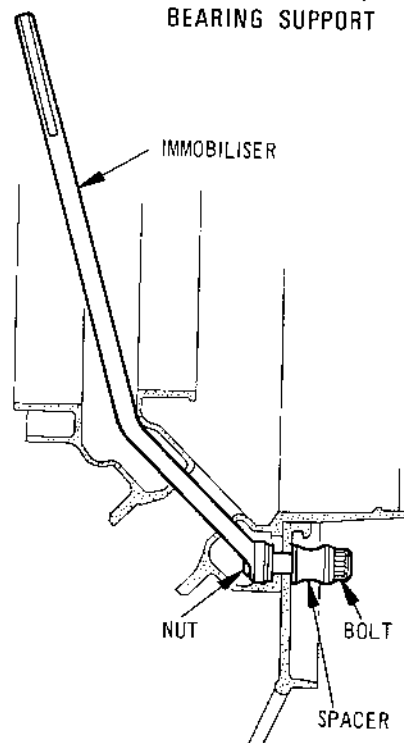
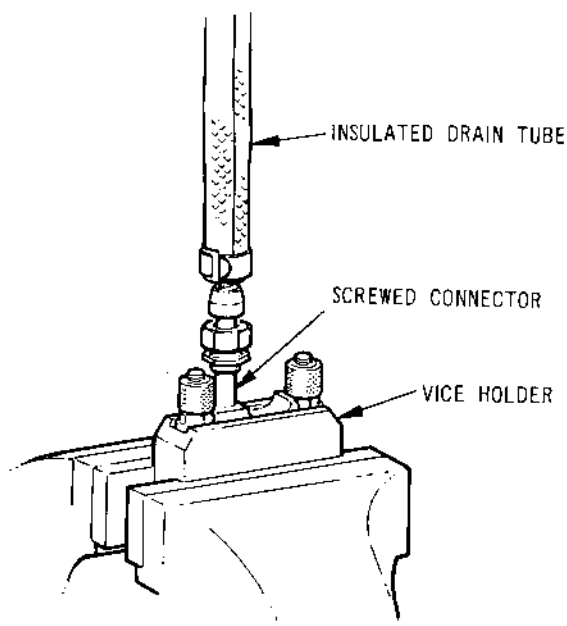
VIEW INSIDE BEARING SUPPORT

FRONT COVER COUNTERSUNK
SCREWS LOCATED AT POSITIONS *



No 16 LABYRINTH RING

VIEW ON FRONT OF
BEARING SUPPORT



VIEW OF IMMOBILISER IN
BEARING SUPPORT

Removing Front Cover Unit from Bearing Support
Figure 108

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- (b) Unscrew the oil scavenge tube end assembly castellated nut using the cranked spanner (Tool 1598), then carefully withdraw the tube end assembly from the front cover unit.
- (c) Remove the sealing rings from the tube end assemblies. Place the tube end assemblies in a clean sealed container.
- (2) Unscrew the bolts securing the vent adapter tube to the raised flange, then withdraw the adapter tube from the front cover unit.
- Q. Remove Front Cover Unit from Bearing Support (Ref.Fig.108).
 - (1) Remove the small section of insulation blanket from the twin air duct location.
 - (2) Unscrew and remove the countersunk screws from the front face of the bearing support. Carefully withdraw the insulated front cover unit from the bearing support. Remove the insulating blankets from the front cover.
 - (a) Release the wire-locking securing the insulating blankets.
 - (b) Unscrew and remove the nuts securing the insulating blanket to the front cover, then remove the insulating blanket from the cover.
 - (3) Release the retaining rings securing the screwed connector bolts to the front cover, then withdraw the insulated drain tube and screwed connector from the front cover and remove the bolts.
 - (4) Remove the insulated tube from the screwed connector.
 - (a) Assemble the screwed connector to the vice holder (Tool 968) and secure with the special washers and thumbnuts.
 - (b) Clamp the vice holder in a bench vice.
 - (c) Unscrew the drain tube union nut from the screwed connector and remove the pipe.
 - (d) Release and remove the screwed connector from the vice holder.

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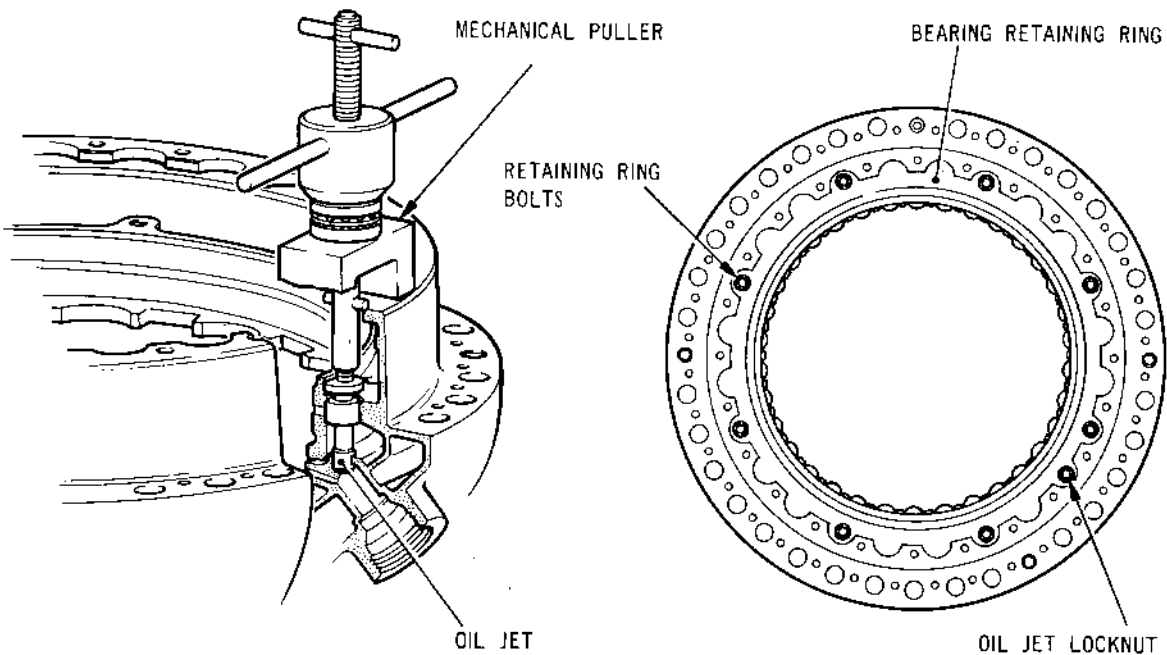
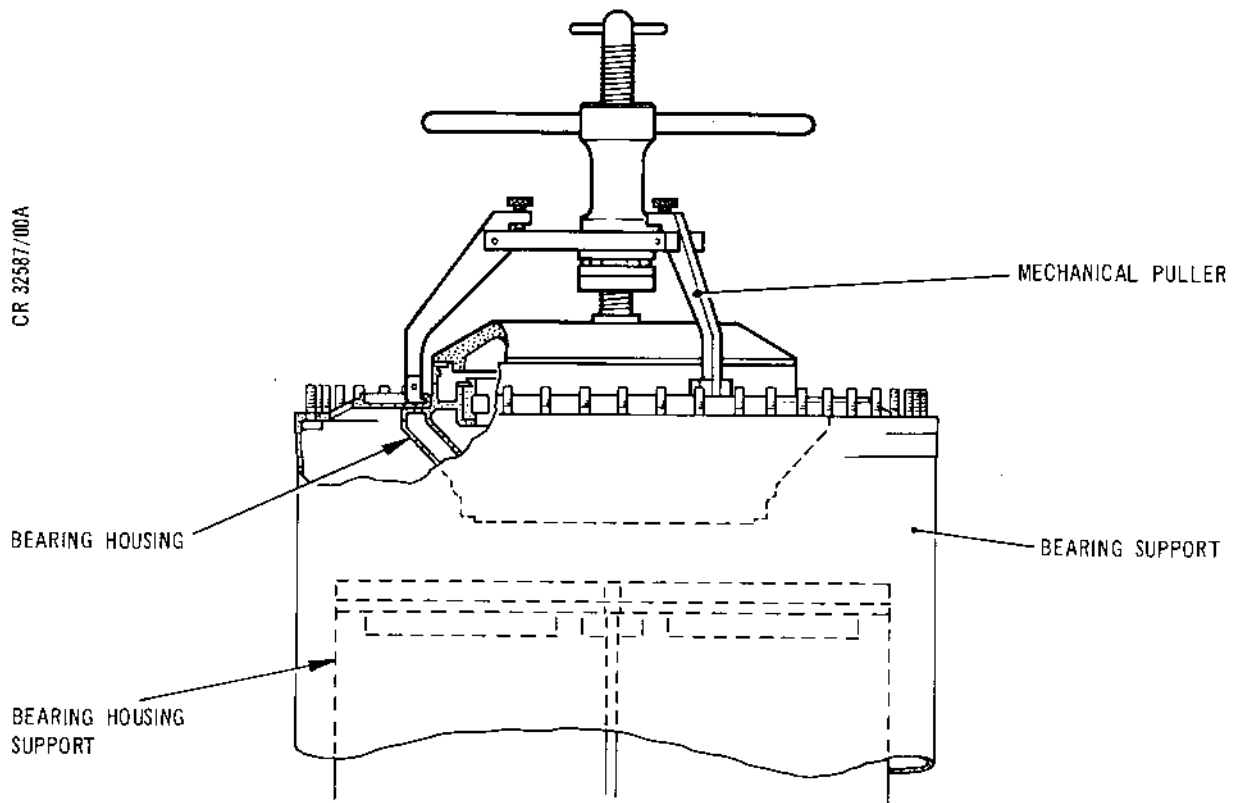


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Removing Bearing Housing and Oil Jet
Figure 109

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(e) Reassemble the special washers and thumbnuts to the vice holder, then remove the holder from the bench vice.

(5) Release the straps and remove the insulation blanket from the drains tube.

R. Remove Bearing Housing from Bearing Support (Ref.Fig.108).

(1) Remove the nuts securing No.16 labyrinth ring, then withdraw the ring.

(2) Using immobilizer (Tool 841) on the left-hand nuts, and immobilizer (Tool 842) on the right-hand nuts, remove the nuts from inside the bearing housing.

(3) Remove the bolts and spacers from the rear face of the bearing support, then withdraw the bearing housing from the bearing support.

NOTE: If the bearing housing proves difficult to remove, the following procedure (para.(4) to (7)) must be carried out (Ref.Fig.109).

(4) Place the bearing support over bearing housing support (Tool 1961) to prevent the bearing housing from dropping inside the bearing support when removed.

(5) Assemble the mechanical puller (Tool 641) to the bearing support and housing engaging the puller legs with the machined recess in the bearing support flange. Adjust the puller to engage with the bearing housing.

(6) Carefully turn the large handle of the mechanical puller until the bearing housing is removed.

(7) Remove the mechanical puller and place the bearing support on the pallet (Tool 1014).

S. Remove Bearing from Bearing Housing (Ref.Fig.109).

(1) Remove the bolts securing the retaining ring to the bearing housing.

(2) Remove the oil jet locknut, then withdraw the retaining ring.



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- (3) Withdraw the bearing assembly from the bearing housing and place into a clean sealed container.
- NOTE: If SB.72-17 is embodied, ensure that the bearing retaining ring and bearing housing are kept as a matched set.
- T. Remove Squeeze Film Oil Jet from Bearing Housing (Ref.Fig.109).
- (1) Locate the mechanical puller (Tool 587) on the bearing housing and screw the puller thrust screw into the oil jet.
 - (2) Operate the puller and carefully extract the oil jet. Remove the oil jet from the puller.
- U. Remove Engine Mounting Trunnions and Remaining Components from Diffuser Case and C.C.O.C.
- (1) Remove the diffuser case from the stand.
 - (a) Attach crane hoist to the multiple leg sling (Tool 1191), then attach the sling to the diffuser case flange.
 - (b) Remove the nuts and bolts securing the diffuser case to the stand.
 - (c) Operate the hoist and transfer the diffuser case to a suitable working area in preparation for the removal of external items.
 - (2) Remove the engine mounting trunnions.
 - (a) Ensure the trunnions are supported, then remove the securing bolts and lift the trunnions away from the diffuser case.
 - (b) Withdraw the headless pins from the diffuser case using the impact puller (Tool 1653).
 - (3) Remove the elbow and the screwed plug and washer from the left-hand trunnion location on the diffuser case.
 - (4) Remove the elbow and insulated tube assembly from the right-hand trunnion location, then withdraw the insulated tube assembly. Release the straps and remove the insulation from the tube.

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- (5) Remove the bolts securing the the air duct to No.6 vane position and remove the duct.
- (6) Remove the bolts securing the cover blanks and brackets to the diffuser case and remove the blanks.
- (7) Using the special screwdriver (Tool 1626), release the screws securing the shoulder bolts to No.12 labyrinth seal locating flange, then remove the bolts.
- (8) Release and remove the inspection port mounting boss and gasket (SB.72-58), blanking plates (Pre SB.72-75) and thermocouple mounting blocks from the CCOC.
- (9) Remove saddle plates and igniter adapters from the CCOC incorporating bolted on igniters and pilot fuel sprayer mountings.
 - (a) Remove the bolts securing the igniter adapters to the saddle plates/CCOC. Remove the adapters and gaskets.
 - (b) Remove the screws securing the inner and outer saddle plates. Remove the saddle plates and gaskets.
- (10) Remove the bolts and pins (where practicable) from all disassembled components.

V. Disassemble HP Turbine Rotor Bearing.

CAUTION: COMPONENTS MUST BE LABELLED AND KEPT TOGETHER AS A SET.

- (1) Clean the bearing prior to disassembly (Ref.72-09-00 Cleaning Process D).
- (2) Disassemble the rollers and cage from the outer track.

NOTE: The following procedure should be done in an approved clean room.

- (a) Hinge open the lever of the pliers (Tool 1982) and locate the plier jaws over a roller.

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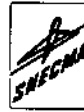
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- (b) Turn the tommy bar to apply sufficient force to the plier jaws to grip the roller, then close the lever and extract the roller from the cage.
- (c) Release the pliers and repeat the procedure until all rollers and cage are removed.
- (d) Place the rollers, cage and outer track in protective bags.

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STANDARD PRACTICES - DISASSEMBLY

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STANDARD PRACTICES - DISASSEMBLY

1. General

- A. Disassembly comprises dismantling the engine to sub-assemblies and then dismantling each sub-assembly to a sufficient depth to facilitate subsequent overhaul procedures.
- B. During the disassembly procedures it is assumed that all normal locking devices will be released prior to removing bolts, nuts, etc.
- C. Certain components (e.g. ball and roller bearings) shall be labelled, placed in clean plastic or PVC bags and passed to a 'clean room' immediately upon removal from the engine, where further disassembly and subsequent overhaul procedures are carried out. The components to which this applies are detailed in the applicable Chapters. Bearings which could be subject to unavoidable delays should be treated with a temporary corrosion protective solution (Ref. Standard Practices 72-09-00 Cleaning).
- D. It is recommended that Plus-Gas release agent is applied to bolt and/or nut threads, and allowed to soak, before attempting to remove them. This applies particularly to those components subjected to high temperatures.
- E. Approved blanks and covers shall be installed at the appropriate stages of disassembly to protect protruding items and joint faces, and to prevent the ingress of foreign matter.
- F. An initial examination of components shall be carried out as they are removed, and any evidence of defects which may be removed by cleaning shall be noted on the inspection report. These components shall then be passed to inspection for assessment of defects prior to cleaning.
- G. All self-locking nuts, captive nuts and inserts are reusable providing that they satisfy the Inspection/Check examination (Ref.72-09-00) and the locking (run-down) torque requirements specified in the relevant Sub-assembly Chapter.
- H. Appropriate measures shall be taken to collect spillage of oil, fuel, etc. as components are disconnected and/or removed.
- J. When disconnecting tubes having union nut type end fittings, the adapter and/or tube shall be prevented from turning with the union nut by using the appropriate wrenches.

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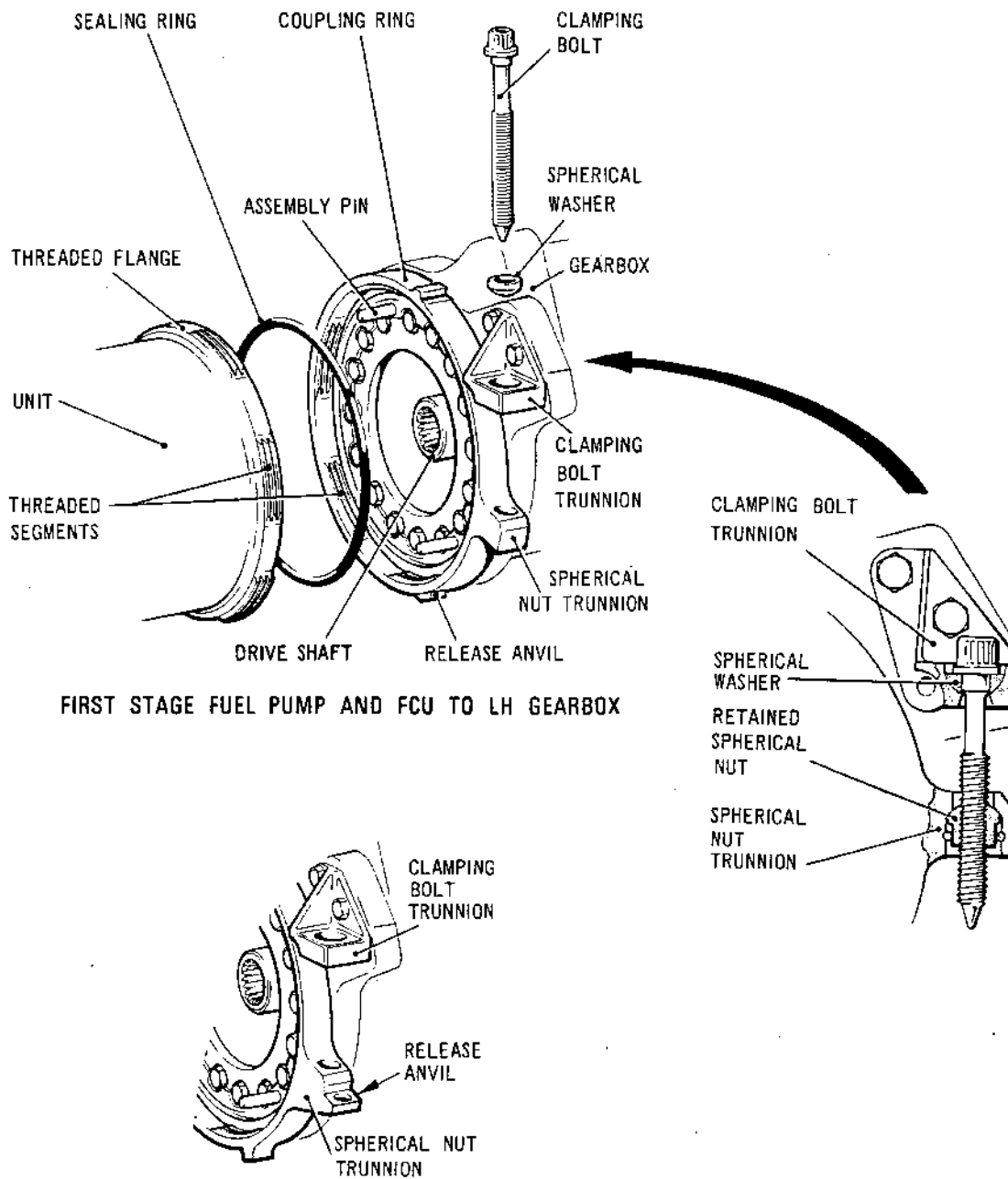


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FIRST STAGE FUEL PUMP AND FCU TO LH GEARBOX

AIR STARTER AND IDG TO RH GEARBOX

Disassembling QAD Couplings
Figure 101

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sneema

- K. Where special containers and pallets are specified they must be used to segregate and protect components after disassembly. Other suitable containers should be used to fulfil the same purposes if special ones are not specified.

2. Locking Devices

- A. Split cotter pins must be removed and locking wire must be cut and removed prior to releasing nuts, etc. Similarly, keywashers and cupwashers must be unlocked sufficiently to give unimpeded spanner access and to allow the component to rotate.
- B. Cupwashers may be re-used, subject to satisfactory inspection (Ref. 72-09-00 Inspection/Check) and reconditioning (Ref. 72-09-00 Repair). Keywashers, except multi-tabbed types designed for re-use, shall be scrapped.
- C. Split cotter pins and locking wire shall be scrapped.

3. Sealing Devices

- A. Toroidal sealing rings shall be scrapped. Seal plates and metallic sealing rings shall be segregated and returned to the manufacturer for possible reconditioning.
- B. Gaskets, 'C' seals and similar items shall be scrapped.

4. Quick Attach/Detach (QAD) Couplings (Ref.Fig.101)

- A. Support the assembly to be removed with the specified lifting equipment.
- B. Unscrew and remove the coupling ring clamping bolt and spherical washer from the locking trunnion.
- C. Use the specified drift against the flat face of the release anvil and drive the coupling ring in the direction to separate the trunnions until it is just loosened.
- D. Turn the coupling ring by hand until the threads disengage and align with their withdrawal slots.
- E. Withdraw the assembly.
- F. Install the appropriate blanks.

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5. Rim Clenching Clamp Assemblies

- A. When removing the clamp assembly, ensure that the outer eyebolt nut is released and removed prior to releasing the inner eyebolt nut.
- B. Retain the nuts with their respective eyebolts.

6. Tri-wing Fasteners (Ref.Fig.102)

- A. The size of the recess in the head of a tri-wing fastener is indicated by means of a number in a circle.
- B. It is essential when removing a tri-wing fastener that a driver bit carrying the same number as the fastener is used. The size number of the driver bit is marked on the shank, either contained within a circle or as a suffix to the part number.

7. Handling and Disposal of Asbestos Containing Materials (Ref. Tables 101 to 104)

- A. Tables 101 to 104 list all parts on the engine which contain asbestos.
- B. Dust or fibres released from asbestos containing materials or components, if inhaled, can cause serious harm to health including cancers of the respiratory system.
- C. Dust or fibres may be released during the handling of new components, as a result of the opening of asbestos containing joints and during the removal of service run components. Components subject to service running may become friable and be more prone to dust or fibre release.
- D. Asbestos present in Rolls-Royce components will be Chrysotile (white asbestos).
- E. National Health, Safety or Environmental regulations may exist which govern the handling and disposal of asbestos containing materials. It is the responsibility of the user to ensure compliance and to protect the health of employees working with such materials by preventing or containing any release, preventing personal exposure and ensuring workplace cleanliness.

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**ATP
TEMPORARY
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BRITISH AIRWAYS

OLYMPUS 593

OVERHAUL MANUAL

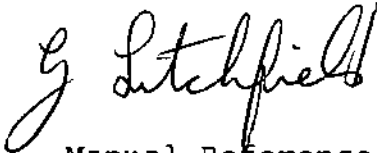
(ATP E6868)

TR Page 1 of 1

15 April, 1996

TEMPORARY REVISION No. 72-596

THIS TEMPORARY REVISION IS ISSUED BY BRITISH AIRWAYS QUALITY AND TECHNICAL SERVICES AND COMPLIES WITH BCAR'S CHAPTER A5-3, B5-3 AND/OR TSS No. 0-2 AS REQUIRED. CAA DESIGN APPROVAL No. DAI/8566/78.



For CHIEF ENGINEER QUALITY AND TECHNICAL SERVICES.

Manual Reference DISASSEMBLY 72-09-00 Page 105

REASON FOR REVISION

To include instruction to restore the interference fit of steel bushes or linings.

ACTION

Add new Paragraph 8 as follows:

8. Steel Bushes or Linings

Restore interference fit by plating in accordance with BOR 5.

Originator: TIS
Reference: -
Workbook: GE 72-56

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- F. The information given here is to assist the user in identifying the hazards and is not intended to replace national regulations, nor can it address all workplace situations. A risk assessment must be carried out by a person knowledgeable in the hazards, risks and controls necessary when working with asbestos.
- G. Components and materials must be sealed in strong plastic bags and clearly labelled as containing asbestos. An additional outer labelled bag should also be used. They must be treated as hazardous waste and be disposed of according to relevant local or national regulations.
- H. Asbestos containing materials are being replaced by non-asbestos alternatives. Some of these (eg. sheet gasket materials) may contain man-made or natural mineral fibres which may irritate the skin and respiratory system if released. Suitable precautions must be taken to avoid such irritation. Service or Modification bulletins should identify where alternatives have been authorised.

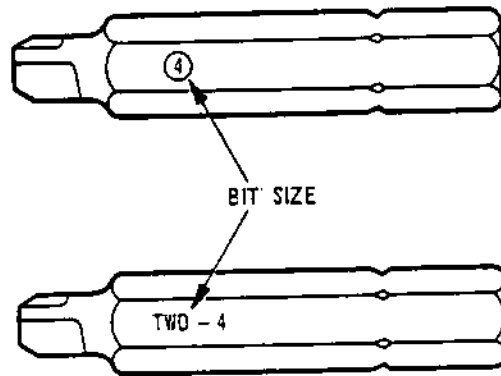


OLYMPUS 593

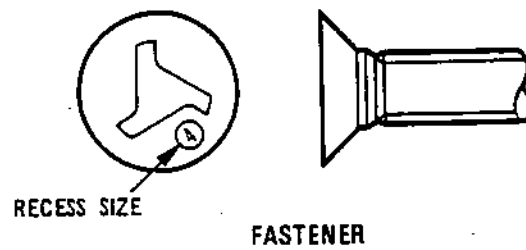


MK.610-14-28 SNECMA
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CR 33098/00A



DRIVER BIT



FASTENER

Removing Tri-wing Fasteners
Figure 102

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SNECMA

Printed in England

IPC Ref. No.	Asbestos Gasket Part No.	Non-Asbestos Gasket Part No.	IPC Ref. No.	Asbestos Gasket Part No.	Non-Asbestos Gasket Part No.
71-73-01-02-85	B492712	B517264	72-65-00-01-470	B461290	B517180
71-79-02-01-80	B484464	B517265	72-65-00-09-120	B458332	B517181
72-01-03-01-310	B479675	B517154	75-02-02-01-120	B484462	B517183
72-01-03-02-95	B479675	B517154	76-10-50-01-50	B479601	B517259
72-01-03-03-170	B484309	B517155	76-10-50-03-40	B479599	B517260
72-01-03-05-290	B479668	B517156	76-10-50-03-80	B479599	B517260
72-01-04-01-85	B479672	B517157	76-10-50-03-340	B479600	B517261
72-01-04-01-255	B479671	B517158	76-10-50-03-370	B479600	B517261
72-01-04-02-55	B479672	B517157	76-10-50-04-90	B479598	B517263
72-01-04-02-120	B479673	B517159	76-21-02-01-55	B494298	B517184
72-01-04-02-130	B470843	B517160	77-23-02-01-30	B479672	B517157
72-01-04-03-105	B479672	B517157	77-23-02-01-60	B479672	B517157
72-01-04-03-390	B470843	B517160	79-11-01-01-30	B427591	B517243
72-01-04-04-25	B470843	B517160	79-11-01-01-230	B477301	B517244
72-22-01-02-140	B484816	B517162	79-11-01-01-240	B477701	B517245
72-23-01-01-50	B484359	B517163	79-11-01-01-270	B477535	B517246
72-32-00-07-130	B484298	B517164	79-11-01-01-310	B479563	B517247
72-62-01-02-110	B461494	B517165	79-11-02-01-70	B484304	B517248
72-62-01-03-35	B479676	B517166	79-22-01-01-60	B479677	B517249
72-62-01-03-310	B461289	B517167	79-22-01-01-70	B477055	B517250
72-62-01-05-70	B479676	B517166	79-22-01-01-120	B477565	B517251
72-62-01-06-100	B461494	B517165	79-22-02-01-30	B477255	B517252
72-62-01-07-210	B461291	B517168	79-22-02-01-40	B477055	B517250
72-62-01-07-250	B479398	B517169	79-22-02-01-280	B479667	B517253
72-62-01-07-280	B479676	B517166	79-22-02-02-30	B479671	B517158
72-63-01-03-60	B477700	B517171	79-22-02-03-200	B479666	B517254
72-63-01-04-310	B445148	B517172	79-22-02-03-210	B479667	B517253
72-63-01-04-380	B479300	B577173	79-22-02-04-100	B484309	B517255
72-63-01-07-290	B484463	B517174	79-22-03-01-120	B481772	B517256
72-63-01-07-320	B444915	B517175	79-22-04-02-190	B479669	B517257
72-63-01-08-70	B477699	B577176	79-22-04-02-350	B479669	B517257
72-63-01-10-25	B482620	B517177	79-31-01-01-110	B482913	B517258
72-64-00-01-140	B482885	B517179	79-32-01-01-50	B479672	B517157

Asbestos Gaskets Removed by SB 72-9030-407
Table 101

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IPC Ref. No.	Metaflex Seal Part No.	Non-Asbestos Replacement Seal Part No.	Replacement Seal Type	Service Bulletin No.
72-31-03-03-210	B431027	-	SUPAGRAF METAFLEX	-
72-32-00-01-320	B400430	B516970	KALREZ O-RING	OL 72-9019-404
72-32-00-02-70	B400430	B516970	KALREZ O-RING	OL 72-9019-404
72-32-00-02-230	B400430	B516970	KALREZ O-RING	OL 72-9019-404
72-32-00-04-80	B444940	B516973	KALREZ O-RING	OL 72-9019-404
72-32-00-04-390	B444938	B516971	KALREZ O-RING	OL 72-9019-404
72-32-00-05-105	B444939	B516972	KALREZ O-RING	OL 72-9019-404
72-61-00-01-345	B444939	B516972	KALREZ O-RING	OL 72-9019-404
72-61-00-01-590	B444939	B516972	KALREZ O-RING	OL 72-9019-404
72-63-01-02-100	B445747 or B479349	AS43013-225	VITON O-RING	OL 72-9022-406
72-63-01-02-290	B445747 or B479349	AS43013-225	VITON O-RING	OL 72-9022-406

Metaflex Seals Containing Asbestos and their Replacements
Table 102

IPC Ref. No.	Ferrobestos Seal Part No.	Non-Asbestos Replacement Seal Part No.	Replacement Seal Type	Service Bulletin No.
72-22-01-02-80	B458169	-	FEROFORM F61	-
72-32-00-04-180	B439980	B517109	SUPAGRAF	OL 72-9026-408
72-32-00-07-120	B421372	B517108	SUPAGRAF	OL 72-9026-408
72-32-00-08-100	B421372	B517108	SUPAGRAF	OL 72-9026-408

Ferrobestos Seals Containing Asbestos and their Replacements
Table 103

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IPC Ref. No.	Ferrobestos Bush Part No.	PTFE Replacement Bush Part No.	Service Bulletin No.
77-22-03-01-040	B429736	B494996	OL 77-9025-34
77-22-03-01-090	B429736	B494996	OL 77-9025-34
77-22-05-01-040	B429736	B494996	OL 77-9025-34
77-22-07-01-040	B429736	B494996	OL 77-9025-34
77-22-07-01-080	B429736	B494996	OL 77-9025-34
77-22-09-01-040	B429736	B494996	OL 77-9025-34
77-22-09-01-080	B429736	B494996	OL 77-9025-34
77-22-09-01-110	B429736	B494996	OL 77-9025-34
77-22-09-01-150	B429736	B494996	OL 77-9025-34

Thermocouple Lead Bushes Containing Asbestos and
their Replacements
Table 104

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AIR INLET SECTION - DISASSEMBLY

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DISASSEMBLY

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AIR INLET SECTION - DISASSEMBLY

1. General

- A. Prior to commencing disassembly refer to 72-09-00 Disassembly for general information.
- B. During disassembly reference is made to vane positions, the vanes being numbered from one to five counter-clockwise when viewed from the front face, with No.1 vane at the top.
- C. Throughout the text, special tools are quoted by their reference number; e.g. Tool 1324. For a complete list of the tooling required for assembly and for the Manufacturer's Part Number, refer to Special Tools, Fixtures and Equipment, Table 1001.

2. Disassemble the Air Inlet Section

- A. Assemble the Air Intake Case to the Stand (Ref.Fig.101).

NOTE: Two methods are given for attaching the air intake case to the stand (Ref.para.(2) and (4)). The method of para.(2) applies if the case is stored front face up, and the method in para.(4) if the case is stored front face down.

- (1) Assemble the holding fixture (Tool 1254) to the stand (Tool 1320) (Ref.Fig.101).

NOTE: This para. is applicable only if the method of para.(2) is to be used and the holding fixture is not already assembled to the stand.

- (a) Attach the lifting eye of the multiple leg sling (Tool 1255) to a hoist and position the hoist over the holding fixture. Attach the three shackles of the sling to the eyebolts of the fixture, and raise the fixture.
- (b) Ensure that the brackets of the stand extend upwards. Traverse the fixture beneath the brackets, then raise the fixture to abut the brackets. Align the bolt-holes and secure with the eight nuts and bolts.

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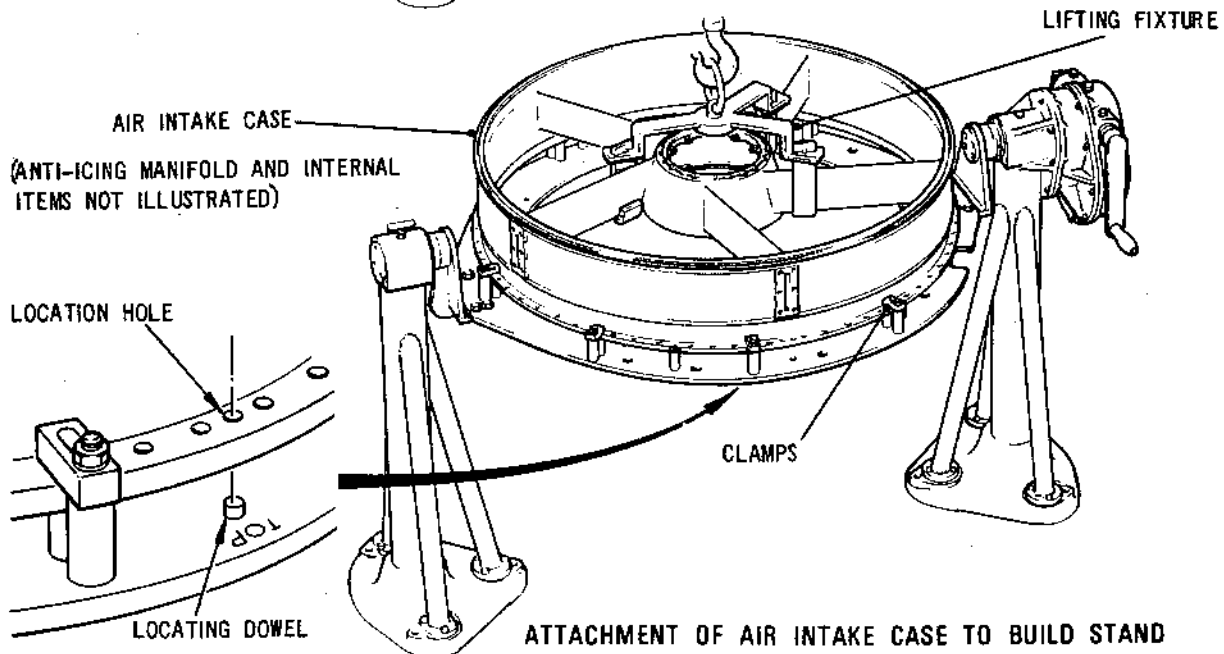
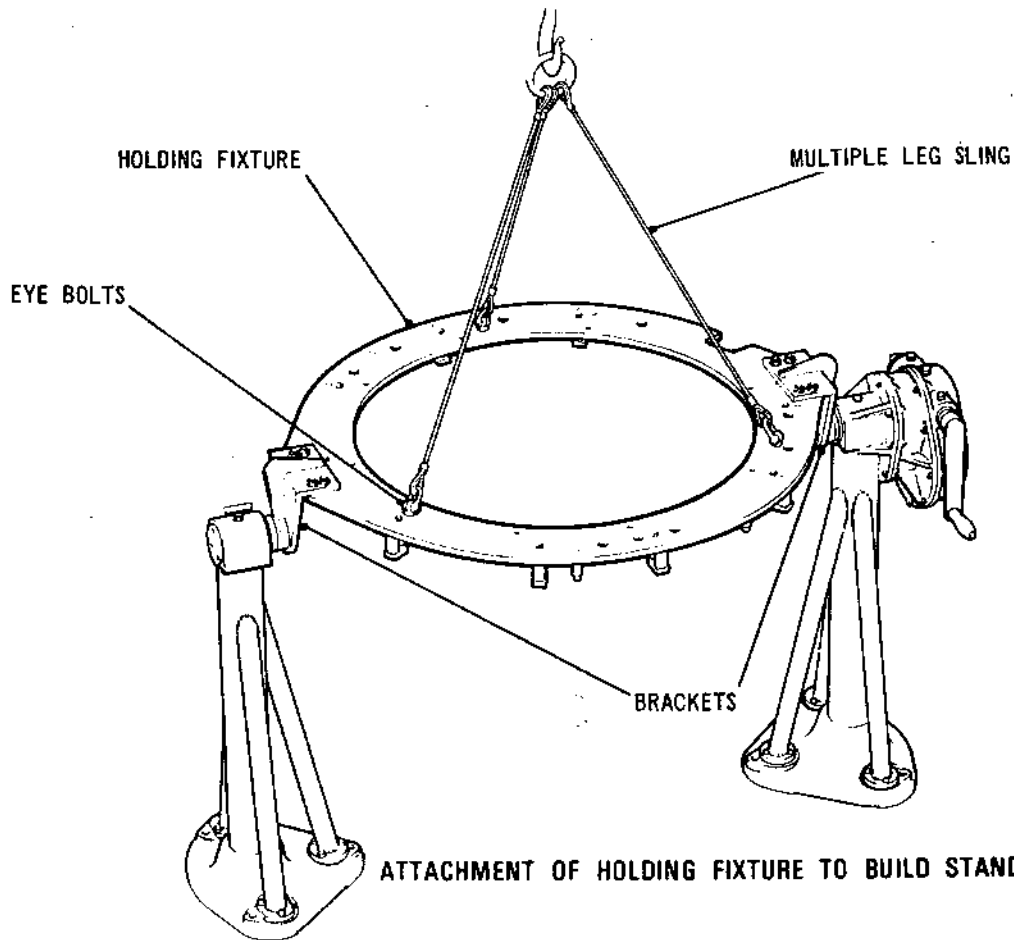


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CR 32440/00B



Assembling Air Intake Case to Stand
Figure 101

TN40357



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- (c) Release the shackles from the eyebolts, then move the sling away from the holding fixture and release the hoist. Rotate the stand handle and invert the fixture so that the eyebolts point downwards.
- (2) Assemble the air intake case to the holding fixture (Ref.Fig.101).

NOTE: This para. is only applicable if the case is stored front face up.

- (a) Attach the lifting ring of the lifting fixture (Tool 894) to the hoist, then position the fixture over the intake case. Lower the fixture and engage its legs under three of the case vanes, then raise the case off the pallet and position it above the holding fixture.
- (b) Ensure that the clamps of the holding fixture face outwards and are clear of the case rear flange. Align the locating hole on the flange near vane No.1 with the short dowel on the fixture and lower the case onto the fixture. Screw the captive bolts of the holding fixture into the threads in the intake case rear flange, then turn the holding fixture clamps onto the intake case flange and tighten their retaining nuts.
- (c) Lower the hoist, release the lifting fixture legs from the intake case vanes, then raise the lifting fixture clear of the case. Remove the fixture from the hoist.
- (3) Remove the holding fixture (Tool 1254) from the stand (Tool 1320).

NOTE: This para. is only applicable if the method of para.(4) is to be used and if the holding fixture is assembled to the stand.

- (a) Invert the build stand so that the bottom face of the holding fixture is uppermost, then secure the shackles of the multiple leg sling (Tool 1255) to the eye-bolts of the fixture.

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- (b) Support the weight of the holding fixture with the lifting equipment, then release and remove the eight nuts and bolts securing the holding fixture to the stand.
- (c) Lower the fixture and traverse from under the brackets of the stand.
- (4) Assemble the air intake case to the holding fixture.

NOTE: This para. is only applicable if the case is stored front face down.

- (a) Ensure that the clamps of the holding fixture face outwards, rotate the fixture to align the locating hole on the rear flange near vane No.1 with the short dowel on the fixture and carefully lower the fixture onto the case ensuring that the cut-out on the fixture clears the anti-icing duct at vane 2 (Ref.Fig.102).
 - (b) Screw the captive bolts of the holding fixture into the threads in the intake rear flange, then turn the holding fixture clamps onto the intake case flange and tighten the retaining nuts.
 - (c) Raise the hoist and traverse the fixture beneath the brackets of the build stand which should be pointing upwards.
 - (d) Raise the fixture to engage with the brackets, and secure with the eight bolts and nuts.
 - (e) Release the shackles from the eye-bolts, remove the sling from the hoist and rotate the stand to bring the front face of the case uppermost.
- B. Remove the Rear Baffle and Labyrinth Housing (Ref.Fig.102).
- (1) Rotate the stand to invert the case.
 - (2) Remove the 18 bolts securing the rear baffle to the air intake case, and the 18 bolts securing the rear baffle to the inner baffle, then remove the nine bolts securing the rear baffle and labyrinth housing to the bearing housing.

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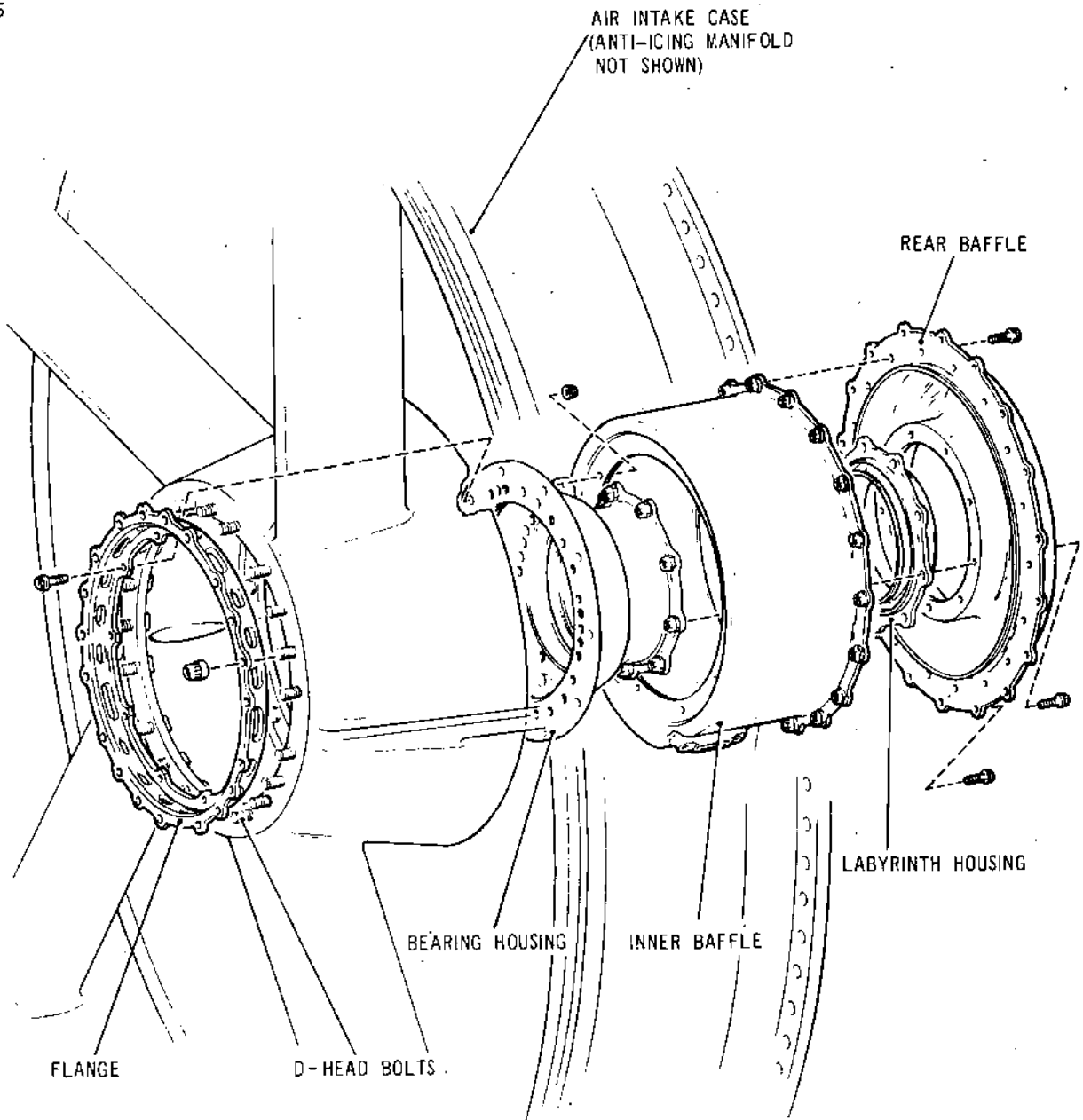
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Removing Items from Air Intake Inner Case
Figure 102

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- (3) Lift the rear baffle and labyrinth housing from the assembly and place in container (Tool 1466).

C. Remove the Lubrication System Components (Ref.Fig.103).

- (1) Screw the puller (Tool 888) into the threads of the filter housed in the oil feed flange at vane No.3. Pull the filter from the housing, then remove the puller from the filter.
- (2) Remove the eight bolts securing the oil feed flange to the oil tube and anti-icing duct at No.3 vane. Remove the flange and gasket if SB.72-35 is embodied, then attach a protector (Tool 1879) to the sealing face of the flange.
- (3) Remove the eight bolts securing the oil scavenge flange and bracket to the oil tube and anti-icing duct at No.4 vane. Remove the flange, bracket and gasket if SB.72-35 is embodied, then attach a protector (Tool 1879) to the sealing face of the flange.
- (4) Using cranked wrenches (Tool 880 and 881), release the two nuts securing the olive ends of the two inner oil tubes, then slide the nuts along the tubes away from the bearing housing. Using ring wrenches (Tool 1604 and 1605), remove the four nuts and bolts securing the outer ends of the two inner oil tubes to the flanges of the outer oil tubes located in No.3 and No.4 vane.

NOTE: If SB.72-80 is embodied the nut securing the nut retainer must be released last.

- (5) Pull the outer end of the inner oil tubes away from the flanges, then gradually withdraw the olive ends of the inner oil tubes from the bearing housing until released. Attach protectors (Tool 893) to the sealing faces of the oil tubes.

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DISASSEMBLY

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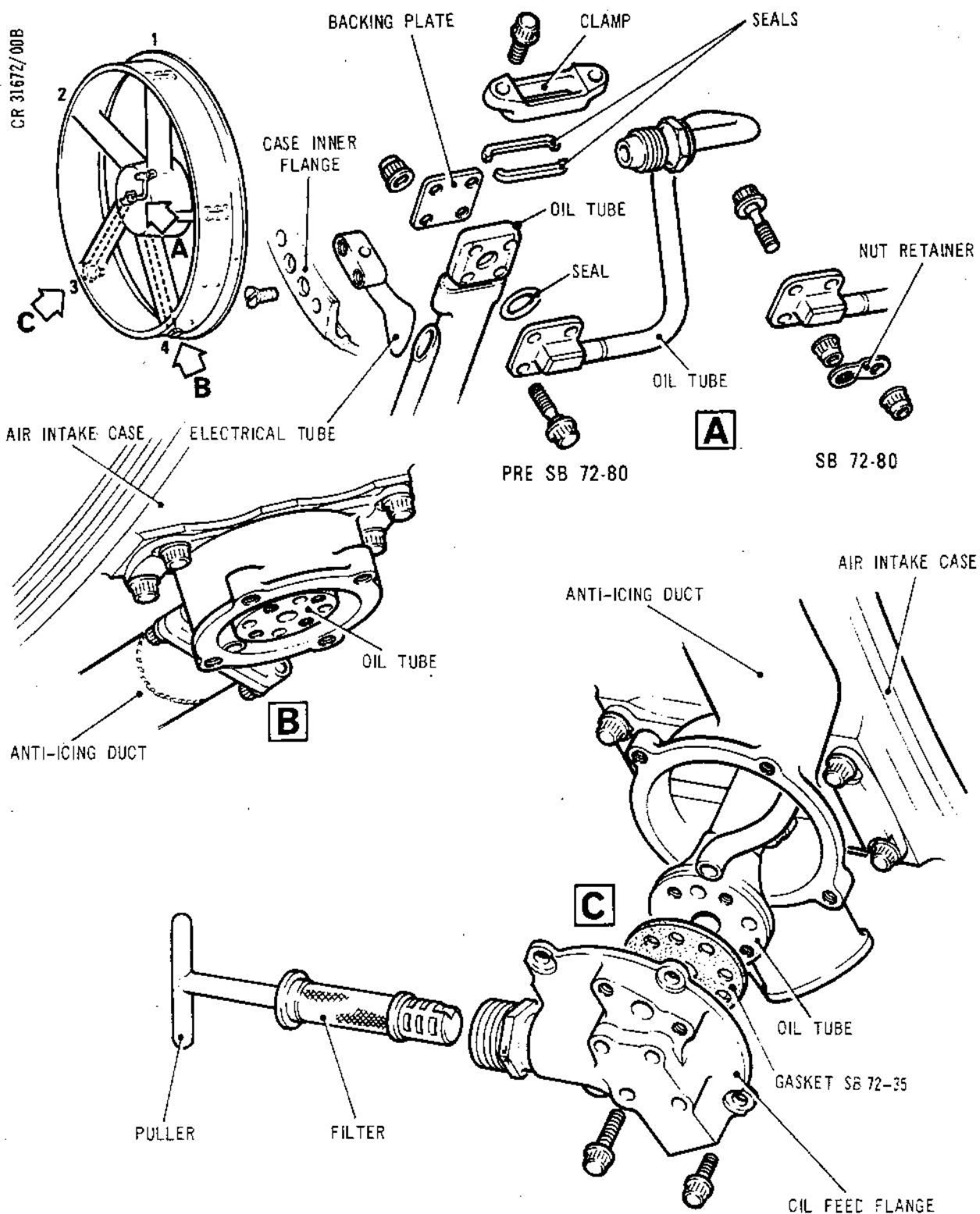


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Removing Oil Tubes from Air Intake Case
Figure 103

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- (6) Remove the two bolts and detach the two clamps retaining the seals at the inner ends of the outer oil tubes and inner baffle. Gently prise the oil tubes at the inner end to free them from the seals, then withdraw the tubes from the outer end of vanes. If the oil tubes are difficult to remove, secure the adapter (Tool 519) to the outside end of the tubes with engine bolts, then screw the impact puller (Tool 1690) into the adapter and operate the puller to remove the tube. Release and remove the puller and adapter. Attach protectors (Tool 893 and 889) to the oil tube sealing faces.

D. Remove and Disassemble Bearing Housing Assembly (Ref. Fig.102).

- (1) Remove the 10 nuts and bolts securing the inner baffle assembly and bearing housing to the front flange of the case. Remove the inner baffle assembly, then lift out the bearing housing complete with the bearing and place on a bench.
- (2) Unscrew and remove the seven bolts attaching the bearing retaining plate to the housing, then lift the retaining plate off the three headless locating pins. Gently apply thumb pressure to the bearing inner face and withdraw the bearing. Place the inner baffle, retaining plate and bearing housing in container (Tool 1466).

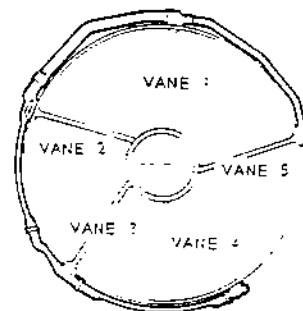
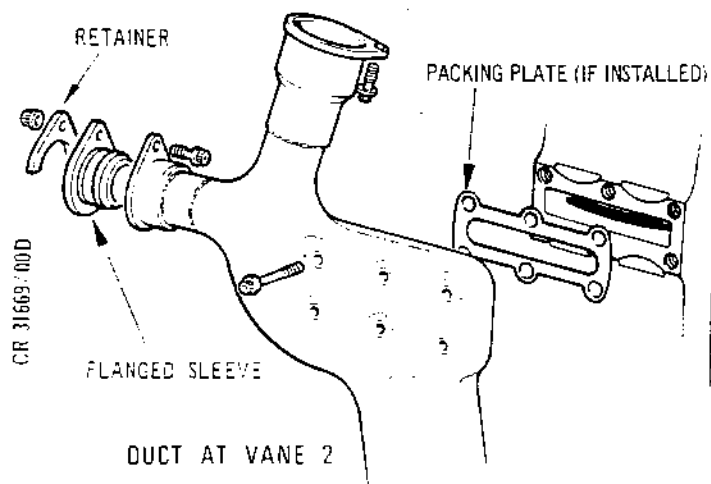
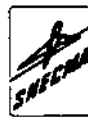
E. Remove the Front Flange and Tube (Ref.Fig.102 and 103).

- (1) Unscrew and remove the 20 nuts from the D-headed bolts securing the front flange to the air intake case and pull the front flange from the case. Place the front flange in container (Tool 1466).
- (2) Turn the bolts so that their D-heads are clear of the groove in the case, then withdraw the bolts.
- (3) Unscrew and remove the two countersunk headed bolts from the front flange of the case and remove the electrical tube.

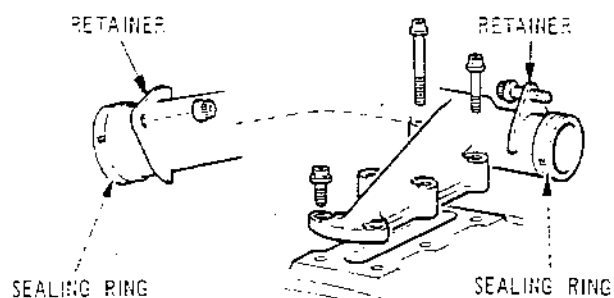
F. Remove the Anti-icing Manifold (Ref.Fig.104).

- (1) Remove the duct at vane 5.
 - (a) Remove the securing nut, bolt and retainer at vane 1.

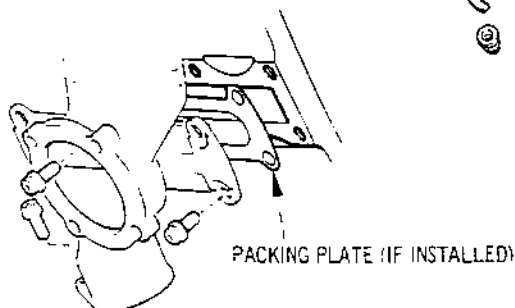
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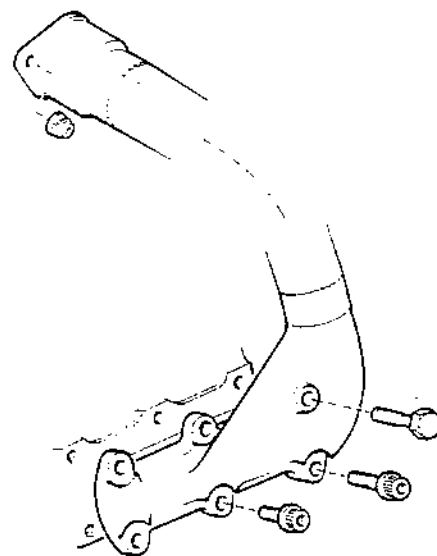
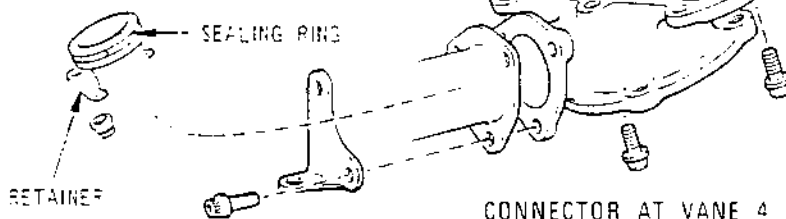
VIEW ON FRONT OF ENGINE



SEALING RING



RETAINER



DUCT AT VANE 5

Removing Anti-icing Manifold from Outer Case
Figure 104



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- (b) Remove the six bolts securing the duct to the intake case at vane 5 and detach the duct.
- (2) Remove the duct at vane 1.
 - (a) Remove the securing nut, bolt and retainer at vane 2.
 - (b) Remove the six bolts securing the duct to the intake case at vane 2 and detach the duct.
 - (c) Remove the sealing rings from the duct.
- (3) Remove the duct at vane 2.
 - (a) Remove the securing nut, bolt and retainer between vane 2 and vane 3.
 - (b) Remove the six bolts securing the duct to the intake case at vane 2 and detach the duct together with packing plate if installed.
 - (c) Remove the flanged sleeve from the inlet connection.
- (4) Remove the connector at vane 4.
 - (a) Remove the three bolts securing the bracket and duct to the connector at vane 4.
 - (b) Remove the six bolts securing the connector to the intake case at vane 4 and remove the connector.
 - (c) Attach protector (Tool 879) to the connector.
- (5) Remove the duct at vane 3.
 - (a) Remove the securing nut, bolt and retainer at vane 3, then remove the duct leading to vane 4.
 - (b) Remove the six bolts securing the duct to the intake case at vane 3 together with packing plate if installed and detach the duct. Attach protector (Tool 879) to the face of the duct.
 - (c) Remove the sealing rings from both ducts.
- (6) Place all removed components into container (Tool 1880).

DISASSEMBLY

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G. Disassemble LP Compressor Rotor Front Bearing.

CAUTION: COMPONENTS MUST BE LABELLED AND KEPT TOGETHER AS A SET.

- (1) Clean the bearing prior to disassembly (Ref.72-09-00 Cleaning Process D).
- (2) Disassemble the rollers and cage from the outer track.

NOTE: The following procedure should be done in an approved clean room.

- (a) Hinge open the lever of the pliers (Tool 1983) and locate the plier jaws over a roller.
- (b) Turn the tommy bar to apply sufficient force to the plier jaws to grip the roller, then close the lever and extract the roller from the cage. Release the pliers from the roller.
- (c) Repeat the procedure until all the rollers are removed, then withdraw the cage.
- (d) Place the rollers, outer track and cage in protective bags.

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AIR INTAKE FAIRING - DISASSEMBLY

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For information on the disassembly of the Air
Intake Fairing, refer to 71-00-01 Disassembly.

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72-21-01

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AIR INTAKE CASE - DISASSEMBLY

For information on the disassembly of the Air
Intake Case, refer to 72-20-00 Disassembly.

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72-22-01

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LP COMPRESSOR ROTOR FRONT BEARING SUPPORT - DISASSEMBLY

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For information on the disassembly of the LP Compressor
Rotor Front Bearing Support, refer to 72-20-00 Disassembly.

TN29603

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LP COMPRESSOR ASSEMBLY - DISASSEMBLY

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LP COMPRESSOR ASSEMBLY - DISASSEMBLY

1. General

- A. Prior to commencing the disassembly, refer to 72-09-00, Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly refer to Special Tools, Fixtures and Equipment Table 1001.
- C. The LP compressor assembly will be received, rear flange uppermost, from the Engine Bulk Disassembly. The LP thrust bearing assembly will have been removed from the compressor and a balancing bearing assembly assembled in its place to which a rear bearing adapter plate is attached and slave exit guide vane cases interspersed between the adapter plate and rear flange of the LP case. A balancing bearing adapter is also assembled to the front of the compressor, the outer rim of the adapter is spigot located in the mobile stand which supports the assembly. The rotating assembly is supported by the rear bearing adapter.
- D. If a check balance of the LP compressor assembly is required, remove the assembly from the mobile stand, turn it to the horizontal position, then assemble it to the balancing machine. Carry out the balancing procedure in accordance with 72-31-00 Assembly para.13. Should a check balance of the individual rotor disks be required during disassembly refer to 72-31-03 Assembly.
- E. To facilitate disassembly the compressor will require removing from the mobile stand, turned through 180 deg, (front flange uppermost) and then assembled to the disassembly stand. During the "turning over" procedure both front and rear bearing adapters will remain assembled to the compressor. The compressor will be disassembled only as far as the stage 6 stator vanes, the case will be raised from the slave exit guide attachment flange and transferred to 72-31-01 for disassembly of the stage 6 stator vanes and brackets. The remaining stage 7 rotor disk, spacer ring and rotor shaft rear will be transferred to the turnover stand for removal of the rear bearing adapter and balancing bearing assembly. The vane fixing rings will be disassembled under 72-31-01.

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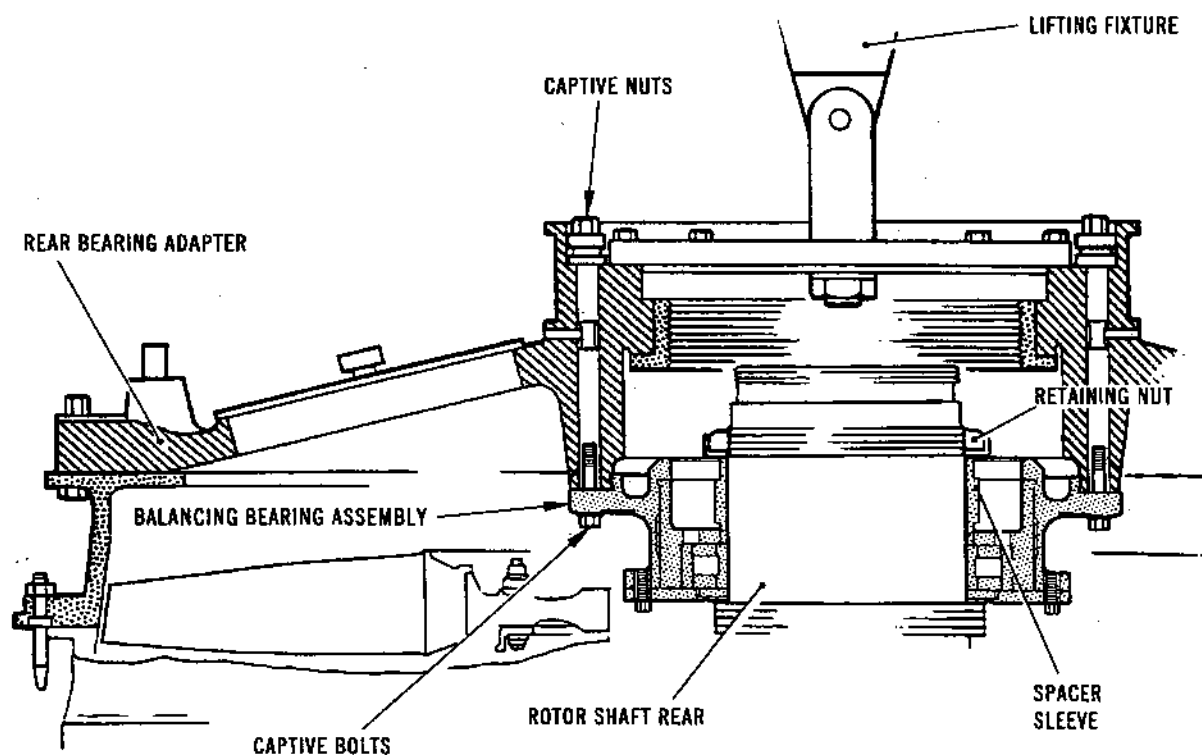
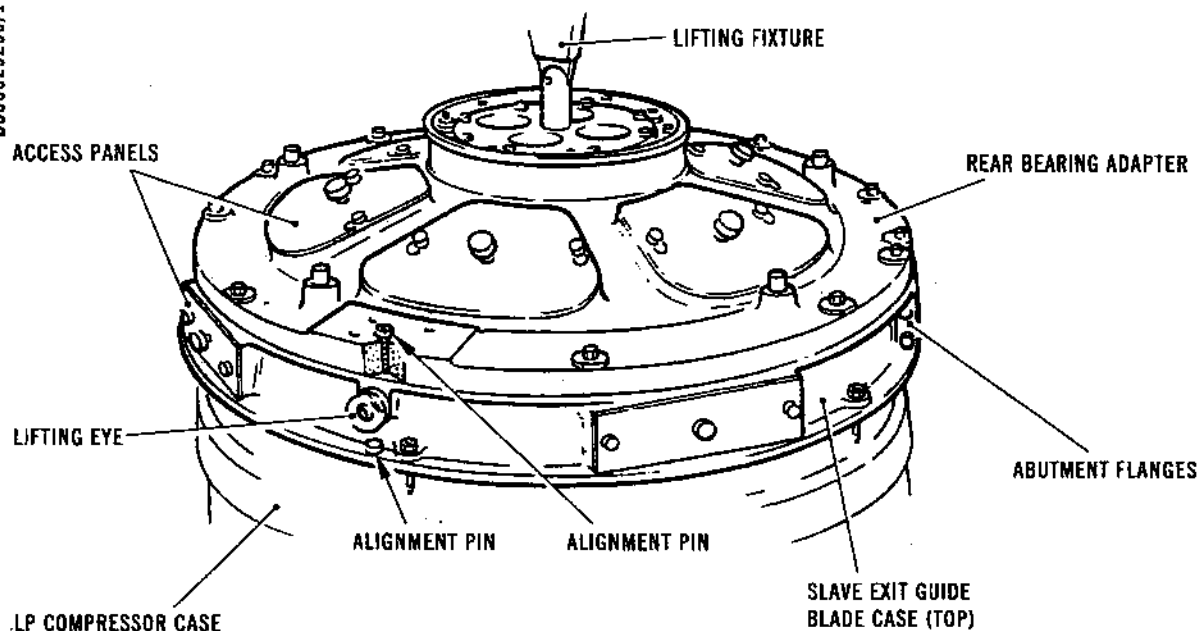
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Checking Correct Assembly of Rear Bearing Adapter
to Slave Bearing Assembly
Figure 101

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2. Prepare the LP Compressor Assembly for Disassembly

A. Remove the LP Compressor Assembly from the Mobile Stand.

- (1) Check that the rear bearing adapter (3163) is correctly assembled to the LP compressor rear flange and that the inner ring of bolts securing the rear adapter to the balancing bearing assembly are tight (Ref.Fig.101).
- (2) Ensure that the lifting fixture (Tool 1096) has eight captive bolts, then offer the fixture to the rear bearing adapter aligning the offset captive bolt and threaded hole. Screw in and fully tighten the bolts. Check that the LP case front flange is securely bolted to the front bearing adapter (Tool 588).
- (3) Attach a hoist to the lifting fixture (Tool 1096), then moving the hoist as necessary, raise the compressor assembly until it clears the mobile stand.

B. Turn the LP Compressor Assembly to the Horizontal Position.

- (1) Identify the offset bolt position in the trunnion adapter (Tool 1097) then align it with the corresponding offset tapped hole in the front bearing adapter (Tool 588), screw in the four captive bolts and fully tighten.
- (2) Ensure the two locking bars of the front support (Tool 1076) are released. Raise the hoist and position the assembly so that the trunnion adapter aligns with the support (Tool 1076). Operate the hoist as necessary to align the trunnion adapter bar (Tool 1097) so that it rests in the support (Tool 1076). Secure the trunnion adapter bar with the two locking bars of the support.



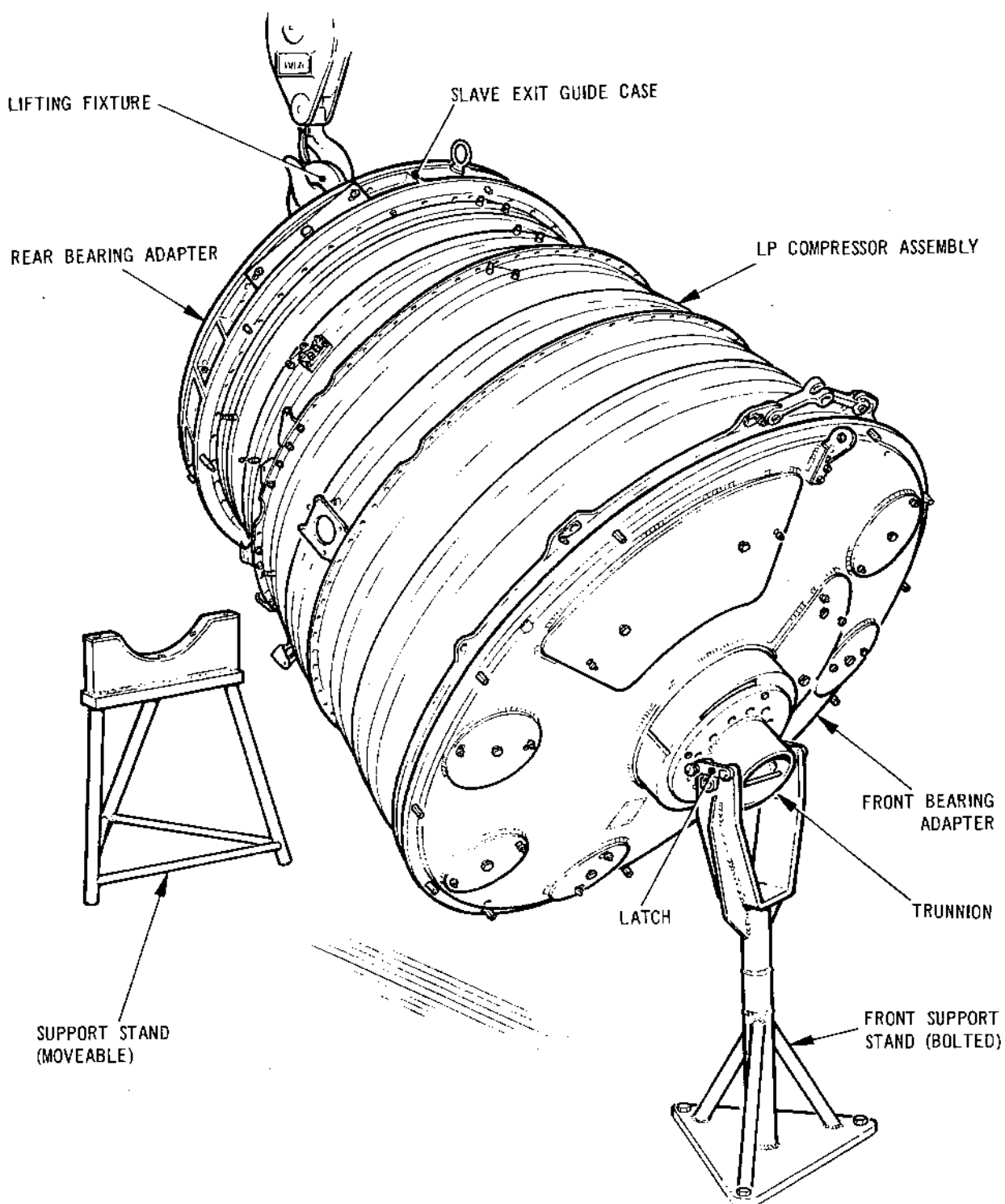
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Lowering the Compressor Assembly into the Horizontal Position
Figure 102

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WARNING: AVOID JERKING THE HOIST WHEN TRAVERSING TO OBVIATE THE DANGER OF DISENGAGING THE FRONT TRUNNION FROM THE SUPPORT.

- (3) Ensure that the eye of the lifting fixture (Tool 1096) points to the top of the compressor case, easily recognized by the lifting point on the front bearing adapter. Slowly lower the compressor assembly, pivoting about the front support. Continue to lower the assembly, simultaneously adjusting the traverse on the hoist to coincide with the changing angle of the compressor assembly until it reaches the horizontal position (Ref.Fig.102).

C. Turn the LP Compressor Assembly Front Bearing Adapter Uppermost.

- (1) Position the rear support (Tool 1306) to locate in the channel of the rear bearing adapter (Tool 344), it may be necessary to raise/lower the hoist for final adjustment. Lower the hoist then remove the hook from the lifting fixture.
- (2) Attach the hoist to the lifting beam (Tool 1056), then position the beam over the LP compressor assembly so that the whips of the beam align the lifting eyes on the front and rear adapters. Secure the whips to the compressor assembly with the two shackles (Ref.Fig.103).

NOTE: The lifting beam adjustment handle should be to the front of the LP compressor assembly.

- (3) Release the locking bars of the support stand (Tool 1076), then steadily raise the hoist adjusting the lifting beam (if necessary) to support the compressor assembly in the horizontal position. Raise the compressor clear of the supports.
- (4) Unscrew and remove the lifting fixture from the rear bearing adapter. Remove the trunnion adapter from the front bearing adapter, then assemble the same trunnion adapter to the rear bearing adapter and tighten the trunnion securing bolts. Assemble the lifting fixture (Tool 1098) to the front bearing adapter and secure.

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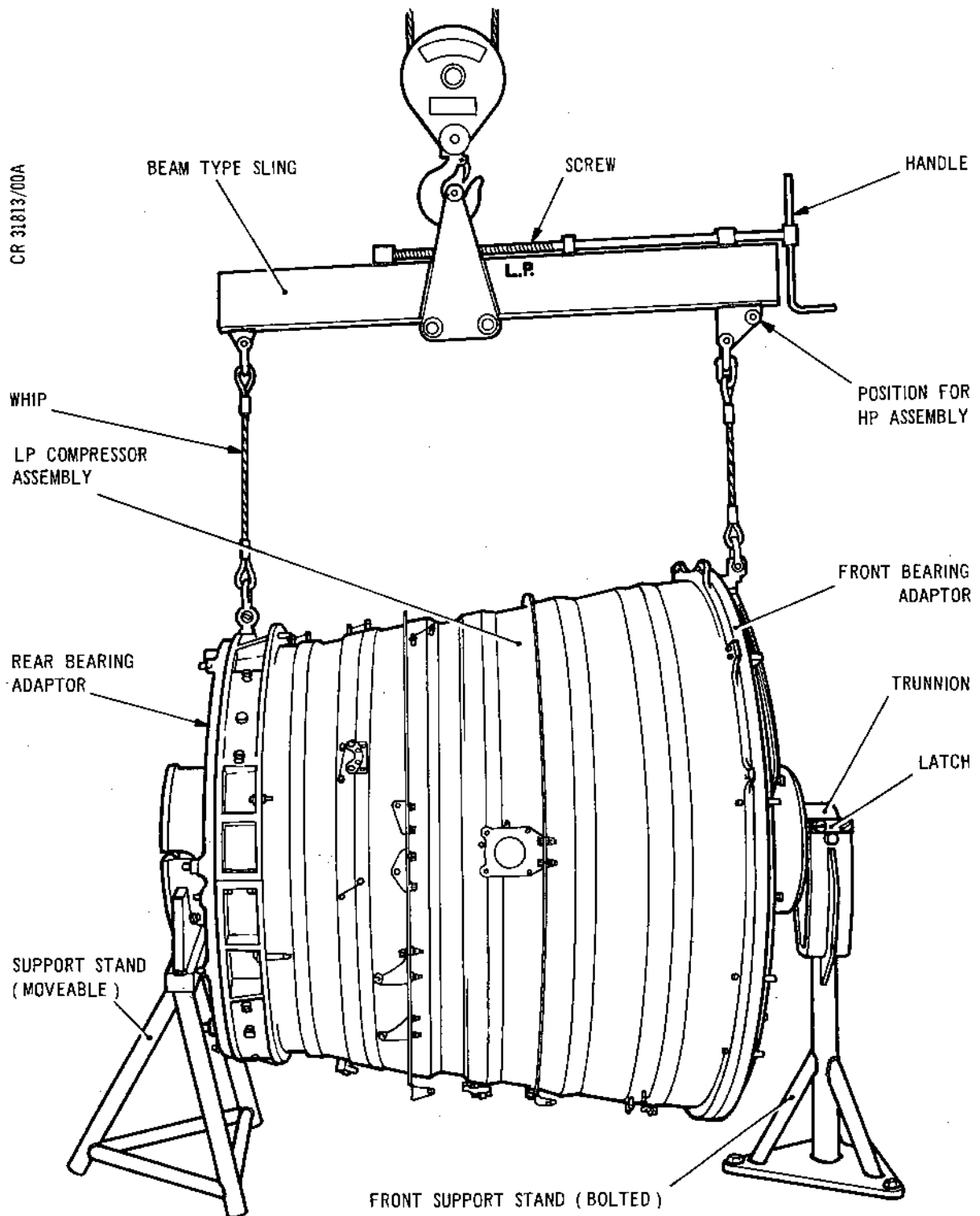
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Preparing to Raise Assembly Front Bearing Adapter Uppermost
Figure 103

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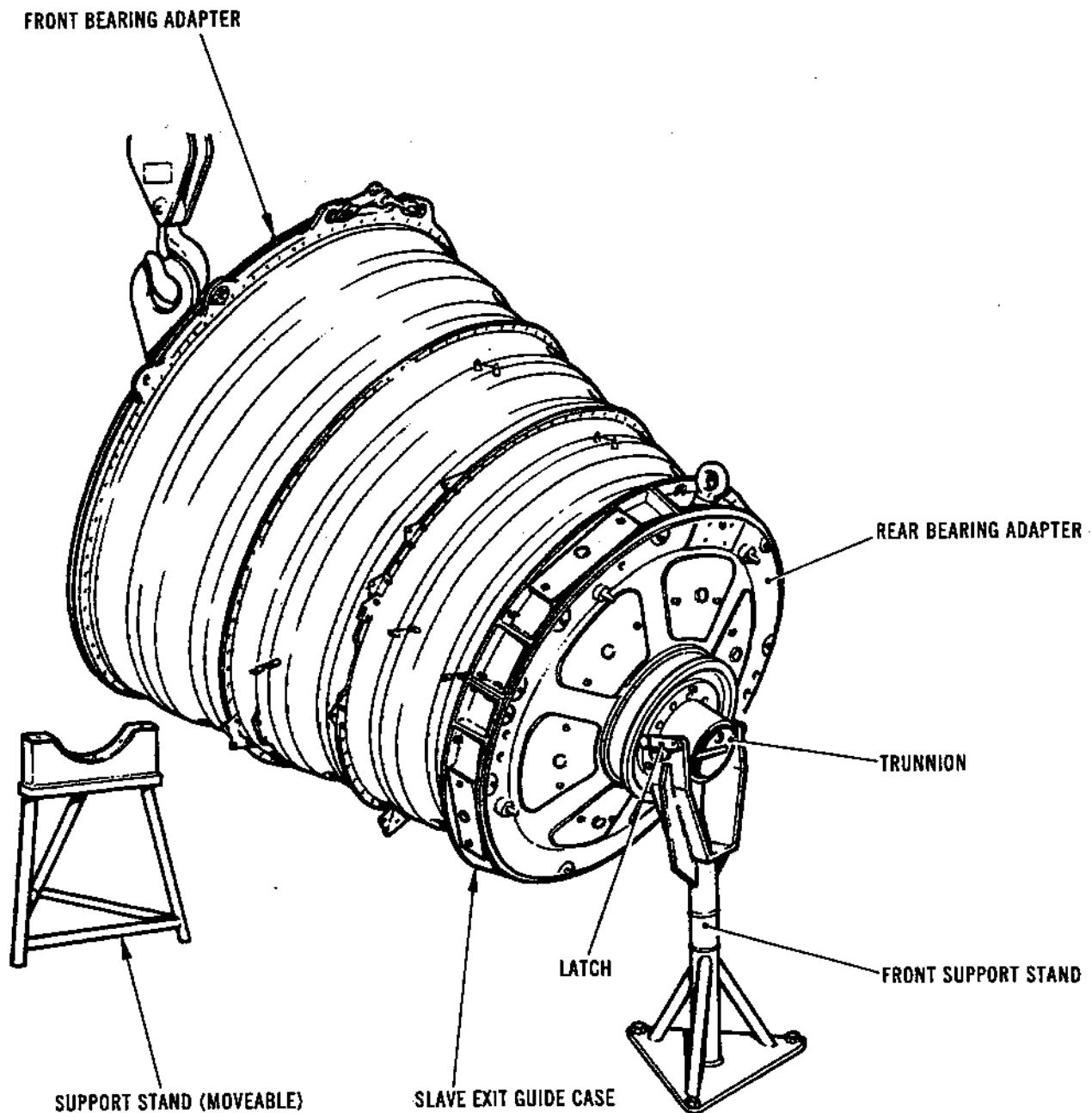


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Turning the Compressor Assembly from the Horizontal to the Vertical
Figure 103A

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- (5) Ensure that the compressor assembly is well clear of any obstacle, then turn the assembly so that the rear bearing adapter is aligned with the support (Tool 1076). Place the support (Tool 1306) to the front of the compressor. Lower the compressor assembly onto the two supports. Lock the rear trunnion adapter in position with the locking bars.
 - (6) With the LP compressor assembly secure in the two supports, remove the horizontal lifting beam shackle pins, lower the beam onto a suitable platform and replace the shackle pins.
 - (7) Attach the hook of the hoist to the lifting fixture (Tool 1098) now bolted to the front bearing adapter inner flange. Carefully raise the hoist, simultaneously traversing the crane as required through the changing angle until the front adapter is uppermost and the compressor assembly is vertical (Ref.Fig.103A).
- D. Assemble the LP Compressor Assembly to the Build Stand (Ref.Fig.104).
- (1) Raise the crane sufficiently to take up the compressor assembly's weight, but do not impart strain on the locking latches of the support underneath. Release the locking latches securing the rear trunnion. Carefully raise the hoist making sure that the locking latches do not become fast on the rear bearing adapter as the bars pivot upwards. Replace the locking latches securing screws.
 - (2) Lower the hoist until the rear adapter abuts the build stand. Disconnect the hoist then remove the lifting fixture.
- E. Remove the Front Bearing Adapter (Ref.Fig.105).
- (1) Assemble the lifting fixture (Tool 1096) to the front bearing adapter, note the offset bolt position.
 - (2) Remove the slave nuts and bolts securing the front bearing adapter to the LP compressor front flange, place the nuts and bolts in a canvas bag and tie to the front adapter flange. Carefully raise the hoist and steady the front adapter over the LP front bearing outer track.

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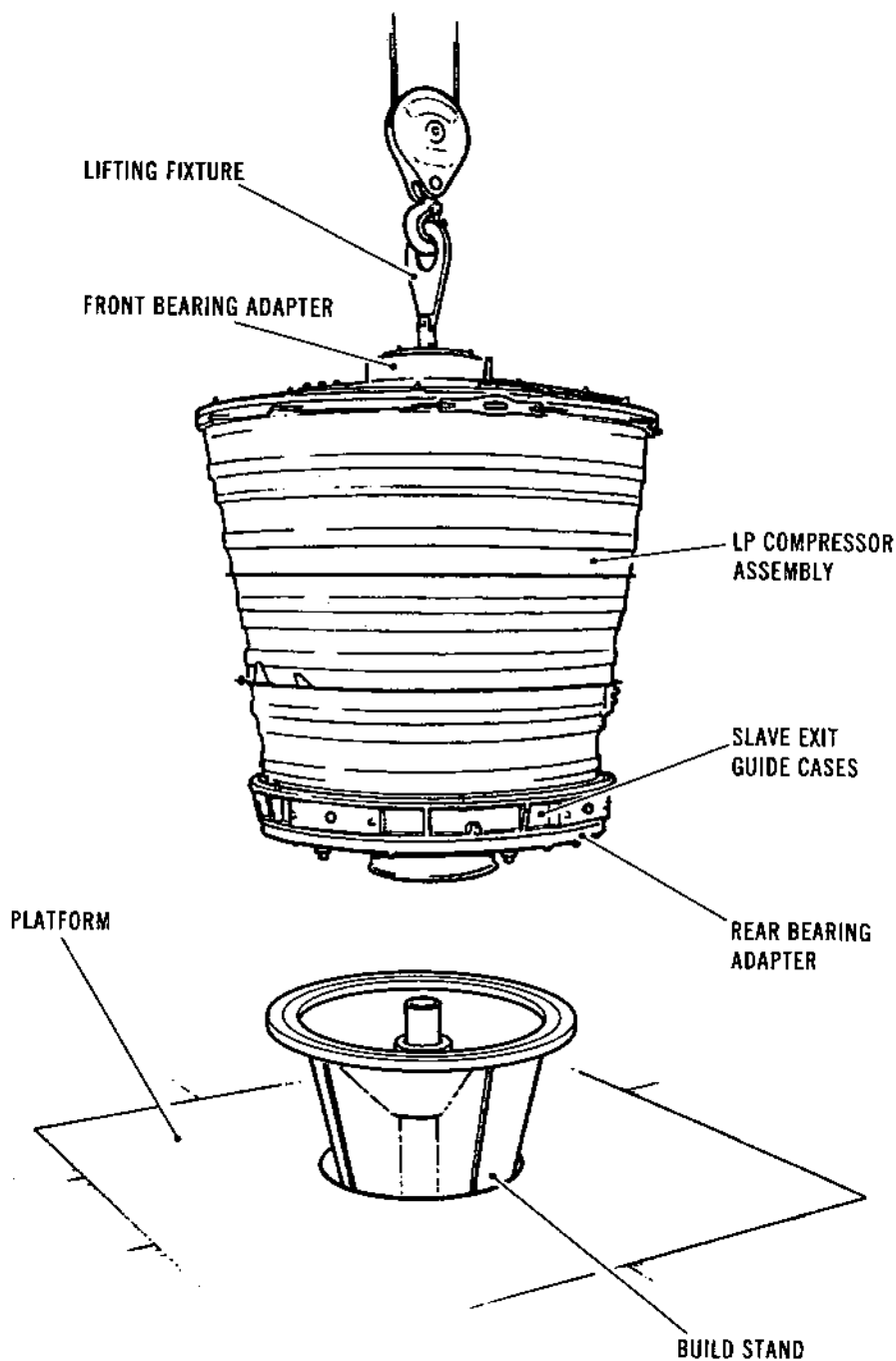


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Lowering the Assembly onto the Extension Stand
Figure 104



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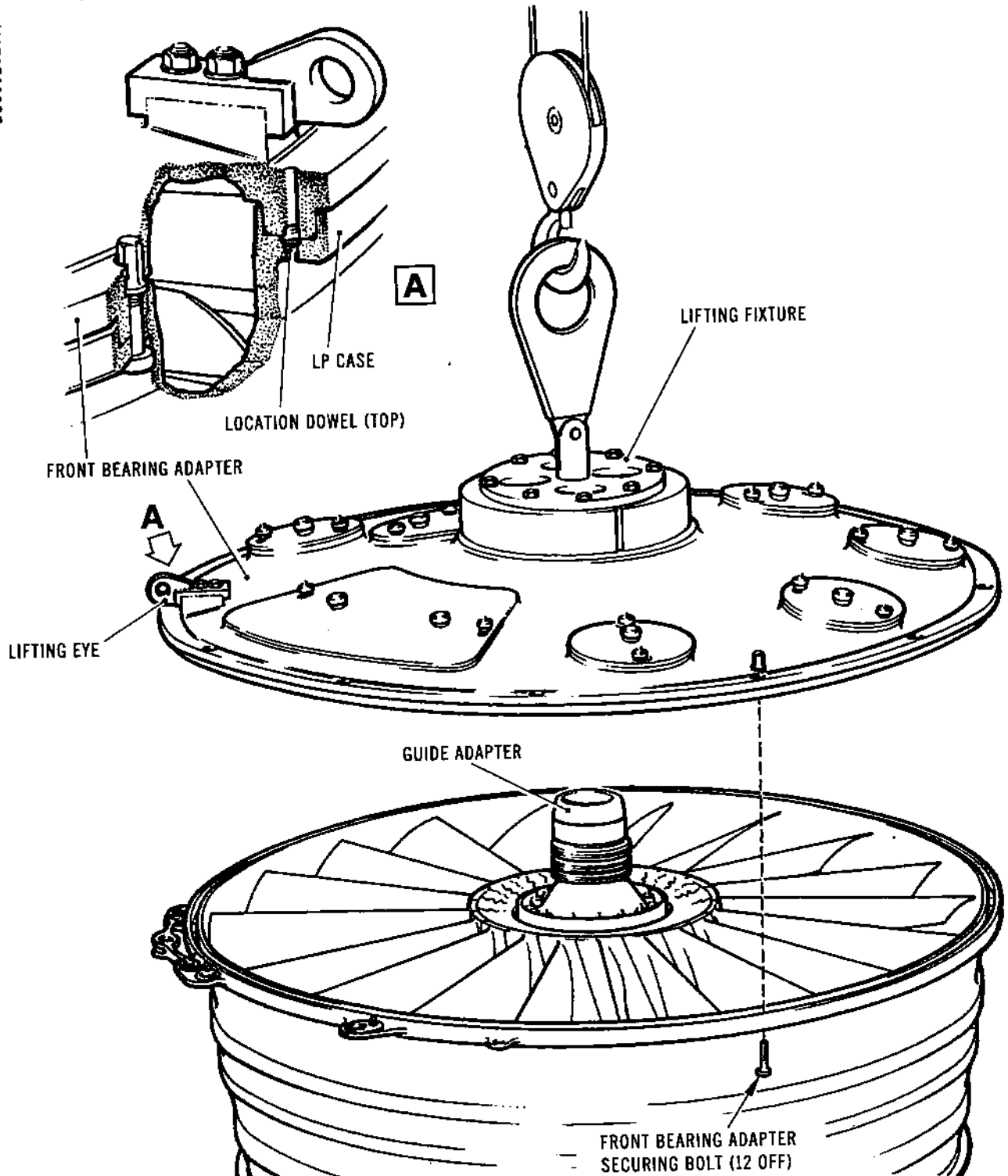


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Removing the Front Bearing Adapter
Figure 105



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- (3) Raise the front adapter clear of the compressor assembly then lower the adapter onto a pallet. Disconnect the hoist then remove the lifting fixture.
3. Disassemble the Rotor Shaft Front, Rotor Disks, Stator Vanes, Spacer Rings and Inner Fixing Rings
 - A. Remove the Rotor Shaft Front and the Balancing Bolts.
 - (1) Check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8449-191).
 - (2) Assemble the mechanical puller (Tool 629) to the rotor shaft front (Ref.Fig.106), engaging the three legs in the recesses behind the inner track, then operate the puller and carefully withdraw the track. Remove the puller and place the inner track in a container.
 - (3) Position a platform stand (Tool 1214) near the compressor case for a convenient working height.
 - (4) Remove the 14 nuts securing the rotor shaft front to the stage 1 rotor disk. Using a mechanical driver (Ref.Fig.107) (Tool 1603) and a suitable hammer carefully drift the bolts rearwards. Remove the rotor shaft front and place the shaft on a suitable worktop.
 - B. Remove the Stage 1 Bladed Rotor Disk.
 - (1) Assemble a blade retainer band (Tool 1166) to each pair of stage 1 rotor blades. The bands are to be nearer the blade tips and their retaining fasteners uppermost.
 - (2) Assemble a multiple leg sling (Tool 1103) to the stage 1 rotor blades (Ref.Fig.108).
 - (a) Attach a hoist to the lifting sling ring, raise the hoist then position the sling over the rotor disk.
 - (b) Ensure that the tommy bars of the legs are pointing to 'FREE', then lower the hoist guiding the legs between the rotor blades. When the three pads of the sling rest on the blade roots turn the tommy bars to 'LIFT'.

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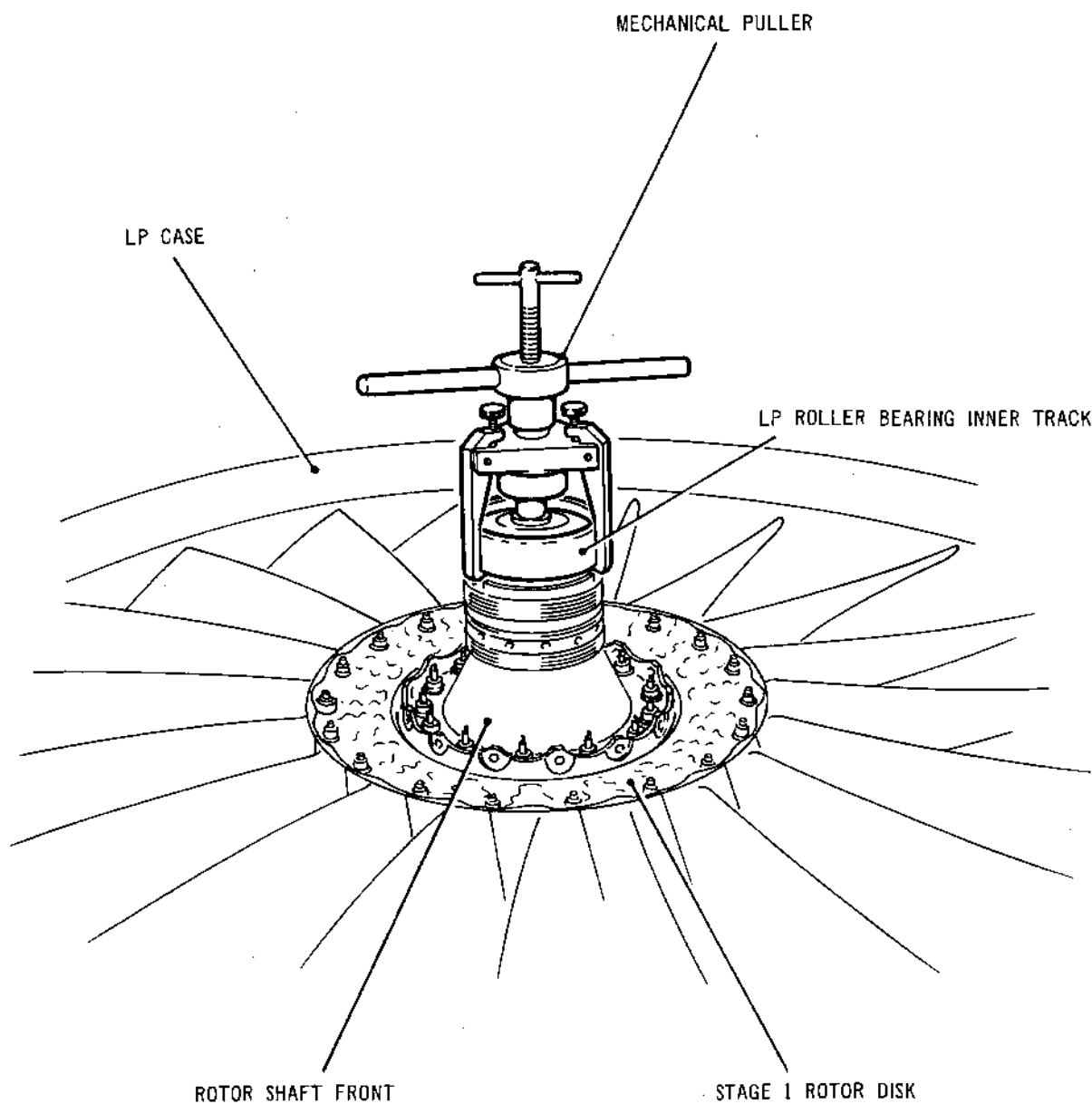
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Disassembling the LP Roller Bearing Inner Track
Figure 106

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- (3) Check that none of the 14 rotor shaft front/stage 1 disk securing bolts are lodged in the rotor disk holes. Operate the hoist then raise the rotor disk clear of the compressor assembly (Ref.Fig.108). Lower the bladed disk onto a pallet, then disconnect the hoist and remove the lifting fixture. Expand a protection band (Tool 1123) around the blade tips. Do not remove the protection band or blade retaining clips from the rotor blades. Remove the 14 stage 1 disk/rotor shaft front retaining bolts.
- C. Remove the Stage 1-2 Spacer Ring and the Stage 1 Stator Vanes.
- (1) Using the wrench (Tool 1627) and turning key (Tool 987), remove the 20 locknuts securing the stage 1-2 spacer ring and the stage 2 rotor disk. Using the mechanical driver (Tool 1610) and a suitable mallet carefully drive the bolts rearwards paying particular attention not to damage the bolts or their threads. Remove the spacer ring from the disk face, then assemble a protector (Tool 443) to the labyrinth on the spacer ring. Place the spacer ring in the appropriate part of the container (Tool 1410).
- (2) Unscrew and remove the two locknuts securing the retaining piece to the bolted vane fixing ring position (loading slot). Ease the retaining piece over the two bolts protruding from the vane fixing ring and remove.
- (3) Remove and discard the locking wire from the bolts securing the bolted vane and probe vane on the outside of the compressor case at stage 1 stator vane location. Unscrew and remove the bolts and sleeves from this position also the support plug assembly. Place bolts, sleeves, plug and support plug assembly in a container.
- (4) Ease the bolted vane at the loading slot position from the vane fixing ring, then place the vane in a container (Tool 1377). Ease the remainder of the vanes clockwise/counter-clockwise disengaging each vane through the loading slot location. Place all the vanes in the container. Remove the vane fixing ring and place in the appropriate part of the container (Tool 1440).

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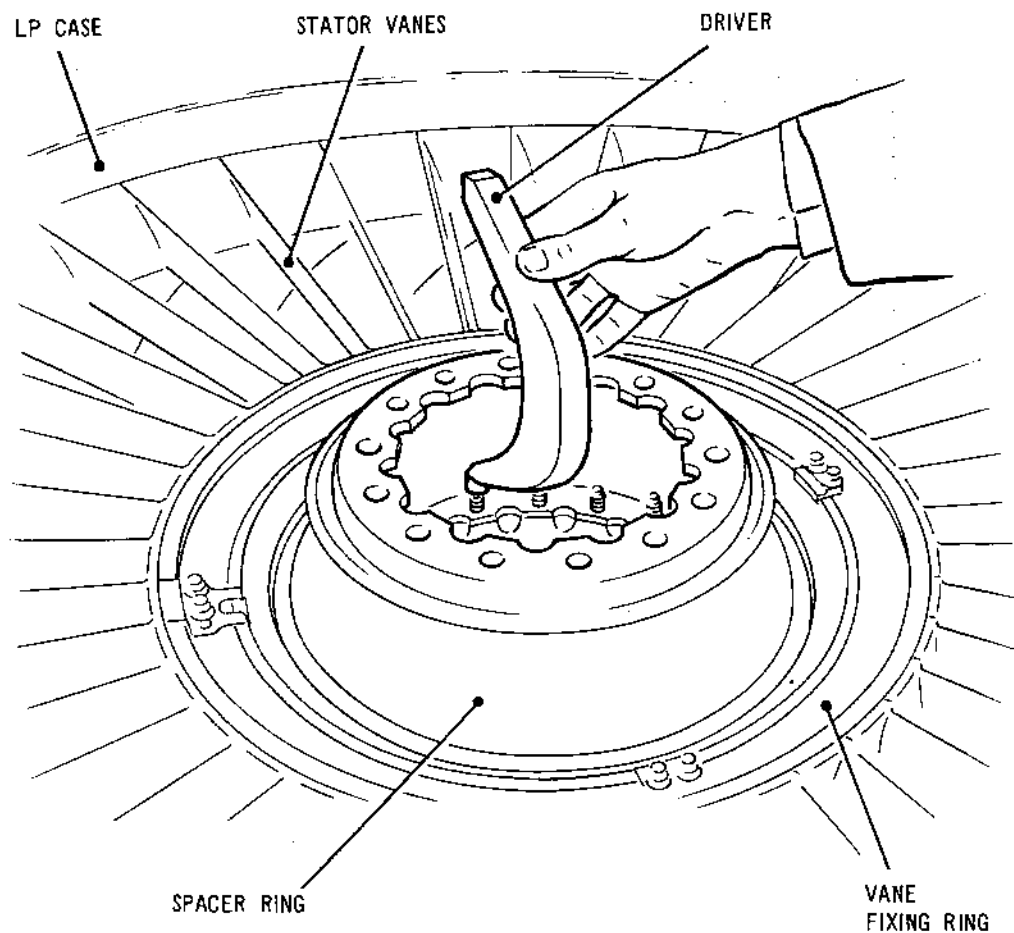
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Drifting the Retaining Bolts Rearwards
Figure 107



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D. Remove the Stage 2 Rotor Disk and the Stage 2-3 Spacer Ring.

- (1) Assemble a blade retainer band (Tool 1166) to each pair of stage 2 rotor blades. The bands are to be nearer the blade tips and their retaining fasteners uppermost.
- (2) Assemble a multiple leg sling (Tool 1102) to the stage 2 rotor blades (Ref.Fig.108).
 - (a) Attach a hoist to the lifting sling ring, raise the hoist then position the sling centrally over the rotor disk.
 - (b) Ensure that the tommy bars of the legs are pointing to 'FREE', then lower the hoist guiding the legs between the rotor blades. When the three pads of the sling rest on the blade roots turn the tommy bars to 'LIFT'.
- (3) Check that none of the 20 stage 1-2 spacer ring/ stage 2 rotor disk securing bolts are lodged in the stage 2 disk holes. Operate the hoist raising the rotor disk above the LP case, taking care not to allow the disk to swing causing damage to the rotor blades or case. Lower the disk onto a pallet. Turn the tommy bars of the lifting sling to 'FREE' raise the lifting sling clear of the rotor disk then place the sling on its storage rack, disconnect the hoist. Expand a protection band (Tool 1124) around the tips of the stage 2 rotor disk. Remove the 20 bolts resting on the stage 3 rotor disk.
- (4) Using the wrench (Tool 1591) and location key (Tool 1590), remove the 24 nuts securing the stage 2-3 spacer ring and the stage 3 rotor disk.
- (5) Using the mechanical driver (Tool 1610) and a suitable mallet, drift the stage 3 rotor securing bolts rearwards taking care not to damage the bolts or their threads. Remove the spacer ring, assemble a protector (Tool 1167) to the labyrinth, then place the spacer ring in the appropriate part of the container (Tool 1410).

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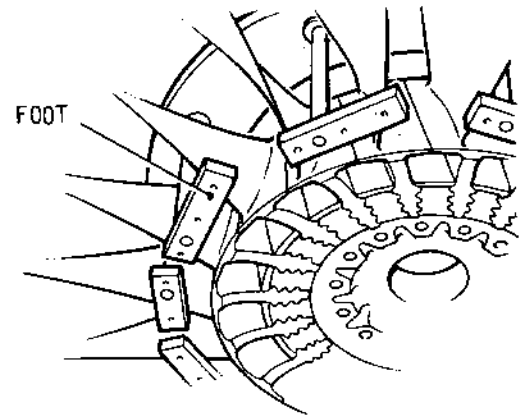
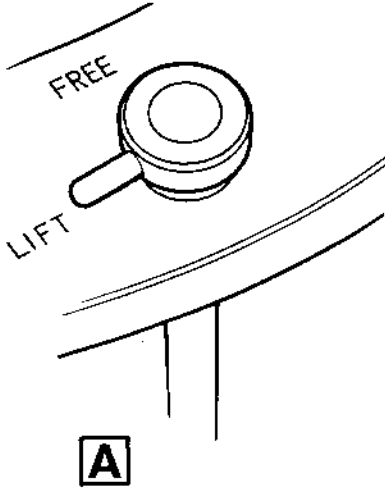


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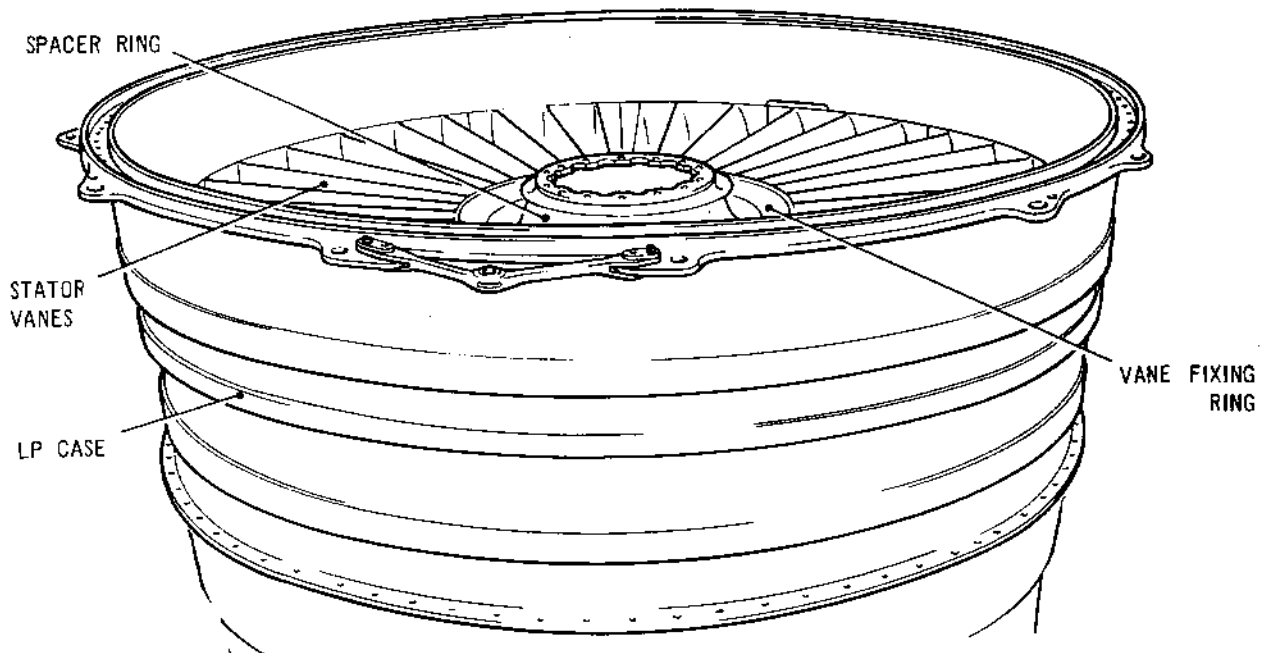
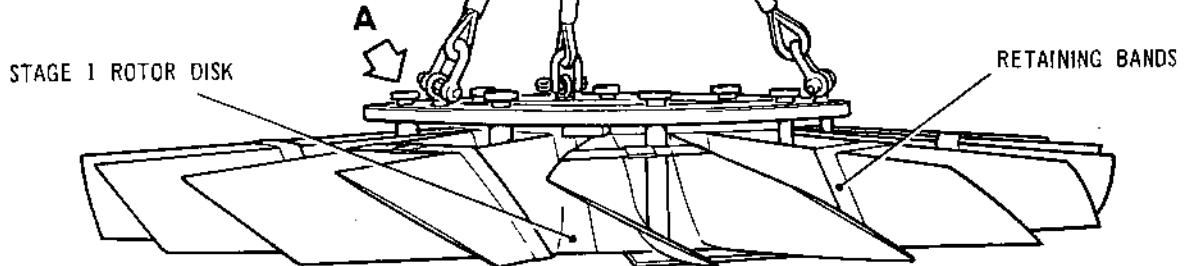
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UNDERSIDE VIEW
OF DISK



Assembling the Multiple Leg Sling and
Removing the Stage 1 Rotor Disk
Figure 108

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E. Remove the Stage 2 Stator Vanes.

- (1) Unscrew and remove the two locknuts securing the retaining piece, from the bolted vane fixing ring position (loading slot). Ease the retaining piece over the two bolts protruding from the vane fixing ring and remove.
- (2) Remove and discard the locking wire from the bolts securing the bolted vane and probe vane on the outside of the compressor case at stage 2 stator vane location. Unscrew and remove the bolts and sleeves from this position. Remove the support plug assembly and place the items in a container.
- (3) Ease the bolted vane at the loading slot position from the vane fixing ring, then place the vane in a container (Tool 1376). Remove the remainder of the vanes from the case, easing the vanes clockwise/ counter-clockwise disengaging each vane through the loading slot location. Place all the vanes in the container. Remove the vane fixing ring and place in the appropriate part of the container (Tool 1440).

F. Remove the Stage 3 Rotor Disk and the Stage 3-4 Spacer Ring.

- (1) Assemble the lifting fixture (Tool 1161) (Ref.Fig.109) to the front face of the stage 3 rotor disk. Guide the three claws through the centre hole then turn the claws outwards to lock and locate on the rear face of the disk. Screw down the three thumbnuts to secure the claws in the locked position.
- (2) Attach the hoist to the lifting fixture, adjust the hoist so that it is centrally aligned with the rotor disk. Check that none of the 24 stage 3-4 spacer ring/stage 3 rotor disk securing bolts are lodged in the disk holes. Raise the rotor disk clear of the compressor case, avoid the disk swinging causing damage to the blades or compressor case.

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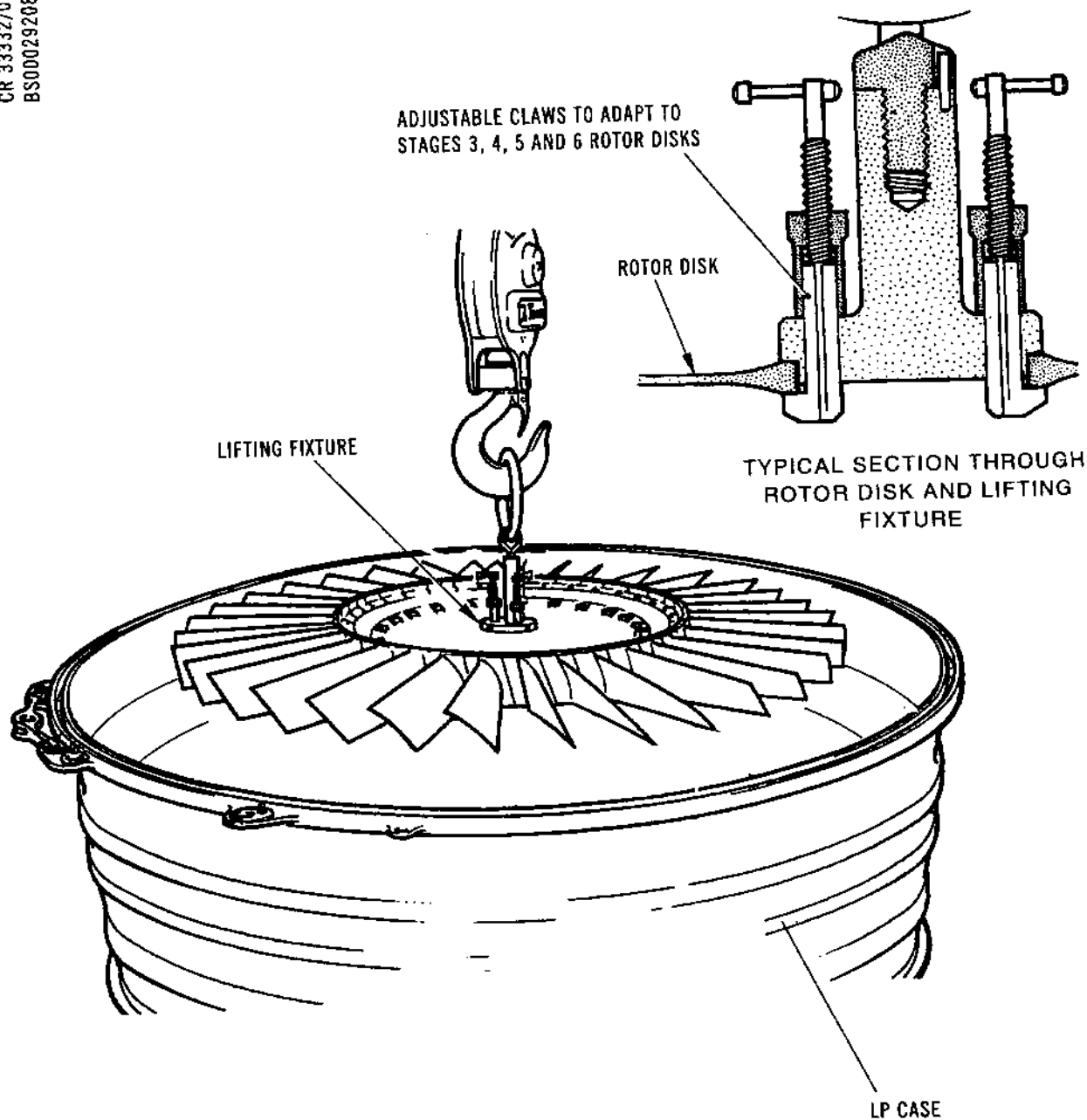


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Assembling the Lifting Fixture to Rotor Disk
Figure 109



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- (3) Lower the rotor disk onto a pallet, disconnect the hoist, then remove the lifting fixture from the centre of the disk. Expand a protection band (Tool 1125) around the stage 3 rotor blade tips. Remove the 24 bolts resting on the stage 4 rotor disk.

NOTE: Prior to carrying out the following operation, check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8449-191).

- (4) Using the wrench (Tool 1591) and location key (Tool 1590), unscrew and remove the 24 locknuts from the stage 3-4 spacer ring.
- (5) Using the mechanical driver (Tool 1610) and a suitable mallet, drive the stage 4 disk securing bolts rearwards taking care not to damage the bolts. Remove the stage 3-4 spacer ring, assemble a protector (Tool 1168) to the labyrinth, then place the spacer ring in the appropriate part of the container (Tool 1411).

G. Remove the Stage 3 Stator Vanes (Ref.Fig.110 and 111).

- (1) Unscrew and remove the two locknuts securing the retaining piece at the stage 3 loading slot vane fixing ring positions, then remove the retaining piece.
- (2) Remove and discard the locking wire from the bolts securing the bolted vanes and probe vanes on the outside of the compressor case. Remove the bolts and sleeves from these positions. Remove the support plug assembly and place the items in a container.
- (3) Moving the stator vanes clockwise or counter-clockwise as appropriate remove the stage 3 vanes from the compressor case loading slot location. Place the vanes in a container (Tool 1375). Remove the vane fixing ring and place the ring in the appropriate part of the container (Tool 1440).

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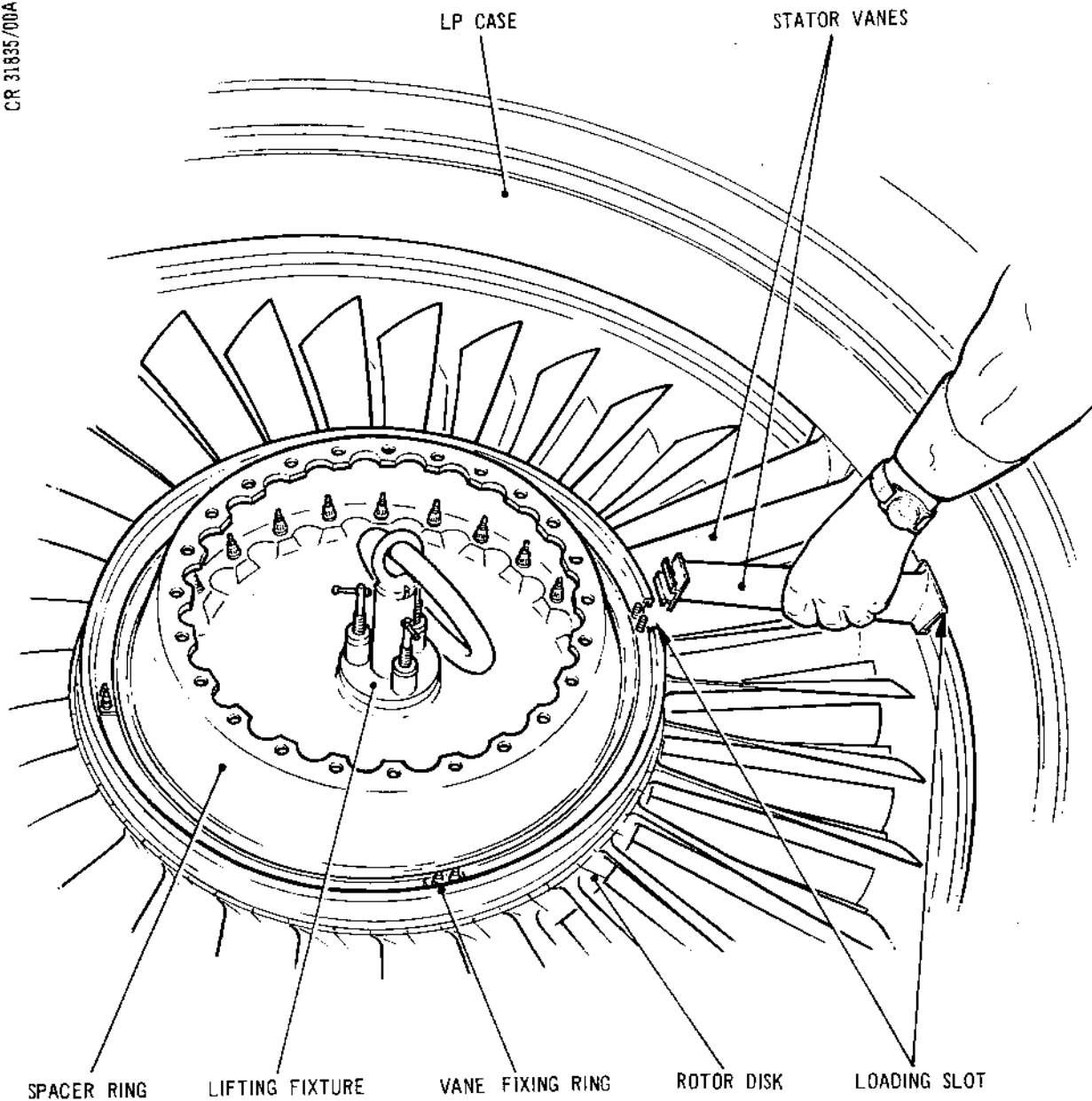
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Removing the Stator Vanes
Figure 110

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H. Remove the Stage 4 Rotor Disk and the Stage 4-5 Spacer Ring.

- (1) Assemble the lifting fixture (Tool 1161) (Ref.Fig.109) to the front face of the stage 4 rotor disk. Guide the three claws through the centre hole then turn the claws outward to lock and locate on the rear face of the disk. Screw down the three thumbnuts to secure the claws in the locked position.
- (2) Attach the overhead hoist to the lifting fixture. Check that none of the 24 stage 4-5 spacer ring/ stage 4 rotor disk securing bolts are lodged in the disk holes. Raise the rotor disk clear of the compressor case, avoid the disk swinging causing damage to the blades or compressor case.
- (3) Lower the rotor disk onto a pallet, disconnect the hoist, then remove the lifting fixture from the centre of the disk. Expand a protection band (Tool 1126) around the stage 4 rotor blade tips. Remove the 24 bolts resting on the stage 5 rotor disk.
- (4) Check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8449-191).
- (5) Using the wrench (Tool 627) and location key (Tool 1590), unscrew and remove the 24 locknuts securing the stage 5-6 spacer ring and stage 5 disk. Using the mechanical driver (Tool 1610) and a suitable mallet, drive the 24 bolts rearwards avoiding damage to the bolts. Remove the spacer ring then assemble a protector (Tool 1169) to the spacer ring labyrinth. Place the ring in its container (Tool 1411).

J. Remove the Stage 4 Stator Vanes (Ref.Fig.110 and 111).

- (1) Unscrew and remove the two locknuts securing the retaining piece at the stage 4 loading slot inner fixing ring position, then remove the retaining piece.
- (2) Remove and discard the locking wire from the bolts securing the bolted vanes and probe vanes on the outside of the compressor case. Remove the bolts and sleeves from these positions. Remove the support plug assembly, then place the items in a container.

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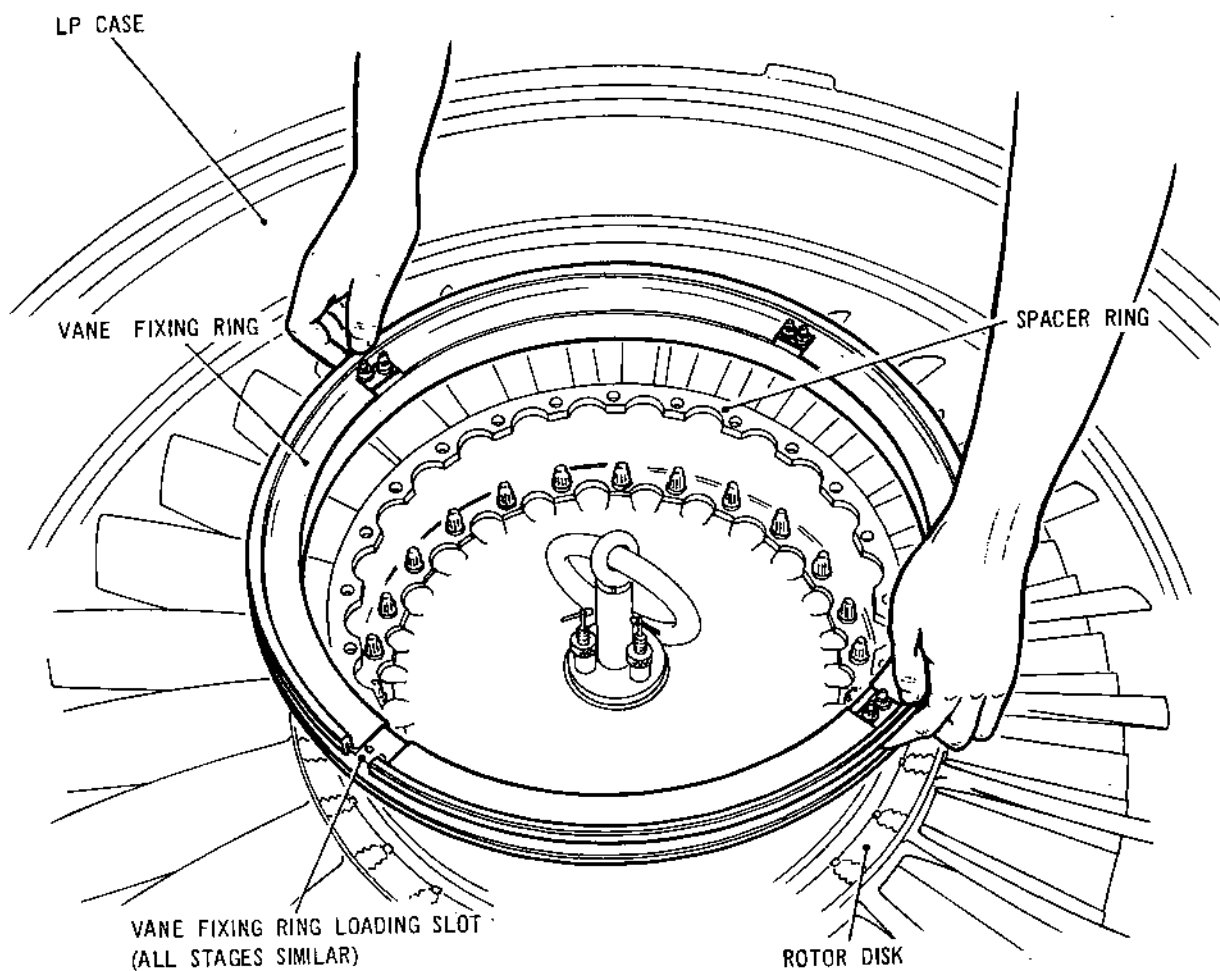
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Removing the Vane Fixing Ring
Figure 111

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- (3) Easing the stator vanes clockwise or counter-clockwise as appropriate, to facilitate their disengagement through the loading slot, remove the stage 4 stator vanes. Place the vanes in a container (Tool 1391). Remove the vane fixing ring from the compressor case and place the ring in the appropriate part of the container (Tool 1440).
- K. Remove the Stage 5 Rotor Disk and the Stage 5-6 Spacer Ring.
- (1) Assemble the lifting fixture (Tool 1161) (Ref.Fig.109) to the centre hole of the stage 5 rotor disk. Guide the three claws through the centre hole, then turn the claws outward to lock and locate on the rear face of the disk. Screw down the three thumbnuts to secure the claws in the locked position.
 - (2) Attach the overhead hoist to the lifting fixture. Check that none of the 24 stage 5-6 spacer ring/ stage 5 rotor disk securing bolts are lodged in the disk holes. Raise the rotor disk clear of the compressor case, avoid the disk swinging causing damage to the blades or the compressor case.
 - (3) Lower the rotor disk onto a pallet, disconnect the hoist, then remove the lifting fixture from the centre of the disk. Expand a protection band (Tool 1127) around the stage 5 rotor blade tips. Remove the 24 bolts resting on the stage 6 rotor disk.
 - (4) Remove the three blanking plates at three equi-spaced positions from the outside of the slave exit guide vane case. Adjust the three adjustable supports (Tool 1006) to their minimum adjustment, then feed the supports through the three equi-spaced holes in the slave exit guide case so that they rest on the three machined faces in the rear bearing adapter. Secure each support with the thumbnuts.
 - (5) Readjust the three supports (Tool 1006) so that each support abuts the rear face of the stage 7 rotor disk.
 - (6) Check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref. SB.72-8449-191).

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- (7) Using the wrench (Tool 627) and location key (Tool 1590), slacken the 24 locknuts securing the stage 5-6 spacer ring and stage 6 rotor disk. Do not remove the nuts, but unscrew each nut sufficiently to assemble a retaining clip (Tool 1038) between the rear of the nut face and the spacer ring. With the bolts held in position by the retaining clips remove the nuts and place them in a container.
- (8) Screw an assembly pin (Tool 1065) onto each of the 24 bolts being retained by a clip, then remove the retaining clips. Gently tap on the pins moving the bolts rearwards to rest on the disk below. Guide the spacer ring upwards over the pins and remove. Assemble a protector (Tool 1169) to the spacer ring labyrinth and place the spacer ring in the appropriate part of the container (Tool 1411).

L. Remove the Stage 5 Stator Vanes (Ref.Fig.110 and 111).

- (1) Unscrew and remove the two locknuts securing the retaining piece at the stage 5 loading slot vane fixing ring position, then remove the retaining piece.
- (2) Remove and discard the locking wire from the bolts securing the bolted vanes and probe vanes on the outside of the compressor case. Remove the bolts and sleeves from these positions. Remove the support plug assembly, then place the items in a container.
- (3) Easing the stator vanes clockwise or counter-clockwise as appropriate to facilitate their disengagement through the loading slot, remove the stage 5 stator vanes. Place the vanes in a container (Tool 1392). Remove the vane fixing ring from the compressor case and place the ring in the appropriate part of the container (Tool 1440).

M. Remove the Stage 6 Rotor Disk (Ref.Fig.109).

- (1) Assemble the lifting fixture (Tool 1161) to the centre hole of the stage 6 rotor disk. Guide the three claws through the centre hole, then turn the claws outward to lock and locate on the rear face of the disk. Screw down the three thumbnuts to secure the claws in the locked position.

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- (2) Attach the overhead hoist to the lifting fixture. Raise the hoist carefully guiding the rotor disk upwards over the assembly pins, avoiding the disk swinging and causing damage to the blades or the compressor case.
- (3) Lower the rotor disk onto a pallet, disconnect the hoist, then remove the lifting fixture from the centre of the disk. Expand a protection band (Tool 1128) around the stage 6 rotor blade tips.

4. Transfer the LP Compressor Case to the Disassembly Stand

A. Release the LP Compressor Case from the Slave Exit Guide Cases.

- (1) Remove the slave nuts and bolts securing the compressor case rear flange to the slave exit guide cases.
- (2) Attach the multiple leg sling (Tool 1101) to the overhead hoist, then position the sling over the compressor case. Equally space each of the slings attachment plates around the front flange and secure with the thumbscrews. Centralize the hoist then carefully raise the compressor case taking care to keep the case centralized. Raise the case clear of the disassembly platform (Ref.Fig.112).
- (3) Lower the compressor case onto a suitable pallet then disconnect the hoist from the multiple leg sling. Transfer the compressor case on the pallet to the disassembly stand, if the case is not to be disassembled immediately, remove the multiple leg sling.

NOTE: The remaining stage 6 stator vanes, brackets and vane fixing rings will be disassembled under Chapter 72-31-01, Disassembly.



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5. Assemble the Rear Bearing Adapter and the Stage 7 Rotor Disk Assembly to the Turnover Stand

A. Remove the Rear Bearing Adapter and the Stage 7 Rotor Disk Assembly from the Build Stand (Ref.Fig.112 and 113).

- (1) Remove the axial nuts and bolts securing the top and bottom slave exit guide cases to each other. Remove the slave nuts and bolts securing the slave exit guide cases to the rear bearing adapter.
- (2) Withdraw the exit guide cases from the rear bearing adapter, then place them on a pallet, keeping the cases together as a matched pair. Place the slave nuts and bolts in a container and place them with the exit guide cases.
- (3) Pull on the assembly pins assembled to the 24 bolts so that each of the 24 bolts is moved forward through the disk bolt holes and the flat of each bolt located against the rim of the stage 6-7 spacer ring. As each bolt is pulled fully forward assemble a retaining clip (Tool 1038) to the unthreaded diameter of the bolt. Make sure that each bolt is retained with a clip then remove the assembly pins.
- (4) Assemble the mounting plate (Tool 1294) to the stage 7 disk assembly.
 - (a) Make sure that the 24 retaining clips assembled to the bolts are so positioned that the 'L' shape tangs are turned outwards.
 - (b) Attach the overhead hoist to the lifting ring of the mounting plate. Raise the hoist and position the mounting plate over the stage 7 rotor disk.
 - (c) Align the 24 holes in the mounting plate with the 24 bolts protruding from the stage 7 disk assembly.
 - (d) Lower the mounting plate onto the bolts, so that it abuts the rotor shaft rear flange. Make sure that all the clips are accommodated in the 24 recesses machined in the mounting plate.
 - (e) Secure the mounting plate at four equi-spaced positions with four slave nuts.

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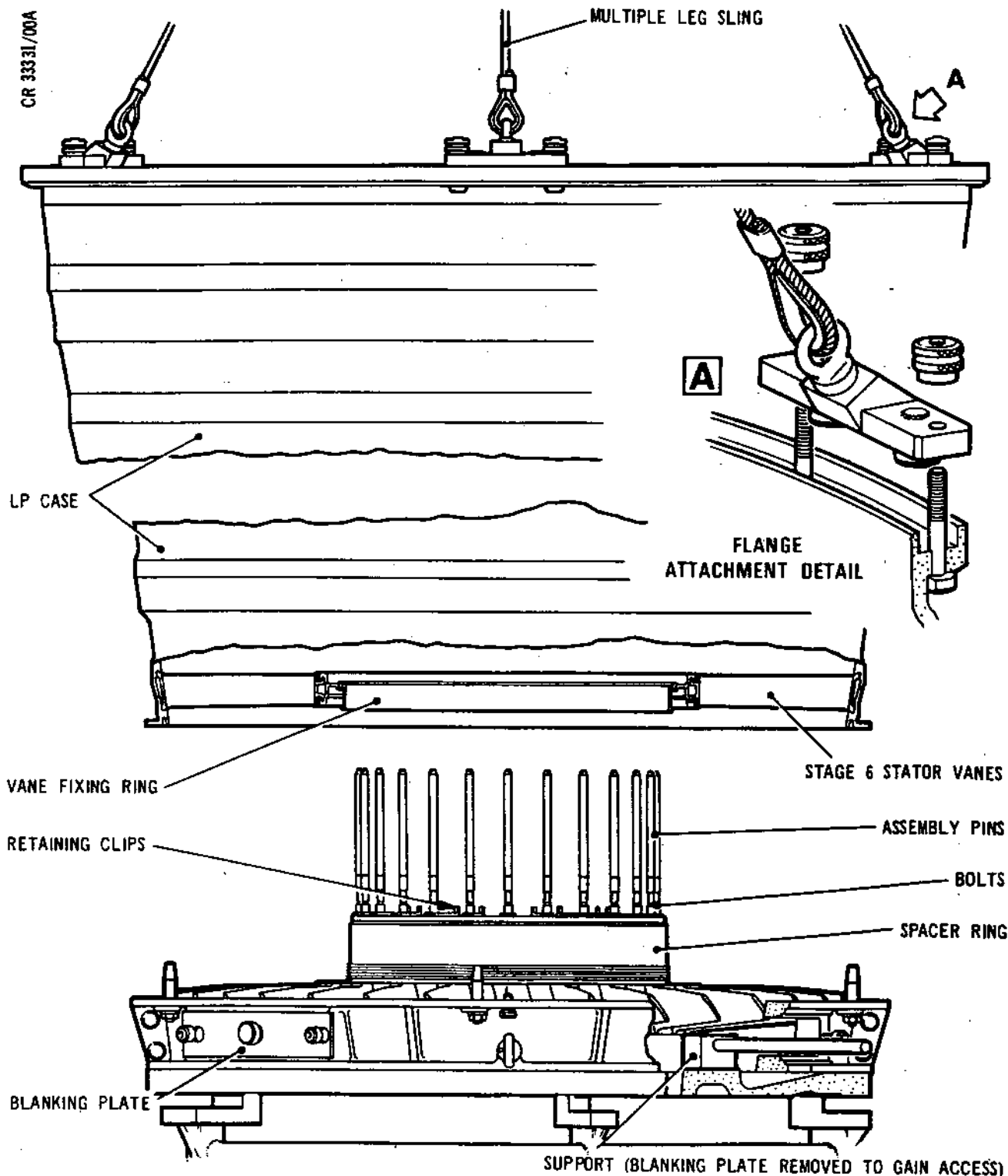


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Removing the LP Case and Stage 6 Stator Vanes
Figure 112

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- (5) Operate the hoist and carefully raise the assembly so that the bearing adapter disengages from the build stand (Ref.Fig.113).

B. Prepare the Turnover Stand (Ref.Fig.114).

- (1) Depress the pedal, of the turnover stand (Tool 697), controlling the lock on the trunnion arm, then turn the cranked handle of the turnover stand to bring the moveable arm into its uppermost position.

WARNING: KEEP CLEAR OF THE TRUNNION ARM WHEN
RELEASING LOCKING PIN.

NOTE: The trunnion arm attached to the opposite column is independant from any mechanical control after the locking pin has been released, and is thus free to move left or right.

- (2) Release the locking pin securing the trunnion arm, then reposition the arm to its uppermost position. Lock the arm with the pin.

C. Assemble the Stage 7 Rotor Disk Assembly to the Turnover Stand.

- (1) Operate the hoist and position the stage 7 disk assembly centrally over the turnover stand (Tool 697).
- (2) Lower the stage 7 disk assembly onto the trunnion arms taking care not to damage the stage 7 blades against the stand. Secure the assembly to the trunnion arms with slave nuts and washers. Disconnect the hoist.
- (3) Pull the pin to release the arm, turn the thumbscrew on the pin to retain the pin in the unlocked position. Depress the pedal controlling the lock on the opposite trunnion arm, then turn the stand through 180 deg. so that the rear bearing adapter is uppermost. Using the locking pin and foot pedal lock both the trunnion arms.



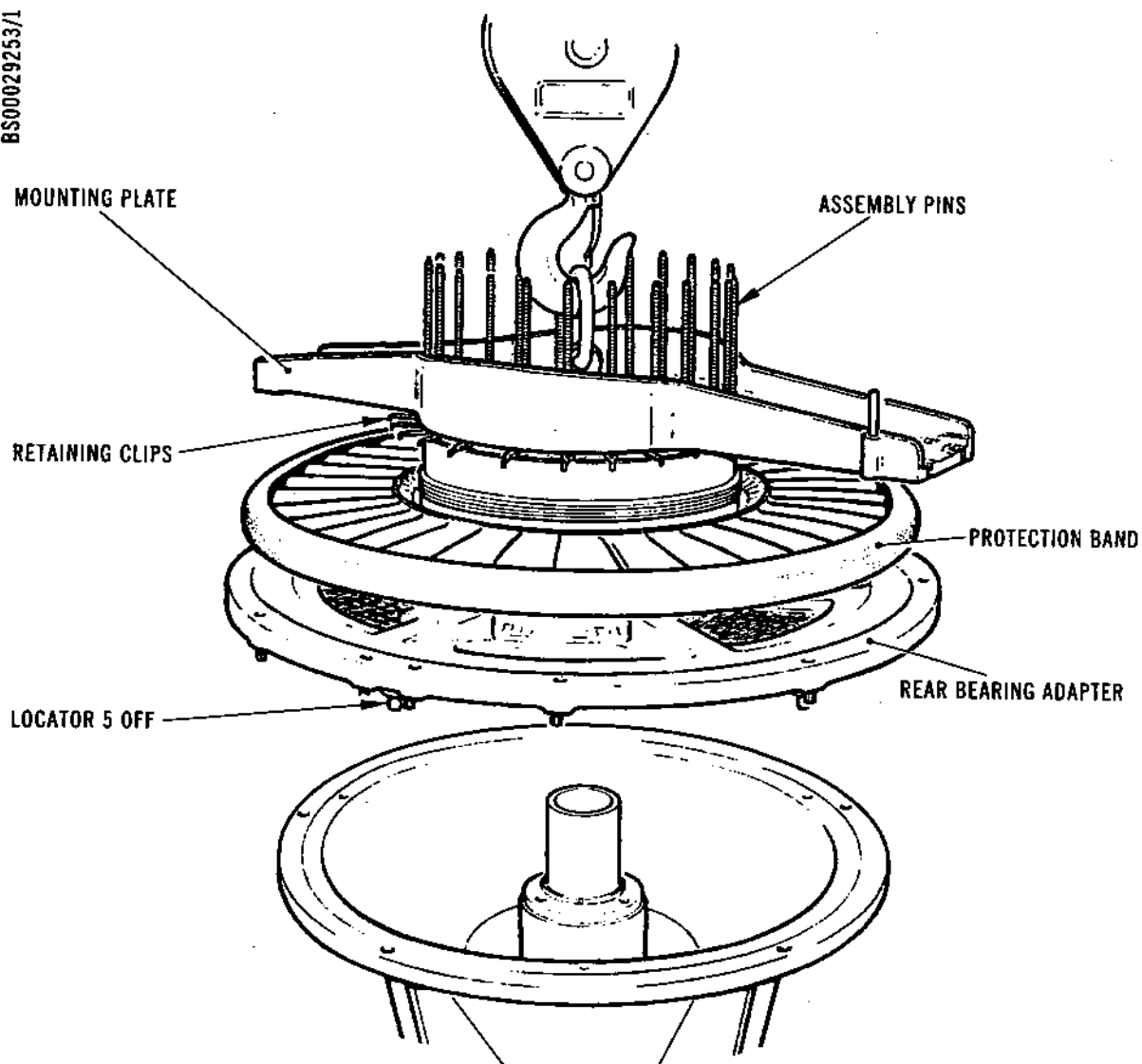
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Transferring the Rear Bearing Adapter and Stage 7 Disk
Assembly to the Turnover Stand
Figure 113



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6. Disassemble the Stage 7 Rotor Disk, Rotor Shaft Rear and the Rear Bearing Adapter

A. Remove the Rear Bearing Adapter (Ref.Fig.114).

- (1) Unscrew the bolts retaining the rear trunnion to the rear adapter then remove the trunnion.
- (2) Assemble the lifting fixture (Tool 1096) to the rear face of the rear bearing adapter, note the offset bolt position. Screw in and fully tighten the four captive bolts.
- (3) Attach the overhead hoist to the lifting fixture. Unscrew the captive bolts securing the rear adapter to the balancing bearing assembly assembled to the rotor shaft rear.
- (4) Centrally align the hoist attachment with the lifting fixture, then slowly take up the slack in the lifting fixture. Before taking the weight of the rear bearing adapter, make sure that the captive bolts are completely unscrewed from the balancing bearing assembly, and that although the bolts remain captive in the rear bearing adapter, they are able to move quite freely a limited distance rearwards.
- (5) Operate the hoist and remove the rear bearing adapter by carefully raising the adapter clear of the turnover stand. Lower the rear bearing adapter onto a pallet, disconnect the hoist, then remove the lifting fixture.

B. Remove the LP Compressor Bearing Retaining Nut (Ref.Fig. 115).

- (1) Insert the sleeve (Tool 696) into the rotor shaft rear, then engage the immobiliser (Tool 280) into the splines of the rotor shaft. Ensure that the spanner (Tool 1594) is bolted to the multiplier (Tool 1022).

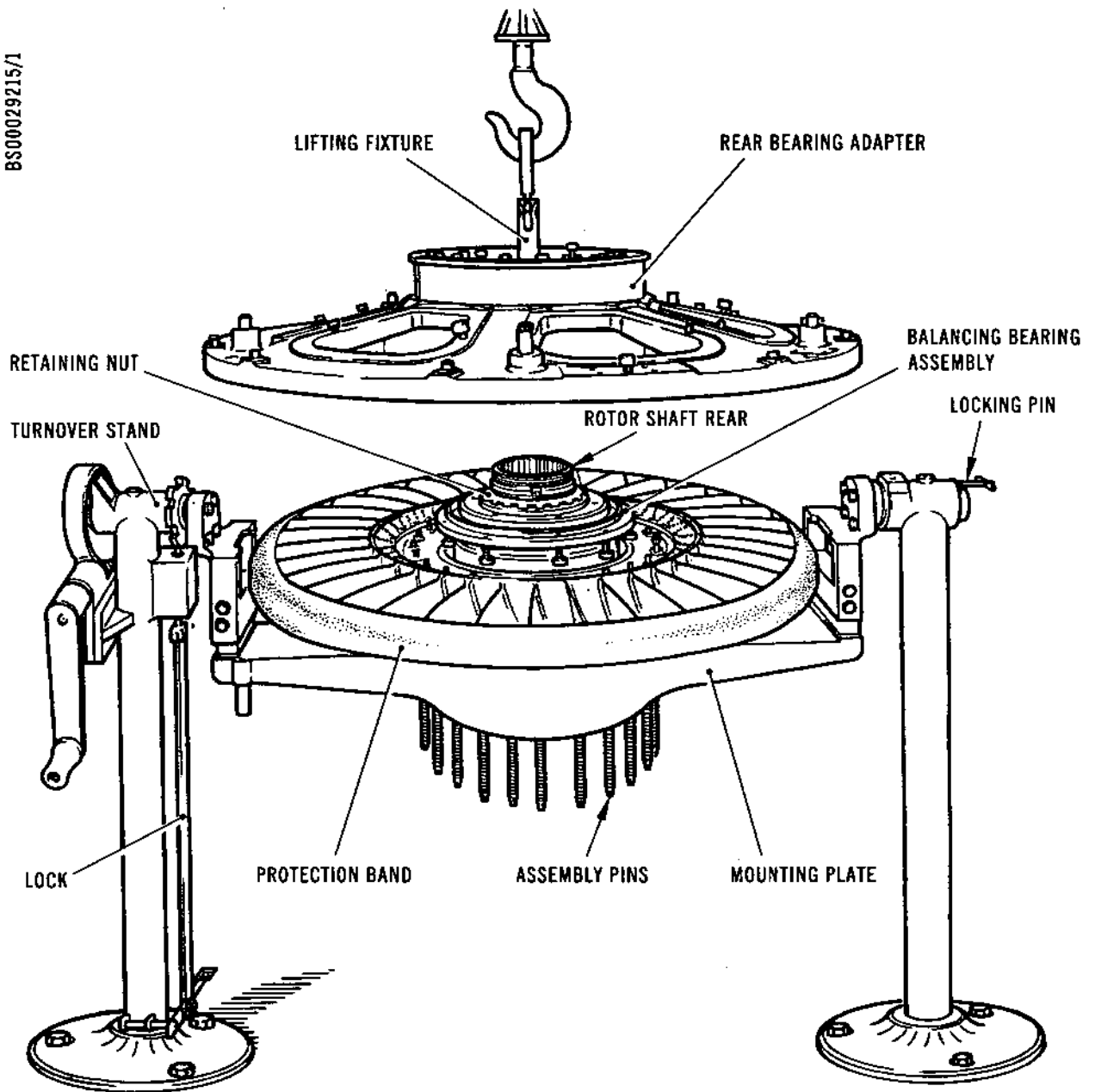


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Removing the Rear Bearing Adapter
Figure 114

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- (2) Raise the multiplier/spanner over the rotor shaft rear, then guide the spanner (Tool 1594) down over the rotor shaft and engage it in the bearing retaining nut. It may be necessary to turn the square in the top of the multiplier to effect engagement of the drive in the immobiliser. Care must be taken to keep fingers clear of the spanner castellations.

NOTE: The operator should always check the input/output ratio of any multiplier being used also the correct rotation to effect a torque or detorque procedure. The multiplier in this case has a 25 to 1 ratio.

- (3) Disconnect the hoist from the multiplier. Using the wrench (Tool 1651), detorque the LP compressor retaining nut. Connect the hoist to the multiplier then carefully remove the multiplier and place it on a pallet. Withdraw the immobiliser from the rotor shaft rear.

- (4) Remove the LP bearing retaining nut and washer.

C. Remove the LP Compressor Balancing Bearing Assembly (Ref.Fig.115).

- (1) Assemble the mechanical puller (Tool 283) to the rotor shaft rear.
- (a) Screw the central threaded shroud of the puller onto the rotor shaft rear. Engage sufficient threads of the shroud to operate the puller but do not overtighten.
 - (b) Secure the puller to the balancing bearing outer location with the captive bolts and fully tighten the bolts.
- (2) Turn the puller tommy bar in a clockwise direction to remove the balancing bearing assembly with spacer sleeve. When the balancing bearing becomes free of its interference location, lift the puller, bearing assembly and sleeve clear of the rotor shaft.

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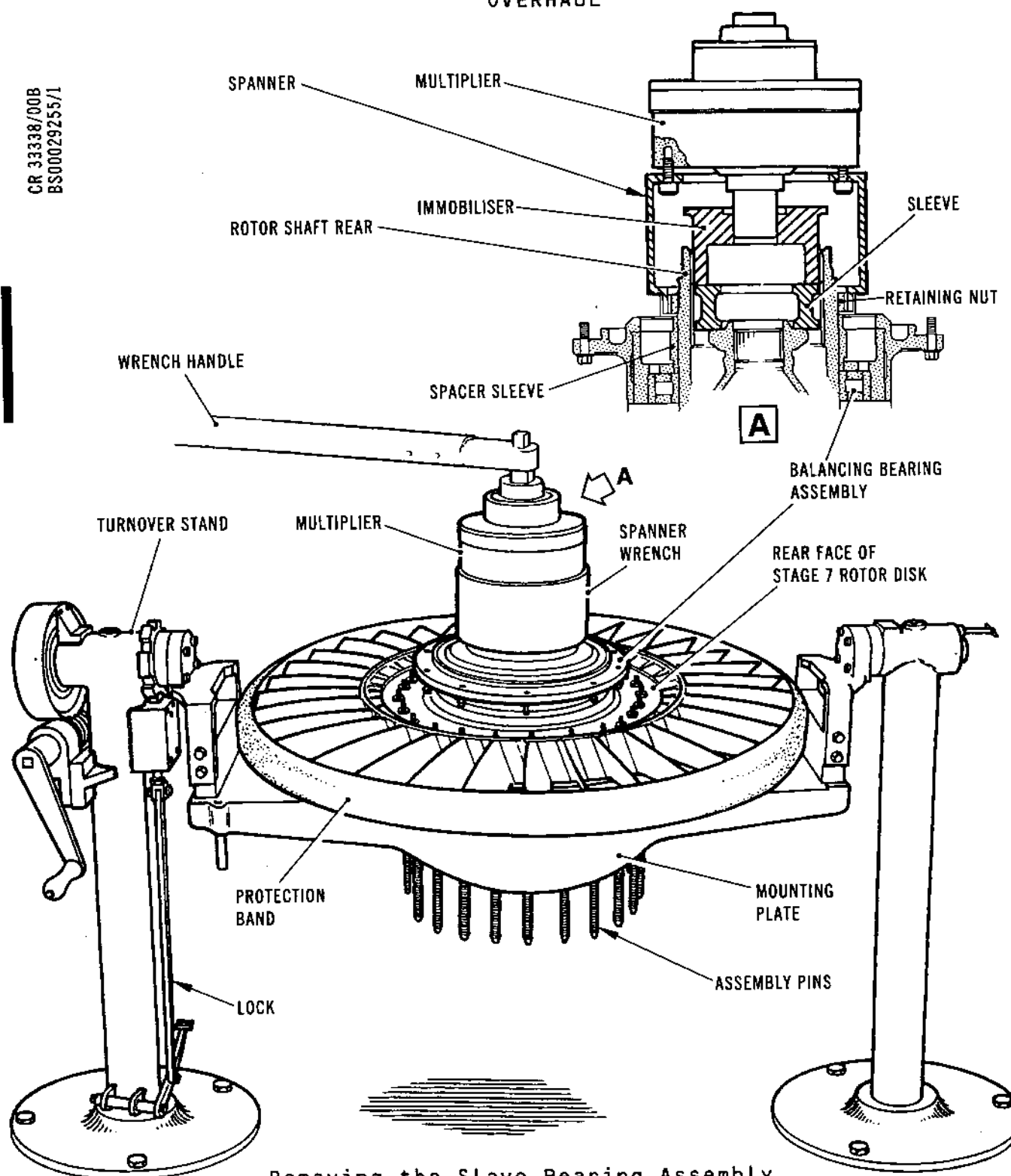


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Removing the Slave Bearing Assembly
Figure 115



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- (3) Place the balancing bearing assembly and puller onto a suitable worktop, unscrew the captive securing bolts from the outer flange, then remove the puller from the bearing assembly.
 - (4) Assemble the two bearing protectors (Tools 3161 and 3162).
- D. Remove the Mounting Plate and the Stage 7 Rotor Disk Assembly from the Turnover Stand.
- (1) Pull the locking pin on the trunnion arm, turn the thumbscrew on the pin to retain the pin in the unlocked position. Depress the pedal controlling the lock on the opposite trunnion arm, then using the cranked handle, turn the assembly through 180 deg. so that the rotor disk and mounting plate are uppermost.
 - (2) Release the foot pedal and engage the locking pin so that the assembly is secure.
 - (3) Connect the overhead hoist to the lifting ring of the mounting plate. Unscrew the nuts securing the mounting plate to the trunnion arms, pivot the bolts outwards to release the mounting plate.
 - (4) Raise the assembly clear of the turnover stand, then transfer and position the assembly over the bench. Place a support (Tool 1095) beneath the assembly, then lower the hoist until the stage 7 disk abuts the bolster. Ensure that the disk is seating correctly on the bolster, then unscrew the four slave nuts retaining the mounting plate to the rotor shaft rear.
 - (5) Operate the hoist and raise the mounting plate clear of the stage 7 disk assembly. Transfer the mounting plate back to the turnover stand, then reassemble the plate to the two trunnion arms and secure with the bolts and nuts. Expand a protection band (Tool 1129) over the tips of the rotor blades.

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- E. Disassemble the Rotor Shaft Rear, Stage 6-7 Spacer Ring and the Stage 7 Rotor Disk.
- (1) Remove the 24 clips retaining the bolts then withdraw the bolts from the stage 6-7 spacer ring and rotor shaft rear. Place the bolts and clips in containers.
 - (2) Assemble the lifting fixture (Tool 1017) to the rotor shaft rear.
 - (a) Slacken the thumbnut on the lifting fixture sufficiently to disengage the sliding arm, then assemble the lifting fixture to the rotor shaft rear.
 - (b) Engage the sliding arm into one of the slots in the locking cone then lock the arm with the thumbnut.
 - (3) Attach the overhead hoist to the lifting fixture then raise the rotor shaft rear clear of the stage 6-7 spacer ring and stage 7 rotor disk. Lower the shaft onto the worktop, disconnect the hoist then remove the lifting fixture. Place the rotor shaft rear in container (Tool 1379).
 - (4) Check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8449-191).
 - (5) Remove the 24 locknuts securing the stage 7 rotor disk to the stage 6-7 spacer ring. Assemble a labyrinth protector (Tool 1170) to the stage 6-7 spacer ring, then place the spacer ring and stage 7 rotor disk with the previously disassembled components from the compressor assembly.
- F. Disassemble items from Rotor Shaft Rear (Ref.Fig.116).
- (1) Remove securing bolts and remove the sleeve housing.
 - (2) Remove seal from the shoulder of sleeve housing.
 - (3) Remove spherical mounting.

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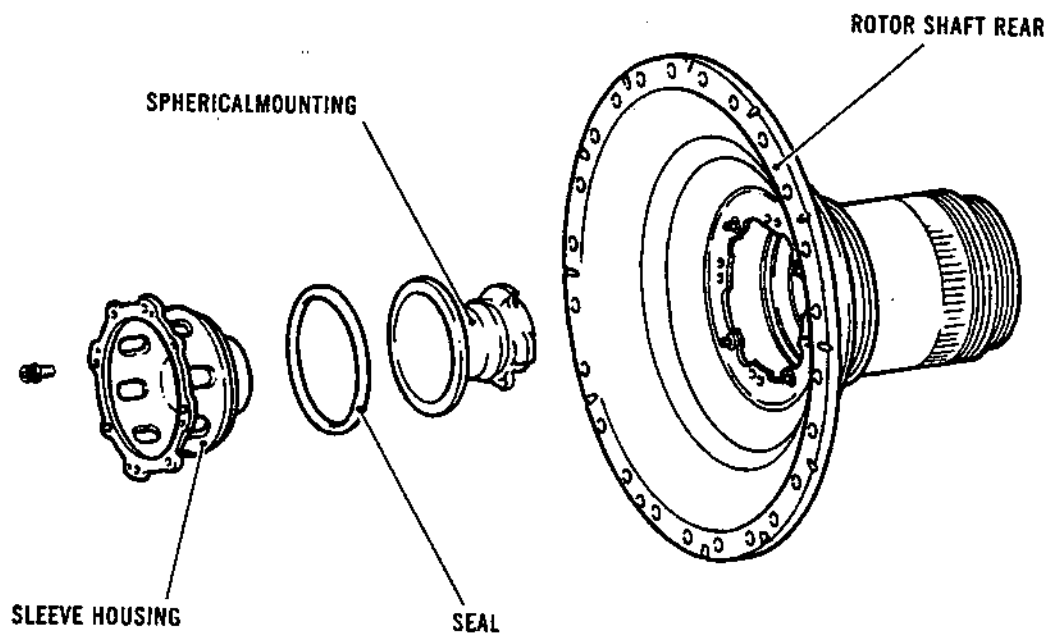


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Disassembling Items from the LP Rotor Shaft Rear
Figure 116



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LP COMPRESSOR CASE AND VANES - DISASSEMBLY

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LP COMPRESSOR CASE AND VANES - DISASSEMBLY

1. General

- A. Prior to commencing disassembly, refer to 72-09-00 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the Manufacturer's Part No., refer to Special Tools, Fixtures and Equipment Table 1001.
- C. The LP compressor case will be received from 72-31-00 assembly in a disassembled condition except for the stage 6 stator vanes, labyrinth rings/fixing rings, brackets, spherical bearings and bushes. The LP case will be assembled to the disassembly turnover stand, where the vanes and brackets on the blow-off flanges will be disassembled.

2. Disassemble LP Case Items

- A. Disassemble Front Mounting Bracket, Spherical Bearings and Bushes from the Front Flange.
 - (1) Unscrew and remove the two nuts securing the mounting bracket pins, then remove the bolts, pins and mounting bracket, place the items in a container.
 - (2) Unscrew and remove the two nuts securing the two spherical bushes at the outer locations on the flange, then remove the four spherical bushes with their spherical bearings. Discard the spherical bushes and spherical bearings.
- B. Prepare the Stand.
 - (1) Using the cranked handle of the turnover stand (Tool 1317), turn the stand so that the mounting face of the adapter plate is facing down.

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- (2) Check that the brass extractor pads do not protrude beyond the abutment face of the plate and that all the clamping plates on the adapter plate have been slackened off so that the plates are sufficiently withdrawn to clear the LP case front flange when the case is assembled to the plate.
- C. Assemble the LP Case to the Adapter Plate.
- (1) Guide the support arms of a fork lift apparatus beneath the pallet supporting the LP case. Raise the fork lift so that the pallet just clears the floor.
 - (2) Move the pallet and case under the adapter plate, aligning the 'TOP' of the LP case with the 'TOP' of the adapter plate. Raise the fork lift until the guide pins in the adapter plate are about to enter the corresponding holes in the LP case front flange. Check that the adapter plate is level; then raise the fork lift so that all the guide pins enter the front flange at the same time.
 - (3) With the LP case correctly located and abutting the adapter plate, slide the clamping plates into position on the LP case front flange. Secure all the clamping plates to the case flange by tightening the clamping plate bolts. Lower the fork lift then withdraw the pallet.
- D. Remove the Stage 6 Stator Vanes and Vane Fixing Ring.
- (1) Using the cranked handle on the stand, turn the adapter plate until the LP case is in the horizontal position, adjust up or down as necessary to obtain a convenient working height.

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- (2) Remove and discard the locking wire locking the bolted vanes and probe vanes on the outside of the case. Unscrew and remove all the bolts and sleeves from these locations. Unscrew and remove the plug and support plug assembly retaining bolts. Remove the plug and plug support assembly from the case. Place all the items in a container.

NOTE: Prior to carrying out the following operation, check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8259-153).

- (3) Unscrew and remove the two nuts securing the vane retaining plate at the loading slot inner fixing ring location. Remove the retaining plate then place the items in a container. Discard the bolts.

- (4) Slide each vane round the LP case and inner fixing ring grooves, then disengage each vane through the loading slot location. Place the vanes in a container (Tool 1393).

- (5) Remove other three remaining plates in a similar manner as in (3); discard the six bolts.

E. Disassemble Retaining Rings , Nuts, Retaining Plates and Bolts from the Labyrinth Rings/Fixing Rings.

NOTE: Do not separate the labyrinth rings from the fixing rings.

- (1) Place the stage 1 labyrinth ring/fixing ring on the worktop with the labyrinth ring uppermost.
- (2) Remove the bolt retaining rings from the two bolts at the loading slot location, discard the retaining rings.
- (3) Unscrew and remove the six nuts securing the three retaining plates then place the nuts and plates in a container.
- (4) Carefully remove the eight bolts from the labyrinth ring/fixing ring; discard the bolts.
- (5) Adopting a similar procedure, disassemble the retaining rings, nuts, plates and bolts from the remaining labyrinth rings/fixing rings, place the items in a container except for the bolts which are to be discarded.

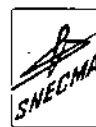
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- (6) Carefully place the labyrinth rings/fixing rings in the appropriate part of the container (Tool 1440).
- F. Remove Brackets and Special Bolts from the Front and Rear Blow-off Flanges.
- (1) Using the cranked handle, on the stand, turn the adapter plate until the LP case rear flange is uppermost.
- NOTE: Do not remove the mounting bracket (4-70) or the identification plate (4-40) from the front blow-off flange without authority.
- (2) If the identification plate is to be removed, immobilize the shear neck type nuts, with a gripping device, then unscrew the bolts, discard the nuts.
 - (3) Disassemble nuts, bolts and brackets from the front and rear blow-off flanges. Place the items in a container.
- G. Disassemble Pulse Probe or Blanking Plate.
- (1) Remove the three bolts and the bracket from the bottom rear of the case, then carefully withdraw the pulse probe on engines to pre SB.71-8314-28 or the blanking plate on engines incorporating SB.71-8314-28.
- H. Remove the LP Case from the Stand.
- (1) Attach a multiple leg sling (Tool 1178) to the overhead hoist then position the hoist over the LP case. Adjust the hoist so that the lifting hook takes up a central position over the top of the case. Assemble the three attachment plates of the sling to the rear flange of the case at equidistant positions, then secure the attachment plates with their thumbscrews.
 - (2) Operate the hoist sufficiently to take up the slack in the whips, then release the clamping plates retaining the LP case front flange to the adapter plate of the turnover stand.
- CAUTION: DO NOT TRY TO RAISE THE CASE CLEAR OF THE ADAPTER PLATE AT THIS STAGE.



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- (3) Carefully take the weight of the LP case, then turn the extractor screws on the underside of the mounting plate in equal increments until the brass pads push the case clear of the guide pins and the spigot location. Raise the case clear of the stand then lower onto a pallet.
- (4) Disconnect the hoist then remove the multiple leg sling. Transfer the LP case inner fixing rings and loose items to the cleaning area. Ensure that an identification tally is attached to the groups of components.

J. Remove Liners from Fixing Rings.

- (1) On engines to SB.72-8690-296, SB.72-8730-298 and SB.72-9061-434 standard, release peening and remove the anti-fret liners from the fixing rings, stages 1 to 6.

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LP COMPRESSOR EXIT GUIDE CASE AND VANES - DISASSEMBLY

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LP COMPRESSOR EXIT GUIDE CASE AND VANES - DISASSEMBLY

1. General

- A. Prior to commencing the disassembly, refer to 72-09-00 Disassembly for general information.
- B. The top and bottom LP exit guide vane cases will be received on a pallet with the LP compressor group for disassembly.
- C. After the removal of the vanes, the top and bottom half cases must be kept together as a matched pair and suitably identified.

2. Disassemble the Exit Guide Cases and Vanes

A. Prepare for Disassembly.

- (1) Place the top and bottom exit guide cases on a suitable worktop.
- (2) Remove and discard the locking wire from the fixed vane securing bolts in the top and bottom half cases. Remove and discard the locking wire from the four probe plugs in the top and bottom half cases.
- (3) Unscrew and remove the bolts, sleeves, probe plugs and washers from both cases.

B. Remove the Vanes and Seals from the Exit Guide Cases.

- (1) Remove the 54 nuts and bolts retaining the seals to the vanes. Place the seals, nuts and bolts in a container.
- (2) Remove the vanes from the top and bottom half cases, place the vanes in a container. Place the two half cases on a pallet, then tie an identification tally onto each case. Transfer the vanes and cases to the cleaning area.

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LP COMPRESSOR ROTOR - DISASSEMBLY

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LP COMPRESSOR ROTOR - DISASSEMBLY

1. General

- A. Prior to commencing disassembly, refer to 72-09-00 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001.
- C. The LP (bladed) rotor disks will be received, on pallets, from 72-31-00 disassembly. Ensure all items are suitably identified and placed in the appropriate containers as detailed in the following text.

2. Disassemble the Blades from Stage 1-7 LP Rotor Disks

- A. Remove the Blades from the Stage 1 Disk.
 - (1) Assemble the lifting fixture (Tool 401) to the Stage 1 disk (Ref.Fig.101).
 - (a) Attach a hoist to the lifting fixture and position the fixture above the disk.
 - (b) Ensure the hand knobs of the lifting fixture are located at the 'FREE' position then lower the hoist and engage the end plate of the fixture in the disk. Raise the hand knobs and move to the 'LOCK' position, engaging the lugs under the disk, depress the hand knobs to engage their locking pins.
 - (2) Raise the hoist and position the disk on suitable blocks or support (Tool 1326). Raise the hand knobs of the lifting fixture and move to the 'FREE' position, depress the knobs to engage the locking pins, then raise the hoist and remove the fixture.
 - (3) Remove the blade protection/retaining band then remove the blade retaining bands in turn and slide the blades down out of the disk, do not allow the blades to fall. Place all blades in the container (Tool 1395). Blades that are not to the standard of SB.72-8787-300 are to be returned to the manufacturer.

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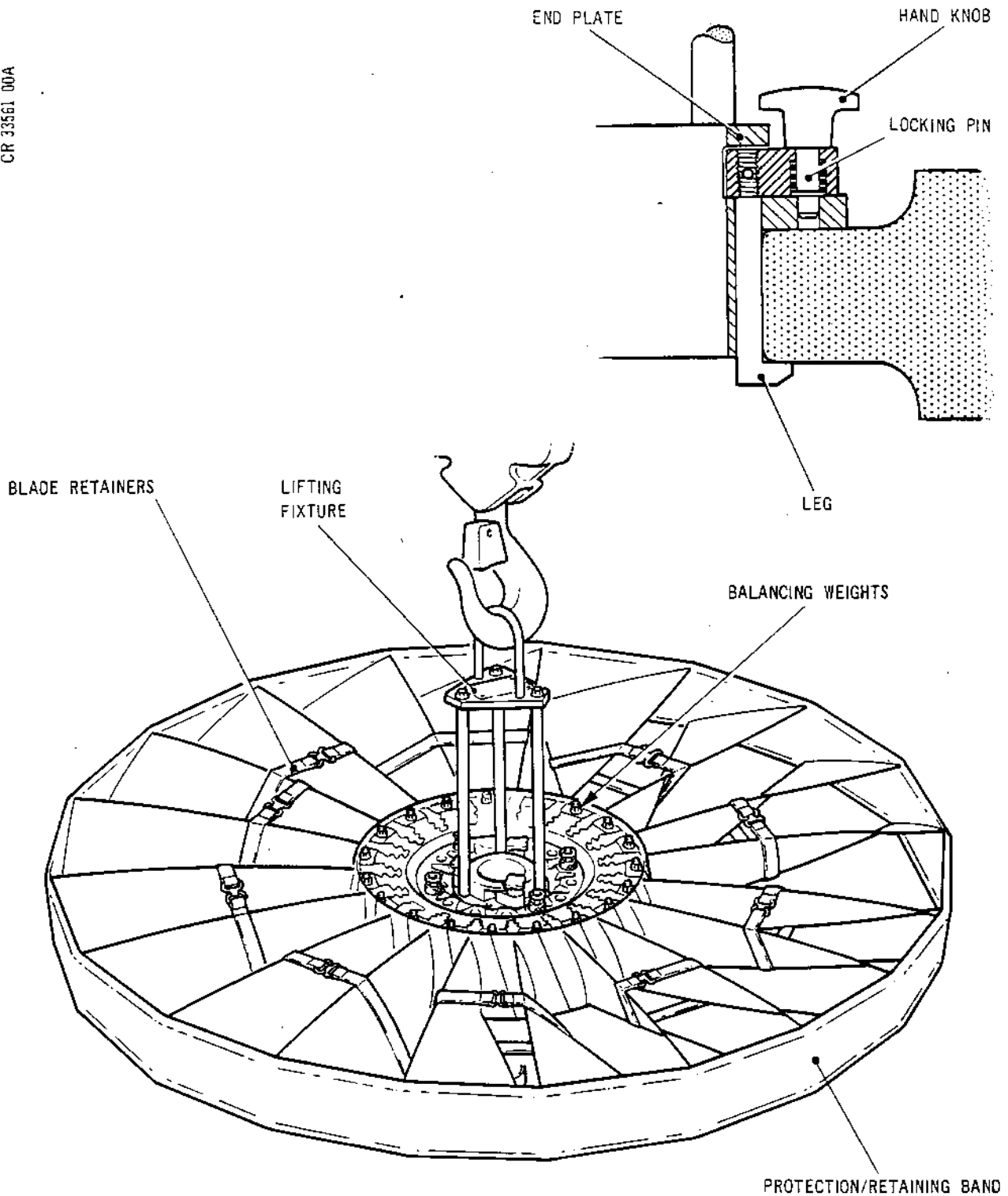


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TN32412

Assembling Lifting Fixture to Stage 1 Disk
Figure 101

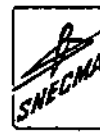
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- (4) Check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8449-191).
- (5) Unscrew and remove the 19 nuts from the uppermost face of the disk then remove the balancing weights and bolts. Using the lifting fixture (Tool 401) Ref.para.(1). Place the disk in the container (Tool 1409).

B. Remove the Blades from Stage 2 Disk.

- (1) Assemble the multiple leg sling (Tool 1285) to the stage 2 disk (Ref.Fig.102).
 - (a) Attach the sling to a hoist and position the hoist above the disk.
 - (b) Unscrew and remove the three nuts and washers from the waisted bolts of the sling. Equi-space the bolts around the disk then pass the bolts through the holes in the disk and reassemble the washers and nuts to the bolts to secure the sling.
- (2) Raise the hoist and position the disk on suitable blocks or support (Tool 1326), then unscrew and remove the nuts and washers from the sling bolts, raise the hoist and remove the sling.
- (3) Remove the protection/retaining band then remove the blade retaining bands in turn and slide the blades down out of the disk, do not allow the blades to fall. Place all blades in the container (Tool 1396).
- (4) Unscrew and remove any nuts, from the underside of the disk, securing balancing weights and bolts then remove both weights and bolts. Using the multiple leg sling (Tool 1285) Ref.para.(1) place the disk in the container (Tool 1407).

C. Remove the Blades from Stage 3 Disk.

- (1) Assemble the multiple leg sling (Tool 1217) to the stage 3 disk (Ref.Fig.103).
 - (a) Attach the sling to a hoist and position the sling above the disk.
 - (b) Assemble to the disk, from the rear (underside) face, four equi-spaced slave bolts (Tool 367). Engage each bolt in the larger knurled nuts of the sling blocks and fully tighten the nuts.

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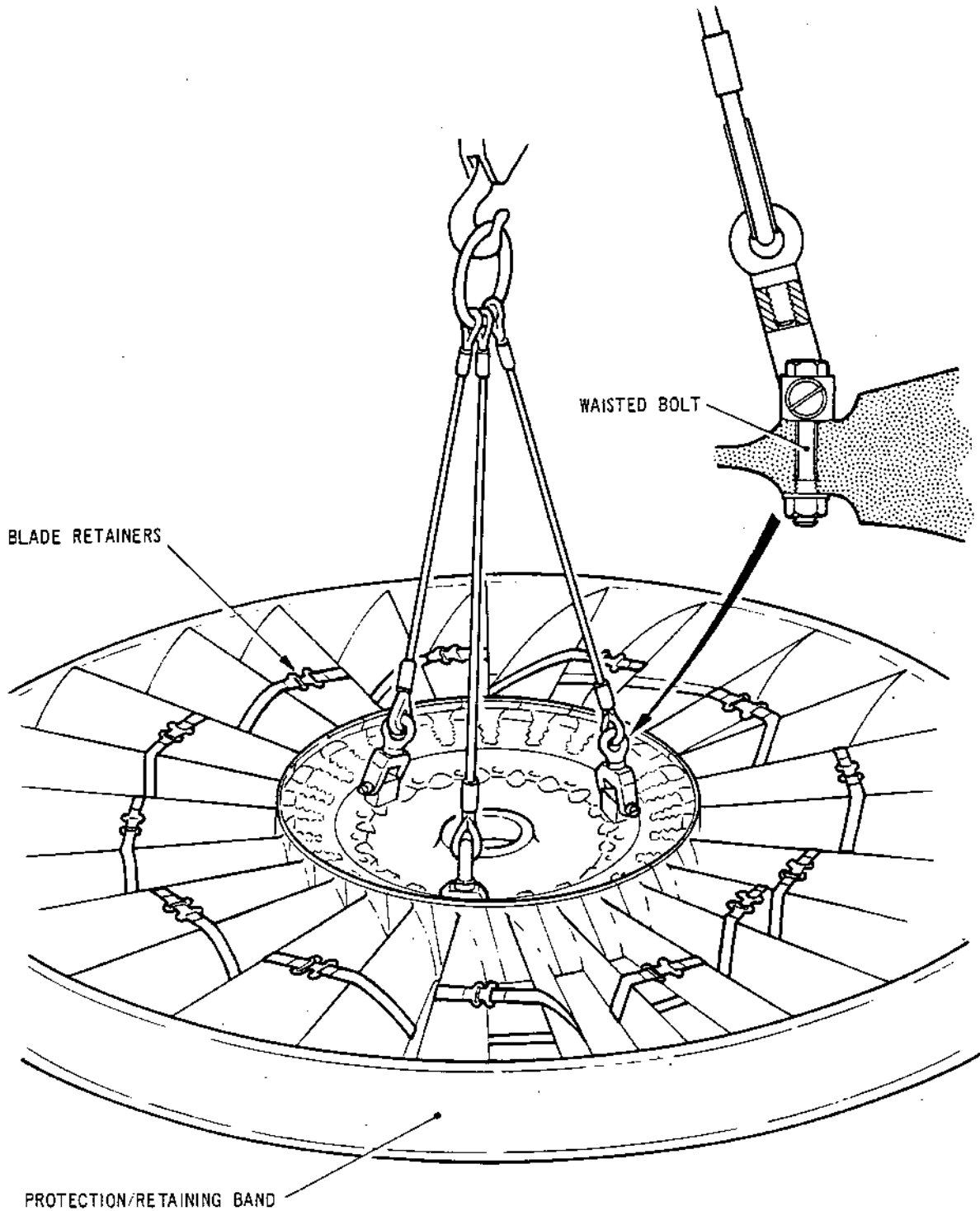


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TN32414

Assembling Multiple Leg Sling to Stage 2 Disk
Figure 102

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- (2) Raise the hoist and position the disk on suitable blocks or support (Tool 1326). Unscrew the knurled nuts raise the hoist and remove the sling, then remove the slave bolts from the disk.

NOTE: The sling may be left attached to the disk whilst the blades are being removed.

- (3) Using a light alloy chisel bend each blade locking key upward until vertical. Using a light alloy drift, on the blade root, steadily drift each blade out of the disk, ensure the blades do not drop. Remove the locking keys from the blade roots and place the blades in the container (Tool 1397).
- (4) Unscrew and remove any nuts, from the underside of the disk, securing balancing weights and bolts then remove both weights and bolts. Using the multiple leg sling (Tool 1217) Ref.para.(1) place the disk in the container (Tool 1408).

D. Remove the Blades from Stage 4 Disk.

- (1) Assemble the multiple leg sling (Tool 1217) and slave bolts (Tool 426) to the stage 4 disk and remove the blades as detailed in para.C.

NOTE: Ignore the reference to balancing weights, use the container (Tool 1398) for the stage 4 blades and container (Tool 1407) for the stage 4 disk.

E. Remove the Blades from Stage 5 Disk.

- (1) Assemble the multiple leg sling (Tool 1217) and slave bolts (Tool 426) to stage 5 disk and remove the blades as detailed in para.C.

NOTE: Ignore the reference to balancing weights, use the container (Tool 1399) for the stage 5 blades and container (Tool 1407) for the stage 5 disk.

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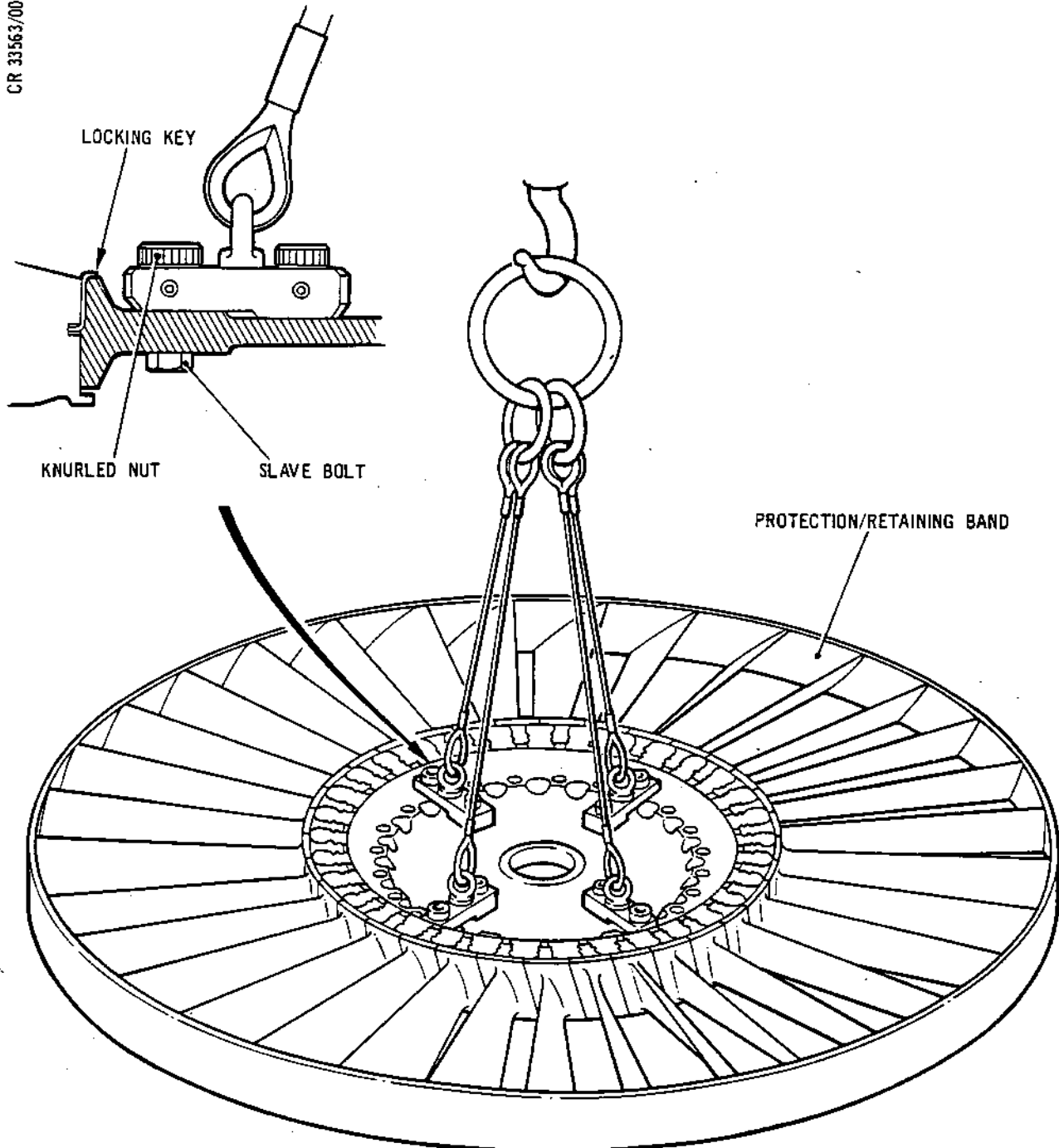


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Assembling Multiple Leg Sling to Stage 3 Disk
Figure 103

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F. Remove the Blades from the Stage 6 Disk.

- (1) Assemble the multiple leg sling (Tool 1217) and slave bolts (Tool 368) to the stage 6 disk and remove the blades as detailed in para.C.

NOTE: Ignore the reference to balancing weights, use the container (Tool 1464) for the stage 6 blades and the container (Tool 1407) for the stage 6 disk.

G. Remove the Blades from Stage 7 Disk.

- (1) Assemble the multiple leg sling (Tool 1217) and slave bolts (Tool 1164) (use the smaller knurled nuts) to the stage 7 disk and remove the blades as detailed in para.C.

NOTE: Ignore the reference to balancing weights use the container (Tool 1465) for the stage 7 blades and container (Tool 1406) for the stage 7 disk.

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LP COMPRESSOR DRIVE SHAFT - DISASSEMBLY

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LP COMPRESSOR DRIVE SHAFT - DISASSEMBLY

1. General

- A. Prior to commencing disassembly, refer to 72-09-00 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001.
- C. The LP drive shaft will be received in a transporter or mobile stand with protectors assembled to each end of the shaft, and the signal shaft tube as a separate item. The disassembly entails the removal of the drive shaft rear and the removal of the stiffener disk assembly from the drive shaft front, and the removal of items from the shafts and the signal tube.

2. Disassemble the LP Drive Shaft

- A. Assemble the LP Drive Shaft to the Stand (Ref.Fig.101).
 - (1) Unscrew and remove the nuts, balancing weights and bolts and remove the sealing ring from the drive shaft front.
 - (2) Remove the protector (Tool 408) from the end of the drive shaft rear, then screw the lifting fixture (Tool 1055) onto the end of the shaft and connect a hoist to the fixture.
 - (3) Release and hinge open the bushes if the drive shaft is in the mobile stand, then supporting the front end of the shaft, raise the rear end of the shaft (by hoist) until the shaft is vertical and clear of the transporter or mobile stand.
 - (4) Release and remove the protector (Tool 999) from the (bottom) front end of the shaft, then position and lower the drive shaft into the stand (Tool 1110).

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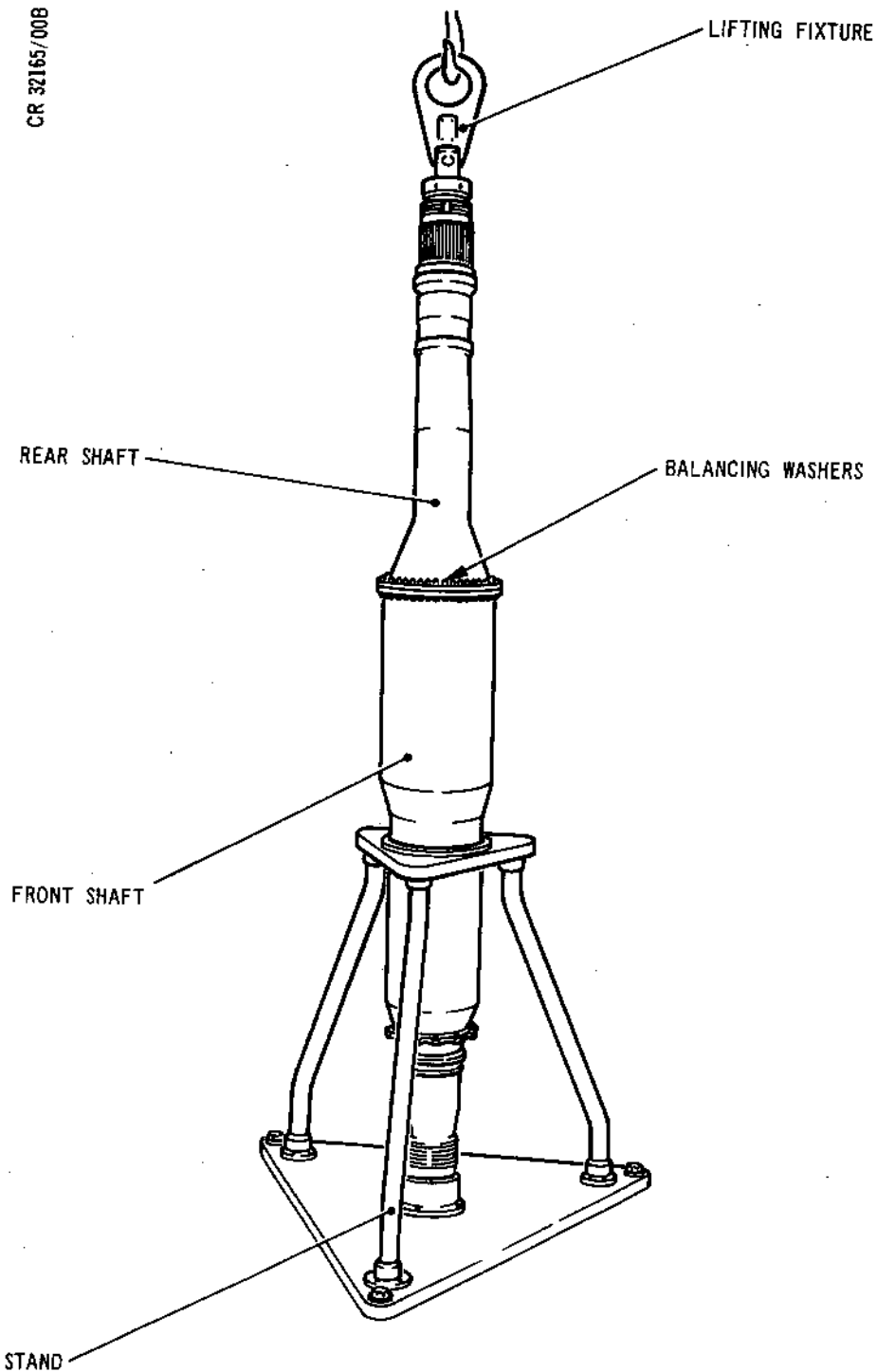
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Assembling LP Drive Shaft to Stand
Figure 101

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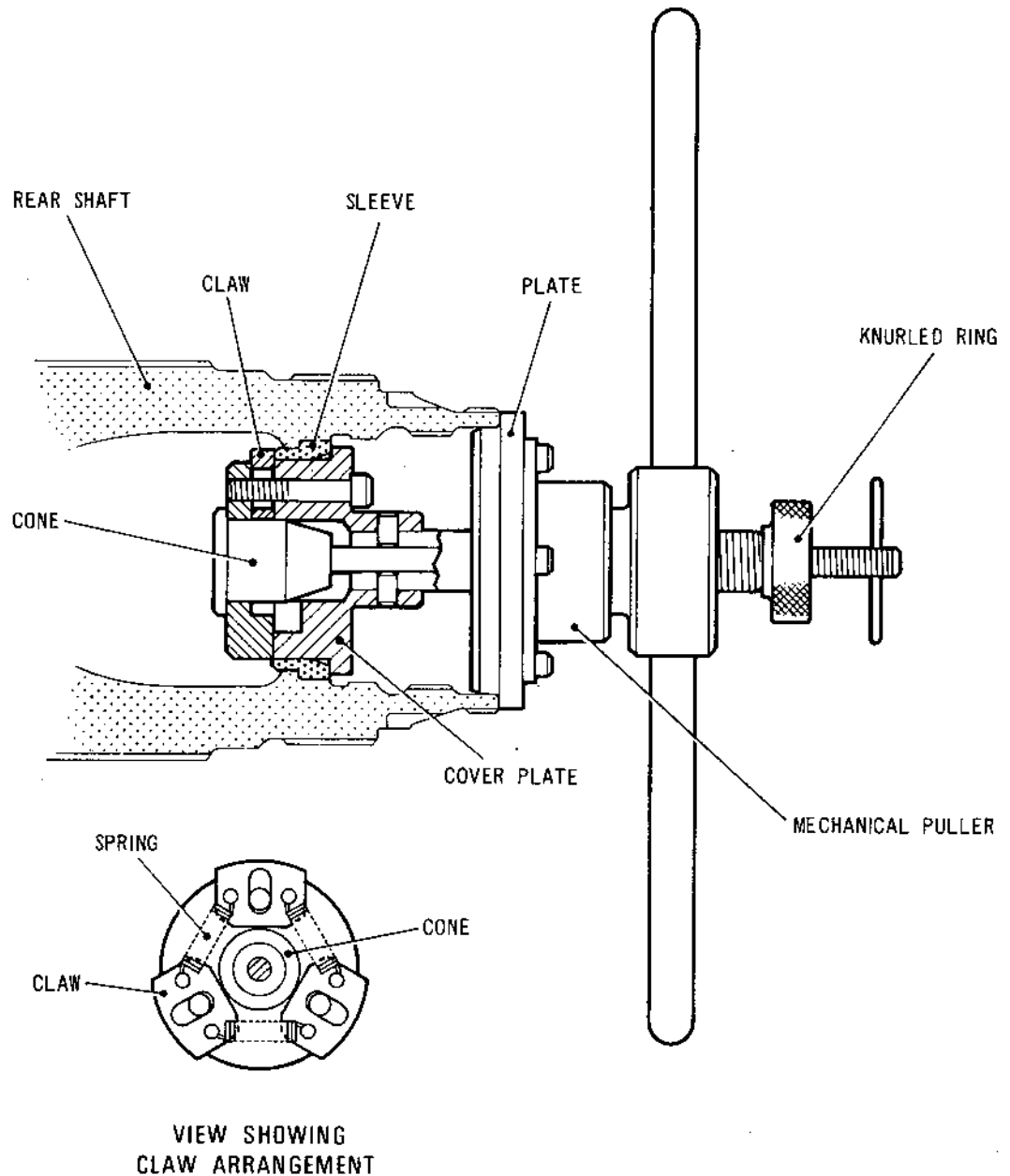
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Removing Sleeve from LP Drive Shaft Rear
Figure 102

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B. Remove the LP Drive Shaft Rear.

- (1) Unscrew and remove the nuts, balancing washers and bolts securing the front and rear shafts. With the lifting fixture and hoist still attached to the rear shaft, raise the hoist, then position and lower the shaft onto a suitable clean flat surface. Disconnect the hoist, then unscrew and remove the lifting fixture.
- (2) Remove the sleeve from the rear end of the rear shaft using the mechanical puller (Tool 1305) (Ref.Fig.102).
 - (a) Screw in on the small tommy bar until the cone is out of engagement with the three claws, allowing them to retract under the action of the springs.
 - (b) Unscrew the large tommy bar to move the claw assembly away from the handle.
 - (c) Slide the claw assembly into the rear shaft until the flange on the claw cover plate abuts the spacer.
 - (d) Hold the knurled ring and screw out on the small tommy bar causing the cone to extend the claws behind the sleeve.
 - (e) Screw in on the large tommy bar and engage the plate in the shaft, then continue screwing, holding the knurled ring steady, until the spacer is released.
 - (f) Withdraw the puller and spacer from the shaft. Screw in on the small tommy bar to retract the claws, then withdraw the spacer from the puller and place the spacer in a suitable container.
- (3) Release and open the clamp of fixture (Tool 1451), then lower the rear shaft into the fixture. Close and secure the clamp.

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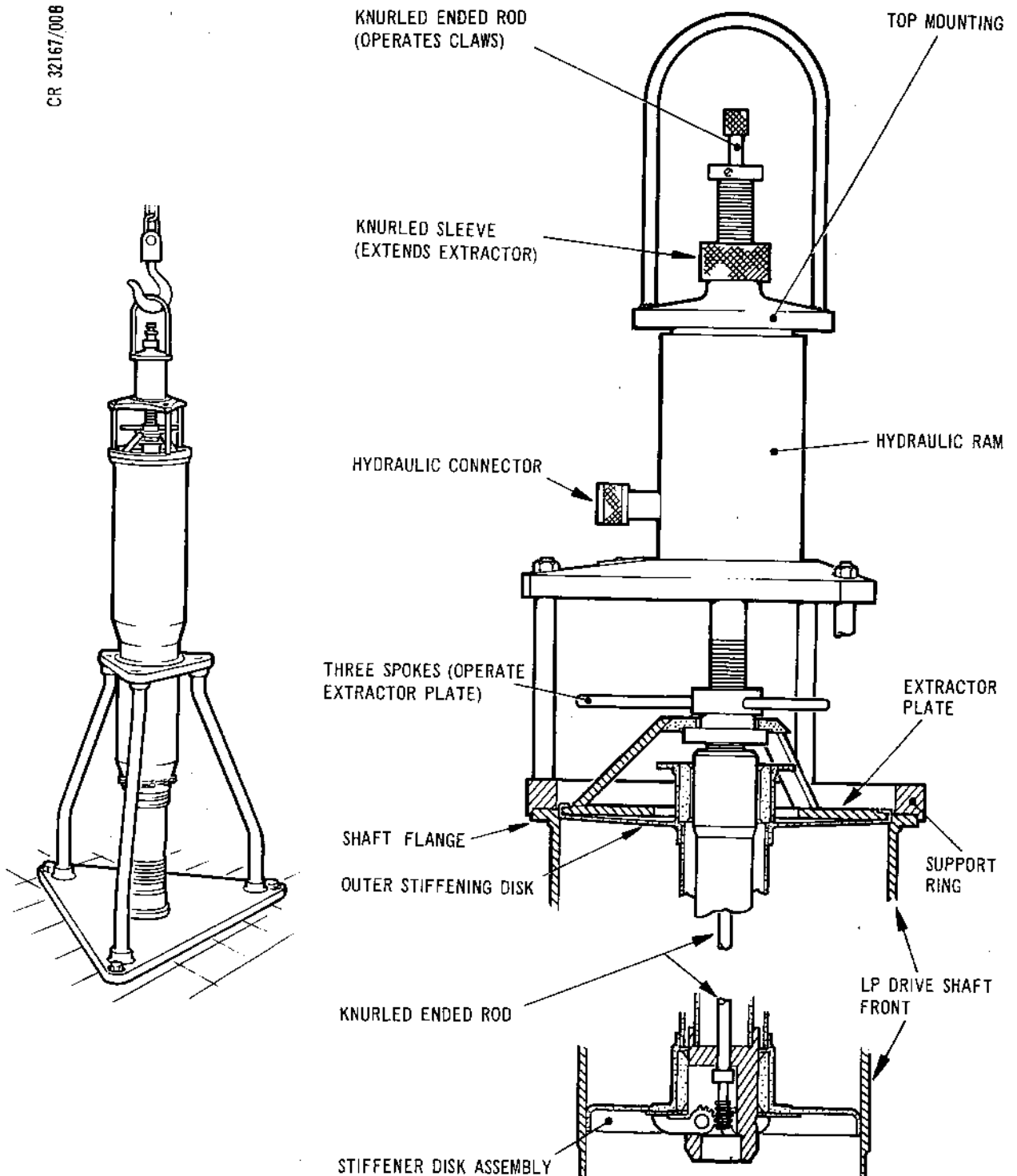
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TN29067



Removing Stiffener Disk: Assembly from LP Drive Shaft Front
Figure 103

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C. Remove the Stiffening Disk Assembly from the LP Drive Shaft Front.

- (1) Assemble the extractor (Tool 655) to the stiffener and shaft (Ref.Fig.103).
 - (a) Push in the central knurled ended rod until the three claws are fully retracted into the rod end. Unscrew on the three central spokes to withdraw the disk extractor plate. Unscrew the knurled sleeve to extend the extractor, then attach a hoist to the top mounting.
 - (b) Lower the extractor into the disk stiffener until the support ring spigots onto the shaft flange and the top mounting rests on the hydraulic ram.
 - (c) Pull out the central knurled ended rod to open the claws, then screw down the knurled sleeve until resistance is felt as the claws locate against the disk stiffener. Screw down on the three spokes and guide the three lugs on the outer disk through the three slots in the extractor plate. Rotate the extractor plate to trap it behind the three lugs, then unscrew on the three spokes until the plate is in firm contact with the lugs.
- (2) Operate the extractor to release the disk stiffener from the shaft.
 - (a) Attach the hose of a hand hydraulic pump to the hydraulic connector (Enerpak female half coupling AR400).
 - (b) Operate the hand pump until the stiffener disk is released from the five lands in the shaft.
- (3) Remove the extractor.
 - (a) Release the extractor plate from the outer disk by screwing down on the three spokes to release the plate then rotating the plate until the cut-outs align with the disk lugs.

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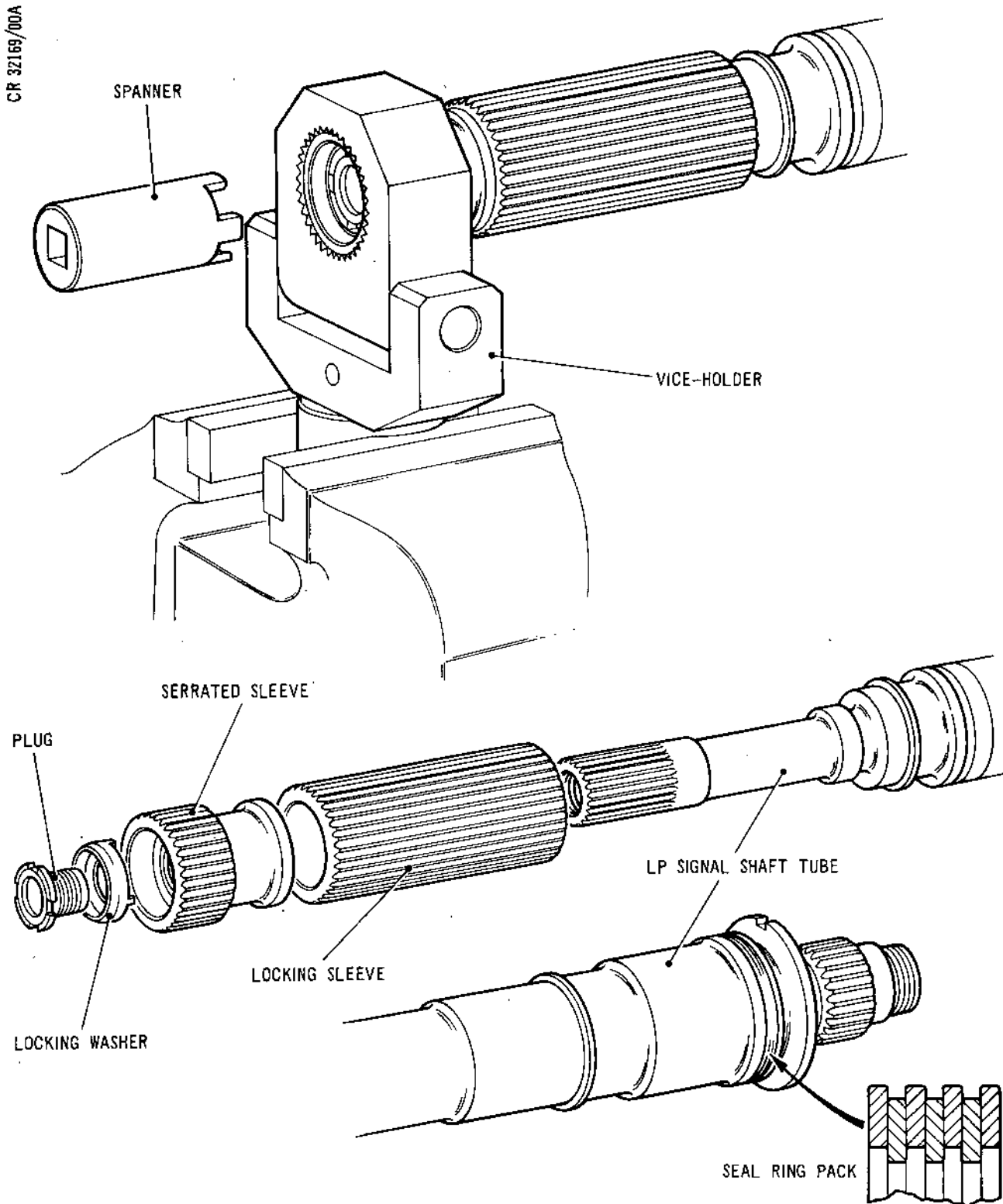


- (b) Release the hydraulic pressure allowing the extractor rod to be lowered into the disk assembly, then disconnect the hydraulic hose.
- (c) Unscrew the knurled ring, push down on the knurled ended rod to release the claws, then raise the hoist to withdraw the extractor from the shaft and disk assemblies, and lower the extractor onto a suitable surface.
- (4) Withdraw the disk assembly from the shaft and place it on a clean protected surface.
- (5) Unscrew and remove the three nuts and bolts securing the bearing retaining plate at each end of the stiffening disk assembly and remove the plates.
- (6) If the stiffening disk assembly is stained heavily enough to require a heavy cleaning process (Process F, Ref. 72-31-04 Cleaning) prior to crack detection the carbon bearings must be removed as follows:
- (a) Heat the assembly to 400 deg. C, then drive the bearings out using a long drift. Discard bearings after removal.
- (b) If this procedure fails to remove the bearings they may be machined out.
- D. Remove the LP Drive Shaft Front from the Stand.
- (1) Locate the lifting fixture (Tool 1109) on the rear flange of the drive shaft front and secure the fixture to the shaft with slave bolts (Tool 328) and nuts.



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Removing Items from LP Signal Shaft Tube
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- (2) Attach a hoist to the lifting fixture, raise the shaft out of the stand until clear of the stand, then position and lower the shaft over the fixture (Tool 1450). Release and open the clamps of the fixture. Lower the shaft into the fixture, release and remove the lifting fixture, then correctly locate the shaft in the fixture. Close and secure the clamp.
 - (3) Place all loose items in a suitable container.
- E. Disassemble the LP Signal Shaft Tube (Ref.Fig.104).
- (1) Locate the vice holder (Tool 1301) in a hand vice and secure the holder, then remove the signal shaft from its fixture (Tool 1452) and insert the serrated sleeve on the end of the shaft into the holder. Release the locking washer securing the screwed plug, then using spanner (Tool 1614) unscrew and remove the plug.
 - (2) Withdraw the sleeve from the holder, then withdraw the serrated and locking sleeve from the signal shaft.
 - (3) Withdraw the seal ring pack from its location at the rear end of the shaft and slide the pack to the front end of the shaft and remove.
 - (4) Place the signal shaft tube in its fixture (Tool 1452), and the loose items in container (Tool 1378) with the generating mechanism items from breakdown 72-31-05.

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LP SHAFT SIGNAL SYSTEM GENERATING MECHANISM - DISASSEMBLY

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For information on the disassembly of the LP Shaft Signal System Generating Mechanism, refer to 72-00-00 Disassembly.

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COMPRESSOR INTERMEDIATE CASE - DISASSEMBLY

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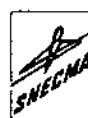
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COMPRESSOR INTERMEDIATE CASE - DISASSEMBLY

1. General

- A. Prior to commencing the disassembly, refer to 72-09-00 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001.
- C. The LP compressor thrust bearing and housing assembly will have been removed from the LP compressor rear during engine bulk disassembly (Ref.72-00-00 Disassembly) and will be received for disassembly in a protective container as a separate item. During Overhaul procedure these items must remain with the intermediate case assembly.
- D. The inner sub-assembly (5-330) and the outer sub-assembly (5-420) are to remain together as one unit, therefore it is not recommended that the two items be separated during normal overhaul. In addition, the inner sub-assembly (5-330) and the three segments bolted to it are manufactured as a matched set and must not be disassembled.
- E. It is essential (at the seal locations) that the sealing grooves are hand lapped and the sealing faces are skim ground to remove any areas of damage caused by Metaflex seals. A satisfactory surface finish, to install 'C' seals, must be achieved (Refer to Chapter 72-32-00 Assembly).

2. Assemble the Intermediate Case to the Disassembly Stand

- A. Prepare the Intermediate Case.
 - (1) Remove the protection cover from the front of the intermediate case.
 - (2) Carefully remove the HP probe operating/labyrinth ring from the HP bevel gear and place the ring in a container.

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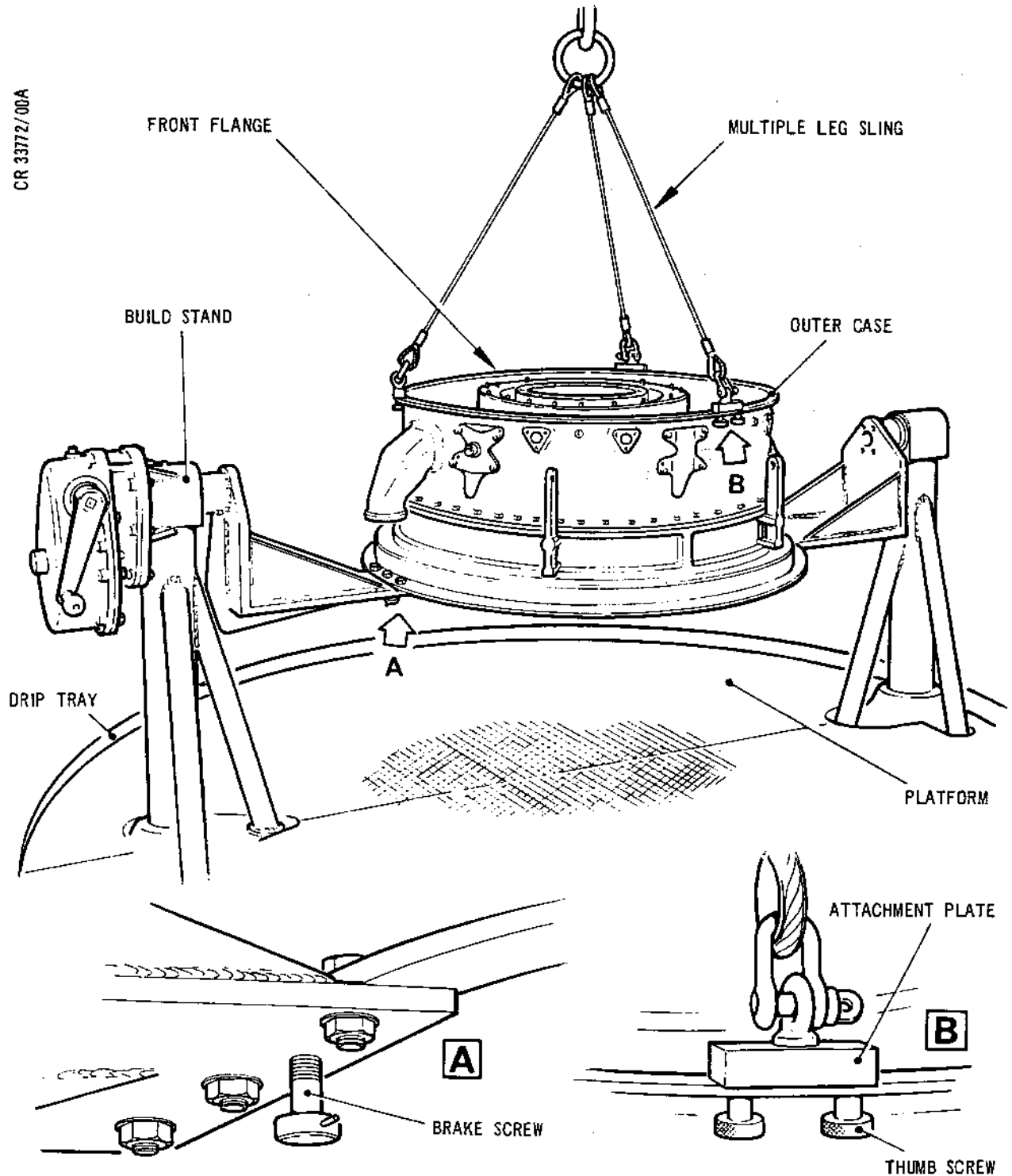
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Assembling the Intermediate Case to the Disassembly Stand
Figure 101



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- (3) Assemble the multiple leg sling (Tool 1089) to three equally spaced positions on the front flange, then connect a hoist to the sling ring.
- (4) Raise the intermediate case off its container, then release and remove the packing pieces assembled to the rear flange. Reassemble the slave nuts to the packing pieces and stow.
- (5) Raise the case to a convenient working height then assemble the bearing retainer (Tool 434) to the bearing assembly and HP bevel gear. Secure the retainer with the thumbnut (Ref.Fig.102).

B. Secure Case to Stand (Ref.Fig.101).

CAUTION: ENSURE BRAKE SCREW IS APPLIED DURING DISASSEMBLY PROCEDURE.

- (1) Using the cranked handle, adjust the disassembly stand (Tool 1263) until the mounting plate is front face uppermost.
- (2) Lower the intermediate case onto the disassembly stand aligning the TOP of the intermediate (No.1 vane) with the TOP marked on the stand. Secure the intermediate case to the stand using slave bolts and nuts, then disconnect and remove the sling.
- (3) Apply release agent (Ref.72-09-00 Disassembly) to the 30 bolts visible between the inner wall of the inner case and the HP bearing housing. Allow a reasonable period of time for penetration before turning the intermediate case rear flange uppermost.

3. Disassemble the HP Bearing Housing Assembly

A. Remove Air Baffles (Ref.Fig.102).

- (1) Using the cranked handle, turn the disassembly stand until the rear flange of the intermediate case is uppermost.
- (2) Apply release agent to the dowels and bolt positions on the air baffle unit, then also apply release agent to the locking lugs on the HP rear baffle and inner labyrinth housing.

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- (3) Remove the 24 bolts securing the air baffle assembly at the outer location, then remove the 12 securing bolts from its inner location. Remove the outer air baffle assembly and place the items in a container.
- (4) Using a suitable driver and hammer, carefully free the rear outer baffle from its corresponding locking lugs on the inner labyrinth housing. Remove the rear outer and rear inner air baffles and place them in a container.

CAUTION: EXERCISE CARE WHEN REMOVING THE FOLLOWING BOLTS.

- (5) Release the 30 bolts at the inner location retaining the inner labyrinth housing and bearing retainer to the bearing housing assembly. Apply a further application of release agent to the bolts then remove the bolts and place in a container.

B. Remove the Inner Labyrinth Housing.

- (1) Remove the bolted half segment from the inner disk of the mechanical puller (Tool 823) to facilitate assembly of the puller to the labyrinth housing.
- (2) Assemble the puller to the bearing housing so that the segment locates under the shoulder of the inner labyrinth housing.
- (3) Reassemble the half segment, then readjust the puller to engage both segments under the shoulder of the inner labyrinth.
- (4) With the outer ring of the puller located on the bearing housing, withdraw the inner labyrinth from its location. Remove the puller from the labyrinth housing, then place the housing in a container.

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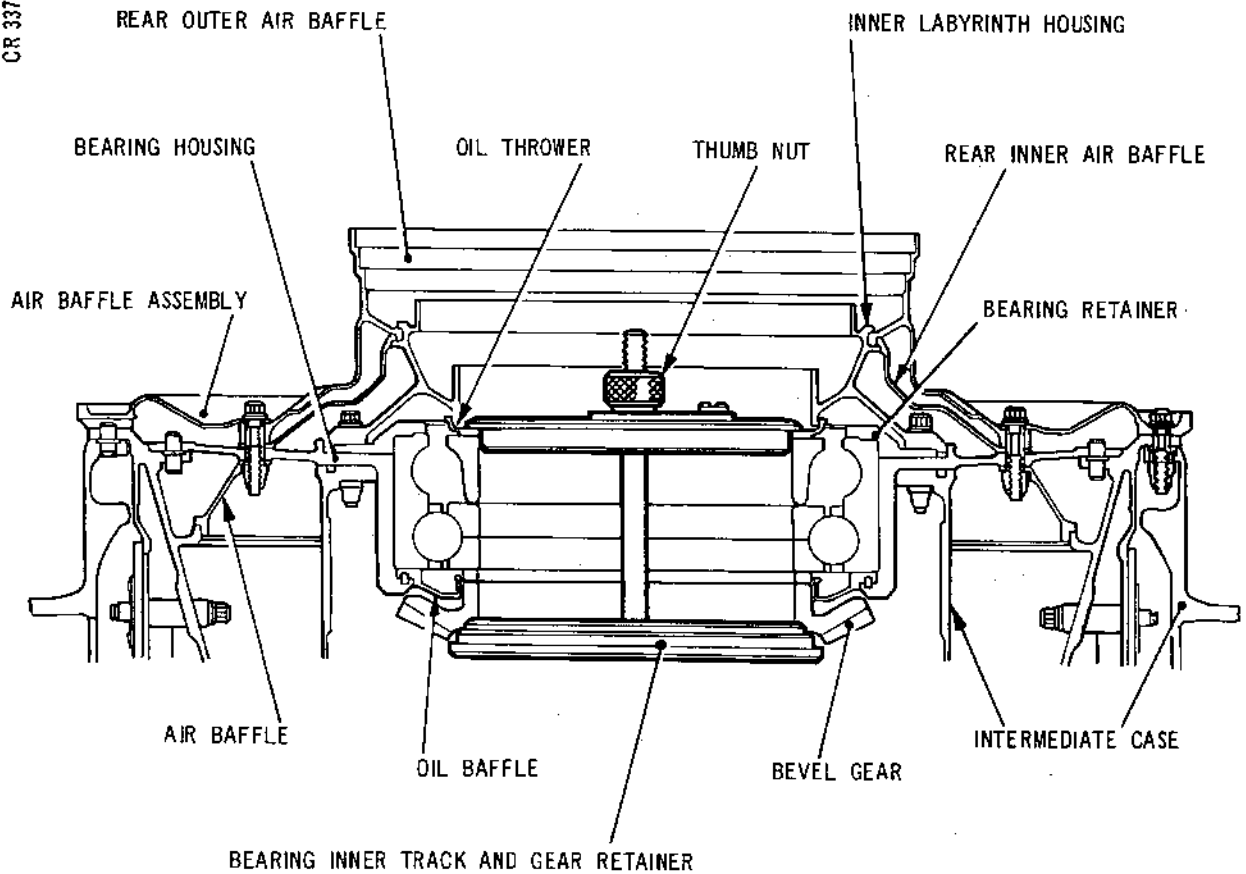


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Preparing to Disassemble the HP Bearing Housing Assembly
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C. Remove the Bearing Retainer.

- (1) Screw a puller (Tool 1668) into each extraction position nearest the dowels locating the retainer.
- (2) Turn each puller in equal increments until the retainer is free of its location. Remove the pullers and place the retainer in a container.
- (3) Remove the seal from the bearing housing and discard as follows:
 - (a) Pre SB.0L.593-72-9019-404 standard, remove the Metaflex seal.
 - (b) SB.0L.593-72-9019-404 standard, remove the Kalrez O-ring.
 - (c) SB.0L.593-72-9053-426 standard, remove the metal 'C' seal.

D. Remove the HP Bearing Housing Assembly.

CAUTION: EXERCISE CARE WHEN REMOVING THE HP BEARING ASSEMBLY FROM THE SIX DOWELS.

- (1) Remove the 18 bolts from the outer location of the bearing housing.
- (2) Screw a puller (Tool 1668) into each of the extractor positions nearest the dowels in the housing.
- (3) Turn each puller in small equal increments until the bearing housing is released from the dowels.
- (4) Carefully lift the bearing housing assembly from the intermediate case, taking care not to knock and damage the HP bevel gear on the inner case. Place the assembly on a protected worktop, then remove the six pullers.

E. Remove the HP Bearing from the Housing.

- (1) Remove the knurled thumbnut securing the bearing retaining plates, then remove the upper plate.

DISASSEMBLY

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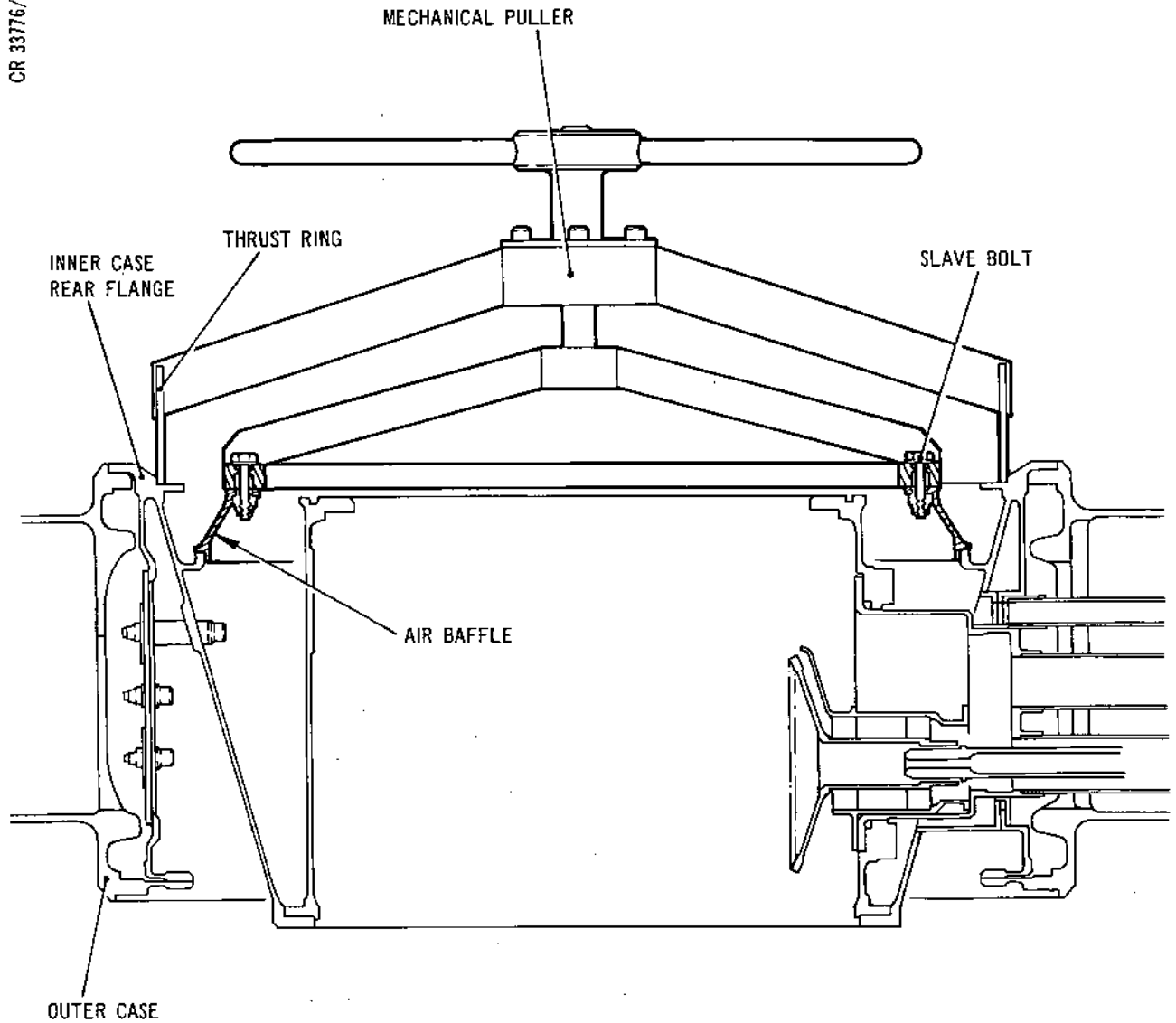
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MK.610-14-28
OVERHAUL



CR 33776/00A



Withdrawing the Inner Air Baffle from
the Intermediate Case
Figure 103



OLYMPUS 593

MK.610-14-28
OVERHAUL

sheema

- (2) Lift the bearing housing assembly clear of the lower retainer and bevel gear, then place the bevel gear adjusting washer and oil thrower from the top of the bearing into a container.

NOTE: Assistance will be required to immobilize the bearing housing when lifting out the bearing.

- (3) Carefully lift the bearing out of the housing, then place the bearing in a protective container.
- (4) Reverse the bearing housing, then, using a suitable driver and hammer, carefully tap the oil baffle free of its pins. Place the oil baffle and bearing housing in a container.

F. Disassemble the Air Baffle from the Inner Case (Fig.103).

- (1) Assemble the mechanical puller (Tool 932) to the air baffle and secure with slave bolts.
- (2) Adjust the puller until the thrust ring is resting on the inner case flange.
- (3) With the puller correctly located withdraw the air baffle, disassemble the baffle from the puller, then place the baffle in a container.

4. Disassemble the Right and Left-hand Gearbox Mounting Assemblies

A. Disassemble the Right-hand Gearbox Mounting Assembly (Ref.Fig.104).

- (1) Turn the stand until the intermediate case front flange is uppermost.
- (2) Ensure that the threads of the mechanical puller (Tool 959) are clean and free from damage, then screw the puller into the hollow pin until the flange of the screw abuts the intermediate case flange. Locate the pot of the puller over the screw, then assemble the locknut and washer to the screw (Ref.S.B.72-8678-249).

CAUTION: EXERCISE CARE WHEN WITHDRAWING HOLLOW PIN FROM FLANGE.

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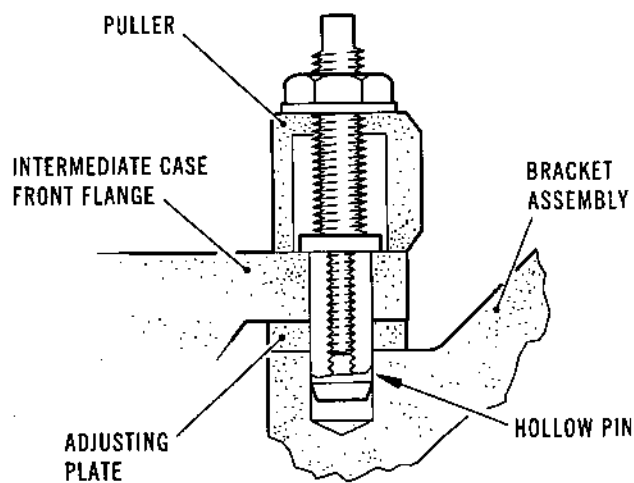


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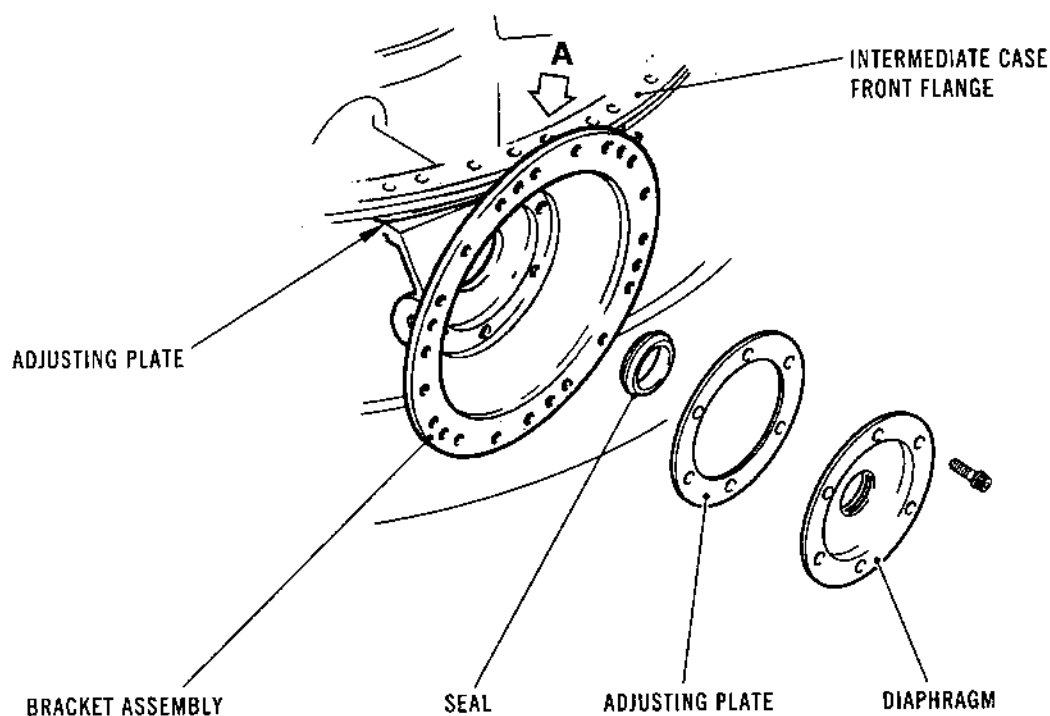


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sneema



METHOD OF REMOVING
HOLLOW PIN AT A



Disassembling the Right-hand Gearbox Bracket Assembly
Figure 104



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MK.610-14-28 SNECMA
OVERHAUL

- (3) Hold the screw stationary, then turn the locknut in small increments and carefully withdraw the hollow pin, avoiding excessive load or erratic movement being applied to the locknut.
- (4) Unscrew and remove the six bolts retaining the diaphragm.
- (5) Withdraw the bracket assembly from the drive housing, then disassemble the adjusting plate and seal. Discard seal.

B. Disassemble the Left-hand Gearbox Mounting Assembly (Ref.Fig.105).

- (1) Ensure that the threads of the mechanical puller (Tool 959) are clean and free from damage, then screw the puller into one of the hollow pins in the flange of the intermediate case. Ensure the flange of the screw abuts the intermediate case flange. Locate the pot of the puller over the screw, then assemble the locknut and washer to the screw.

CAUTION: EXERCISE CARE WHEN WITHDRAWING THE HOLLOW PINS FROM THE FLANGE.

- (2) Hold the screw stationary, then turn the locknut in small increments and carefully withdraw the hollow pin, avoiding excessive load or erratic movement being applied to the locknut.
- (3) Using the puller (Tool 959), repeat the operation to remove the second hollow pin. Place the pins in a container.
- (4) Unscrew and remove the four bolts securing the air seal retainer.

DISASSEMBLY

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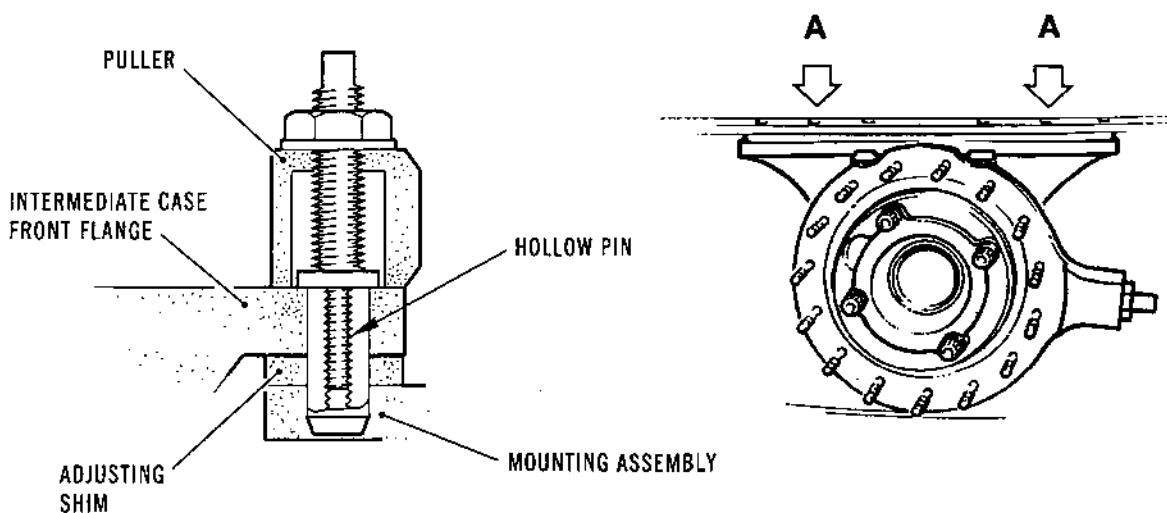


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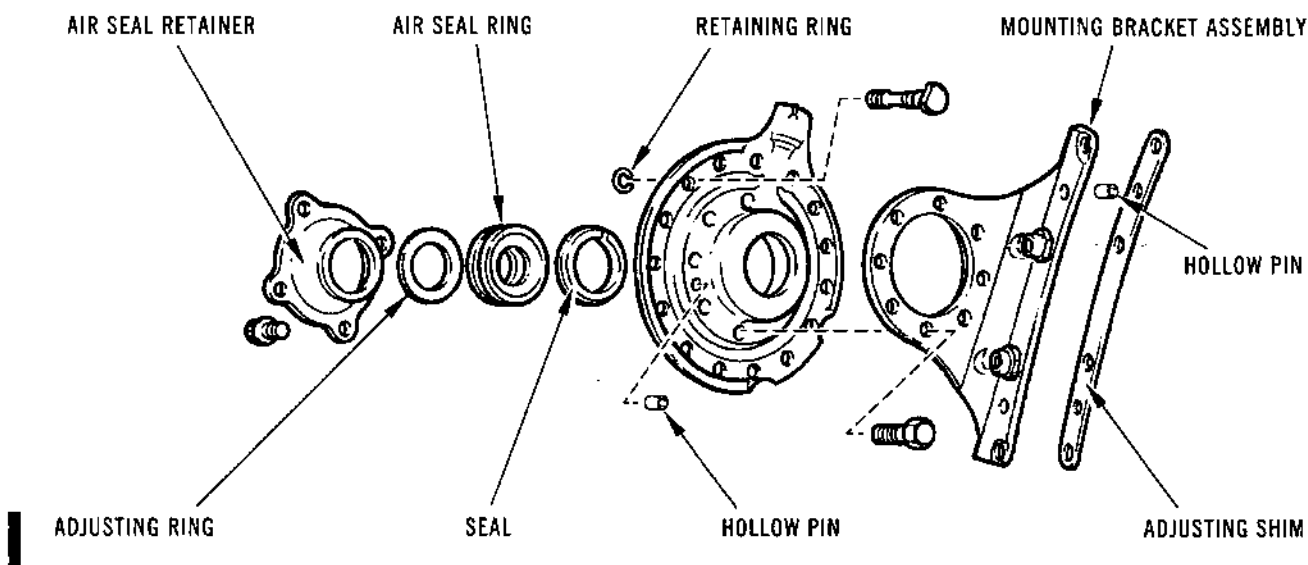


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OVERHAUL

sneema



METHOD OF REMOVING HOLLOW PIN AT A



Disassembling the Left-hand Gearbox Mounting Assembly
Figure 105



OLYMPUS 593



MK.610-14-28 SNECMA
OVERHAUL

- (5) Disassemble and discard the 15 retaining rings retaining the 15 gearbox bolts.
- (6) Withdraw the adapter plate, adjusting shim and mounting bracket assembly from the drive housing, then remove the eight bolts retaining the mounting assembly to the adapter.
- (7) Disassemble the 15 bolts, air seal retainer, adjusting ring, air seal ring and seal from the adapter.
- (8) Discard the seal and place all the other items in a container.

5. Disassemble Switches, Sump, Adapter and Splined Shaft

A. Remove the Oil Pressure Transmitter (Ref.Fig.106).

CAUTION: AVOID DAMAGE TO JOINT FACES WHEN REMOVING COMPONENTS AND GASKETS.

- (1) Unscrew and remove the bolts securing the oil pressure transmitter switch, then withdraw the switch and discard the seal. Place the switch in a protective container.
- (2) Ensure that the mating face of the protector (Tool 572) is undamaged, then assemble the protector to the switch face on the sump case, and secure it with the waisted screws.

B. Remove the Oil Pressure Switch (Ref.Fig.106).

- (1) Unscrew and remove the bolts securing the oil pressure switch and bracket to the sump case, then withdraw the switch and bracket and discard the seal. Place the switch in a protective container.



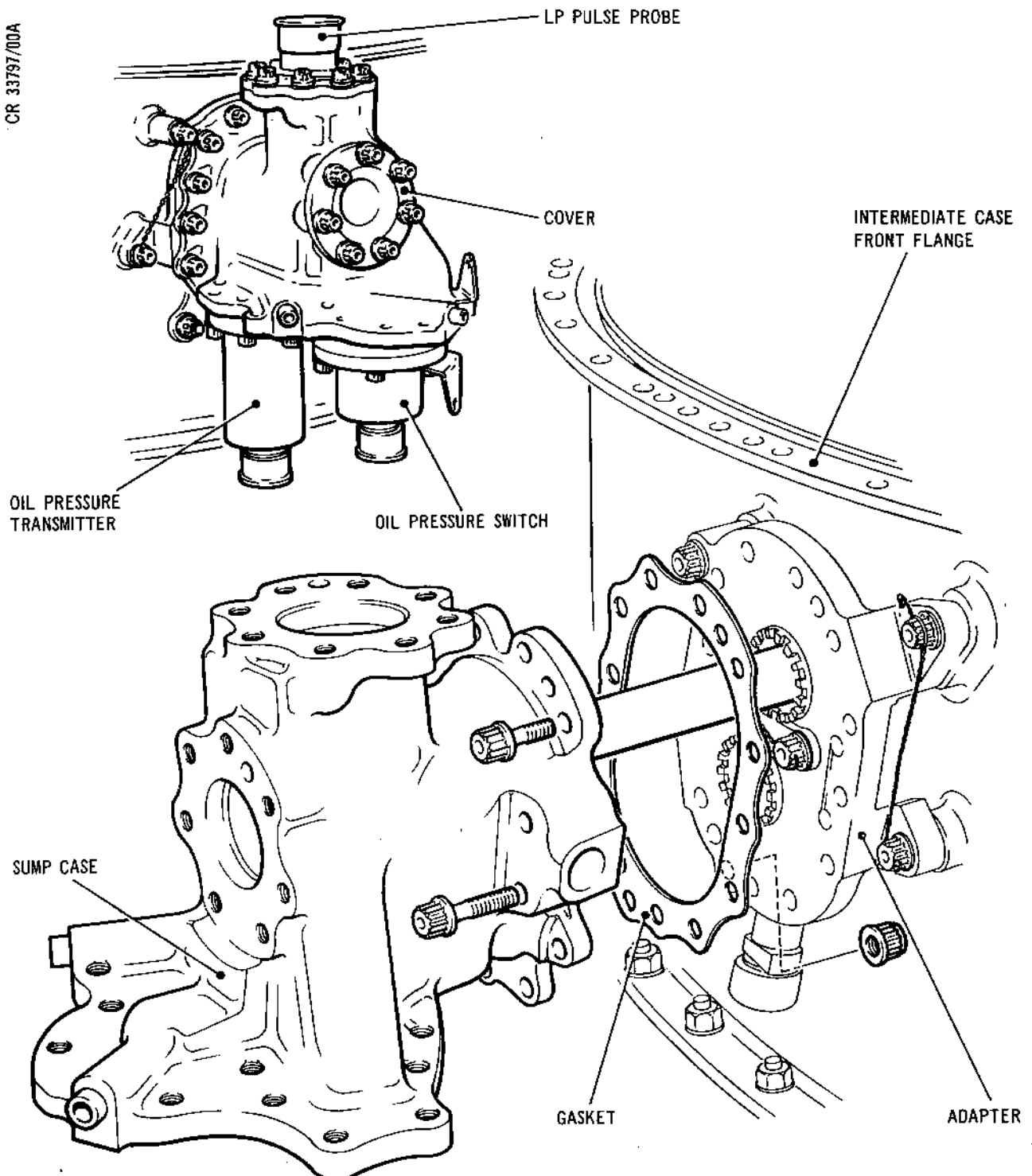
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OVERHAUL



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Disassembling Oil Switches, Probe and Sump
from the Outer Case
Figure 106



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- (2) Ensure that the mating face of the protector (Tool 571) is undamaged, then assemble it to the switch face on the sump case and secure with the waisted screws.
- C. Remove the LP Pulse Probe (Ref.Fig.106).
- (1) Remove the bolts securing the LP pulse probe to the sump case, withdraw the pulse probe, discard the seal then place the probe in a protective container.
 - (2) Ensure that the mating face of the protector (Tool 570) is undamaged, then assemble it to the pulse probe face on the sump case and secure it with the waisted screws.
 - (3) Unscrew and remove the bolts, cover, and gasket from the LP hand turning location on the sump, then place the cover in a container.
- D. Disassemble the Sump Case from Adapter (Ref.Fig.106).
- (1) Unscrew and remove the 13 bolts and one self-locking nut retaining the sump case to the adapter. Support the sump case during this operation.
 - (2) If necessary, lightly tap the sump case with a suitable mallet to break the seal between the sump case and gasket.
 - (3) Carefully withdraw the sump case and splined shaft, then place the sump case assembly on the worktop. Discard the gasket.
- E. Disassemble the Gland Nuts and Adapter Assembly (Ref.Fig.107).
- (1) Remove and discard the locking wire from the gland nuts locking plate securing bolts and the adapter securing bolts.

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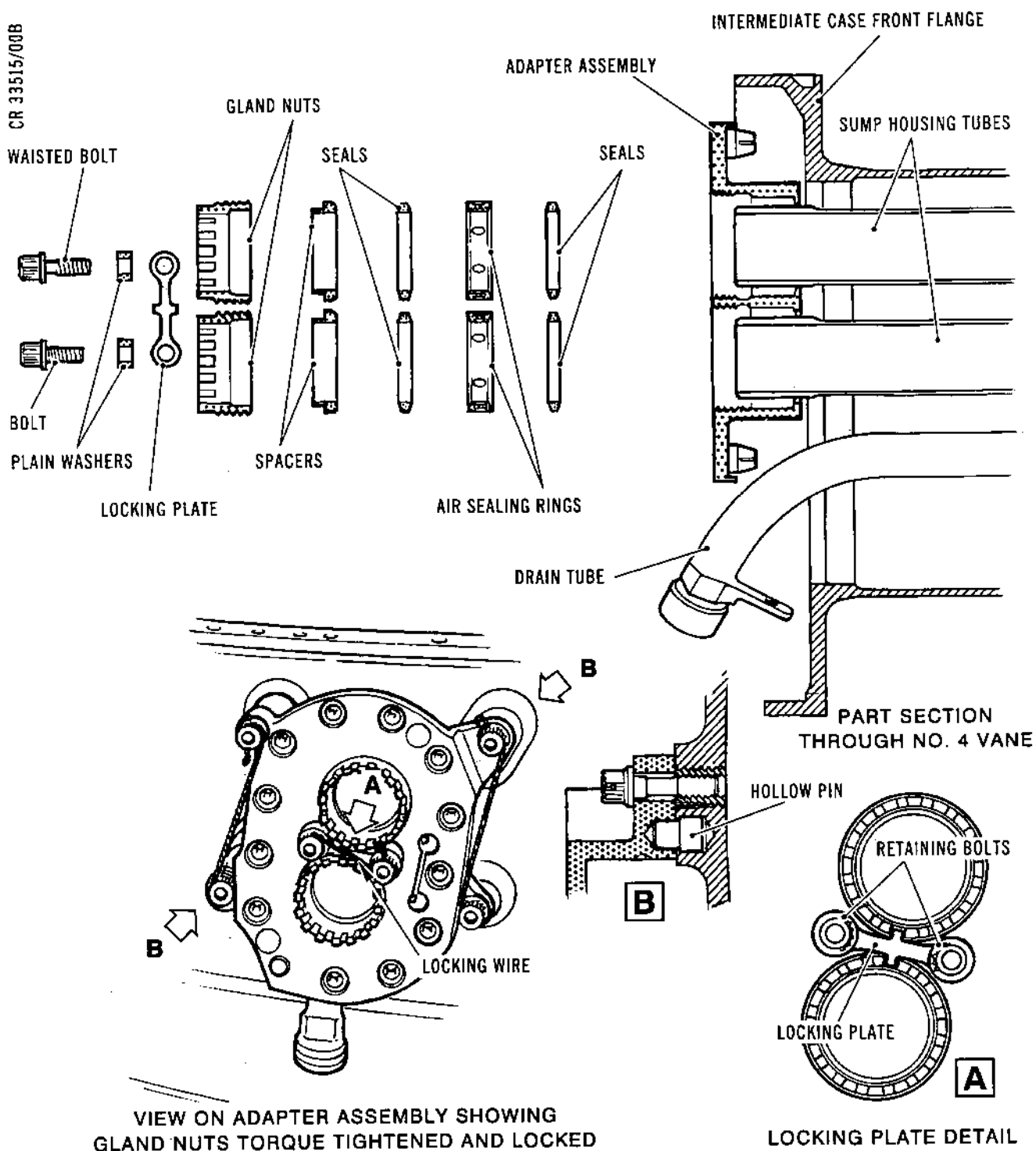
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OVERHAUL

sneema

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Disassembling Gland Seal Items and Adapter
Figure 107



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MK.610-14-28 *sneema*
OVERHAUL

- (2) Unscrew and remove the locking plate securing bolts, then remove the locking plate and plain washers.
- (3) Using the special spanner wrench (Tool 1527) unscrew and remove both gland nuts.
- (4) Remove the four bolts securing the adapter to the intermediate case.
- (5) Apply a small quantity of release agent to the hollow pin positions locating the adapter to the intermediate case.

CAUTION: EXERCISE CARE WHEN REMOVING THE ADAPTER.

- (6) Using a suitable mallet, very carefully tap the adapter to ease it from the hollow pin locations ensuring that the adapter is kept square until released.
- (7) Place the adapter face down on the worktop, then push out the spacers, seals and air seal rings. Discard the seals, then place the adapter and items in a container.

F. Disassemble the Splined Shaft and Bearing Assembly from the Sump Case (Ref.Fig.108).

- (1) Remove the retaining ring from within the sump case (located in front of the bearing), and place the ring in a container.
- (2) Insert the mechanical driver (Tool 341) through the LP hand turning aperture in the sump case, then secure the driver with the bolts.
- (3) Turn the handle of the driver and carefully press the bearing assembly from the sump case. Remove the driver from the sump case, then place the case in a container.

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ENSURE RETAINING RING
IS REMOVED BEFORE
PRESSING OUT BEARING

SUMP CASE

MECHANICAL DRIVER

**1 PRESSING THE SPLINED SHAFT AND
BALL BEARING ASSEMBLY OUT OF THE SUMP CASE**

SPLINED SHAFT

BALL BEARING

SHEARING QUILL SHAFT

WITHDRAW RETAINING RING
BEFORE OPERATION **3**

2

PULLER

**3 DISASSEMBLING
SHEARING QUILL SHAFT**

DRIVER

VICE HOLDER

RETAINING NUT
(IMMOBILIZED IN VICE HOLDER)

4 REMOVING BEARING RETAINING NUT

LOCATION SCREW

SPLINED SHAFT

DRIVER

SUPPORT

5 DRIVING THE SPLINED SHAFT THROUGH THE BALL BEARING ASSEMBLY
Disassembling the Splined Shaft and Bearing
Assembly from the Sump Case
Figure 108

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OVERHAUL



- (4) Disassemble the small retaining ring from within the splined shaft, then withdraw the shearing quillshaft from the end of the splined shaft. If the quillshaft is to SB.72-3 standard, use the puller (Tool 177) to withdraw the quillshaft. Place the retaining ring and shearing quillshaft in a container.

G. Disassemble the Ball Bearing from the Splined Shaft
(Ref.Fig.108).

- (1) Assemble the splined shaft to the vice holder (Tool 336), then secure the holder to a bench vice.
- (2) Using the driver (Tool 339) and a general application wrench, turn the shaft to unscrew the bearing retaining nut. Remove the shaft and nut, then place both items in a container. Release and remove the holder from the vice.
- (3) Secure the support of the mechanical puller (Tool 342) to a bench vice, insert the splined shaft through the support, then adjust the location screws to locate the bearing.
- (4) Turn the driver handle and push the splined shaft through the ball bearing assembly. Release the ball bearing from the support, then place the shaft and bearing in a container. Release and remove the puller from the vice.

6. Disassemble Location Plates and Fire Covers from Outer Case

A. Remove the Fire Cover from No.1 Vane.

- (1) Remove the locking wire, then unscrew and remove the four bolts securing the fire cover then remove the cover. Place the bolts and fire cover into a container.

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B. Disassemble the Location Plate/Fire Cover from No.2 Vane.

- (1) Apply a small quantity of release agent to the splines and hollow pin locations of the location plate/fire cover.
- (2) Remove the locking wire and the four bolts securing the plate/cover to the case.
- (3) Ease the plate/cover from its location, if necessary, lightly tap the plate with a suitable mallet. Place the bolts and plate/cover in a container.

C. Disassemble the Location Plate/Fire Cover and Vent Tube from No.6 Vane.

- (1) Apply a small quantity of release agent to the splines and hollow pin locations of the location plate/fire cover.
- (2) Remove the locking wire and the four securing bolts from the plate/cover.
- (3) Ease the plate/cover from its location, if necessary, lightly tap the plate with a suitable mallet. Place the bolts and plate/cover in a container.
- (4) Insert a spanner between the front flanges of the intermediate case (the inner end of No.6 vane), then unscrew and remove the two bolts securing the vent tube to the wall of the case.
- (5) Apply a small quantity of release agent (if necessary) to the locating diameter of the vent tube in the inner case wall.
- (6) Ease the vent tube outboard from its location, then turn the tube 90 deg and withdraw it through the vane, place the bolts and tube into a container.

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7. Disassemble the Lubrication System (Ref.Fig.109)

A. Disassemble the Oil Distributor from No.6 Vane Position.

- (1) Remove the bolt and tube retainer securing the cross feed tube to the main distributor, then push the cross feed tube into the distributor allowing its disengagement from the smaller distributor.
- (2) Remove the three bolts retaining the smaller distributor at No.6 vane position, then remove the distributor. Unscrew and remove the bolt and nut retaining the oil jet. Place the items in a container.

B. Disassemble Main Oil Distributor.

- (1) Withdraw the cross-feed tube from the distributor.
- (2) Disassemble the bolt and retainer from the LP bearing feed location, withdraw the tube and place in a container.
- (3) Remove the bolt and plate securing the HP bearing feed tube, then push the tube into the inner case.
- (4) Remove the LP probe retainer bolts, retainer, probe and the two adjusting washers, place the items into a protective container.
- (5) Remove the three oil distributor retaining bolts, then remove the distributor.
- (6) Disassemble the HP probe retainer, probe and the two adjusting washers from the distributor, then remove the oil jet.
- (7) Withdraw the oil sleeve, nozzle, and HP bearing oil feed tube from the inner case. Place all the items into a container.

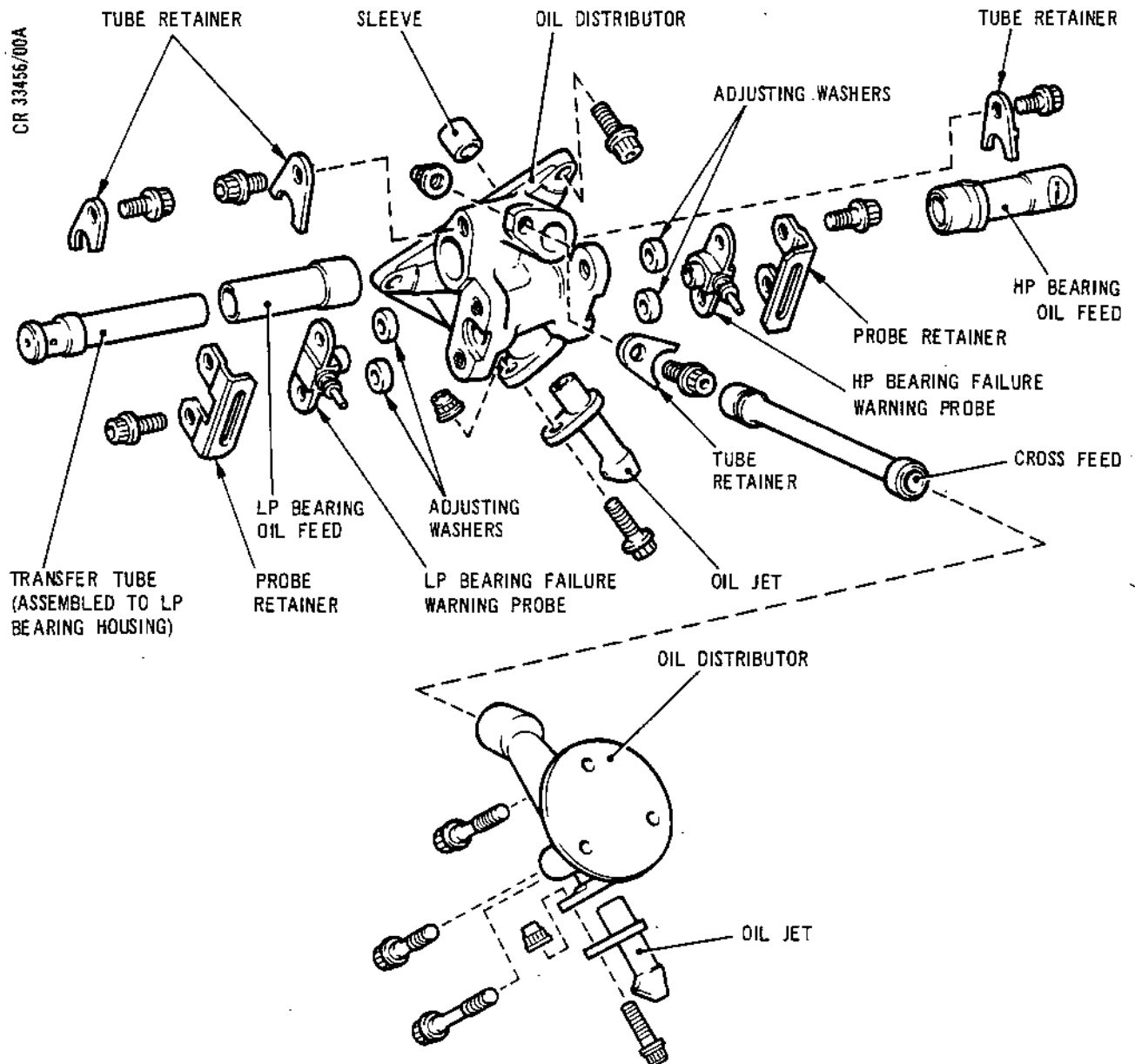
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Disassembling the Lubrication System
Figure 109

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C. Disassemble the Oil Feed Housing and Bearing Failure Warning Tube (Ref.Fig.110).

- (1) Turn the intermediate case rear flange uppermost.
- (2) Unscrew and remove the nine bolts retaining the oil feed housing (No.2 vane) to the inner case.
- (3) Partially withdraw the housing to permit access to the bearing failure warning tube.
- (4) Completely remove the locking wire from the bearing failure warning tube retaining nut.
- (5) Reassemble the oil feed housing to the inner case, then temporarily secure the housing with four equally spaced bolts.
- (6) Insert the crowfoot attachment socket wrench (Tool 1494) between the intermediate case rear flanges to engage correctly with the bearing failure warning tube retaining nut.

CAUTION: EXERCISE CARE WHEN DISASSEMBLING THE
RETAINING NUT.

NOTE: The retaining nut has been torque-tightened
to 240 lbf in. (27,1 N.m).

- (7) Carefully slacken off the retaining nut, then remove the four bolts temporarily retaining the oil feed housing to the inner case.
- (8) Withdraw the oil feed housing together with the bearing failure warning tube, then disassemble the warning tube from the housing.



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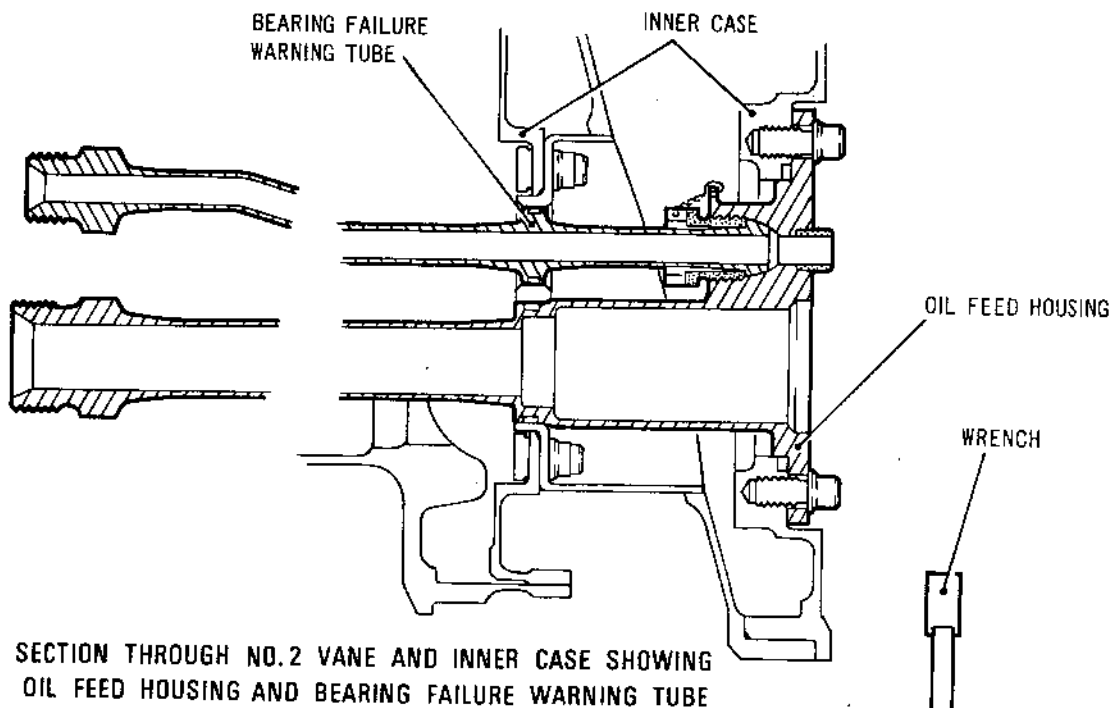
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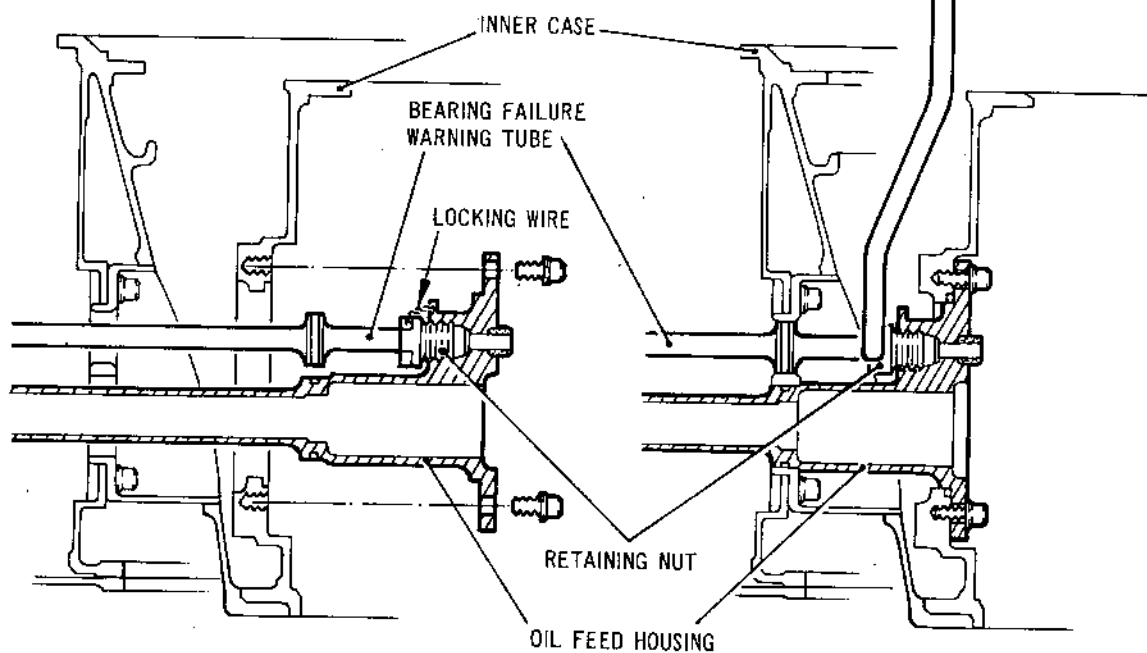


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SECTION THROUGH NO.2 VANE AND INNER CASE SHOWING OIL FEED HOUSING AND BEARING FAILURE WARNING TUBE



OIL FEED HOUSING PARTIALLY WITHDRAWN TO FACILITATE LOCKING WIRE REMOVAL

OIL FEED HOUSING TEMPORARILY REASSEMBLED TO DETORQUE RETAINING NUT

Disassembling the Oil Feed Housing and Bearing Failure Warning Tube
Figure 110

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- (9) Disassemble the pack sealing rings and Metaflex seal from their locations and discard. Place the oil housing, warning tube and bolts into a container.

NOTE: Do not remove the six bolts (5-400), nuts (5-390) and housing (5-410), these items are part of the outer sub-assembly (5-420).

8. Disassemble the LP Driven Bevel Gear and the Left and Right-Hand Accessory Drives

A. Disassemble the LP Driven Bevel Gear Assembly (Ref.Fig.111).

- (1) Using the cranked ring wrench (Tool 1581). Remove the five bolts securing the bearing housing assembly to the inner case (No.4 vane).
- (2) Secure the vice holder (Tool 356) in a bench vice, then assemble the bearing housing assembly to the holder.
- (3) Using the spanner wrench (Tool 1516) remove the bearing retaining nut from the shaft. Remove the assembly from the holder and the holder from the vice.
- (4) Place the support (Tool 355) on a firm worktop, then lower the assembly onto the support and locate the pins of the support through the provisioned access holes in the gear until the pins abut the adjusting washer behind the gear.
- (5) Assemble the driver (Tool 1515) to the gear shaft, then using a hammer, drive the gear shaft downwards to release the adjusting washer, roller bearing inner and inner spacer sleeve from the shaft. Remove the assembly and the gear from the support.

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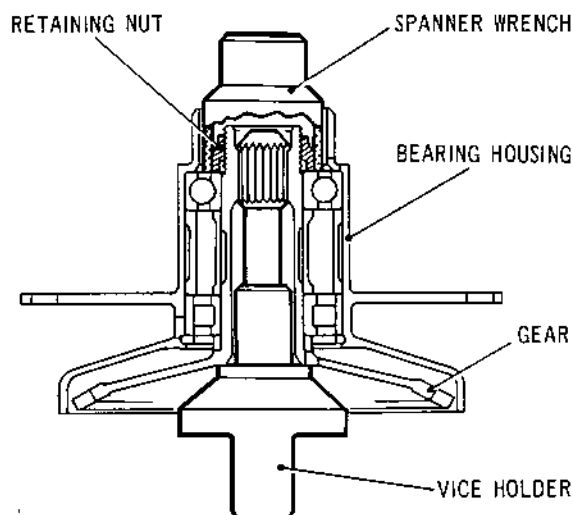
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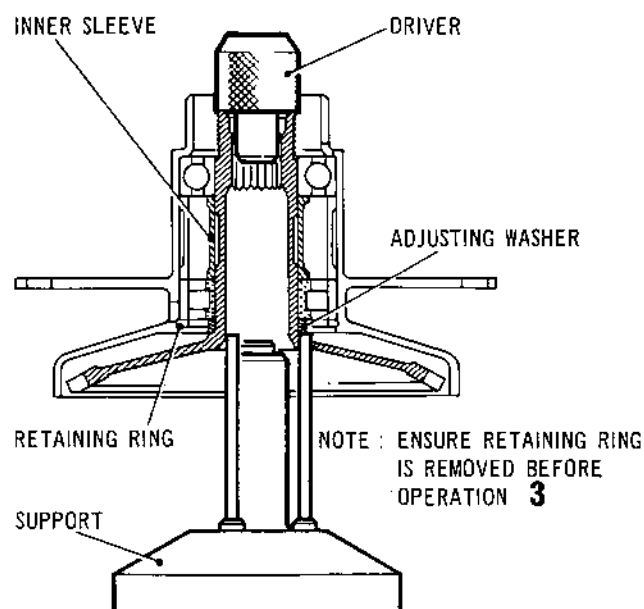


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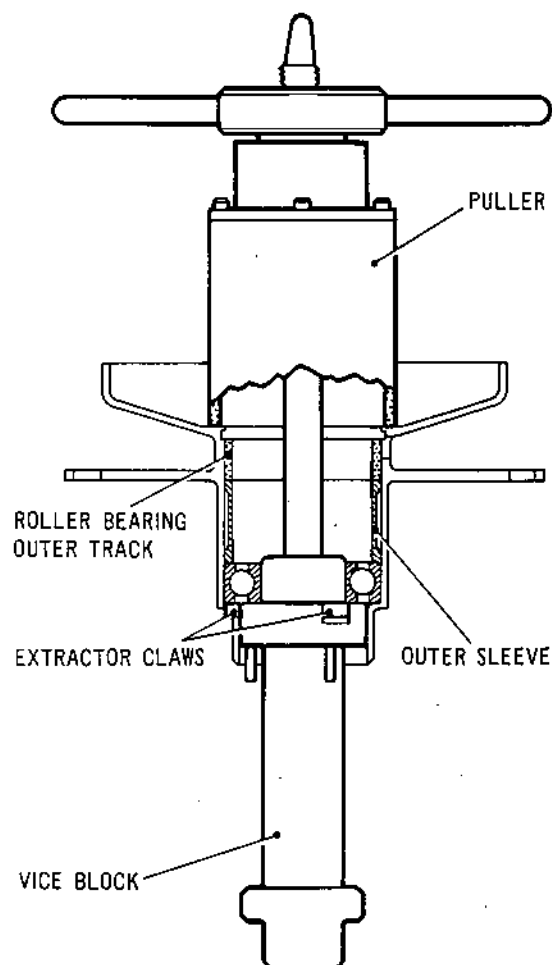
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1 REMOVING BEARING RETAINING NUT



2 DISASSEMBLING ADJUSTING WASHER, ROLLER BEARING AND SLEEVE FROM THE GEAR SHAFT AND HOUSING



3 WITHDRAWING THE BALL BEARING, OUTER SLEEVE AND ROLLER BEARING OUTER TRACK FROM THE HOUSING

Disassembling the LP Bevel Gear and Housing Assembly
Figure 111

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- (6) Remove the retaining ring from the bearing housing.
- (7) Secure the vice block of the draw screw puller (Tool 353) to the bench vice, then assemble the bearing housing assembly to the puller.
- (8) Assemble the mechanical puller (Tool 352) to the bearing housing assembly and to the threads of the draw screw puller (Tool 353).
- (9) With the claws of the mechanical puller correctly located on the ball bearing assembly, withdraw the ball bearing, outer sleeve and roller bearing outer track from the bearing housing. Remove the puller from the draw screw, then remove the items from the puller, the housing from the draw screw and the draw screw from the vice. Place all of the items into a container.

B. Disassemble the Left-hand Accessory Drive (Ref.Fig.112).

- (1) Remove the four bolts securing the bearing housing and gear assembly to the drive housing (No.5 vane), then withdraw the gear assembly from the inner case.

NOTE: Tooling application shown in Figure 112 is the same for pre and S.B.72-8784-307 standard of engine although only the pre-S.B. standard is illustrated.

- (2) Assemble the gear assembly to the support (Tool 256) and secure the gear with the retaining plates. Using the socket wrench (Tool 327) remove the bearing retaining nut, then remove the assembly from support.
- (3) Position the gear assembly on the worktop, then locate the smaller inside diameter of the split collar (Tool 623) under the shoulder of the ball bearing.
- (4) Lift the split collar and gear assembly, then locate the complete assembly onto the support (Tool 622).

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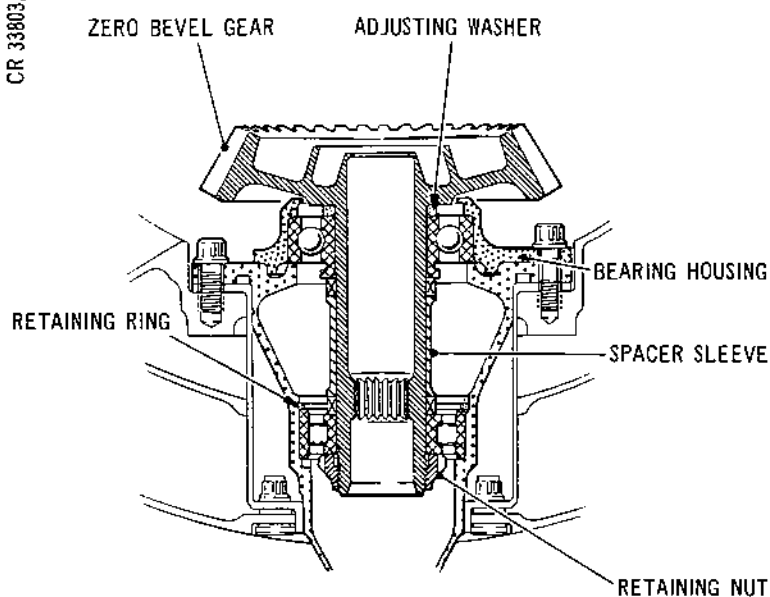
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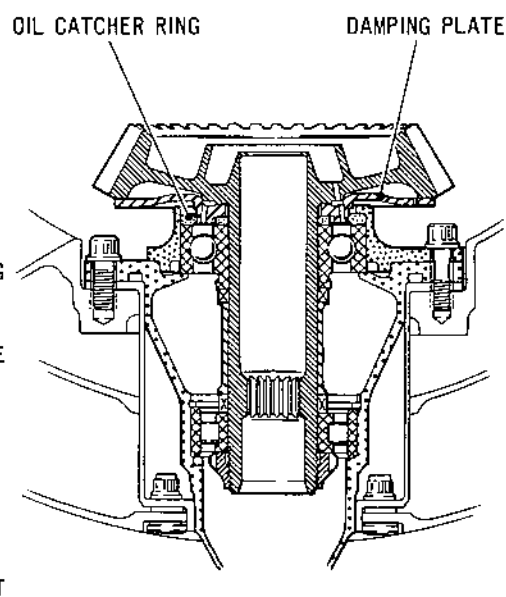


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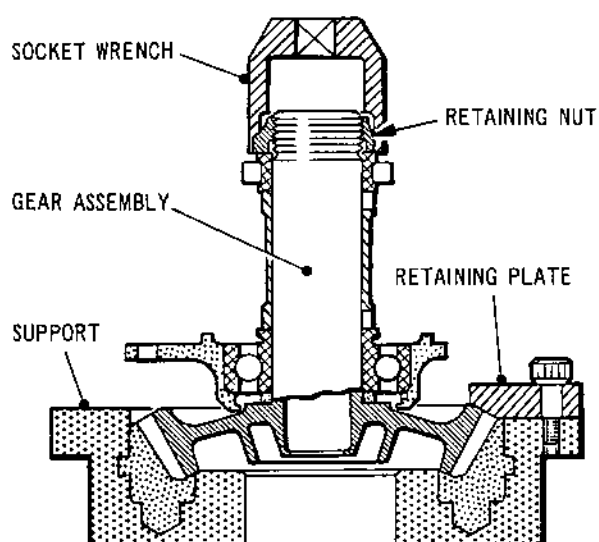
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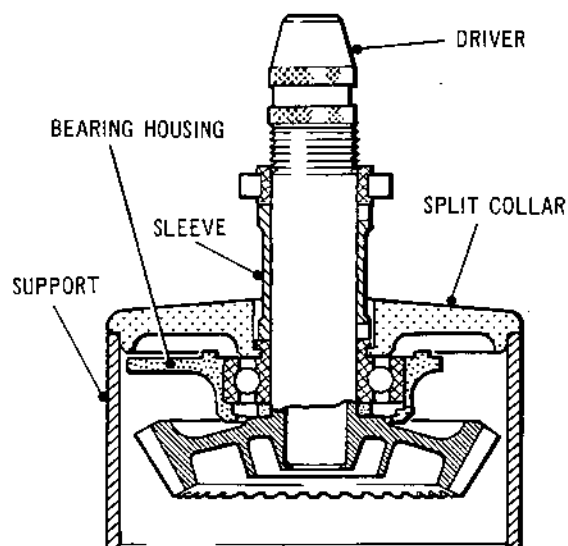
PRE SB.72-8784-307



SB.72-8784-307



1 REMOVING BEARING RETAINING NUT



2 DRIVING THE GEAR SHAFT THROUGH BEARING AND SLEEVE ASSEMBLY

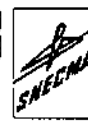
Disassembling the Left-hand Accessory Drive Gear Assembly
Figure 112 (Sheet 1 of 2)

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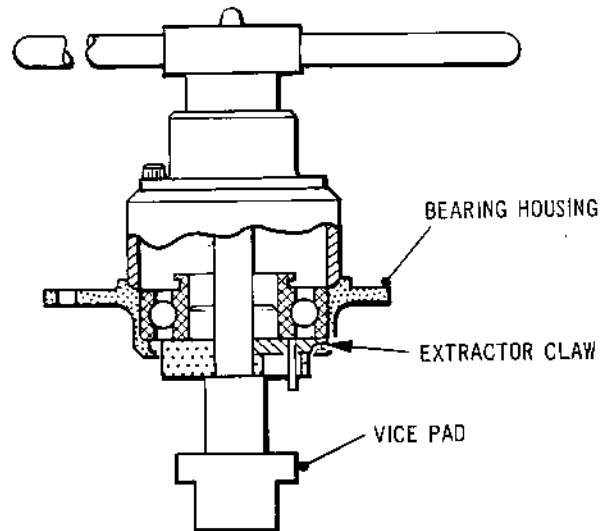


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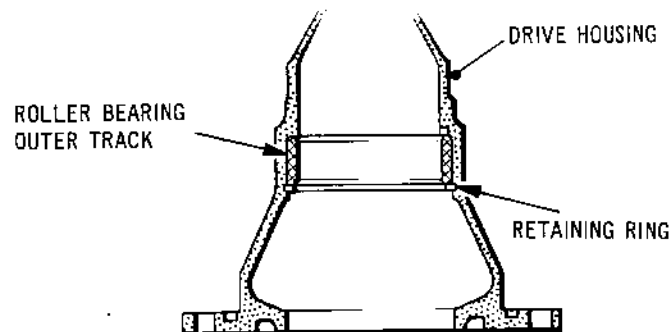
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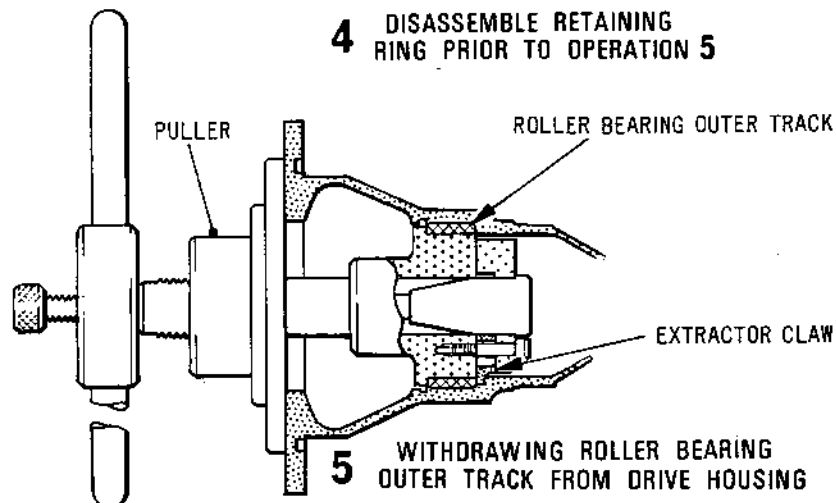
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3 WITHDRAWING BALL BEARING
ASSEMBLY FROM HOUSING



4 DISASSEMBLE RETAINING
RING PRIOR TO OPERATION 5



5 WITHDRAWING ROLLER BEARING
OUTER TRACK FROM DRIVE HOUSING

Disassembling the Left-hand Accessory Drive Gear Assembly
Figure 112 (Sheet 2 of 2)

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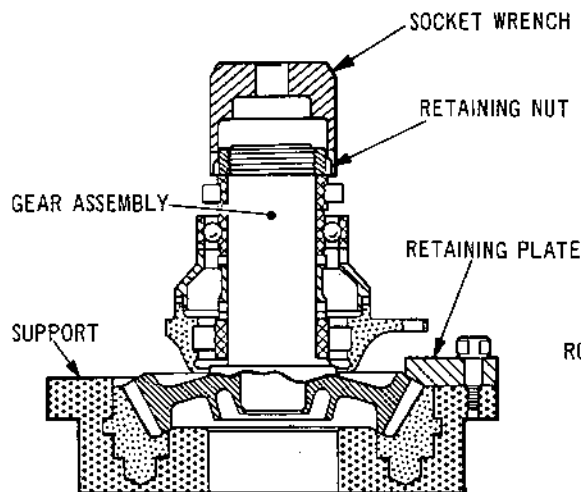
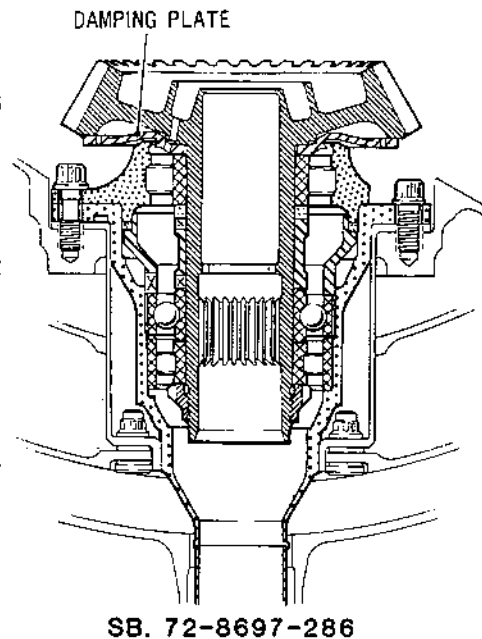
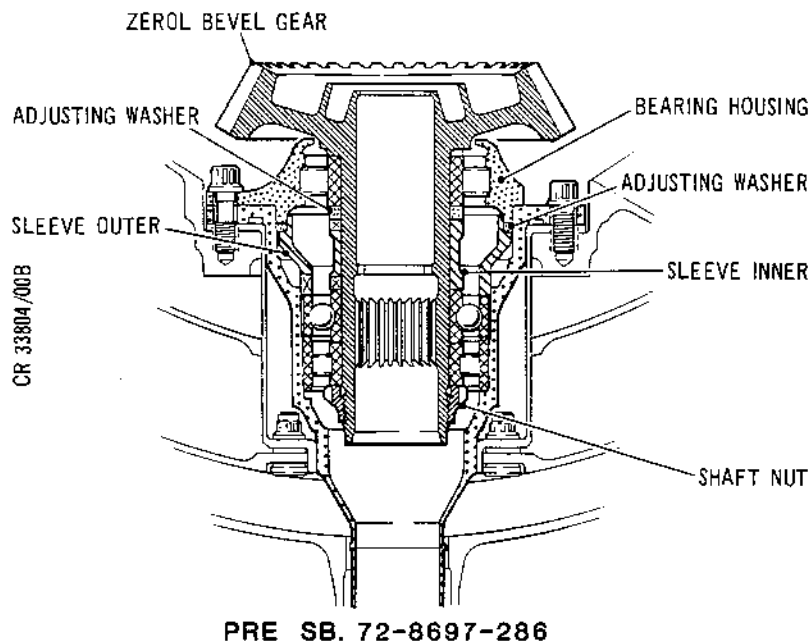
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- (5) Assemble the driver (Tool 630) to the gear shaft, then drive the gear shaft through the roller bearing inner, sleeve, ball bearing assembly and adjusting washer. Remove the driver, split collar and loose items. On engines to S.B.72-8784-307 standard, remove the damping plate from the gear shaft.
 - (6) Assemble the mechanical puller (Tool 701) to the bearing housing so that the extraction claw locates correctly behind the ball bearing.
 - (7) Secure the vice pad in the bench vice, then withdraw the ball bearing from the housing. Separate the mechanical puller and remove the loose items. On engines to S.B.72-8784-307 standard, remove the oil catcher ring from the bearing housing. Place all of the disassembled items into a container.
- C. Disassemble the Roller Bearing Outer Track from the Drive Housing (Ref.Fig.112).
- (1) Remove the eight bolts securing the left-hand drive housing to the inner case (No.5 vane).
 - (2) Using two pullers (Tool 1668) withdraw the housing from No.5 vane, remove the pullers.
 - (3) Remove from the drive housing the retaining ring from the recess in front of the outer track.
 - (4) Insert the extractor head of the mechanical puller (Tool 544) into the housing locating the extractor claws into the three provisioned recesses in the housing. Adjust the puller (Tool 255) so that it abuts the flange of the housing, then withdraw the roller bearing outer track. Release and remove the outer track from the puller. Place the retaining ring, outer track, housing and retaining bolts into a container.
- D. Disassemble the Right-hand Accessory Drive (Ref.Fig.113).
- (1) Remove the four bolts securing the bearing housing and gear assembly to the drive housing (No.3 vane), then withdraw the gear assembly from the inner case.

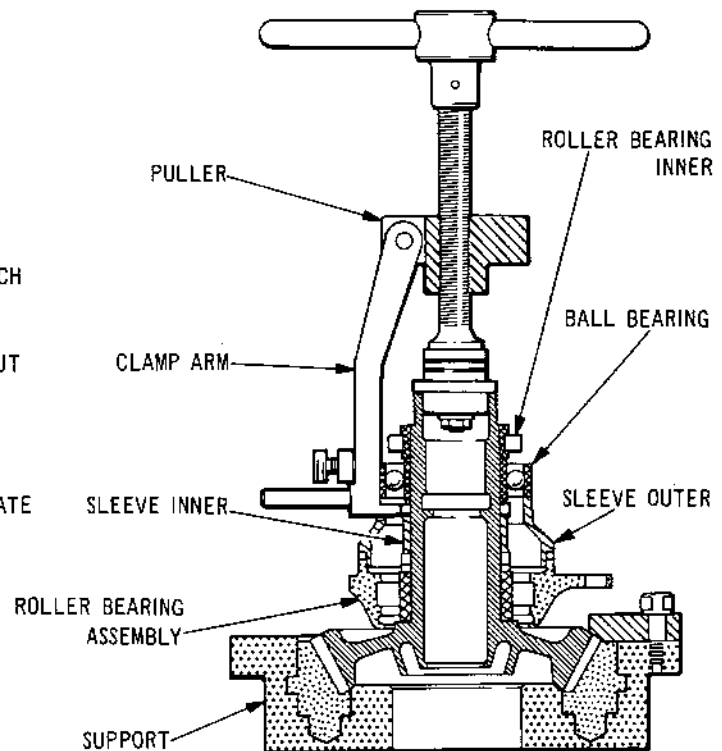


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1 REMOVING BEARING RETAINING NUT



2 DISASSEMBLING ROLLER BEARING INNER AND BALL BEARING

Disassembling the Right-hand Accessory Drive Gear Assembly
Figure 113 (Sheet 1 of 2)

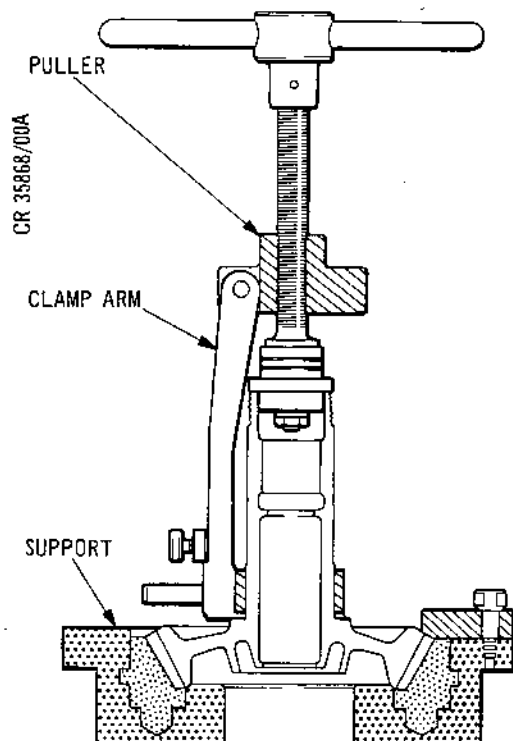
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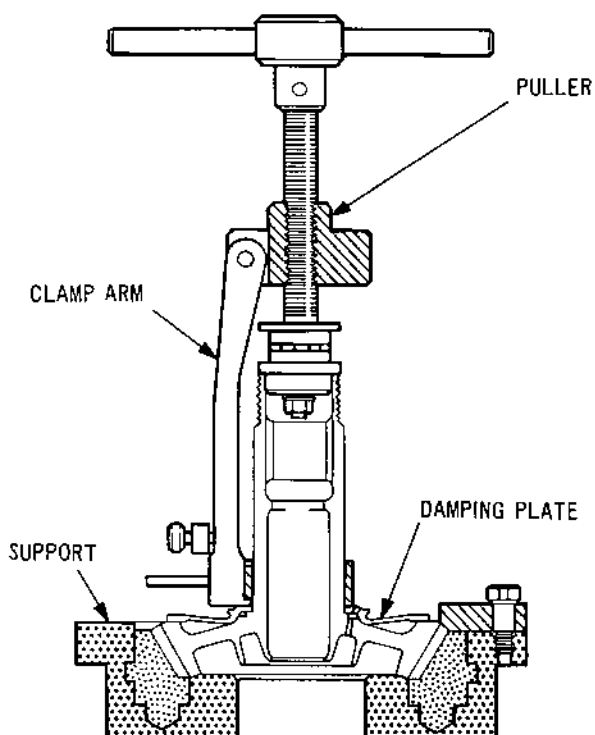
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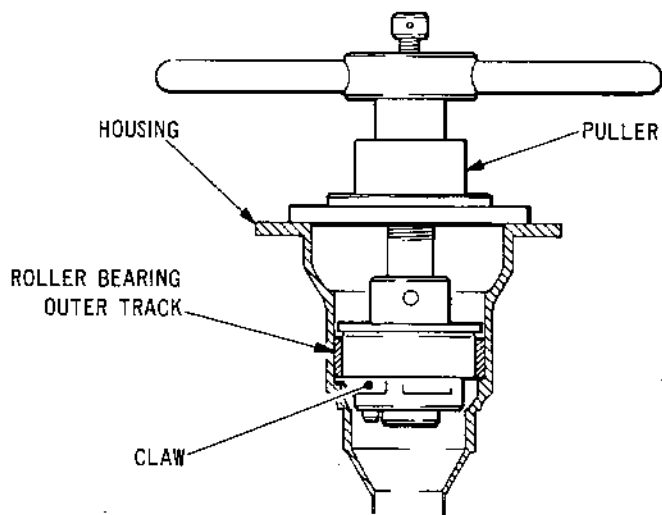


PRE SB. 72-8697-286



SB. 72-8697-286

3 REMOVING ROLLER BEARING INNER TRACK



4 WITHDRAWING ROLLER BEARING OUTER TRACK FROM DRIVE HOUSING

Disassembling the Right-hand Accessory Drive Gear Assembly
Figure 113 (Sheet 2 of 2)

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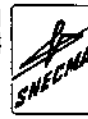
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- (2) Assemble the gear assembly to the support (Tool 256) and secure the gear with the retaining plates. Secure the support in a bench vice.
- (3) Using the spanner wrench (Tool 1497) remove the bearing retaining nut.
- (4) Assemble the mechanical puller (Tool 258) to the gear assembly and adjust the clamp arms of the puller so that the extraction claws locate correctly behind the ball bearing assembly. Operate the puller and withdraw the ball bearing and the roller bearing inner from the shaft. Release and remove the bearings from the puller.
- (5) Disassemble the inner and outer spacers, adjusting washers and roller bearing outer from the gear.
- (6) Remove roller bearing inner track from gear.
 - (a) On engines to pre-S.B.72-8697-286 standard, withdraw the bearing inner track using the mechanical puller (Tool 257).
 - (b) On engines to S.B.72-8697-286 standard, withdraw the bearing inner track using the mechanical puller (Tool 3133), then remove the damping plate from the gear.
- (7) Place all disassembled items in a container.
- (8) Remove the eight bolts securing the housing to the inner case, then using two pullers (Tool 1668), withdraw the drive housing from No.3 vane.
- (9) Insert the mechanical puller (Tool 286) into the housing locating the claws of the puller behind the roller bearing outer track. Screw the mechanical puller (Tool 255) onto the puller already assembled until it abuts the housing, then continue turning the handle until the bearing is released. Release and remove the bearing from the mechanical pullers. Place the housing, bolts and roller bearing into a container.



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9. Disassemble the Oil Sump Assembly and Drain Tube Retaining Bolts

A. Remove the Oil Sump from the Inner Case.

- (1) Remove the 11 bolts securing the oil sump assembly to the inner case (No.4 vane).
- (2) Screw four pullers (Tool 1668) into the extractor positions in the sump flange, turn each puller in equal increments until the sump becomes free, then remove the sump from the case. Remove the pullers from the sump.
- (3) Unscrew and remove the two bolts within the sump housing, then disassemble the support housing from the two pins. Discard the seal as follows, then place the items into a container:
 - (a) Pre SB.0L.593-72-9019-404 standard, discard the Metaflex seal.
 - (b) SB.0L.593-72-9019-404 standard, discard the Kalrez O-ring.
 - (c) SB.0L.593-72-9053-426 standard, discard the metal 'C' seal.

B. Disassemble the Drain Tube Retaining Bolts.

- (1) Turn the intermediate case so that No.1 vane is uppermost.
- (2) Insert the holding spanner (Tool 1582) through the sump aperture (No.4 vane inner case), then using standard wrench equipment, unscrew and remove the nine bolts and self-locking nuts from the drain tube and retainer. Remove the one off D-headed bolt and self-locking nut from the TOP position. Place the oil retainer nuts and bolts in a container.

NOTE: The drain tube is removed after the inner case has been lifted from the outer case.



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10. Disassemble the Intermediate Inner Case Unit from the Outer Case

A. Release the Blanking Plate from Inner Case.

- (1) Turn the intermediate until the rear flange is uppermost.
- (2) Insert the internal threaded end of the slave bar (Tool 1805) through the access aperture of the outer case at the No.1 vane location, then screw the bar onto the threads of the centre bolt of the blanking plate bolted to the inner case. Secure the slave bar at the outer location with the thumbnut.
- (3) Unscrew and remove the four bolts and two tubes retaining the blanking plate to the inner case, place the items in a container.
- (4) Readjust the slave bar so that the blanking plate is now held against the inner wall of the outer case. Secure the plate in this position with the thumbnut at the outer case location.

NOTE: The blanking plate will be finally disassembled after the inner case has been removed.

B. Remove the Inner Case.

- (1) Gaining access through the rear of the case, remove the 18 bolts and nuts retaining the front inner case flange to the outer case. Place the nuts and bolts into a container.
- (2) Assemble a puller (Tool 1668) to each of the threaded extractor positions nearest the dowels in the rear flange of the inner case.
- (3) Turn each puller in equal increments until the inner case is free of the dowels.
- (4) Carefully lift the inner case from the outer case and place on the worktop. Assemble slave bolts and nuts to the outer sub-assembly (5-420) at No.4 vane location to retain the housing (5-380). Remove the pullers from the inner case.
- (5) Assemble six slave bolts and washers (equally spaced) to the front flange of the case unit (5-420/330).

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- C. Remove the Housings from No.3 and 5 Vanes of the Inner Case.

NOTE: Prior to carrying out the following operation, check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8334-205).

- (1) Unscrew and remove the bolts and nuts securing the accessory inner end drive housings from No.3 and 5 vanes.
- (2) Remove the housing and adjusting washers from each vane, then discard the seals as follows:
 - (a) Pre SB.0L.593-72-9019-404 standard, discard the Metaflex seal.
 - (b) SB.0L.593-72-9019-404 standard, discard the Kalrez O-ring.
 - (c) SB.0L.593-72-9053-426 standard, discard the metal 'C' seal.
- (3) Place the inner case, housings and adjusting washers into containers.

- D. Remove the Drain Tube and Blanking Plate from Outer Case.

- (1) Unscrew the thumbnut retaining the slave bar in position at No.1 vane. Disassemble the slave bar and plate, place the blanking plate into a container, then screw the thumbnut back onto the slave bar.
- (2) Remove the drain tube and oil retainer from the case.
- (3) Turn the intermediate case until the front flange is uppermost.
- (4) Assemble the multiple leg sling (Tool 1089) to three equi-spaced positions around the flange, then connect a hoist to the sling ring.
- (5) Unscrew and remove the slave nuts and bolts securing the intermediate outer case to the stand. Raise the case clear of the stand, then lower onto a suitable pallet, remove the sling. Reassemble the slave nuts and bolts to the stand.

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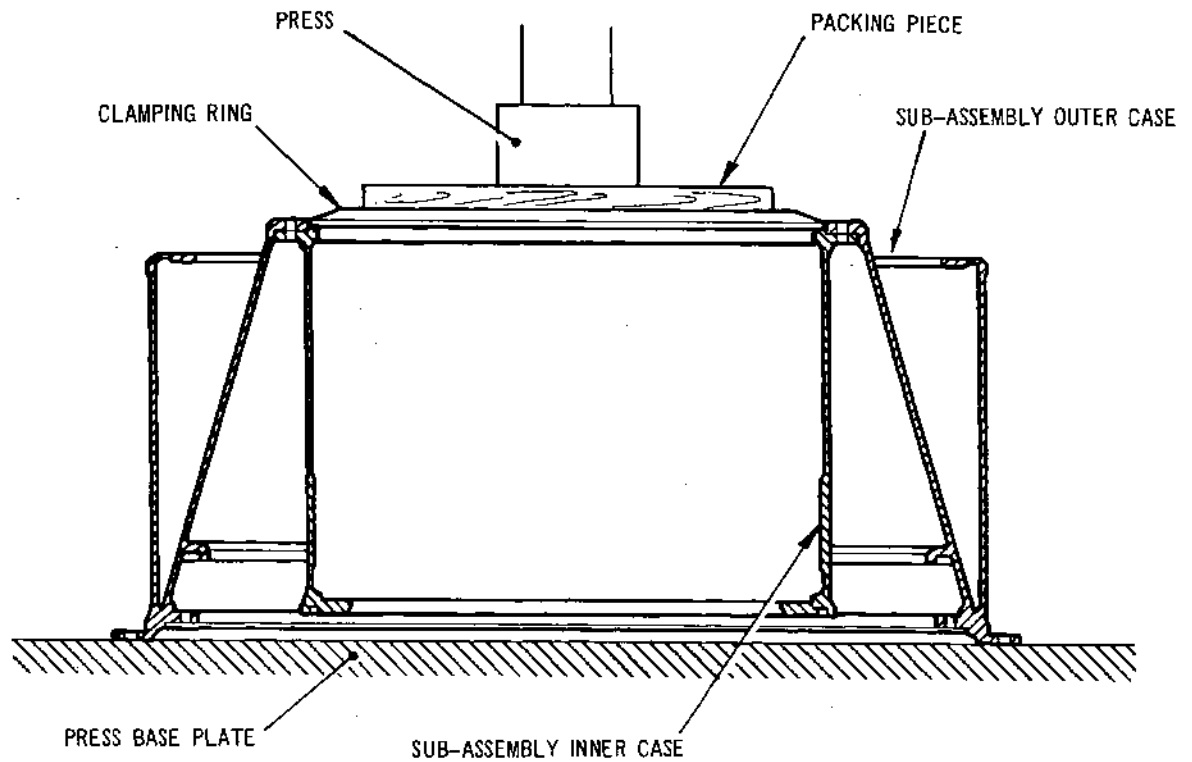
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Disassembling the Inner Case from the Outer Case
Figure 114

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11. Disassemble Segments from the Sub-assembly Inner Case

NOTE: The sub-assembly inner case (5-330), the sub-assembly outer case (5-420) and the bolted segments should not be disturbed unless their disassembly is considered essential. If disassembly of the cases is essential, then part of SB.72-8260-187 (three alignment holes bored in the front flanges) must be embodied before attempting disassembly.

A. Disassemble the Sub-assembly Inner Case from the Sub-assembly Outer Case.

- (1) Place the inner/outer sub-assembly unit (5-330/420) on the worktop, flanged face downward. Using the alignment pin (Tool 3064) establish the positions of the three equi-spaced alignment holes and suitably mark the outside of the case at these locations for reassembly convenience. If the alignment holes have not been bored then refer to SB.72-8260-187 for the rework procedure.
- (2) Unscrew and remove the six slave bolts and washers assembled to the front flange, place the bolts and washers in a container.
- (3) Unscrew and remove the hand knob and clamping ring from the fixture (Tool 3065).
- (4) Place the case unit on the base plate of a suitable press, then locate the clamping ring on the front (top) of the case.
- (5) Operate the press and apply sufficient load to the clamping ring to carefully press out the inner case. Place the outer case in a protective container, then remove the clamping ring from the inner case.

B. Disassemble the Segments.

NOTE: The sub-assembly inner case (5-330) and the three segments are a matched set and must be kept together.

- (1) For reassembly convenience, note the relative positions of the segments.

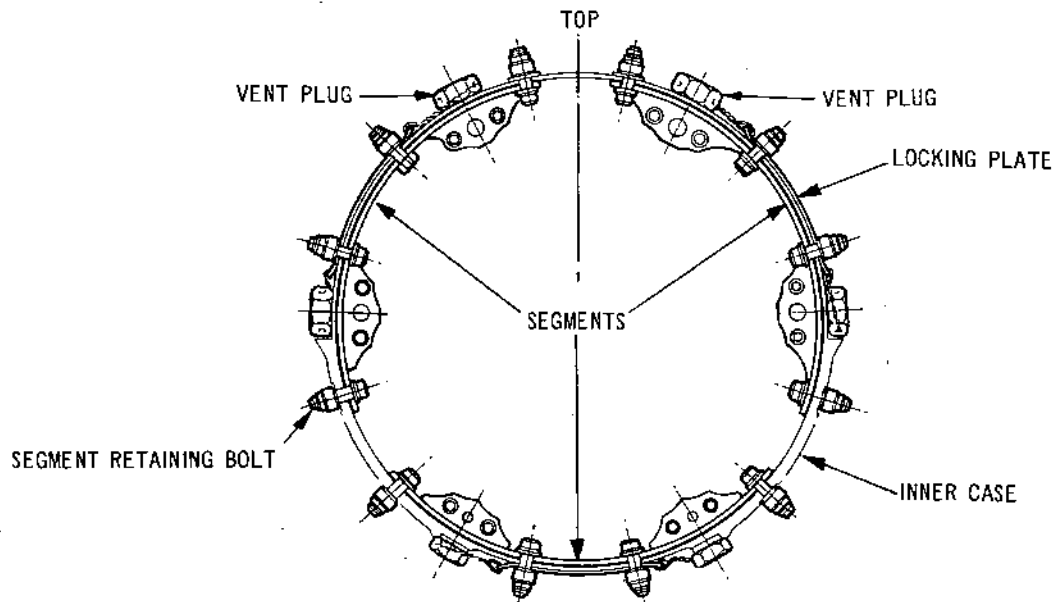


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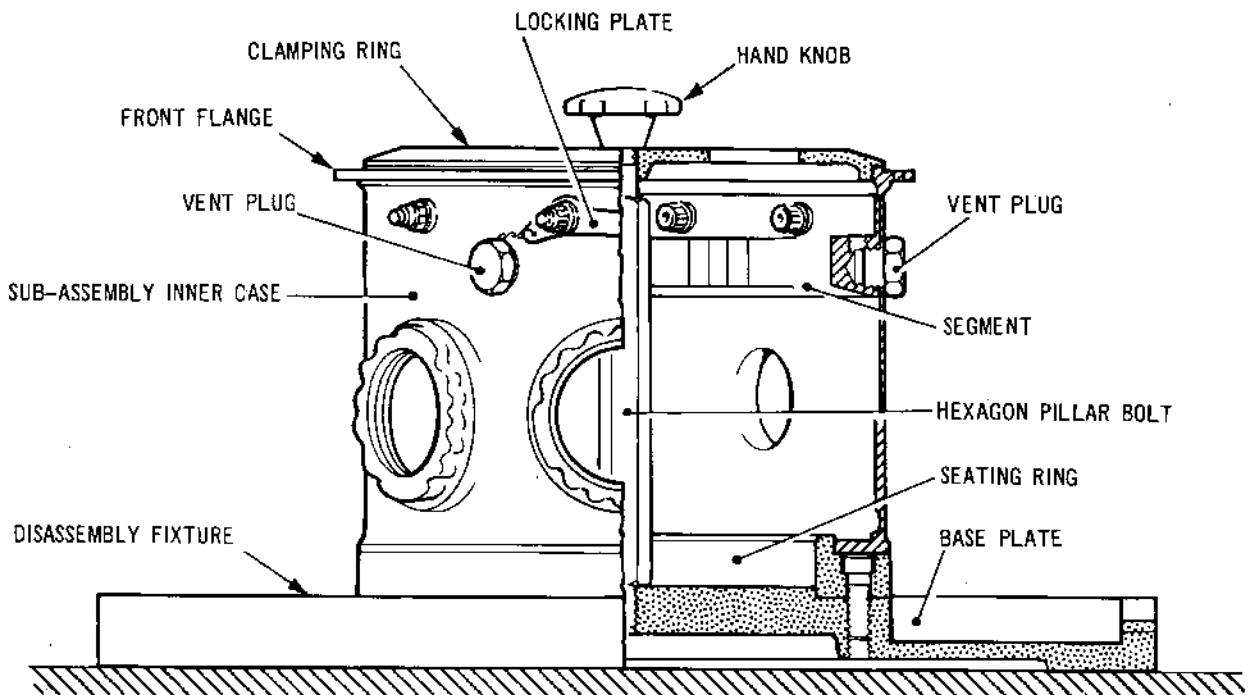
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DIAGRAMMATIC VIEW ON SEGMENTS LOOKING REARWARD



Disassembling the Vent Plugs and Segments
Figure 115



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- (2) Observe the TOP position of the fixture base plate (Tool 3065) then assemble the sub-assembly inner case (5-330) to the plate so that the location pin in the front flange of the case aligns the TOP of the fixture and the location dowel in the base plate enters the bottommost hole in the rear flange of the case.
- (3) Assemble the clamping ring to the case and secure with the hand knob.
- (4) Remove and discard the locking wire attached to the vent plugs and locking plates.
- (5) Carefully de-torque, unscrew and remove the six vent plugs from the inner case.
- (6) Unscrew and remove the hand knob and clamping ring, then remove the segment securing nuts and bolts and segments, and place the items in a container.
- (7) Remove the case from the fixture, and place the case in a container, then reassemble the clamping ring and hand knob to the fixture.

12. Disassemble the LP Bearing Housing Assembly

A. Remove the LP Bearing (Ref.Fig.116).

- (1) Remove the LP bearing housing assembly from its protective container and with the oil transfer tube uppermost, place the assembly on a worktop.
- (2) Remove the bolt and retaining plate securing the oil transfer tube, then withdraw the tube. Place the tube, bolt and retaining plate into a container.
- (3) Unscrew and remove the 30 bolts captive in the front inner and outer air baffle.
- (4) Remove the bolts securing the bearing retainer, then disassemble the retainer from the locating dowels, place the bolts and retainer into a container.
- (5) Unscrew the thumbnut securing the retainer plates to the bearing, then remove the top plate and lower the bottom plate.

NOTE: Assistance may be required to immobilize the bearing housing.

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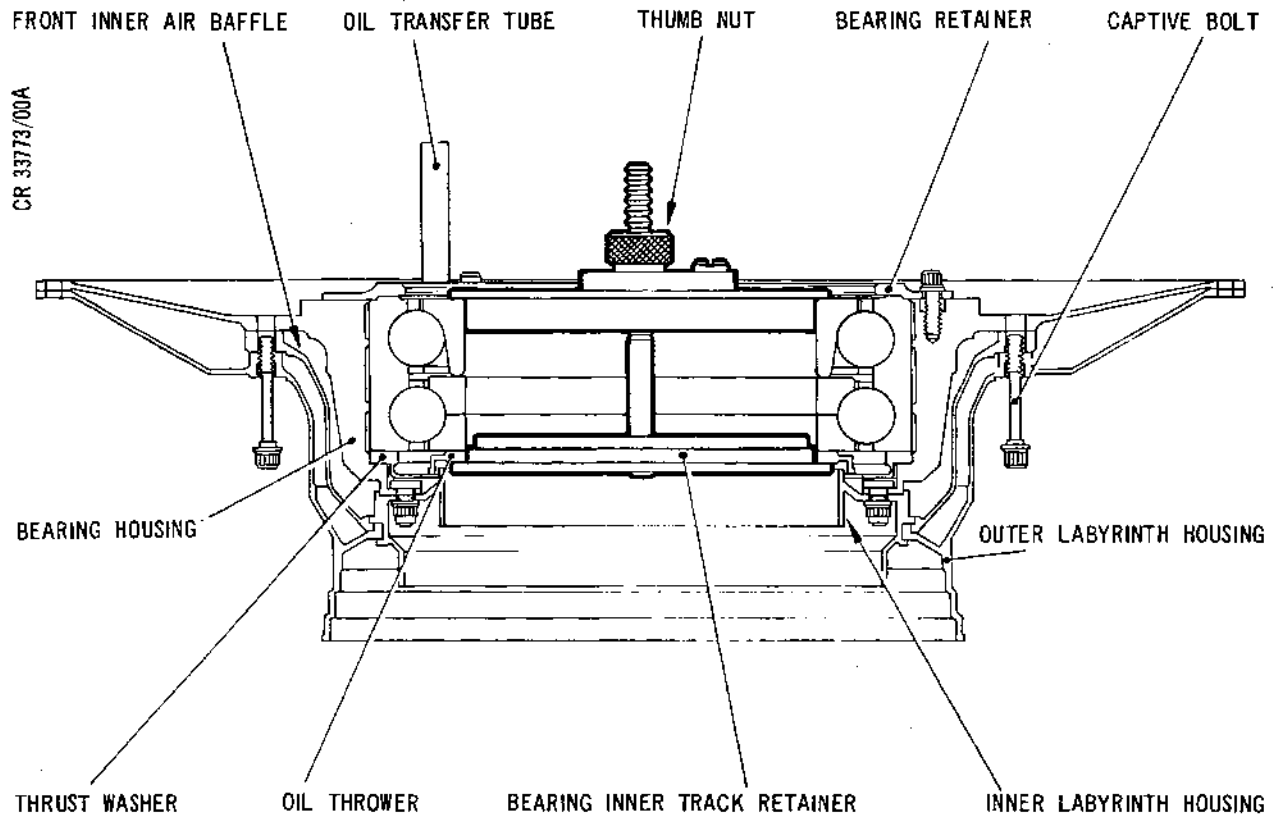
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Preparing to Disassemble the LP Bearing Housing Assembly
Figure 116

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- (6) Carefully lift the bearing from its housing taking care to retain the loose inner tracks, then place the bearing in a protective container. Remove the oil thrower from the bearing housing and place in a container.
 - (7) Lift the bearing housing assembly clear of the bottom bearing retainer plate, then invert the housing leaving the baffles uppermost.
 - (8) Reassemble the bearing retaining plates to each other and secure with the thumbnut, then place it with the other tools.
- B. Disassemble the Air Baffles, Thrust Washer and Inner Labyrinth Housing (Ref.Fig.116).
- (1) Using a suitable driver and hammer, disengage the outer labyrinth housing from the inner labyrinth housing. Place the outer labyrinth housing and air baffle into a container.
- NOTE: Prior to carrying out the following operation, check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8334-205).
- (2) Remove the 24 locknuts securing the inner labyrinth housing to the bearing housing, then using the ring (Tool 851) and mechanical driver/puller (Tool 897 and 828) disassemble the thrust washer double D-head bolts and inner labyrinth housing. Place the items in a container.
- NOTE: The disassembly of the intermediate case assembly is now completed, ensure that all of the disassembled components are clearly identified, and that matched items are kept together. If necessary, place components in protective containers before their transfer to the cleaning area.
- (3) Ensure that the module plate remains with the assembly.

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13. Disassemble the LP and HP Compressor Thrust Bearings

A. General.

CAUTION: SETS OF ROLLERS, CAGES AND TRACKS OF EACH BEARING MUST BE LABELLED RELATIVE TO THEIR POSITIONS AND KEPT TOGETHER AS A SET.

- (1) Clean each bearing prior to disassembly (Ref.72-09-00 Cleaning Process D).
- (2) The following disassembly procedure on each bearing should be carried out in an approved 'clean' room.
- (3) On completion of the disassembly of the bearings, it may be necessary to either code or serialize the matched items (Ref. SB.72-17).

B. Disassemble the LP Compressor Thrust Bearing.

- (1) Arrange a cloth or similar material to 'cushion' the balls should they fall from the cage.
- (2) With the loose inner tracks removed, pass the forks of the extractor (Tool 1984) between the bearing cage and the outer track, then continue to slide the extractor in until enough pressure is applied to press the ball from the cage.
- (3) Remove the next ball from the cage by inserting the hook of extractor (Tool 1985) into the hole left by the removal of the first ball. Remove the remainder of the balls from the cage, then remove the cage and the remaining inner track.
- (4) Remove the first ball from the second cage using extractor (Tool 1984), then remove the remaining balls using extractor (Tool 1985). Remove the cage when released.

C. Disassemble the HP Compressor Thrust Bearing.

- (1) Arrange a cloth or similar material to 'cushion' the balls should they fall from the cage.

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- (2) With the loose inner tracks removed, pass the forks of the extractor (Tool 1984) between the bearing cage and the outer tracks, then continue to slide the extractor in until enough pressure is applied to press the ball from the cage.
- (3) Remove the next ball from the cage by inserting the hook of extractor (Tool 1985) into the hole left by the removal of the first ball. Remove the remainder of the balls from the cage, then remove the cage.

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HP COMPRESSOR ASSEMBLY - DISASSEMBLY

1. General

- A. Prior to commencing the disassembly, refer to 72-09-00 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref. No. e.g. (Tool 1234). For a complete list of tooling required for the check balance, removal of the intermediate case assembly, disassembly of the HP compressor assembly, and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001, 1002 and 1003. Where special tools are quoted in the disassembly for storage and protection of the rotor blades, disks etc. suitable alternative containers and protectors may be used.
- C. The HP compressor assembly will be received from engine bulk disassembly in a mobile stand with the intermediate case assembled, the intermediate case sitting in the stand. Dependent on whether the HP compressor assembly requires a check balance or not, will determine what adapters, sleeves etc. are assembled.
- D. A check balance of the HP compressor is not a normal feature of disassembly and need only be carried out if detailed by the defect investigation or inspection departments. If a check balance is required, items of the HP turbine section have been identified by their Illustrated Parts Catalogue (I.P.C.) number (72-51-03/1-90) for easy identification. The breakdown number is quoted first, 72-51-03 followed by the I.P.C. Fig.No.1 and the Item No.90.
- E. Prior to the check balance and/or disassembly of the HP compressor, the intermediate case assembly must be removed. The preparation for removal of the intermediate case will vary on whether the compressor is to be balanced or not, but the actual procedure for removal of the intermediate case is identical.
- F. If a check balance is required, the procedure cannot be carried out on the normal disassembly stand, but must be carried out on the assembly stand. The procedure entails the assembly of the HP turbine assembly, the balancing and concentricity checks of the assembly, then the removal of the turbine assembly and a final balance of the HP compressor. The assembly is then disassembled in the normal manner in the disassembly stand.

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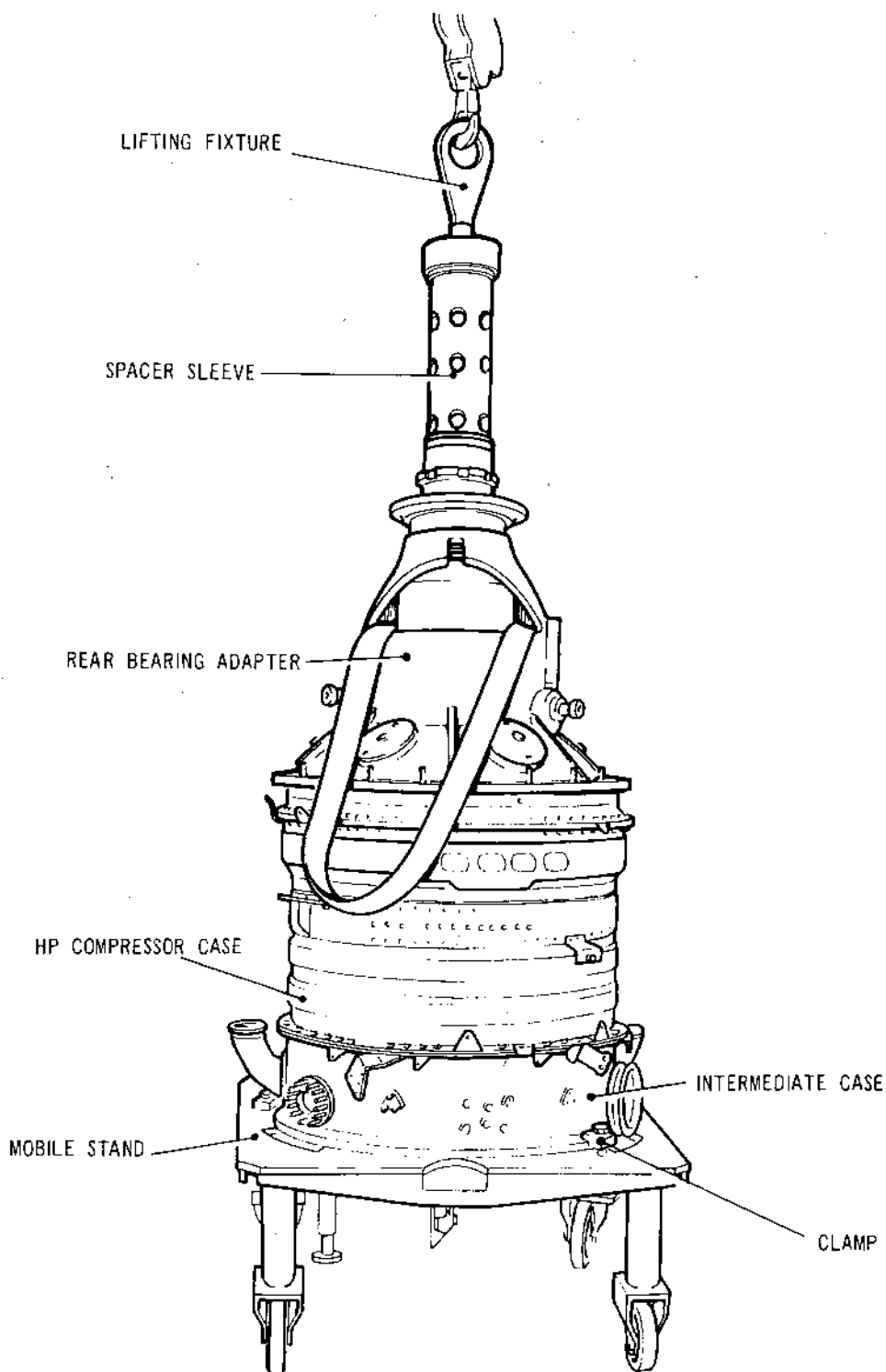


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Removing HP Compressor Assembly/Intermediate Case
from Mobile Stand
Figure 101

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2. Remove the Intermediate Case Assembly from the HP Compressor Assembly

NOTE: If the HP compressor assembly is to be checked balanced, prepare for the removal of the intermediate case as detailed in para.A. For normal disassembly, prepare for the removal of the intermediate case as detailed in para.B.

A. Prepare a Check Balance Assembly for the Removal of the Intermediate Case Assembly (Ref.Fig.101).

- (1) Release and withdraw the mobile stand clamps securing the intermediate case to the stand (Tool 1036) (Ref. Fig.101). Attach a hoist to the lifting fixture (Tool 1043) (on top of the assembly), then raise the hoist until the assembly is clear of the stand. Position the assembly alongside the pit stand (Tool 1027).
- (2) With the arms of the stand extending upwards, traverse the assembly sideways into the stand so that the rear bearing adapter extensions are above the stand arms. Align the holes in the adapter extensions with the locating pins and studs in the stand arms, then lower the assembly onto the arms. Assemble washers and nuts to the studs and fully tighten the nuts (Ref.Fig.102).
- (3) Unscrew the lifting fixture until released, then raise the hoist. Unscrew and remove the slave nut (Tool 1042) from the LP drive shaft, then lower the hoist and screw the fixture back onto the spacer sleeve. Unscrew the spacer sleeve until released from the HP drive shaft, then raise the hoist until the sleeve is clear of the LP drive shaft. Lower the sleeve onto a suitable surface, then disconnect the hoist from the lifting fixture and remove the fixture from the sleeve. Unscrew the cap screws of the split sleeves (Tool 1058) then remove the sleeves from the HP and LP drive shafts.
- (4) Screw the guide sleeve (Tool 377) onto the rear (top) end of the LP drive shaft. Lower the HP drive shaft support sleeve (Tool 1031) over the LP drive shaft and onto the HP drive shaft engaging the splines and resting it on the bearing (Ref.Fig.102).

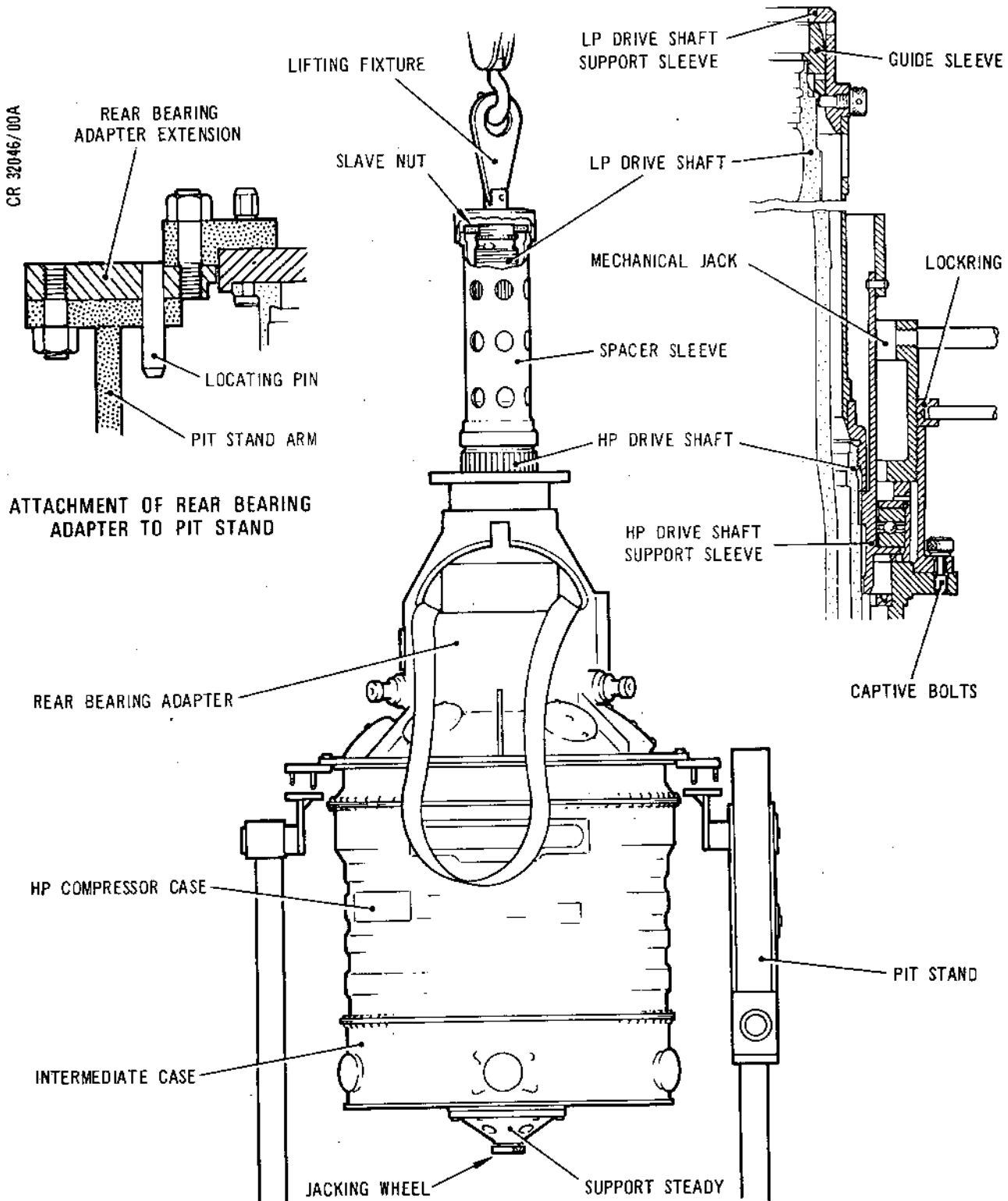
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Securing Rear End of LP and HP Drive Shafts to Rear Bearing Adapter
Figure 102

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- (5) Lower the mechanical jack (Tool 1029) over the support sleeve and align the captive bolts with the tapped holes in the rear adapter. Unscrew the jack (if required), to allow the jack to abut the adapter, then screw the captive bolts into the adapter. Using the tommy bars, screw in on the jack until it abuts the support sleeve, then release the jack half a turn. Temporarily lock the jack by tightening the lockring against it.
- (6) Lower the LP drive shaft support sleeve (Tool 1030) into the assembled HP support sleeve and screw it onto the HP drive shaft until it abuts the other sleeve, then release the sleeve one and a half turns.
- (7) Rotate the pit stand arms 180 deg until the intermediate case is uppermost.

NOTE: Refer to para.C. and remove the intermediate case assembly.

B. Prepare the Assembly for the Removal of the Intermediate Case Assembly.

NOTE: Para.B. applies to assemblies not requiring a check balance.

- (1) Remove the split sleeves from between the HP and LP drive shafts(Ref.Fig.103).
- (a) Attach a hoist to the lifting fixture (Tool 1043), unscrew the fixture until released from the spacer sleeve (Tool 391) then raise the hoist. Release and remove the slave nut (Tool 1042) from the LP drive shaft, then lower the hoist and screw the lifting fixture back onto the spacer sleeve.
- (b) Unscrew the spacer sleeve until released from the HP drive shaft, raise the hoist sufficient to enable removal of the split sleeves (Tool 1058). Unscrew the cap screws of the split sleeves then remove the sleeves from the HP and LP drive shafts.

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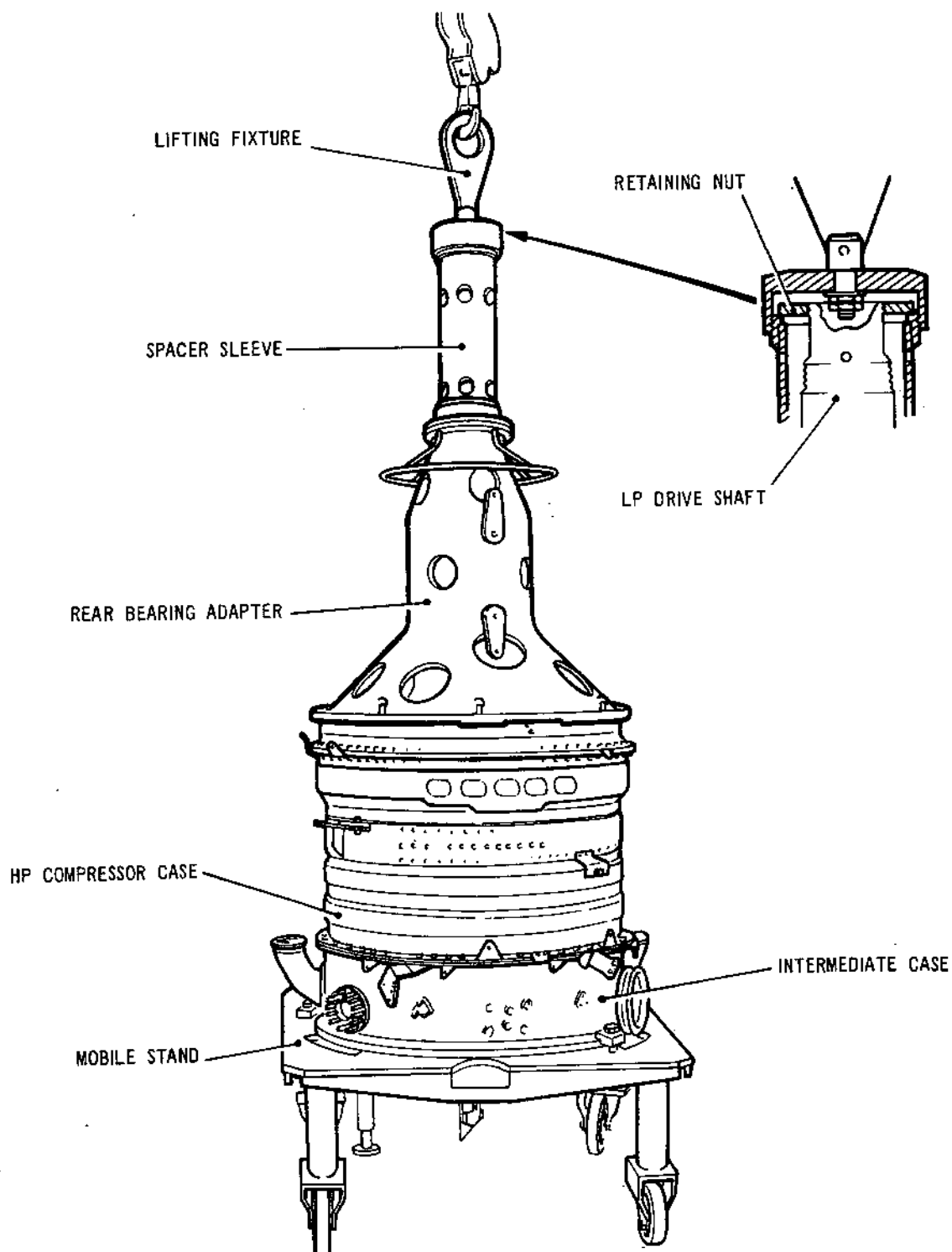


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Removing Split Sleeve from LP and HP Drive Shafts
Figure 103

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- (c) Lower the hoist and screw the spacer sleeve onto the HP drive shaft. Unscrew the lifting fixture until released from the sleeve, then screw the slave nut (Tool 1042) onto the LP drive shaft until it abuts the sleeve. Screw the lifting fixture (Tool 1043) back onto the sleeve.
- (2) Invert the HP compressor/intermediate case assembly (Ref.Fig.104).
- (a) Release and withdraw the stand clamps securing the intermediate case to the mobile stand (Tool 1036). Ensure that the lifting fixture (Tool 1039) under the intermediate case is secured to the case.
- (b) With the hoist still attached to the lifting fixture (Tool 1043), raise the hoist until the assembly is clear of the stand, then position the hoist next to another hoist in an area clear of obstruction that will permit the HP compressor/intermediate case to be inverted.
- (c) Attach the second hoist to the eye end of the lifting fixture plate (Tool 1039) and ensure that when the plate is raised it will rest on the lifting plate pad. Ensure that the lifting fixture attached to the first hoist, is aligned with the plate attached to the second hoist and that it will pivot correctly.
- (d) Steadily raise the second hoist and lower the first hoist until the complete assembly is inverted, then disconnect the first hoist.
- (3) Unscrew and remove the lifting fixture from the (lower) end of the spacer sleeve, then unscrew and remove the slave nut from the (lower) end of the LP drive shaft. Screw the protector (Tool 403) onto the end of the spacer sleeve (Ref.Fig.104).

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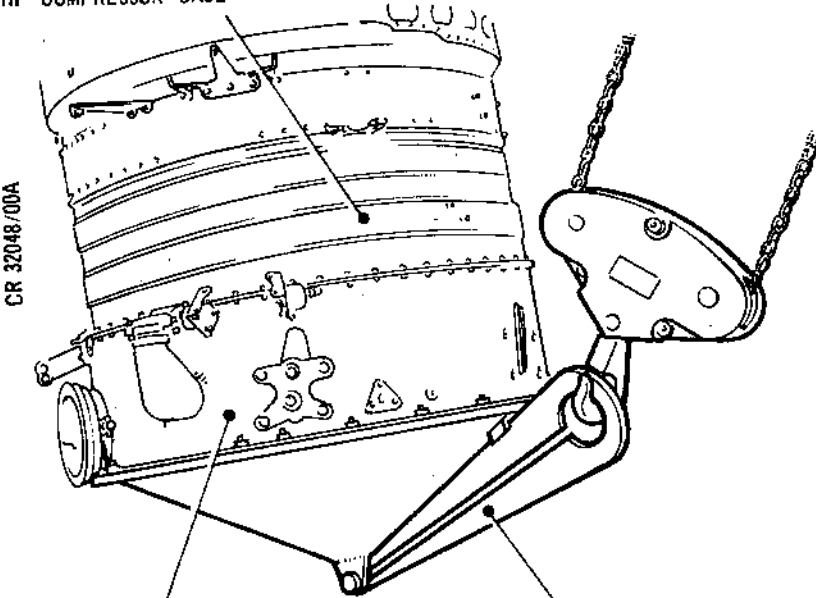
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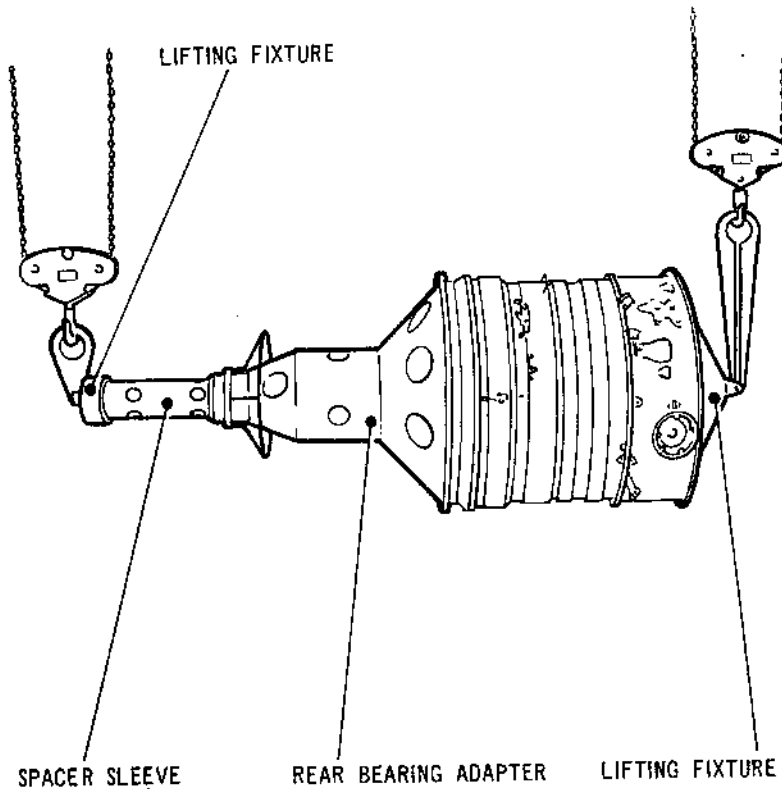
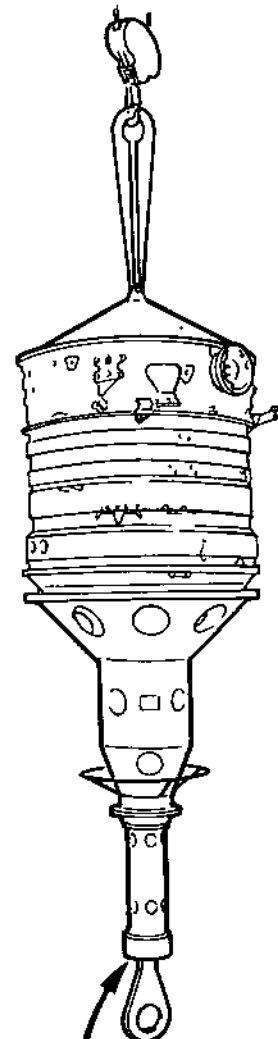
HP COMPRESSOR CASE

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INTERMEDIATE CASE

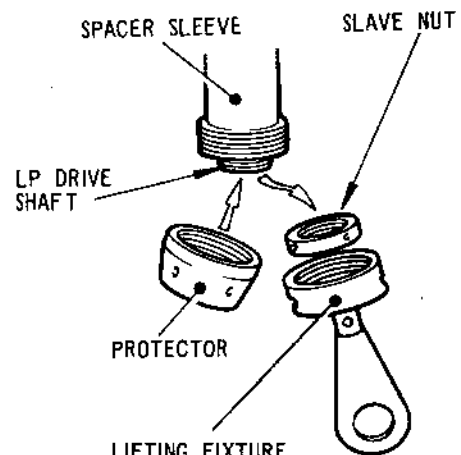
LIFTING FIXTURE



SPACER SLEEVE

REAR BEARING ADAPTER

LIFTING FIXTURE



SPACER SLEEVE

SLAVE NUT

LP DRIVE
SHAFT

PROTECTOR

LIFTING FIXTURE

Inverting HP Compressor Assembly/Intermediate Case
Figure 104

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- (4) Ensure that the container (Tool 1050) is positioned in the hole beneath the disassembly stand (Tool 1040), then position and lower the HP compressor into the stand (Ref.Fig.105). Position the stand clamps over the HP case flange, then secure the clamps with the knurled nuts. Position the platforms (Tool 1233) around the stand.
- (5) Release and remove the slave nuts and washers securing the lifting fixture to the intermediate case. Raise the hoist until the fixture is clear of the case, then position and lower the fixture onto a suitable support. Disconnect the hoist and lower the lifting fixture plate onto its pad.
- C. Release and Remove the Intermediate Case Assembly.
- (1) Release the captive bolts securing the support steady (Tool 396) to the intermediate inner case, then withdraw the steady (Ref.Fig.102).
- (2) Unscrew and remove the two bolts securing the LP probe in the inside of the intermediate inner case, then withdraw the LP probe, retaining plate and the two adjusting washers (Ref.Fig.106).
- (3) Remove the static seal housing using the mechanical puller (Tool 1962).
- (a) Unlock the keywashers then unscrew and remove the 12 bolts securing the static seal housing to the intermediate case.
- (b) From the extractor, unscrew and remove the three extractor claws from their parking position in the larger of the two plates.
- (c) Position the extractor, large plate first, over the LP drive shaft and rest the smaller plate on the end of the shaft. Insert the extractor claws through the slots in the larger plate and engage the claws beneath the seal housing, tighten the knurled thumbscrews to secure the claws.

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- (d) Screw in the three extractor bolts, in equal progressive increments, and draw the housing from its location. Unscrew the thumbscrews to disengage the claws from the housing, remove the extractor from the shaft then screw the claws into their parking holes in the larger plate. Remove the seal housing from the intermediate case.
- (4) Slide the protector (Tool 427) over the LP drive shaft, then using the pliers (Tool 1523), release the locking washer from the retaining nut. Remove the protector from the shaft.
- (5) Release the bearing retaining nut(Ref.Fig.107).
- (a) Locate the spanner wrench steady (Tool 397) on the inner part of the intermediate case and secure the steady with its captive bolts.
- (b) Offer the immobilizer (Tool 387) over the LP drive shaft and engage it in the cut-aways inside the rotor shaft front.

NOTE: Before using the multiplier (Tool 1022), turn the input drive and note the direction of rotation of the output drive.

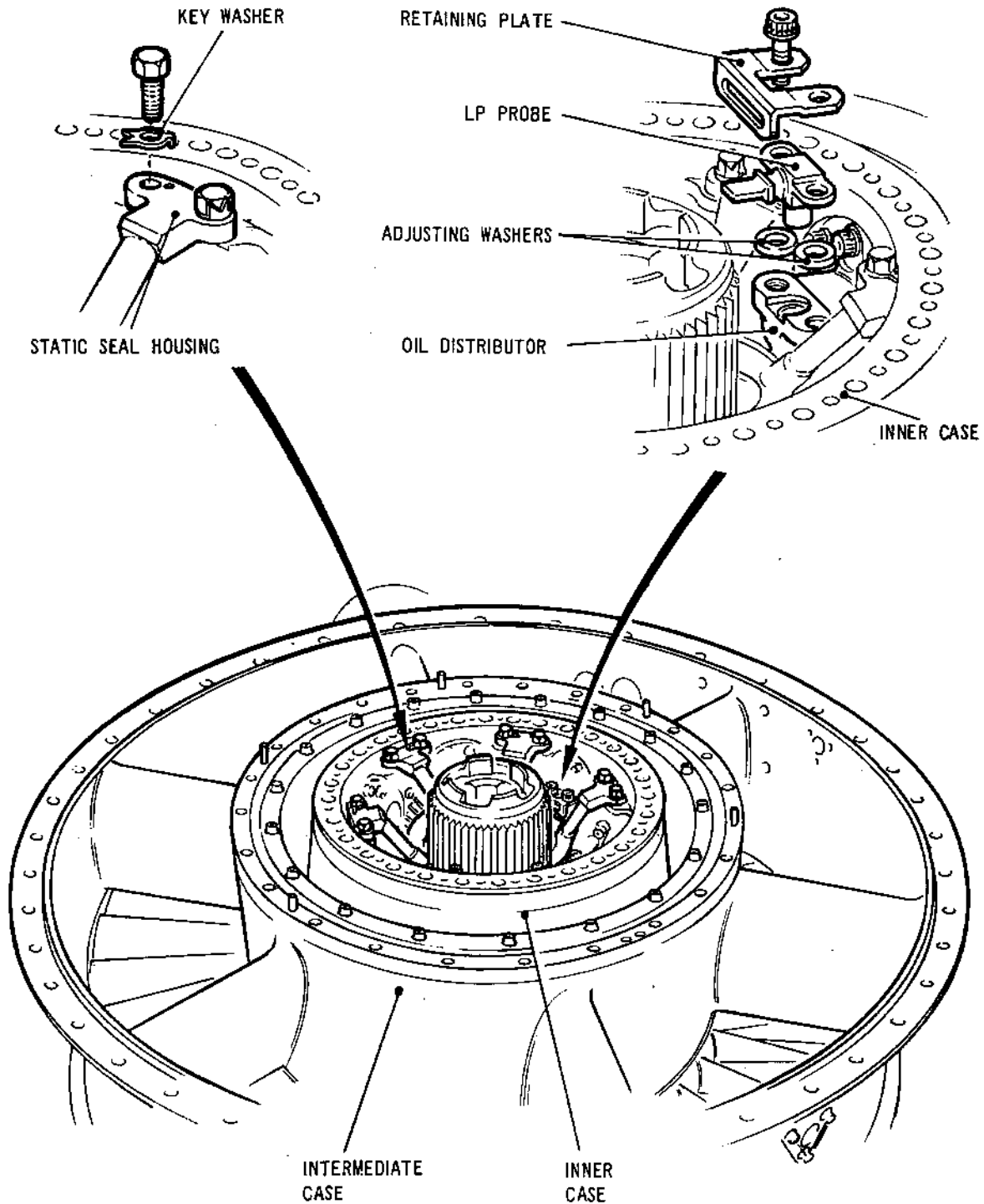
- (c) Ensure that the multiplier (Tool 1022) is bolted to the spanner wrench (Tool 386), then lower the spanner/multiplier over the LP drive shaft and immobilizer and engage the multiplier square drive in the immobilizer. Turn the HP rotor shaft as necessary to engage the spanner pin in the cut-away in the steady and the spanner dogs in the retaining nut.
- (d) Engage a wrench in the multiplier, then release the LEFT-HAND threaded retaining nut.
- (e) Remove the wrench, then withdraw the multiplier/spanner and the immobilizer from the rotor shaft front and steady. Use the hand spanner (Tool 1324) to unscrew the nut, then remove the spanner and release and remove the steady.

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Removing Static Seal Housing and LP Probe from
Intermediate Case
Figure 106

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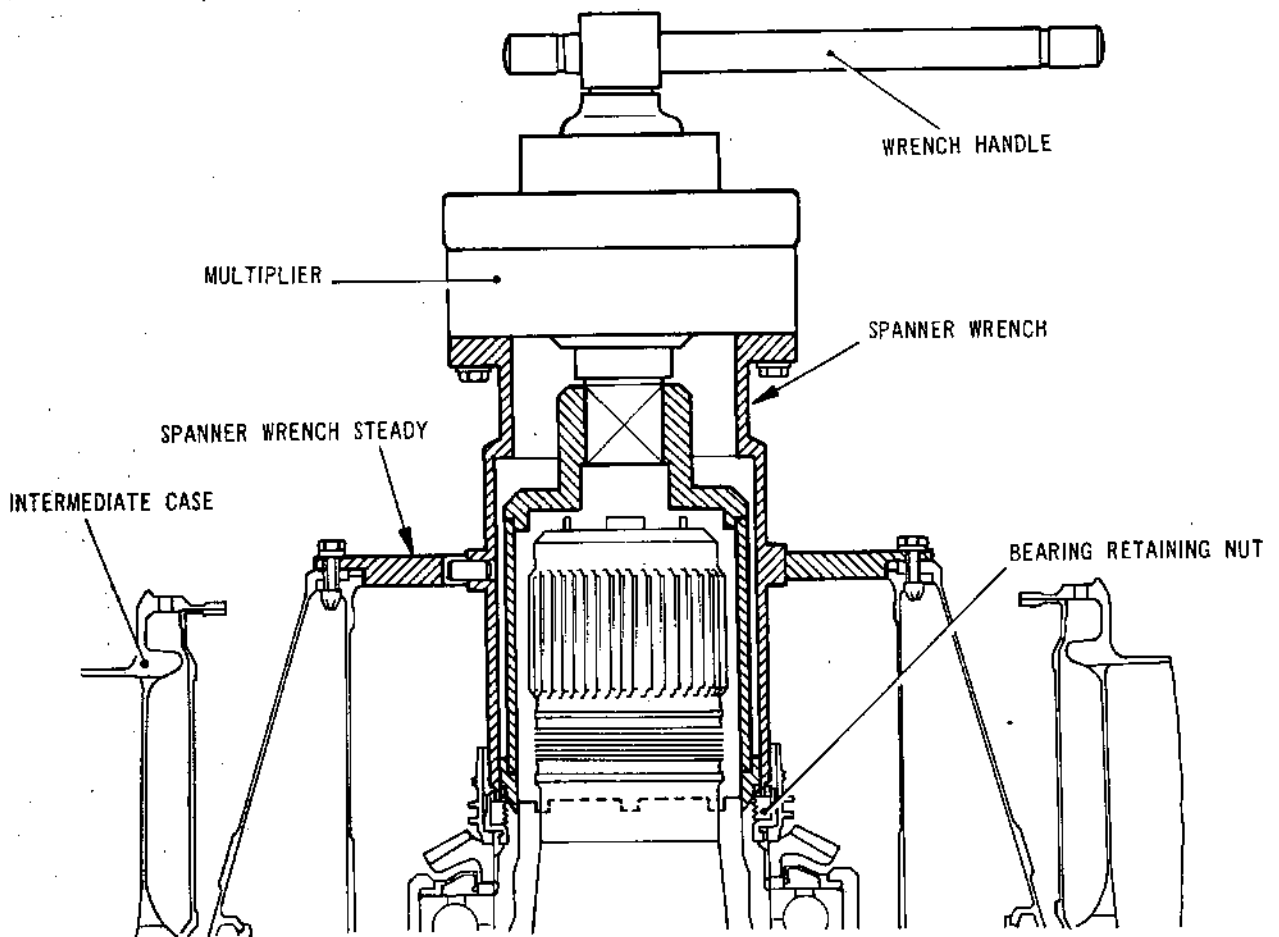
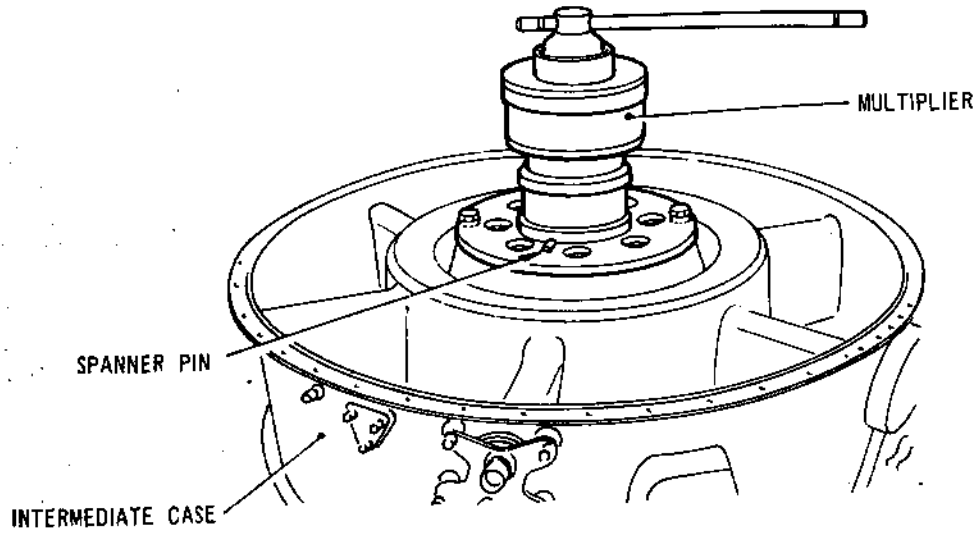
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TN27329

Removing HP Rotor Bearing Retaining Nut
Figure 107



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- (f) Withdraw the retaining nut and locking washer from the rotor shaft front.
- (6) Release and remove all nuts, bolts and brackets from the intermediate case rear flange/HP compressor case front flange. Place the items in suitable containers.
- (7) Assemble the lifting/extracting fixture (Tool 411) to the intermediate case (Ref.Fig.108).
- (a) Attach a hoist to the lifting ring of the fixture, then position and lower the fixture onto the intermediate case guiding the fixture pot over the LP drive shaft. Align the captive bolts of the fixture with the tapped holes in the inner case, then screw in the fixture handle (if necessary), to enable the fixture plate to abut the case. Screw the fixture bolts into the case and fully tighten the bolts.
- (b) Unscrew the fixture handle so that the fixture pot abuts the HP rotor shaft front, then continue unscrewing the fixture handle until the intermediate case/HP rotor bearing are released from the rotor shaft front.

NOTE: The fixture handle will be stiff to turn, but this is normal.

- (8) Raise the hoist until the intermediate case is clear of the LP drive shaft, then position the case over a suitable pallet. Bolt three (evenly spaced) transport blocks (Tool 1232) to the rear (bottom) flange of the outer case, then lower the case and rest the blocks on the pallet. Release the captive bolts of the lifting fixture, then remove the fixture from the case and the hoist.
- (9) Withdraw the adjusting washer from the rotor shaft front.

NOTE: The intermediate case assembly can now be transferred to its disassembly section (72-32-00, Disassembly).

NOTE: If the HP compressor assembly is not to be worked on immediately, lower the protector (Tool 1246) over the LP drive shaft and rest it on the HP compressor case.

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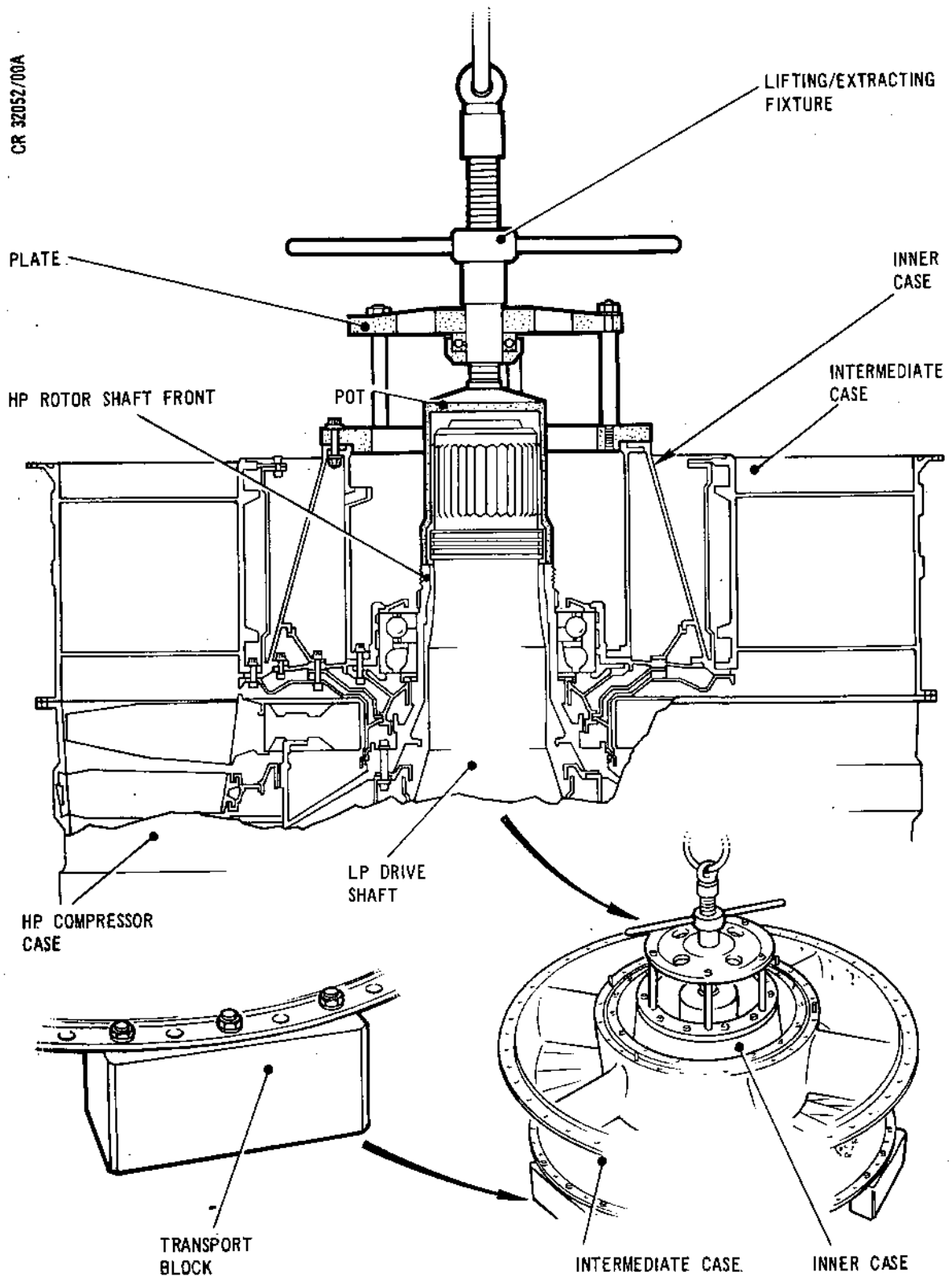
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Removing Intermediate Case from HP Compressor Assembly
Figure 108

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OVERHAUL



NOTE: If the HP compressor assembly requires a check balance proceed as detailed in para.3. If the assembly does not require a check balance, disassemble the HP compressor assembly as detailed in para.8.

3. Prepare and Check Balance the HP Compressor and Turbine Assembly

A. Assemble the Front Bearing Adapter to the HP Front Case and the Rotor Shaft Front (Ref.Fig.109).

- (1) Ensure that the slave bearing (Tool 1289) is assembled and secured to the front bearing adapter (Tool 1032). Offer the lifting/extracting fixture (Tool 1353) to the adapter, align the offset thumbscrew with the offset tapped hole in the adapter, then screw the thumbscrews into the adapter. Fully tighten the screws.
- (2) Screw the steady (Tool 288) onto the rotor shaft front, then remove the protector covering the top of the case (if assembled). Apply lubricant 'A' to bearing location on the rotor shaft front, then assemble the spacer ring (Tool 870) to the shaft (in lieu of the adjusting washer and oil thrower).
- (3) Ensure that the LP support sleeve (Tool 1030) has been unscrewed one and a half turns from contact with the HP support sleeve (Tool 1031) on the bottom of the rear bearing adapter. Release the mechanical jack (Tool 1029) lockring, then screw in on the jack to raise the HP compressor (approx.) 0.125 in. (4,0 mm) (Ref.Fig.102).

NOTE: Unless the LP support sleeve is loosened off from the jack, there is no operating clearance, and the jack cannot be operated.

- (4) Attach a hoist to the lifting/extracting fixture, then position and lower the front bearing adapter over the steady. Release the hoist, then screw the fixture onto the steady, pressing the slave bearing onto the rotor shaft front. Align the dowel hole in the front bearing adapter with the dowel in the HP front case (with the lifting eyes in the front and rear adapters aligned), then screw down on the fixture until the bearing is fully down. Release the thumbscrews securing the fixture to the front bearing adapter, then unscrew and remove the fixture. Unscrew and remove the steady from the rotor shaft front.

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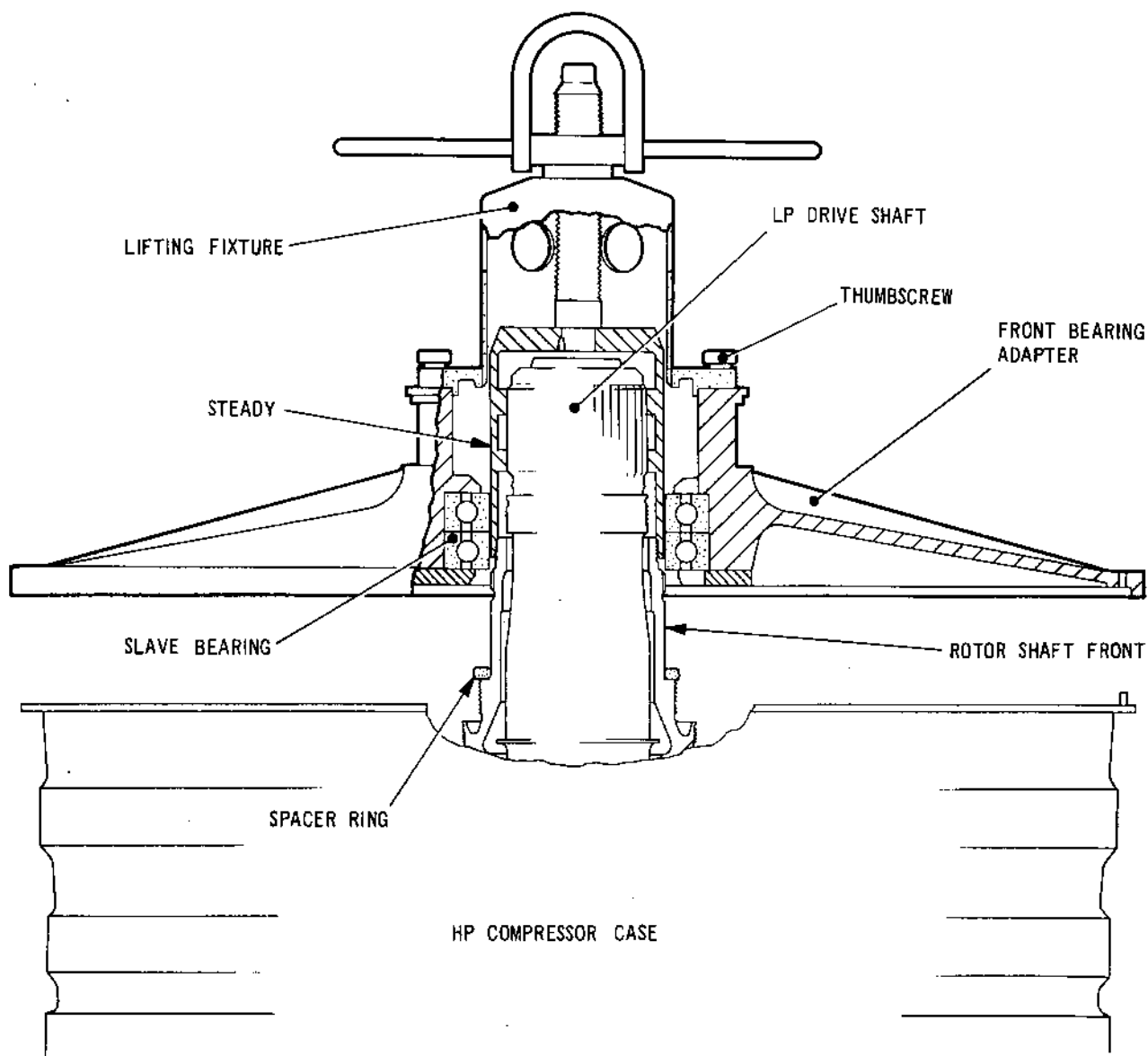
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Assembling Front Bearing Adapter to Front Case
Figure 109

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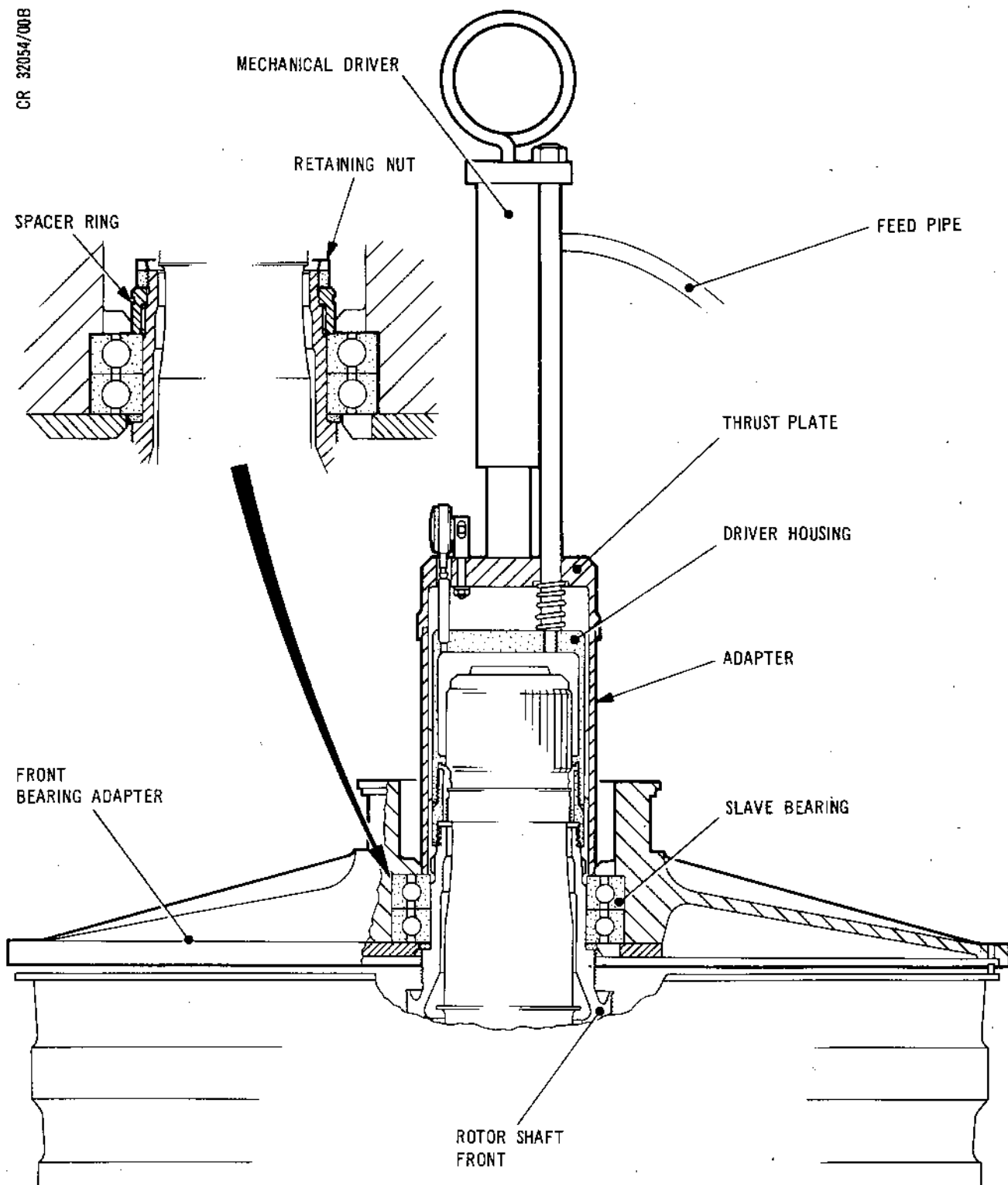


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Assembling Front Bearing Adapter Bearing to Rotor Shaft Front
Figure 110

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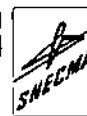
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- (5) Locate the adapter (Tool 891) on the inner race of the front bearing adapter slave bearing. Screw the extension (Tool 521) onto the hydraulic mechanical driver (Tool 900). Lower the driver over the LP drive shaft until it abuts the rotor shaft front, then screw the driver housing onto the rotor (Ref.Fig.110).

NOTE: Do not overtighten.

- (6) Connect the feed pipe from a hand operated hydraulic pump to the hydraulic driver connection (Ref.Fig.110). Operate the hand pump and apply a pressure to the driver, ensuring that as the piston moves down, the thrust plate locates correctly over the adapter. Apply a pressure of 7500 lb in. (3,402 kg) to the driver.
- (7) Release the hydraulic pressure and check that the driver thrust plate rises (under its spring pressure). Disconnect the feed pipe from the driver, then unscrew and withdraw the driver and extension. Remove the adapter from the front bearing adapter.
- (8) Apply lubricant 'B' (Ref.72-09-00 Assembly) to the threads of the rotor shaft front, then assemble the spacer ring (Tool 988) and the 'LEFT-HAND' threaded retaining nut (72-61-00/1-10) to the rotor. Hand-tighten the nut using spanner wrench (Tool 1324).
- (9) With the dowel hole in the front bearing adapter engaged in, or aligned with, the dowel in the HP front case (Ref. para.(4)), and the bolt holes in the adapter and case aligned, lower the mechanical jack until the adapter abuts the HP case flange. Secure the adapter to the case with slave nuts and bolts. Lock the jack with its lockring.
- (10) Offer the steady (Tool 1158) to the front bearing adapter, align the bolts with the adapter holes, then screw the bolts into the adapter, fully tighten the bolts. Offer the immobilizer (Tool 387) (Ref.Fig.111) into the steady and over the LP drive shaft, and engage it in the cut-aways inside the HP rotor shaft front. Ensure that the multiplier (Tool 1022) is bolted to the spanner wrench (Tool 386), then offer the spanner/multiplier over the immobilizer. Turn the HP rotor shaft as necessary to engage the spanner pin in the cut-away in the steady and the spanner dogs in the retaining nut. Using a torquemeter wrench

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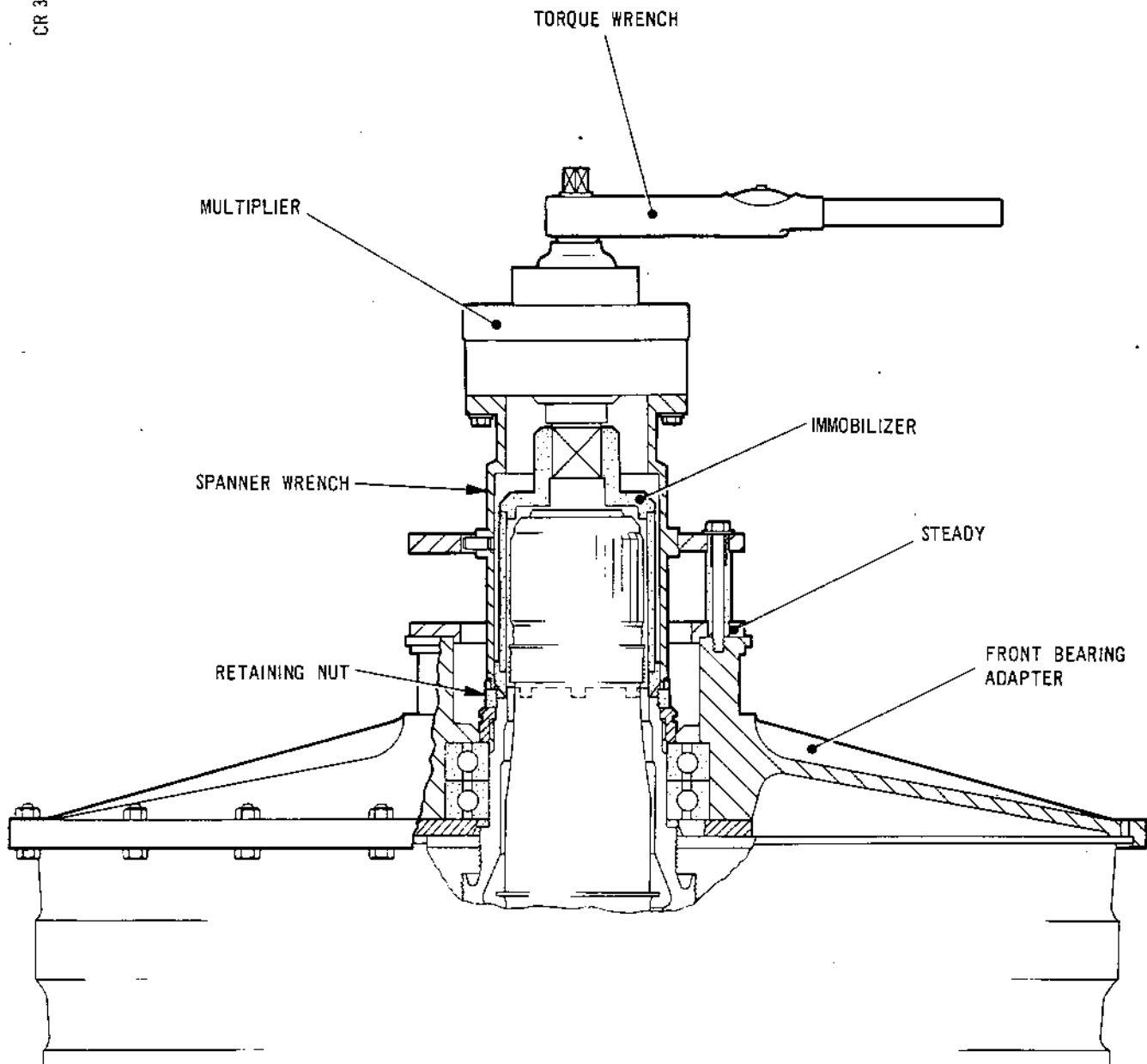


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Tightening Front Bearing Retaining Nut
Figure 111

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(Tool 1656) in the multiplier, torque-tighten the 'LEFT-HAND' threaded retaining nut to 1250 lb ft (1694,8 N.m) (reading of 50 lb ft (67,8 N.m) on the wrench because of the 25 to 1 multiplier). Remove the torque-meter wrench, multiplier/spanner, immobilizer and steady from the assembly.

- (11) Assemble the steady, support and immobilizer to the LP drive shaft and the front bearing adapter (Ref. Fig.112).
- (a) Offer the immobilizer (Tool 1339) into the front bearing adapter and engage the teeth in the HP drive shaft front retaining nut.
 - (b) Unscrew the knurled locknut, then withdraw the location bush towards the eye-end of the steady (Tool 290). Offer the steady shaft to the LP drive shaft and slide the four lobes of the steady shaft through the four cut-aways in the drive shaft, then turn the steady shaft 45 deg so that the lobes locate behind the lands of the drive shaft. Push the location bush down, locating it over the drive shaft and ensuring that its peg locates in one of the cut-aways in the steady shaft. Screw on the knurled locknut and tighten it against the location bush.
 - (c) Offer the front support (Tool 292) over the steady, then withdraw the immobilizer from the (rotor drive shaft) nut, align the immobilizer pins and threaded studs with the plain holes in the front support then engage the two. Screw knurled nuts (Tool 1340) onto the protruding end of the studs until the immobilizer is held against the support.
 - (d) Push the support onto the steady and screw the support locknut onto the steady. Align the offset screw of the support with the offset tapped hole in the front bearing adapter, then screw the screws into the adapter ensuring that the support locknut is screwed fully into the steady. Release the support locknut to allow a 0.005 in. (0,127 mm) clearance between the nut and the support, then screw the steady locking nut (Tool 291) onto the end of the steady and lock it against the support locknut.

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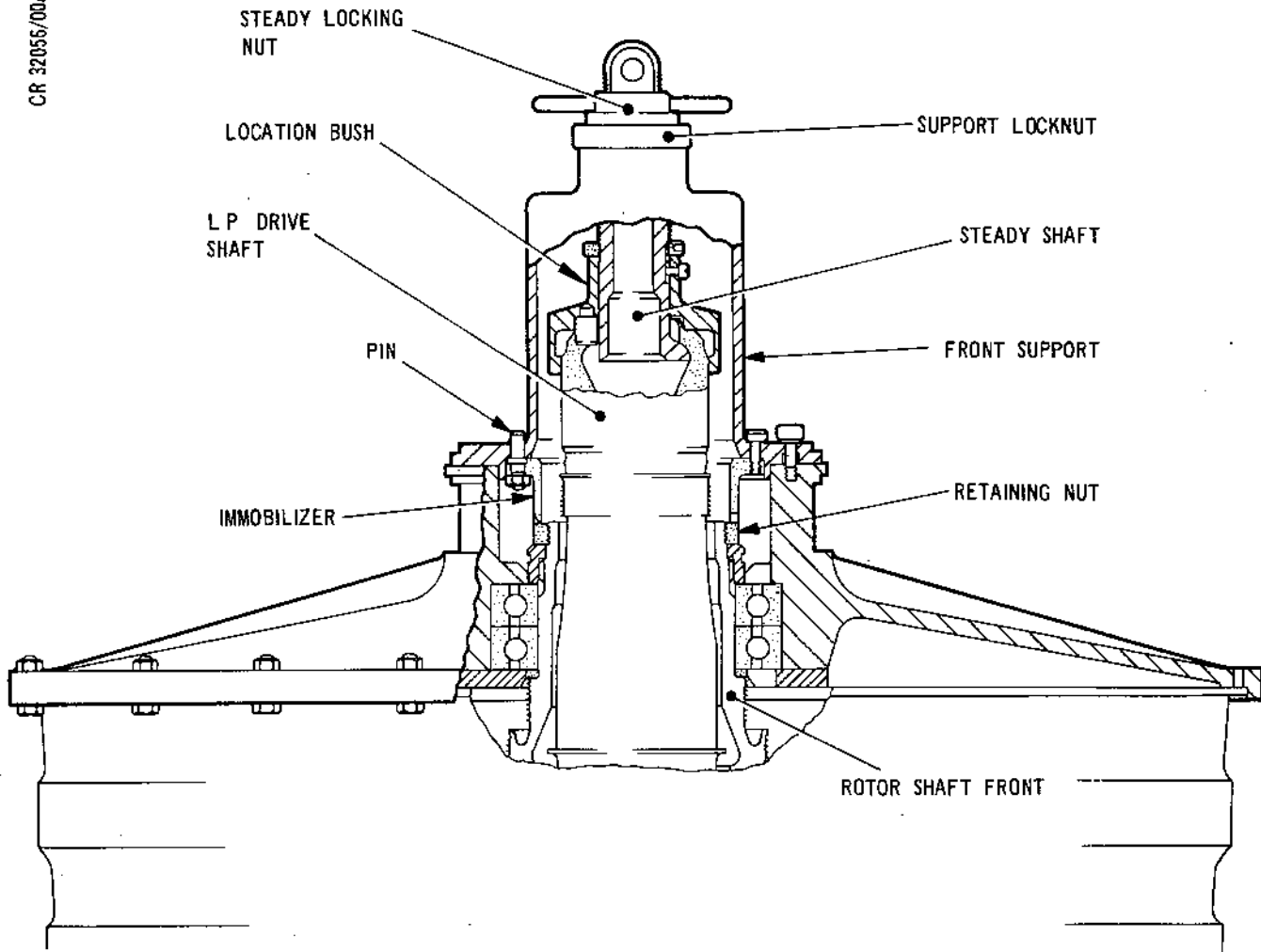


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Supporting LP Drive Shaft
Figure 112

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(12) Assemble and secure protector (Tool 395) to the blow-off position at stage 3 location, and protector (Tool 394) to the vent position at stage 5 location of the compressor front case.

B. Assemble the HP Turbine Assembly to the HP Compressor Assembly.

NOTE: The HP turbine assembly must be obtained from engine bulk disassembly. The turbine wheel will be bladed with the blades correctly locked, and the hub unit (72-51-03/1-200) will have the front labyrinth (72-51-03/1-160) assembled to it, whilst the rear labyrinth will be loose. The labyrinths, hub and blade tips will have protectors assembled.

(1) Prepare the HP compressor assembly.

- (a) Release and remove the three knurled nuts (Tool 1340) from the front support (Tool 292) (Ref. Fig.113) releasing the immobilizer (Tool 1339), then push the three studs of the immobilizer to engage the immobilizer in the teeth of the HP drive shaft front retaining nut, turning the rotor (slightly) to achieve engagement. Screw three knurled headed bolts (Tool 1341) into the three tapped holes in the front support to secure the immobilizer in engagement with the retaining nut.
- (b) Turn the stand arms 180 deg to position the rear bearing adapter uppermost.
- (c) Unscrew and remove the LP drive shaft support sleeve (Tool 1030) from the HP drive shaft, then release the mechanical jack (Tool 1029) lock-ring and unscrew the jack a turn. Unscrew the jack captive bolts, then remove the jack (Ref. Fig.102).
- (d) Withdraw the HP drive shaft support sleeve (Tool 1031) from the shaft, then unscrew and remove the guide sleeve (Tool 377) from the end of the LP drive shaft.

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(2) Assemble the HP turbine assembly (Ref.Fig.113 and 114).

- (a) Slide a slave adjusting washer (72-51-04/1-40) over the LP and HP drive shafts and rest it on the bearing. Slide the HP front labyrinth and hub assembly over the LP drive shaft, align the master serration of the hub and the HP drive shaft, then engage the two. Apply lubricant 'B' to the round nut (72-51-04/1-10), then assemble the keywasher (72-51-04/1-30), plain washer (72-51-04/1-20) and round nut to the HP drive shaft.
- (b) Locate the adapter (Tool 1315) on the dowels of the immobilizer (Tool 1343) then secure the adapter to the immobilizer with five cap screws (of the immobilizer). Locate the multiplier (Tool 1022) on the end of the immobilizer, align the holes of both items, then secure them together with eight cap screws (of the immobilizer).
- (c) Slide the spanner wrench (Tool 1085) over the LP drive shaft and engage it in the hub nut. Attach a hoist to the handle of the immobilizer, then raise the hoist and position and lower it over the LP drive shaft. Turn the drive of the multiplier as necessary to engage its square drive in the spanner, and the adapter serrations on those of the hub. Unscrew and remove the lifting ring from the side of the immobilizer, then ensuring that the painted instructions on the arm are uppermost. Lower the torque loading arm (Tool 1342) over the immobilizer and locate the clearance holes over the pillars.
- (d) Unscrew the three knurled headed bolts (Tool 1341) located in the front support, allowing the immobilizer to drop and release the rotor. Turn the rotor to align the datum bolt hole in the labyrinth hub with the cut-away in the rear bearing adapter. Examine the heads of the turbine bolts (72-51-04/1-180) for the position numbers, then insert No.1 bolt through the labyrinth/hub, adapter, immobilizer and arm and secure with a slave nut lubricated with lubricant 'B' (Ref.72-09-00 Assembly). Insert the remaining nine bolts in numerical sequence in a clockwise direction (as viewed from the

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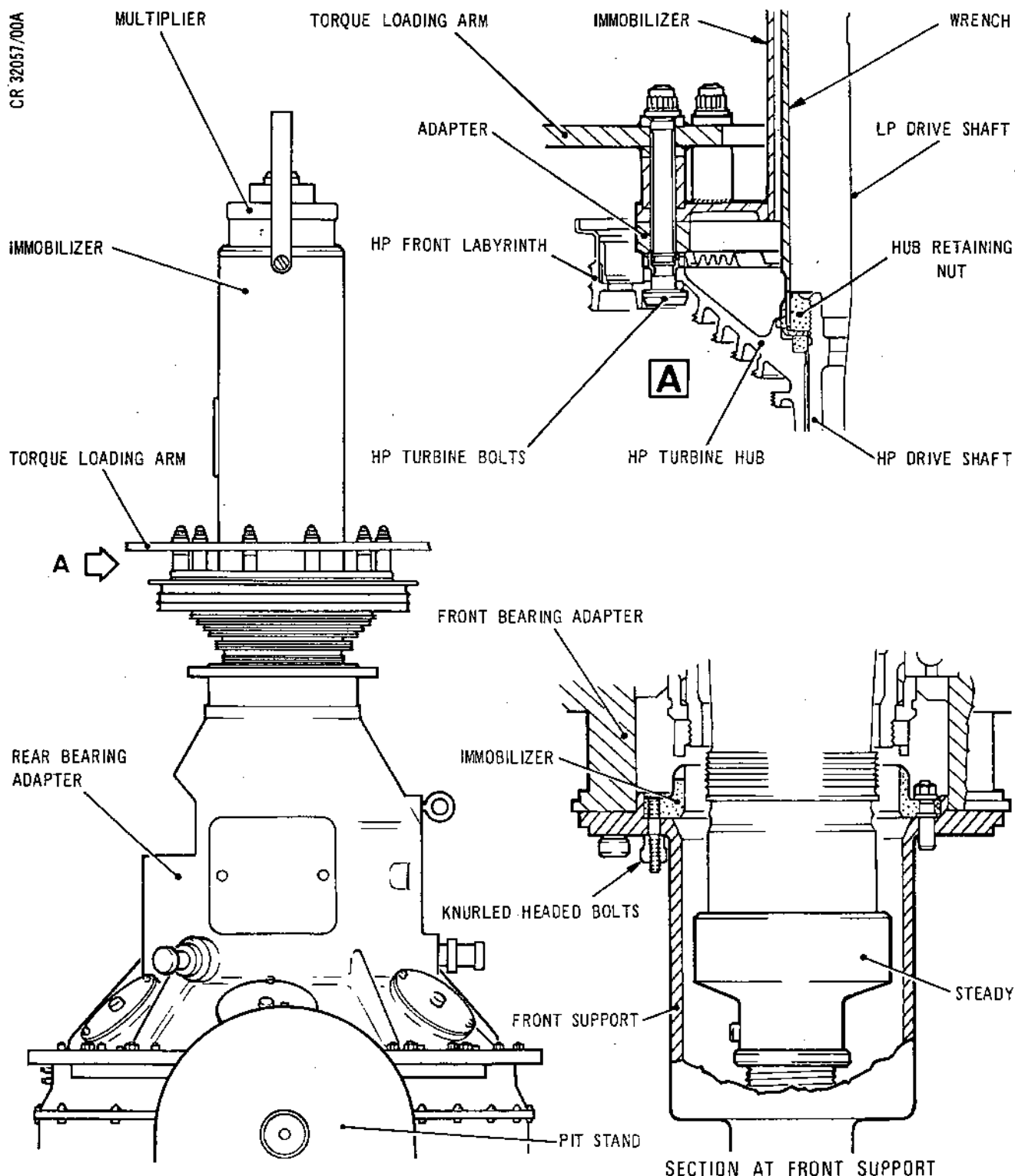


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CR 32057/00A



Assembling HP Turbine Hub Assembly and Retaining Nut to
HP Drive Shaft
Figure 113

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rear), by turning the rotor to align the holes with the cut-away, and secure with slave nuts.

NOTE: If the protector on the hub prevents the insertion of the turbine bolts, release and remove the protector.

- (e) Turn the stand arms 90 deg to position the HP compressor horizontal in its correct attitude. Looking from the rear of the assembly turn the arm so that it is horizontal, with the painted instruction dealing with the spring balance on the right-hand side. Engage the immobilizer (Tool 1339) in the HP drive shaft front retaining nut and secure with the three knurled headed bolts (Tool 1341). Fully tighten the turbine bolt nuts.
- (f) Attach a spring balance (capable of a load of 200 lb (90,7 kg) to a hoist, then attach the balance to the shackle on the right-hand end of the arm. Hook the weights carrier (Tool 1344) to the shackle at the left-hand end of the arm, then add the five weights (Tool 1345) (totalling 165 lb) to the carrier, ensuring that as the weights are added, an equal load is applied by the hoist, until the total weight of 170 lb (77,11 kg) on one end of the arm, is equalled by load of 170 lb (77,11 kg) on the scale at the other end of the arm.
- (g) Using the torque-meter wrench (Tool 1658) in the multiplier, torque-tighten the retaining nut between 3000 and 3300 lbf ft (4067,5 and 4474,2 N.m) (reading of 120 to 130 lbf ft (162,8 and 176,2 N.m)) on the wrench because of the 25 to 1 multiplier). Remove the wrench, then remove the weights and reduce the load on the spring balance an equivalent amount, until all the weights are removed and the spring balance reads zero. Disconnect the spring balance from the arm and hoist, and the weight carrier from the other end of the arm.
- (h) Turn the stand arms 90 deg to position the rear bearing adapter uppermost. Release the turbine bolt nuts, then unscrew the three knurled headed bolts (Tool 1341) located in the front support, allowing the immobilizer to drop and release the rotor. Turning the rotor as necessary to align the turbine bolts with the

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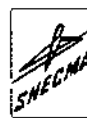
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rear bearing adapter cut-away, release and remove the turbine bolts. Remove the torque-loading arm from the immobiliser, then screw the lifting ring into the side of the immobiliser. Attach a hoist to the handle of the immobiliser, then raise the hoist and position and lower the immobiliser onto a suitable container. Release the hoist from the immobiliser. Remove the spanner wrench from the hub nut.

- (j) Assemble the lifting fixture (Tool 1120) to the HP turbine unit (Ref.Fig.114).
- (i) Ensure that the thumbnuts are loose and the tommy bars of the claws point to the 'UNLOCK' position.
- (ii) Attach a hoist to the lifting ring of the fixture, then position and lower the fixture into the centre of the turbine wheel, ensuring that the rear of the turbine is uppermost as denoted by the blade locking plates. Turn the tommy bars of the claws to the 'LOCK' position, then lock the claws with the thumbnuts.
- (k) Determine the datum hole of the hub by examining the face of the outside circumference in line with a Hirth serration for a datum mark $\downarrow \bigcirc$. This mark will be in line with a datum mark \downarrow on the rear face of the front labyrinth. Then determine the datum hole in the turbine wheel by examining the outer face of the bolt bosses on the rear (uppermost) face of the wheel for a datum mark $\rightarrow \bigcirc$. Note the position of the datum hole in each item.
- (l) Raise the hoist and position and lower the turbine wheel over the LP drive shaft. Align the datum holes, then lower the wheel onto the hub engaging the Hirth serrations. Release the thumbnuts of the lifting fixture, then turn the tommy bars to the 'UNLOCK' position. Raise the hoist, then position and lower the fixture onto a suitable container and disconnect the hoist.
- (m) Examine the rear ring labyrinth seal (72-51-04/1-160A) rear face, inboard of the attachment bolt holes, for a datum mark $\rightarrow \bigcirc$ indicating the datum hole. Offer the rear labyrinth over the

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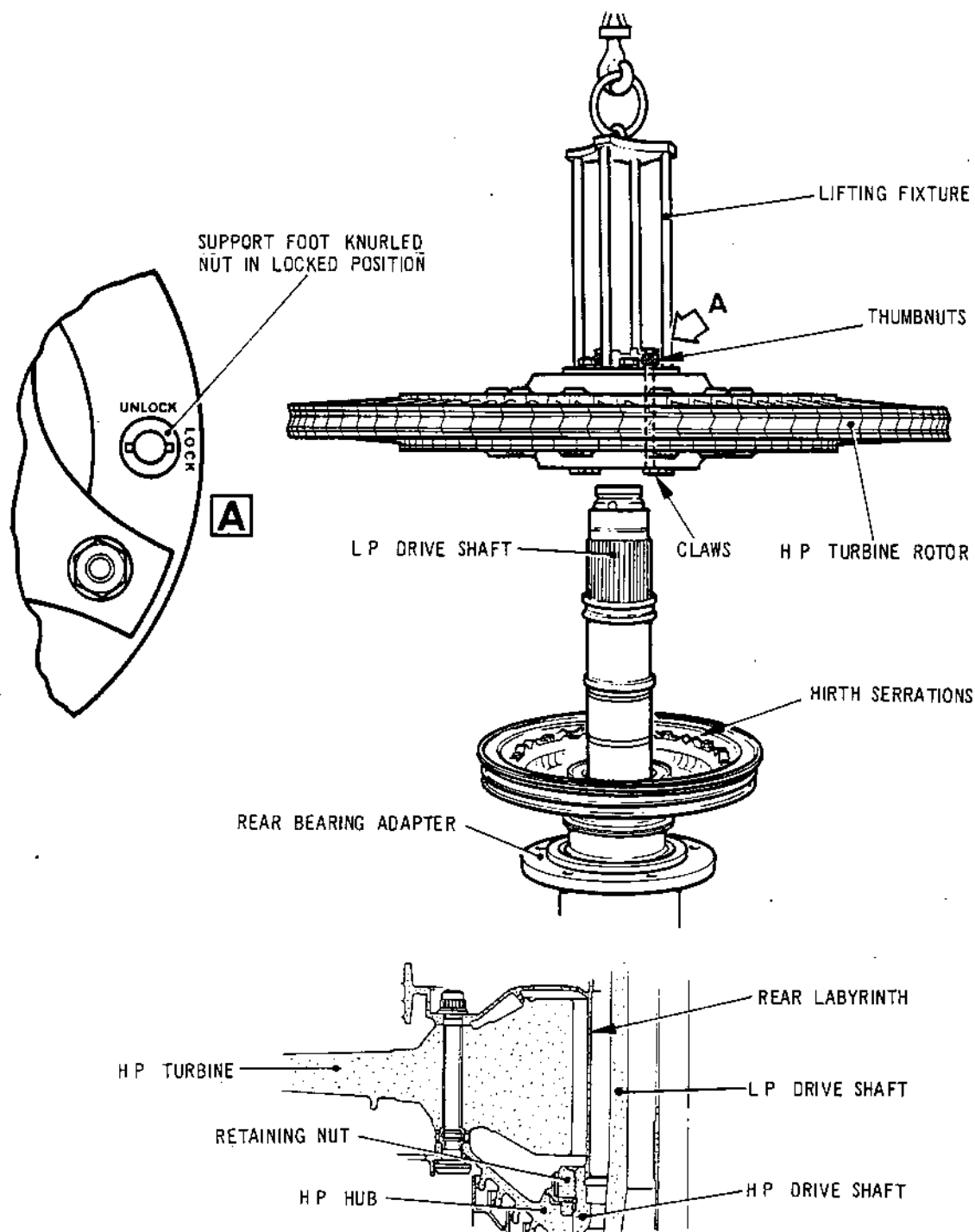
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Assembling HP Turbine Wheel Unit to HP Hub
Figure 114

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lp drive shaft, align the datum holes of the labyrinth and turbine wheel, then rest the labyrinth on the wheel. Turn the rotor to align the datum bolt hole in the labyrinth/hub with the cut-away in the rear bearing adapter. Examine the heads of the turbine bolts (72-51-04/1-180B) for the position numbers, then insert No.1 bolt through the labyrinth/hub, turbine wheel and rear labyrinth and secure with a self-locking nut (72-51-04/1-120A) lubricated with lubricant 'B'. Insert the remaining nine bolts in numerical sequence in a clockwise direction (as viewed from the rear) by turning the rotor to align the bolt holes with the cut-away, and secure the bolts with the nuts, having lubricated them with lubricant 'B'.

- (n) Engage the immobilizer (Tool 1339) in the HP drive shaft front retaining nut and secure by screwing in the three knurled headed bolts (Tool 1341). Tighten the turbine wheel nuts in the following sequence 1, 6, 3, 8, 2, 7, 4, 9, 5 and 10 in progressive increments to a final torque between 80 and 90 lbf ft (108,5 and 122,0 N.m).
- (p) Assemble the split sleeve (Tool 393) to the LP drive shaft and HP turbine rear labyrinth. If the balance is not to be carried out immediately, ensure that the protector (Tool 1062) is assembled to the hub labyrinth, and the protectors (Tool 1061, 1063 and 1126) are assembled to the turbine front and rear labyrinths and the turbine blades.

NOTE: The HP compressor and turbine assembly is now ready for balancing and for concentricity and swash checks.

C. Prepare the Balancing Machine (Avery 72N56)(Ref.Fig.115).

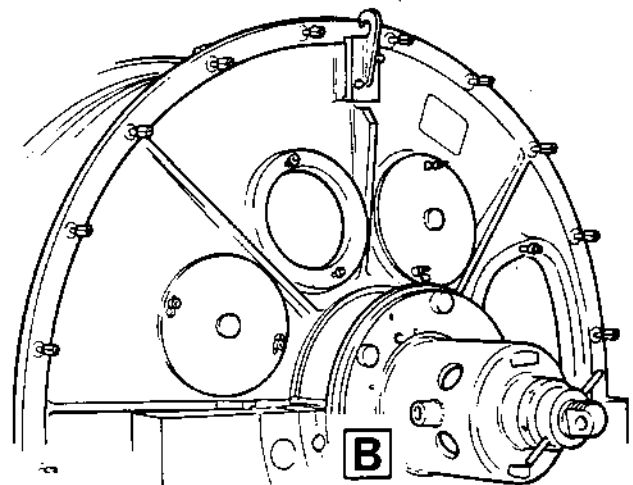
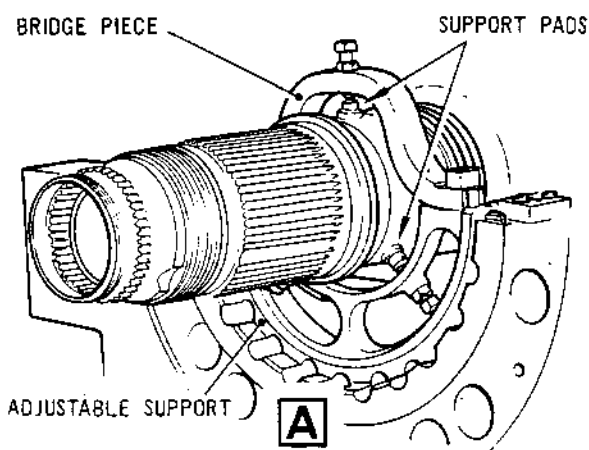
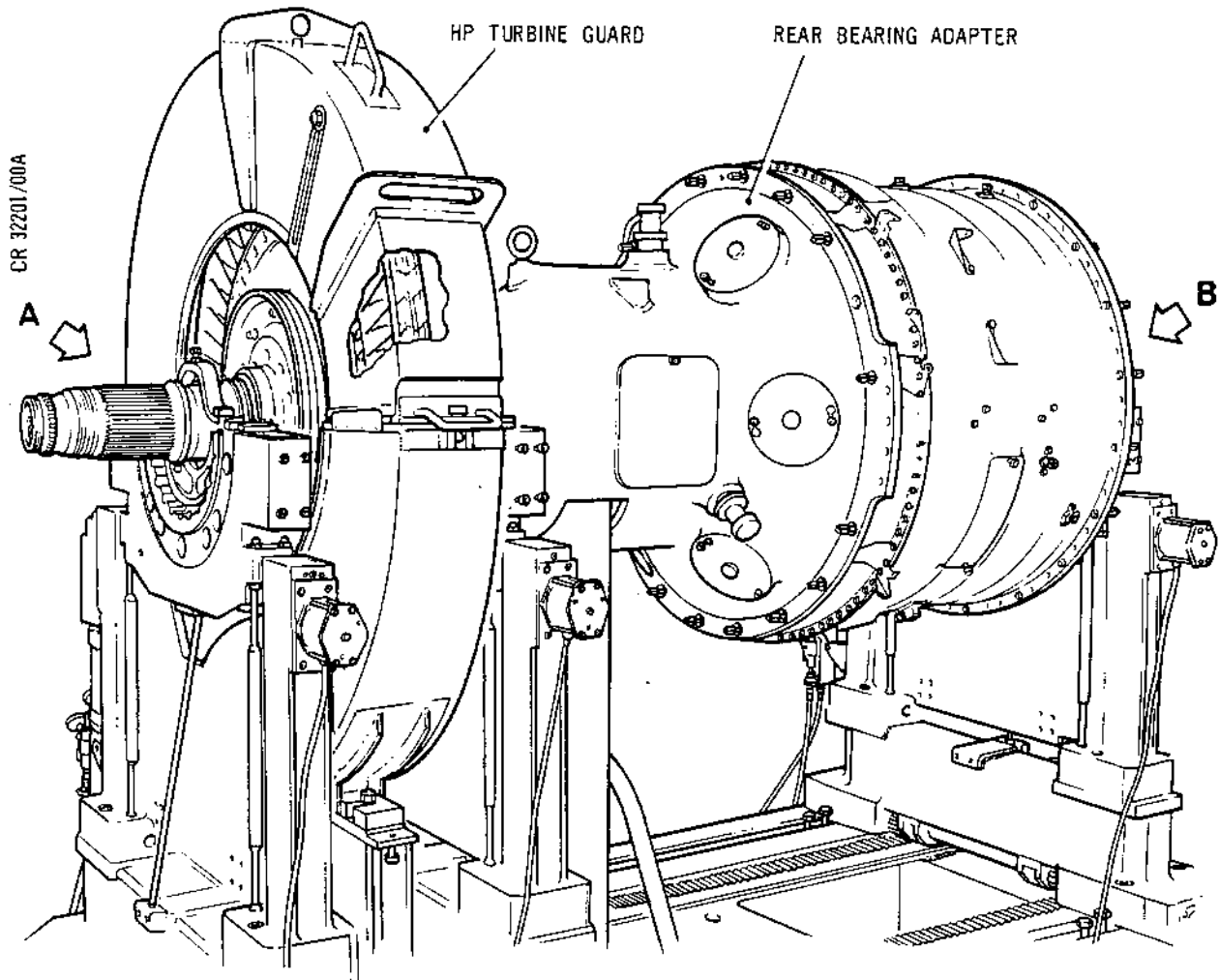
- (1) Assemble a spacer (Tool 1075) to the left-hand and centre cradles of the machine, and spacer (Tool 1074) to the right-hand cradle. Assemble clamp plates to each cradle to secure the spacers.
- (2) Assemble the adjustable support (Tool 1090) to the spacer in the left-hand cradle so that the hinged bridge piece opens away from the operator. Assemble clamp plates to the spacer to secure the support, then open the bridge piece. Ensure that the three support pads are withdrawn.

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Assembling HP Compressor and Turbine Assembly to
Balancing Machine
Figure 115

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- (3) Assemble and (temporarily) secure two brackets (Tool 1291) to the bed of the machine in between the left-hand and centre cradles. Position the bottom half of the turbine guard (Tool 1303) on the two brackets, then locate the bracket/guard securing studs in the slots in the guard brackets and secure with washers and nuts.

D. Assemble the HP Compressor and Turbine Assembly to the Balancing Machine (Ref.Fig.115).

- (1) Rotate the pit stand arms 90 deg with the lifting eyes on the front and rear adapters uppermost. Attach a hoist to the roller of the beam type sling (Tool 1056) (Ref.Fig.116), then raise the hoist and position the beam over the HP compressor assembly. Ensure that the strop is shackled to the upper hole in the end plate, and the single leg sling (Tool 1394) is shackled to the bracket at the other end of the beam. Attach the strop/sling to the rear bearing adapter eye and the front bearing adapter plate with the shackles. Position the beam lifting roller towards the turbine wheel end of the beam, or as marked on the beam.
- (2) Raise the hoist to tension the strop/sling, then unscrew and remove the nuts and washers securing the adapter to the pit stand arms. Adjust the position of the beam lifting roller to support the assembly in the horizontal position. Traverse the hoist to disengage the adapter from the locating pins of the arms. Raise the hoist taking care to guide the assembly out of the stand.

NOTE: If the HP compressor is to be assembled direct to the balancing machine by hoist proceed as detailed in para.(8) onwards. If, however, the availability of the balancing machine entails a delay before the HP compressor is balanced, but the pit stand is required for other use, or the position or availability of equipment prevents the HP compressor from being assembled direct to the machine, the HP compressor can be assembled to the mobile stand or support stands as follows (Ref.Fig. 116).

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- (3) Position the assembly over the front support (Tool 1076) and rear support (Tool 1306), then lower the assembly engaging the front bearing support lugs in the front support and the recessed part of the rear bearing adapter in the rear support. If the assembly has to remain on the support stands for a period, or has to be assembled to the mobile stand, release the beam type sling and lower it to the floor.

NOTE: When the assembly is required for assembling to the balancing machine, remove it from the supports and assemble it to the machine as detailed in para.(6) onwards.

NOTE: If the assembly requires transporting in the mobile stand, assemble it to the stand as detailed in para.(4).

- (4) Close and secure the front support locking bars, then screw the lifting fixture (Tool 1055) onto the end of the LP drive shaft and attach a hoist to the fixture. Moving the hoist as necessary, raise the rear end of the assembly, pivoting about the front support, until the assembly is vertical. Release the front support locking bars, then raise the hoist and position it over the mobile stand (Tool 1036). Ensure that the stand clamps are clear, align the lifting eye and attachment nuts of the adapter with the stand cut-aways, then lower the assembly onto the stand. Secure the adapter to the stand with the stand clamps. Release the hoist.

NOTE: When the assembly is required for assembling to the balancing machine, remove it from the mobile stand and assemble it to the machine as detailed in para.(5) onwards.

- (5) Attach a hoist to the lifting fixture, then release the mobile stand clamps and raise the hoist and position the assembly over the front support (Tool 1076). Lower the assembly engaging the lugs of the front bearing support in the front support, then close and secure the front support locking bars. Moving the hoist as necessary, lower the rear end of the assembly, pivoting about the support, and rest the recessed part of the rear bearing adapter on the rear support (Tool 1306), ensuring that the lifting eye and plate of the adapters are uppermost. Release

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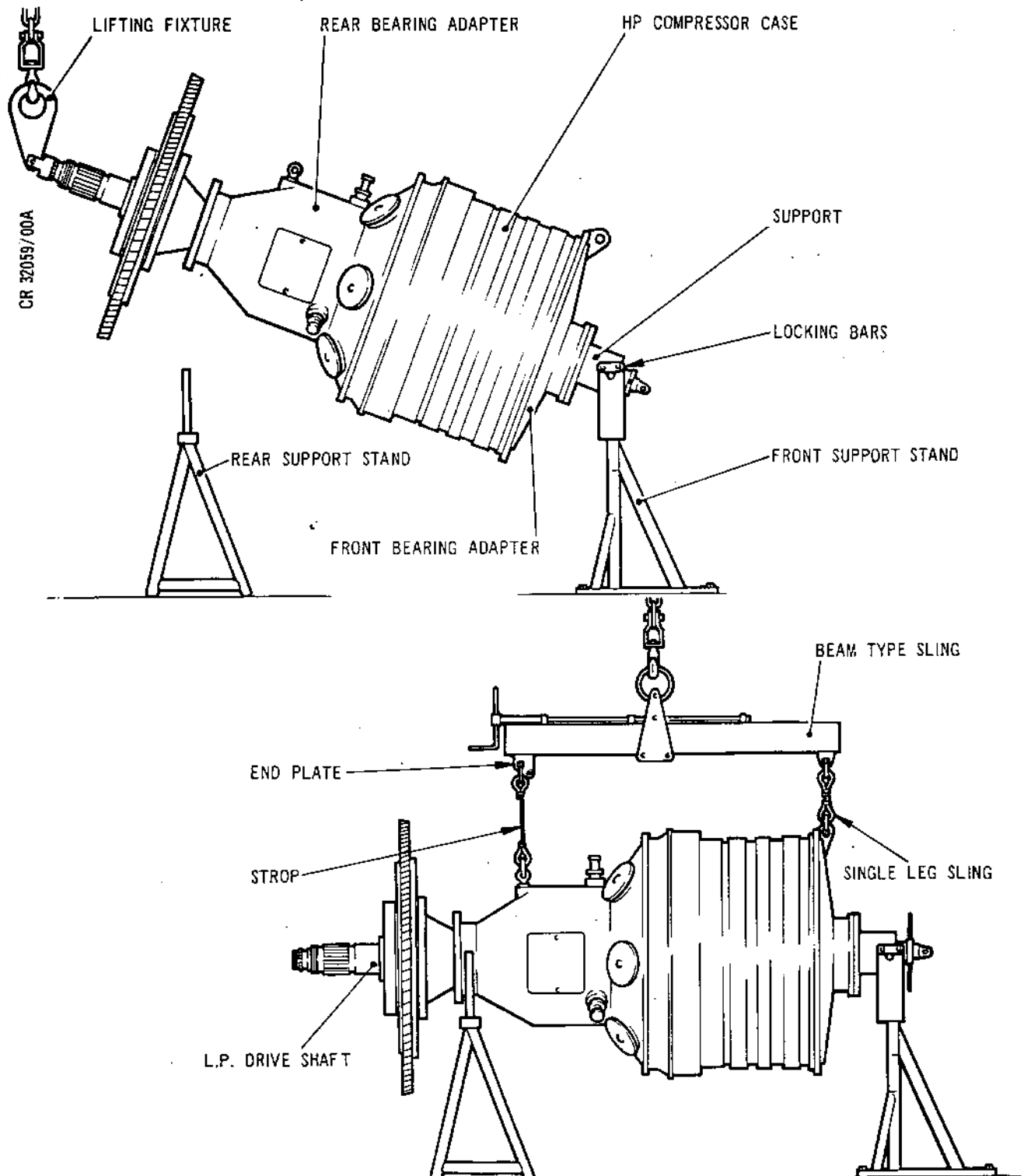
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Assembling HP Compressor Assembly to Front and Rear Supports
Using Beam Type Sling
Figure 116

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the hoist, then unscrew and remove the lifting fixture from the LP drive shaft.

CAUTION: ENSURE THAT THE LIFTING FIXTURE (TOOL 1055) PLATE PIVOTS AS THE ASSEMBLY IS LOWERED.

- (6) Attach a hoist to the roller of the beam type sling (Tool 1056) then raise the hoist and position the beam over the HP compressor. Ensure that the strop is shackled to the upper hole in the end plate, and the single leg sling (Tool 1394) is shackled to the bracket at the other end of the beam. With the shackles remove from the bottom of the strop and single leg sling, attach the strop/sling to the rear bearing adapter eye, and the front bearing adapter plate with the shackles. Position the beam lifting roller towards the turbine wheel end of the beam, or as marked on the beam.
- (7) Raise the hoist and adjust the position of the beam lifting roller (if necessary) to support the assembly in the horizontal position.
- (8) Remove the protectors (if assembled) from the hub labyrinth, turbine front and rear labyrinths and turbine blade tips.
- (9) Position the assembly over the balancing machine with the front bearing adapter at the right-hand side (Ref. Fig.115). Position the balancing machine cradles to align with the recessed portion in each adapter and the plain portion of the LP drive shaft, then lock the cradles. Release the guard brackets, then position the guard and brackets to align with the turbine wheel. Secure the brackets and guard. Steadily lower the assembly and guide the adapter recesses onto the cradle spacers, then assemble clamp plates to each spacer to secure the adapters. Close and secure the bridge piece, then adjust in on the three support pads until they abut the LP drive shaft. Lock the support pads with their locknuts. Release and remove the beam type sling from the HP compressor, then position and lower the sling onto a suitable surface and disconnect the hoist.

NOTE: Unless already indicated, it is recommended that the beam type sling is painted to indicate the position the lifting roller should be in with the HP turbine assembled, and which end of the beam is positioned over which adapter.

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- (10) Align the balancing machine motor and rollers with the belt protruding from the cut-away of the rear bearing adapter, assemble the belt to the motor/rollers and adjust as necessary to operate correctly, then secure the motor/rollers.
- (11) Attach a strip of black adhesive tape around the HP drive shaft, clear of the belt, but within the area of the cut-away in the rear bearing adapter. Mark the adhesive tape with a white spot in line with the datum bolt hole of the turbine wheel (Ref. para. B. (2), (k)), and chalk mark a line on the drive shaft which must remain for future use. Use the spot as the datum for balancing.
- (12) Assemble a tie bar (Tool 1292) to the front face of the left-hand and centre cradle of the balancing machine, and secure with four bolts or Allen screws, then secure a tie bar (Tool 1293) to the rear face of the left-hand and centre cradle.
- (13) Release and remove the split sleeves from the LP drive shaft, then using a hoist, assemble and secure the top half of the turbine guard (Tool 1303) to the bottom half of the guard.
- (14) Unscrew and remove the three knurled headed bolts (Tool 1341) securing the immobilizer (Tool 1339) in engagement with the HP drive shaft front retaining nut, then screw the three knurled headed nuts (Tool 1340) onto the protruding ends of the immobilizer studs. Fully tighten the nuts to hold the immobilizer out of engagement with the retaining nut and permit the HP compressor and turbine to turn.
- (15) Prepare the balancing machine for balancing in accordance with the manufacturers instructions, setting up the pick-ups, nodel bar, pick-up wires and scanning head etc.
- E. Check Balance of HP Compressor Rotor and Turbine Assembly (Ref. Fig. 117).
- (1) Start the balancing machine and run the assembly up to balancing speed in accordance with the manufacturers instructions.

NOTE: 1 drm in. = 45 g mm.

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- (2) Allow the assembly to rotate long enough to eliminate the effects of differential temperature on the readings obtained, then calibrate the machine and continue to rotate the assembly until the change in the mean average readings of unbalance at F and T3 over a period of three minutes are less than 2 drm in.
- (3) Calibration checks.
 - (a) The application of 4 drms of plasticine to the HP drive shaft 9 in. (228,6 mm) rearward of Rc should register approximately 9 drm in. at F and 33 drm in. at Rc 180 deg from the reading at F.
- (4) Record the 'as received' amount and angle of unbalance at F and T3.
- (5) Remove the balance weights at T3.
- (6) Rotate the assembly and record the amount and angle of unbalance at F and T3.
- (7)
 - (a) Changes of unbalance within the limits of 150 drm in. at F and 80 drm in. at T3 proceed to para.5.A.
 - (b) Changes in excess of limits quoted are to be investigated.

4. Prepare and Check the Concentricity and Swash of the HP Compressor and Turbine Assembly

- A. Prepare the Surface Table Equipment for Checking the Concentricity and Swash (Ref.Fig.118).

NOTE: If the availability of equipment entails using the spacers used for the balancing, remove the HP compressor from the balancing machine and place on the support stands (Ref.para.B. (1) to (4) and para.3.D. (3) to (8)), then release and remove the spacers from the machine and assemble the spacers to the surface table.

- (1) Position two supports (Tool 1073) on the surface table.
- (2) Assemble a spacer (Tool 1074) to one support and spacer (Tool 1075) to the remaining support. Assemble clamp plates to each support to secure the spacers.
- (3) Position the jack (Tool 1059) on the surface table.

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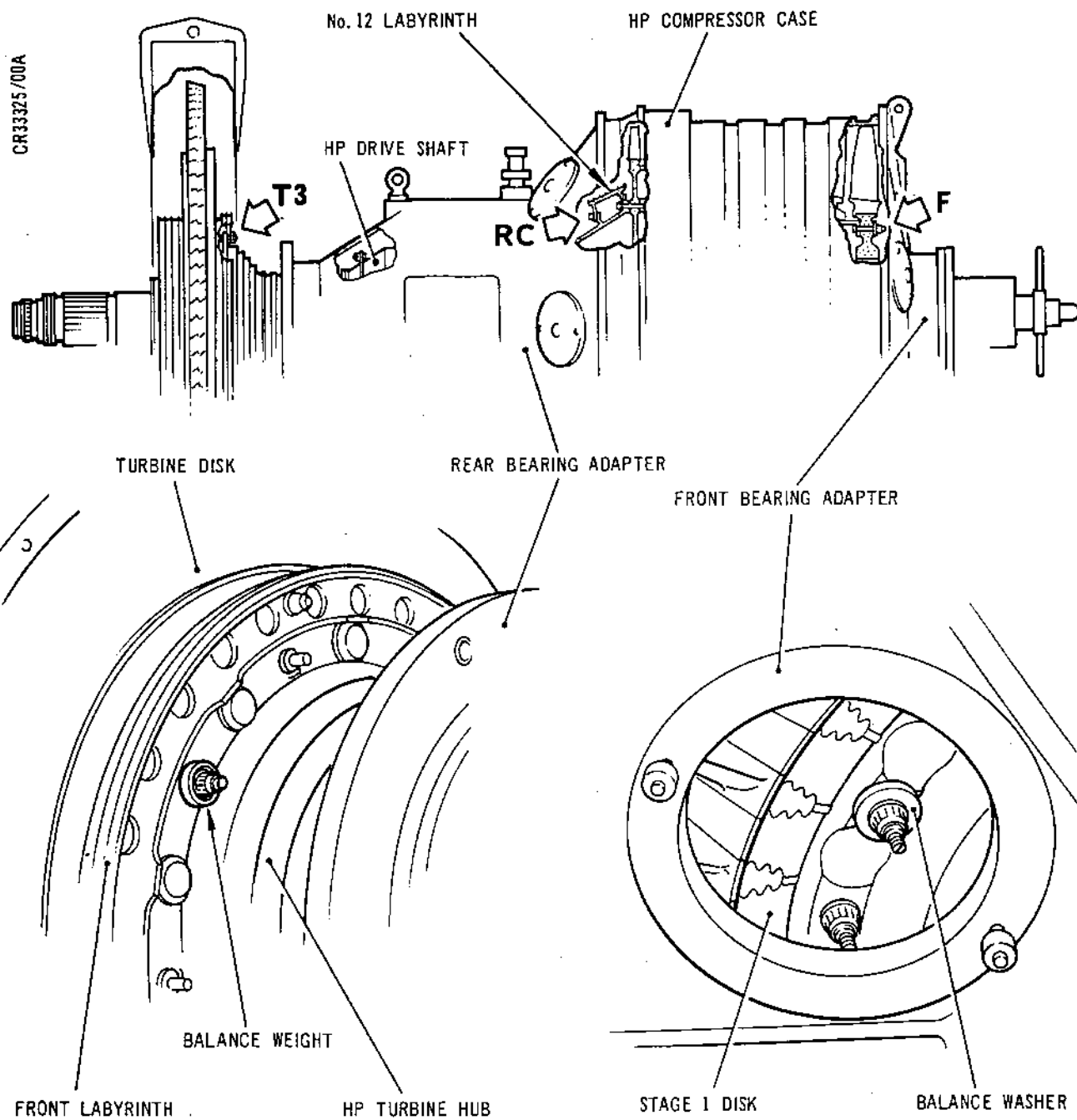
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VIEW AT **T3**

VIEW AT **F**

Positions of Balancing Washers on HP Compressor and
Turbine Assembly
Figure 117

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B. Remove the HP Compressor and Turbine Assembly from the Balancing Machine and Assemble to the Surface Table.

- (1) Remove the top half of the guard (if assembled) from around the turbine wheel, then assemble the split sleeves (Tool 393) to the LP drive shaft and HP turbine rear labyrinth. Release and hinge open the bridge piece of the adjustable support (Ref.Fig.115).
- (2) Release and remove the drive belt from the motor and rollers, and secure the belt clear of the machine to prevent possible fouling. Remove the black adhesive tape from the HP drive shaft.
- (3) Attach a hoist to the roller of the beam type sling (Tool 1056), then raise the hoist and position the beam over the HP compressor. Ensure that the strop is shackled to the upper hole in the end plate, and the single leg sling (Tool 1394) is shackled to the bracket at the other end of the beam. Attach the strop/sling to the rear bearing adapter eye and the front bearing adapter plate with the shackles. Position the beam lifting roller towards the turbine wheel end of the beam, or as marked on the beam.
- (4) Release and remove the clamp plates from the spacers. Raise the hoist and adjust the position of the beam lifting roller (if necessary) to support the assembly in the horizontal position. Steadily raise the hoist until the HP compressor is clear of the balancing machine.

NOTE: If the availability of the surface table entails a delay before the HP compressor can be assembled to the table, but the balancing machine is required for other use, or the position or availability of equipment prevents the HP compressor from being assembled direct to the table, the HP compressor can be assembled to the mobile or support stands as detailed in para.3.D. (3) to (8).
- (5) Position the HP compressor over the surface table. Ensure that the supports on the surface table are aligned with the recessed portion in each adapter, and that the supports are secured to the surface table. With the front bearing adapter located over the spacer (Tool 1074), lower the assembly and guide the adapter recesses onto the spacers, then assemble clamp plates to each spacer to secure the adapters. Release and remove the beam type sling from the adapters, then

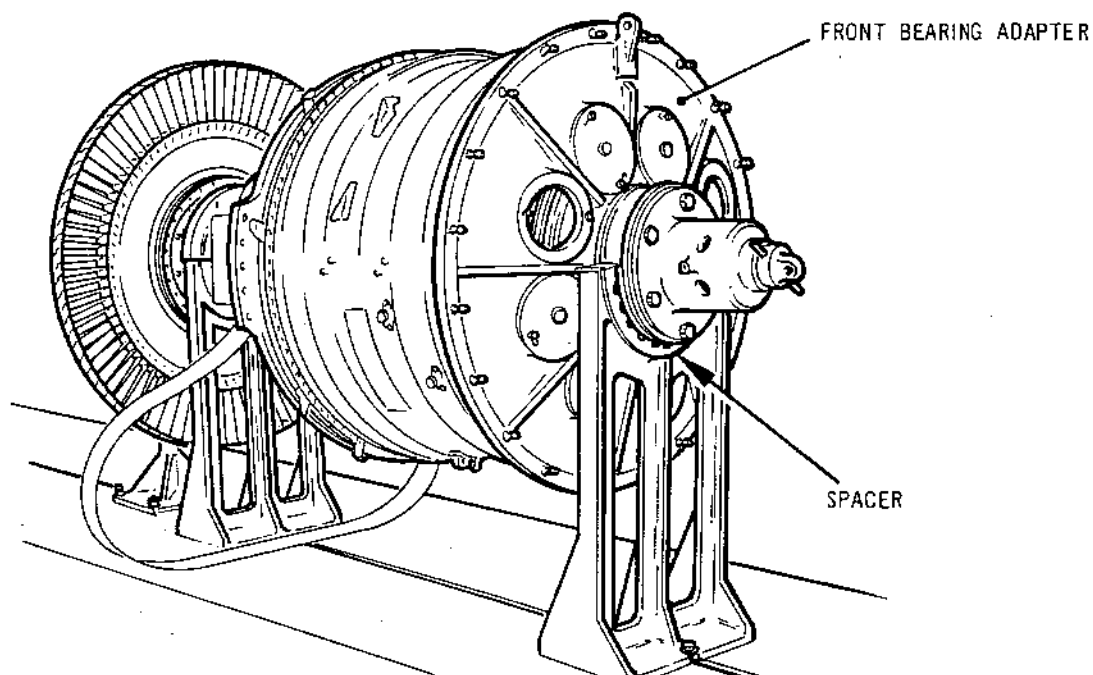
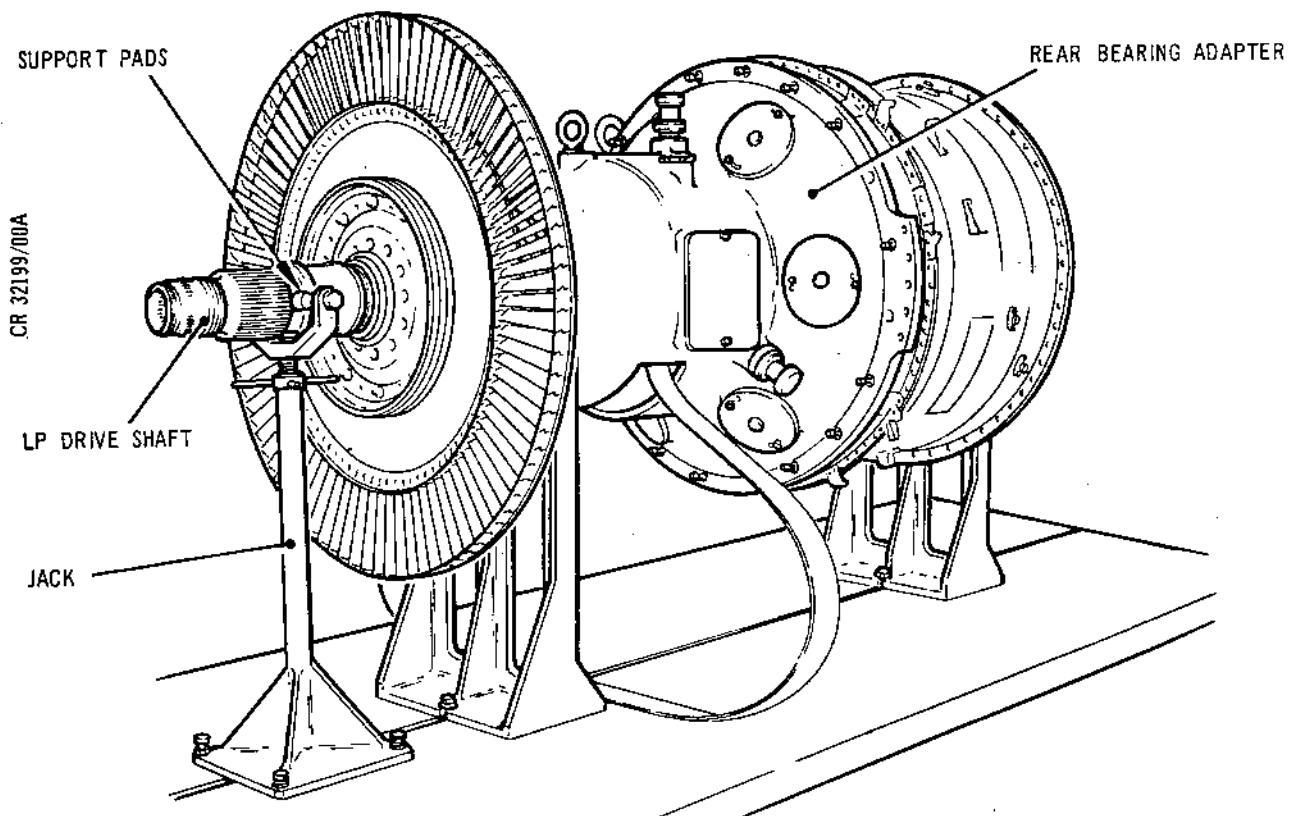
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Assembling HP Compressor and Turbine Assembly to Surface Table
Figure 118

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lower the beam onto a suitable container and release the hoist. Position the jack (Tool 1059) under the LP drive shaft, at a plain portion of the shaft, then adjust in on the three support pads until they abut the shaft. Release and remove the split sleeves (Tool 393) from the LP drive shaft turbine labyrinth.

C. Check the Concentricity and Swash of the HP Compressor and Turbine Assembly (Ref.Fig.119).

- (1) The procedure for checking the swash and concentricity is as follows.
 - (a) Remove the access panels from the front bearing adapter to check the positions at the front end of the rotor, and the large access panel from the rear bearing adapter to check the positions at the rear end of the rotor.
 - (b) Select suitable surface blocks, stands and dial gauge equipment for the position to be checked, then engage the dial gauge with the item, ensuring that the gauge is in its mid travel position, and where possible, engaged at the top vertical position.
 - (c) Identify the datum bolt hole of the HP turbine wheel (Ref.para.3.D.(11)) by the chalk mark on the shaft. Use the datum mark as the common angular datum line.
 - (d) Turn the rotor to position the datum line at the top vertical position; then position and lock the dial gauge scale to (zero) '0'.
 - (e) Turn the rotor in a clockwise direction as viewed from the rear, and record the swash or eccentricity at eight equi-spaced angular positions. Ensure that when the rotor returns to its starting point, the gauge returns to '0'. If the gauge does not return to '0', check the equipment to ensure there is no looseness and that the gauge is locked, then recheck until a satisfactory result is achieved.
 - (f) When swash checks entail the dial gauge pointer passing over blade roots, care must be taken to ensure that the gauge setting is not altered.

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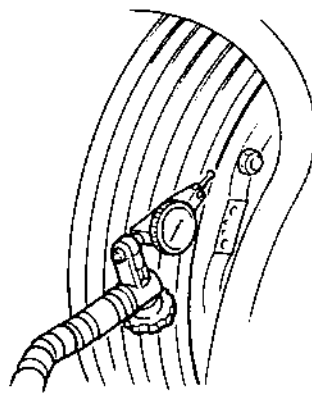
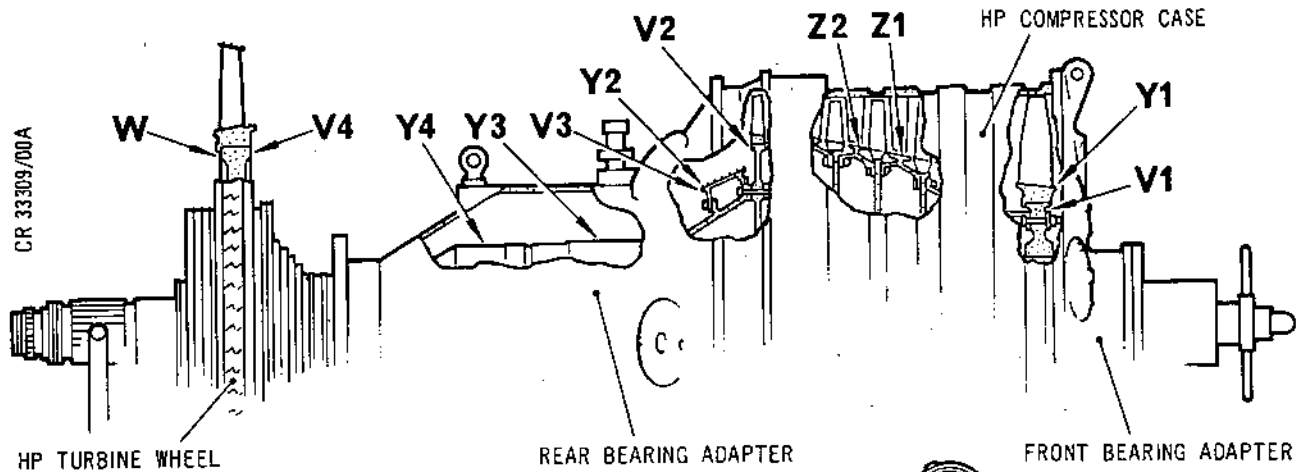
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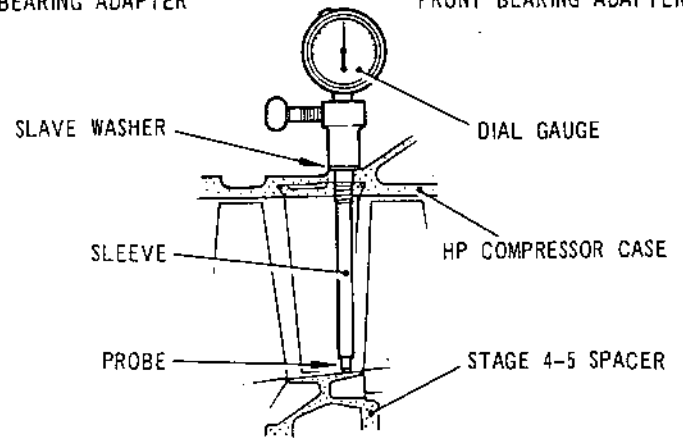


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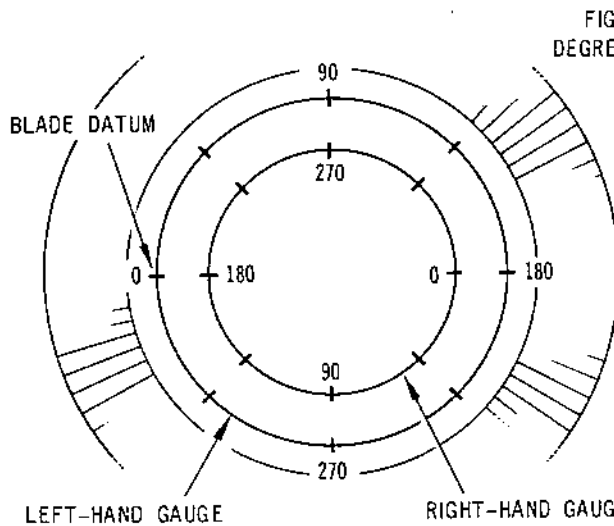
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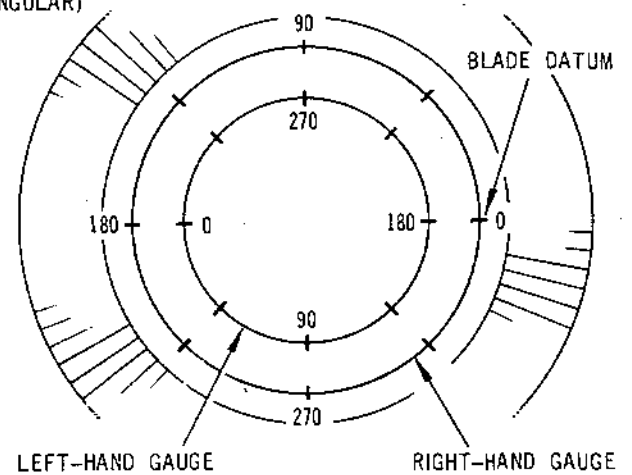
TYPICAL SWASH CHECK



TYPICAL CONCENTRICITY CHECK



VIEW ON **W**



VIEW ON **V4**

Checking Swash and Concentricity of the HP Compressor
and Turbine Assembly
Figure 119

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- (g) On completion of the checks replace and secure the panels.
- (2) Check and record the amount of swash and eccentricity as detailed in para.(1) at the following positions.
 - (a) The eccentricity at the rear land of the rear (No.12) labyrinth (position Y2).
 - (b) The eccentricity at the mid position of the HP drive shaft (position Y3).
 - (c) The eccentricity at the rear end of the HP drive shaft (position Y4).
 - (d) The swash at the stage 7 disk at the blade root location (position V2).
 - (e) The swash at the rear land of the rear (No.12) labyrinth (location V3).
 - (f) The swash at the stage 1 disk at the blade root (position V1).
 - (g) The eccentricity at the stage 1 disk at the blade lip (position Y1).
- (3) The eccentricity at position Z1 and Z2 as follows.
 - (a) Remove the rear bolt and spacer from the bolted vane at the top of the compressor case at the stage 3 vane location.
 - (b) Remove the checking gauge (Tool 1) from its container (Tool 90) and slide the probe out of the sleeve. Ensure that a slave washer is assembled to the sleeve, then screw the sleeve into the hole in the case and fully tighten the sleeve.
 - (c) Insert the probe into the sleeve, then insert the dial gauge indicator into the sleeve and secure it in the sleeve with the wing screw, ensuring that the gauge is in its mid travel position.
 - (d) Check the amount of eccentricity at stage 3-4 spacer ring (position Z1) as detailed in para.(1), (c) to (e).

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- (e) Release and remove the dial gauge indicator, then unscrew and remove the gauge sleeve and washer. Stow the gauge in its container. With the sleeve (2-20) assembled to the bolt (2-10) screw the bolt into the case and torque-tighten the bolt between 60 and 65 lbf in. (6,8 and 7,3 N.m). Wire-lock the bolt to the other stator vane securing bolt.
- (f) Check the amount of eccentricity at stage 4-5 spacer ring (position Z2) by removing the rear bolt and spacer from the bolted vane at the left-hand side of the compressor case at the stage 4 vane location. Using the check gauge (Tool 2) follow the procedure as detailed in para.(b) to (d).
- (4) Measure swash of the HP turbine wheel, front face at position V4 and rear face at position W (Ref.Fig.119).
- (a) The checks entail the use of two dial gauges, for each face, and readings are taken simultaneously at the left and right-hand sides of the wheel.
- NOTE: Before carrying out swash checks it is recommended that both front and rear faces are chalked up as in Fig.119, using the wheel datum as zero.
- (b) Swash at rear face, position W.
- (i) With both dial gauges set to zero, and each positioned at its own wheel zero turn the wheel counter-clockwise, looking from the rear and record both dial readings at each of the eight angular positions. Ensure that on returning to the start position both gauges again read zero.
- (ii) For each gauge add the two largest readings to record the maximum TIR and angle.
- (iii) Total swash for rear face is recorded as the mean average of TIR readings from left and right-hand gauges and at the mean average of both angles.
- (c) Swash at front face, position V4, repeat the procedure described for position W.



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- (d) Should the TIR of swash be greater than 0.005 in. (0,127 mm) remove the HP turbine assembly from the HP compressor assembly (ref.para.D) and carry out an investigation.
 - (5) The total indicator reading (TIR) of swash at positions V1, V2, V3, V4 and W should not exceed 0.005 in. (0,127 mm). Amounts of eccentricity can be compared with those recorded at engine build and should be in the region of 0.004 in. (0,1016 mm) maximum.
 - (6) Assemble the split sleeves (Tool 393) to the LP drive shaft and HP turbine rear labyrinth.
- D. Remove the HP Compressor and Turbine Assembly from the Surface Table.
- (1) Attach a hoist to the roller of the beam type sling (Tool 1056), then raise the hoist and position the beam over the HP compressor. Ensure that the strop is shackled to the upper hole in the end plate, and the single leg sling (Tool 1394) is shackled to the bracket at the other end of the beam. Remove the shackles from the bottom of the strop and single leg sling, then attach the strop/sling to the rear bearing adapter eye, and the front bearing adapter plate with the shackles (Ref.Fig.116). Position the beam lifting roller towards the turbine wheel end of the beam, or as marked on the beam.
 - (2) Raise the hoist and adjust the position of the beam lifting roller (if necessary) to support the assembly in the horizontal position.

NOTE: If the availability of the pit stand or its position prevents the HP compressor from being assembled direct (by hoist) into the stand (Ref.para. (3) and (4)), assemble it to the mobile stand as detailed in para.3. D. (3) to (8), then assemble it to the pit stand.

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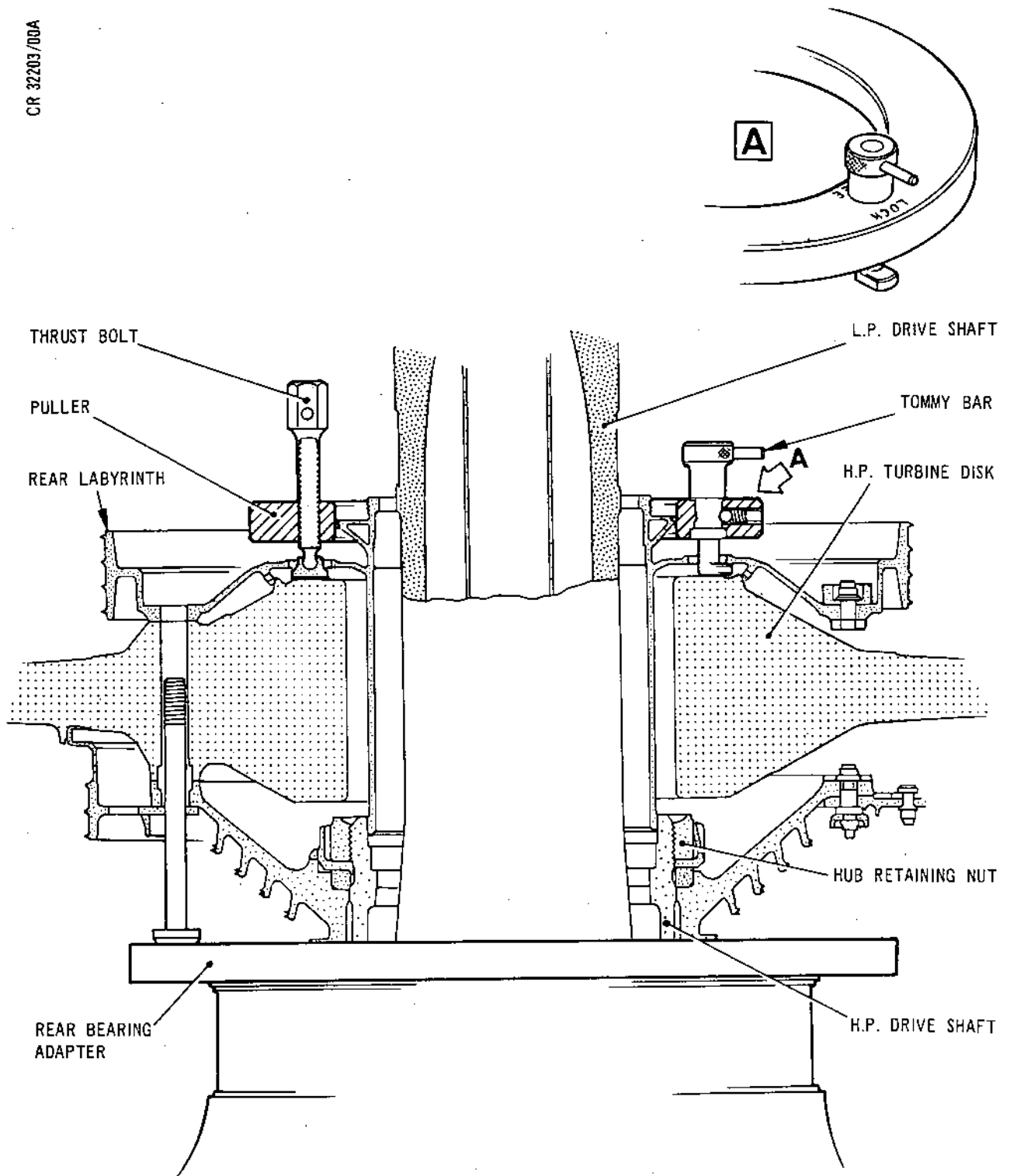
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Removing Rear Labyrinth from HP Turbine Disk
Figure 120

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- (3) Position the assembly above the pit stand (Tool 1027). Position the pit stand arms so that the locating pins/studs are at 90 deg to the vertical, then lower the compressor into the stand so that the front face of the rear bearing adapter flange faces the pins/studs and is level with them. Traverse the hoist and engage the pins/studs into the extensions of the adapter flange, then assemble and fully tighten a washer and nut to each of the studs.
- (4) Release and remove the beam type sling from the adapters, then lower the beam onto a suitable container and release the hoist. Rotate the pit stand arms 90 deg to position the rear bearing adapter uppermost.

5. Remove the HP Turbine Assembly from the HP Compressor Assembly

A. Remove the Rear Labyrinth from the HP Turbine Disk (Ref. Fig.120).

- (1) Release and remove the protector (Tool 1062) from the hub labyrinth (if assembled) then unscrew and remove the 10 nuts securing the labyrinth to the turbine disk and lower the bolts onto the rear bearing adapter flange. Release and remove the split steady (Tool 393) from the labyrinth and the LP drive shaft.
- (2) Ensure that the tommy bars of the mechanical puller (Tool 1247) are turned to 'FREE' and the thrust bolts are unscrewed.
- (3) Offer the puller over the LP drive shaft and guide the claws through the air holes in the labyrinth. Turn the claw tommy bars to 'LOCK', then screw in on the three thrust bolts until they contact the disk. Screw the thrust bolts in, in equal increments, until the labyrinth is released.
- (4) Withdraw the labyrinth/puller over the LP drive shaft and place them on a clean flat surface. Turn the claw tommy bars to 'FREE' and remove the puller from the labyrinth.

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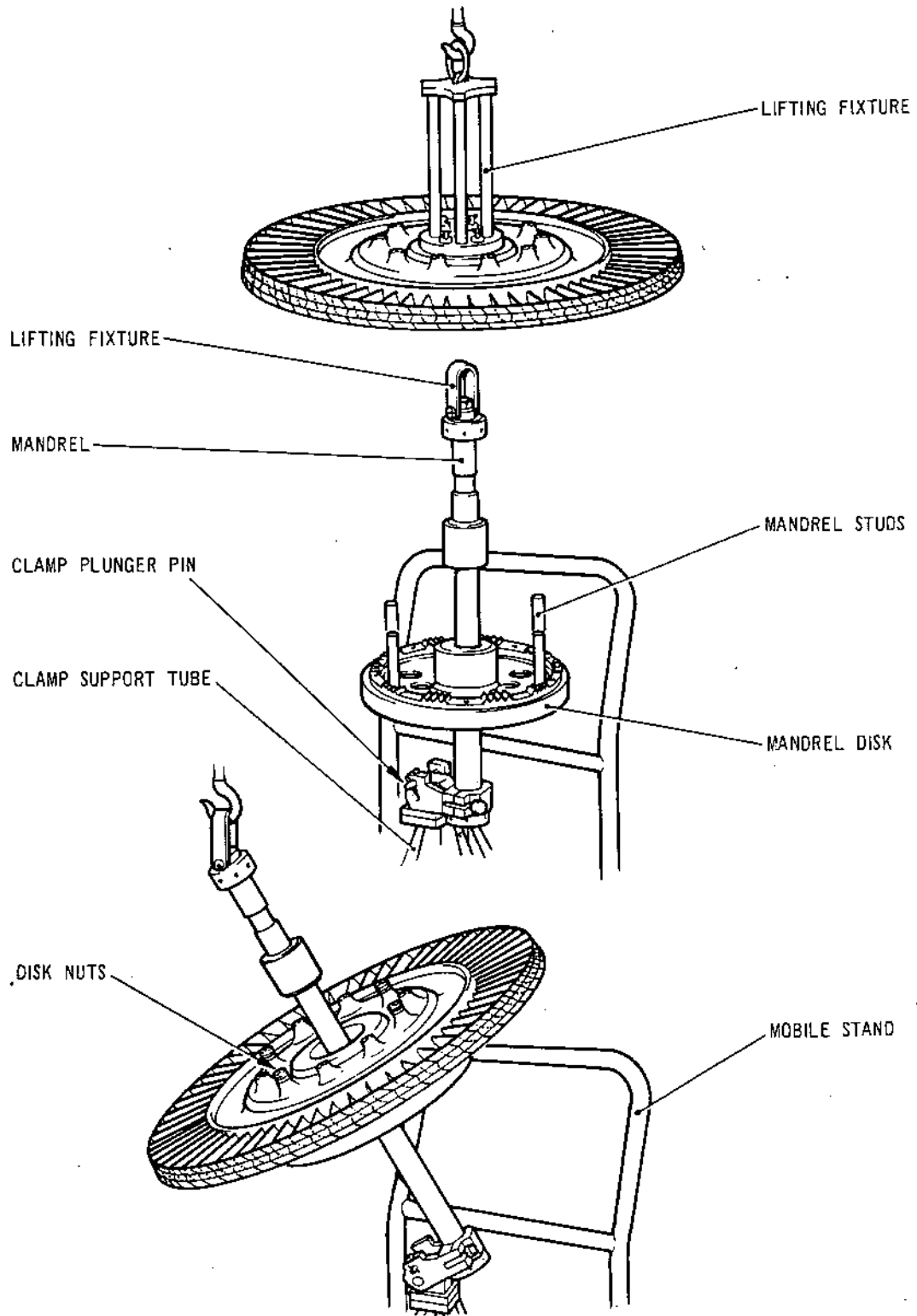
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Assembling HP Turbine Wheel to Mobile Stand
Figure 121

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B. Remove the HP Turbine Wheel from the Hub/Labyrinth Unit
(Ref. Fig.121).

- (1) Ensure that the lifting fixture (Tool 1120) thumbnuts are undone, that the claws are pushed out and the claw tommy bars point to 'UNLOCK'.
- (2) Attach a hoist to the lifting fixture, then lower the fixture over the LP drive shaft and guide the bottom locating ring into the centre hole of the disk, until the top locating ring abuts the disk.
- (3) Turn the tommy bars to 'LOCK' adjusting their position as required to locate them under the disk, then tighten the thumbnuts to lock the claws.
- (4) Steadily raise the turbine disk until clear of the LP drive shaft, then position and lower it onto a suitable pallet (Ref. para.5) or onto its mobile stand (Tool 1111) as follows.
 - (a) Ensure that the mandrel (Tool 139) is assembled to the pivoting bearing side of the mobile stand, with the mandrel secured in the vertical position and the Hirth serrations uppermost. Remove the pin and lower the other side of the stand.
 - (b) Position the disk over the mandrel, then lower the hoist and guide the disk over the mandrel and engage the mandrel studs in the bolt holes of the disk. Screw the special nuts onto the studs and fully tighten the nuts. Screw the lifting fixture (Tool 1113) into the (top) end of the mandrel.
 - (c) Release the lifting equipment thumbnuts, then turn the claw tommy bars to 'UNLOCK'. Steadily raise the hoist until the fixture is clear of the mandrel, then lower the fixture onto a suitable container and remove the hoist.
 - (d) Attach the hoist to the lifting fixture of the mandrel, then withdraw the plunger from the bearing. Lower the hoist and pivot the mandrel about the bearing until the mandrel is nearly horizontal. Raise the side of the stand and lock it with the pin, then lower the lifting fixture end of the mandrel and locate it in the other bearing. Pivot the bearing cap over the mandrel and secure the cap with its pivot bolt and thumbnut. Push in the plunger on the other bearing. Release and remove the hoist.

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- (5) If the turbine disk was placed on a pallet, release the lifting fixture thumbnuts, turn the claw Tommy bars to 'UNLOCK', taking the weight of the disk as required to disengage the claws from under the disk, then withdraw the fixture from the disk. Remove the fixture from the disk and place it on a suitable container.
- C. Remove the HP Turbine Front Labyrinth and Hub Assembly from the HP Drive Shaft (Ref.Fig.122).
- (1) Ensure that the adapter (Tool 1315) is located and secured to the plate of the immobilizer (Tool 1343) and the multiplier (Tool 1022) is secured to the handle end of the immobilizer.
- (2) Lower the spanner wrench (Tool 1085) over the LP drive shaft and locate it in the retaining nut. Attach a hoist to the handle of the immobilizer (Tool 1022), then lower the immobilizer over the spanner and turn the multiplier drive as necessary to engage it in the spanner and to align the immobilizer pillars with the bolts in the hub. Disconnect the hoist from the handle.
- (3) Push the bolts up through the pillars and screw slave nuts onto the bolts, fully tightening the nuts. Insert a bar into the immobilizer, then unscrew the nut.
- (4) Unscrew and remove the nuts and lower the bolts onto the adapter flange. Attach a hoist to the handle, then steadily raise the hoist until the immobilizer is clear of the spanner. Position and lower the immobilizer onto a suitable container, then disconnect the hoist. Withdraw the spanner from the LP drive shaft and place it on a suitable container.
- (5) Unscrew the hub retaining nut, then remove the nut, plain washer and keywasher from the HP drive shaft.
- (6) Attach a hoist to the extractor/lifting equipment (Tool 1057), then steadily lower the extractor over the LP drive shaft until the cylinder engages in the HP drive shaft. Aligning the pillars with the hub bolts, turn the handle to lower the extractor until it abuts the hub. Push the hub bolts up through the pillars, then screw slave nuts onto the five bolts. Withdraw the remaining five bolts by turning the HP drive shaft, as necessary, to remove the bolts through the cut-away in the rear bearing adapter flange.

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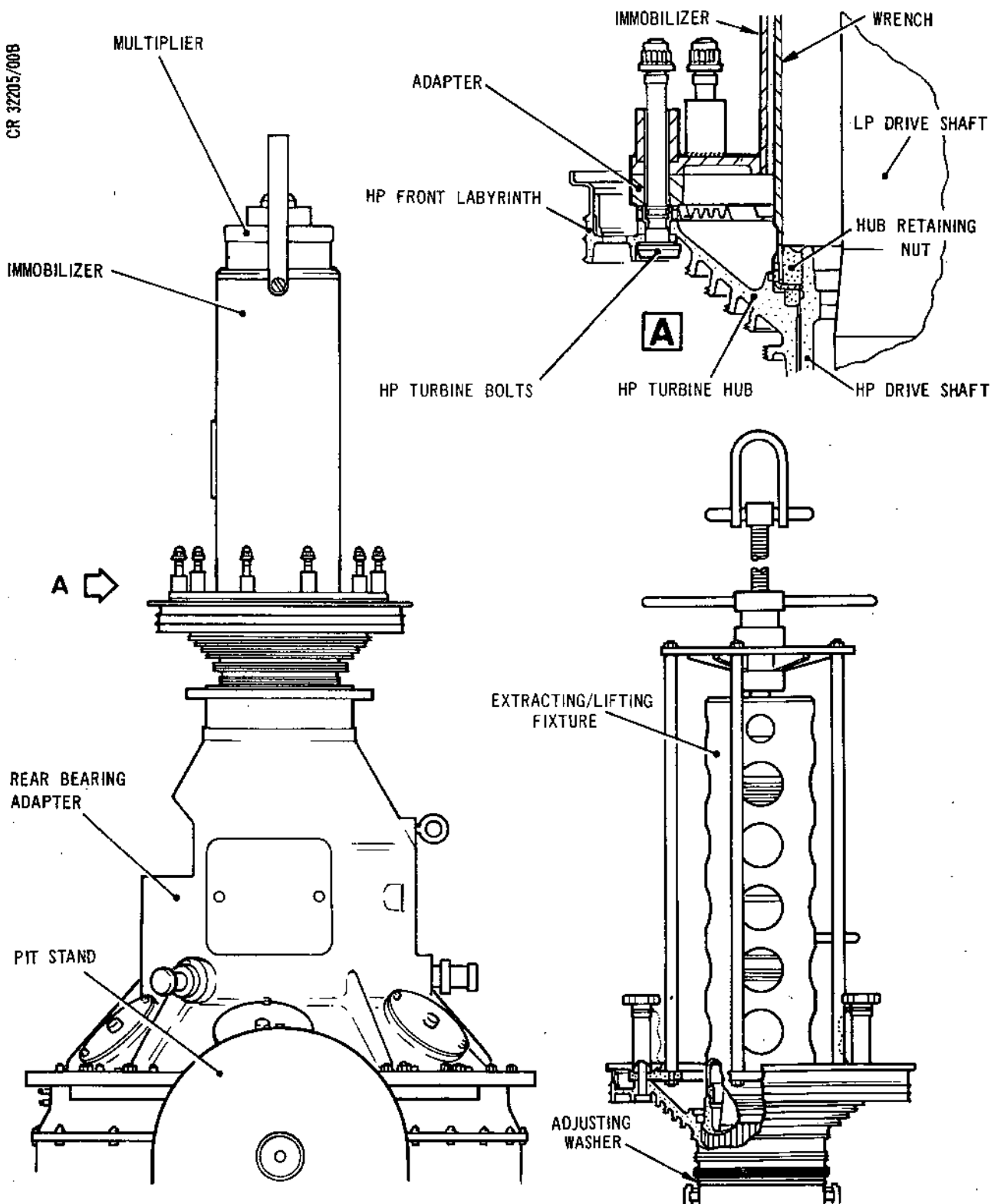


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Removing HP Turbine Hub and Labyrinth
Figure 122

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- (7) Screw in on the extractor handle until the hub/labyrinth is released, then steadily raise the hoist until the hub is clear of the LP drive shaft. Lower the hub onto a clean flat surface. Unscrew and remove the slave nuts, then remove the extractor from the hub and lower it onto a suitable container. Disconnect the hoist.
- (8) Remove the bolts from the hub, then assemble the protector (Tool 1062) to the hub labyrinth.
- (9) Remove the adjusting washer from the HP drive shaft, then place it in a container and retain it with the hub/labyrinth.
- (10) Ensure that the protectors (Tool 1061 and 1063) are assembled to the turbine front and rear labyrinths and the protector (Tool 1126) is assembled to the turbine blades.

NOTE: The HP turbine items should now be transferred to their disassembly section (72-51-03, Disassembly).

- (11) Offer the spacer ring (Tool 414) with its flanged end to the rear (uppermost), over the LP and HP drive shaft and rest it on the bearing inner race. Apply lubricant 'B' to the retaining nut (02/3-10), then screw it onto the HP shaft. Tighten the nut with the hand spanner wrench (Tool 410).
- (12) If the HP compressor is not to be worked on for a period, assemble the split sleeves (Tool 1058) to the HP and LP drive shafts.

6. Prepare and Check Balance of HP Compressor Assembly

A. Prepare the Balancing Machine (Avery 72N56) (Ref.Fig.123).

NOTE: If the equipment was left on the balancing machine following the balance of the HP compressor and turbine assembly, para.A. will not be required, but the bottom half of the turbine guard (Tool 1303) must be released and removed from the balancing machine and the tie bar (Tool 212) from the cradles.

- (1) Assemble a spacer (Tool 1075) to the left-hand and centre cradles of the machine, and spacer (Tool 1074) to the right-hand cradle. Assemble clamp plates to each cradle to secure the spacers.

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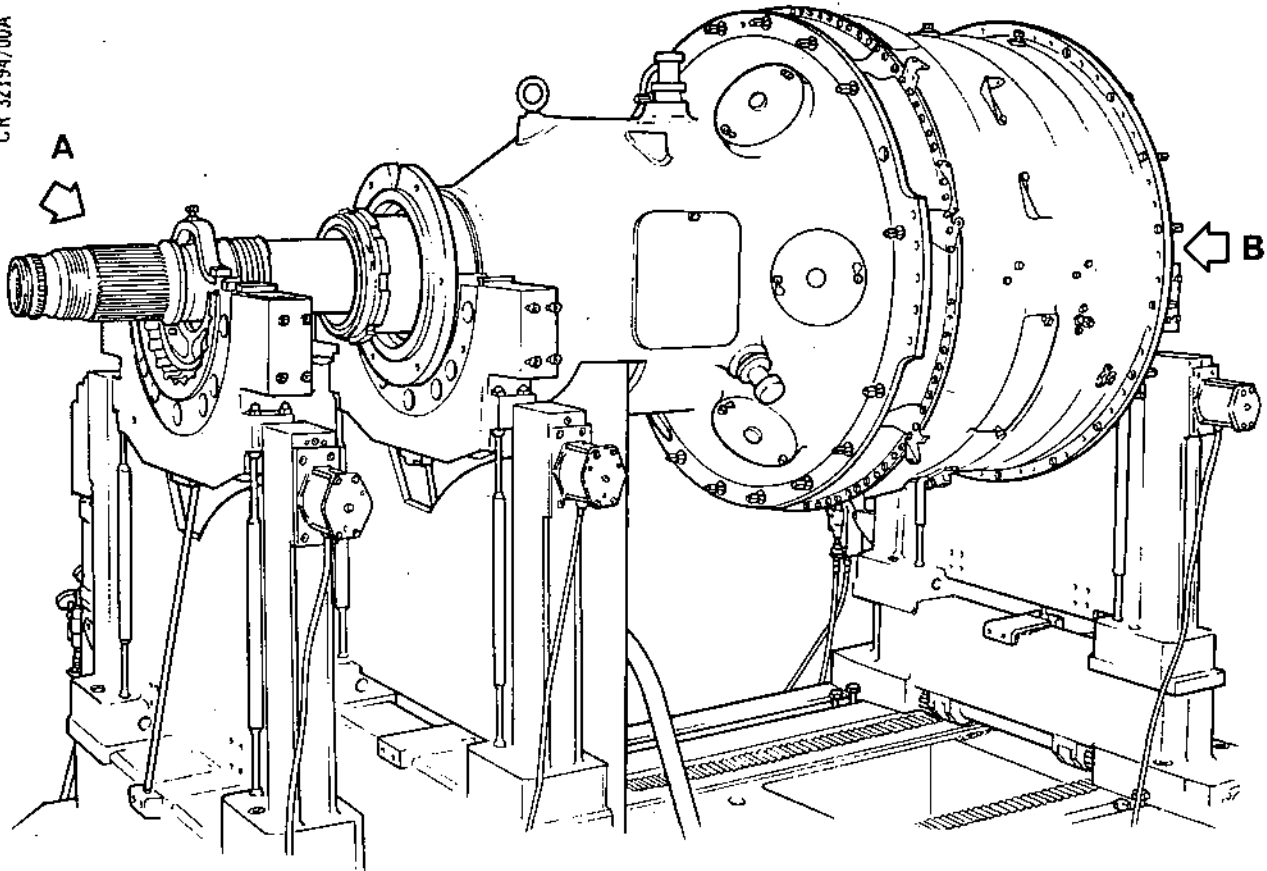


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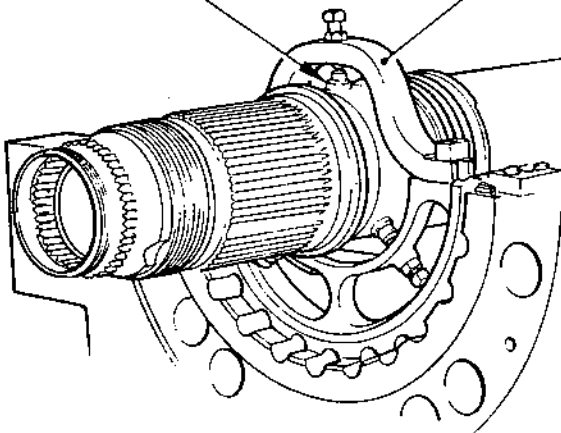


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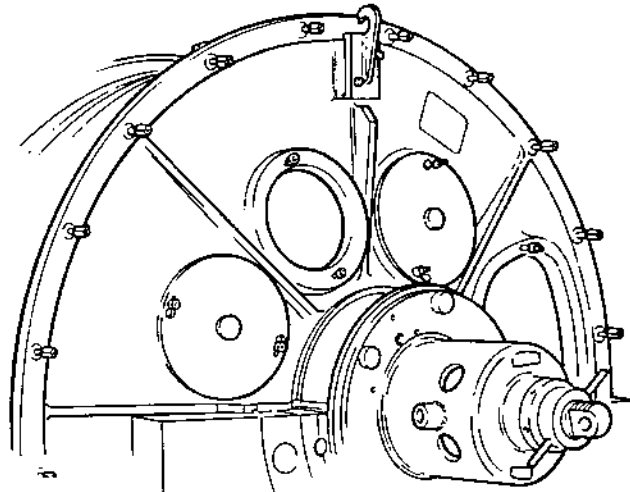


SUPPORT PAD

BRIDGE PIECE



A



B

Assembling HP Compressor Assembly to Balancing Machine
Figure 123

DISASSEMBLY

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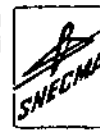
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- (2) Assemble the adjustable support (Tool 1090) to the spacer in the left-hand cradle so that the hinged bridge piece opens away from the operator. Assemble clamp plates to the spacer to secure the support, then open the bridge piece. Ensure that the three support pads are withdrawn.
- B. Assemble the HP Compressor Assembly to the Balancing Machine (Ref.Fig.123).
- (1) Rotate the pit stand arms 90 deg with the lifting eyes on the front and rear bearing adapters uppermost. Attach a hoist to the roller of the beam type sling (Tool 1056), then raise the hoist and position the beam over the HP compressor assembly. Ensure that the strop is shackled to the upper hole in the end plate, then attach the single leg sling (Tool 1394) to the bracket at the other end of the beam with a shackle. Remove the shackles from the bottom of the strop and single leg sling, then attach the strop/sling to the rear bearing adapter eye, and the front bearing adapter plate with the shackles. Position the beam lifting roller to the beam mid position, or as marked on the beam.
- (2) Raise the hoist to tension the strop/sling, then unscrew and remove the nuts and washers securing the adapter to the pit stand arms. Adjust the position of the beam lifting roller to support the assembly in the horizontal position. Traverse the hoist to disengage the adapter from the locating pins of the arms. Raise the hoist taking care to guide the assembly out of the stand.
- (3) Position the assembly over the balancing machine with the front bearing adapter at the right-hand side. Position the balancing machine cradles to align with the recessed portion in each adapter and the plain portion of the LP drive shaft, then lock the cradles. Steadily lower the assembly and guide the adapter recesses onto the cradle spacers, then assemble clamp plates to each spacer to secure the adapters. Close and secure the bridge piece of the adjustable support, then adjust in on the three support pads until they abut the LP drive shaft. Lock the support pads with their locknuts.

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- (4) Align the balancing machine motor and rollers with the belt protruding from the cut-away of the rear bearing adapter, assemble the belt to the motor/rollers and adjust as necessary to operate correctly, then secure the motor/rollers.
- (5) Attach a strip of black adhesive tape around the HP drive shaft, clear of the belt, but within the area of the cut-away in the rear bearing adapter. Mark this adhesive tape with a white spot in line with the chalk mark on the HP drive shaft denoting the datum hole of the turbine wheel (Ref. para. 4, C. (c)). Use the spot as the datum for balancing.
- (6) Release and remove the split sleeves from the LP drive shaft.
- (7) Prepare the balancing machine for balancing in accordance with the manufacturers instructions, setting up the pick-ups, model bar, pick-up wires and scanning head etc.

C. Check Balance of HP Compressor Rotor (Ref. Fig. 124).

- (1) Start the balancing machine and run the assembly up to balancing speed in accordance with the manufacturers instructions.
- (2) Allow the assembly to rotate long enough to eliminate the effects of differential temperature on the readings obtained, then calibrate the machine and continue to rotate the assembly until the change in the mean average readings of unbalance at F and Rc over a period of three minutes are less than 2 drin in.
- (3) Calibration checks.
 - (a) The application of 4 drms of plasticine to the HP drive shaft 9 in. (228,6 mm) rearward of Rc should register approximately 9 drin in. at F and 33 drin in. at Rc 180 deg from the reading at F.
 - (b) The rotation of the slave distance piece (Tool 414) through 180 deg should not affect balance at Rc by more than 2 drin in.

NOTE: 1 drin in. = 45g mm.

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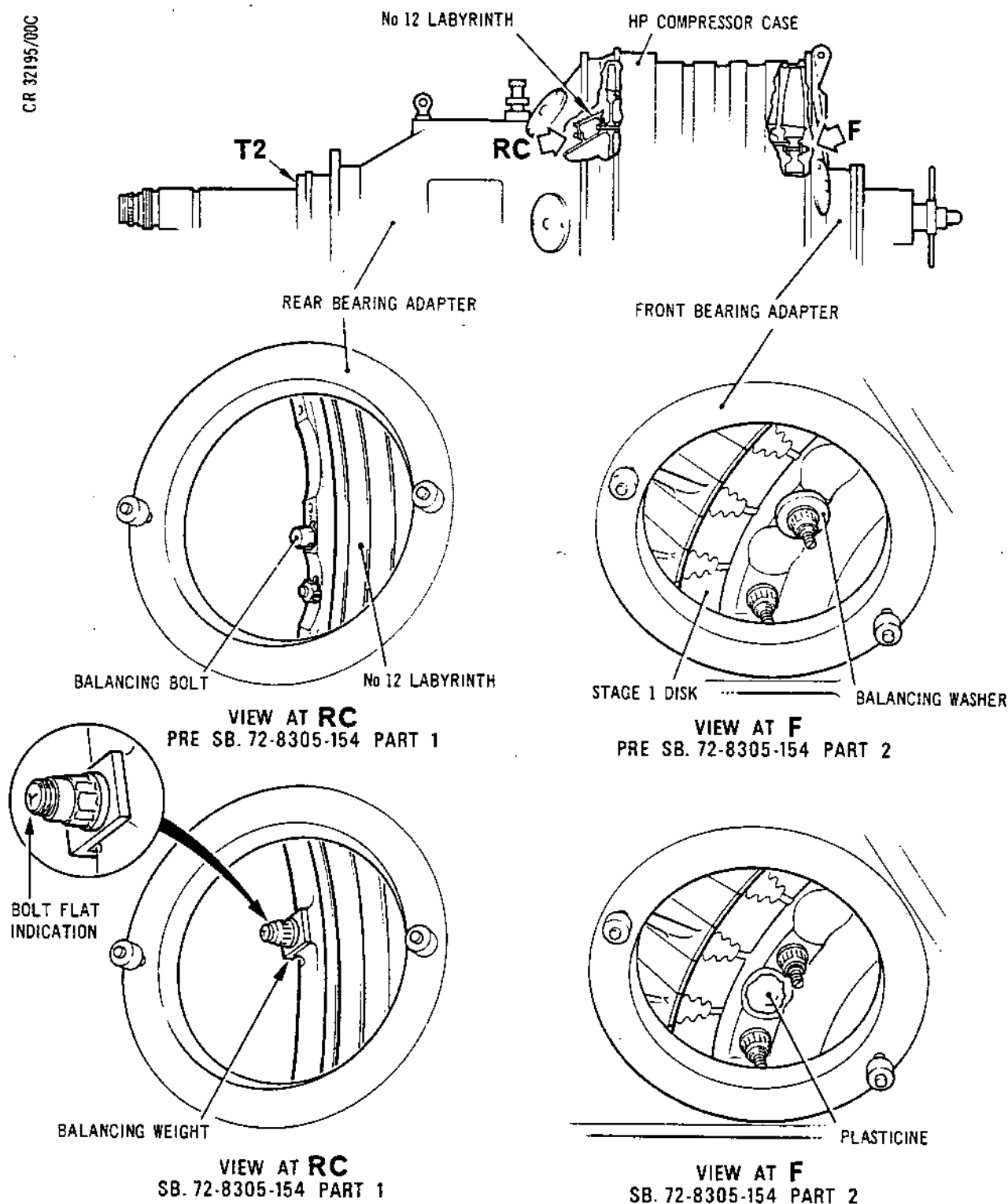
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Removing Balancing Washers from HP Compressor Assembly
Figure 124



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- (4) Record the 'as received' amount and angle of unbalance at F and Rc.
- (5) Unscrew the self-locking nuts and remove the balance weights from F (Ref.Fig.124), then replace and torque-tighten the nuts between 300 and 330 lbf in. (33,9 and 37,3 N.m).
- (6) On Pre SB.72-8305-154 Part 1 standard engines, unlock the tabwashers, remove and discard the balancing bolts (detail Rc).

NOTE: Balancing bolts are lifed at each overhaul strip and must be replaced with new bolts) (Ref.72-33-00 Para.6.c. Sub-Assembly).

- (7) On engines embodying SB.72-8305-154 Part 1 unscrew the nuts from the labyrinth rear flange bolts and remove the balancing weights. Replace the nuts and torque-tighten between 67 and 73 lbf in. (7,6 and 8,3 N.m).

NOTE: Check that the D-headed bolts are assembled correctly. The cross of the letter T marked on the tip of the bolts denotes the position of the D-headed bolt flat (detail Rc).

- (8) Rotate the assembly and record the amount and angle of unbalance at F and Rc.
- (9) A change of unbalance greater than 130 drn in. at Rc is excessive and should be investigated.

D. Remove the HP Compressor Assembly from the Balancing Machine.

- (1) Offer the two halves of the split sleeve (Tool 1058) to the LP drive shaft and locate the ends in the HP drive shaft, then secure the two halves together. Release and hinge open the bridge piece of the adjustable support.
- (2) Release and remove the drive belt from the motor and rollers and secure the belt clear of the machine to prevent possible fouling. Remove the black adhesive tape and chalk mark from the HP drive shaft.
- (3) Attach a hoist to the roller of the beam type sling (Tool 1056), then raise the hoist and position the beam over the HP compressor. Ensure that the strop is shackled to the upper hole in the end plate, and the single leg sling (Tool 1394) is shackled to the bracket at the other end of the beam. Attach the strop/sling to the rear bearing adapter eye and the front bearing adapter plate with the shackles (Ref. Fig.116). Position the beam lifting roller to the beam mid position, or as marked on the beam.

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- (4) Release and remove the clamp plates from the spacers. Raise the hoist and adjust the position of the beam lifting roller (if necessary) to support the assembly in the horizontal position. Steadily raise the hoist until the HP compressor is clear of the machine.
- (5) Position the assembly over the front support (Tool 1076) and rear support (Tool 1306), then lower the assembly engaging the front bearing support lugs in the front support and the recessed part of the rear bearing adapter on the rear support.
- (6) Close and secure the front support locking bars, then screw the lifting fixture (Tool 1055) onto the end of the LP drive shaft and attach a hoist to the fixture. Moving the hoist as necessary, raise the rear end of the assembly, pivoting about the front support, until the assembly is vertical. Release the front support locking bars, then raise the hoist and position it over the mobile stand (Tool 1036) (Ref. Fig.125). Ensure that the stand clamps are clear, align the lifting eye and attachment nuts of the adapter with the stand cut-aways, then lower the assembly onto the stand. Secure the adapter to the stand with the stand clamps. Release the hoist.

7. Prepare the HP Compressor Assembly for Disassembly

A. Remove the HP Compressor Rear Labyrinth from the HP Drive Shaft.

- (1) Unscrew and remove the lifting fixture (Tool 1055) from the LP drive shaft, then release and remove the split sleeve (Tool 1058) from the LP and HP drive shafts (Ref.Fig.125).
- (2) Unscrew the bearing retaining nut using the hand spanner (Tool 410), then withdraw the retaining nut and spacer ring (Tool 414) from the HP drive shaft.
- (3) Offer the multiple leg sling (Tool 1054) over the LP and HP drive shaft and align the captive bolts with the tapped holes in the rear (top) flange of the rear bearing adapter. Screw the bolts into the adapter and fully tighten the bolts. Release and remove the slave nuts and bolts securing the rear bearing adapter to the HP rear case.

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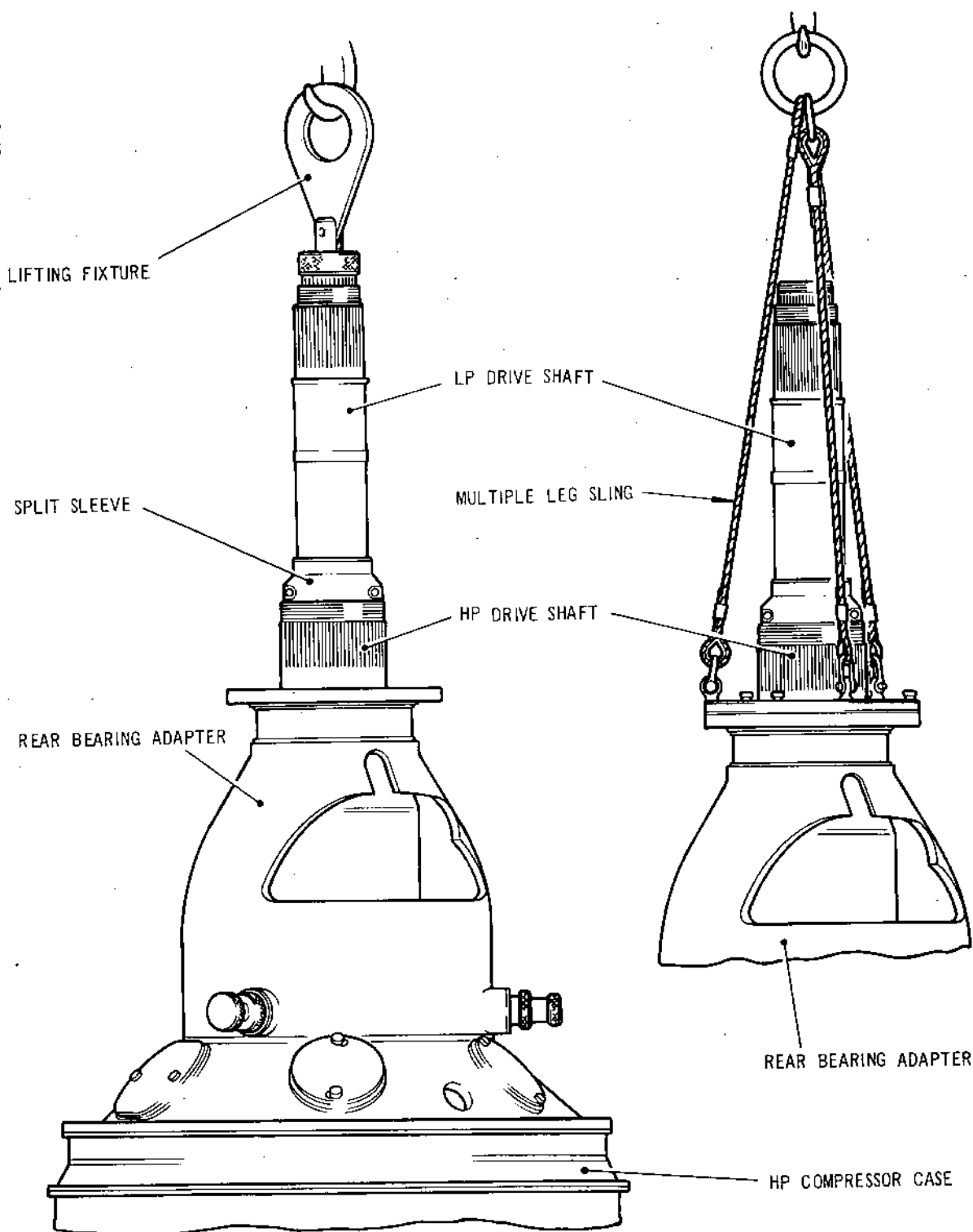


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Assembling HP Compressor Assembly to Mobile Stand
Figure 125

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- (4) Attach a hoist to the ring of the sling, then steadily raise the adapter until clear of the LP drive shaft. Position and lower the adapter onto a suitable pallet. Release the hoist, then release and remove the sling from the adapter.
 - (5) On engines to Pre SB.72-8305-154 Part 1 standard release and remove the nuts, keywashers and flat washers from the rear (top) bolts securing the labyrinth to the HP drive shaft. On engines to SB.72-8305-154 Part 1 standard remove the nuts from the rear (top) bolts securing the labyrinth to the HP drive shaft, remove and discard the bolts. Unscrew and remove the nuts from the front bolts (hidden under the labyrinth) securing the labyrinth to the drive shaft.
 - (6) On engines Pre.SB.0L.72-8305-154, screw pullers (Tool 1668) into the tapped extractor holes in the rear (top) of the labyrinth until they contact the HP drive shaft flange, then screw in the pullers in equal progressive increments until the labyrinth is released.
 - (7) On engines to SB.0L.72-8305-154, install the hydraulic extractor (Tool 3154) and release the labyrinth.
 - (8) Withdraw the labyrinth from the HP drive shaft. Remove (Tool 1668) or (Tool 3154) and bolts from the labyrinth, discard and scrap the bolts then secure the protector (Tool 1239) around the labyrinth. Engines to Pre SB.72-8305 standard unclip the bolt retaining rings, then remove and discard the bolts from the HP drive shaft labyrinth flange
- B. Assemble the Lifting Equipment and Invert the HP Compressor Assembly (Ref.Fig.126).
- (1) Attach the lifting plate of the beam type sling (Tool 1051) to a hoist, then position the hoist over the adapter (Tool 1041). Secure the two whips of the sling to the two lifting plates of the adapter with shackles.

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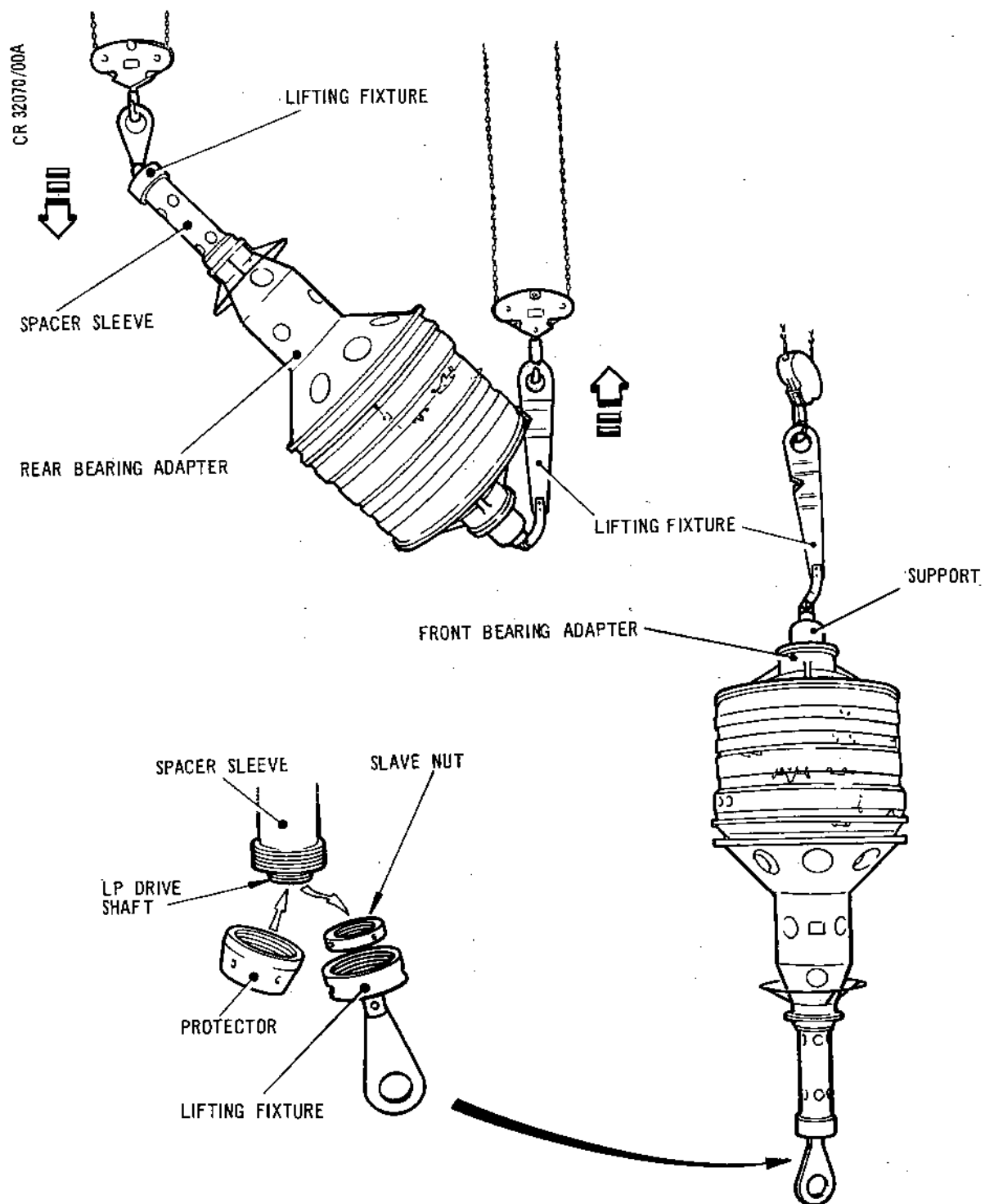
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Inverting HP Compressor Assembly
Figure 126

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- (2) Raise the hoist and position the adapter over the LP drive shaft. Lower the adapter aligning the bolt holes in both flanges, and locate the adapter pin hole over the HP compressor case locating pin. Insert the adapter slave bolts through the case flange and secure with (special) slave nuts. Fully tighten the nuts. Release the sling from the adapter, then remove the sling from the hoist.
- (3) Lower the spacer sleeve (Tool 391) over the LP drive shaft and screw it onto the HP drive shaft. Screw the slave nut (Tool 1042) onto the LP drive shaft and just tighten against the sleeve.
- (4) Lower the lifting fixture (Tool 1043) over the slave nut and screw the fixture onto the extension sleeve until tight. Attach a hoist to the lifting fixture.
- (5) Release the clamps of the mobile stand, raise the hoist until the assembly is clear of the stand, then position the hoist next to another hoist in an area clear of obstruction that will permit the HP compressor to be inverted.

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- (6) Position the forked end of the lifting fixture (Tool 914) on the eye-end of the steady (Tool 290) protruding out of the front support in the front (bottom) of the assembly, and secure with the special bolt of the fixture. Raise the end of the fixture, ensuring that the right-angled plates abut the edge of the front bearing adapter, then attach a hoist to the fixture.
- (7) Ensure that the lifting fixture attached to the first hoist is aligned with the bottom lifting fixture and that it will pivot correctly, then steadily raise the second hoist and lower the first hoist until the assembly is inverted. Disconnect the first hoist from the lifting fixture.
- (8) Unscrew and remove the lifting fixture (Tool 1043) from the (bottom) end of the spacer sleeve, then unscrew and remove the slave nut from the (bottom) end of the LP drive shaft. Screw the protector (Tool 403) onto the end of the spacer sleeve.
- (9) Ensure that the container (Tool 1050) is positioned in the hole beneath the disassembly stand (Tool 1040), then position and lower the HP compressor into the stand (Ref.Fig.105). Position the stand clamps over the HP case flange, then secure the clamps with the knurled nuts. Position the platforms (Tool 1233) around the stand.
- (10) Disconnect the hoist from the lifting fixture (Tool 914) then release and remove the fixture from the steady.

C. Remove the Front Bearing Adapter from the HP Compressor Assembly.

- (1) Remove the support (Tool 292), steady (Tool 290) and immobilizer (Tool 1339) from the LP drive shaft and the front bearing adapter (Ref. Fig.112).
 - (a) Unscrew and remove the three knurled nuts (Tool 1340) from the immobilizer studs that protrude through the support.
 - (b) Unscrew and remove the steady locking nut (Tool 291) from the steady shaft, then release the knurled screws of the support. Unscrew the knurled ring of the support until the support is released, then withdraw the support disengaging it from the pins of the immobilizer.

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- (c) Unscrew the knurled lockring, then withdraw the location bush from the LP drive shaft, turn the shaft to disengage its lobes from behind the LP drive shaft lands, and withdraw the steady shaft from the LP drive shaft. Assemble the knurled lockring and locking nut to the steady shaft.
- (d) Withdraw the immobilizer from the LP drive shaft.
- (2) Remove the retaining nut from the HP rotor shaft front (Ref.Fig.111).
 - (a) Offer the steady (Tool 1158) over the LP drive shaft, align the three captive bolts with the tapped holes in the front bearing adapter, then screw the bolts into the adapter and tighten bolts.
 - (b) Offer the immobilizer (Tool 387) over the LP drive shaft and engage it in the cut-aways inside the HP rotor shaft front.
 - (c) Locate the multiplier (Tool 1022) on the spanner wrench (Tool 386) and screw the spanner captive bolts into the multiplier ensuring the bolts are tight.
 - (d) Offer the spanner/multiplier over the LP drive shaft and immobilizer and engage the multiplier square drive in the immobilizer, then turn the HP rotor shaft as necessary to engage the spanner pin in the cut-away in the steady and the spanner dogs in the retaining nut.
 - (e) Using a wrench in the multiplier release the 'LEFT-HAND' threaded retaining nut.
 - (f) Remove the wrench, multiplier/spanner, immobilizer and steady from the assembly.
 - (g) Unscrew and withdraw the nut and spacer ring (Tool 988) from the rotor shaft front.
- (3) Offer the steady (Tool 288) (Ref.Fig.127) over the LP drive shaft and screw it onto the HP rotor shaft front, then screw the lifting/extracting fixture (Tool 1353) onto the steady. Align the offset thumbscrews of the lifting fixture with the tapped

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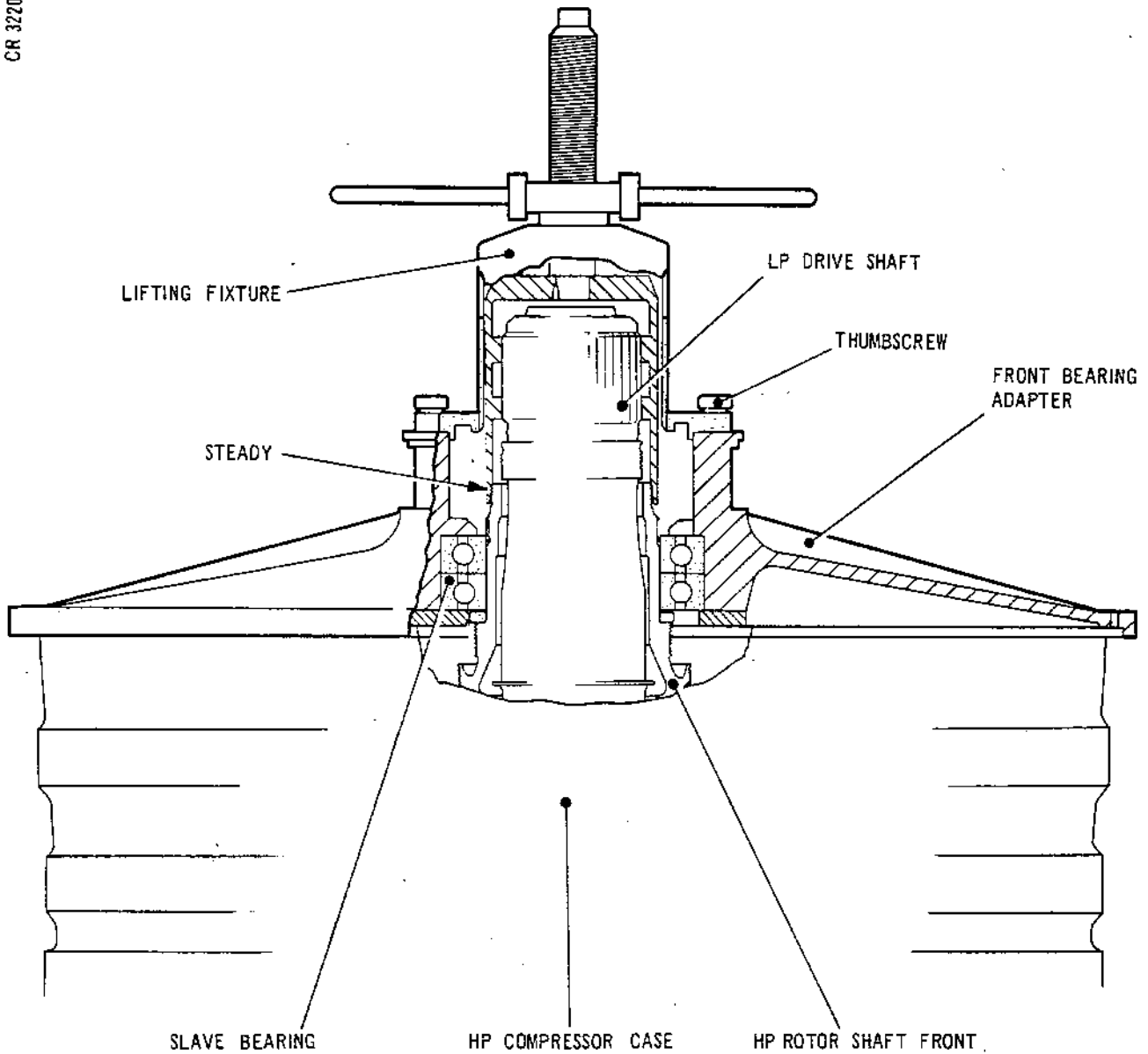
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Removing Front Bearing Adapter
Figure 127

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holes in the front bearing adapter, and where possible, screw the thumbscrews into the adapter. Screw the fixture onto the steady until the fixture abuts the adapter, then fully tighten the thumbscrews.

- (4) Unscrew and remove the slave nuts and bolts securing the front bearing adapter to the front flange of the HP front case. Unscrew the lifting/extracting fixture handle and raise the adapter, drawing the slave bearing off the rotor shaft front. When the bearing is released, attach a hoist to the lifting fixture, then steadily raise the hoist and unscrew the lifting fixture handle until it is released from the steady. When the adapter is clear, position and lower it onto a suitable container, then release the hoist. Unscrew and remove the steady (Tool 288) from the rotor shaft front, then offer a protector (Tool 1246) over the LP and HP shafts and rest it on the HP front case flange.

8. Disassemble the HP Compressor Assembly

A. Remove the Stage 1 Bladed Compressor Disk.

NOTE: Remove the protector (Tool 1246) (if assembled) from the HP compressor case front flange.

- (1) Check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8446-172).
- (2) Release the nuts securing the stage 1 disk to the rotor centre front, then using the universal socket wrench (Tool 1522) unscrew and remove the nuts.
- (3) Screw the driver (Tool 1225) onto the end of a stage 1 disk bolt, then drift the bolt out of the disk/rotor centre front. Unscrew the driver from the bolt, then repeat the procedure with the remainder of the bolts. Remove the balancing washers and/or plain washers if SB.72-73 is embodied, from the disk face.
- (4) Assemble the multiple leg sling (Tool 404) to the stage 1 disk (Ref.Fig.128).
 - (a) Attach a hoist to the lifting ring of the sling, then position the hoist over the disk.
 - (b) Ensure that the three lifting clip chains are positioned in No.1 slot of each plate. Loosen the wingnut on each lifting clip, then ensuring that the three clips are evenly disposed around the disk, locate each clip under a blade.

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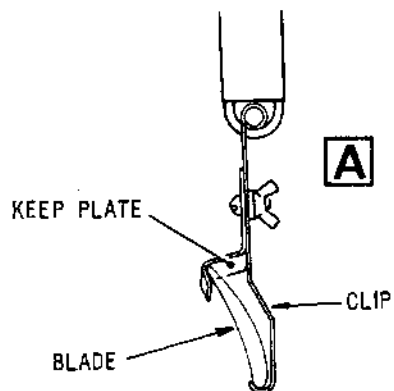
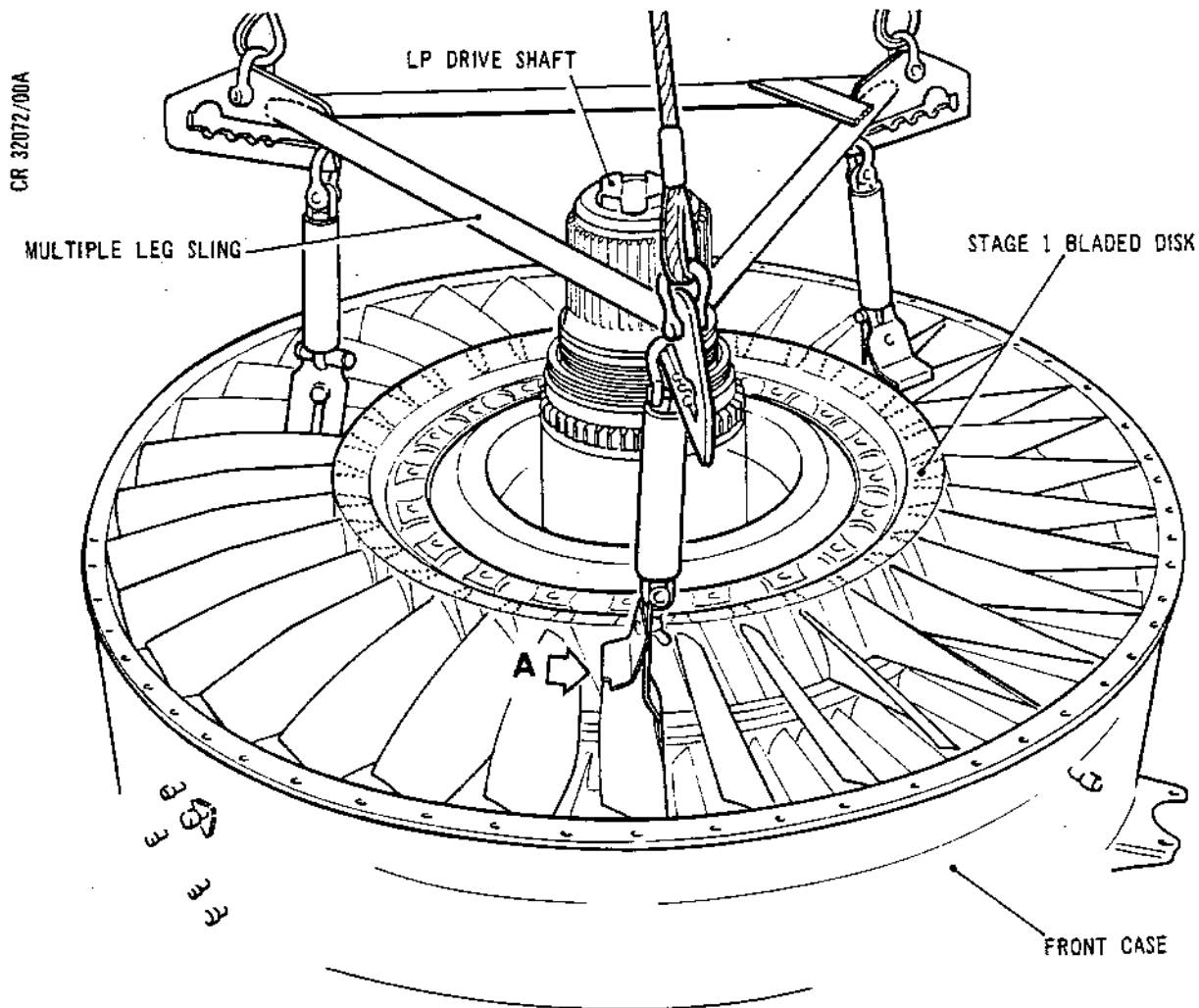
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Removing Stage 1 Bladed Disk from Rotor Shaft Front
Figure 128

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- (c) Position the keep plate (of each lifting clip) over the top of a blade, and ensuring that the keep and lifting clips are abutting the blades, secure each clip with its wingnut.
- (5) Steadily raise the hoist until the disk is clear of the LP drive shaft, ensuring that it does not swing causing damage to the blades. Position and lower the disk onto a suitable pallet, then release the sling from the blades and disconnect the hoist from the sling. Assemble the protector/retaining band (Tool 1130) around the tips of the blades.

NOTE: If the assembly is not to be worked on immediately, rest the wooden protector (Tool 1364) on the stage 1 stator vanes.

B. Remove the Stage 1 Stator Vanes from the Front Case (Ref.Fig.129).

NOTE: Remove the protector (Tool 1364) (if assembled) from the stator vanes.

- (1) Release and remove from the outside of the case, the two bolts and spacers securing each of the four bolted and two probe bolted stator vanes to the case.
- (2) Remove the two nuts securing the stator vane retainer to the inner fixing ring, then withdraw the retainer from the bolts.
- (3) Identify the bolted stator vane aligned with the loading (cut-away) slot in the case and the opening in the inner fixing ring, then withdraw the inner end of the vane from the ring, pivoting the vane about its outer end, then withdraw the vane from the case loading slot. Ensure that platforms (Tool 1391) are assembled to containers (Tool 1374), then insert the vane into a platform.
- (4) Ease the remainder of the vanes, in turn, along the slot in the case and inner fixing ring into the loading slots and remove in the same manner as the bolted vane. To assist the movement of the vanes, apply lubricant A to the slot in the case and ring. To enable the last few vanes to be removed, it will be necessary to support and/or move the ring (slightly) up/down, and also to turn it to ensure that the loading slots remain aligned. As the vanes are removed, ensure that they are placed in the platforms in the containers.

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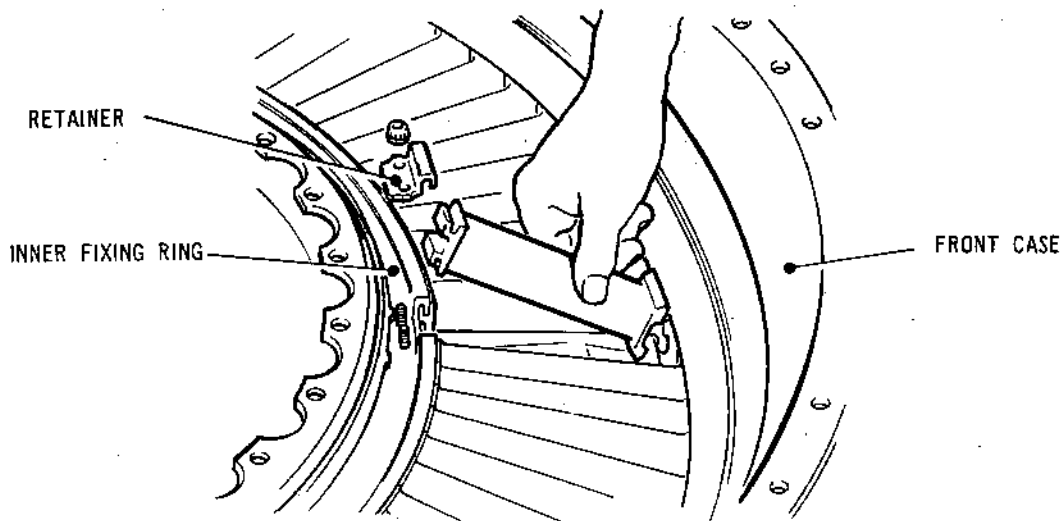
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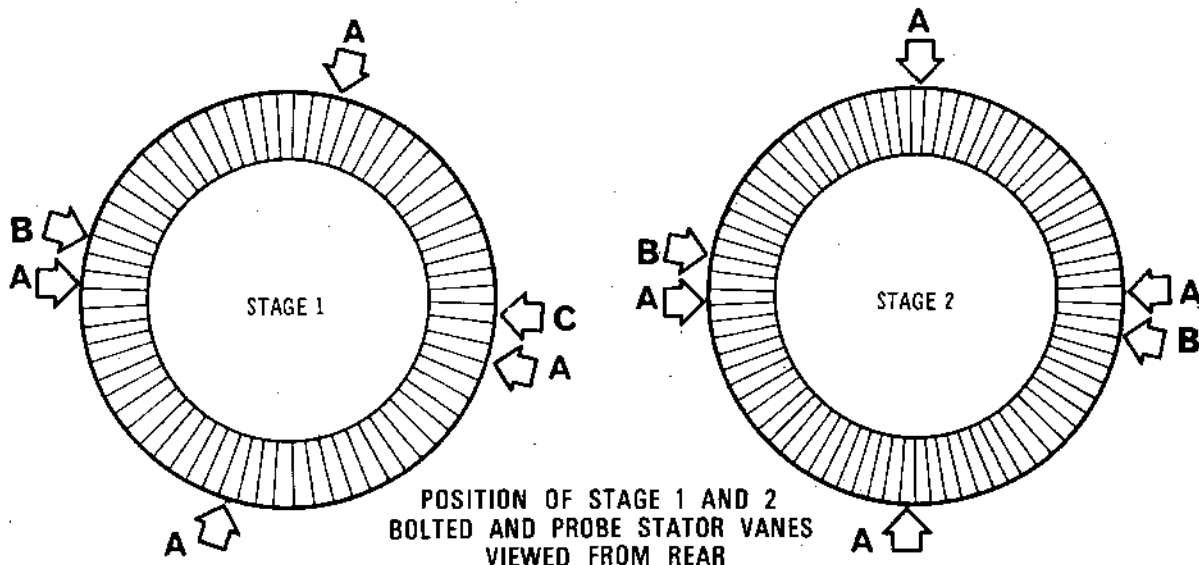
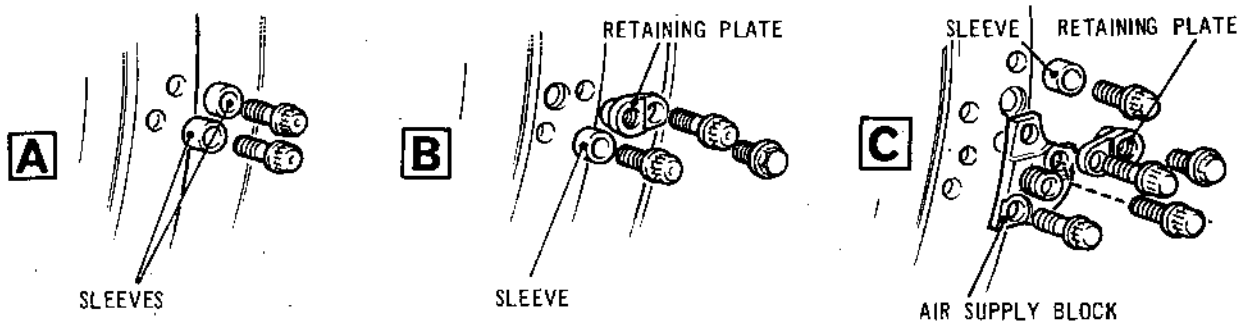
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REMOVAL OF STAGE 2 VANES



POSITION OF STAGE 1 AND 2
BOLTED AND PROBE STATOR VANES
VIEWED FROM REAR

Removing Stage 1 Stator Vanes from Front Case
Figure 129



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- (5) Withdraw the inner fixing ring unit from the case, taking care not to damage the labyrinths of the rotor centre front, then stow the ring in the appropriate slot in the container (Tool 1441).

NOTE: If the assembly is not to be worked on immediately, rest the wooden protector (Tool 1364) on the stage 2 blades.

C. Remove the HP Rotor Shaft Front from the Air Transfer Tube.

- (1) Remove the 20 bolts resting on the rotor shaft front, then unscrew and remove the 10 bolts securing the rotor shaft front to the air transfer tube. Lower the protector (Tool 392) over the shaft and locate it around the labyrinths on the rotor shaft front.
- (2) Unscrew and remove the 24 nuts securing the rotor shaft front to the stage 2 disk/spacer ring using the cranked ring wrench (Tool 1591). Screw the driver (Tool 1225) onto the end of a bolt, then drift the bolt out of the shaft/disk/spacer until released. Unscrew the driver from the bolt, then repeat the procedure with the remainder of the bolts.
- (3) Remove the rotor shaft front from the stage 2 disk using the mechanical puller (Tool 457), slave bolts (Tool 459) and thrust bolts (Tool 458) (Ref.Fig.130).
 - (a) Attach a hoist to the multiple leg sling (Tool 1645) then position the hoist over the puller and secure the sling to the puller eye bolts with the sling shackles.
 - (b) Ensure that the six thrust bolts are screwed into the inner ring of tapped holes (at the plate corners) in the puller from underneath. Position and lower the puller onto the rotor shaft front aligning the inner ring of holes in the puller with bolt holes in the shaft.
 - (c) Insert the eight slave bolts into the bolt holes in the shaft flange and through the puller, then screw the puller hand nuts onto the bolts, ensuring that the flats on the slave bolts locate correctly against the shaft, and the hand nuts are tightened.

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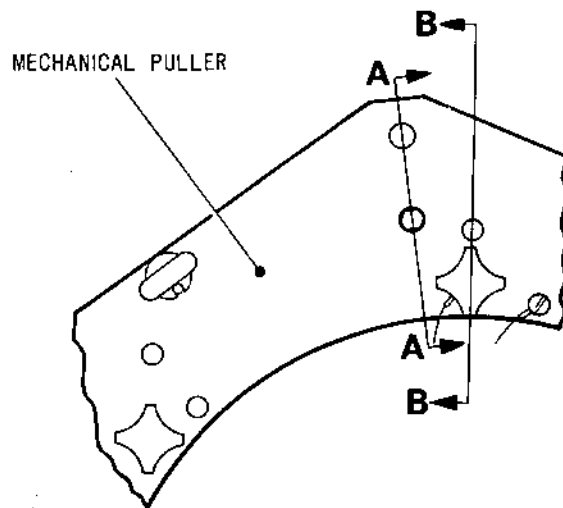
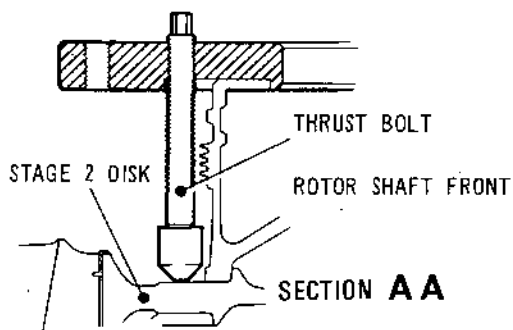
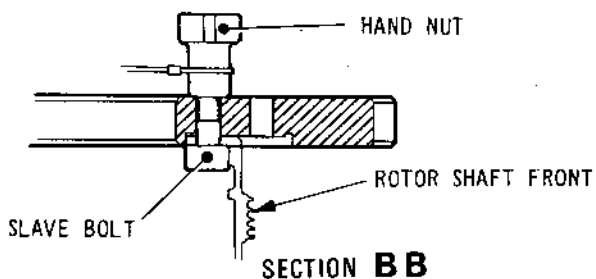
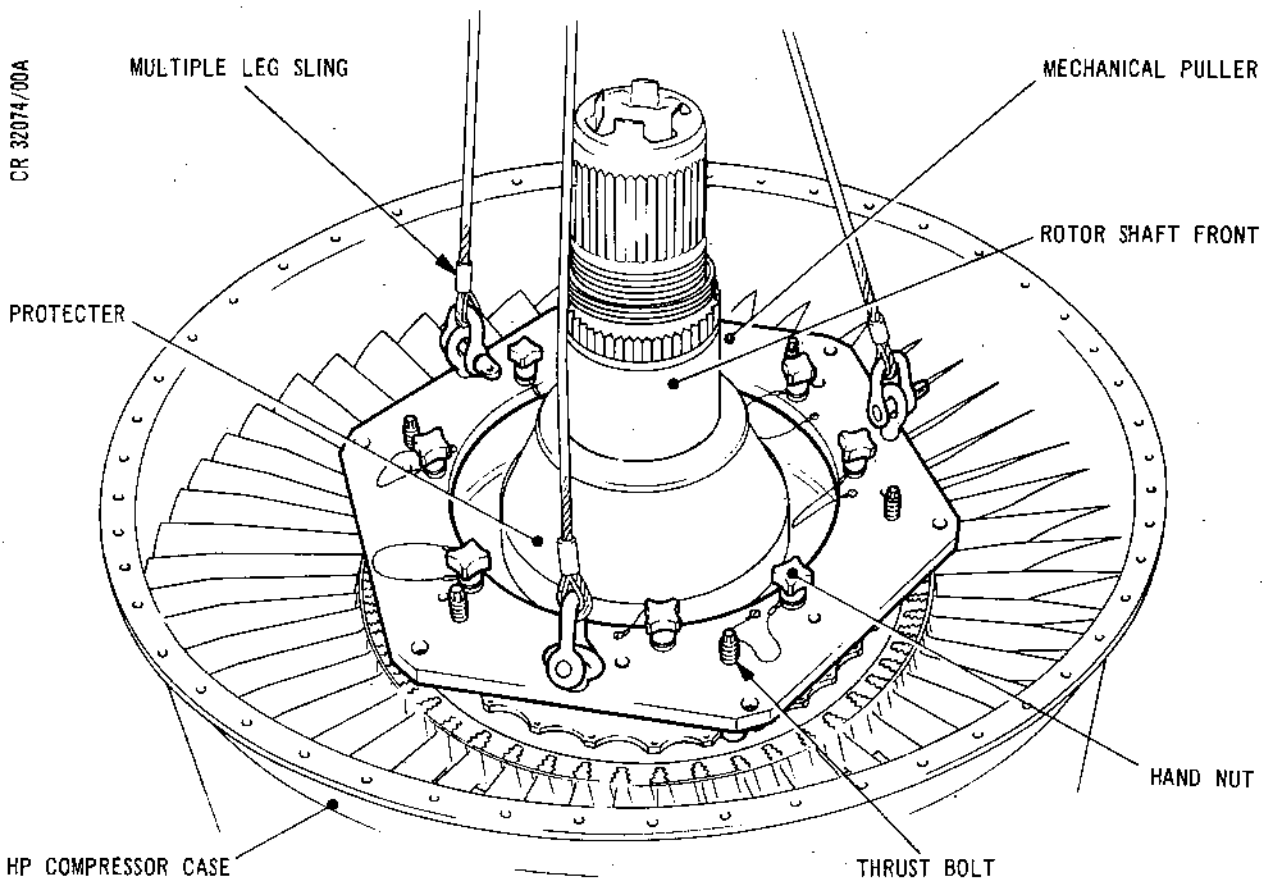
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Removing Rotor Shaft Front
Figure 130

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- (d) Screw in on the six thrust bolts until they contact the disk, then separate the shaft from the disk by screwing in the thrust bolts in equal progressive increments until the items are separated.
- (e) Unscrew the puller hand nuts and remove the slave bolts from the shaft. Raise the hoist until the puller is clear of the LP drive shaft, then position the puller over a suitable surface. Remove the thrust bolts from the puller (if required, to prevent possible damage), then lower the puller. Release and remove the sling from the puller and the hoist.
- (f) Lower the lifting fixture (Tool 388) over the LP drive shaft and screw it onto the end of the rotor shaft front. Attach a hoist to the fixture then raise the shaft until clear of the LP drive shaft. Position and lower the shaft onto a clean flat surface. Disconnect the hoist, then unscrew and remove the lifting fixture from the shaft.

NOTE: The lifting fixture is used to guide the rotor shaft front over the LP drive shaft without causing damage. If the puller (Tool 457) is used as a lifting fixture, damage to the LP drive shaft may occur.

- (g) Remove the hand nut/spindle and clamp plate from the container (Tool 1420), then lower the front end of the rotor shaft front into the container. Assemble the clamp plate to the shaft, then secure it with the hand nut/spindle.
- (4) Lower the steady (Tool 287) over the LP drive shaft and secure it to the air transfer tube with the two captive bolts.

D. Remove the Stage 2 Bladed Compressor Disk and Stator Vanes.

NOTE: Remove the protector (if assembled) from the compressor blades.

- (1) Release the stage 2 disk from the stage 2 - 3 spacer ring using the mechanical puller (Tool 461) and claws (Tool 462) (Ref.Fig. 131).

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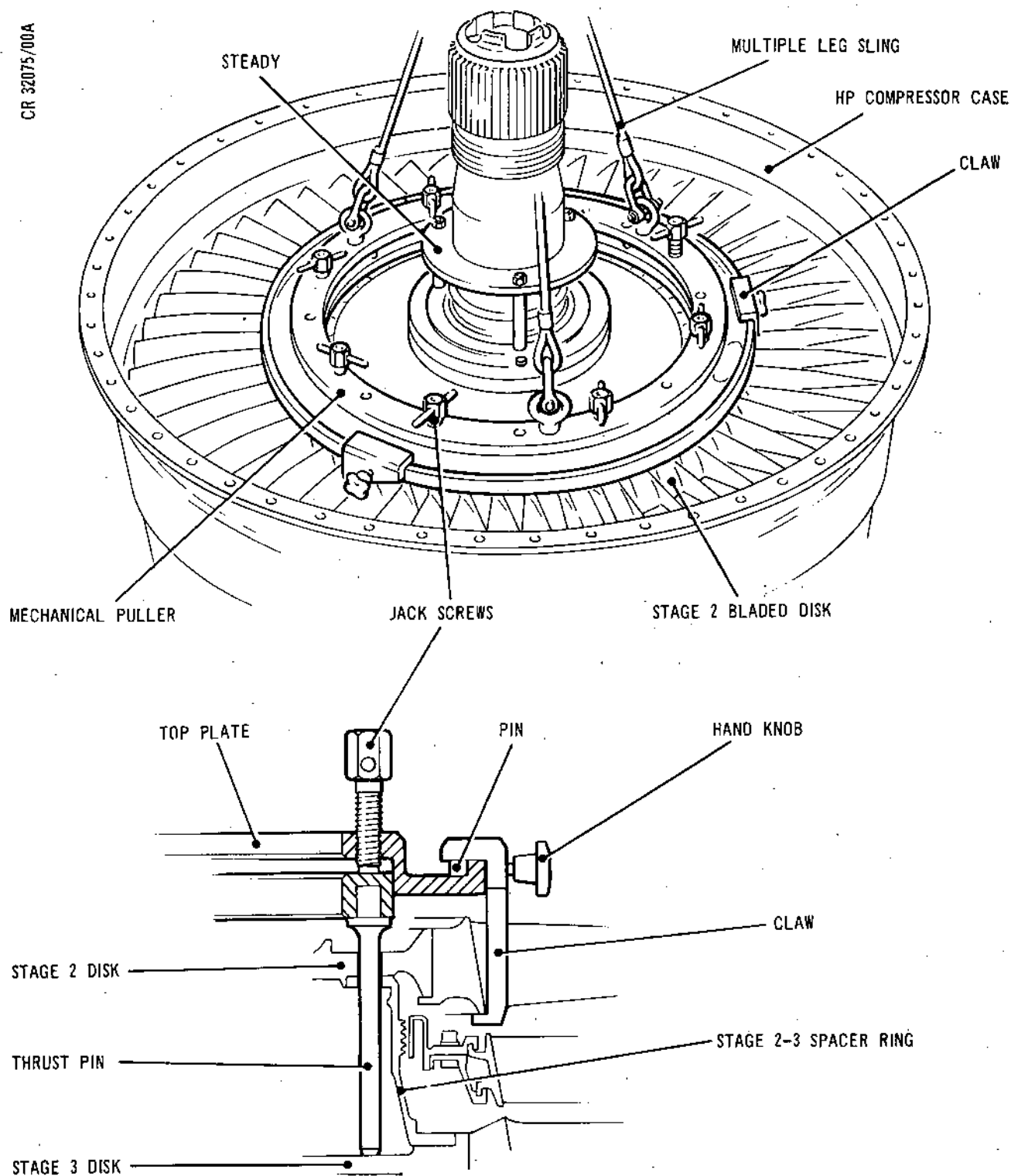
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Releasing Stage 2 Disk from Spacer Ring
Figure 131

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- (a) Attach a hoist to the multiple leg sling (Tool 1645), then position the hoist over the puller and secure the sling to the puller eye bolts with the sling shackles.
 - (b) Position and lower the puller into the case, align the puller thrust pins with the bolt holes in the disk, then lower the pins into the bolt holes and rest the pins on the disk below.
 - (c) Evenly space the three claws around the puller and engage the two pins of each claw in the recess in the top plate of the puller, and the hooked end of the claws around the bottom lip of the disk. If the claws will not go under the disk, unscrew the jack screws in the top plate to lower the claws. With the claws under the disk, screw in on the jack screws to engage them behind the lip, then tighten the hand knob of each claw.
 - (d) Screw the jack screws into the plate in equal progressive increments until the disk is released from the spacer ring.
 - (e) Unscrew the jack screws, then release the claw hand knobs. Remove the claws by disengaging them from under the disk and withdrawing them from the top plate.
 - (f) Raise the hoist until the puller is clear of the LP drive shaft, then position and lower the puller onto a suitable surface. Disconnect the sling from the hoist, then release and remove the sling from the puller.
- (2) Assemble the multiple leg sling (Tool 404) to the stage 2 disk (Ref.Fig.128).
- (a) Attach a hoist to the lifting ring of the sling, then position the hoist over the disk.
 - (b) Ensure that the three lifting clip chains are positioned in No.2 slot of each plate. Loosen the wingnut on each lifting clip, then ensuring that the three clips are evenly disposed around the disk, locate each clip under a blade.

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OVERHAUL



- (c) Position the keep plate (of each lifting clip) over the top of a blade, and ensuring that the keep and lifting clips are abutting the blades, secure each clip with its wingnut.
- (3) Steadily raise the hoist until the disk is clear of the LP drive shaft, ensuring that it does not swing causing damage to the blades. Position and lower the disk onto a suitable pallet, then release the sling from the blades and disconnect the hoist from the sling. Assemble the protector/retaining band (Tool 1130) around the tips of the blades. Collect the bolts resting on the stage 3 disk and place the bolts in a container.
- (4) Release and remove from the outside of the case, the two bolts and spacers securing each of the four bolted and two probe bolted stator vanes to the case (Ref. Fig.129).
- (5) Remove the two nuts securing the stator vane retainer to the inner fixing ring, then withdraw the retainer from the bolts.
- (6) Identify the bolted stator vane aligned with the loading (cut-away) slot in the case and the opening in the inner fixing ring, then withdraw the inner end of the vane from the ring, pivoting the vane about its outer end, then withdraw the vane from the case loading slot. Ensure that the platforms (Tool 1391) are assembled to containers (Tool 1374), then insert the vane into a platform.
- (7) Ease the remainder of the vanes, in turn, along the slot in the case and inner fixing ring into the loading slots, and remove in the same manner as the bolted vane. To assist the movement of the vanes, apply lubricant A to the slot in the case and ring. To enable the last few vanes to be removed, it will be necessary to support and/or move the ring (slightly) up/down, and also to turn it to ensure that the loading slots remain aligned. As the vanes are removed, ensure that they are placed in the platforms of the containers.
- (8) Withdraw the inner fixing ring unit from the case, taking care not to damage the labyrinths on the spacer ring, then stow the ring in the appropriate slot in the container (Tool 1441).

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E. Remove the Stage 2 - 3 Spacer Ring, Stage 3 Bladed Compressor Disk and Stator Vanes.

- (1) Unscrew and remove the 36 nuts securing the stage 2 - 3 spacer ring to the stage 3 disk using the cranked ring wrench (Tool 1591). Screw the driver (Tool 1225) onto the end of a bolt, then drift the bolt out of the spacer/disk/spacer until released. Unscrew the driver from the bolt, then repeat the procedure with the remainder of the bolts.
- (2) Remove the stage 2 - 3 spacer ring from the stage 3 disk using the mechanical puller (Tool 457), slave bolts (Tool 460) and thrust bolts (Tool 458) (Ref.Fig. 132).
 - (a) Attach a hoist to the multiple leg sling (Tool 1645) then position the hoist over the puller and secure the sling to the puller eye bolts with the sling shackles.
 - (b) Ensure that the six thrust bolts are screwed into the outer ring of tapped holes (at the plate corners) in the puller from underneath. Position and lower the puller onto the spacer aligning the outer ring of holes in the puller with the bolt holes in the spacer.
 - (c) Insert the eight slave bolts into the bolt holes in the spacer flange and through the puller, then screw the puller hand nuts onto the bolts, ensuring that the flats on the bolts locate correctly against the spacer, and the hand nuts are tightened.
 - (d) Screw in on the six thrust bolts until they contact the disk, then separate the spacer from the disk by screwing in the thrust bolts in equal progressive increments until the items are separated. Raise the hoist until the spacer is clear of the LP drive shaft, then position and lower the spacer onto a suitable clean flat surface.

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- (e) Unscrew the puller hand nuts and remove the slave bolts from the spacer. Raise the hoist until the spacer is clear, then position the puller over a suitable surface. Remove the thrust bolts from the puller (if required, to prevent possible damage), then lower the puller. Release and remove the sling from the puller and the hoist.
 - (f) Open the protector (Tool 933), position it around the labyrinth on the spacer, then secure the protector with its clamp screw. Stow the spacer in its correct slot in the container (Tool 1441).
- (3) Release the stage 3 disk from the stage 3 - 4 spacer ring using the mechanical puller (Tool 463) and claws (Tool 464) (Ref.Fig.133).

- (a) Assemble a blade retainer (Tool 1166) to each consecutive group of four or five blades until all blades are secured in groups.

NOTE: The blade retainers prevent the blades slipping out of the disk when the disk is raised.

- (b) Attach a hoist to the multiple leg sling (Tool 1645), then position the hoist over the puller and secure the sling to the puller eye-bolts with the sling shackles.
- (c) Position and lower the puller into the case, align the puller thrust pins with the bolt holes in the disk, then lower the pins into the bolt holes and rest the pins on the disk below.
- (d) Evenly space the three claws around the puller and engage the two pins of each claw in the recess in the top plate of the puller, and insert the end of each claw in a cut-away in the disk between the disk and spacer. If the claws are not aligned with the cut-away, unscrew the jack screws in the top plate to lower the claws until they align with the cut-away, then tighten the claw hand knobs to secure the claws in the cut-away.
- (e) Screw the jack screws into the plate in equal progressive increments until the disk is released from the spacer ring.

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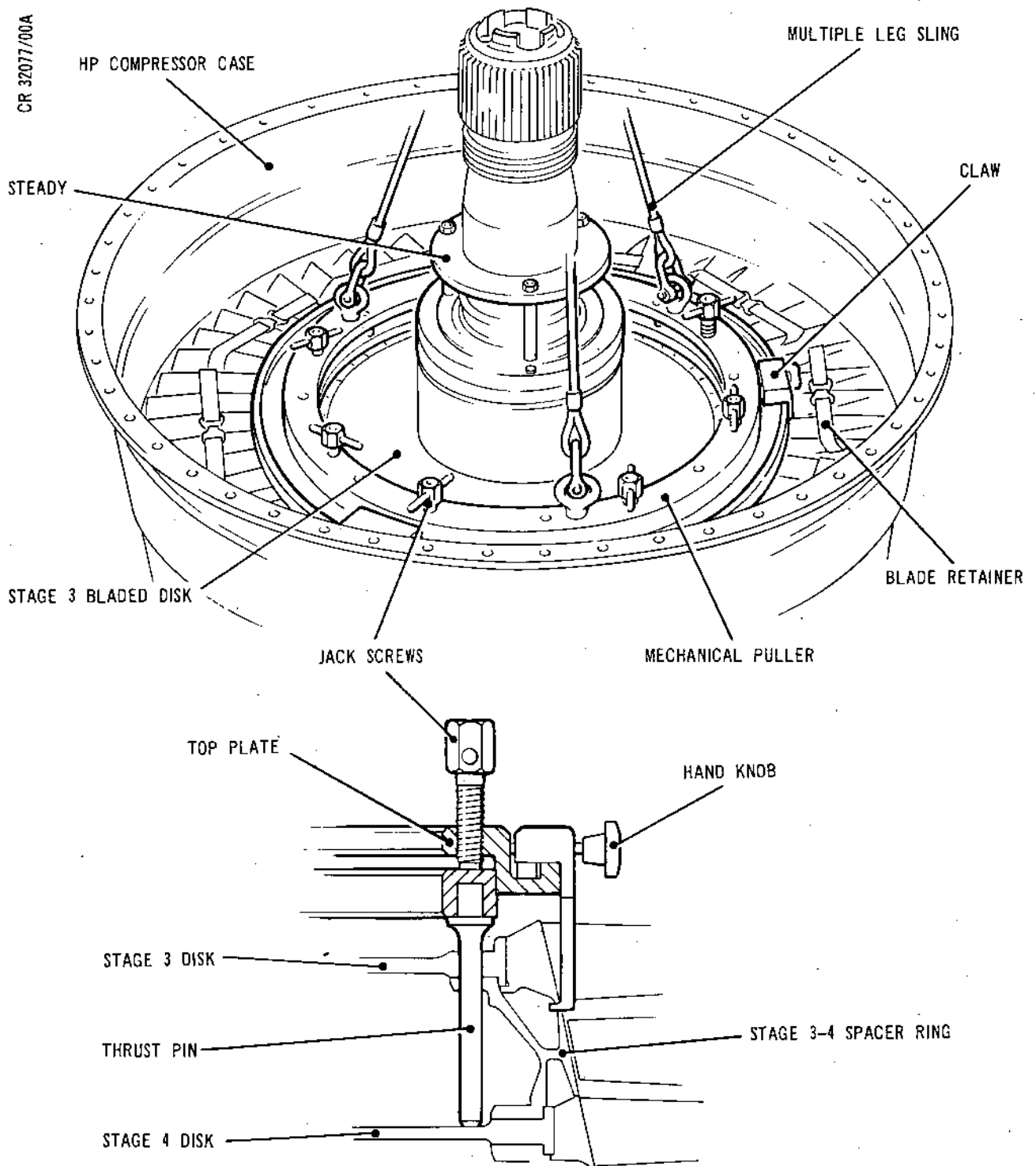


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OVERHAUL



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Releasing Stage 3 Disk from Spacer Ring
Figure 133



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- (f) Unscrew the jack screws, then release the claw hand knobs and withdraw the claws from the disk and the puller.
 - (g) Raise the hoist until the puller is clear of the LP drive shaft, then position and lower the puller onto a suitable surface. Disconnect the sling from the hoist, then release and remove the sling from the puller.
- (4) Assemble the multiple leg sling (Tool 404) to the stage 3 disk (Ref.Fig.128).
- (a) Attach a hoist to the lifting ring of the sling, then position the hoist over the disk.
 - (b) Ensure that the three lifting clip chains are positioned in No.3 slot of each plate. Loosen the wingnut on each lifting clip, then ensuring that the three clips are evenly disposed around the disk, locate each clip under a blade.
 - (c) Position the keep plate (of each lifting clip) over the top of a blade, and ensuring that the keep and lifting clips are abutting the blades, secure each clip with its wingnut.
- (5) Steadily raise the hoist until the disk is clear of the LP drive shaft, ensuring that it does not swing causing damage to the blades. Position and lower the disk onto a suitable pallet, then release the sling from the blades and disconnect the hoist from the sling. Assemble the protector/retaining band (Tool 1130) around the tips of the blades. Collect the bolts resting on the stage 4 disk and place the bolts in a container.
- (6) Release and remove from the outside of the case, the two bolts and spacers securing each of the four bolted stator vanes to the case.
- (7) Identify the bolted stator vane aligned with the loading (cut-away) slot in the case, then pivot the inner end of the vane upwards and withdraw the outer end of the vane from the case loading slot. Ensure that the platforms (Tool 1390) are assembled to the containers (Tool 1374), then insert the vane into a platform.

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- (8) Ease the remainder of the vanes, in turn, along the slot in the case and remove in the same manner as the bolted vane. To assist the movement of the vanes, apply lubricant A to the slot in the case. As the vanes are removed, ensure that they are placed in the platform of the containers.

NOTE: If the assembly is not to be worked on immediately, rest the wooden protector (Tool 1361) on the stage 4 blades in the case.

F. Remove the Stage 3 - 4 Spacer Ring, Stage 4 Bladed Compressor Disk and Stator Vanes.

- (1) Unscrew and remove the 36 nuts securing the stage 3 - 4 spacer ring to the stage 4 disk using the cranked ring wrench (Tool 1591). Locate the driver (Tool 1611) over the end of a bolt, then drift the bolt out of the spacer. Repeat the procedure with the remainder of the bolts.

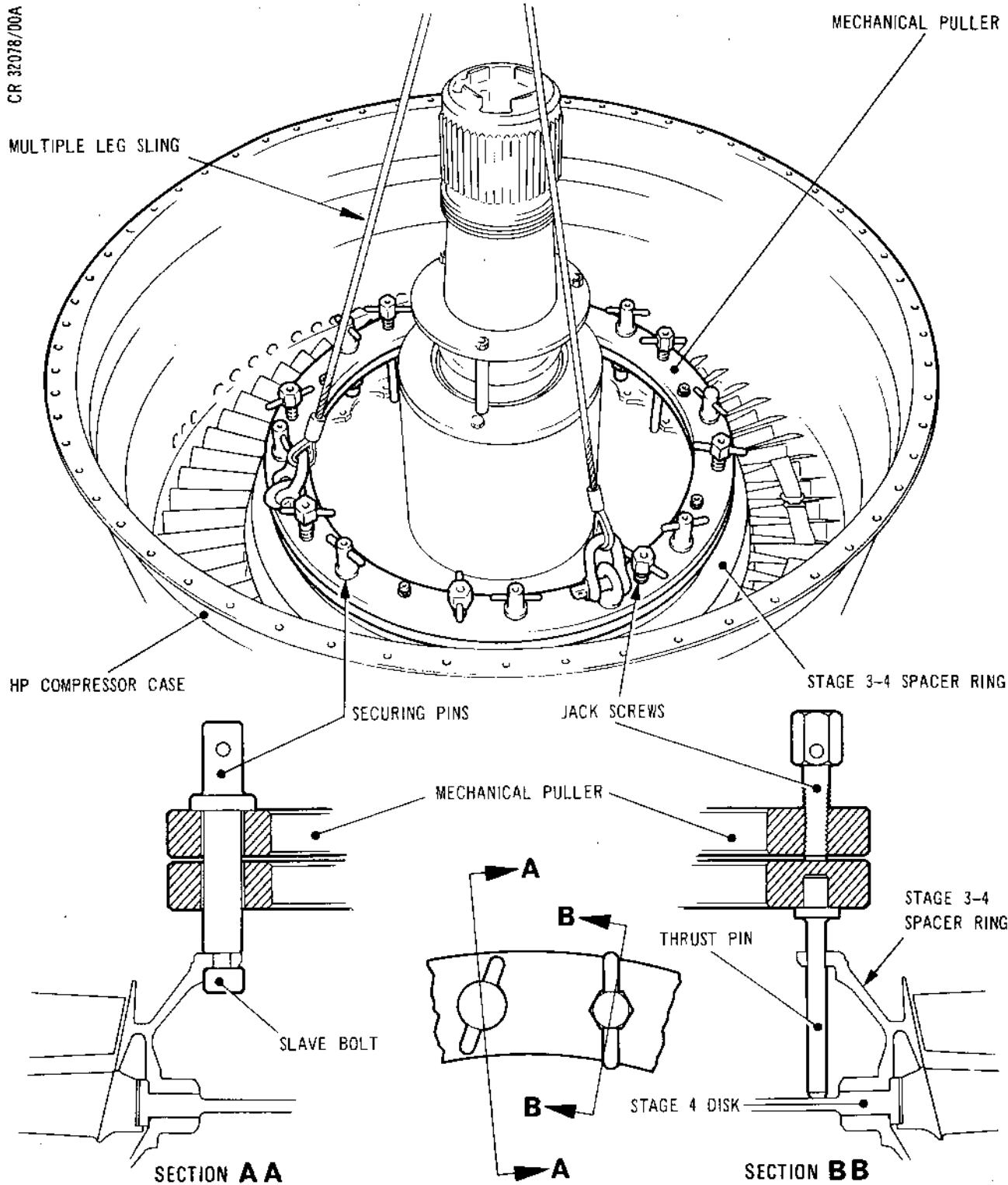
NOTE: Remove the protector (if assembled) from the compressor blades.

- (2) Remove the stage 3 - 4 spacer ring from the stage 4 disk using the mechanical puller (Tool 471), slave bolts (Tool 475) and securing pins (Tool 474) (Ref. Fig.134).
- (a) Attach a hoist to the multiple leg sling (Tool 1645) then position the hoist over the puller and secure the sling to the puller eye bolts with the sling shackles.
- (b) Position and lower the puller into the case, align the puller thrust pins with the bolt holes in the spacer, then lower the pins into the bolt holes and rest the pins on the disk below.
- (c) Insert the eight slave bolts into the bolt holes in the spacer flange (from underneath), then insert the securing pins through the holes in the puller plates and screw the pins onto the slave bolts. Ensure that the flats on the bolts



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Releasing Stage 3-4 Spacer Ring from Disk
Figure 134

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locate correctly against the spacer, and the pins are tight.

NOTE: If the securing pin holes do not align with the bolt holes in the spacer, turn the puller and locate the puller thrust pins in different holes, until the securing pin holes align with spacer bolt holes. The misalignment will be due to the nine evenly spacer offset bolt holes in the spacer.

- (d) Screw in on the eight jack screws until they contact the lower plate, then separate the spacer from the disk by screwing in the jack screws in equal progressive increments until the items are separated. Raise the hoist until the spacer is clear of the LP drive shaft, then position and lower the spacer onto a suitable clean flat surface.
- (e) Unscrew the securing pins and remove the slave bolts from the spacer. Raise the hoist until the spacer is clear, then position and lower the puller onto a suitable surface. Release and remove the sling from the puller and the hoist. Place the spacer in its correct slot in the container (Tool 1441).
- (3) Release the stage 4 disk from the stage 4 - 5 spacer ring using the mechanical puller (Tool 465) and claws (Tool 466) (Ref.Fig.135).
- (a) Assemble a blade retainer (Tool 1166) to each consecutive group of four or five blades until all blades are secured in groups.

NOTE: The blade retainers prevent the blades slipping out of the disk when the disk is raised.

- (b) Attach a hoist to the multiple leg sling (Tool 1645), then position the hoist over the puller and secure the sling to the puller eye bolts with the sling shackles.
- (c) Position and lower the puller into the case, align the puller thrust pins with the bolt holes in the disk, then lower the pins into the bolt holes and rest the pins on the disk below.

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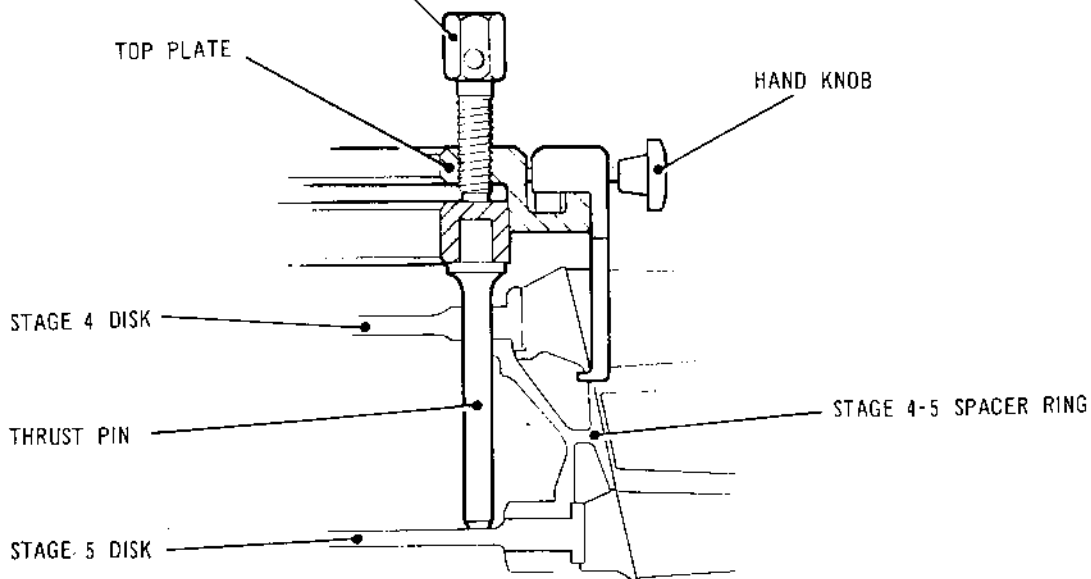
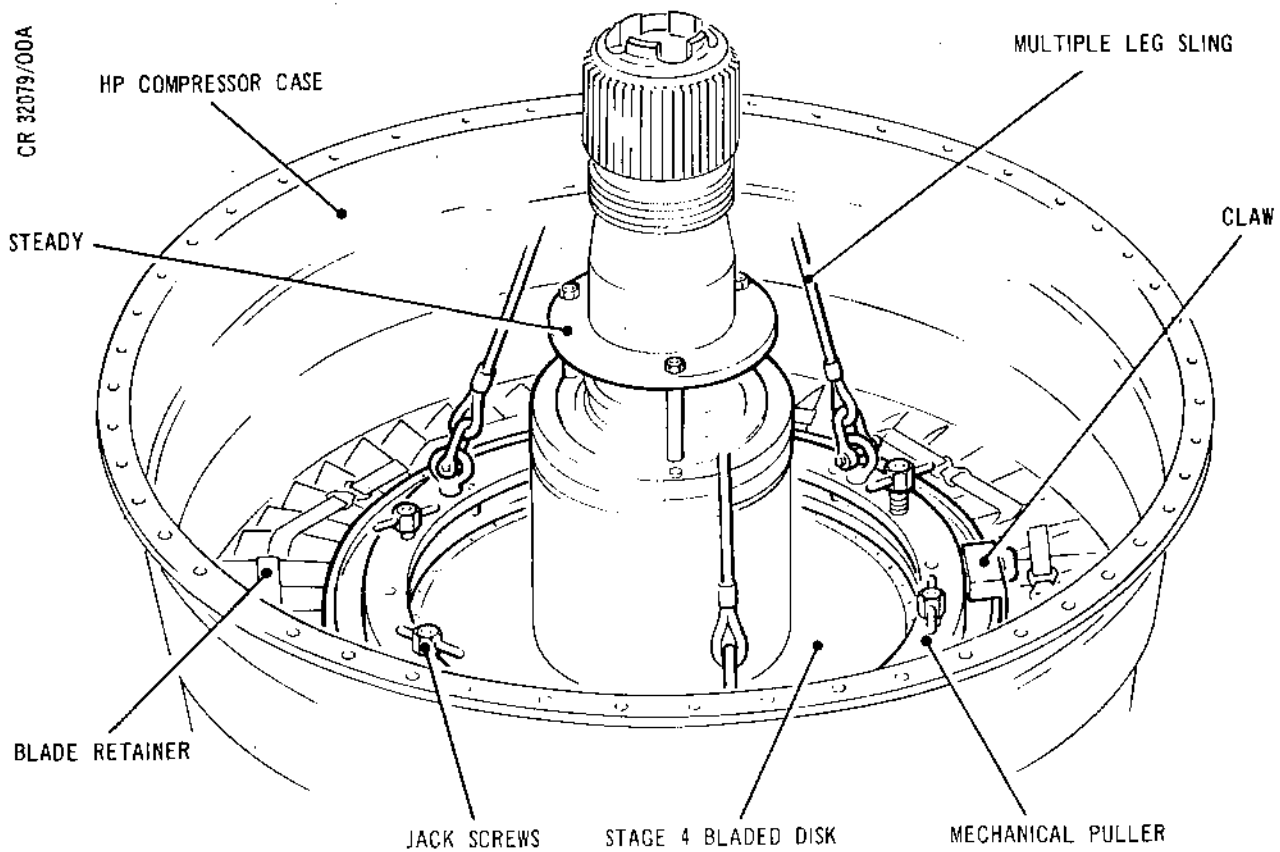
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Releasing Stage 4 Disk from Spacer Ring
Figure 135

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- (d) Evenly space the three claws around the puller and engage the two pins of each claw in the recess in the top plate of the puller, and insert the two ends of each claw in a cut-away in the disk between the disk and spacer. If the claws are not aligned with the cut-aways, unscrew the jack screws in the top plate to lower the claws until they align with the cut-aways, then tighten each claw hand knob to secure each claw end in the cut-aways.
- (e) Screw the jack screws into the plate in equal progressive increments until the disk is released from the spacer ring.
- (f) Unscrew the jack screws, then release the claw hand knobs and withdraw the claws from the disk and the puller.
- (g) Raise the hoist until the puller is clear of the LP drive shaft, then position and lower the puller onto a suitable surface. Disconnect the sling from the hoist, then release and remove the sling from the puller.
- (4) Assemble the multiple leg sling (Tool 404) to the stage 4 disk (Ref.Fig.128).
- (a) Attach a hoist to the lifting ring of the sling, then position the hoist over the disk.
- (b) Ensure that the three lifting clip chains are positioned in the outermost slot of each plate. Loosen the wingnut in each lifting clip, then ensuring that the three clips are evenly disposed around the disk, locate each clip under a blade.
- (c) Position the keep plate (of each lifting clip) over the top of a blade, and ensuring that the keep and lifting clips are abutting the blades, secure each clip with its wingnut.
- (5) Steadily raise the hoist until the disk is clear of the LP drive shaft, ensuring that it does not swing causing damage to the blades. Position and lower the disk onto a suitable pallet, then release the sling from the blades and disconnect the hoist from the sling. Assemble the protector/retaining band (Tool 1130) around the tips of the blades. Collect the bolts resting on the stage 5 disk and place the bolts in a container.

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- (6) Release and remove from the outside of the case, the two bolts and spacers securing each of the six bolted stator vanes to the case.
- (7) Identify the bolted stator vane aligned with the loading (cut-aways) slot in the case, then pivot the inner end of the vane upwards and withdraw the outer end of the vane from the case loading slot. Ensure that the platforms (Tool 1390) are assembled to the containers (Tool 1373), then insert the vane into a platform.
- (8) Ease the remainder of the vanes, in turn, along the slot in the case and remove in the same manner as the bolted vane. To assist the movement of the vanes, apply lubricant A to the slot in the case. As the vanes are removed, ensure that they are placed in the platforms of the containers.

NOTE: If the assembly is not to be worked on immediately, rest the wooden protector (Tool 1360) on the stage 5 blades in the case.

G. Remove the Stage 4 - 5 Spacer Ring and Stage 5 Bladed Compressor Disk (Ref.Fig.136).

- (1) Unscrew and remove the 36 nuts securing the stage 4 - 5 spacer ring to the stage 5 disk using the cranked ring wrench (Tool 1591). Locate the driver (Tool 1611) over the end of a bolt, then drift the bolt out of the spacer. Repeat the procedure with the remainder of the bolts.

NOTE: Remove the protector (if assembled) from the compressor blades.

- (2) Remove the stage 4 - 5 spacer ring from the stage 5 disk using the mechanical puller (Tool 472), slave bolts (Tool 475) and securing pins (Tool 474).
 - (a) Attach a hoist to the multiple leg sling (Tool 1645) then position the hoist over the puller and secure the sling to the puller eye-bolts with the sling shackles.
 - (b) Position and lower the puller into the case, align the puller thrust pins with the bolt holes in the spacer, then lower the pins into the bolt holes and rest the pins on the disk below.

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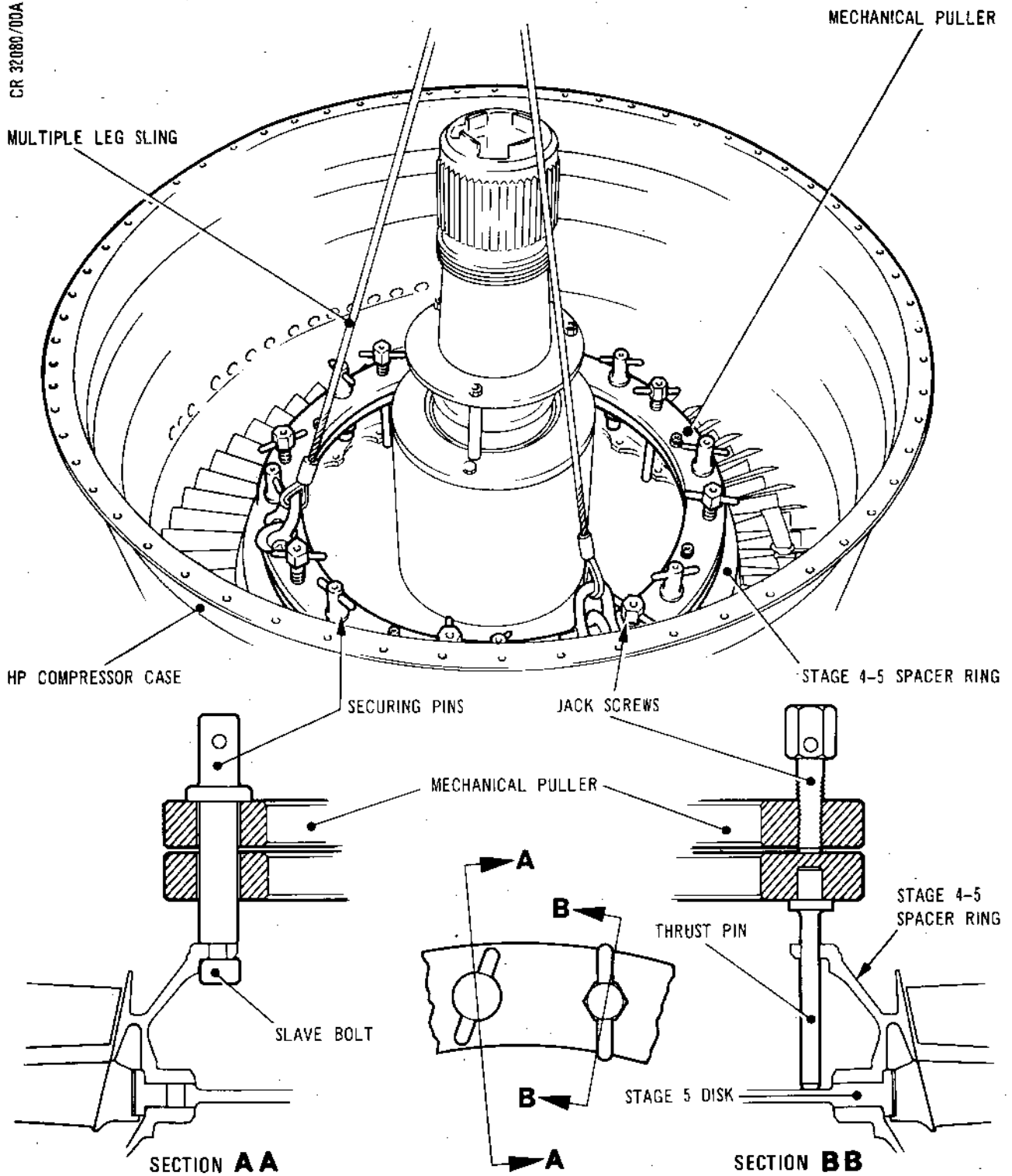
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Releasing Stage 4-5 Spacer Ring from Disk
Figure 136

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- (c) Insert the eight slave bolts into the bolt holes in the spacer flange (from underneath), then insert the securing pins through the holes in the puller plates and screw the pins onto the slave bolts. Ensure that the flats on the bolts locate correctly against the spacer, and the pins are tight.

NOTE: If the securing pin holes do not align with the bolt holes in the spacer, turn the puller and locate the puller thrust pins in different holes, until the securing pin holes align with spacer bolt holes. The misalignment will be due to the nine evenly spaced offset bolt holes in the spacer.

- (d) Screw in on the eight jack screws until they contact the lower plate, then separate the spacer from the disk by screwing in the jack screws in equal progressive increments until the items are separated. Raise the hoist until the spacer is clear of the LP drive shaft, then position and lower the spacer onto a suitable clean flat surface.
- (e) Unscrew the extractor screws and remove the slave bolts from the spacer. Raise the hoist until the spacer is clear, then position and lower the puller onto a suitable surface. Release and remove the sling from the puller and the hoist. Place the spacer in its correct slot in the container (Tool 1441).

- (3) Release the stage 5 disk from the stage 5 - 6 spacer ring using the mechanical puller (Tool 467) and claws (Tool 468) (Ref.Fig.137).

- (a) Assemble a blade retainer (Tool 1166) to each consecutive group of four or five blades until all blades are secured in groups.

NOTE: The blade retainers prevent the blades slipping out of the disk when the disk is raised.

- (b) Attach a hoist to the multiple leg sling (Tool 1645), then position the hoist over the puller and secure the sling to the puller eye bolts with the sling shackles.

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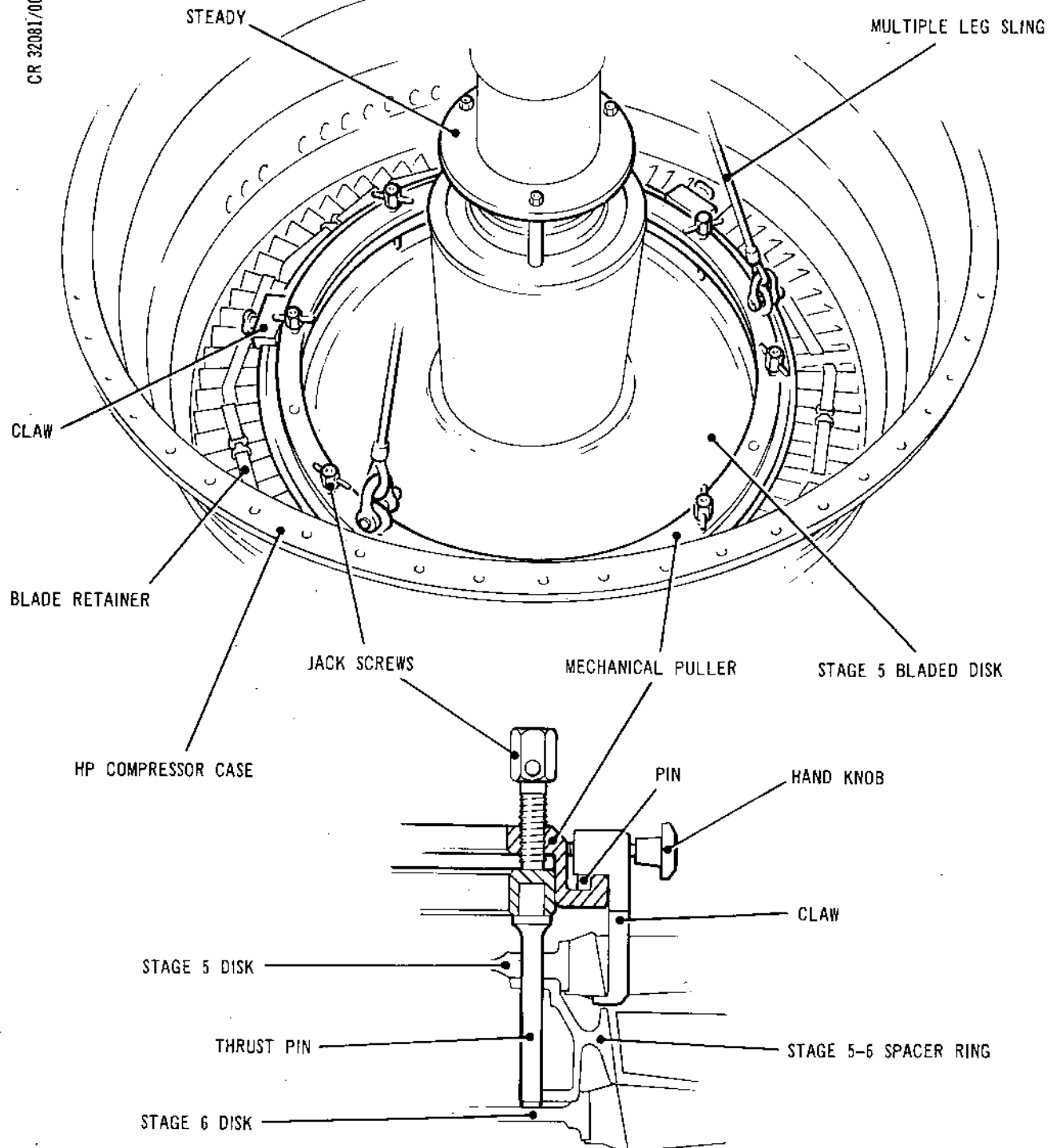


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Releasing Stage 5 Disk from Spacer Ring
Figure 137

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- (c) Position and lower the puller into the case, align the puller thrust pins with the holes in the disk, then lower the pins into the bolt holes and rest the pins on the disk below.
 - (d) Evenly space the three claws around the puller and engage the two pins of each claw in the recess in the top plate of the puller and insert the two ends of each claw in a cut-away in the disk between the disk and spacer. If the claws are not aligned with the cut-away, unscrew the jack screws in the top plate to lower the claws until they align with the cut-away, then tighten each claw hand knob to secure each claw end in the cut-away.
 - (e) Screw the jack screws into the plate in equal progressive increments until the disk is released from the spacer ring.
 - (f) Unscrew the jack screws, then release the claw hand knobs and withdraw the claws from the disk and the puller.
 - (g) Raise the hoist until the puller is clear of the LP drive shaft, then position and lower the puller onto a suitable surface. Disconnect the sling from the hoist, then release and remove the sling from the puller.
- (4) Assemble the multiple leg sling (Tool 404) to the stage 5 disk (Ref.Fig.128).
- (a) Attach a hoist to the lifting ring of the sling, then position the hoist over the disk.
 - (b) Ensure that the three lifting clip chains are positioned in the outermost slot of each plate. Loosen the wingnut in each lifting clip, then ensuring that the three clips are evenly disposed around the disk, locate each clip under a blade.
 - (c) Position the keep plate (of each lifting clip) over the top of a blade, and ensuring that the keep and lifting clips are abutting the blades, secure each clip with its wingnut.

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- (5) Steadily raise the hoist until the disk is clear of the LP drive shaft, ensuring that it does not swing causing damage to the blades. Position and lower the disk onto a suitable pallet, then release the sling from the blades and disconnect the hoist from the sling. Assemble the blade protector/retaining band (Tool 1130) around the tips of the blades. Collect the bolts resting on the stage 6 disk and place the bolts in a container.

H. Remove the HP Compressor Front Case from the Rear Case.

- (1) Assemble the multiple leg sling (Tool 1053) to the front case.
 - (a) Attach a hoist to the lifting ring of the sling, then position the sling over the front case.
 - (b) Remove the thumbscrews from the attachments brackets, then evenly dispose the three brackets on the front (top) flange of the case and secure them with the thumbscrews.
- (2) Release and remove all nuts, bolts and brackets from the abutment flanges of the compressor front and rear cases. Place the items in suitable containers.
- (3) Steadily raise the hoist until the case is clear of the LP drive shaft, ensuring that the case does not swing causing damage to the stator vanes. Position and lower the case onto a suitable pallet.
- (4) Release and remove the sling from the case and the hoist.

NOTE: If the assembly is not to be worked on immediately, rest the wooden protector (Tool 1359) on the stage 6 blades in the rear case.

J. Remove the Stage 5 - 6 Spacer Ring, Stage 6 Bladed Compressor Disk and Stator Vanes.

- (1) Unscrew and remove the 36 nuts securing the stage 5 - 6 spacer ring to the stage 6 disk using the cranked ring wrench (Tool 1591). Locate the driver (Tool 1611) over the end of the bolt, then drift the bolt out of the spacer. Repeat the procedure with the remainder of the bolts.

NOTE: Remove the protector (if assembled) from the compressor blades.

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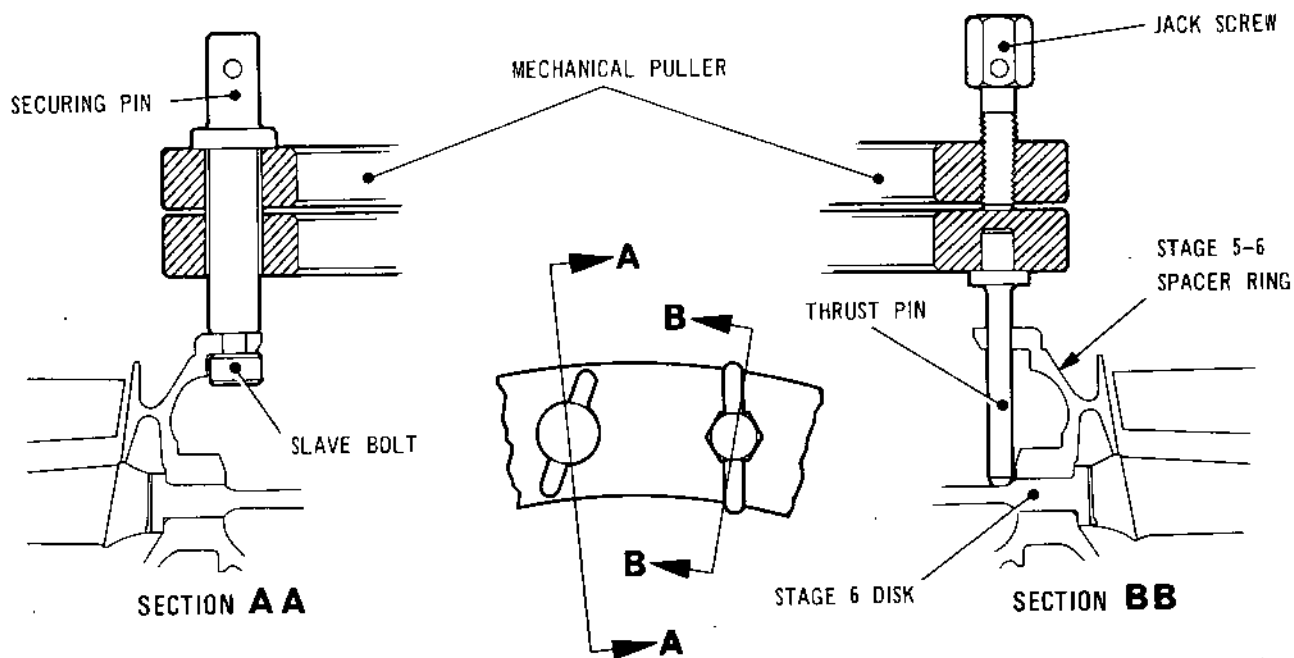
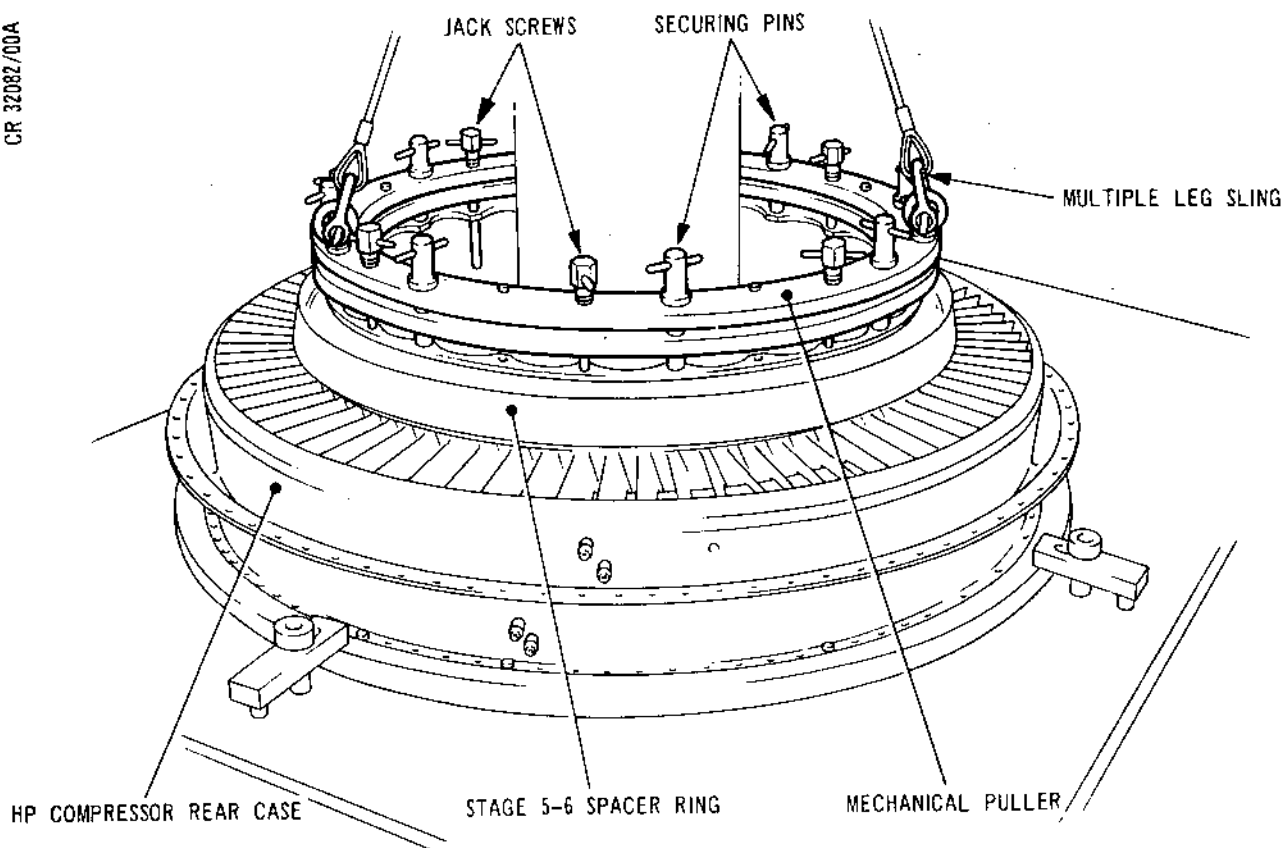
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Releasing Stage 5-6 Spacer Ring from Disk
Figure 138

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- (2) Remove the stage 5 - 6 spacer ring from the stage 6 disk using the mechanical puller (Tool 473), slave bolts (Tool 475) and securing pins (Tool 474) (Ref. Fig.138).

- (a) Attach a hoist to the multiple leg sling (Tool 1645) then position the hoist over the puller and secure the sling to the puller eye bolts with the sling shackles.
- (b) Position and lower the puller into the case, align the puller thrust pins with the bolt holes in the spacer, then lower the pins into the bolt holes and rest the pins on the disk below.
- (c) Insert the eight slave bolts into the bolt holes in the spacer flange (from underneath), then insert the securing pins through the holes in the puller plates and screw the pins onto the slave bolts. Ensure that the flats on the bolts locate correctly against the spacer, and the pins are tight.

NOTE: If the securing pin holes do not align with the bolt holes in the spacer, turn the puller and locate the puller thrust pins in different holes, until the extractor screw holes align with spacer bolt holes. The misalignment will be due to the nine evenly spaced offset bolt holes in the spacer.

- (d) Screw in on the eight jack screws until they contact the lower plate, then separate the spacer from the disk by screwing in the jack screws in equal progressive increments until the items are separated. Raise the hoist until the spacer is clear of the LP drive shaft, then position and lower the spacer onto a suitable clean flat surface.
- (e) Unscrew the extractor screws and remove the slave bolts from the spacer. Raise the hoist until the spacer is clear, then position and lower the puller onto a suitable surface. Release and remove the sling from the puller and the hoist. Place the spacer in its correct slot in the container (Tool 1441).

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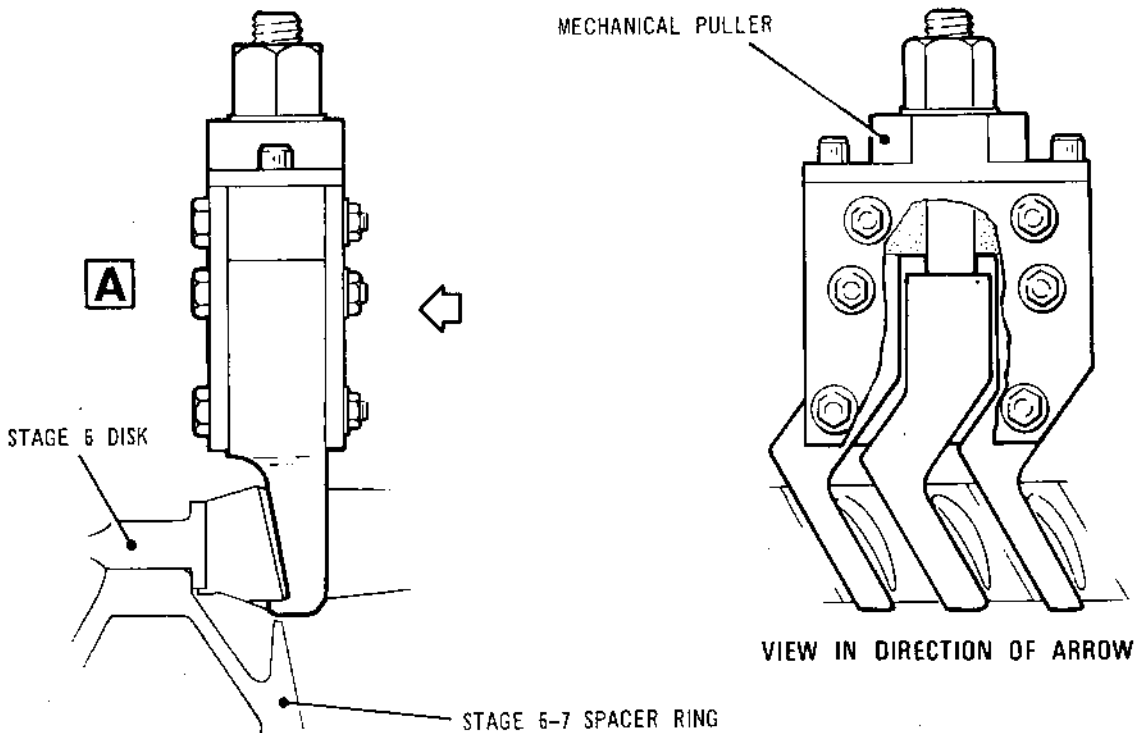
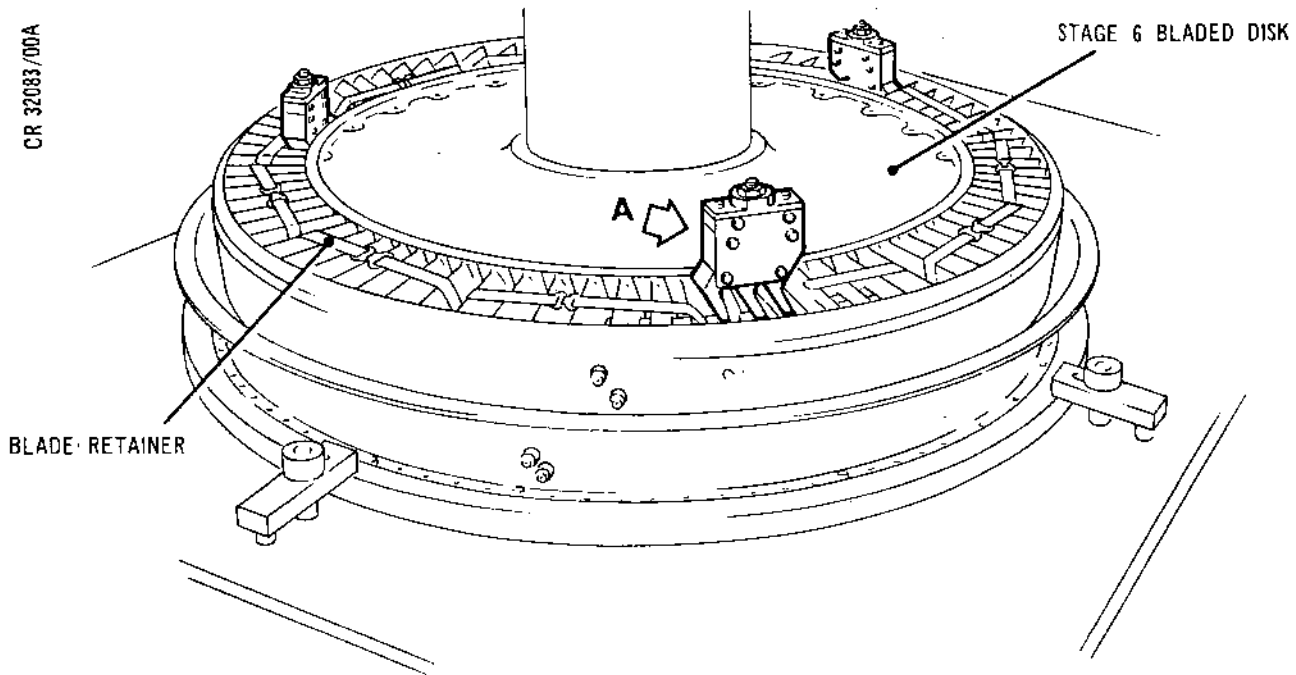


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Releasing Stage 6 Disk from Spacer Ring
Figure 139

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- (3) Release the stage 6 disk from the stage 6 - 7 spacer ring using the mechanical puller (Tool 469) (Ref.Fig.139).
 - (a) Assemble a blade retainer (Tool 1166) to each consecutive group of five or six blades until all the blades are secured in groups.

NOTE: The blade retainers prevent the blades slipping out of the disk when the disk is raised.
 - (b) Evenly space the three pullers around the disk at the cut-away positions in the disk, then insert the three claws of each puller into the cut-away in the disk between the disk and the spacer.
 - (c) In equal progressive increments, screw the nuts of the pullers onto the studs drawing the centre claws upwards until the disk is separated from the spacer ring.
 - (d) Release the nuts of the pullers, then withdraw the pullers from the disk/spacer ring.
- (4) Assemble the multiple leg sling (Tool 404) to the stage 6 disk (Ref.Fig.128).
 - (a) Attach a hoist to the lifting ring of the sling, then position the hoist over the disk.
 - (b) Ensure that the three lifting clip chains are positioned in the outermost slot of each plate. Loosen the wingnut on each lifting clip, then ensuring that the three clips are evenly disposed around the disk, locate each clip under a blade.
 - (c) Position the keep plate (of each lifting clip) over the top of a blade, and ensuring that the keep and lifting clips are abutting the blades, secure each clip with its wingnut.
- (5) Steadily raise the hoist until the disk is clear of the LP drive shaft, ensuring that it does not swing causing damage to the blades. Position and lower the disk onto a suitable pallet, then release the sling from the blades and disconnect the hoist from the sling. Assemble the protector/retaining band (Tool 1130) around the tips of the blades.

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- (6) Release and remove from the outside of the case, the two bolts and spacers securing each of the three bolted and one probe bolted stator vanes to the case. Discard the bolts.
- (7) Identify the bolted stator vane aligned with the loading (cut-away) slot in the case, then pivot the inner end of the vane upwards and withdraw the outer end of the vane from the case loading slot. Ensure that the platforms (Tool 1390) are assembled to the containers (Tool 1373), then insert the vane into a platform.
- (8) Ease the remainder of the vanes, in turn, along the groove in the case and remove in the same manner as the bolted vane. To assist the movement of the vanes, apply lubricant A to the groove in the case. As the vanes are removed, ensure that they are placed in the platforms of the containers.
- (9) On engines to SB.72-8806-313 standard, remove the front and rear liners from the stage 6 vane groove.

K. Remove the Stage 6 - 7 Spacer Ring (Ref.Fig.140).

- (1) Check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8446-172).
- (2) Gain access from underneath the stand and through holes in the rear adapter, and remove the (larger) inner ring of nuts securing the spacer ring and disk to the HP drive shaft using the cranked ring wrench (Tool 1517), discard the nuts. Screw the driver (Tool 762) onto a bolt, then drift the bolt out of the three items. Unscrew the driver from the bolt, then drift the remaining bolts out. Collect all the bolts from the top of the disk, then place the bolts in a suitable container. Bolts to Pre SB.72-99 standard can be retained for further use but SB.72-99 standard and SB.72-8766-291 standard bolts are lifed at one build only and must be discarded at each dis-assembly.

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- (3) Gaining access in the same manner, remove the nuts securing the spacer to the disk using the cranked ring wrench (Tool 1544) and socket wrench (Tool 1619).
- (4) Assemble the puller (Tool 470) to the spacer.
 - (a) Locate in the outer ring of spacer bolt-holes, a hole in line with the centre of a scallop in the inner edge of the spacer. Screw an assembly pin (Tool 1065 or 1067) on to the protruding bolt. Pull up on the assembly pin until the bolt shank is visible then turn the pin clockwise to align the flat on the bolthead with the spacer. Assemble a retaining clip (Tool 1038) to the bolt to secure it in the raised position then remove the assembly pin, the clip should abut the spacer and radiate outward. Draw up and retain a further five bolts, leaving five bolt-holes between each.

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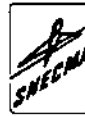
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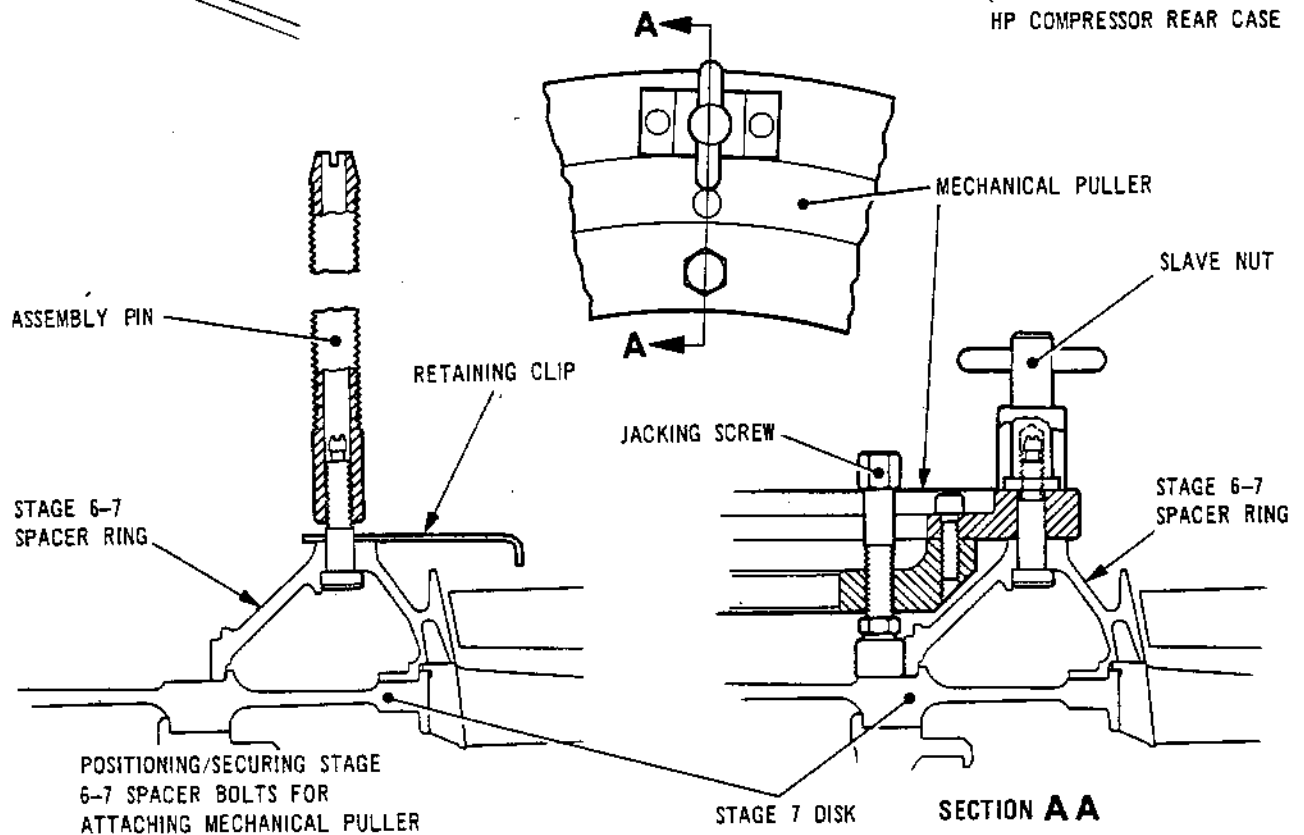
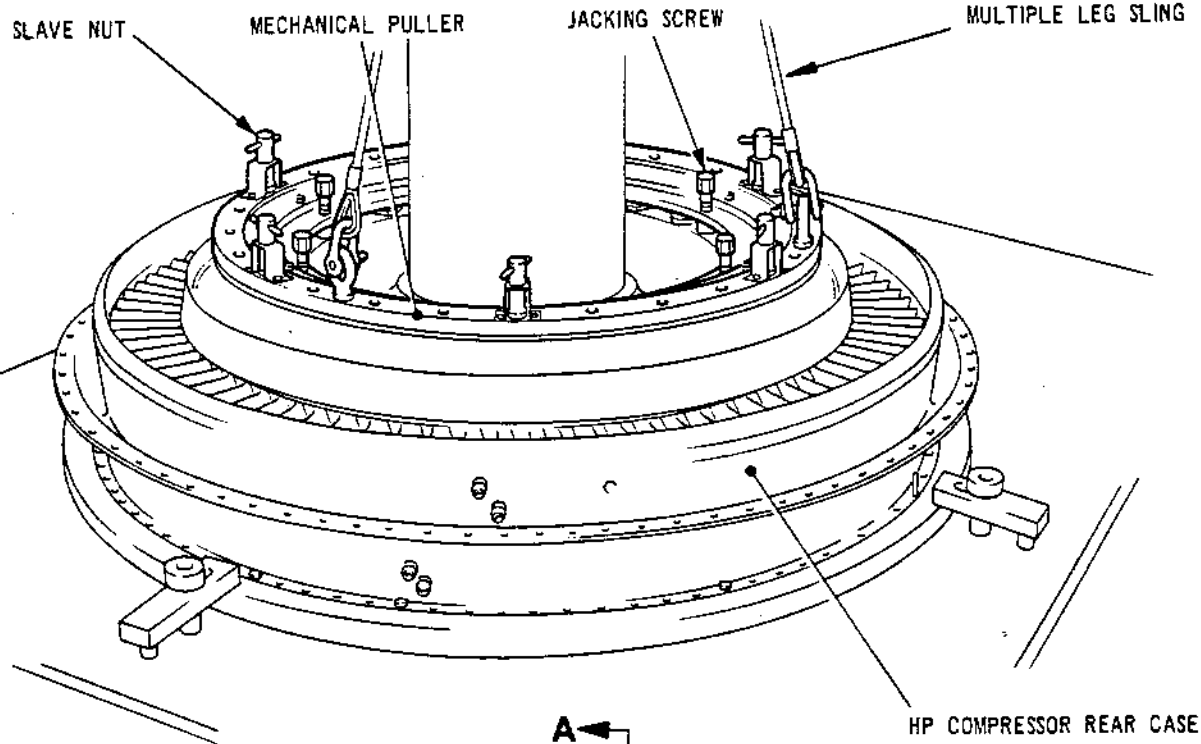


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Releasing Stage 6-7 Spacer Ring from Disk
Figure 140

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- (b) Attach a hoist to the multiple leg sling (Tool 1645), then position the hoist over the puller and secure the sling to the puller eye-bolts with the sling shackles.
 - (c) Position and lower the puller into the case, align the puller (tommy bared) slave nuts with the (clipped) bolts, and lower the puller onto the bolts until the slave nuts can be screwed onto the bolts. Lower the puller, screwing the slave nuts onto the bolts, until the puller is nearly touching the retaining clips, then pull the clips off the bolts, lower the puller to abut the spacer and fully tighten the slave bolts.
- (5) Screw in on the jacking screws until they abut the disk, then separate the spacer from the disk by screwing in the jacking screws in equal progressive increments. When released, raise the hoist until the spacer is clear of the LP drive shaft, remove the bolts from the outer flange of the spacer (from underneath), then position and lower the spacer onto a suitable clean flat surface.
- (6) Unscrew the puller slave nuts, then raise the hoist and position and lower the puller onto a suitable surface. Release and remove the sling from the puller and the hoist. Remove the bolts from the spacer and place in a suitable container with the bolts from the disk. Place the spacer in its correct slot in the container (Tool 1441).
- L. Remove the Stage 7 Compressor Disk from the HP Compressor Drive Shaft.
- (1) Ensure that a platform (Tool 1390) is assembled to the container (Tool 1373), then withdraw the rotor blades from the disk and insert them in the container platform.

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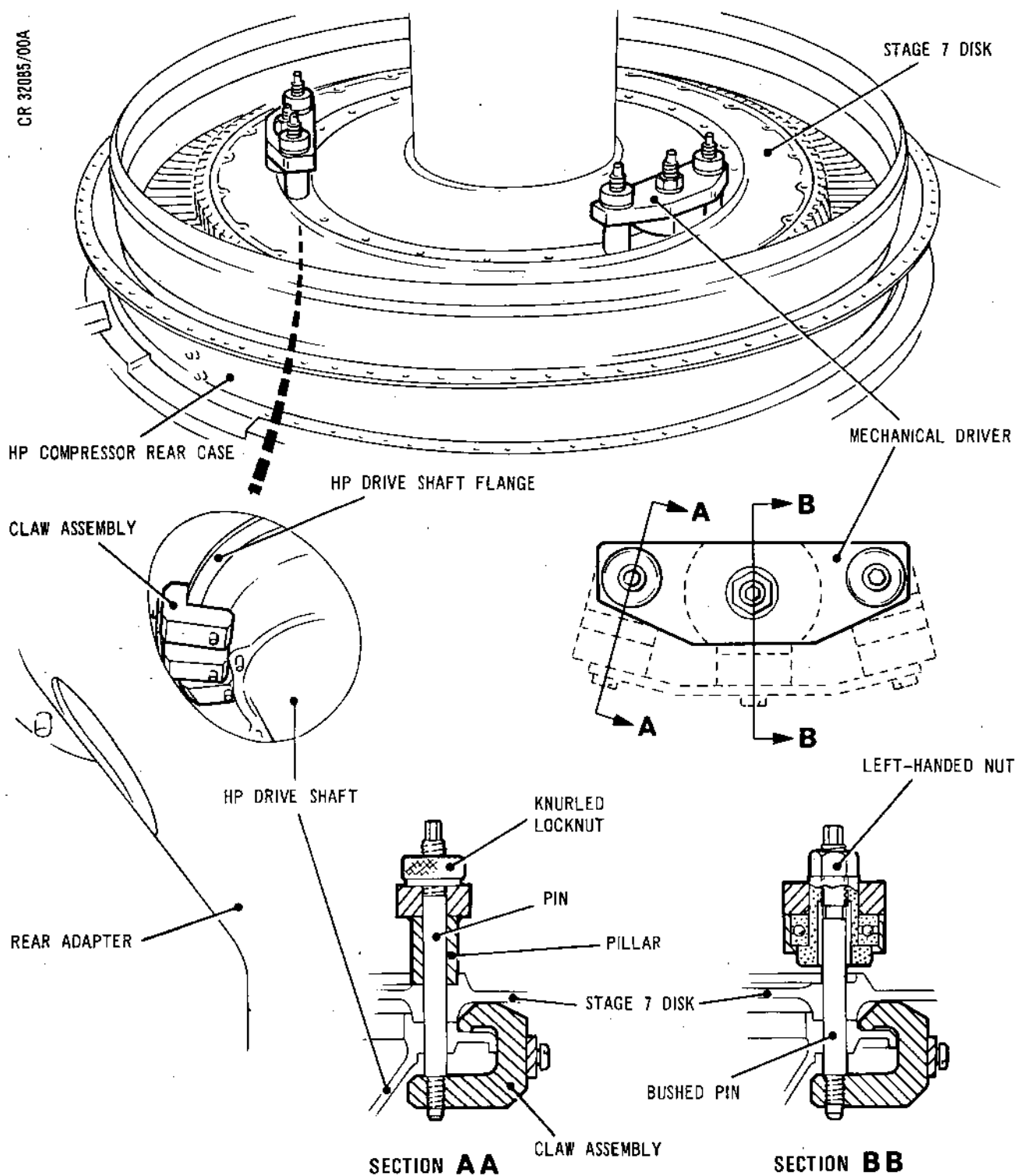
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Releasing Stage 7 Disk from HP Drive Shaft
Figure 141

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- (2) Assemble the mechanical driver (Tool 476), claw assembly (Tool 477), bushed pin (Tool 479) and pin (Tool 478) to the disk (Ref.Fig.141).
 - (a) Gain access from underneath the stand and through holes in the rear adapter and insert a claw assembly in between the flange on the drive shaft and the disk, and align the tapped holes in the claws with the bolt holes in the disk.
 - (b) Insert the bushed pin into a bolt hole in the top of the disk in line with the centre claw (of the three claws), then screw the pin into the claw and tighten the pin.
 - (c) Lower the centre hole of the driver over the bushed pin and rest the pillars of the driver on the disk. If the pillars do not contact the disk, unscrew the left-hand large nut of the bushed pin.
 - (d) Insert a pin into each of the two outer holes in the driver, and screw a pin into each of the claws. Fully tighten the pins and lock with the knurled locknuts.
 - (e) Evenly dispose two more mechanical drivers and assemble to the disk following the same procedure.
- (3) Screw in on the left-hand large nut on each puller until the bushes contact the bearings in the drivers, then screw in the large nuts in equal progressive increments until the disk is separated from the drive shaft.
- (4) Remove the mechanical drivers, claws and pins from the disk.
 - (a) Release the knurled locknuts, unscrew and remove the two outside pins from each driver, then withdraw the three drivers from the bushed pins.
 - (b) Unscrew and remove the bushed pins from the claw assemblies, and withdraw the claw assemblies from underneath the disk through the access holes in the rear adapter.
- (5) Assemble the multiple leg sling (Tool 1086) to the disk.
 - (a) Attach a hoist to the lifting ring of the sling, then position the hoist over the disk.

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- (b) Remove the thumbnuts from the three adapters, then insert the adapter studs through three evenly spaced outer ring bolt holes in the disk, and screw the thumbnuts onto the studs.
- (6) Steadily raise the hoist until the disk is clear of the LP drive shaft, then position and lower the disk over the container (Tool 1419). Remove the hand nut and clamp plate from the container, then lower and locate the disk on the container locating plate. Assemble the clamp plate and nut to the centre screw of the container and fully tighten the nut. Release and remove the sling from the disk and the hoist.
- M. Remove the HP Compressor Rear Case from the Stand.
- (1) Assemble the multiple leg sling (Tool 1960) to the rear case.
- (a) Attach a hoist to the lifting ring of the sling, then position the sling over the rear case.
- (b) Remove the thumbscrews from the attachment brackets, then evenly dispose the three brackets on the front (top) flange of the rear case and secure them with the thumbscrews.
- (2) Unscrew and remove the slave nuts and bolts securing the rear case to the rear bearing adapter, and release and withdraw the stand clamps.
- (3) Steadily raise the hoist until the case is clear of the LP drive shaft, then position and lower the case onto a suitable pallet.
- (4) Release and remove the sling from the case and the hoist.
- N. Remove the Air Transfer Tube from the HP Compressor Drive Shaft (Ref.Fig.142).
- (1) Release the two bolts, then withdraw the steady (Tool 287) from the LP drive shaft and air transfer tube.
- (2) Attach a hoist to the lifting shackle of the lifting/extracting fixture (Tool 409), then position and lower the fixture over the LP drive shaft. Unscrew and withdraw the thrust plate, then align the five attachment bars with the holes in the end of the air

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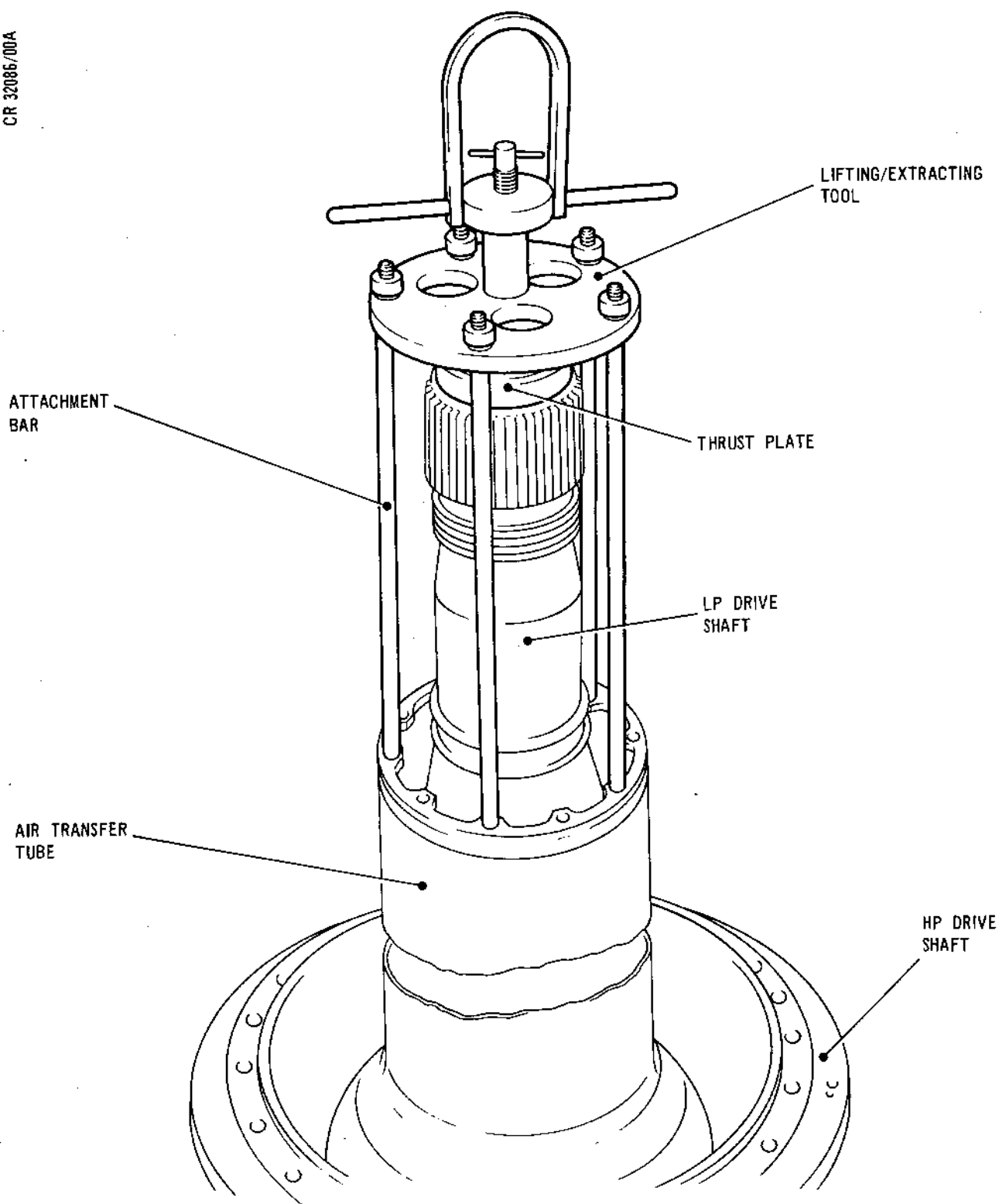
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Removing Air Transfer Tube from HP Drive Shaft
Figure 142



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transfer tube. Screw the bars into the anchor nuts in the tube, then screw in on the thrust plate and locate it over the end of the LP drive shaft.

- (3) Screw in on the thrust plate until the air transfer tube is released from the HP drive shaft, then raise the hoist until the tube is clear of the LP drive shaft. Position and lower the tube onto a suitable pallet, then unscrew the five attachment bars.
- (4) Raise the hoist until the fixture is clear of the air transfer tube, then position and lower the fixture onto a suitable surface. Release the hoist from the fixture.

P. Remove the LP Compressor Drive Shaft from the HP Compressor Drive Shaft.

- (1) Assemble the lifting fixture (Tool 1068) (Ref.Fig.143) to the front (top) end of the LP drive shaft.
 - (a) Unscrew the locknut and withdraw the keep plate from the four body pins and towards the lifting plate.
 - (b) Offer the fixture to the drive shaft and slide the four lobes of the body through the cut-aways in the shaft. Turn the body to locate the lobes behind the lands in the shaft. Push the keep plate towards the shaft locating the two lobes in two of the cut-aways in the shaft and over the four pins of the body. Screw on the locknut and tighten it against the keep plate.
- (2) Assemble the LP drive shaft to the mobile stand or transporter.
 - (a) Attach a hoist to the lifting plate of the fixture, then steadily raise the hoist until the LP drive shaft is clear of the HP drive shaft. Position and lower the shaft in an area free of obstruction.

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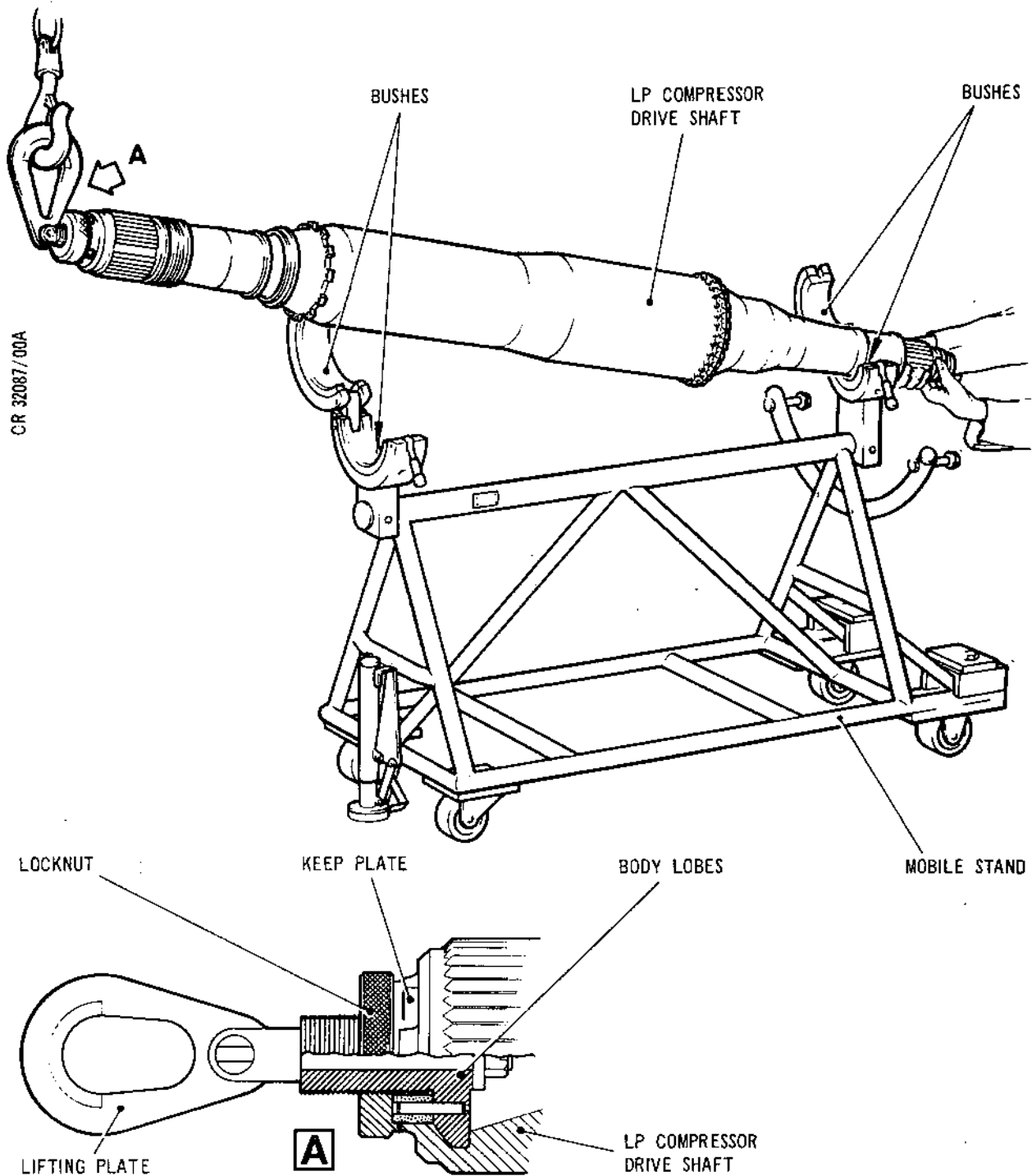
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Removing LP Drive Shaft from the HP Drive Shaft
Figure 143

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- (b) Screw the lifting fixture (Tool 1055) onto the rear (bottom) end of the shaft. Attach a second hoist to the lifting fixture, then raise the hoist to bring the LP drive shaft to the horizontal position.

NOTE: If a second hoist is not available, screw the protector (Tool 408) onto the rear end of the shaft in lieu of the lifting fixture, and support and/or guide the shaft by hand into the stand or transporter.

- (c) Position the transporter (Tool 1092) or mobile stand (Tool 1332) (Ref.Fig.143) under the LP drive shaft. Lower and/or man handle the shaft onto the transporter locating the rear end of the shaft on the small clamp, or onto the mobile stand, having first opened the bushes, and locating the front end of the shaft at the locking end of the stand. Close the bushes and lock them with the knurled nuts.
- (d) Remove the lifting fixture from the front end of the shaft by releasing the locknut, withdrawing the keep plate, then turning the body until its lobes align with the cut-aways in the shaft, withdraw the body. Assemble the protector (Tool 999) to the splines and labyrinth at the front end of the shaft and secure the protector with its thumbnut.
- (e) Unscrew and remove lifting fixture (Tool 1055) from the rear end of the shaft (if assembled), and screw the protector (Tool 408) onto the shaft (unless already assembled).

NOTE: The LP drive shaft can now be transferred to its disassembly section (72-31-04 Disassembly).

Q. Remove the HP Compressor Drive Shaft from the Stand (Ref.Fig.144).

- (1) Attach a hoist to the ring of the beam type sling (Tool 1060) and if the sling is assembled to the stand (Tool 405), unscrew and remove the securing nuts and washers. Raise the hoist and position the sling over the HP drive shaft, then lower the hoist and guide the sling onto the shaft aligning the attachment holes. Offer eight evenly spaced slave

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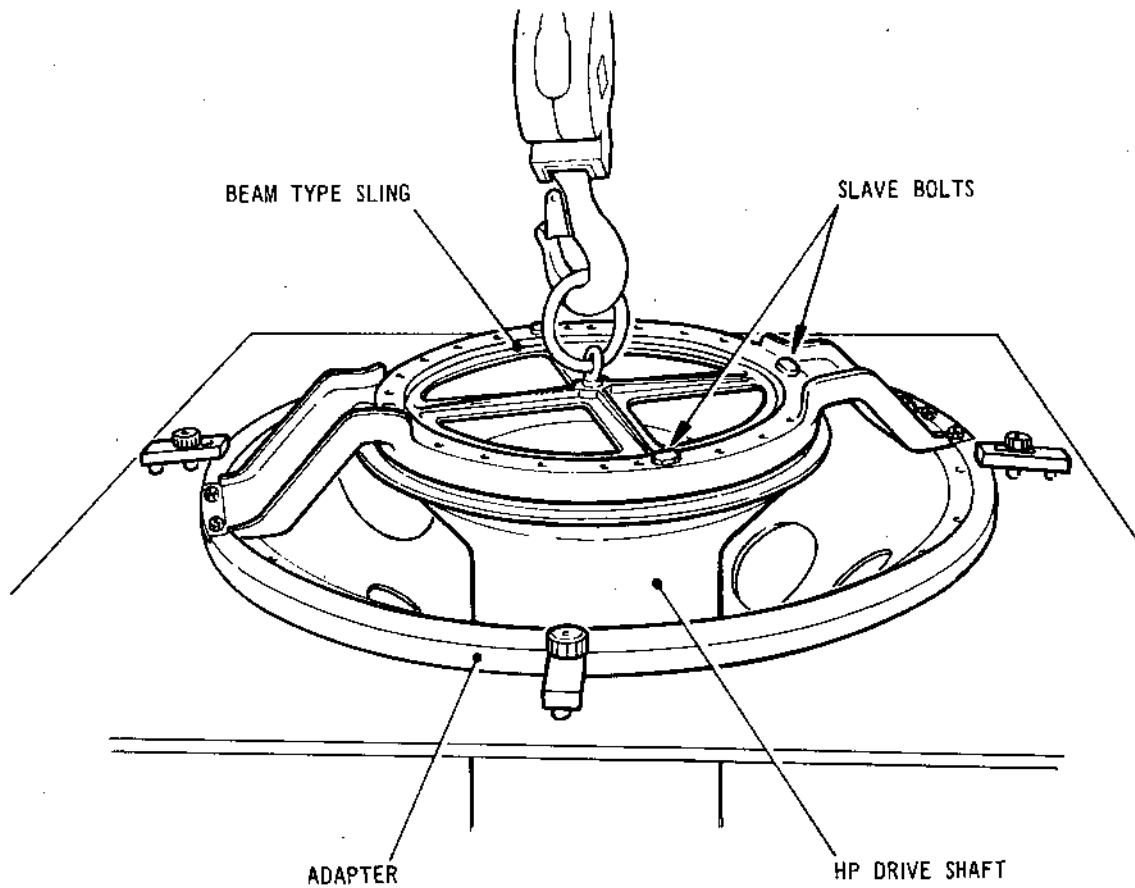


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Removing HP Drive Shaft from Adapter/Stand
Figure 144

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bolts (Tool 385) up through the shaft and sling and screw slave nuts (Tool 385) onto the bolts. Fully tighten the nuts.

- (2) Unscrew the spacer sleeve (Tool 391) from the bottom of the drive shaft, and when released, lower the sleeve into the container in the ground.
- (3) Raise the hoist until the HP drive shaft is clear of the stand, then position the shaft over the stand (Tool 405). Ensure that the stand arms extend upwards, then lower the sling onto the studs in each arm. Assemble and secure a washer and nut to each stud, then release the hoist (Ref.Fig.145).
- (4) Release the stand trunnion lock and rotate the stand arms until the sling is underneath, then apply the lock.
- (5) Remove the roller bearing inner race from the rear (top) end of the HP drive shaft using the mechanical puller (Tool 1234) (Ref.Fig.145).
 - (a) Ensure that the three thumbscrews in the ring are unscrewed allowing the claws to touch the ring, and the centre screw is undone.
 - (b) Lower the puller ring over the drive shaft and align the three claws with the three cut-aways in the drive shaft below the inner race. Screw in the three thumbnuts to engage and lock the claws behind the inner race, then screw in the handle until the pad abuts and locates in the end of the shaft.
 - (c) Screw in the handle and draw the inner race off the shaft until it is released. Unscrew the three thumbnuts, disengage the claws from behind the race, then remove the puller. Lift the inner race from the shaft and place the race in a suitable container.
- (6) Unscrew and remove the nuts and bolts securing the balancing washers to the flange below the bearing journal on the drive shaft. Place the items in a suitable container.
- (7) Screw the lifting fixture (Tool 1069) onto the rear (top) end of the drive shaft and attach a hoist to the lifting eye.

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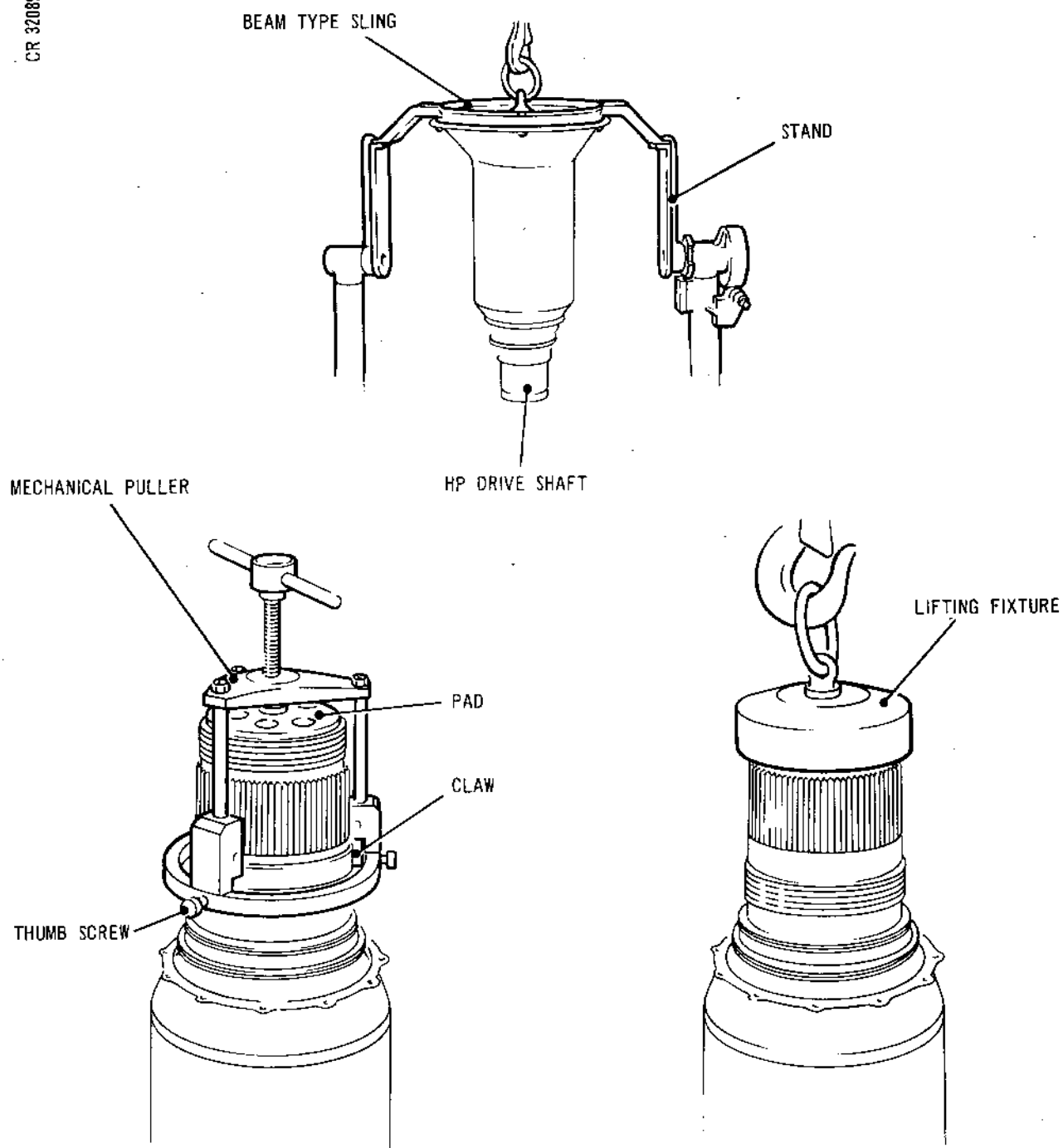
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Removing Bearing Race from HP Drive Shaft
Figure 145

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- (8) Unscrew and remove the slave nuts from underneath the beam type sling, then withdraw the slave bolts from the drive shaft.
- (9) Raise the hoist and position and lower the drive shaft over container (Tool 1453). Release and hinge open the clamp of the container, then support the bottom of the shaft and position it in the container. Unscrew and remove the lifting fixture from the shaft and the hoist, then screw the protector (Tool 1238) on the end of the shaft and lower the shaft into the container. Separate the two halves of the protector (Tool 1241), then position and secure the protector about the labyrinths on the shaft. Assemble the clamp over the shaft and secure it to the container with the retaining pin.
- (10) Attach a hoist to the beam type sling (Tool 1051), then position and lower the sling into the HP compressor stand. Secure the two whips of the sling to the two lifting plates of the adapter with shackles. Raise the hoist until the adapter is clear of the stand, then position and lower the adapter onto a suitable surface and turn it onto its side. Disconnect the sling from the adapter and the hoist, then turn the adapter and rest it on its large flange.
- (11) Withdraw the spacer sleeve (Tool 391) from the container in the ground, then remove the protector (Tool 403) from the sleeve.

NOTE: The disassembly of the HP Compressor Assembly is now completed, but the front/rear compressor cases and the stator vane inner fixing rings must now be transferred to their disassembly section (72-33-01 Disassembly), and the bladed compressor disks to their disassembly section (72-33-02 Disassembly).

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HP COMPRESSOR CASE AND VANES - DISASSEMBLY

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DISASSEMBLY

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HP COMPRESSOR CASE AND VANES - DISASSEMBLY

1. General

- A. Prior to commencing disassembly, refer to 72-09-00 Disassembly for general information.
- B. Throughout the text, special tools are quoted by their reference number; e.g. Tool 1234. For a complete list of the tooling required for disassembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment, Table 1001.

2. Disassemble the Front and Rear Case

- A. Remove Items from the Rear Case (Ref.Fig.101).

- (1) Place the rear case with the rear (end) flange down, onto a flat protected surface, ensuring that the shouldered pin shrunk into the flange does not rest on the surface.
- (2) Unscrew and remove the two blank plugs from the probe mounting block on the outside of the case at the exit guide vane location, then unscrew the four bolts and remove the mounting block. Discard the bolts.

NOTE: It should be noted that removal of the probe mounting block may result in the shearing of the bolts in the compressor casing. If this occurs, refer to the Rolls-Royce, Olympus 593 Project Office, Filton, Bristol, for corrective action.

- (3) Remove from the outside of the case the eight pairs of bolts and sleeves securing the bolted exit guide vanes, ensuring that when the vane located in the loading slot inside the case is released, the vane is pivoted about its root and removed from the loading slot. Ensure that a platform (Tool 1390) is assembled to the container (Tool 1373), then place the vane in the platform. Discard the vane securing bolts.
- (4) Apply lubricant 'A' or release agent 'A' around the vane roots/case groove to assist the removal of the vanes.

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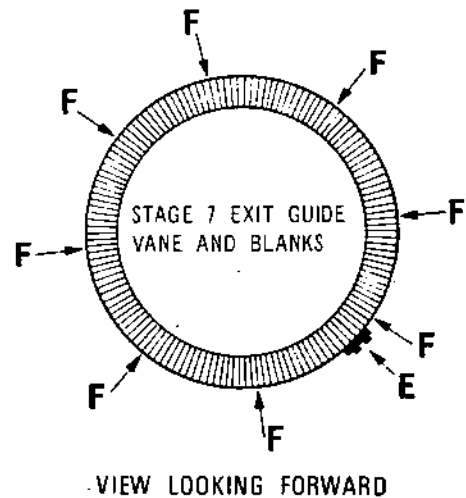
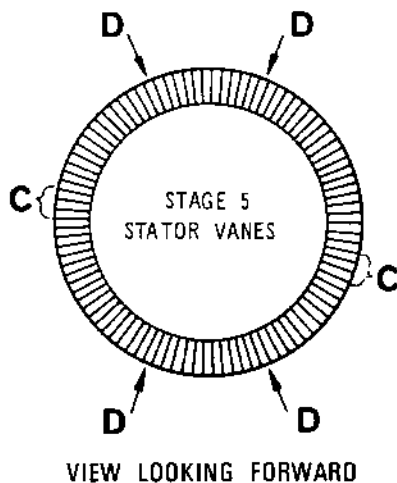
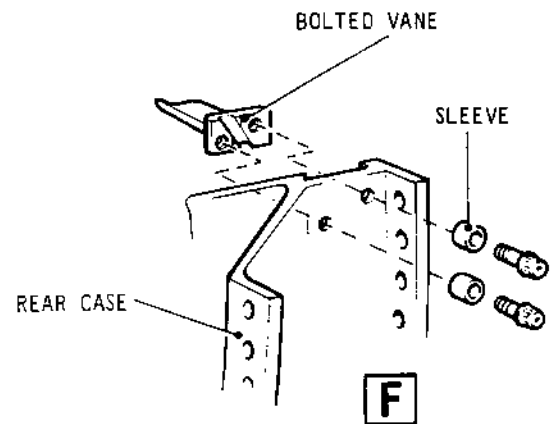
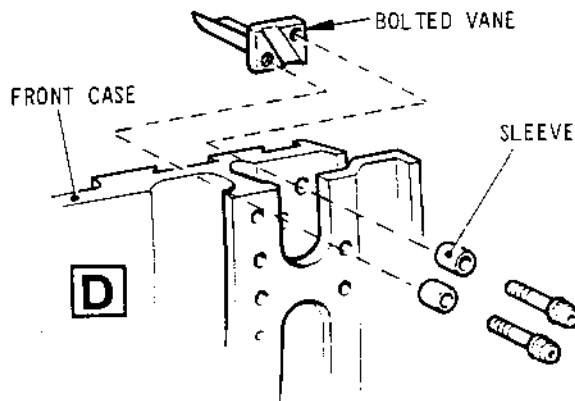
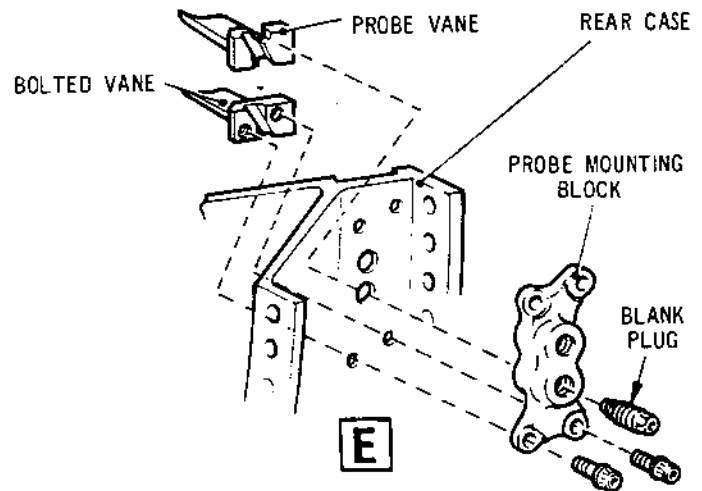
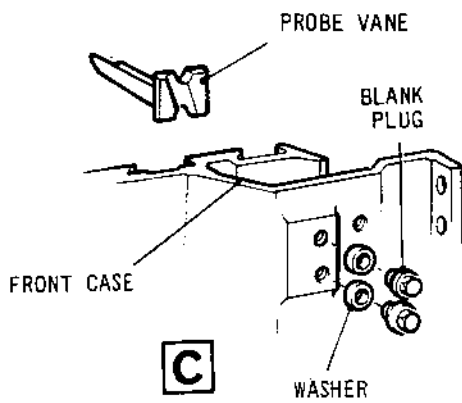


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Positioning of Items on Front and Rear Case
Figure 101



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- (5) In turn, ease the vanes around the groove inside the case and pivot the vanes out of the loading slot. Place the vanes in the container immediately they are removed from the case.
- (6) On engines to SB.72-8806-313 standard, remove the front and rear liners from the stage 7 vane groove.
- (7) Remove from the outside of the case at stage 6 stator vane position, the two pairs of blank plugs.

B. Remove Items from the Front Case (Ref.Fig.101 and 102).

- (1) If required, attach the multiple leg sling (Tool 1053) to the rear (larger) diameter flange of the rear case, and using a hoist, position and lower the case onto a flat protected surface, ensuring that the shouldered pin shrunk into the bottom flange does not rest on the surface. Release and remove the hoist and sling.
- (2) Remove from the outside of the case at stage 5 stator vane position, the four pairs of bolts and sleeves securing the bolted vanes, ensuring that when the vane located in the loading slot inside the case is released, the vane is pivoted about its root and removed from the loading slot. Ensure that a platform (Tool 1390) is assembled to the container (Tool 1373), then place the vane in the platform.
- (3) Apply lubricant 'A' or release agent 'A' around the vane roots/case groove to assist the removal of the vanes.
- (4) In turn, ease the vanes around the groove inside the case and pivot the vanes out of the loading slot. Place the vanes in the container immediately they are removed from the case.
- (5) Remove from the outside of the case at stage 5 stator vane position, the two pairs of blank plugs.

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- (6) Release the two locknuts, then remove the two blank plugs from one of the probe mounting blocks on the outside of the case at stage 4 stator vane position. Unscrew the two retaining bolts and remove the mounting block. Release and remove the remaining probe mounting block, locknuts and blank plugs from the stage 4 stator vane position.

NOTE: It should be noted that removal of the probe mounting block may result in the shearing of the bolts in the compressor casing. If this occurs, refer to the Rolls-Royce, Olympus 593 Project Office, Filton, Bristol, for corrective action.

- (7) Release the two locknuts, then remove the two blank plugs from one of the two probe mounting blocks on the outside of the case at stage 3 stator vane position. Unscrew and remove the two retaining bolts and spacers, and remove the mounting block. Release and remove the remaining probe mounting block, locknuts, blank plugs and spacers from the stage 3 stator vane position.

NOTE: It should be noted that removal of the probe mounting block may result in the shearing of the bolts in the compressor casing. If this occurs, refer to the Rolls-Royce, Olympus 593 Project Office, Filton, Bristol, for corrective action.

- (8) Release and remove from the outside of the front case all pipe, support and mounting brackets that are still attached.

3. Disassemble the Inner Fixing Rings

A. Remove Items from Stage 1 Inner Fixing Ring (Ref.Fig.102).

- (1) Remove the inner fixing ring from its container (Tool 1441) and place the ring on a flat protected surface with the labyrinth extending upwards.

NOTE: Prior to carrying out the following operation, check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8259-153).

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(2) Remove the two nuts securing a retaining plate, then remove the plate and withdraw the bolts from the ring. Release and remove the two remaining retaining plates.

(3) Remove the retaining ring from the remaining bolt and withdraw the bolt.

NOTE: Do not separate the fixing ring from the labyrinth ring.

(4) On engines to SB.72-8694-297 standard, release peening and remove anti-fret liners from the fixing ring groove.

(5) Place the inner fixing ring in the appropriate part of container (Tool 1441).

B. Remove Items from Stage 2 Inner Fixing Ring (Ref.Fig.102).

(1) Remove the inner fixing ring from its container (Tool 1441) and place the ring on a flat protected surface with the labyrinth extending upwards.

NOTE: Prior to carrying out the following operation, check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8259-153).

(2) Remove the two nuts securing a retaining plate, then remove the plate and withdraw the bolts from the ring. Release and remove the two remaining retaining plates.

(3) Remove the retaining ring from the remaining bolt and withdraw the bolt.

NOTE: Do not separate the fixing ring from the labyrinth ring.

(4) On engines to SB.72-8694-297 standard, release peening and remove anti-fret liners from the fixing ring groove.

(5) Place the inner fixing ring in the appropriate part of container (Tool 1441).

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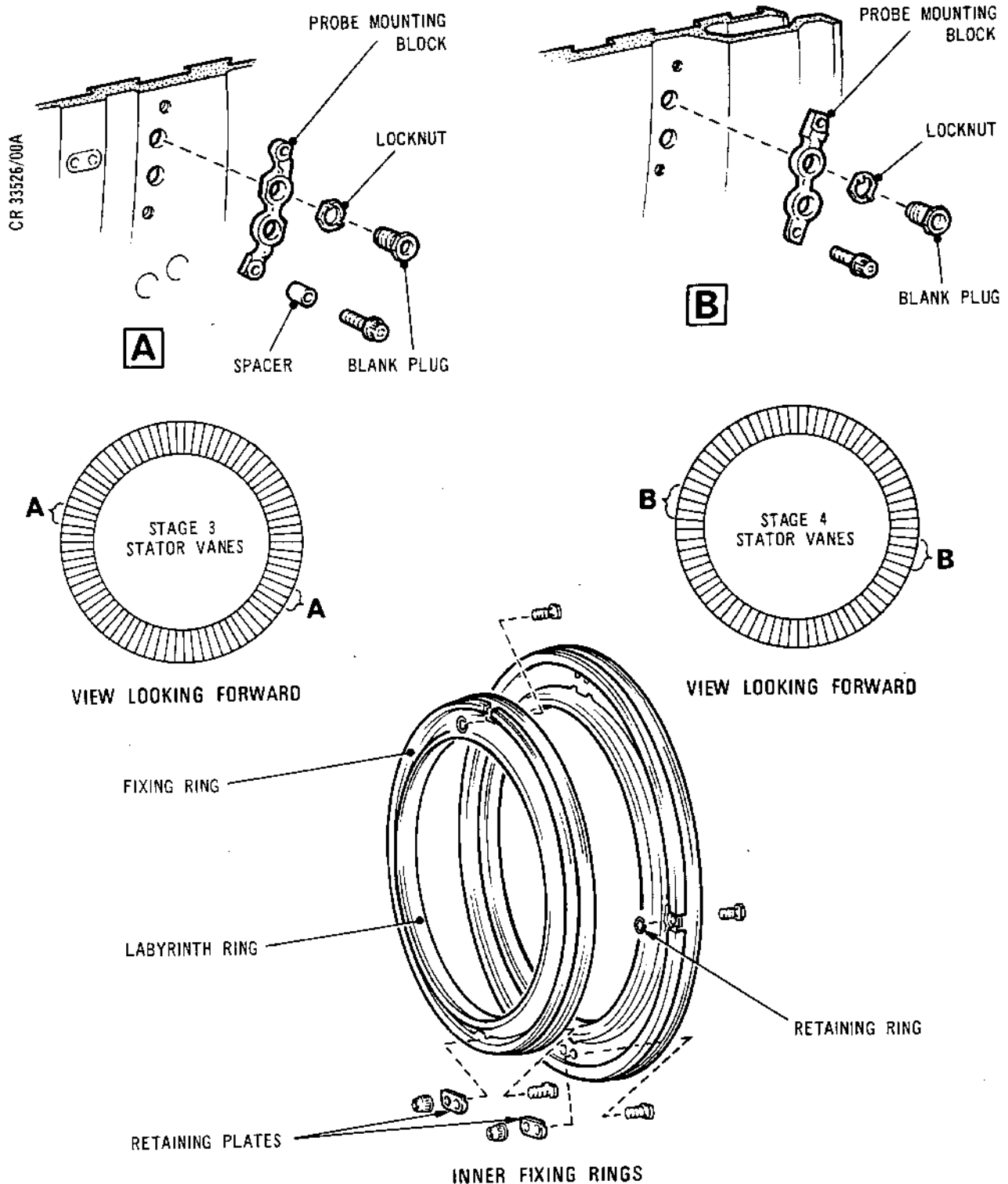
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Positioning of Items on Inner Fixing Rings and Front Case
Figure 102

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HP COMPRESSOR ROTOR - DISASSEMBLY

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HP COMPRESSOR ROTOR - DISASSEMBLY

1. General

- A. Prior to commencing disassembly, refer to 72-09-00 Disassembly for general information.
- B. The HP compressor rotor will, in the main, have been disassembled during the HP compressor assembly disassembly, with the exception of the disks (stages 1 to 6), which will have their blades assembled.
- C. The bladed disks will be received on pallets with protector/retaining bands assembled to the tips of the blades, and the disassembly only entails the removal of the blades from the disks. The blades of stages 3 to 6 are loose in the disks and are only retained by retaining bands, but the blades of stages 1 and 2 are secured by retaining plates.

2. Disassemble the HP Compressor Bladed Rotor Disks (Ref.Fig.101)

A. Remove the Blades from Stage 1 Disk.

(1) Assemble the bladed disk to support (Tool 1676).

(a) Assemble the multiple leg sling (Tool 404) to the stage 1 disk.

(i) Attach a hoist to the lifting ring of the sling, then position the hoist over the disk.

(ii) Ensure that the three lifting clip chains are positioned in No.1 slot of each plate. Loosen the wingnut of each lifting clip, then ensuring that the three clips are evenly disposed around the disk, locate each clip under a blade.

(iii) Position the keep plate (of each lifting clip) over the top of a blade, and ensuring that the keep plate and lifting clips are abutting the blades, secure each clip with its wingnut.

NOTE: The bladed disk may be lifted by hand if preferred, but care must be taken against injury to the operator and/or damage to the blades.

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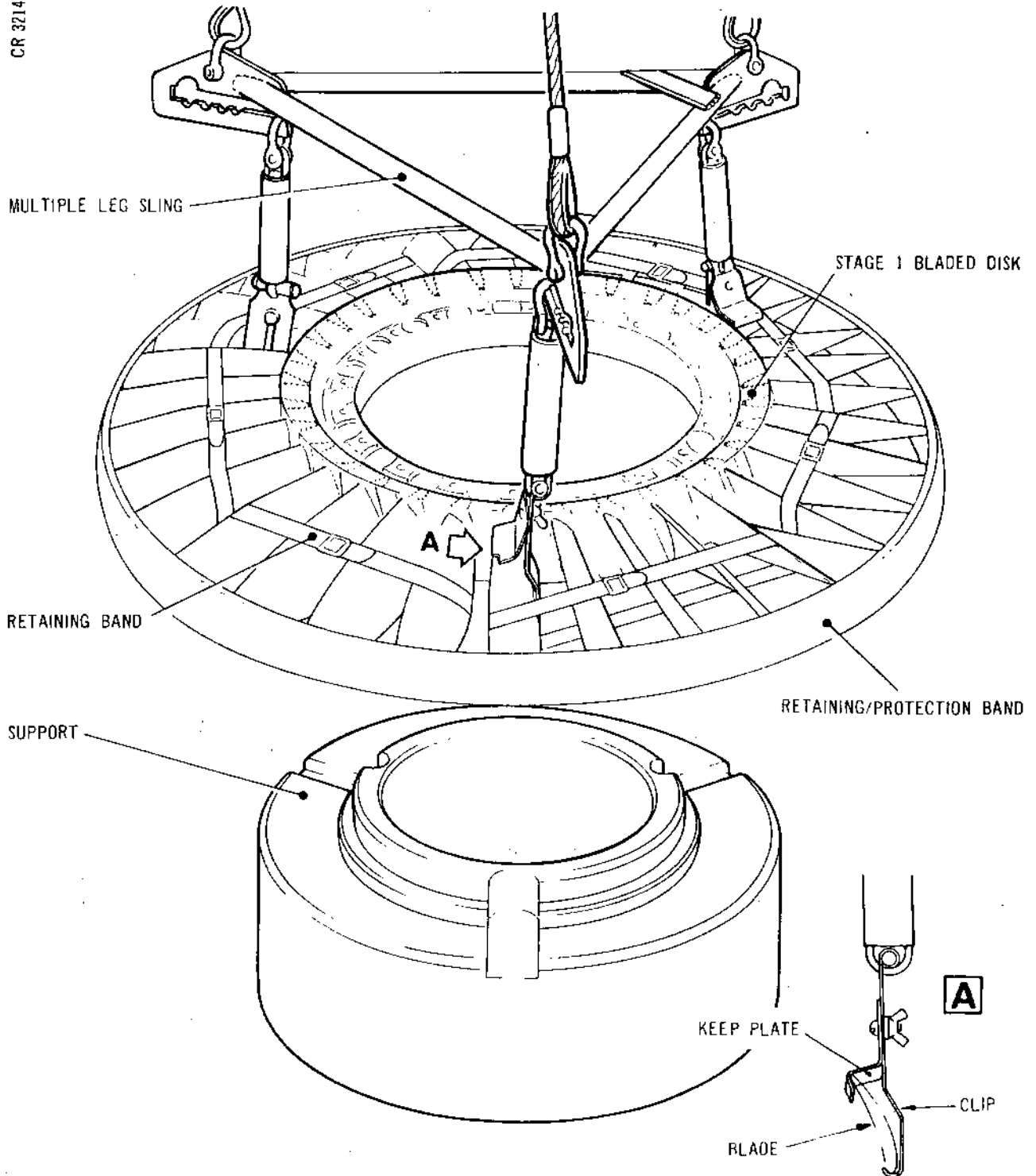
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Removing Blades from Disk
Figure 101

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- (2) Remove the blade protector/retaining band from the tips of the blades, then remove the retaining bands (Tool 1166) in turn and ease the blades out of the disk. Ensure that a platform (Tool 1390) is assembled to a container (Tool 1374), and stow the blades in the platform as they are removed from the disk.
- (3) Remove the disk from the support and stow and secure in the container (Tool 1419) (Ref.para.C.(4)).

E. Remove the Blades from Stage 5 Disk.

- (1) Assemble the bladed disk to the support (Tool 1676) as detailed in para.A.(1), either manually or using the multiple leg sling (Tool 404), ensuring that the clip chains are positioned in No.5 slot.
- (2) Remove the blade protector/retaining band from the tips of the blades, then remove the retaining bands (Tool 1166) in turn and ease the blades out of the disk. Ensure that a platform (Tool 1390) is assembled to a container (Tool 1373), and stow the blades in the platform as they are removed from the disk.
- (3) Remove the disk from the support and stow and secure in the container (Tool 1419) (Ref.para.C.(4)).

F. Remove the Blades from Stage 6 Disk.

- (1) Assemble the bladed disk to the support (Tool 1676) as detailed in para.A.(1), either manually or using the multiple leg sling (Tool 404), ensuring that the clip chains are positioned in No.6 slot.
- (2) Remove the blade protector/retaining band from the tips of the blades, then remove the retaining bands (Tool 1166) in turn and ease the blades out of the disk. Ensure that a platform (Tool 1390) is assembled to a container (Tool 1373), and stow the blades in the platform as they are removed from the disk.
- (3) Remove the disk from the support and stow and secure in the container (Tool 1419) (Ref.para.C.(4)).

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- (2) Remove the blade protector/retaining band from the tips of the blades, then remove the retaining bands (Tool 1166) in turn and ease the blades out of the disk. Ensure that a platform (Tool 1390) is assembled to a container (Tool 1374), and stow the blades in the platform as they are removed from the disk.
- (3) Remove the disk from the support and stow and secure in the container (Tool 1419) (Ref.para.C.(4)).

E. Remove the Blades from Stage 5 Disk.

- (1) Assemble the bladed disk to the support (Tool 1676) as detailed in para.A.(1), either manually or using the multiple leg sling (Tool 404), ensuring that the clip chains are positioned in No.5 slot.
- (2) Remove the blade protector/retaining band from the tips of the blades, then remove the retaining bands (Tool 1166) in turn and ease the blades out of the disk. Ensure that a platform (Tool 1390) is assembled to a container (Tool 1373), and stow the blades in the platform as they are removed from the disk.
- (3) Remove the disk from the support and stow and secure in the container (Tool 1419) (Ref.para.C.(4)).

F. Remove the Blades from Stage 6 Disk.

- (1) Assemble the bladed disk to the support (Tool 1676) as detailed in para.A.(1), either manually or using the multiple leg sling (Tool 404), ensuring that the clip chains are positioned in No.6 slot.
- (2) Remove the blade protector/retaining band from the tips of the blades, then remove the retaining bands (Tool 1166) in turn and ease the blades out of the disk. Ensure that a platform (Tool 1390) is assembled to a container (Tool 1373), and stow the blades in the platform as they are removed from the disk.
- (3) Remove the disk from the support and stow and secure in the container (Tool 1419) (Ref.para.C.(4)).

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HP COMPRESSOR DIFFUSER CASE ASSEMBLY - DISASSEMBLY

For information on the disassembly of the HP Compressor
Diffuser Case Assembly, refer to 72-00-51 Disassembly.

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COMBUSTION SECTION - DISASSEMBLY

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For information on the disassembly of the Combustion
Section, refer to 72-00-51 Disassembly.

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COMBUSTION CHAMBER - DISASSEMBLY

For information on the disassembly of the Combustion Chamber, refer to 72-00-51 Disassembly.

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COMBUSTION CHAMBER OUTER CASE - DISASSEMBLY

For information on the disassembly of the Combustion Chamber Outer Case, refer to 72-00-51 Disassembly.

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HP TURBINE ASSEMBLY - DISASSEMBLY

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For information on the disassembly of the HP
Turbine Assembly, refer to 72-00-51 Disassembly.

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HP TURBINE BEARING SUPPORT - DISASSEMBLY

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For information on the disassembly of the HP Turbine Bearing Support, refer to 72-00-51 Disassembly.

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HP TURBINE NOZZLE - DISASSEMBLY

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For information on the disassembly of the HP
Turbine Nozzle, refer to 72-00-51 Disassembly.

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DISASSEMBLY

72-51-03

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HP TURBINE ROTOR - DISASSEMBLY

1. General

- A. Prior to commencing disassembly, refer to 72-09-01 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001.
- C. The HP turbine rotor sub-assembly is conveyed to the disassembly area on a transport pallet. This incorporates support blocks upon which the turbine assembly rests, thus facilitating the installation of turbine lifting equipment. Turbine blades are interlocked and cannot be removed separately. The complete blade assembly is evenly removed in progressive stages from the turbine disk.

2. Prepare to Remove Turbine Blades

NOTE: If a dynamic balance check of the HP turbine rotor is required transfer the turbine rotor to the HP compressor sub-assembly area (Ref.72-51-03, Assembly).

A. Install Turbine Rotor in Mobile Stand (Ref.Fig.101).

- (1) Secure lifting fixture (Tool 1113) to the end of mandrel (Tool 139). Ensure that the securing bolt is tightened.
- (2) Prepare mobile stand (Tool 1111) to accept the mandrel.
 - (a) Check that the clamp support tubes are securely held in the vertical position by the pins located on the angled support tubes.
 - (b) Open the clamps in readiness for the mandrel and lower the mandrel on to the clamps.
- (3) Assemble mandrel extension (Tool 1135) to the end of the mandrel and secure it with four nuts and washers.

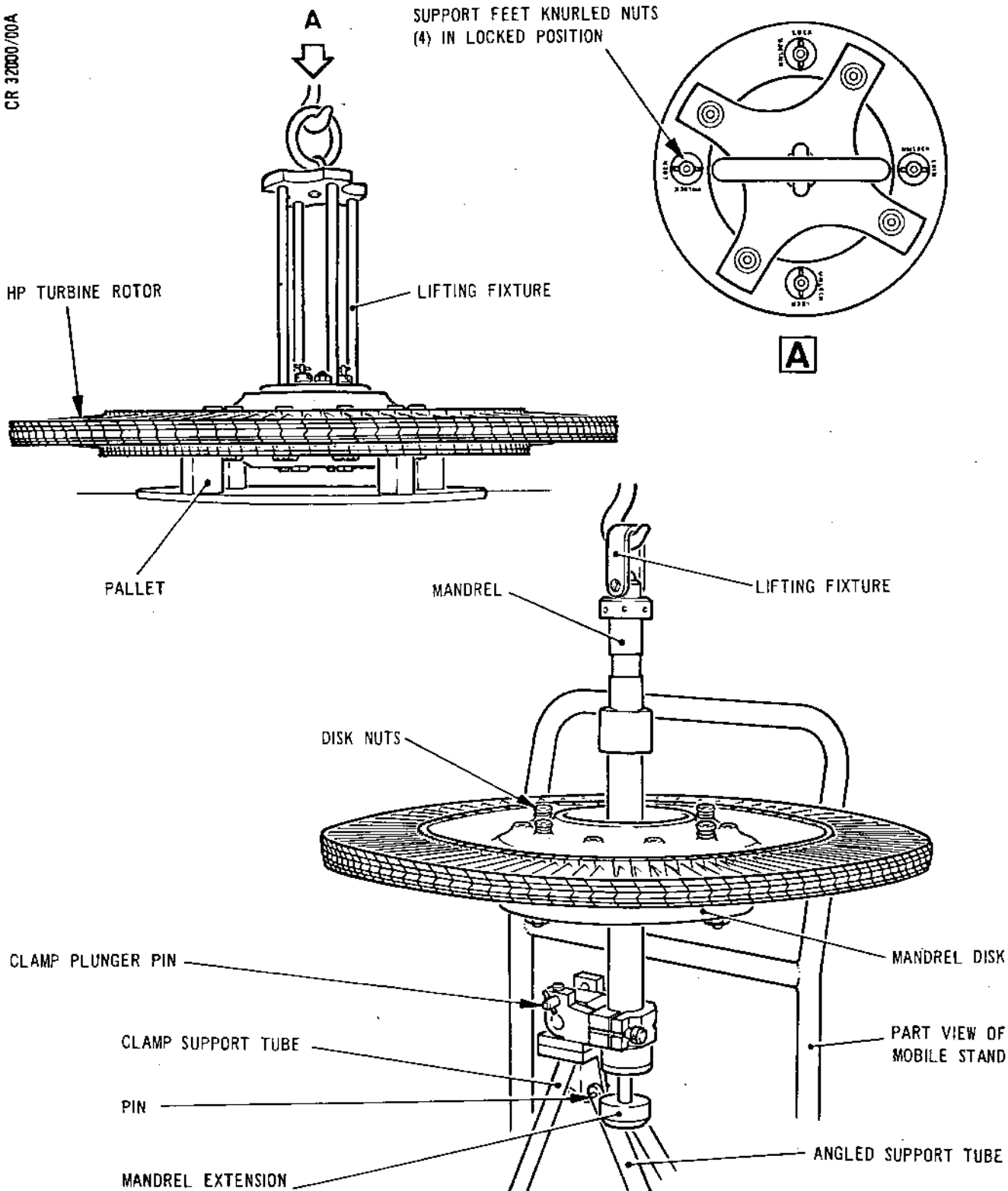


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Assembling HP Turbine Rotor to Mobile Stand
Figure 101

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- (4) Close the clamp positioned near the mandrel extension. Swivel the mandrel to the vertical position so that serrations in the disk are uppermost. Remove the nuts from the disk studs.

NOTE: Each clamp is secured vertically or horizontally by a plunger type pin which must be released or engaged by hand.

- (5) Assemble lifting fixture (Tool 1120) to the HP turbine rotor disk.
 - (a) Ensure that the rotor is securely positioned on the pallet (Tool 1082).
 - (b) Carefully lower the lifting fixture into the centre bore of the disk. Engage the support feet by turning the knurled nuts to the locked position.
- (6) Attach a crane hoist to the lifting fixture and carefully position and lower the turbine rotor over the vertical mandrel and locate over the studs. Secure the turbine rotor with the disk nuts removed earlier. Release and remove the lifting fixture from the turbine rotor.

B. Install Turbine Rotor in Blading Fixture (Ref.Fig.102).

- (1) Place the blade platform stand (Tool 954) on the top of the blading fixture (Tool 1122).
- (2) Attach a crane hoist to the lifting fixture on the end of the mandrel, then position and lower the turbine/mandrel into the blading fixture and by adjusting the hand wheel of the fixture, ensure that the underside of the blades are slightly above the blade platform stand.

3. Turbine Blades Slackness Check

A. Checking Procedure (Ref.Fig.102).

- (1) Carefully check each blade for movement. This check is done by hand.

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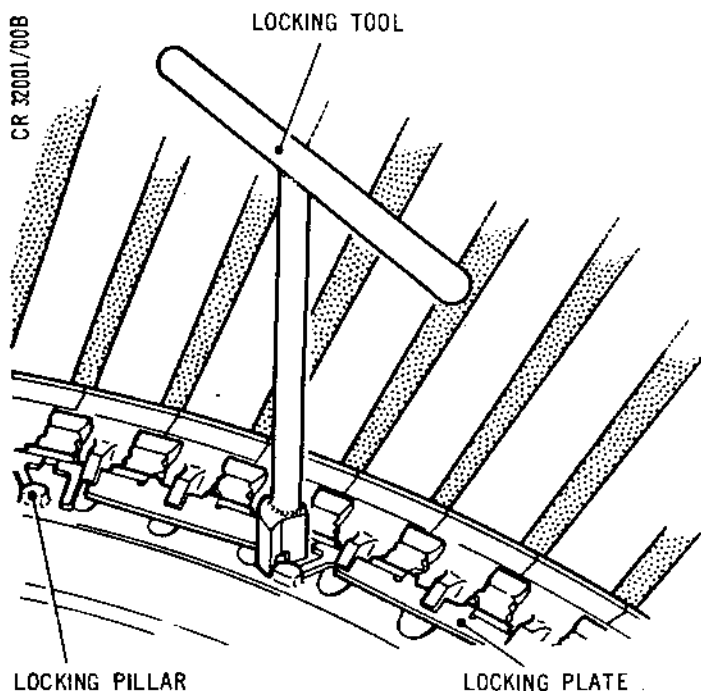


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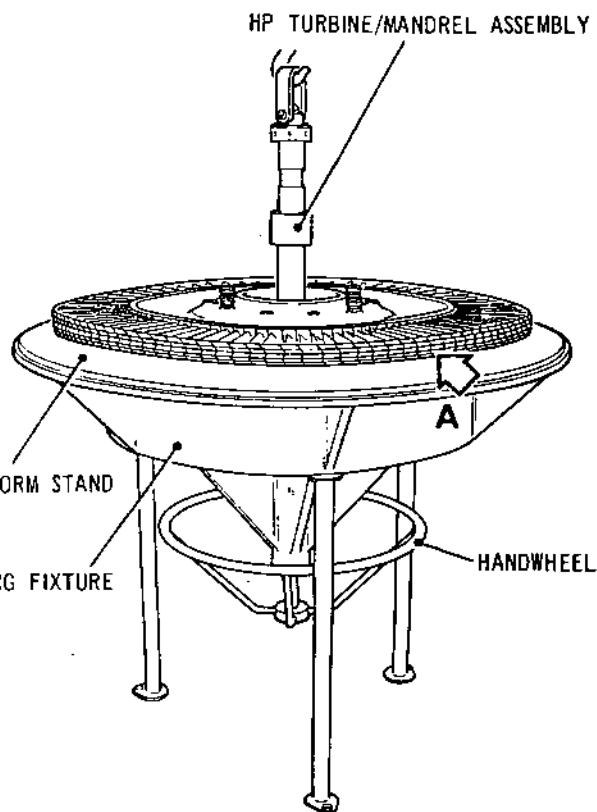
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LOCKING PILLAR

LOCKING PLATE

REMOVAL OF LOCKING PLATES
FROM TURBINE BLADES

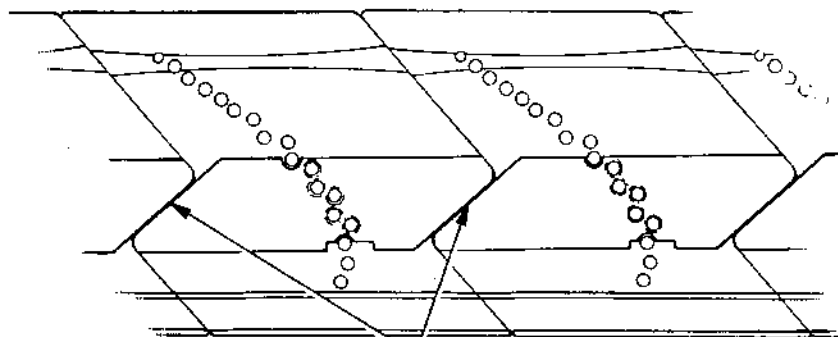


HP TURBINE/MANDREL ASSEMBLY

BLADE PLATFORM STAND

TURBINE DISK BLADING FIXTURE

HANDWHEEL



LOCATIONS OF GAPS CHECK

A

Assembling Turbine Disk to Blading Fixture for
Removing Blades
Figure 102

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72-51-03

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(2) If movement is evident and a clearance occurs at the centre section of the shroud interlocking joints, measure the gaps as follows.

- (a) Evenly and progressively shim the gaps around the total circumference of the interlocking shroud assembly. Initially use one shim only of no more than 0.0015 in. (0,0381 mm) thickness at each gap position. If the gap is less than the shim thickness, shim alternate gaps. Progressively increase the shim thickness at each gap until the maximum thickness is achieved.
- (b) Record the mean thickness of final shimming, this must be no greater than 0.001 in. (0,0254 mm). If the mean gap exceeds the given limit the blades are unacceptable for further engine running and must be rejected.

4. Remove Turbine Blades from Turbine Disk

A. Remove Locking Plates from Turbine Blades (Ref.Fig.102).

- (1) Use locking tools (Tool 1080 and 1081), release the locking plates.
 - (a) Bend the legs of each locking plate away from the turbine disk locking pillars until the plates are released.
 - (b) Remove and discard the locking plates.

B. Remove Turbine Blades.

NOTE: Owing to the interlocking turbine blade shrouds, the blades cannot be removed from the turbine disk singly in one operation.

- (1) Use driver (Tool 907) and a light-weight hammer, carefully tap each blade in turn at the solid section of the blade root to effect a gradual and even removal of the blades from the turbine disk. Adjust the hand wheel on the blading fixture to maintain a clearance between the fixture and the blades.
- (2) Place the blades in containers (Tool 1425) as they are released from the disk. Identify rejected blades clearly with the reason for rejection.

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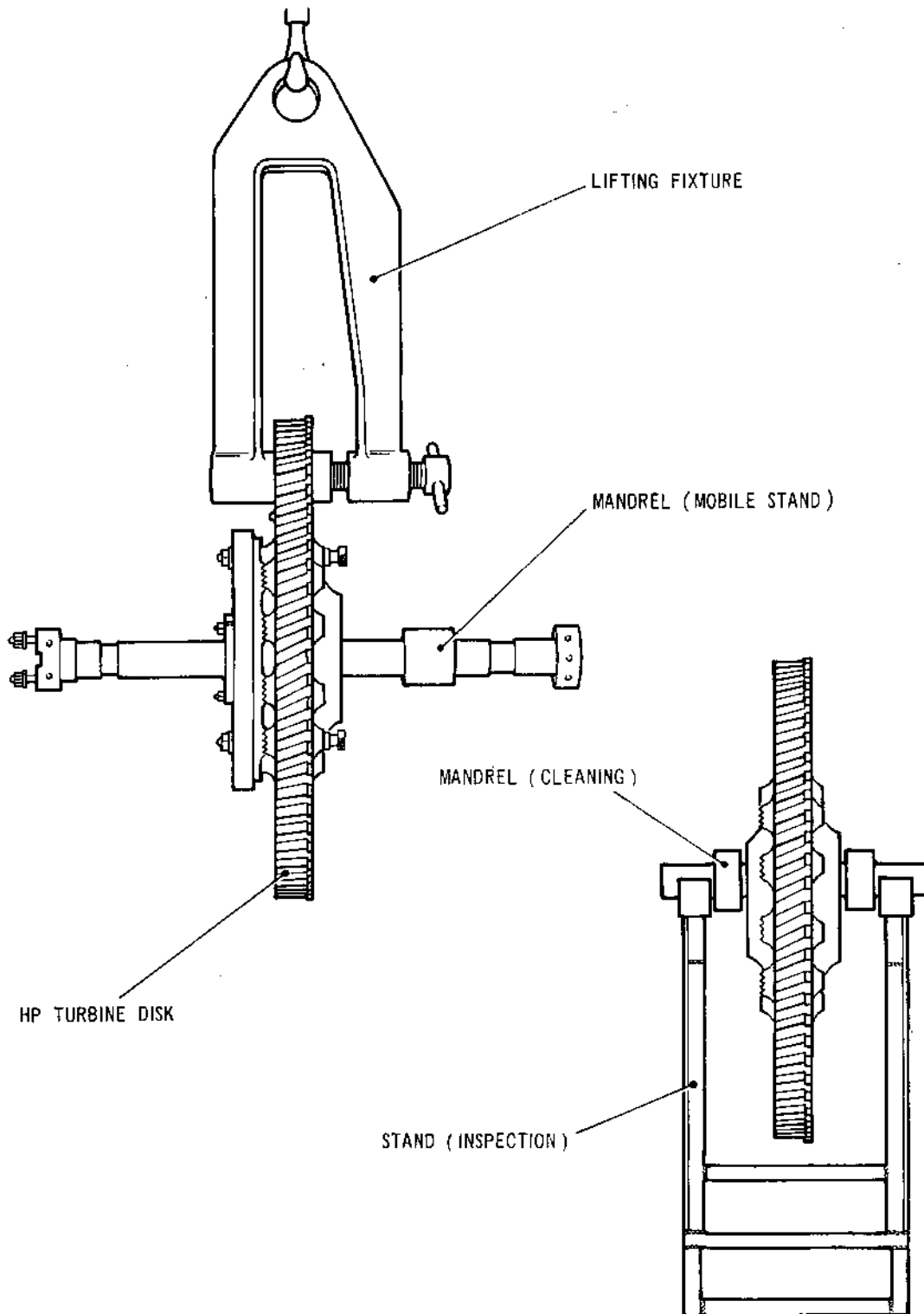


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Assembling HP Turbine Disk to Mandrel and Stand
Figure 103

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C. Remove Turbine Disk from Blading Fixture.

- (1) Attach a crane hoist to the lifting fixture on the end of the mandrel and carefully lift the assembly out of the blading fixture.
- (2) Position and secure the mandrel vertically in the mobile stand. Ensure that the clamp is securely attached to the mandrel.
- (3) Lower the mandrel horizontally in the mobile stand, then remove the crane hoist.

D. Transfer Turbine Disk to Cleaning Mandrel and Stand (Ref.Fig.103).

- (1) Attach lifting fixture (Tool 1141) to the turbine disk and ensure that the fixture is securely tightened.
- (2) Separate the turbine disk from the mobile stand mandrel.

CAUTION: TURBINE DISK MUST BE SUPPORTED BY LIFTING FIXTURE AND CRANE HOIST BEFORE MANDREL/TURBINE DISK SECURING NUTS ARE SLACKENED.

- (a) Slacken the nuts securing the mandrel to the turbine disk.
- (b) Carefully raise the assembly from the mobile stand to allow sufficient clearance for the removal of the mandrel.
- (c) Remove the mandrel from the turbine disk and secure it in the mobile stand.
- (3) Hold the cleaning mandrel (Tool 1437) in the centre bore of the turbine disk and lower the assembly on to stand (Tool 1439).
- (4) Remove the lifting fixture and crane hoist from the turbine disk.
- (5) Remove the blade platform stand from the blading fixture.
- (6) Remove the lifting fixture and mandrel extension from the mobile stand mandrel.

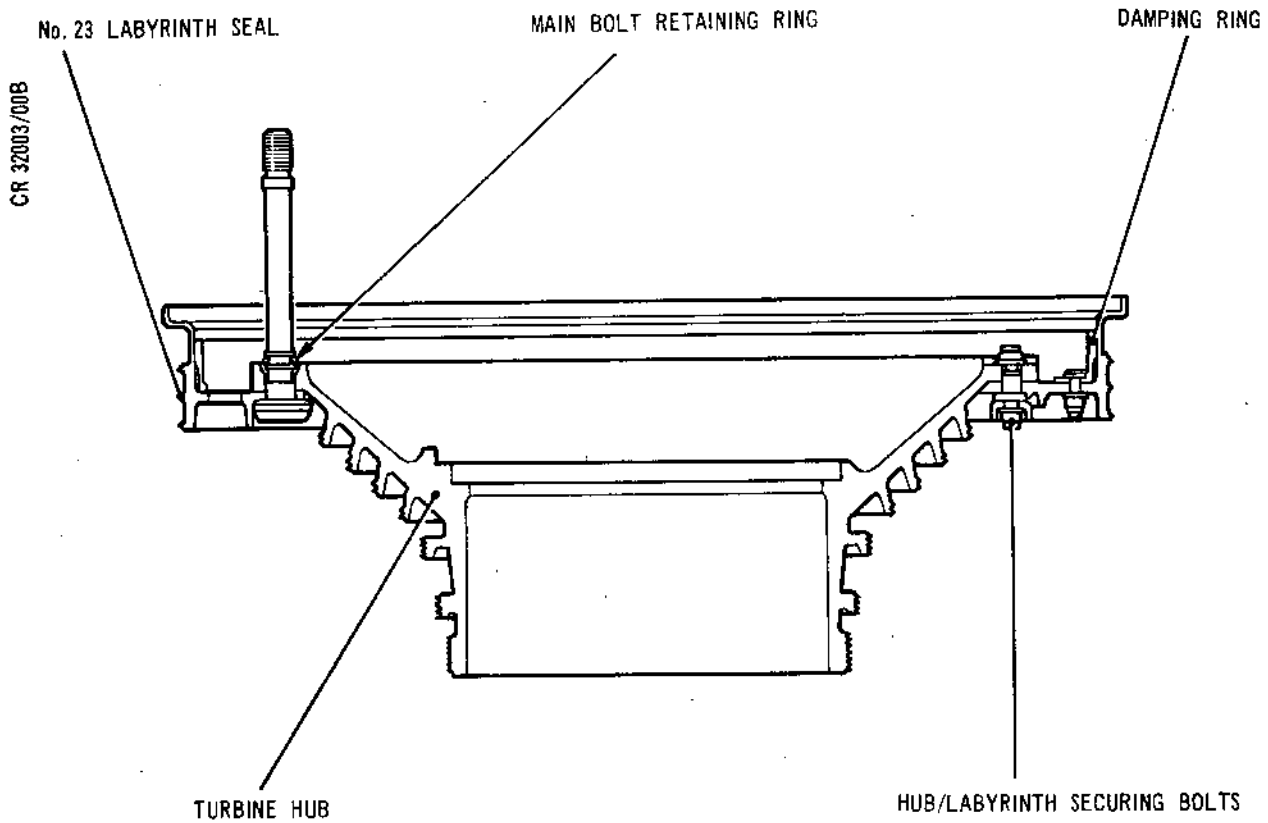
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Disassembling HP Turbine Hub and Labyrinth Seal
Figure 104

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5. Remove Turbine Hub from No.23 Labyrinth Seal and Disassemble Components

NOTE: On receipt from engine disassembly, protector (Tool 1061) should be assembled to the rear (No.24) labyrinth, and protectors (Tools 1062 and 1063) assembled to the hub and front (No.23) labyrinth. If protectors are removed during disassembly, or are not assembled, ensure that they are assembled on completion of the disassembly.

A. Remove Hub from Labyrinth (Ref.Fig.104).

- (1) Release the retaining rings securing the main bolts to the hub. Withdraw the bolts from the hub and place in a suitable container.
- (2) Remove the nuts, bolts and washers securing the hub to the labyrinth. Separate the components and place the hub in a suitable container.

B. Disassemble Damping Ring from No.23 Labyrinth Seal and Remove Bolts from No.24 and 26 Labyrinth Seal (Ref.Fig.104).

NOTE: Prior to carrying out the following operation, check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8444-225).

- (1) Remove the nuts and bolts securing the damping ring to the labyrinth seal.
- (2) Place the labyrinth seal on a suitable flat surface. Ensure that no damage to the labyrinth or damping ring is incurred during removal of the ring.

NOTE: The damping ring slightly overlaps the holes in the labyrinth. This provides suitable points of contact to assist removal.

- (a) Use an implement of soft material to commence removal of the damping ring. Careful leverage will also assist removal.

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- (b) Identify the labyrinth seal and damping ring as balanced matching components that are not interchangeable with other similar items.
- (c) Place the components in suitable containers.

NOTE: Prior to carrying out the following operation, check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8444-225).

- (3) Remove the nuts, bolts and washers from the balance hole positions in No.24 and 26 labyrinth seal, then place the labyrinth seal in a suitable container.
- (4) Ensure that the module identification plate is retained with the disassembled components.

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HP TURBINE ROTOR, HUB AND LABYRINTH ASSEMBLIES - DISASSEMBLY

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For information on the disassembly of the HP Turbine Rotor,
Hub and Labyrinth Assemblies, refer to 72-51-03 Disassembly.

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LP TURBINE NOZZLE - DISASSEMBLY

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LP TURBINE NOZZLE - DISASSEMBLY

1. General

- A. Prior to commencing disassembly, refer to 72-09-01, Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001.
- C. The low pressure (LP) turbine nozzle vane assembly is transported complete on a mobile table to the disassembly area. The sub-assembly is supported by a lifting fixture which incorporates retaining hooks to hold each nozzle vane separately in position.

2. Disassemble Turbine Nozzle Vane Assembly

- A. Remove Each Nozzle Vane from Diaphragm (Ref.Fig.101).
 - (1) Support each nozzle vane during the releasing procedure. Unscrew the knurled nut on the lifting fixture retaining hook and depress the hook to disengage it from the nozzle vane.
 - (2) Turn the retaining hook through an angle of approximately 90 deg to allow withdrawal from the nozzle vane.
 - (3) Withdraw the retaining hook from the nozzle vane and carefully manipulate the nozzle vane away from the diaphragm.
 - (4) Place each vane in container (Tool 1371). Remove the nozzle vane assembly lifting equipment.
- B. Remove Cover Unit from Nozzle Vane Support Diaphragm (Ref.Fig.101).
 - (1) Remove the cover unit/diaphragm from the mobile table and place on a suitable flat surface.
 - (2) Remove the cover unit retaining nuts. Engage the mechanical puller (Tool 962) with the cover and diaphragm. Carefully lever the cover in equal stages until it becomes detached from the diaphragm.
 - (3) Remove the labyrinth retaining bolts and plates. Place the diaphragm in container (Tool 1417) and ensure that it is firmly clamped in position.

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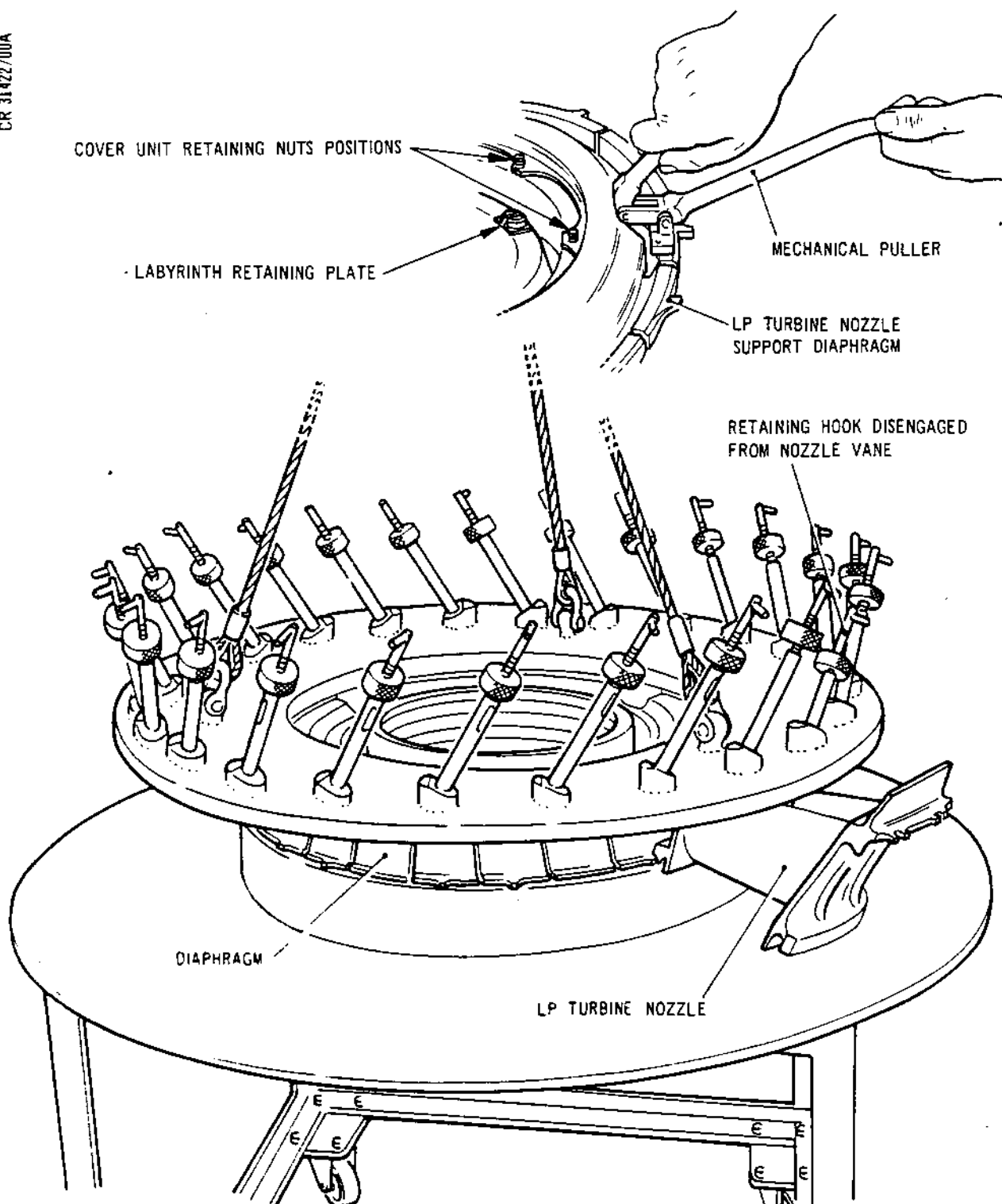
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Disassembling LP Turbine Nozzle Vane Assembly
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LP TURBINE ROTOR - DISASSEMBLY

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LP TURBINE ROTOR - DISASSEMBLY

1. General

- A. Prior to commencing disassembly refer to 72-09-00 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001.
- C. The LP turbine sub-assembly will be conveyed to the disassembly area on a transport pallet. The sub-assembly is secured to a disassembly stand which can be rotated to facilitate access for removal of components. Pallets are used for the temporary storage and transportation of components.

2. Disassemble the LP Turbine Rotor

- A. Position Assembly on Turbine Support Tool.

NOTE: During the following operations retain the protectors (Tool 1134 and 1138) on the labyrinth seals where practical, replace at the earliest opportunity when they have been removed.

- (1) Screw the lifting fixture (Tool 1142) onto the LP turbine disk hub (Ref.Fig.101). Attach an overhead crane to the eye of the hub lifting fixture, then raise the LP disk assembly.
- (2) Position the assembly over the turbine support (Tool 1670) mounted on a solid work bench, centralize the disk over the ring, then lower on to the ring. Remove the crane and lifting fixture.

- B. Turbine Blades Slackness Checks (Ref.Fig.101).

- (1) Carefully check each blade for movement. This check is done by hand.

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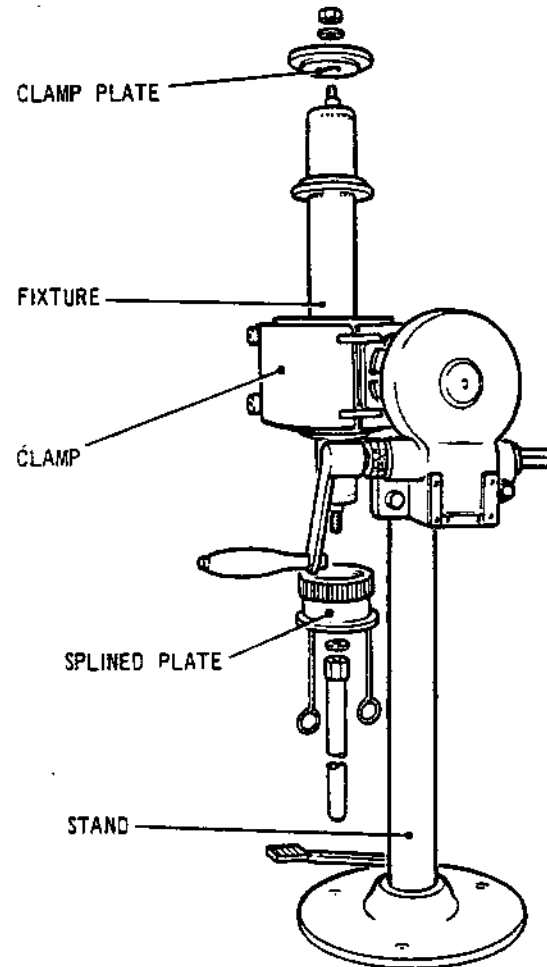
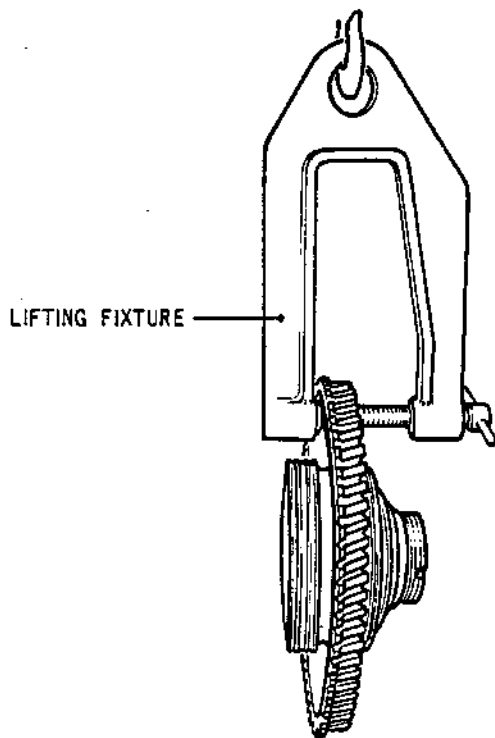
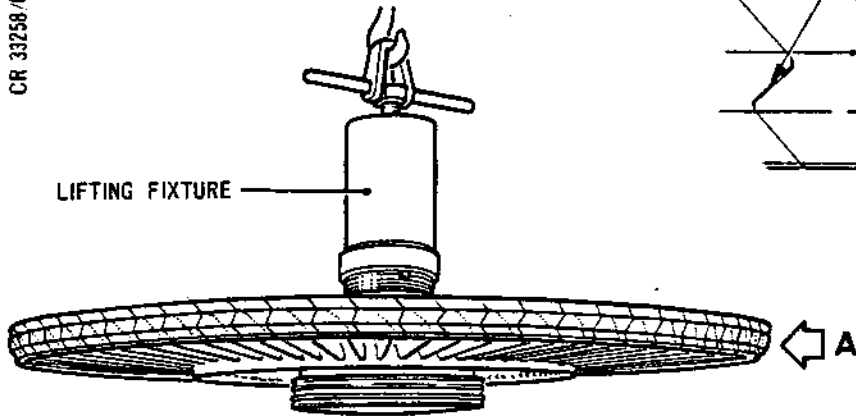


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Lifting Equipment and Disassembly Stand
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- (2) If movement is evident and clearance occurs at the centre section of the shroud interlocking joints measure each gap in turn. If any gap exceeds 0.001 in. (0,0254 mm) the blades are unacceptable for further engine running and must be rejected.

C. Remove Turbine Blades from Disk.

- (1) Straighten the turbine blade locking tabs.

NOTE: Owing to the interlocking turbine blade shrouds, the blades cannot be removed from the turbine disk singly in one operation.

- (2) Using the driver (Tool 907) and a light-weight hammer, carefully tap each blade in turn at the solid section of the blade root to effect a gradual and even removal of the blades from the turbine disk, ensuring that no blade is knocked down more than 0.125 in. (3,175 mm) otherwise the blades may lock together.

- (3) As the blades are released store them in the container (Tool 1426). Identify rejected blades clearly with the reason for rejection.

D. Prepare Assembly for Removal of Hub and Labyrinth.

NOTE: In order to remove the items from the disk, the hub must be assembled to the stand, the stand turned 90 deg and the hub repositioned on the stand.

- (1) Assemble the disk/hub assembly to the stand (Tool 873).
 - (a) Release the thumbnuts of the clamp and hinge open the clamp.
 - (b) Position the fixture (Tool 1140) in the clamp ensuring that the locating pin engages in the clamp, then close and secure the clamp with its thumbnuts.

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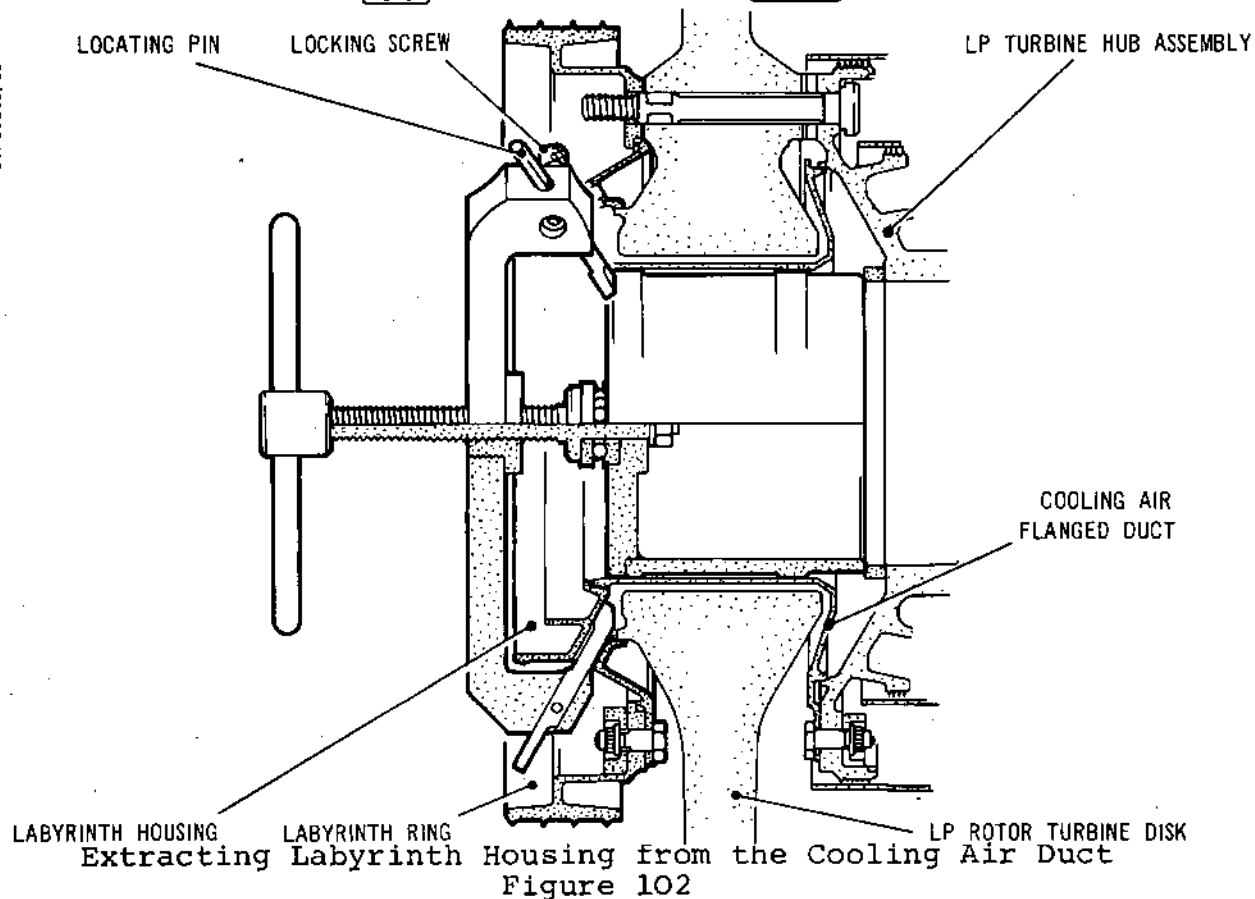
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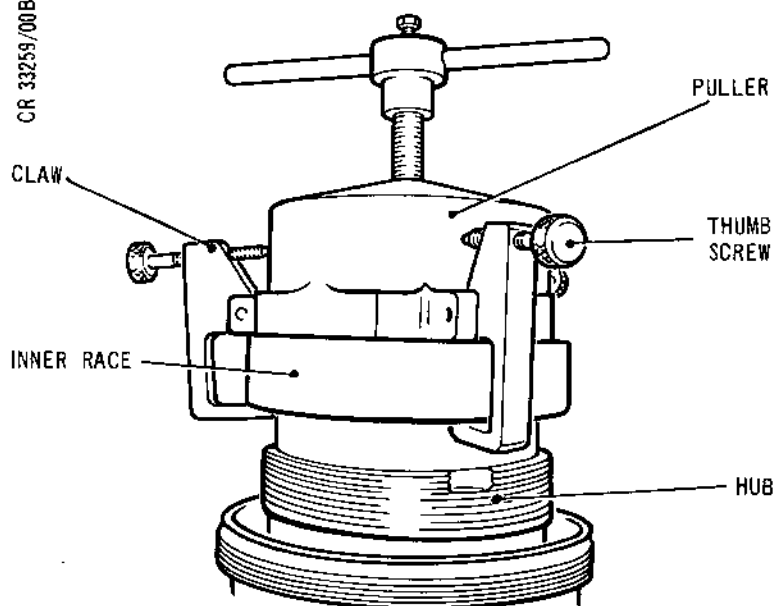
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- (c) Remove the retaining nut, washer and clamp plate from the longer arm of the fixture, then using the hand turning gear, position the arm vertical with the longer arm uppermost (Ref.Fig.101).
 - (d) Screw the lifting fixture (Tool 1142) onto the LP disk hub, then attach an overhead crane to the fixture eye.
 - (e) Raise the disk and position and lower onto the stand fixture. Remove the crane and lifting fixture (Tool 1142), then secure the disk to the adapter using the plate, washer and nut.
 - (f) Using the hand turning gear, turn the clamp so that the axis of the disk is horizontal.
- (2) Reposition the disk/hub assembly on the stand.
- (a) Attach an overhead crane to the eye of the lifting fixture (Tool 1141), then ensure that the adjustable pad is unscrewed.
 - (b) Position and lower the lifting fixture over the disk, then screw in on the adjustable pad until the disk is clamped between the fixture pads.
 - (c) Take the weight of the disk with the crane, then remove the clamp plate, washer and nut from each end of the fixture.
 - (d) Carefully remove the LP disk from the long arm of the fixture and transfer the disk to the short arm ensuring that the hub engages first. Secure the disk to the fixture with the splined plate, washer and nut.
 - (e) Remove the crane and lifting fixture (Tool 1141).
 - (f) Turn the clamp so that the axis of the disk is vertical.

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E. Remove the Labyrinth Ring and Housing from the Disk.

NOTE: Prior to carrying out the following operation, check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8444-225).

- (1) Using the wrench (Tool 1492), remove the nuts and bolts securing the hub, disk and labyrinths together.
- (2) Carefully remove the nut, washer and splined plate securing the LP disk assembly to the fixture.

CAUTION: THE DISK, HUB AND LABYRINTHS ARE NOW LOOSE AND INSECURE; ENSURE THAT THE DISK IS NOT KNOCKED CAUSING IT TO TILT AND FALL.

- (3) Assemble the puller (Tool 1015) to the labyrinth housing (Ref.Fig.102).
 - (a) Unscrew the locking screws and withdraw the locating pins, then finger-tighten the lock screws.
 - (b) Position the puller on the labyrinth housing, locating the puller housing in the cooling air flanged duct.
 - (c) Using the tommy bar, turning it clockwise to lift, and anti-clockwise to lower, adjust the puller body height until the locating pins align with the extractor holes in the labyrinth housing.
 - (d) Release the locking screws, locate and fully enter the locating pins into the labyrinth housing, then secure the locating pins with the locking screws.
 - (e) Turn the tommy bar clockwise, moving the body from the housing and withdrawing the labyrinth housing from the flanged duct.
 - (f) Remove the puller and labyrinth housing assembly.
 - (g) Release and withdraw the puller pins, then remove the puller from the housing.



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- (4) Secure the disk and hub to the fixture using the splined plate, washer and nut, then secure the hub to the disk using two bolts, washers and nuts in diametrically opposite holes.

F. Remove Hub and Labyrinth Assembly from Disk.

- (1) Turn the clamp so that the axis of the disk is horizontal.
- (2) Assemble the lifting fixture (Tool 1141) to the disk, then attach an overhead crane to the fixture and take the weight of the disk.
- (3) Remove the splined plate, washer and nut, then carefully remove the disk from the short arm of the fixture and assemble it to the longer arm ensuring that the disk engages first. Secure the hub to the fixture with the clamp plate, washer and nut.
- (4) Turn the clamp so that the axis of the disk is vertical, then remove the clamp plate, washer and nut and screw the lifting fixture (Tool 1142) onto the hub. Attach a crane to the lifting fixture.
- (5) Raise the disk from the fixture, then position and lower it onto a pallet. Disconnect the crane and remove the lifting fixture from the hub.
- (6) Assemble the plates, washers and nuts to the stand fixture.

NOTE: Prior to carrying out the following operation, check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8444-225).

- (7) Remove the nuts and bolts securing the hub to the disk, then remove the hub.

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G. Remove the Air Duct and Bearing from the Hub.

- (1) Remove the nuts, washers and bolts securing the cooling air flanged duct to the hub, then remove the duct from the hub.
- (2) Remove the bearing inner race from the hub using the mechanical puller (Tool 1137) (Ref.Fig.103).
 - (a) Ensure that the body of the puller is withdrawn from its thrust plate and that the thumbscrew of each claw is unscrewed.
 - (b) Place the puller on the end of the hub and engage the thrust plate in the end of the hub.
 - (c) Operate the puller and engage the three claws in the cutaways in the hub and under the inner race. Tighten the thumbscrew of each claw to lock the claws under the race.
 - (d) Operate the puller and withdraw the inner race from the hub. Release the claws and remove the inner race from the puller.

NOTE: Prior to carrying out the following operation, check bolt protrusion through nuts before slackening. Note bolts with less than 2.5 thread pitches showing beyond nut chamfer and discard them when removed (Ref.SB.72-8444-225).

- (3) Remove the nuts, washers and bolts securing the labyrinth ring to the housing, then remove the ring.
- (4) Place all components in containers and store all the special equipment.

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LP TURBINE BEARING SUPPORT - DISASSEMBLY

1. General

- A. Prior to commencing disassembly refer to 72-09-00 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for disassembly and for the Manufacturers Part No. refer to Special Tools, Fixtures and Equipment Table 1001.

2. Disassemble the LP Turbine Bearing Support

A. Disassemble the Rear Cover Assembly (Ref.Fig.101).

- (1) Locate the bearing housing on the four pillars of the support plate (Tool 1256) (Ref.Fig.102).

NOTE: Para.(2) and (3) do not apply if the rear cover is to be disassembled while still attached to the bearing housing.

- (2) Release the rear cover assembly from the bearing housing (if still attached) by using wrench (Tool 1584) to remove the 27 securing nuts. Withdraw the cover from the housing disengaging the oil tube and the retaining pin. If the flanges of the cover and housing are difficult to separate, remove the blankets (Ref.para.(5)), then use a hammer and alloy drift and lightly drift on the smaller flange of the cover. Withdraw the retaining ring and bearing outer race/rollers from the bearing housing, and place the bearing in a container.
- (3) Bolt the holding fixture (Tool 847) to the Hydraclamp with the clamps uppermost (Ref.Fig.101), then with the clamps withdrawn, position the rear cover on the fixture, engage the clamps over the rear cover flange and tighten the retaining nuts.

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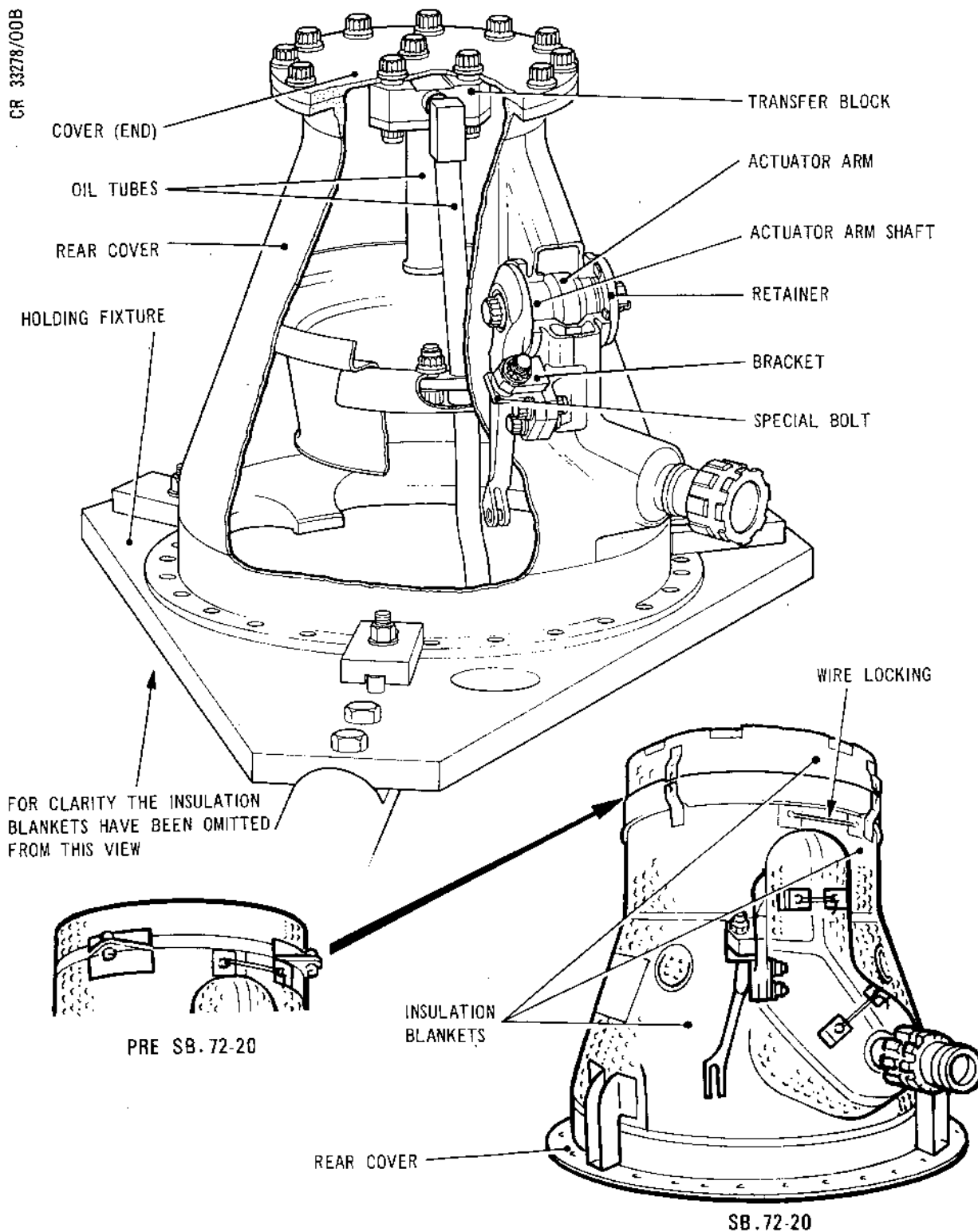
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Disassembling the Rear Cover Assembly
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- (4) Disassemble the actuating arm and bracket from the rear cover.
- (a) If the (end) insulation blanket is still assembled, release the four nuts and bolts (pre SB.72-20), or cut the locking wire (SB.72-20), and remove the blanket.
 - (b) Remove the 12 bolts securing the (end) cover to the rear cover, then withdraw the (end) cover disengaging it from the locating pin and the oil tube.
 - (c) Remove the insulation blanket covering the actuating arm shaft by cutting the locking wire (SB.72-20 or pre SB.72-121 standard only).
 - (d) Remove the split pin (SB.76-2 standard only), then remove the nut from the actuating arm or bolt and withdraw the retainer and seal from the cover.
 - (e) Support the actuating arm inside the rear cover, then withdraw the actuating arm shaft and seal from the rear cover and remove the actuating arm when released. If SB.76-2 Part 2 only is embodied, remove the bolt and sleeve from the shaft.
 - (f) Remove the nut, special bolt and adjusting washer from the bracket, then release and remove the bracket from the bracket on the bottom of the sump.
- (5) Release the wire-locking from the eyelets securing the two (side) insulating blankets together. If the rear cover is still assembled to the bearing housing, remove the four nuts securing the insulating blankets using wrench (Tool 1584). Withdraw the two insulating blankets from the rear cover.

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- (6) If the rear cover is still assembled to the bearing housing, remove the cover as detailed in para.(2) and place it on a bench with the front (larger) flange uppermost. If the cover is assembled to the holding fixture, release and withdraw the fixture clamps, then remove the cover and place it on a bench with the front flange uppermost.
- (7) Remove the two nuts and bolts securing the oil tube to the inside of the rear cover and withdraw the tube. Protect and blank each end of the tube.
- (8) Remove the three nuts and bolts securing the transfer block and oil tube to the (end) cover and separate the items. The two peened bolts assembled in the end cover on SB 72-180 standard engines are to prevent incorrect assembly of the transfer block and must not be removed.

B. Remove the Sockets and Seal Housings from the Cover and Sleeve Assemblies (Ref.Fig.102).

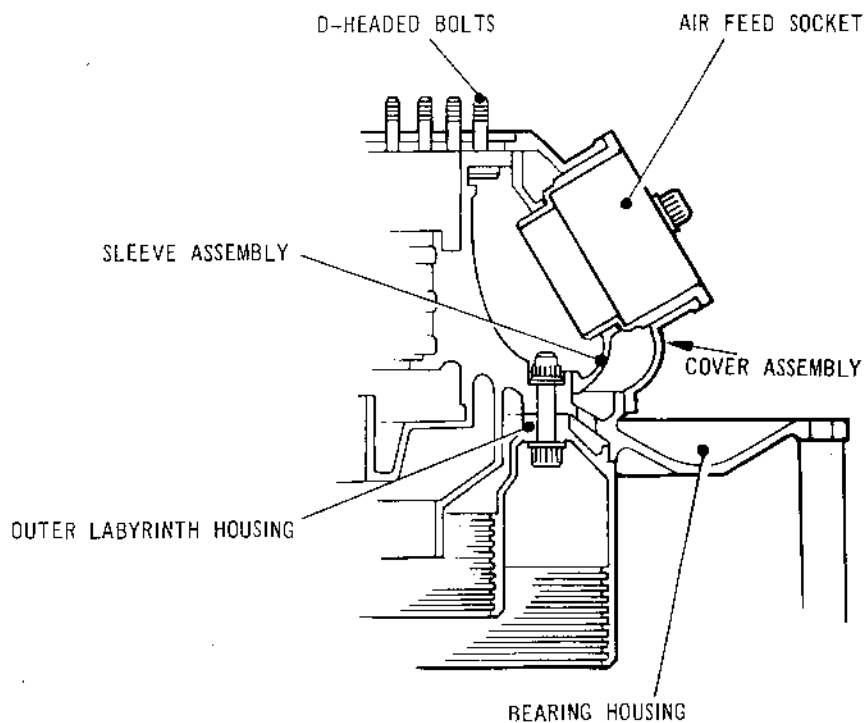
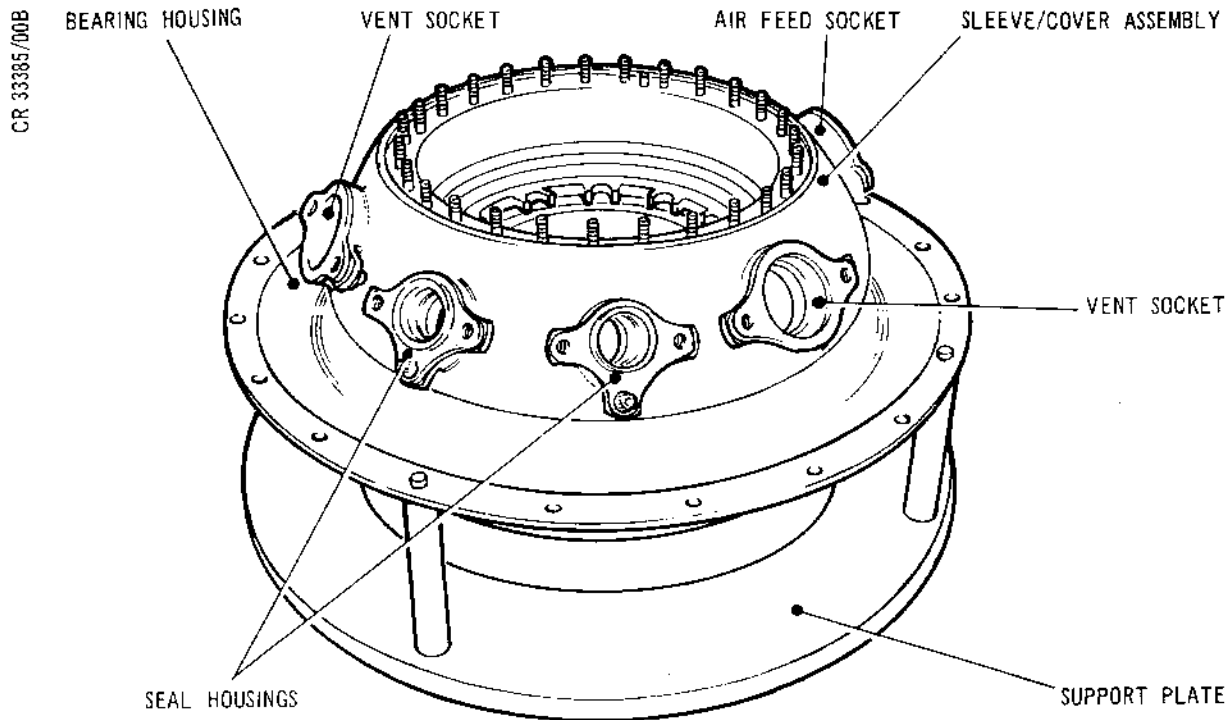
- (1) Remove the air feed socket from the cover and sleeve assemblies using the mechanical puller (Tool 455) and adapter (Tool 449) (Ref.Fig.103).
 - (a) Screw the adapter onto the puller until the puller pin engages in the slot of the adapter.
 - (b) With the adapter/puller at an angle to the axis of the air feed socket, lower the puller plate into the socket until the plate is beneath the socket. Align the adapter/puller with the axis of the socket engaging the step of the plate in the end of the socket. Ensuring that the plate remains correctly engaged in the socket, screw down on the adapter until its body contacts the cover with the larger cut-outs aligned with the bolt flange.
 - (c) Screw the adapter onto the puller until the socket is released from the cover and sleeve. Unscrew the adapter until the socket is out of the adapter body, then remove the socket from the puller.



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Positioning of Sockets and Housings in Sleeve/Cover Assembly
Figure 102

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- (2) Remove the two vent sockets from the cover assembly using the mechanical puller (Tool 448) and adapter (Tool 449) (Ref.Fig.103).
 - (a) Screw the adapter onto the puller until the puller pin engages in the slot of the adapter.
 - (b) With the adapter/puller at an angle to the axis of one of the vent sockets, lower the puller plate into the socket until the plate is beneath the socket. Align the adapter/puller with the axis of the socket engaging the step of the plate in the end of the socket. Ensuring that the plate remains correctly engaged in the socket, screw down on the adapter until its body contacts the cover with the larger cut-outs aligned with the bolt flange.
 - (c) Screw the adapter onto the puller until the socket is released from the cover. Unscrew the adapter until the socket is out of the adapter body, then remove the socket from the puller.
 - (d) Remove the remaining socket from the cover repeating the procedure (Ref.para.(a) to (c)).
- (3) Remove the two seal housings from the cover and sleeve assemblies using the mechanical puller (Tool 447) and adapter (Tool 449).
 - (a) Unscrew and remove the remaining bolt (if assembled) securing each seal housing to the cover assembly.
 - (b) Screw the adapter onto the puller until the puller pin engages in the slot of the adapter, then pull out the locking bar until the claws close inwards.
 - (c) Lower the adapter/puller onto one of the housings and slide the puller claws into the housing until the puller abuts the outer end of the housing. Press the locking bar down to lock the claws behind the inner end of the housing.

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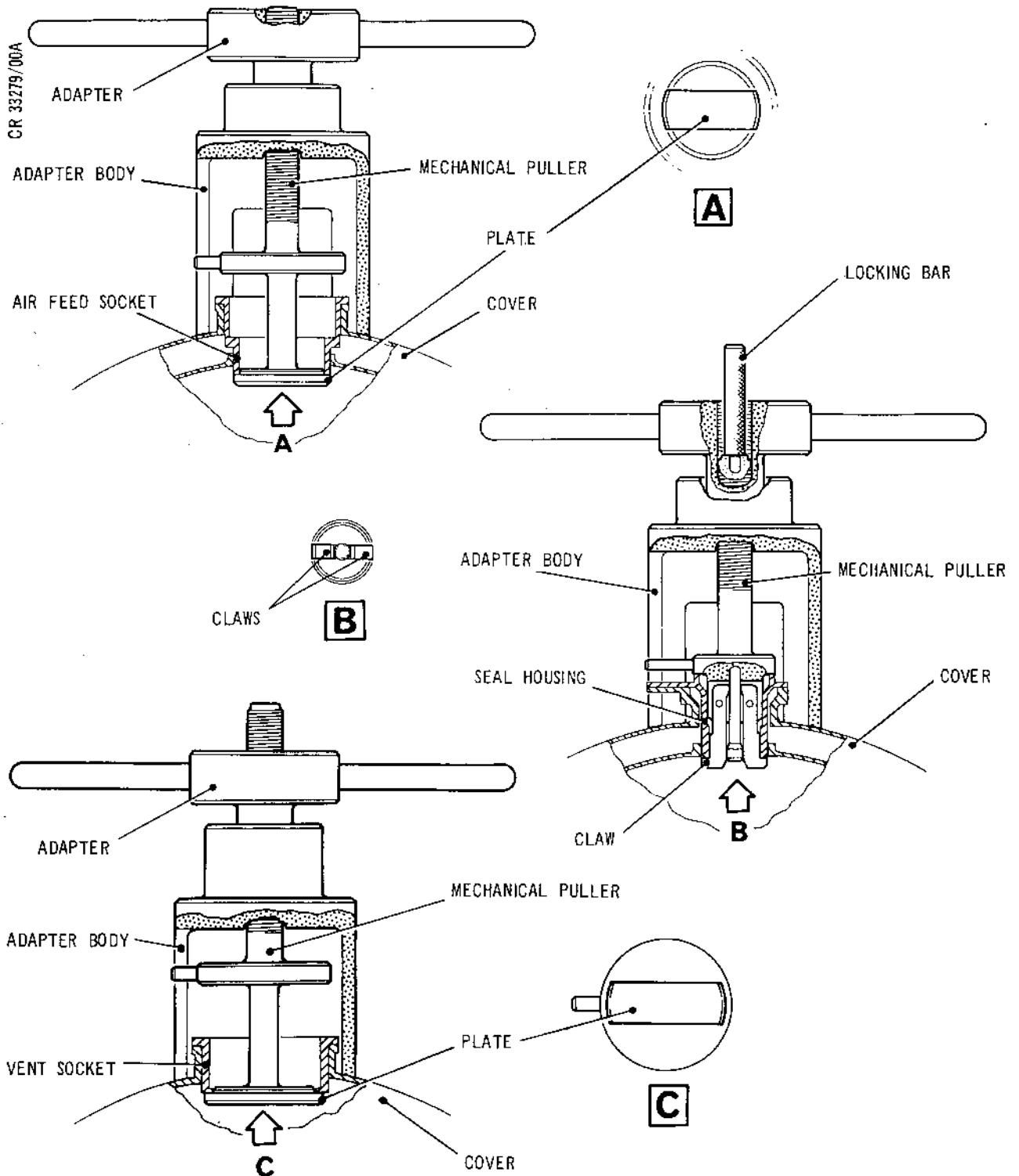
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Removing Sockets and Housings from Sleeve/Cover Assembly
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- (d) With the cut-outs of the adapter body aligned with the three bolt flanges, screw the adapter onto the puller until it contacts the cover, then continue screwing until the housing is released.
 - (e) Pull out on the locking bar to close the claws, and withdraw the housing from the puller.
 - (f) Remove the remaining seal housing from the cover/sleeve repeating the procedure (Ref.(b) to (e)).
- C. Remove the Cover and Sleeve Assemblies from the Bearing Housing.
- (1) Remove the cover assembly using the mechanical puller (Tool 1250) (Ref.Fig.104).
 - (a) Ensure that the knurled nuts are loose, and that the tommy bars of the six claws point to the OPEN position. Ensure that the location plate has been retracted.
 - (b) Lower the puller over the cover and rest the claws on the bearing housing. Screw in the smaller central tommy bar and engage the location plate in the bearing housing. Unscrew the larger central tommy bar until the claws are clear of the bearing housing, then turn the tommy bar of each claw to the CLOSED position to engage the claws with the cover, and lock in position with the thumbnuts.
 - (c) Unscrew the large tommy bar until the cover is released from the housing.
 - (d) Release the knurled nuts of the claws, then turn the claw tommy bars to the OPEN position. Lift the mechanical puller off the bearing housing, then remove the cover from the housing.

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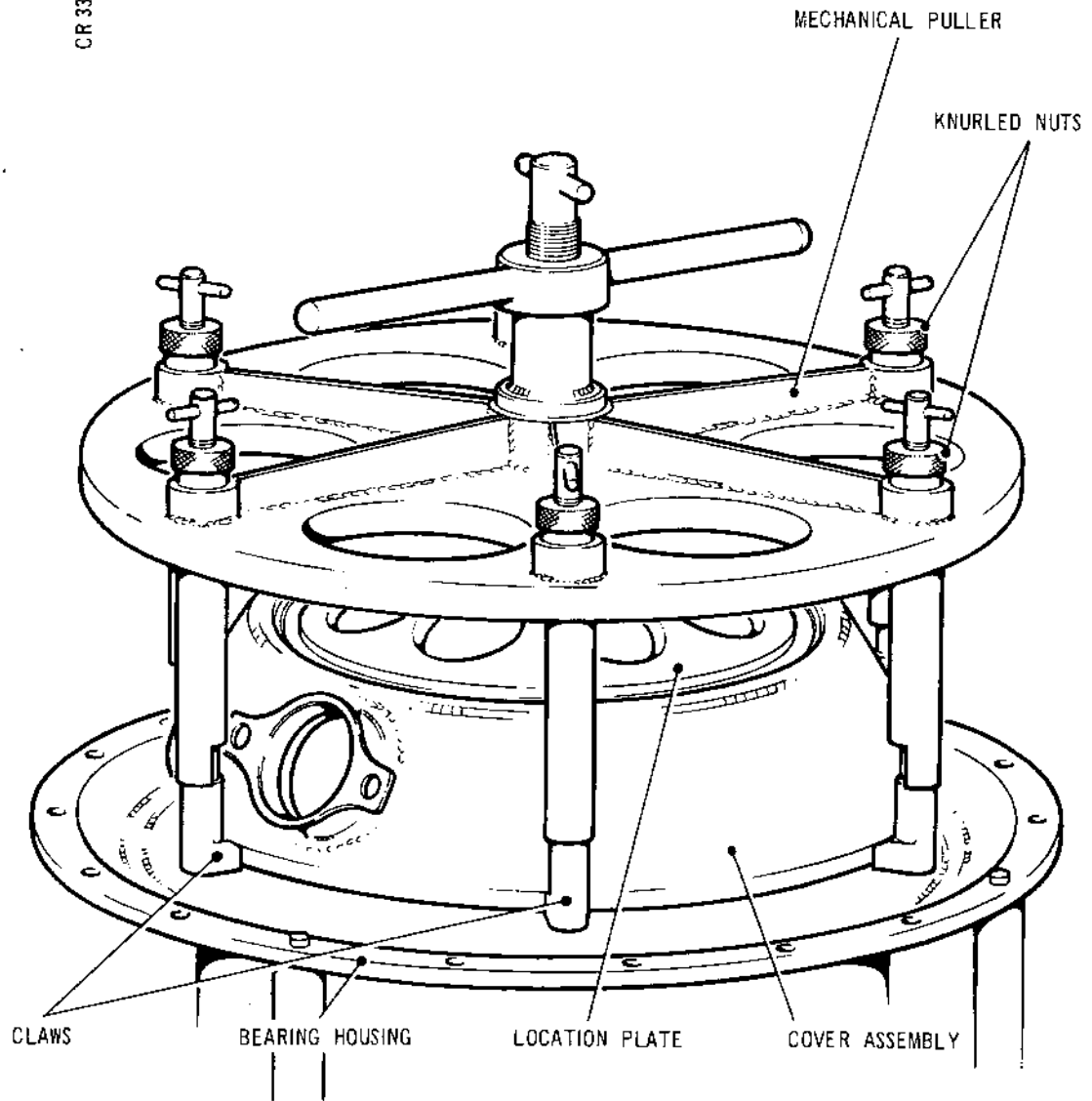
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Removing Cover Assembly from Bearing Housing
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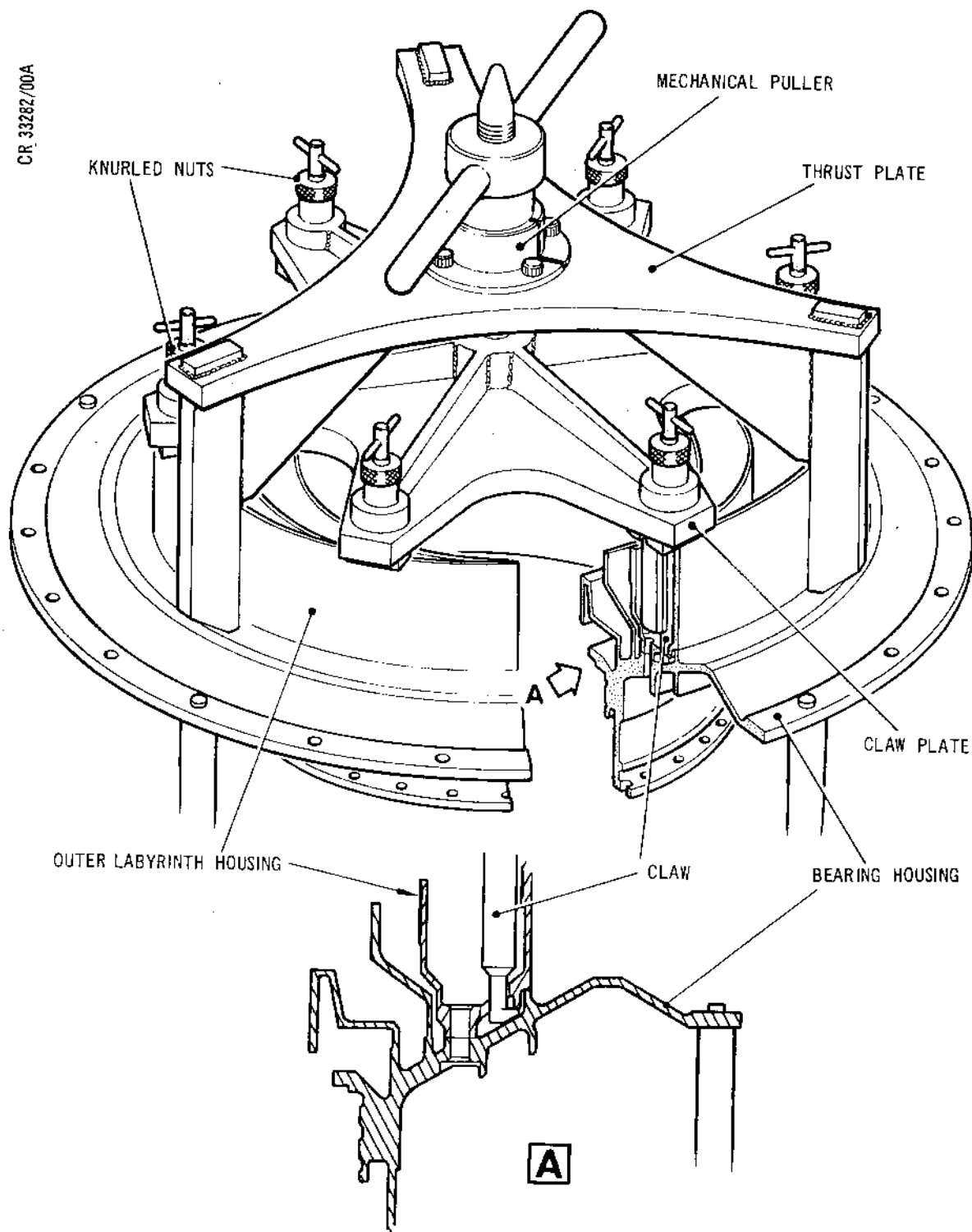


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Removing Outer Labyrinth Housing from Bearing Housing
Figure 105

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(2) Remove the sleeve assembly using the mechanical puller (Tool 1251).

(a) Remove the sleeve assembly repeating the procedure (Ref.(1), (a) to (d)) using the puller (Tool 1251).

NOTE: The alternative puller (Tool 1964) is assembled to the bolts at the top of the bearing housing and pulls on a ring engaged with the six dogs on the sleeve by turning the six tommy nuts.

D. Remove the Outer Labyrinth Housing Assembly from the Bearing Housing (Ref.Fig.105).

(1) Remove the 27 D-headed bolts (Ref.Fig.102) from the bearing housing flange, by turning each bolt in turn 180 deg until the flat on the bolt aligns with the step of the housing and withdrawing the bolt.

(2) Unscrew and remove the eight nuts and bolts that secure the outer labyrinth housing to the bearing housing (Ref.Fig.102).

(3) Invert the bearing/labyrinth housings on the support plate so that the outer labyrinth housing is uppermost.

(4) Remove the outer labyrinth housing using the mechanical puller (Tool 1252).

(a) Ensure that the knurled nuts are loose and the tommy bars of the claws lie circumferentially. Ensure that the claw plate is retracted.

(b) Lower the puller over the outer labyrinth housing and rest the three thrust plate pillars on the bearing housing. Align the claws with air holes in the outer labyrinth housing, then unscrew the large tommy bar to lower the claws into the holes until the claw tommy bars can be turned 90 deg. Turn the claw tommy bars 90 deg to locate the claws under the outer labyrinth, then lock each claw by tightening the knurled nuts.

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- (c) Screw down on the large tommy bar and withdraw the outer labyrinth from the bearing housing. When the outer labyrinth is released, unscrew the knurled nuts of the claws and turn the claw tommy bars 90 deg. Withdraw the mechanical puller from the outer labyrinth, then remove the labyrinth from the bearing housing.
- (5) Remove the bearing housing from the support plate.

NOTE: The disassembly of the LP turbine bearing support is now complete. Place all items in suitable containers and despatch to the cleaning department.

E. Disassemble the LP Turbine Rotor Bearing.

CAUTION: COMPONENTS MUST BE LABELLED AND KEPT TOGETHER AS A SET.

- (1) Clean the bearing prior to disassembly (Ref.72-09-00 Cleaning Process D).
- (2) Disassemble the rollers and cage from the outer track.

NOTE: The following procedure should be carried out in an approved 'clean' room.

- (a) Hinge open the lever of the pliers (Tool 1983) and locate the plier jaws over a roller.
- (b) Turn the tommy bar to apply sufficient force to the plier jaws to grip the roller, then close the lever and extract the roller from the cage. Release the pliers from the roller.
- (c) Repeat the procedure until all the rollers are removed, then withdraw the cage.
- (d) Place the rollers, outer track and cage in protective bags.

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TURBINE EXHAUST DIFFUSER - DISASSEMBLY

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TURBINE EXHAUST DIFFUSER - DISASSEMBLY

1. General

- A. Prior to commencing disassembly refer to 72-09-00 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For the complete list of tooling required for disassembly and for the Manufacturers Part No. refer to Special Tools, Fixtures and Equipment Table 1001.
- C. Throughout this text all instructions will be given in relationship to the vanes, of which there are 10, five having air or oil tubes passing through them. The vanes are numbered 1 to 10 in a clockwise direction as viewed from the rear, with No.1 being the first vane from the (normal) vertical top position, identified by a dowel hole in the outer case front flange.
- D. This chapter deals with the disassembly of the turbine exhaust diffuser assembly, but all the items removed do not belong to 72-53-00, and these items must be identified and segregated under their own breakdowns as listed hereafter. In addition the LP turbine bearing support must be removed and dispatched to 72-52-03 for disassembly.

72-52-03	LP Turbine Bearing Support
71-32-02	Engine Heatshields
71-73-06	Fuel Drain Assembly
72-54-01	Spherical Joint Flange
75-03-02	Flanged Connection
76-13-03	PNC Signal Pitot
76-21-02	LP Signal Shaft System
77-12-03	Engine Power Pitot

- E. To assist in freeing seized nuts and bolts, in particular those securing the flanges of the outer case/spherical joint flange, apply release agent 'A' and allow it to soak in.

2. Disassembly the Turbine Exhaust Diffuser

- A. Assemble the Turbine Exhaust Diffuser to the Stand (Ref. Fig.101).
- (1) Ensure that the mounting plate (Tool 309) is bolted to the stand (Tool 832) and that the stand arms are extending downwards.

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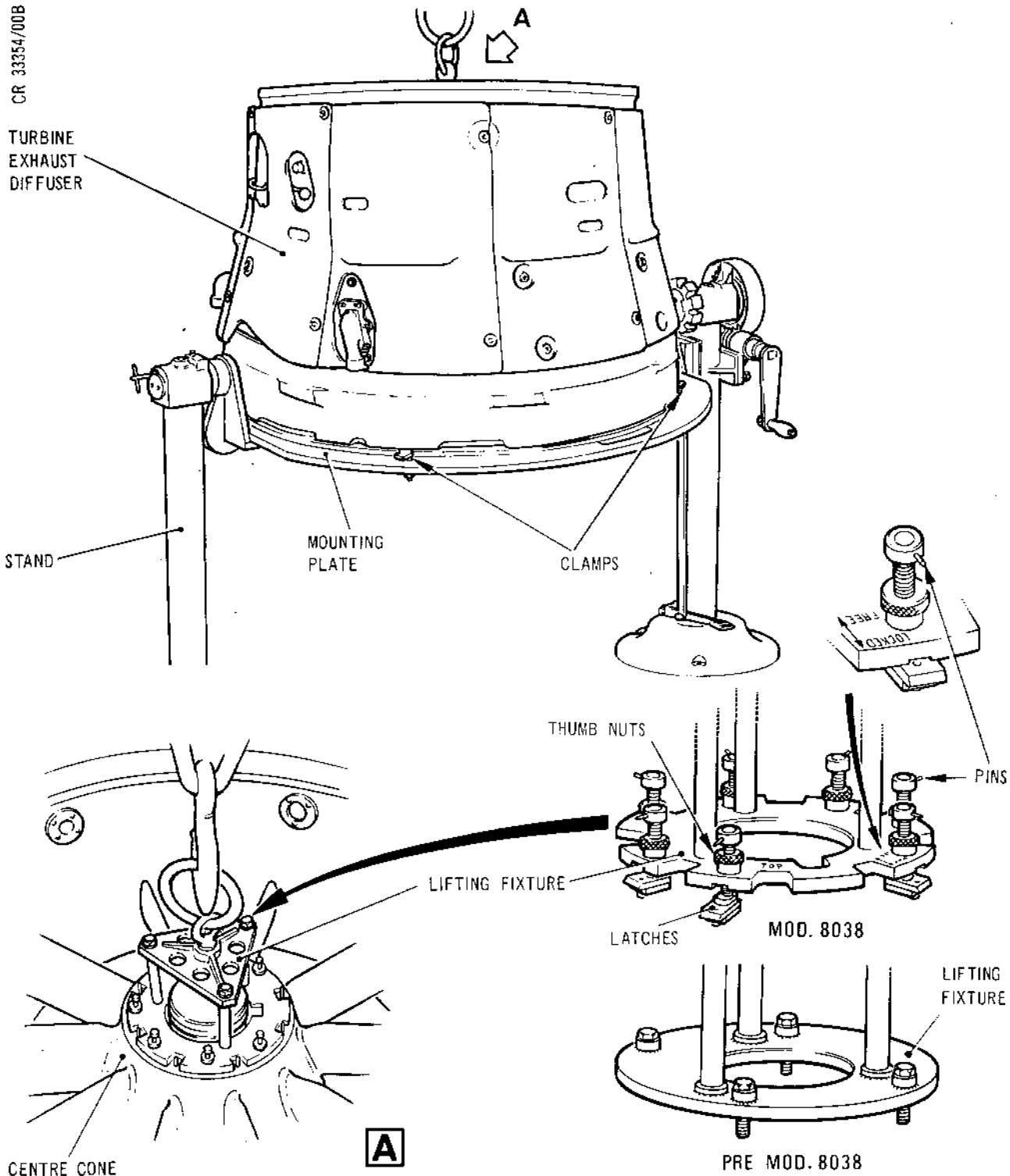


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Assembling Turbine Exhaust Diffuser to Stand
Figure 101

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NOTE: On engines to pre SB.72-8038-181 lifting fixture (Tool 305 or 1953) may be used.

- (2) Release the clamps and remove the protector (Tool 437) from the rear of the diffuser. On engines to pre SB.8038-181 standard, lower the lifting fixture (Tool 305) onto the rear centre cone of the diffuser, align the captive bolts of the fixture with the anchor nuts of the cone, then screw the bolts into the anchor nuts. On engines to pre or SB.72-8038-181 standard, ensure that the thumbnuts are unscrewed and the latches are in the 'FREE' position, then lower the lifting fixture (Tool 1953) onto the rear centre cone. Turn the latches to the 'LOCKED' position and tighten the thumbnuts.
- (3) Attach a hoist to the lifting ring of the fixture, then position the diffuser over the stand mounting plate. Ensure that the four mounting plate clamps are positioned out of the way, then aligning the dowel hole in the front flange of the outer case as near the mid position as possible with one of the cutaways in the mounting plate, lower the diffuser onto the plate aligning the bolt holes. Secure the outer case with the mounting plate clamps. Release and remove the lifting fixture, then remove the hoist from the fixture.

B. Remove and Disassemble the Drain Valve (Ref.Fig.102 or 102A).

NOTE: There are two alternative procedures for disassembling the drain valve from the outer case. The procedure is dependant on whether an internal boss or a saddle plate assembly is used at the drains block mounting location on the outer case.

- (1) Remove the drain valve from the bottom of the outer case (Engines with internal boss) (Ref. Fig.102).
 - (a) Remove the nuts from the three eccentric headed bolts and remove the sealing plate, sleeve and packing piece.
 - (b) Release and remove the plug from the lower drain body.
 - (c) Remove the four bolts securing the drain valve to the outer case, then remove the valve and gasket.



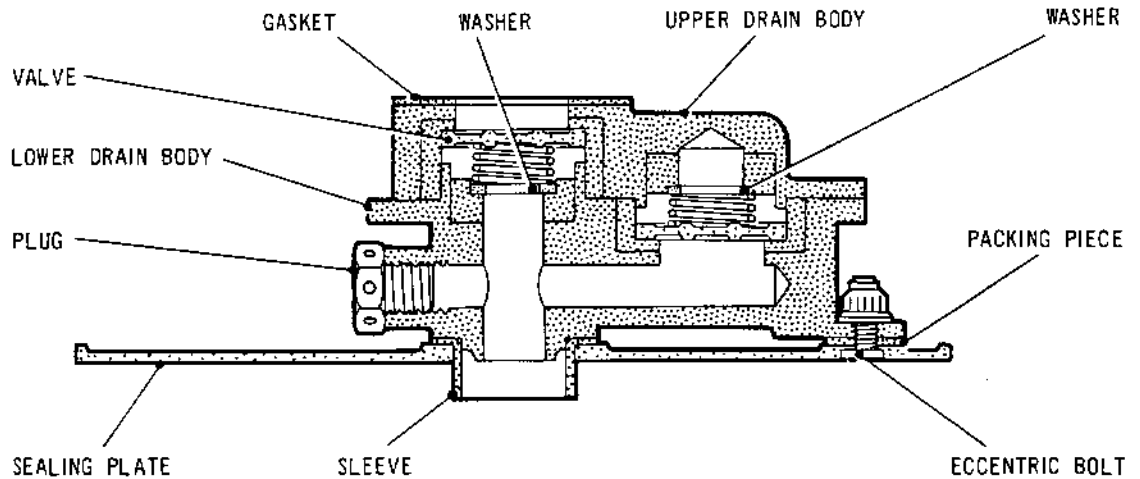
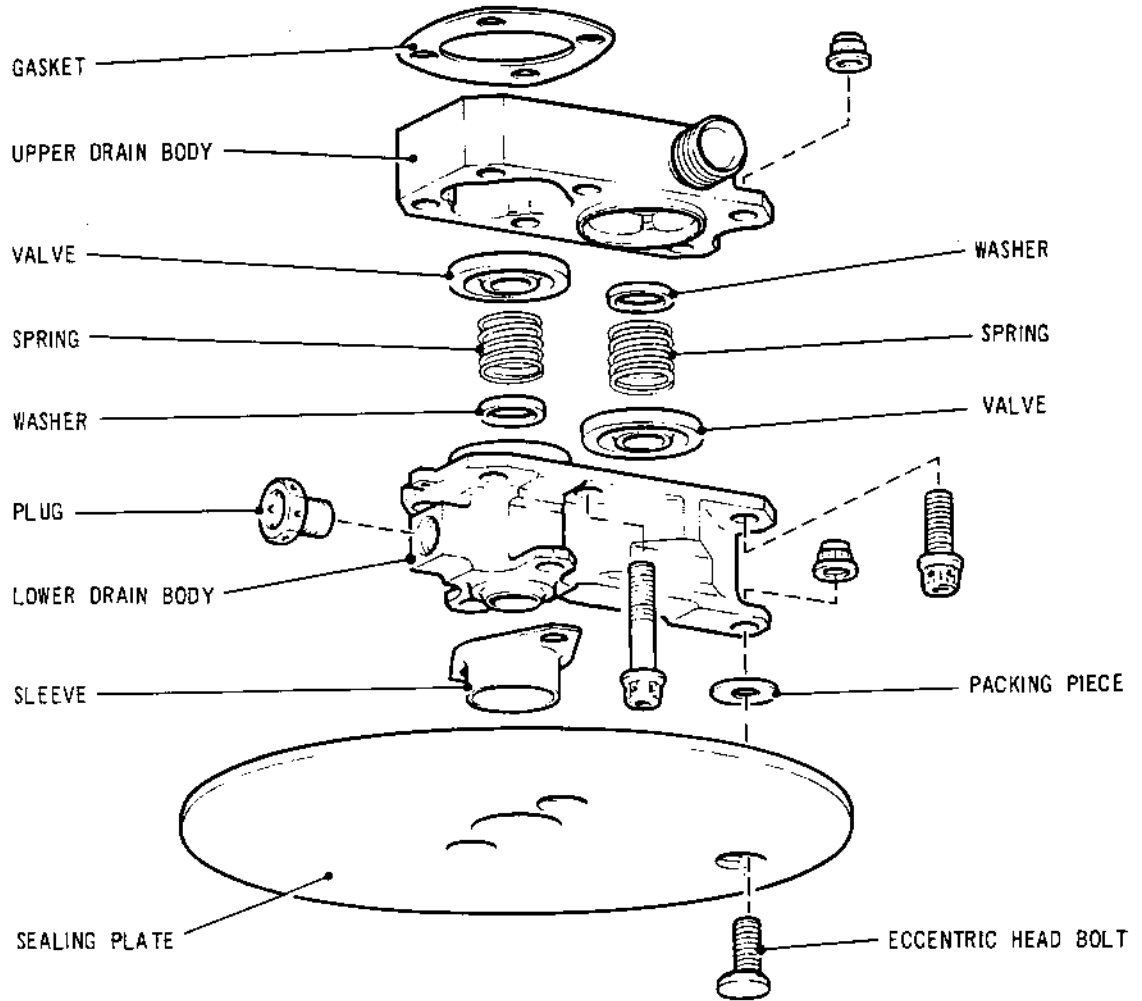
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Disassembling Drain Valve
Figure 102

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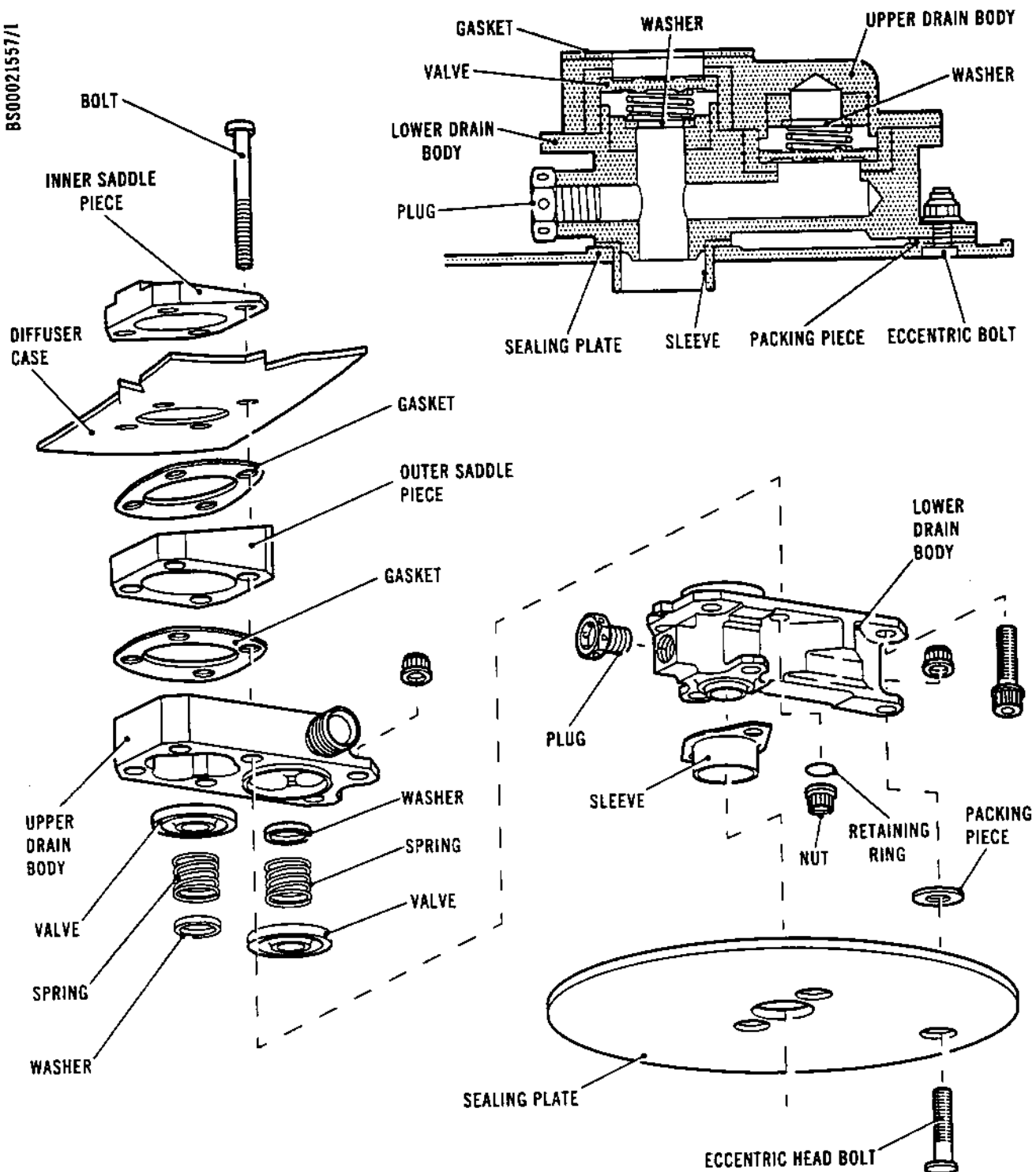
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Disassembling Drain Valve
Figure 102A



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- (2) Remove the drain valve from the bottom of the outer case (Engines with saddle plate assembly) (Ref. Fig.102A).
 - (a) Remove the nuts from the three eccentric headed bolts and remove the sealing plate, sleeve and packing piece.
 - (b) Release and remove the plug from the lower drain body.
 - (c) Remove the four nuts and locking plate (engines to SB.71-8494-27 standard), then remove the drain valve and gasket.
 - (d) Release the retaining ring and remove the outer saddle piece and gasket.
 - (e) Remove the four bolts and inner saddle piece from inside the outer case.
- (3) Disassemble the drain valve.

CAUTION: THE ASSEMBLY CONTAINS SPRING LOADED VALVES.

- (a) Carefully remove the two nuts and bolts securing the upper and lower drain bodies and lift off one of the bodies.
- (b) Remove the two valves and springs, and if loose, the washers.

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C. Remove the Heatshields and Brackets (Ref.Fig.103).

NOTE: The heatshields may be removed in any order, but it is recommended that they are removed in sequence.

- (1) Remove the two rows of bolts, flat washers and dampers securing a heatshield to the heatshield at each side, then ease the released heatshield from engagement with the shield at each side.
- (2) Remove the row of bolts, flat washers and dampers securing one of the partly released heatshields, then withdraw the shield disengaging it from the other shield.
- (3) Remove the remaining heatshields in sequence, removing at the same time the channel assembly and bracket which support the additional heatshield. If the additional heatshield (71-32-02/4-10) is still assembled at this stage, remove it and its six sets of bolts, washers and dampers, then remove the three nuts and bolts and the two additional heatshield brackets from the bracket on the flanged connection and the bracket on the spherical joint flange.
- (4) Release and remove from the containment shield the 10 bolts and the heatshield brackets and, if assembled, the distance pieces.
- (5) Release and remove the nuts, bolts and heatshield brackets from the spherical joint flange brackets.

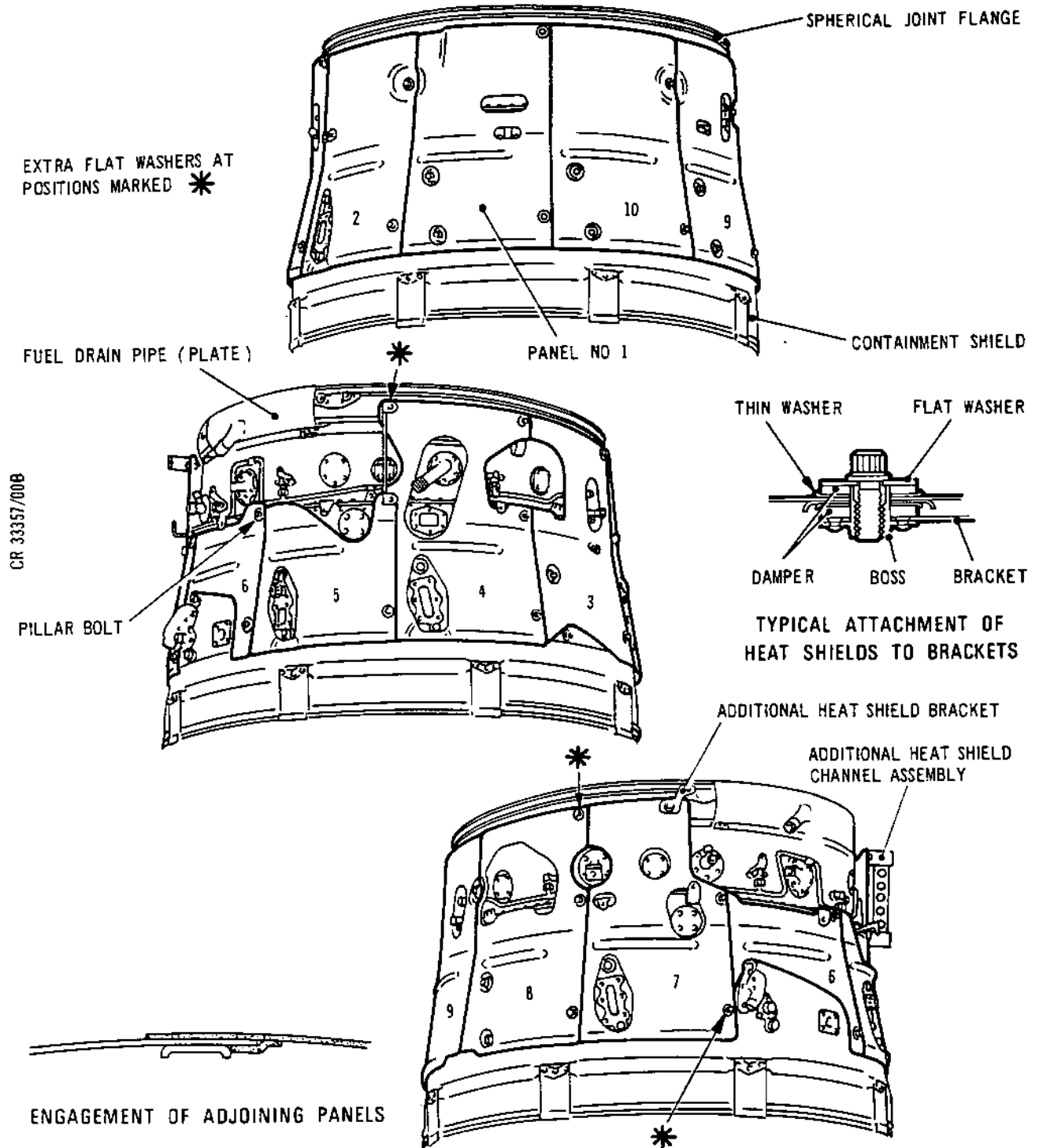
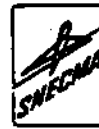
D. Remove Items from the Spherical Joint Flange and the Flange from the Outer Case (Ref.Fig.104).

- (1) Remove the engine power pitot tube assembly.
 - (a) Release and remove the closure nut if assembled to one end of the tube assembly.



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Disassembling Heatshields from Outer Case
Figure 103



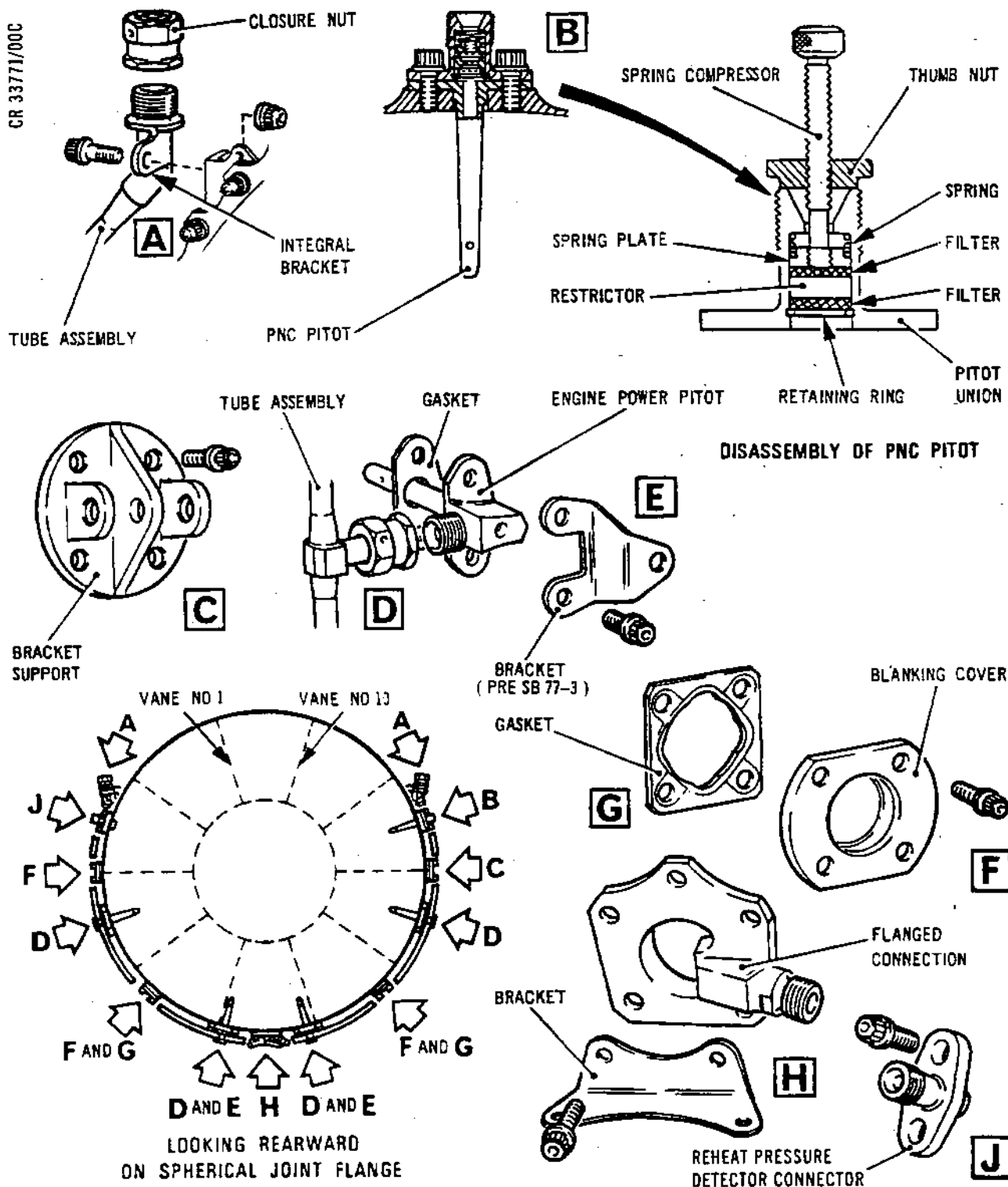
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Disassembling Items from Spherical Joint Flange
Figure 104



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- (b) Release and unscrew the union nuts securing the tube assembly to the four pitots.
- (c) Release and remove the loop clamps from the tube assembly, then remove the bolt securing each end of the tube assembly and withdraw the assembly.
- (2) Remove the two bolts which secure each of the four engine power pitots and the three brackets (pre-SB.77-3), or single bracket (SB.77-3), then withdraw the pitots and gaskets. Assemble suitable protectors to the pitots and place them in containers.

NOTE: The single bracket, secured to one of the two upper pitots, supports the heat shield panel and the two brackets at the lower positions, (pre-SB.77-3), support the vibration transducer cable.

- (3) Remove the two bolts securing the PNC pitot taking care to remove the union with the bolts. Withdraw the pitot from the joint flange taking care not to damage the flanged pin. Discard the bolts.

NOTE: The removal and installation of the PNC pitot is also detailed in 76-13-03.

- (4) Disassemble the PNC pitot union by compressing the spring using the compressor (Tool 1963), and removing the retaining ring, two filter discs and the restrictor. Release the spring, detach the spring plate and place all the items in a container.

- (5) Remove the two bolts securing the reheat pressure detector connector, then withdraw the connector.

NOTE: The removal and installation of the reheat pressure detector connector is also detailed in 76-13-03.

- (6) Remove the four bolts and the bracket support, the four bolts and blanking cover, and then, at two positions, the four bolts, blanking cover and gasket.
- (7) Remove the five bolts, flanged connection and bracket.
- (8) Remove the nuts, bolts and brackets from the flanges of the outer case/spherical joint flange, then remove the joint flange using a hoist and the lifting fixture (Tool 1965) bolted to the bracket support position and to the blanking position opposite.

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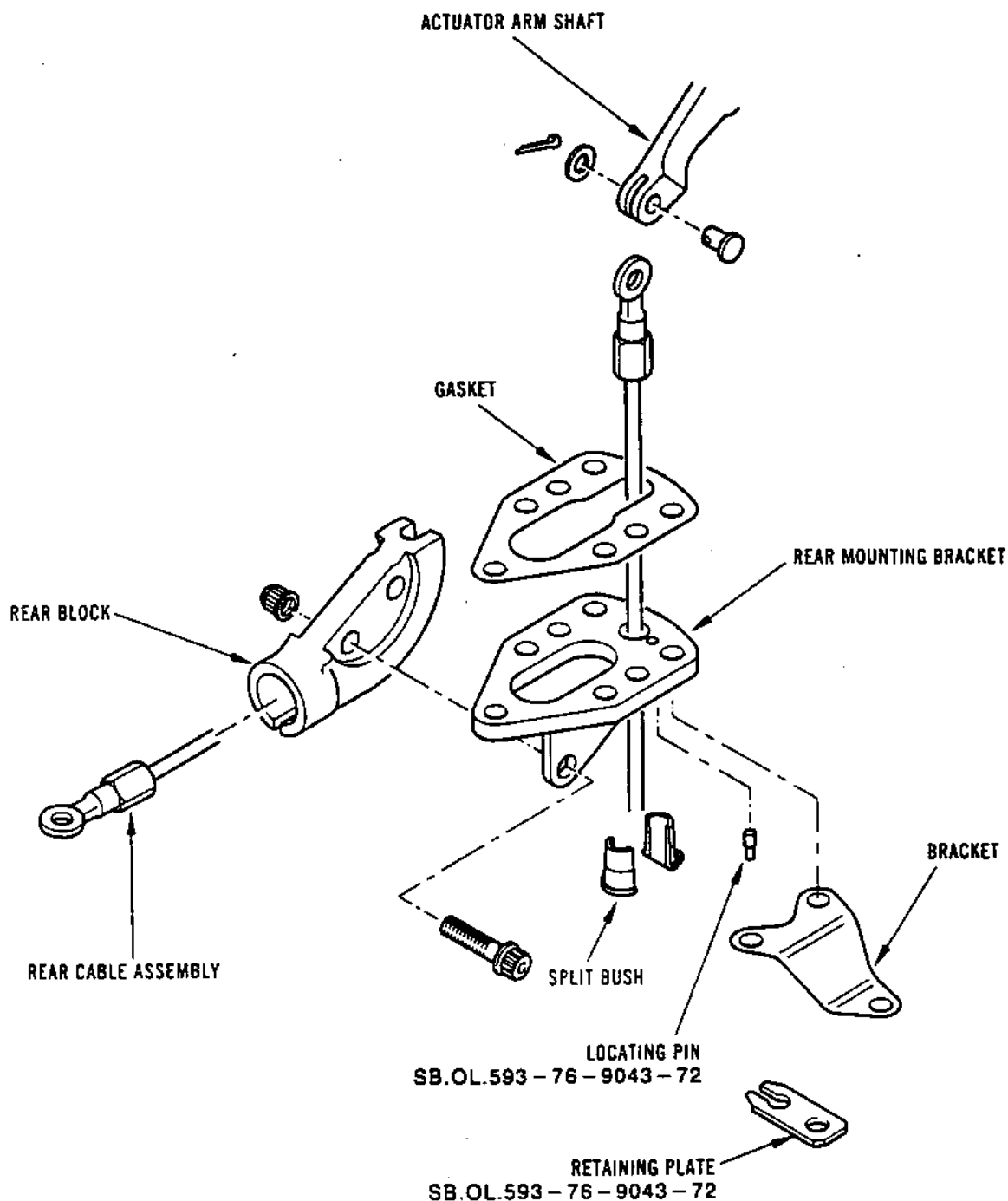


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Removing and Disassembling the Rear Cable Assembly
Figure 105



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E. Remove and Disassemble the Rear Cable Assembly
(Ref.Fig.105).

- (1) Detach rear cable from centre cable and free lower end of cable.
 - (a) Remove nuts and bolts securing rear block to bracket.
 - (b) Compress conduit ends and press rear block toward centre block to take up full depth of conduit housings.
 - (c) Without pulling cable and with rear end of conduit compressed, turn rear block, disengage from cable and detach from conduit end.
 - (d) Compress forward end of conduit and withdraw from middle block.
 - (e) Make use of slot in the conduit and slide it off the cable and expose the cable connection.
 - (f) Remove split pin, washer and shouldered pin from centre/rear cable connection and separate the ends.
 - (g) Pre-SB.0L.593-76-9043-72. Remove split guide bush halves.
 - (h) SB.0L.593-76-9043-72. Remove attachment bolt and retaining plate and remove split guide bush halves.
- (2) Withdraw split pin, washer and shouldered pin of cable connection to shaft actuator arm and detach cable.
- (3) Withdraw cable through lower aperture.

F. Remove the Oil Tubes, Air Tubes and Ducts.

- (1) Rotate the stand 90 deg so that the axis of the assembly is horizontal.
- (2) Remove the oil scavenge tube assembly from No.5 vane (Ref.Fig.106).
 - (a) If installed, remove the insulation blanket at the inner end of the scavenge tube by cutting the locking wire.

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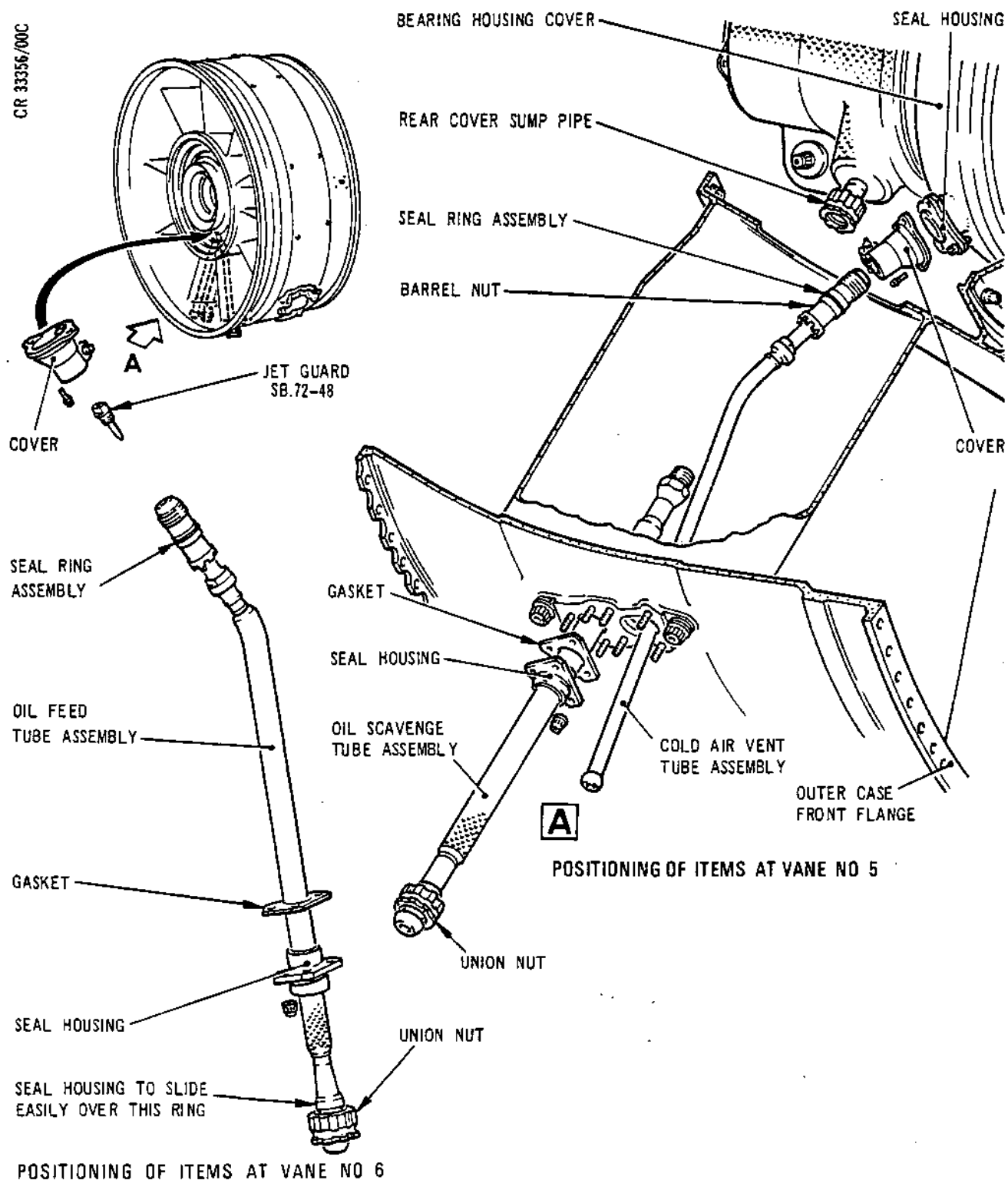
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Disassembling Tubes from No.5 and 6 Vanes
Figure 106

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HOLDER ENGAGING TUBE
ASSEMBLY COLLAR

BARREL NUT

BEARING HOUSING

SEAL HOUSING

COVER

TUBE ASSEMBLY

WRENCH ENGAGING
BARREL NUT SLOTS

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Releasing Barrel Nuts on Oil and Air Tubes
Figure 107

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- (b) Using the wrench (Tool 906) to hold the tube, release and unscrew the rear cover sump pipe union nut, located inside the rear of the inner case, using the wrench (Tool 872). Withdraw the tube assembly from the outside of the vane and the union nut from the tube.
- (c) Remove the nuts securing the seal housing to the outer case, then withdraw the housing and gasket from the bolts.
- (d) On engines to SB.72-20 standard, remove the insulation blankets from the forward end of the rear cover by cutting the locking wire.

NOTE: To gain greater access to the tubes attached to the rear bearing support, the rear cover may be released and withdrawn (Ref.72-52-03 Disassembly). If the rear cover is removed, then the retaining ring and the bearing outer race/rollers must be withdrawn and placed in containers.

- (3) Remove the cold air vent tube from No.5 vane position (Ref.Fig.106 and 107).
 - (a) Remove the nut and bolt clamping the cover to the tube assembly inside the inner case, then remove the two bolts securing the cover to the seal housing. Draw the cover along the tube away from the seal housing to expose the barrel nut.
 - (b) Locate the wrench (Tool 625 or 626) on the barrel nut, then insert the holder (Tool 846) between the wrench and the tube shoulder, and engage it with the flats on the tube. Loosen the nut using the wrench and holder, then unscrew the nut.
 - (c) Withdraw the tube from the seal housing, remove the cover from the tube, then withdraw the tube from the outside of the vane. Remove the seal ring assembly from the barrel nut.
- (4) Remove the oil feed tube assembly from No.6 vane (Ref.Fig.106 and 107).
 - (a) If installed, remove the insulation blanket at the inner end of the oil tube by cutting the locking wire.

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- (b) Remove from inside the inner case the nut and bolt clamping the cover to the tube assembly, then remove the two bolts securing the cover to the seal housing. Draw the cover along the tube away from the seal housing to expose the barrel nut.
- (c) Locate the wrench (Tool 1047 or 1046) on the barrel nut, then insert the holder (Tool 846) between the wrench and the tube shoulder, and engage it with the flats on the tube. Loosen the nut using the wrench and holder, then unscrew the nut.
- (d) Withdraw the tube from the seal housing, remove the cover from the tube, then withdraw the tube from the outside of the vane. Remove the seal ring assembly from the barrel nut, then withdraw the union nut off the tube.
- (e) Remove the three nuts securing the seal housing to the outer case, then remove the housing and gasket.
- (f) Unscrew and remove the jet guard from the end of the tube if SB.72-48 is embodied.
- (5) Remove the cooling air feed duct assembly from No.2 vane position (Ref.Fig.108 and 109).
- (a) Remove the six nuts securing the elbow (if assembled) and the duct to the outer case, then remove the elbow.
- (b) Release and remove from inside the inner case the two nuts and bolts securing the locking plate to the seal housing, then release the seal housing from the duct by removing the two bolts (Pre SB.72-130), or the two nuts using the cranked ring wrench (Tool 1992) to hold the captive bolts if SB.72-130 is embodied.
- (c) Withdraw the duct from the outside of the vane, and the seal housing from the inner case, withdrawing it from the locking plate.
- (d) Withdraw the seal carrier from the bearing support or seal housing and remove the sealing ring from each end of the seal carrier. Release and remove the two bolts and locking plate from the bearing support.

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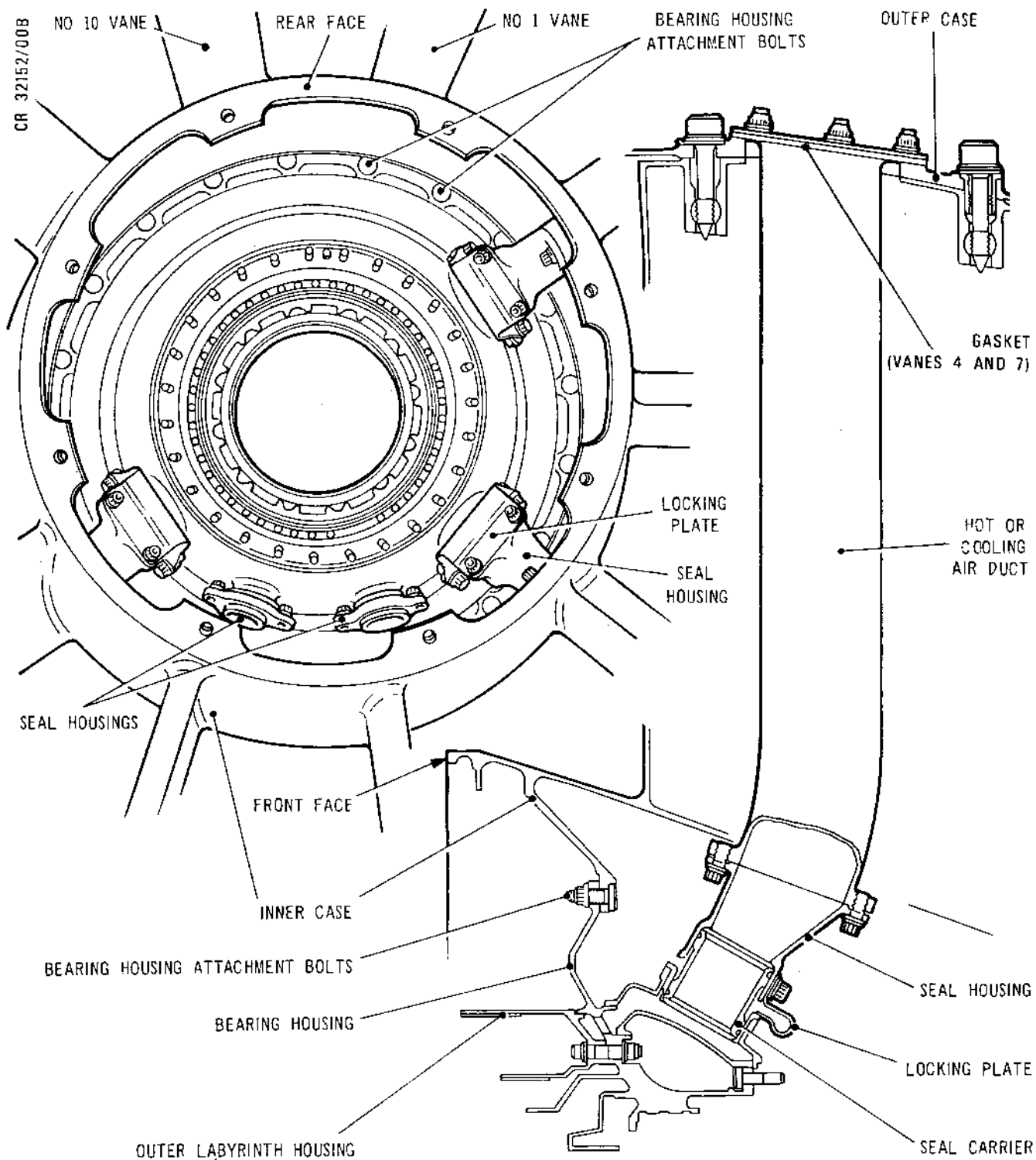
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ATTACHMENT OF DUCTING AT VANES 2, 4 AND 7

Disassembling Ducts from Bearing Housing
Figure 108

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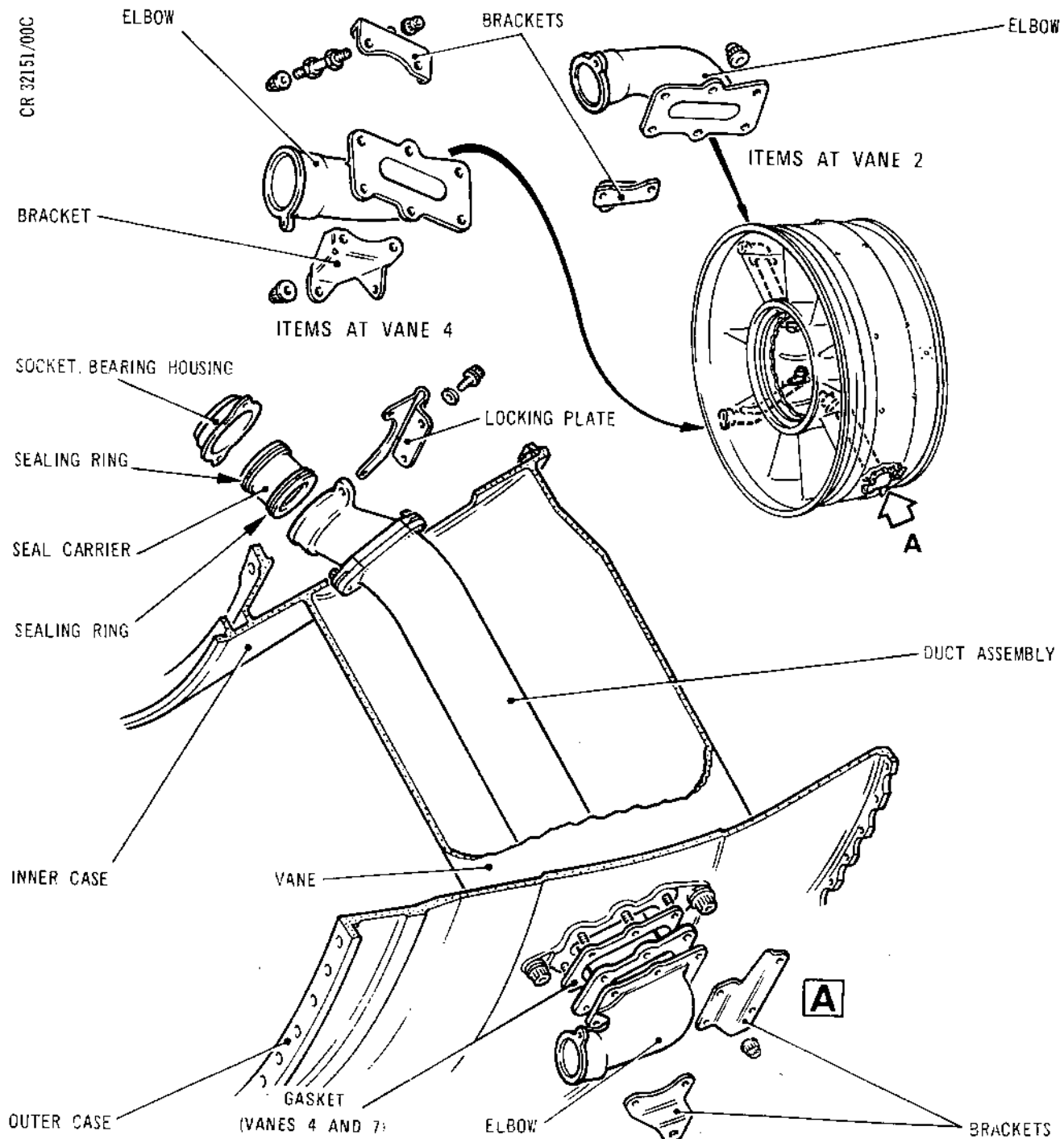
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Disassembling Ducts from No.2, 4 and 7 Vanes
Figure 109

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- (6) Remove the hot air vent duct assembly from No.4 vane position (Ref.Fig.108 and 109).
- (a) Remove the six nuts securing the elbow and brackets (if assembled) and the duct to the outer case, then remove the brackets and elbow.
 - (b) Release and remove from the inside of the inner case the two nuts and bolts securing the locking plate to the seal housing, then release the seal housing from the duct by removing the two bolts (Pre SB.72-130) or the two nuts using the cranked ring wrench (Tool 1992) to hold the captive bolts if SB.72-130 is embodied.
 - (c) Withdraw the duct and gasket from the outside of the vane, and the seal housing from the inner case withdrawing it from the locking plate.
 - (d) Withdraw the seal carrier from the bearing support or seal housing and remove the sealing ring from each end of the seal carrier. Release and remove the two bolts and the locking plate from the bearing support.
- (7) Remove the hot air vent duct assembly from No.7 vane position (Ref.Fig.108 and 109).
- (a) Remove the six nuts securing the elbow and brackets (if assembled) and the duct to the outer case, then remove the brackets and elbow.
 - (b) Release and remove from the inside of the inner case the two nuts and bolts securing the locking plate to the seal housing, then release the seal housing from the duct by removing the two bolts (Pre SB.72-130) or the two nuts using the cranked ring wrench (Tool 1992) to hold the captive bolts if SB.72-130 is embodied.
 - (c) Withdraw the duct and gasket from the outside of the vane, and the seal housing from the inner case withdrawing it from the locking plate.
 - (d) Withdraw the seal carrier from the bearing support or seal housing and remove the sealing ring from each end of the seal carrier. Release and remove the two bolts and the locking plate from the bearing support.

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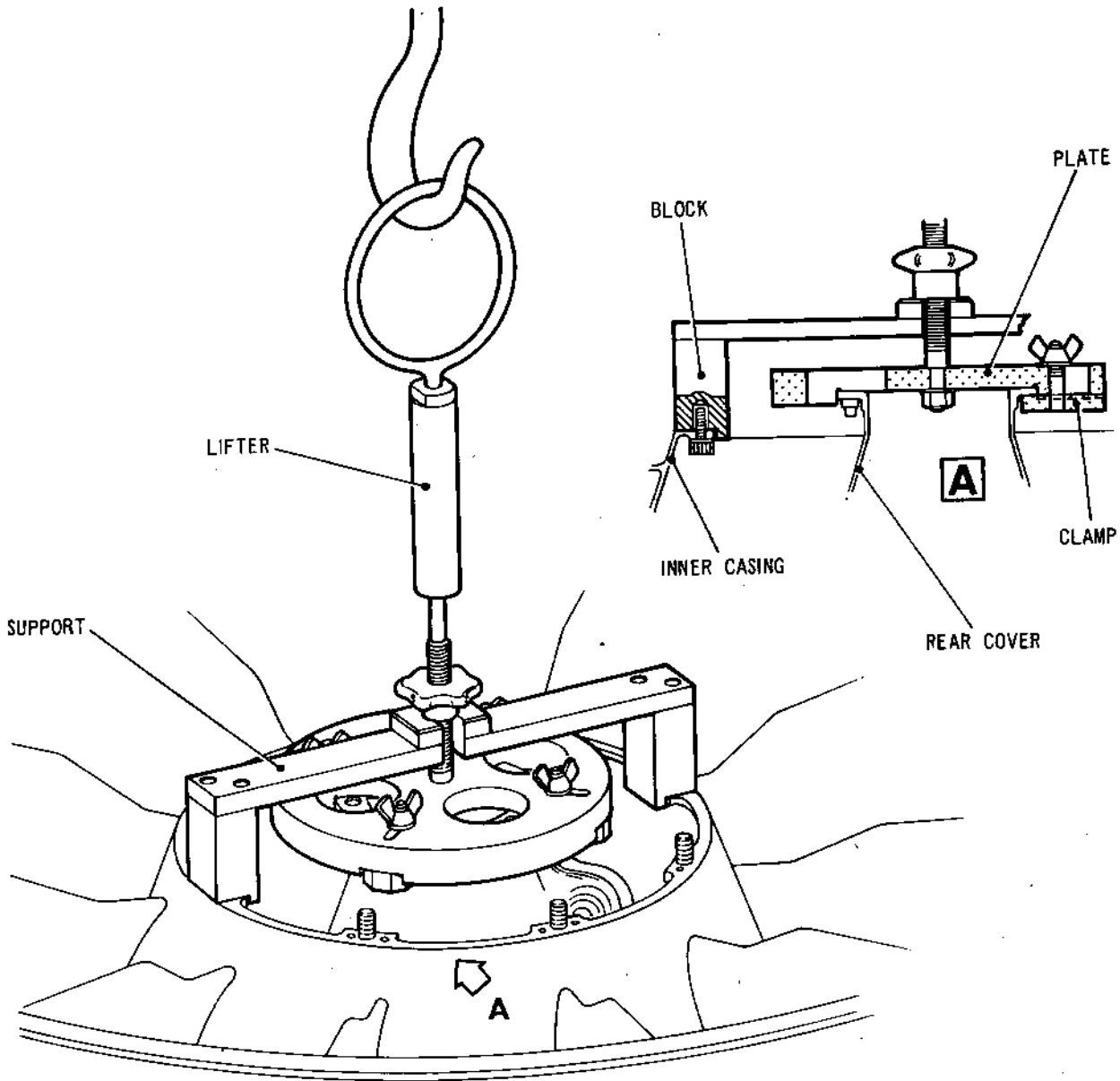


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Removing Turbine Bearing Support
Figure 110

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G. Remove the Turbine Bearing Support (Ref.Fig.110).

NOTE: If the rear cover was removed from the rear bearing support (Ref.para.F.(2)), the support may be released and removed, but it is recommended that the rear cover is reassembled and the lifting equipment used for removing the rear bearing support assembly in accordance with the following procedure.

- (1) If the rear cover is removed, assemble the cover to the bearing housing aligning the locating pin in the housing with the hole in the cover. Ensure that the cover is assembled squarely, so that the oil tube locates correctly in the oil hole in the bearing housing. Assemble the nuts to the protruding bolts, and using the cranked ring wrench (Tool 1584), tighten the nuts.
- (2) Assemble the lifting equipment to the rear cover.
 - (a) Rotate the stand (if required), so that the axis of the assembly is vertical, rear end uppermost.
 - (b) Ensure that the clamps are withdrawn on the lifting fixture (Tool 413), then locate the fixture on the end cover, engage the clamps of the fixture under the end cover flange, then tighten the wingnuts to secure the clamps.
 - (c) Position the support (Tool 420) on the rear flange of the inner case and engage the centre block around the lifting fixture. Tighten the handnut of the fixture against the centre block of the support.
- (3) Remove the nuts and bolts securing the turbine bearing support to the inner case, collecting the nuts from underneath the inner case.
- (4) Connect a hoist to the ring of the lifting fixture and carefully raise the hoist just sufficiently to take up the slack. Unscrew the handnut, and remove the support, then lower the bearing support through the diffuser onto a suitable pallet.

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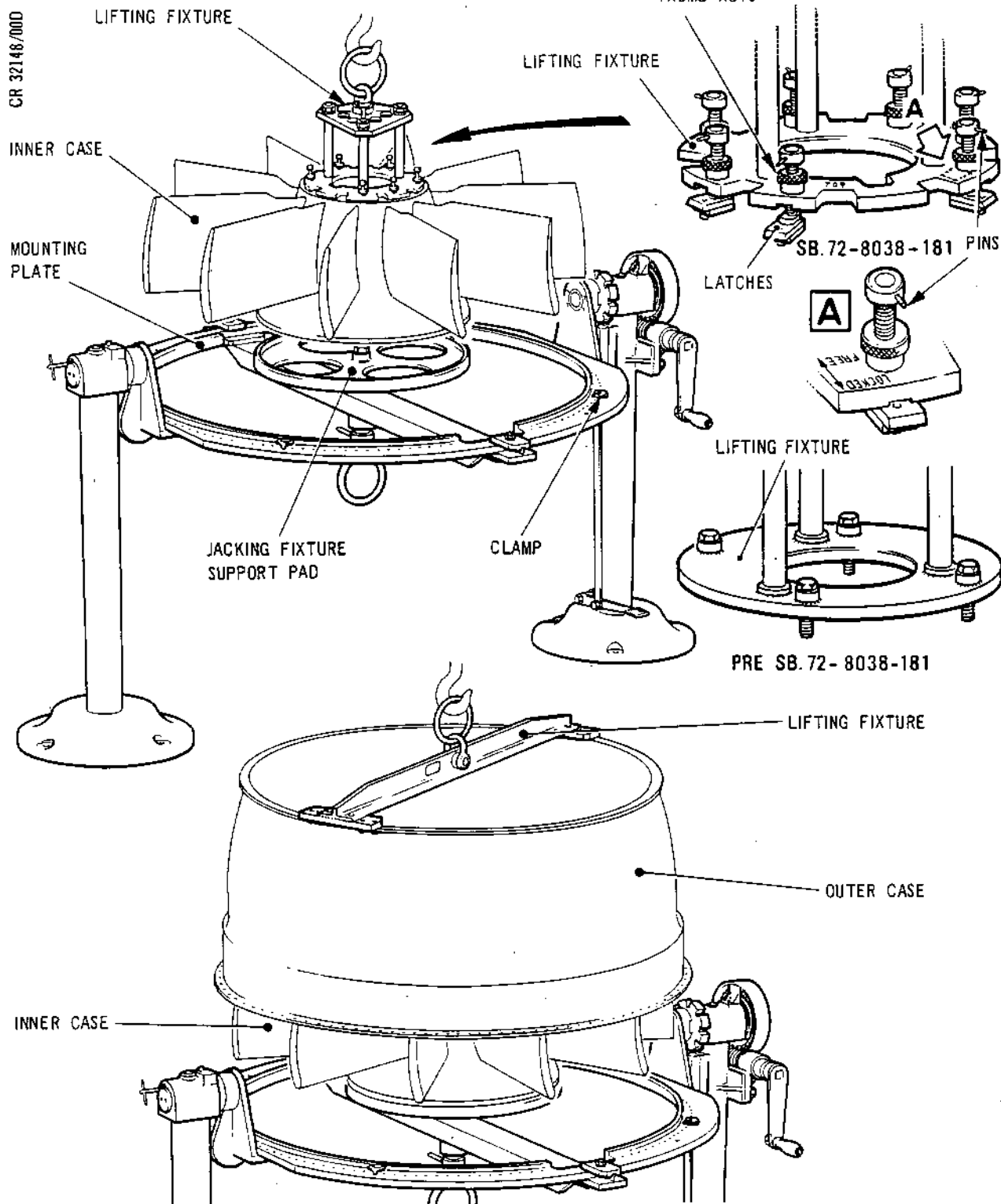
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Removing Inner and Outer Case from Stand
Figure 111

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- (5) Remove the hoist, then release the clamps and remove the lifting fixture from the support.

NOTE: The LP turbine bearing support must now be disassembled (Ref.72-52-03 Disassembly).

H. Remove the Outer Case from the Stand (Ref.Fig.111 and 112).

- (1) Assemble the jacking fixture (Tool 299) to the inner case.
 - (a) Ensure that the jacking fixture is resting in its mobile stand (Tool 811), then position the stand under the stand mounting plate aligning the bridge piece with the cutaway parts in the mounting plate.
 - (b) With the clamp plates of the fixture drawn outwards, raise the fixture and locate the clamps over the mounting plate, then tighten the clamp nuts to secure the clamps.
 - (c) Remove the mobile stand from underneath the mounting plate, then screw up on the jacking fixture until the support pad contacts the inner case.
- (2) Release and unscrew the 10 lower retaining bolts on the outer case securing the outer case to the inner case, then withdraw the bolts and locking plates. Remove the trunnion nuts from the vanes.
- (3) Release and unscrew the 10 upper retaining bolts, then withdraw the bolts and hollow pins from the outer case, using the impact puller (Tool 1690) (if required) to remove the pins. Remove the trunnion nuts from the vanes. Unscrew the jacking fixture to break the contact between the inner and outer cases.
- (4) Ensure that the nuts and washers are removed from the lifting fixture (Tool 298), then lower the fixture onto the rear flange of the outer case locating the studs in the flange bolt holes. Secure the fixture with the slave washers and nuts.

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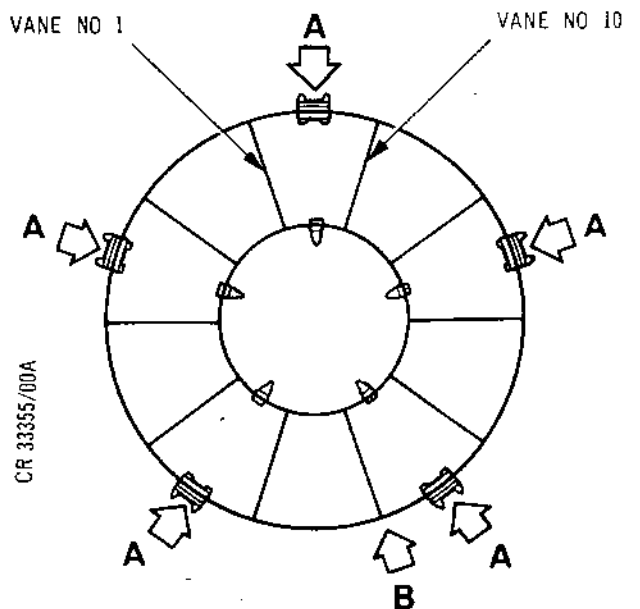
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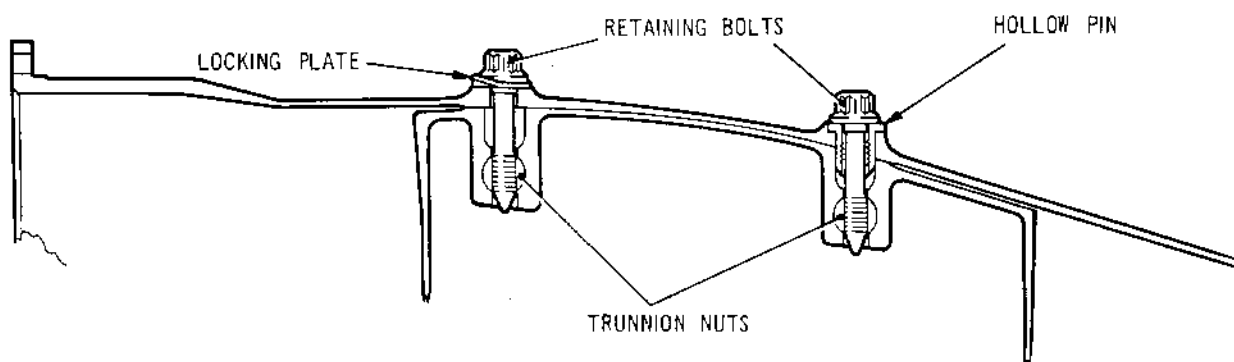
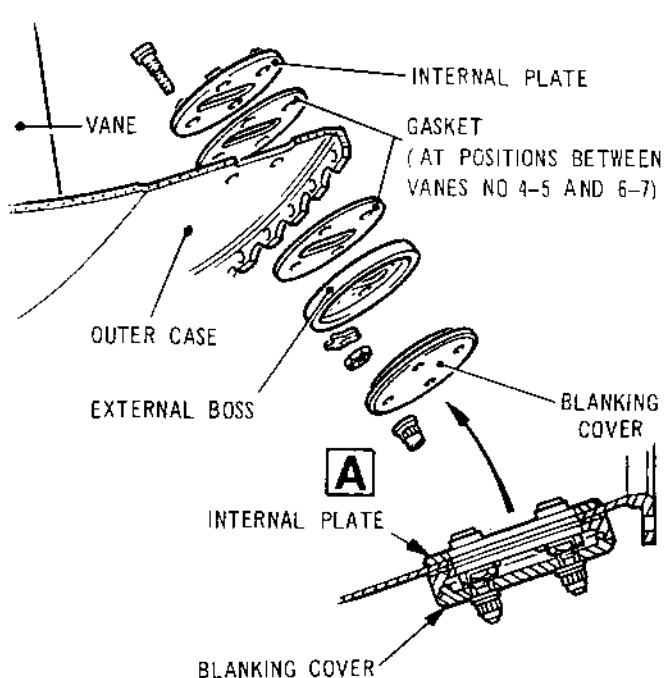
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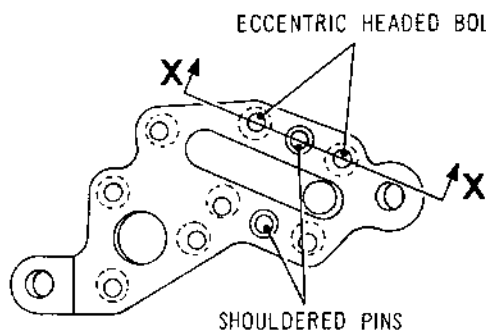


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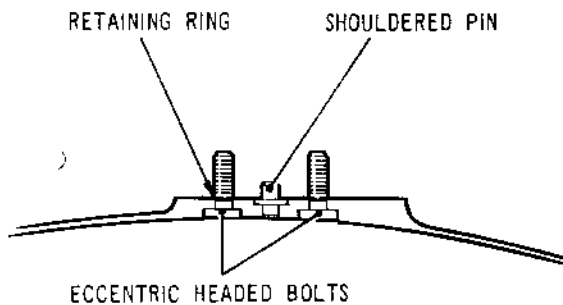
POSITION OF BLANKING COVERS AND PLUGS



ATTACHMENT OF OUTER CASE TO INNER CASE VANES



VIEW AT **B** (VANE No.6)



SECTION **XX**

ATTACHMENT OF ECCENTRIC HEADED BOLTS
AT VANE No.2,4,5 AND 7 SIMILAR

Disassembling Inner and Outer Cases and Items from Outer Case
Figure 112

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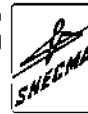
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- (5) Release the mounting plate clamps securing the outer case. Attach a hoist to the lifting fixture ring, then raise the hoist guiding the outer case off the inner case. Position and lower the case onto a pallet, then disconnect the hoist and release and remove the lifting fixture.

J. Remove the Inner Case from the Stand (Ref.Fig.111).

NOTE: On engines to pre SB.72-8038-181 lifting fixture (Tool 305 or 1953) may be used.

- (1) On engines to pre SB.72-8038-181 standard, locate the lifting fixture (Tool 305) on the rear face of the inner case aligning the bolt holes, then secure the fixture with its captive bolts. On engines to post or pre SB.72-8038-181 standard, ensure that the thumbnuts are unscrewed and the latches are in the 'FREE' position, then lower the lifting fixture (Tool 1953) onto the rear face of the inner case. Rotate the latches to 'LOCKED' and tighten the thumbnuts.
- (2) Attach a hoist to the lifting fixture ring, then operate the hoist and remove the inner case from the support of the jacking fixture. Position and lower the inner case onto a pallet. Disconnect the hoist, then release and remove the lifting fixture.
- (3) If the diffuser is to Pre SB.72-31 standard, unscrew and remove the five blanking plugs, washers and nuts from the cone of the inner case.

K. Remove Remaining Items from the Outer Case (Ref.Fig.112).

- (1) If the engine is to Pre SB.72-31 standard, remove the four nuts from the outside of the case from each of the five blanking covers and remove the covers. Release and remove the exposed nuts and keywashers from each of the blanking cover positions, then remove the external bosses and the internal plates and bolts. Remove the internal and external gaskets (if still attached) from the positions between No.4-5 and 6-7 vanes.

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- (2) Remove the retaining rings from the eccentric bolts located at No.2, 4, 5, 6 and 7 vanes, removing the rings from the outside of the case, and the bolts from inside the case.
- (3) Remove the bolts securing each of the mounting brackets to the containment shield, then ease the brackets off the pins.
- (4) Screw the lifting handles (Tool 1966) into four equally spaced threaded holes in the containment shield, then lift the containment shield off the outer case and place on a pallet. Remove the bolts from the flange of the outer case and the handles from the shield.

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SPHERICAL JOINT FLANGE - DISASSEMBLY

For information on the disassembly of the Spherical
Joint Flange, refer to 72-53-00 Disassembly.

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INTERNAL ACCESSORY DRIVES - DISASSEMBLY

For information on the disassembly of the Internal
Accessory Drives, refer to 72-32-00 Disassembly.

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LEFT-HAND GEARBOX - DISASSEMBLY

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LEFT-HAND GEARBOX - DISASSEMBLY

1. General

- A. Prior to commencing disassembly, refer to 72-09-00 Disassembly for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001.
- C. The left-hand gearbox is received for disassembly with the main oil pump attached. Prior to disassembly of the gearbox, the oil pump must be removed. The gearbox is disassembled in three main stages, the removal of front cover, diaphragm, and gearshafts. With one exception, all gearshafts are removed with the diaphragm. When disassembling the gearshafts, bearings and bearing housings, ensure that the matching components are noted and identified. The main drive shaft is a separate item and must be suitably protected.

2. Prepare to Remove Gears from Gearbox Case

- A. Assemble Gearbox to Assembly Stand (Tool 875) (Ref.Fig.101).
 - (1) Remove the module identification plate from the gearbox and carefully retain the plate with the disassembled components.
 - (2) Assemble the lifting fixture (Tool 285) to the gearbox.
 - (a) Slacken the quick attach/detach (QAD) coupling ring bolt located on the rear face of the gearbox case and remove the protector.
 - (b) Assemble the lifting fixture to the QAD coupling and ensure full engagement with the coupling ring. Tighten the coupling ring bolt.
 - (3) Adjust the stand in preparation to accept the gearbox.
 - (a) Unscrew the locking pin attached to the vertical support and rotate the gearbox mounting adapter until it is in the vertical position. Screw the locking pin into position to lock the adapter.

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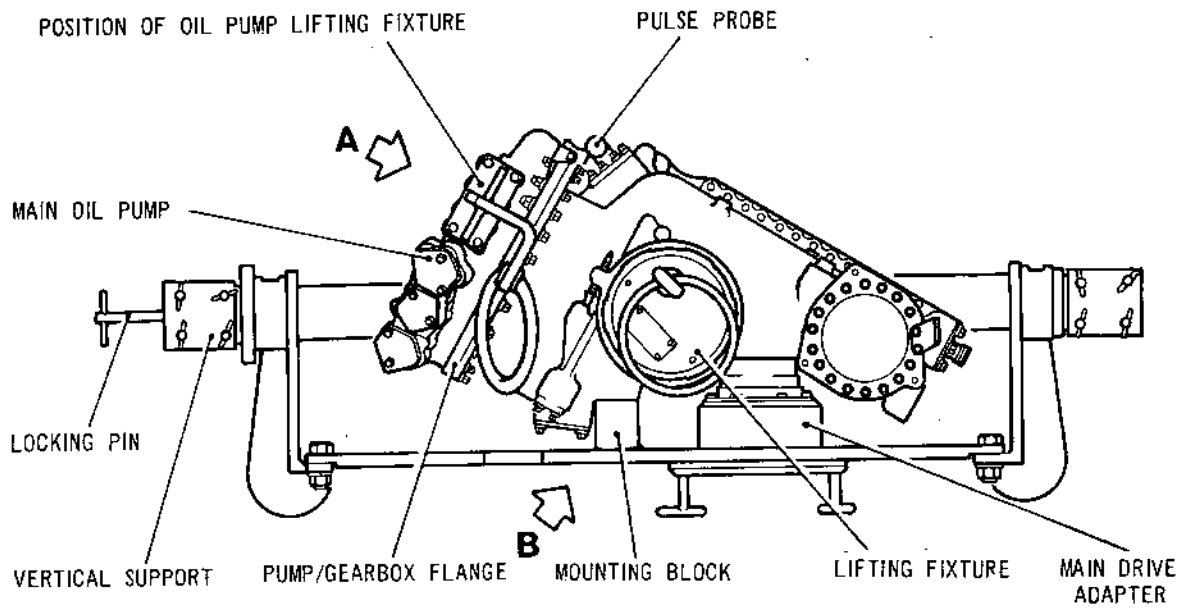


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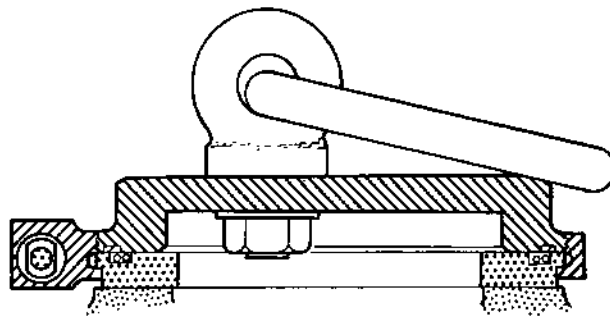
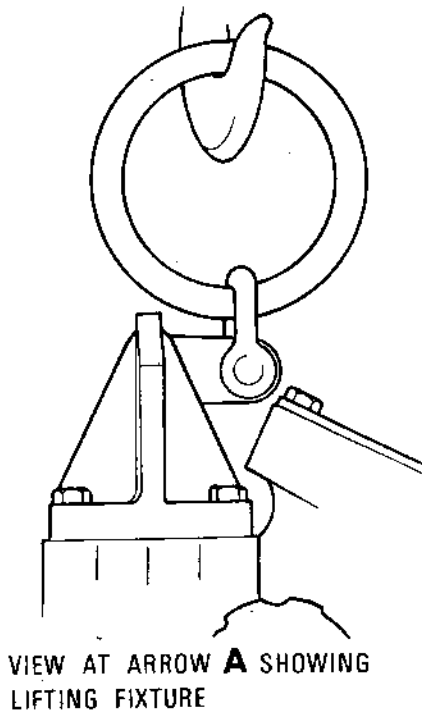
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VIEW LOOKING DOWN ON GEARBOX IN STAND



Assembling Gearbox to Assembly Stand
Figure 101

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- (b) Assemble the main drive location adapter (Tool 867) to the gearbox mounting adapter and secure it with nuts.
- (4) Attach a crane hoist to the gearbox lifting fixture and position the gearbox in readiness for securing it to the stand.
- (5) Secure the gearbox to the stand with nuts and bolts then remove the lifting fixture from the gearbox.

B. Remove Oil Pump (Ref.Fig.101).

- (1) Remove the bolts securing the pulse probe to the gearbox then carefully withdraw the probe and place it into its container (Tool 1159). Assemble protector (Tool 200) to the pulse probe location. The protector is stored in container (Tool 279).
- (2) Assemble the lifting fixture (Tool 93) to the pump.
 - (a) Remove the cover plate, bracket and protector from the lifting fixture location on the pump.
 - (b) Assemble the lifting fixture to the pump and secure it with bolts.
 - (c) Attach a crane hoist to the fixture in preparation for pump removal.
- (3) Remove the nuts, bolts and load spreading washers securing the pump flange to the gearbox flange.
- (4) Separate the flange joints by the use of puller (Tool 1668) which can be screwed into the tappings near the flanged pins positions. Ensure that residual oil drains into the drip tray.
- (5) Carefully withdraw the oil pump and ensure that the quill shaft does not fall free. Remove the quill shaft and assemble protector (Tool 931) to the joint face of the pump.
- (6) Place the oil pump into container (Tool 1632) and ensure that the quill shaft is protected.
- (7) Remove the lifting fixture from the oil pump and assemble protector (Tool 121) to the location. The protector is stored in container (Tool 279).

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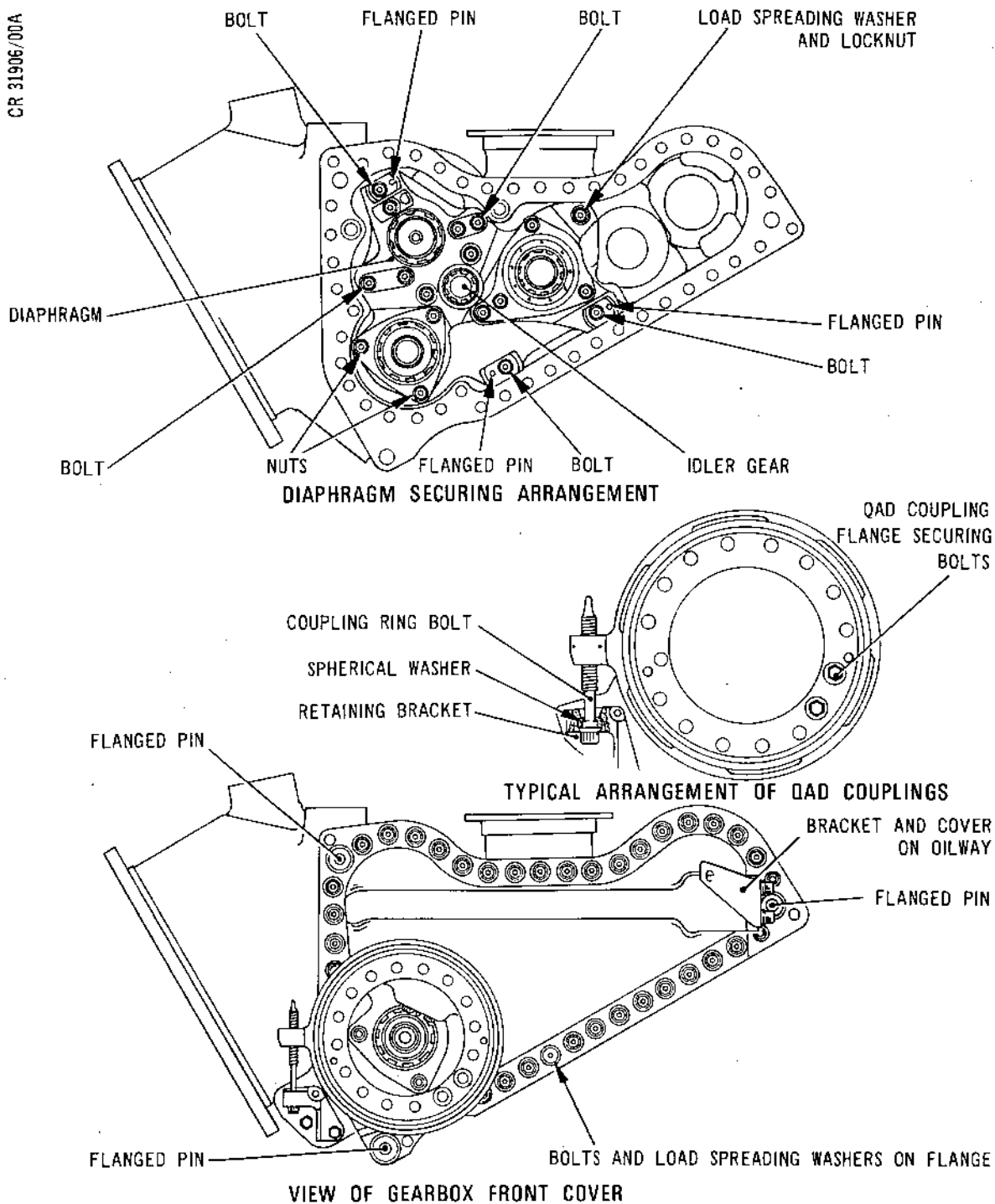


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Removing Front Cover, QAD Couplings and Diaphragm Assembly
Figure 102

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- (8) Carefully remove the flanged pins from the gearbox/oil pump joint face, and assemble protector (Tool 141) to the gearbox.

C. Remove QAD Couplings (Ref.Fig.102).

NOTE: This procedure applies to the gearbox front cover and gearbox case. Ensure that components are retained as matching items.

- (1) Remove the following items.
 - (a) Coupling ring bolt, spherical washer and protector.
 - (b) Retaining bracket bolts and retaining bracket.
 - (c) QAD coupling flange securing bolts.
 - (d) Coupling flange and seal.
- (2) Place the components in suitable containers.
- (3) Assemble a protector (Tool 146) to each QAD coupling location.

D. Remove Front Cover from Gearbox (Ref.Fig.102).

- (1) Remove the bracket and cover from the oilway on the gearbox cover and assemble protector (Tool 145) to that location.
- (2) Remove the bolts securing the cover to the gearbox case at the flanged pin positions. Use the mechanical puller (Tool 715) and extract the flanged pins.
- (3) Remove the remaining bolts and load spreading washers from the flange. Carefully separate the joint flanges by using puller (Tool 1021 or 1668). Ensure that residual oil drains into the drip tray. Remove the cover and protect the joint face with protector (Tool 140).

3. Remove Gears from Gearbox Case

A. Remove Diaphragm and Gearshafts (Ref.Fig.102).

- (1) Adjust the stand to position the diaphragm horizontally to prevent the loose idler gear from falling free on removal of the diaphragm.

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- (2) Remove the bolts, nuts and load spreading washers securing the diaphragm to the gearbox case. Use the puller (Tool 177) and withdraw the flanged pins from the diaphragm.
- (3) Carefully withdraw the diaphragm and attached gears from the gearbox. Place the assembly in a container.
- (4) Remove the idler gear from the gearbox and assemble protectors (Tool 191 and 192) to the bearings. Place the assembly in tray (Tool 1229).

4. Disassemble Gearshafts from Diaphragm and Remove Bearings

A. Prepare to Remove Gearshafts (Ref.Fig.103).

- (1) Assemble the diaphragm to the holding fixture (Tool 152) and secure the holding fixture to Hydraclamp (Tool 1643).
- (2) Remove the idler gear bearing track from the centre of the diaphragm.
 - (a) Remove the bolts and load spreading washers securing the track to the diaphragm. Remove the track and place in a container.

B. Remove and Disassemble Fuel Control Unit/Main Oil Pump Driving Shaft from Diaphragm (Ref.Fig.103 Position A).

- (1) Remove the nuts, bolts and load spreading plates securing the shaft bearing to the diaphragm. Remove the shaft from the diaphragm.
- (2) Secure the vice holder (Tool 166) in a bench vice and place the shaft in the vice holder.
- (3) Unlock the bearing retaining nut cupwasher and place the wrench spanner (Tool 1511) on the retaining nut.

CAUTION: HOLD DRIVING SHAFT TO PREVENT IT FROM FALLING FREE WHEN THE RETAINING NUT AND BEARING ARE REMOVED.

- (4) Unscrew and remove the retaining nut, cupwasher and flat washer then withdraw the quillshaft from the centre of the driving shaft, and remove the cupwasher and flat washer. Place the quillshaft in tray (Tool 1229).

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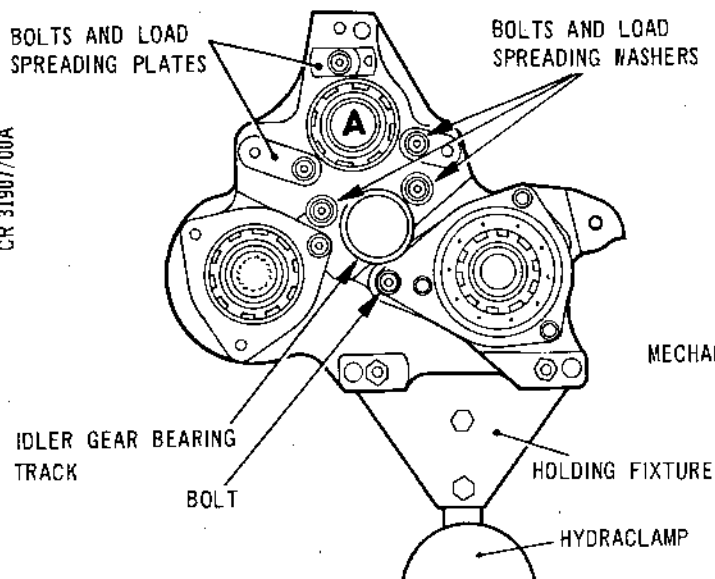
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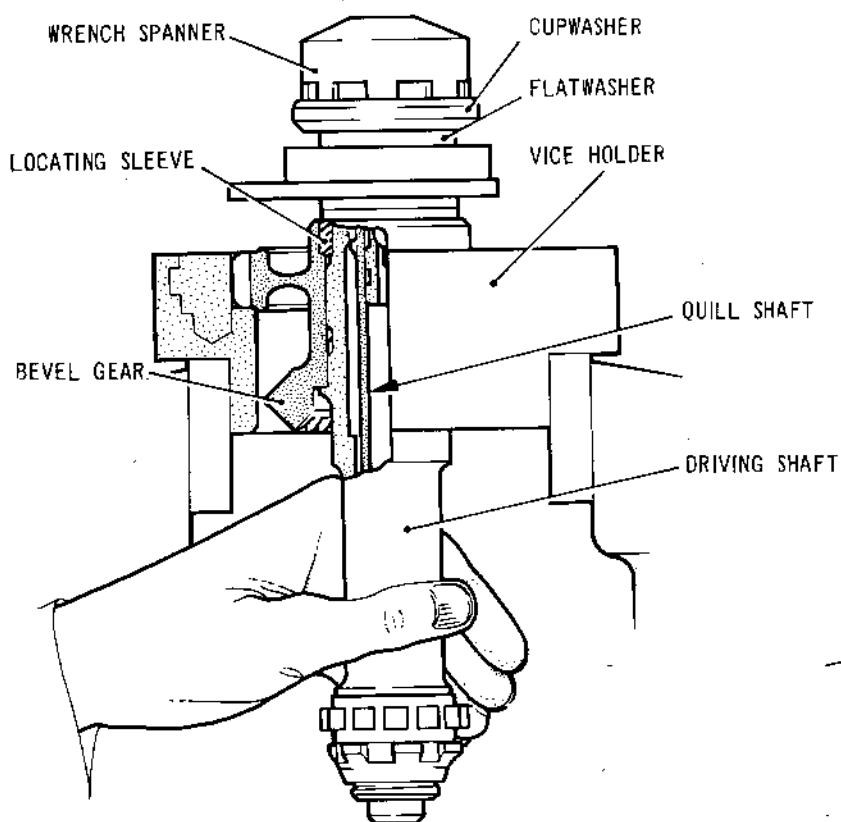
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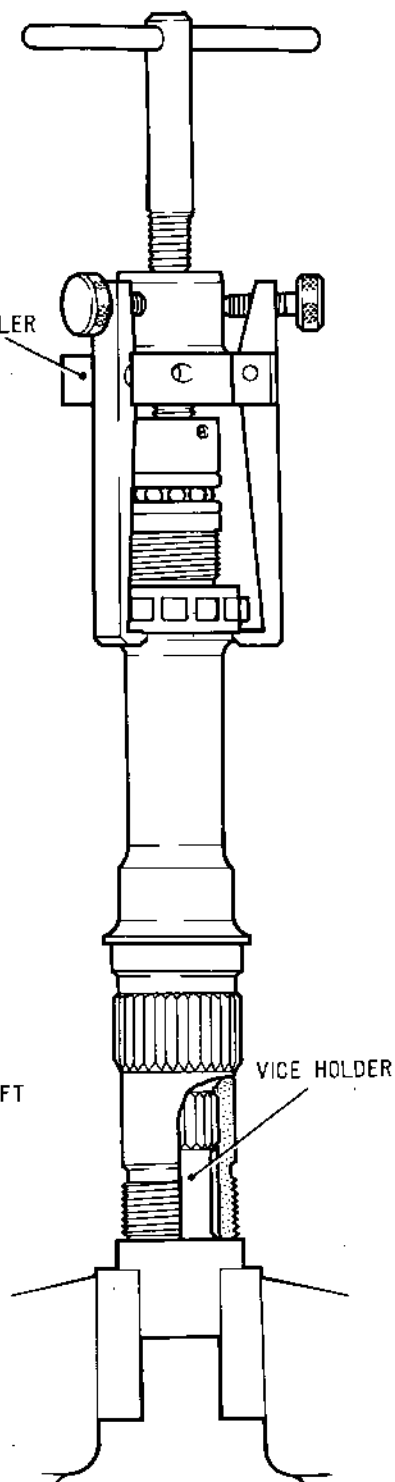
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SECURING ARRANGEMENT OF DRIVING SHAFT A
AND IDLER GEAR BEARING TRACK TO DIAPHRAGM



REMOVAL OF BEARING ASSEMBLY RETAINING NUT



REMOVAL OF ROLLER BEARING

Removing Driving Shaft from Diaphragm
Figure 103

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- (5) Remove the adjusting washer and locating sleeve. Carefully withdraw the driving shaft and place it in tray (Tool 1229). Place the bearing in a container.
- (6) Remove the bevel gear from the vice holder and place it in tray (Tool 1229). Remove the vice holder from the bench vice.
- (7) Remove the roller bearing from the driving shaft.
 - (a) Secure the vice holder (Tool 167) vertically in a bench vice and place the driving shaft in the holder.
 - (b) Use the wrench spanner (Tool 1487) and remove the bearing retaining nut.
 - (c) Hold the assembly firmly in the vice holder and remove the bearing using the mechanical puller (Tool 223). Place the bearing in a container.
 - (d) Remove the shaft from the vice holder and remove the vice holder from the bench vice. Place the shaft in tray (Tool 1229).
- (8) Remove the oil feed sleeve from the quillshaft (Ref.Fig.104).
 - (a) Remove the retaining ring from the end of the quillshaft.
 - (b) Place the support (Tool 196) on a support plate so that the flange section is supported.
 - (c) Insert the quillshaft in the support then insert the driver (Tool 195) into the quillshaft and carefully remove the sleeve ensuring that it does not fall free on removal.
 - (d) Place the quillshaft in tray (Tool 1229) and remove the support from the bench vice.
- (9) Remove the oil trap sleeve from the oil feed sleeve (Ref.Fig.104).
 - (a) Carefully secure the oil feed sleeve to a bench vice. Ensure that no damage or distortion to the sleeve can occur.

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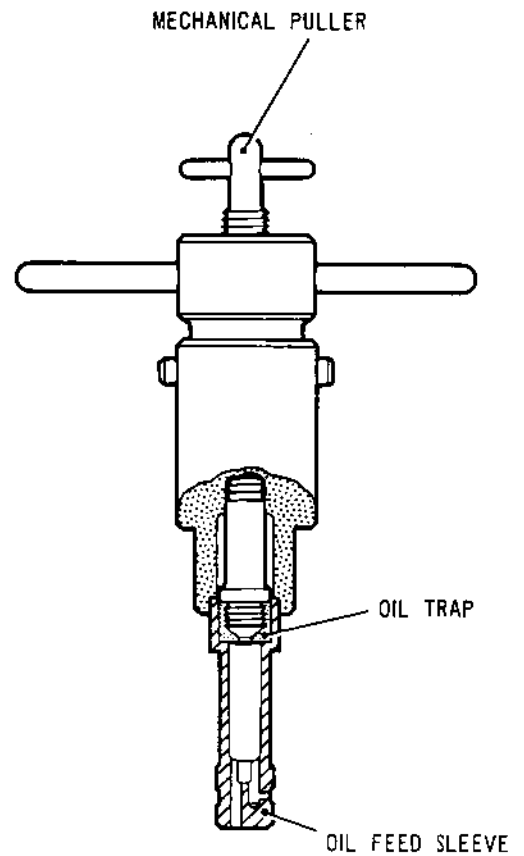
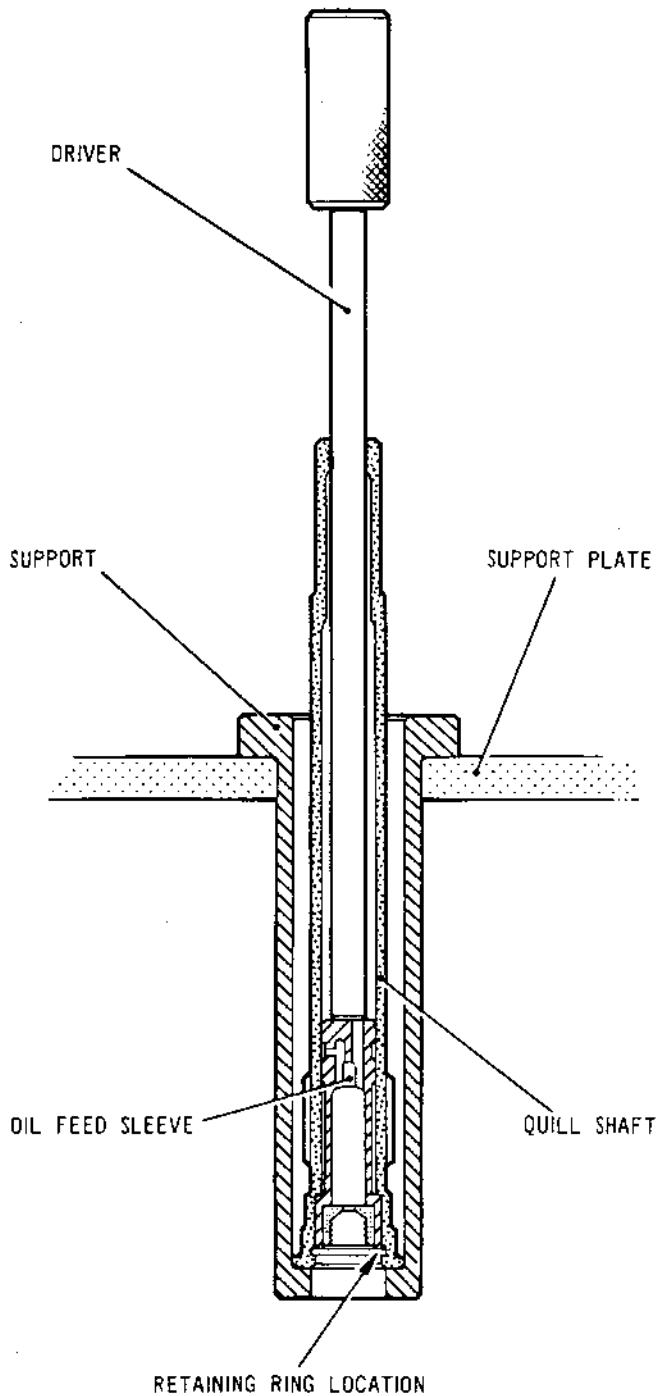
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Removing Oil Feed Sleeve and Oil Trap
Figure 104

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- (b) Assemble the mechanical puller (Tool 273) to the oil trap and carefully extract the trap. Remove the puller and place the oil trap and oil feed sleeve in containers.

C. Remove and Disassemble Stage 1 Fuel Pump Drive Gearshaft from Diaphragm (Ref.Fig.105 Position B).

- (1) Remove the retaining ring and oil trap washer from the inside of the shaft opposite to the end attached to the diaphragm.
- (2) Secure the vice holder (Tool 178) in a bench vice, transfer the diaphragm from the Hydraclamp and engage the gearshaft with the splined section of the holder.
- (3) Support the diaphragm assembly. Unlock the bearing cupwasher and using wrench spanner (Tool 1490) remove the retaining nut.

NOTE: The quillshaft within the gearshaft will emerge during removal of the retaining nut.

- (4) Remove the retaining nut, cupwasher and flat washer from the end of the shaft. Withdraw the quillshaft and place in tray (Tool 1229).
- (5) Carefully remove the gearshaft and place in tray (Tool 1229).
- (6) Transfer the diaphragm assembly to the Hydraclamp.

NOTE: The vice holder can remain in the bench vice in preparation for a later stage of disassembly.

- (7) Remove the nut, bolt and load spreading washer assembly securing the gearshaft bearing to the diaphragm. Remove the bearing and place in a container.
- (8) Assemble the gearshaft to the vice holder and remove the roller bearing retaining nut with wrench spanner (Tool 1566).
- (9) Assemble the mechanical puller (Tool 225) for engines Pre.SB.72-9023-403 or (Tool 3150) for SB.72-9023-403 to the bearing and gearshaft then carefully remove the bearing and place in a container.

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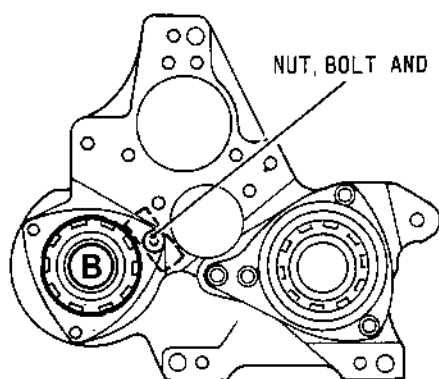


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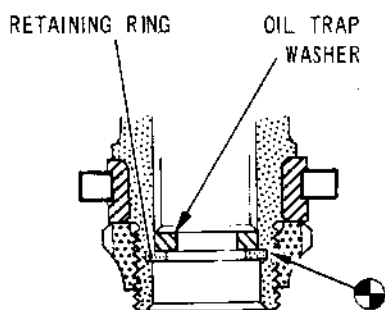
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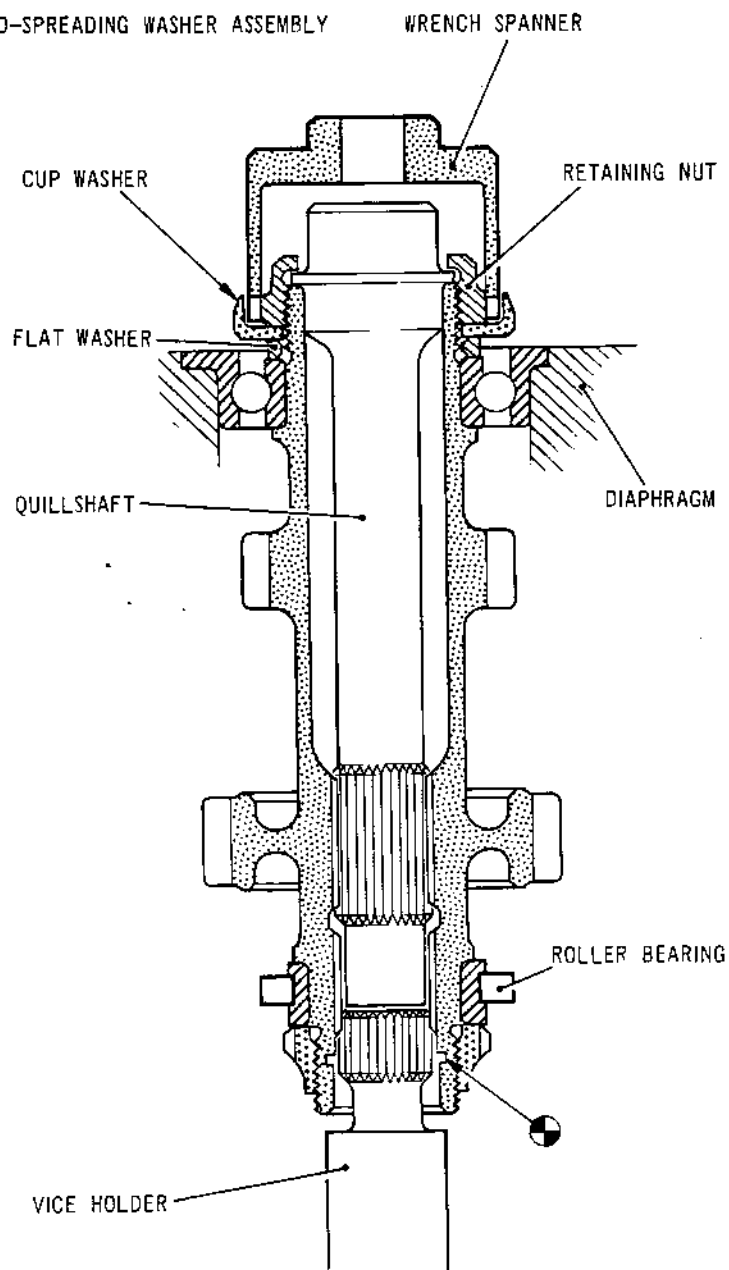
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LOCATION OF SHAFT IN DIAPHRAGM



VIEW SHOWING OIL TRAP
WASHER IN POSITION



Removing Stage 1 Fuel Pump Drive from Diaphragm
Figure 105



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(10) Place the gearshaft in tray (Tool 1229) and remove the vice holder from the bench vice.

D. Remove and Disassemble Main Drive Gearshaft from Diaphragm (Pre SB.72-383).

- (1) Secure the vice holder (Tool 303) in a bench vice. Transfer the diaphragm from the Hydraclamp and place the gear in the vice holder.
- (2) Support the assembly and using wrench spanner (Tool 1491), remove the self-locking bearing retaining nut and washer SB.72-55.
- (3) Remove the nuts securing the bearing to the diaphragm, then remove the retaining plate and withdraw the gearshaft and bearing from the diaphragm. Place the diaphragm in a container.
- (4) Remove the bearing from the gearshaft and place the bearing in a container. Remove the adjusting washer from the gearshaft.
- (5) Remove the bevel gear if it is loosely assembled to the gearshaft.

CAUTION: DO NOT APPLY FORCE TO SEPARATE BEVEL GEAR FROM GEARSHAFT.

- (6) If SB.72-9 Part 3 is not embodied, release and remove the spur gear from the bevel gear.
- (7) Remove the roller bearing retaining nut from the gearshaft with wrench spanner (Tool 1509).
- (8) Assemble the mechanical puller (Tool 229) to the bearing and carefully remove the bearing from the gearshaft.
- (9) Remove the puller from the bearing, then place the bearing in a container. Place the gearshaft in a tray (Tool 1229). Remove the vice holder from the bench vice.

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- E. Remove and Disassemble Main Drive Gear Assembly from Diaphragm (SB.72-383).
 - (1) Secure the vice holder (Tool 303) in a bench vice. Transfer the diaphragm from the Hydraclamp and place the gear in the vice holder.
 - (2) Support the assembly and using wrench spanner (Tool 1491), remove the self-locking bearing retaining nut.
 - (3) Remove the nuts securing the bearing to the diaphragm, then remove the retaining plate and withdraw the gear assembly and bearing from the diaphragm. Place the diaphragm in a container.
 - (4) Remove the bearing from the gear assembly and place the bearing in a container. Remove the adjusting washer from the gear assembly.
 - (5) Remove the roller bearing retaining nut from the gear assembly with wrench spanner (Tool 1509).
 - (6) Assemble the mechanical puller (Tool 229) to the bearing and carefully remove the bearing from the gear assembly.
 - (7) Remove the puller from the bearing, then place the bearing in a container. Place the gear assembly in a tray (Tool 1229). Remove the vice holder from the bench vice.

5. Remove Bearings from Idler Spur Gear

A. Remove Small Diameter Bearing Assembly.

- (1) Secure the vice holder (Tool 304) in a bench vice and place the idler gear in the holder. Position the smaller bearing retaining nut uppermost.
- (2) Using the wrench spanner (Tool 1509) remove the small retaining nut.



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- (3) Assemble the mechanical puller (Tool 224) to the small bearing/gearshaft then remove the bearing and place it in a container. Do not remove the vice holder.

B. Remove Large Diameter Bearing Assembly.

- (1) Invert the idler gearshaft in the vice holder then using wrench spanner (Tool 1566) remove the large retaining nut.
- (2) Assemble the mechanical puller (Tool 225) to the bearing/gearshaft then remove the bearing and place it in a container.
- (3) Place the gearshaft in tray (Tool 1229). Remove the vice holder from the bench vice.

6. Disassemble Bevel Gear Pinions from Gearbox

A. Remove Oil Pump Drive Bevel Pinion (Ref.Fig.106).

- (1) Insert the immobiliser (Tool 331) in the bevel pinion, ensuring full engagement of the splines.
- (2) Engage the immobiliser bar with the hole in the immobiliser plate (Tool 332). Secure the plate to the gearbox case.
- (3) Unlock the retaining nut cupwasher in the oil pump section of the gearbox case.
- (4) Assemble the support plate (Tool 800) to the oil pump location flange. Insert the wrench spanner (Tool 1486) through the support plate and engage it with the bevel gear pinion retaining nut. Carefully unscrew and remove the retaining nut.
- (5) Remove the immobiliser plate, immobiliser and support plate.
- (6) Assemble the mechanical puller (Tool 213) to the oil pump location flange on the gearbox case. Adjust the handle to establish contact between the tool and the end of the bevel gear pinion.
- (7) Carefully remove the bevel pinion from the bearing then remove the adjustment washer from the pinion. Place the gear in tray (Tool 1229).

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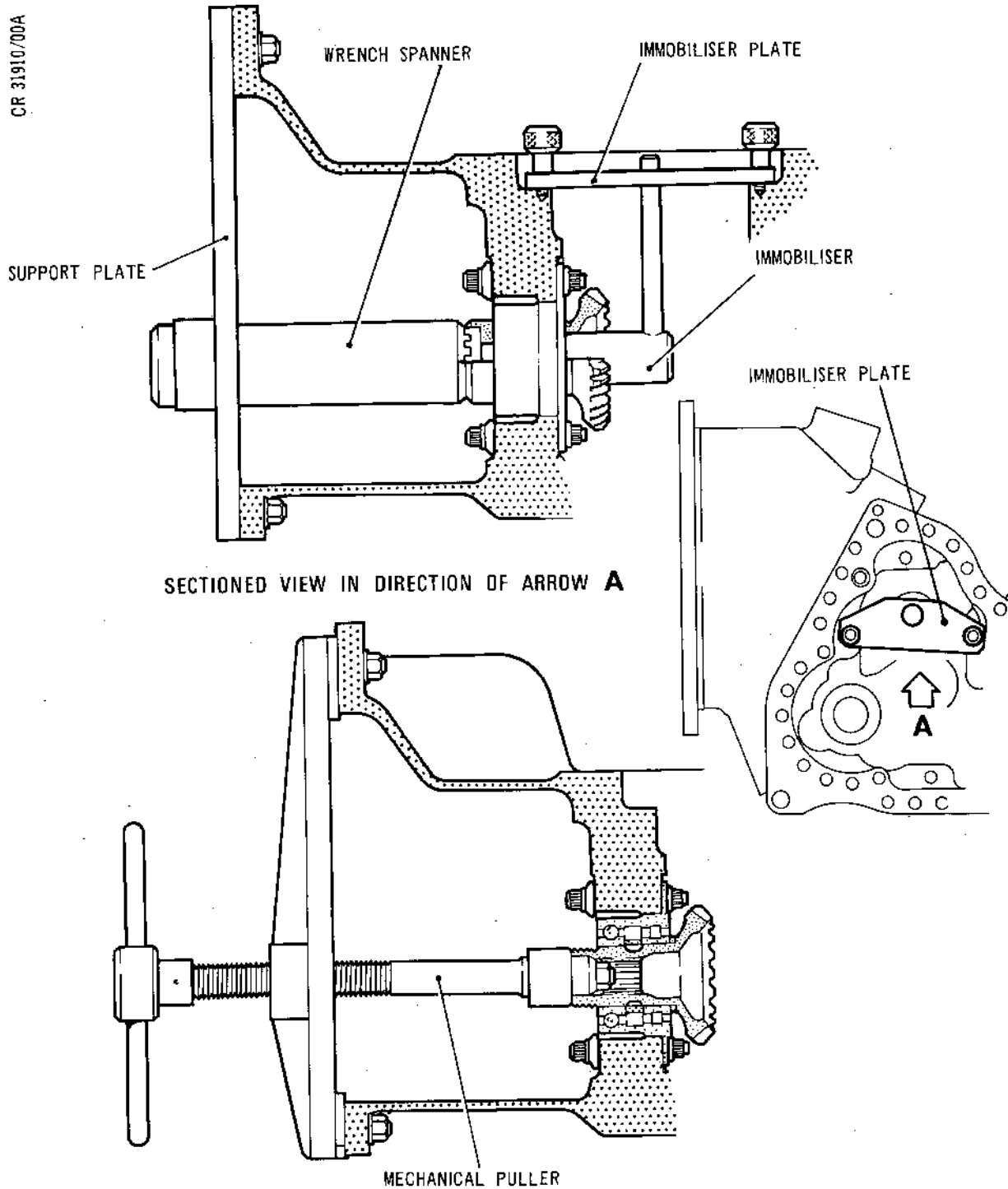


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Removing Oil Pump Drive Bevel Pinion
Figure 106

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(8) Remove the nuts, bolts and load spreading washers securing the bearings to the case. Withdraw the bearings and remove the spacer sleeve.

(9) Place each bearing in a container.

B. Remove Main Drive Shaft Spiral Bevel Pinion (Ref. Fig.107).

(1) Assemble the immobiliser (Tool 168) to the gearbox main drive mounting location on the assembly stand mounting plate.

(a) Engage the tool with the bevel pinion retaining nut.

(b) Secure the immobiliser plate to the mounting plate.

(2) Insert the splined wrench spanner (Tool 1558) through the centre of the immobiliser and engage the splines with the bevel pinion.

(3) Turn the splined wrench spanner in a clockwise direction to unscrew and release the bevel pinion.

(4) Remove the splined wrench spanner and immobiliser from the gearbox case.

(5) Assemble the mechanical driver (Tool 220) to the location from which the immobiliser was removed. Turn the handle of the tool until the bevel pinion is completely removed from the bearing. Place the bevel pinion in tray (Tool 1229).

NOTE: For pre SB.72-383 follow paras.(6) and (7) for SB.72-383 follow para.(8).

(6) Remove the nuts, bolts and washers securing the bevel gear bearing and oil jets to the gearbox case. Remove the bearing assembly and oil jets. Place the oil jets in a suitable container.

(7) Separate the bearings to remove the spacer sleeve and adjustment washer.

(8) Remove the nuts, bolts and washers securing the bevel gear bearing and oil jets to the gearbox case. Remove the bearing assembly, oil jets and adjusting washer. Place the oil jets in a suitable container.

(9) Place each bearing in a container.

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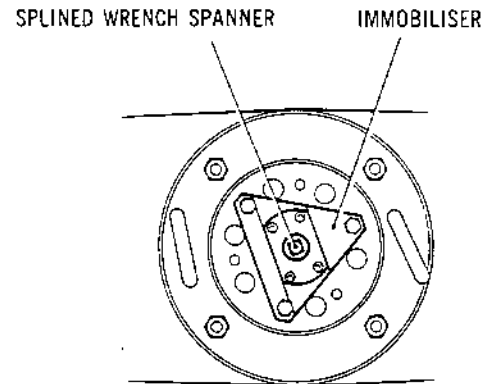
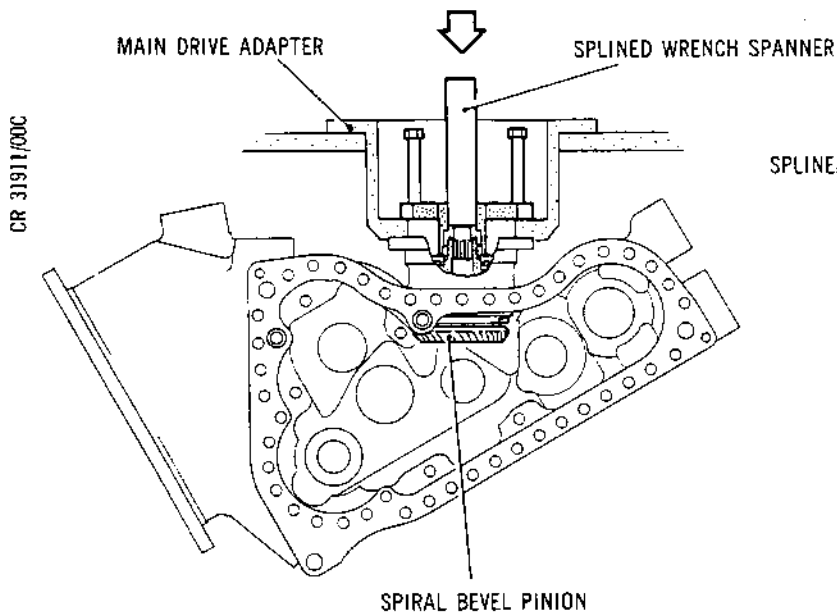
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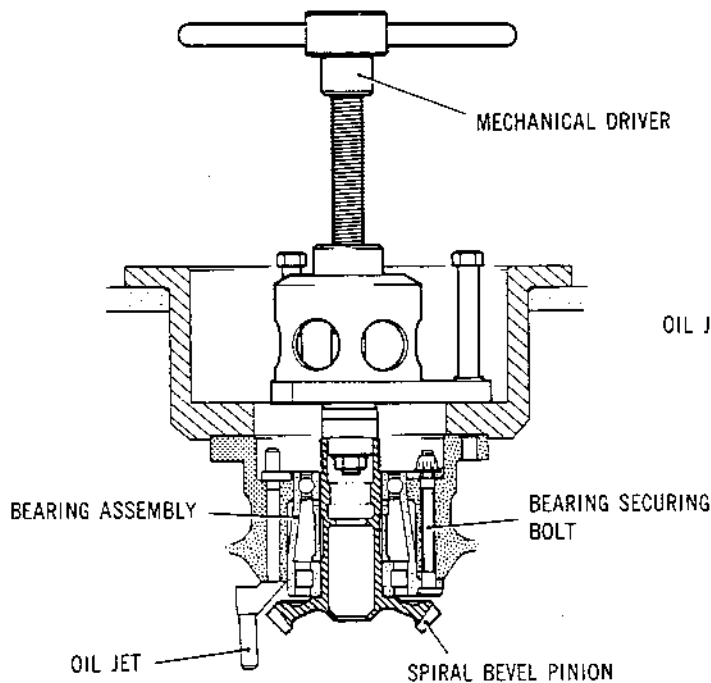
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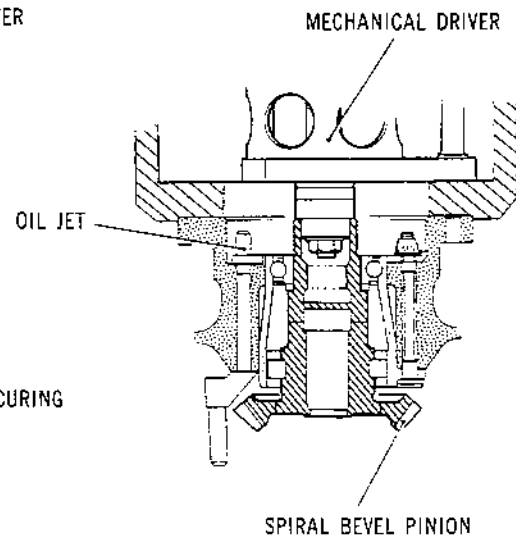
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VIEW IN DIRECTION OF ARROW



PRE SB 72-383 STANDARD



SB 72-383 STANDARD

Removing Main Drive Spiral Bevel Pinion
Figure 107

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7. Disassemble Components from Gearbox Case and Front Cover

A. Remove Components from Gearbox Case (Ref.Fig.108).

- (1) Remove the bolts securing the bearing journals to the gearbox case, then remove the journals and place them with the matching bearings in suitable containers.
- (2) Disassemble the bearing journal at the fuel control unit drive shaft location.
 - (a) Remove the bolt securing the oil jet to the QAD coupling location on the rear face of the gearbox case.
 - (b) Remove the three nuts and bolts securing the bearing housing to the gearbox case. Withdraw the journal and place in a suitable container.
- (3) Unscrew and remove the oil jet from the inner surface of the gearbox case. Place the oil jet in a suitable container.
- (4) Remove the hollow pin and oil strainer assembly from the gearbox case/cover flange.
 - (a) Use puller (Tool 154) with the impact puller (Tool 1653) then remove the hollow pin.
 - (b) Use puller (Tool 156) with the impact puller (Tool 1653) and remove the oil strainer assembly positioned under the hollow pin.
 - (c) Remove the oil jet SB.72-32 from the strainer and place both items in suitable containers.
- (5) Use puller (Tool 154) with the impact puller (Tool 1653) and remove the remaining hollow pin from the flange.
- (6) Release the retaining rings securing the diaphragm bolts to the flange then withdraw the bolts.
- (7) Remove the cover and bracket from the oilway near the QAD coupling location on the rear of the gearbox case. Remove the oil jet and strainer assembly.
 - (a) Screw the puller (Tool 155) into the end of the strainer assembly and withdraw the assembly. If necessary the puller can be used in conjunction with the impact puller (Tool 1653).

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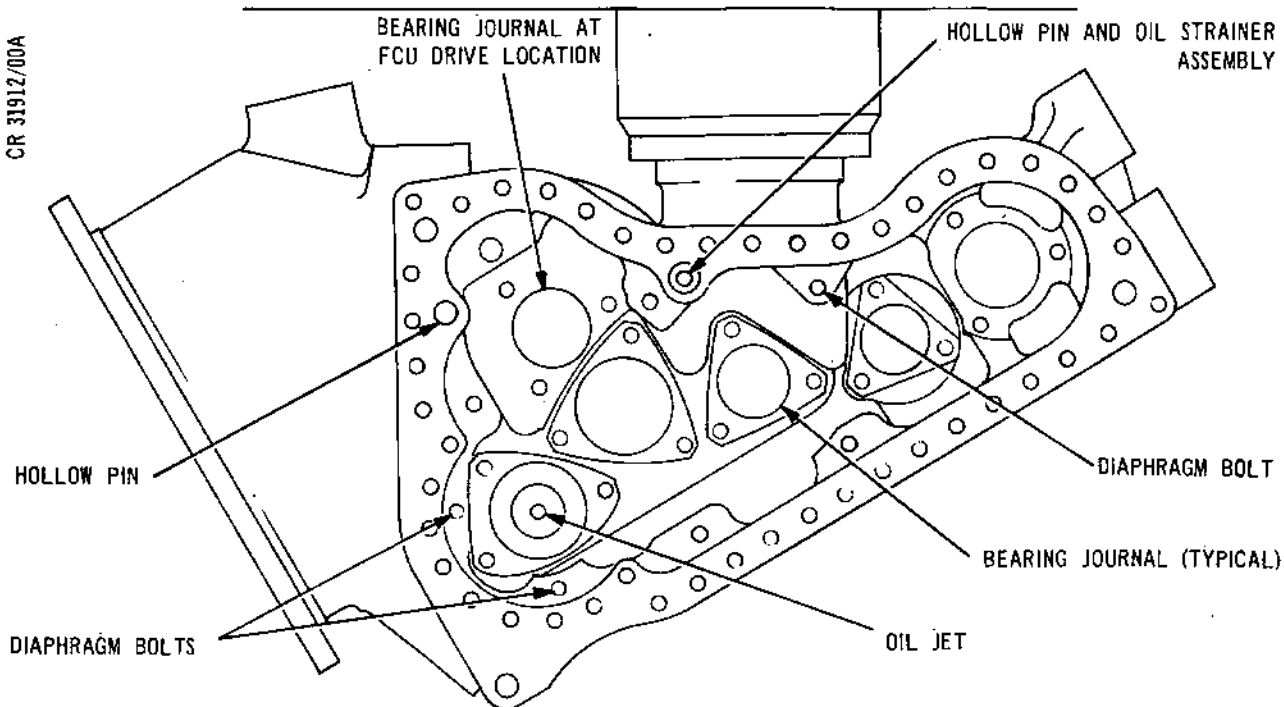


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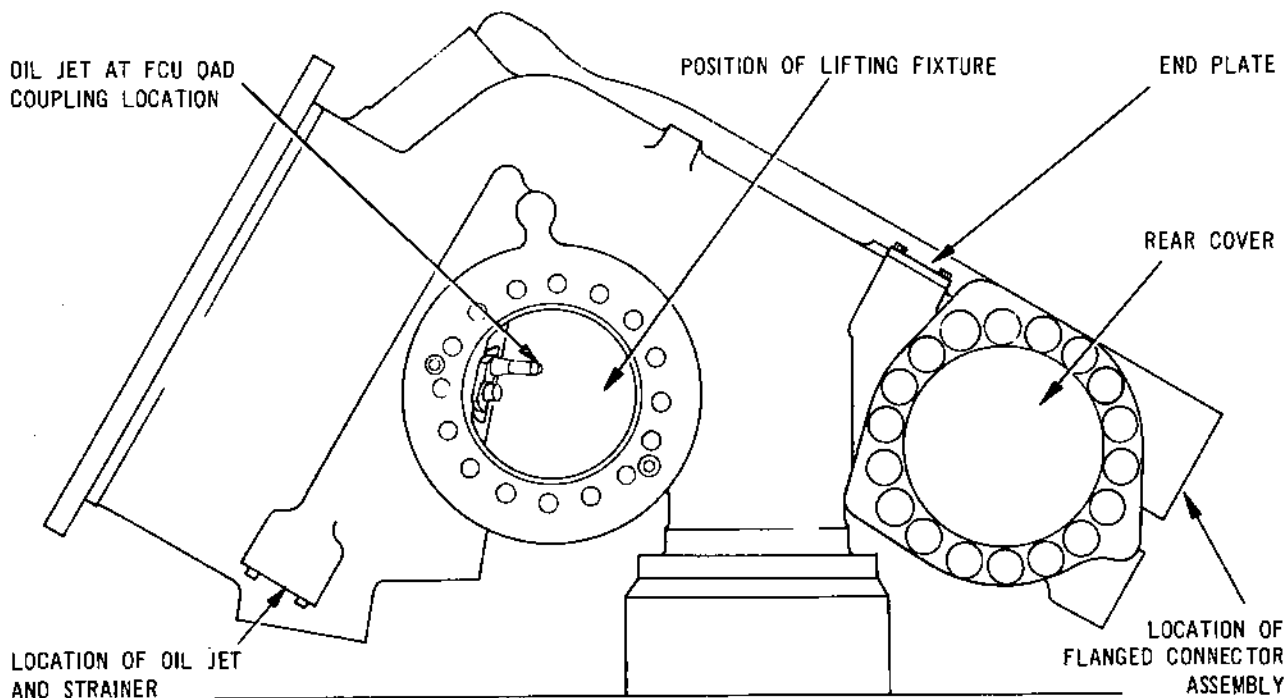
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VIEW INSIDE GEARBOX CASE



VIEW ON REAR OF GEARBOX CASE

Removing Components from Gearbox Case
Figure 108

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- (b) Remove the oil jet from the strainer and place both items in suitable containers.
 - (c) Assemble protector (Tool 142) to the strainer location on the gearbox.
- (8) Disassemble the rear cover from the gearbox case.
- (a) Remove the bolts and load spreading washers. Withdraw the flanged pins with the mechanical puller (Tool 715).
 - (b) Separate the joint flanges by using the puller (Tool 1668) in the extraction holes then remove the cover. Assemble protector (Tool 204) to the rear cover location on the gearbox. The protector is stored in container (Tool 279).
- (9) Remove the end-plate, flanged connector and associated items from the end of the gearbox case near the rear cover. Assemble protector (Tool 198) to the gearbox.
- (10) Remove the stepped pins from the QAD coupling location.
- (11) Remove the protector from the QAD coupling location and assemble the lifting fixture (Tool 313) to the gearbox. Remove the gearbox from the assembly stand and assemble protector (Tool 199) to the main drive location on the gearbox.
- (12) Place the gearbox on a transport pallet and remove the lifting fixture from the gearbox. Assemble the previously removed protector to the QAD coupling location.

B. Remove Components from Front Cover (Ref.Fig.109).

- (1) Remove protectors from the front cover then assemble the holding fixture (Tool 151) to the front cover and secure the assembly in a Hydraclamp.
- (2) Unscrew and remove the plug (Ref.Fig.109 Position A). Place the plug in a suitable container.
- (3) Remove the filter and connector (Ref.Fig.109 Position B).
 - (a) Release the bolt securing the retaining cap and withdraw the retaining cap.

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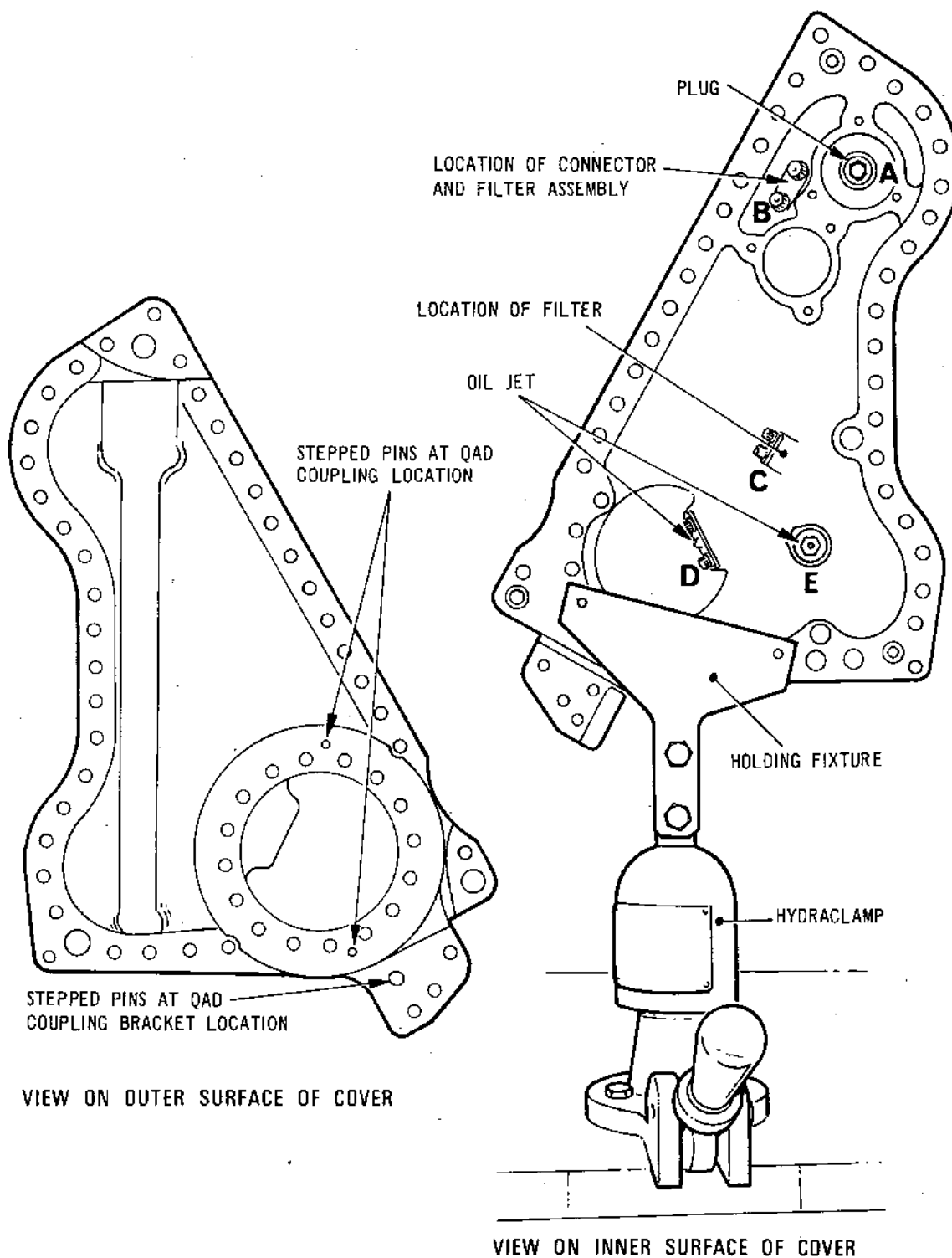


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Removing Components from Front Cover
Figure 109

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- (b) Screw the puller (Tool 158) into the connector and withdraw the assembly from the bore.
- (c) Clamp the vice holder (Tool 159) in a bench vice in preparation for disassembly of the filter and connector.
- (d) Place the filter in the vice holder and ensure that the slot in the end of the filter engages with the pin in the bore of the tool. Remove the connector from the filter.
- (f) Remove the filter from the vice holder and place the components in suitable containers.
- (g) Remove the vice holder from the bench vice.
- (4) Remove the filter assembly (Ref.Fig.109 Position C).
- (a) On engines to Pre SB.72-12 standard remove the bolt securing the retaining cap to the cover. Use the driver (Tool 1484) to withdraw the retaining cap. Screw the puller (Tool 158) into the oil jet located in the bore and withdraw the oil jet and filter assembly. Remove the puller from the oil jet.
- (b) On engines to SB.72-12 standard remove the bolt and washer securing the oil jet sealing plug to the cover. Use the driver (Tool 1484) to withdraw the sealing plug and filter assembly from the bore. Remove the driver from the sealing plug.
- (c) Place the oil jet and filter assembly or oil jet sealing plug and filter assembly in the vice holder (Tool 159). Ensure that the slot in the end of the filter engages with the pin in the bore of the tool. Use the turning key (Tool 1485) unscrew and remove the oil jet or oil jet sealing plug from the filter. Place the components in clean sealed containers.

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- (5) Release the bolts securing the oil jet (Ref.Fig.109 Position D), then remove the oil jet and place in a suitable container.
- (6) Unscrew and remove the oil jet (Ref.Fig.109 Position E). Place the oil jet in a suitable container.
- (7) Carefully remove the stepped pins from the QAD coupling location and adjacent bracket position.
- (8) If SB.72-9 Parts 1 and 2 are not incorporated, release and remove the three bolts securing each of the two bearing outer tracks, then withdraw the outer tracks from the cover (Ref.Fig.109 Position A and below - outer tracks not illustrated).

NOTE: It is recommended that SB.72-9 is incorporated and the redundant outer tracks and spur gear (Ref.para. 4.D.(6)) are deleted from the assembly.

- (9) Disengage the assembly from the clamp and remove the holding fixture from the cover.
- (10) Assemble protectors (Tool 146 and 140) to the cover.

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LEFT-HAND ACCESSORY GEARBOX CASE ASSEMBLY - DISASSEMBLY

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For information on the disassembly of the Left-hand Accessory Gearbox Case Assembly, refer to 72-62-00, Disassembly.

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DISASSEMBLY

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LEFT-HAND ACCESSORY GEARBOX MAIN DRIVES - DISASSEMBLY

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For information on the disassembly of the Left-hand Accessory Gearbox Main Drives, refer to 72-62-00 Disassembly.

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DISASSEMBLY

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FIRST STAGE FUEL PUMP DRIVE AND IDLER GEAR - DISASSEMBLY

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For information on the disassembly of the First Stage Fuel Pump and Idler Gear, refer to 72-62-00 Disassembly.

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FUEL CONTROL UNIT DRIVE AND MAIN OIL PUMP DRIVE - DISASSEMBLY

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For information on the Fuel Control Unit Drive and Main Oil Pump Drive, refer to 72-62-00 Disassembly.

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RIGHT-HAND ACCESSORY GEARBOX - DISASSEMBLY

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OVERHAULRIGHT-HAND ACCESSORY GEARBOX - DISASSEMBLY1. General

- A. Prior to commencing the disassembly refer to 72-09-00 Disassembly for general information.
- B. The right-hand gearbox will be received, on a pallet, from the intermediate case disassembly (72-32-00). During disassembly, drain trays must be suitably positioned to accept the small leakage of oil which will be present.
- C. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001.
- D. During disassembly, individual items are to be identified, adjusting washers placed with their correct assembly and all items placed into containers.

2. Disassemble the Right-hand Accessory Gearbox

- A. Remove the Integrated Drive Generator (IDG) Quick Attach/Detach (QAD) Coupling Ring Assembly and Mounting Bracket.
 - (1) Remove the protector (Tool 792) from the location of the QAD coupling (Ref.Fig.101).
 - (2) Unscrew and remove the locking bolt from the coupling ring and mounting bracket. Remove the spherical washer from the bolt.
 - (3) Unscrew and remove the 32 bolts securing the flange and coupling ring to the gearbox case.

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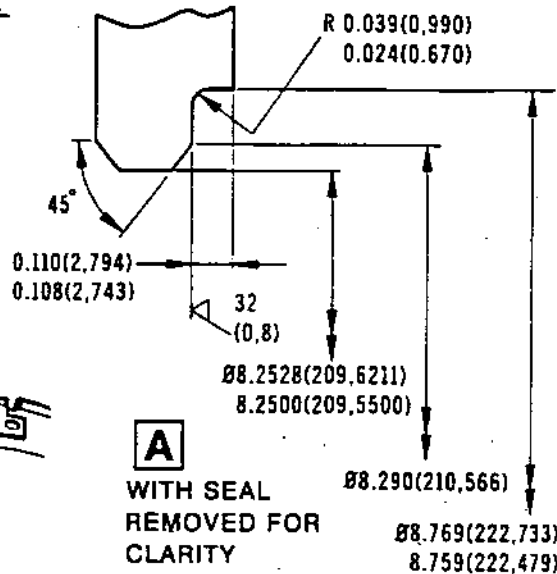
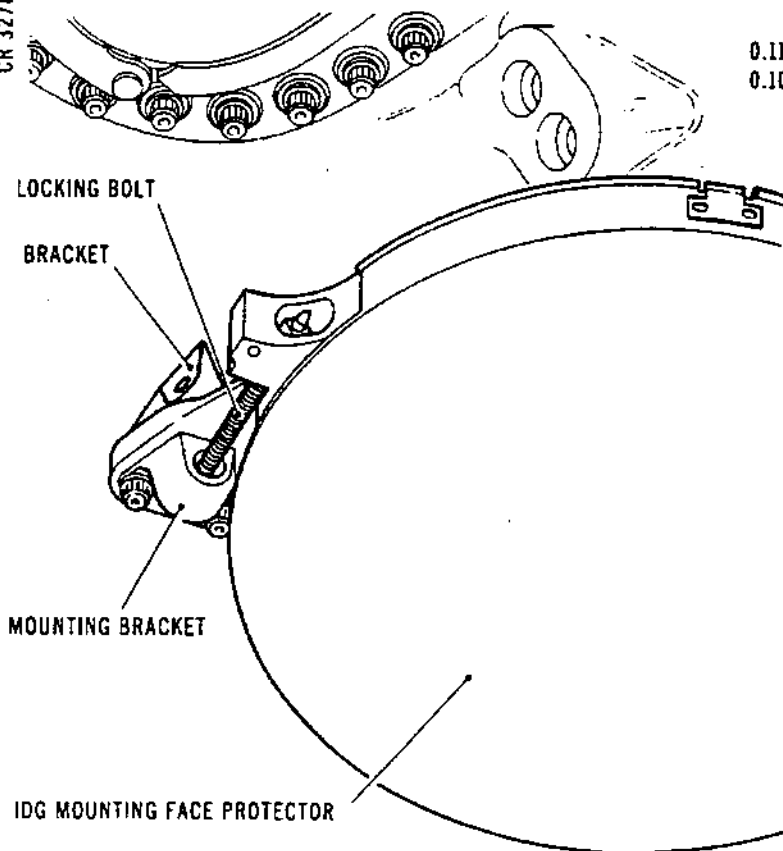
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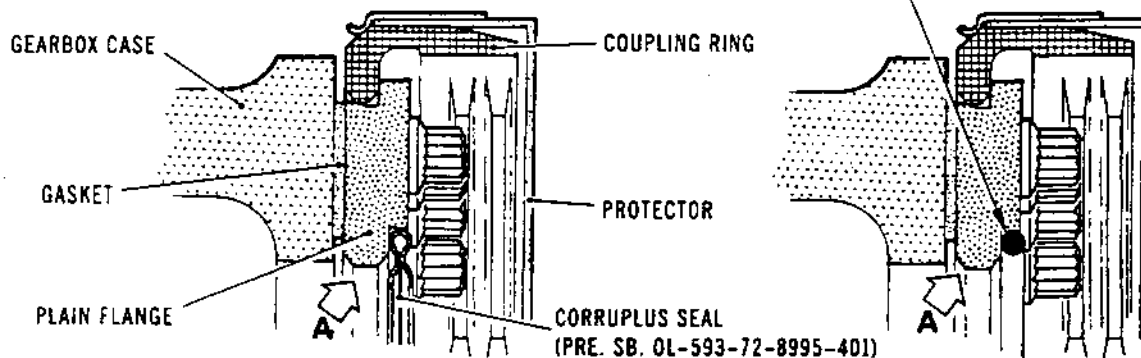


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O RING SEAL
(SB. 0L-593-72-8995-401)



SECTION THROUGH MOUNTING FACE
Removal of the Integrated Drive Generator (IDG)
Quick Attach/Detach (QAD) Coupling Ring
Figure 101



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CAUTION: THE CORRUPPLUS SEAL (Pre.SB.OL.593-72-8995-401) OFTEN FRETS AND DAMAGES ITS SEALING FACE. IN ORDER TO PREVENT DAMAGE TO THE 'O' RING (SB.OL.593-72-8995-401) IT MAY BE NECESSARY TO POLISH THE SURFACE BACK TO ITS ORIGINAL SURFACE FINISH OF 32 MICRO-INCHES (0,8 MICRO-METRES) BEFORE FITTING THE 'O' RING. THE GROOVE MUST NOT BE MADE DEEPER THAN ITS DRAWING DIMENSIONS (REF.FIG.101) OR THE CONSEQUENT REDUCTION IN SEAL NIP MAY RESULT IN LEAKAGE.

- (4) Remove and separate, both flange and coupling ring from the gearbox case, then remove the Corruplus seal (Pre.SB.OL.593-72-8995-401) or the 'O' ring (SB.OL.593-72-8995-401) from the flange.
- (5) Remove the gasket from the flange mounting face.
- (6) Unscrew and remove the two self-locking nuts, load spreading washers and bolts securing the mounting bracket to the gearbox case, then remove the mounting bracket and bracket from the gearbox case.

B. Assemble the Gearbox to the Build Stand (Ref.Fig.102).

- (1) Assemble and secure the lifting adapter (Tool 794) to its location on the gearbox case close to the main and stand-by hydraulic pump mounting locations.
- (2) Assemble and secure the lifting adapter (Tool 793) to its location on the gearbox case close to the inclined bevel gear drive assembly mounting location.
- (3) Assemble the lifting fixture (Tool 827) to the centre of the top slot in the lifting fixture (Tool 795) and secure the two fixtures together with the captive bolt, washer and nut.
- (4) Attach a hoist to the lifting fixture and position the fixture close to the adapters assembled to the gearbox case. Ensure that the lifting plate with the locking pin and fulcrum pin (part of fixture (Tool 795)) is next to the adapter (Tool 793). Unscrew and remove the locking pin then screw both fulcrum pins in to their respective adapters.

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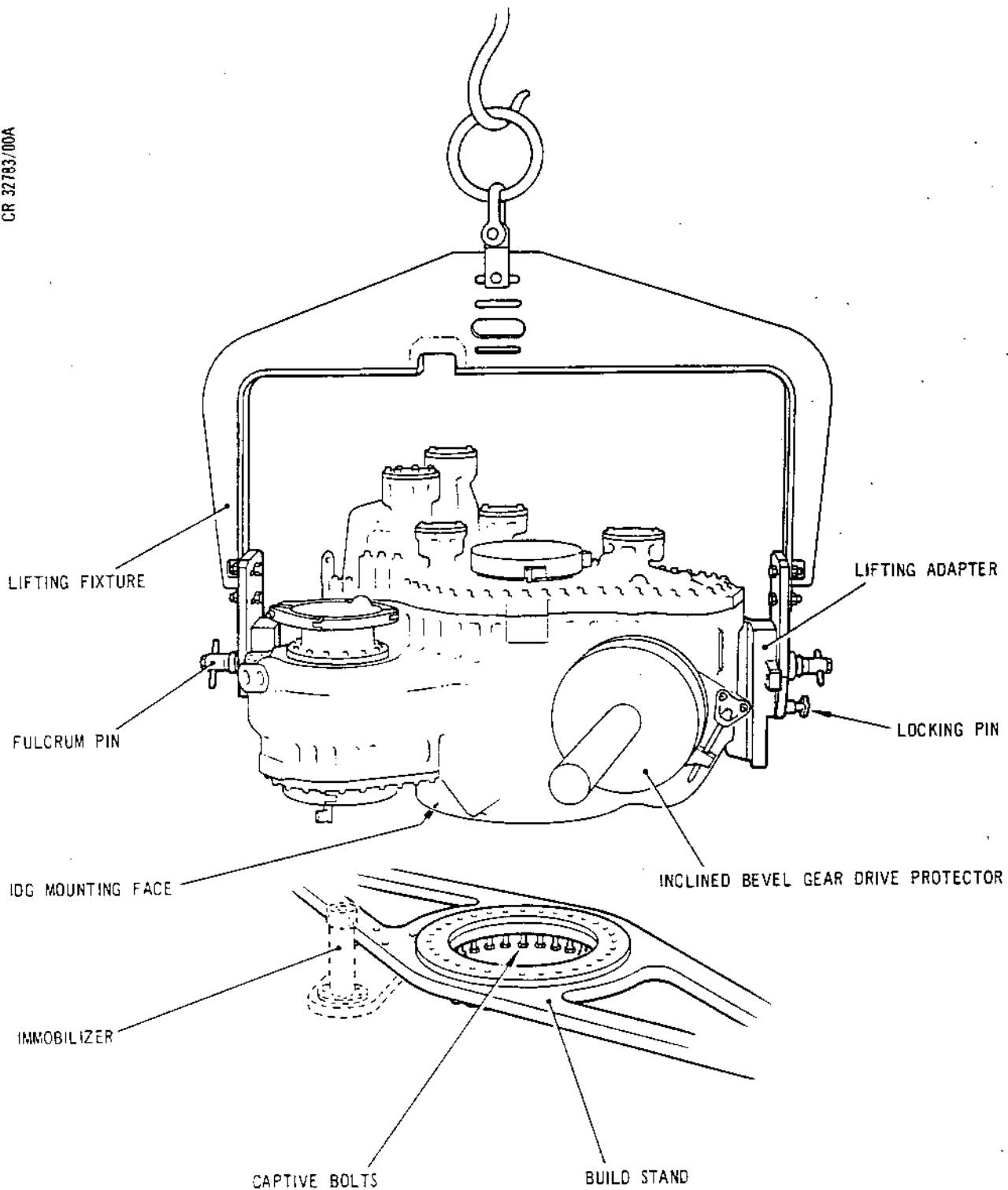


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Lifting and Assembling, to the Build Stand,
the Right-hand Gearbox
Figure 102

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- (5) Raise the hoist until the gearbox is supported, then turn the gearbox so that the IDG mounting face is at the bottom. Engage and screw the locking pin through the lifting fixture in to the adapter (Tool 793).
 - (6) Raise the hoist and position the IDG mounting face to the build stand (Tool 494) such that on the assembly of the immobilizer (Tool 540) to the triangularly spaced tapped holes in the build stand, the splined shaft of the immobilizer will lie on the centre line of the hydraulic pumps drive shaft in the gearbox case. Locate and secure the gearbox case to the build stand with the 32 captive bolts.
 - (7) Release and remove the lifting fixture from the adapters and hoist then release and remove the two adapters from the gearbox.
- C. Remove the Pressure and Scavenge Filters from the Gearbox Case.
- (1) Remove the pressure filter
(Pre S.B.0L.593-72-9036-419) (Ref. Fig.103).
 - (a) Using the adapter (Tool 555) unscrew and remove the magnetic plug and Corrujoint seal from the filter cover assembly.
 - (b) Unscrew and remove the locking bolt and spherical washer from the bracket and nut assembly.
 - (c) Rotate the nut assembly through 30 deg to unlock, remove the nut then withdraw the cover, spring and filter assembly from the adapter. Remove, by unscrewing, the filter and spring from the cover.
 - (d) Unscrew and remove the six bolts securing the bracket and adapter to the gearbox case. Remove the bracket and adapter, then remove both seals from the adapter.
 - (e) Unscrew and remove the valve body and restrictor plug from the gearbox case.
 - (2) Remove the pressure filter (SB.0L.593-72-9036-419) (Ref. Fig.104).
 - (a) Unscrew and remove the locking bolt and spherical washer from the bracket and nut assembly.

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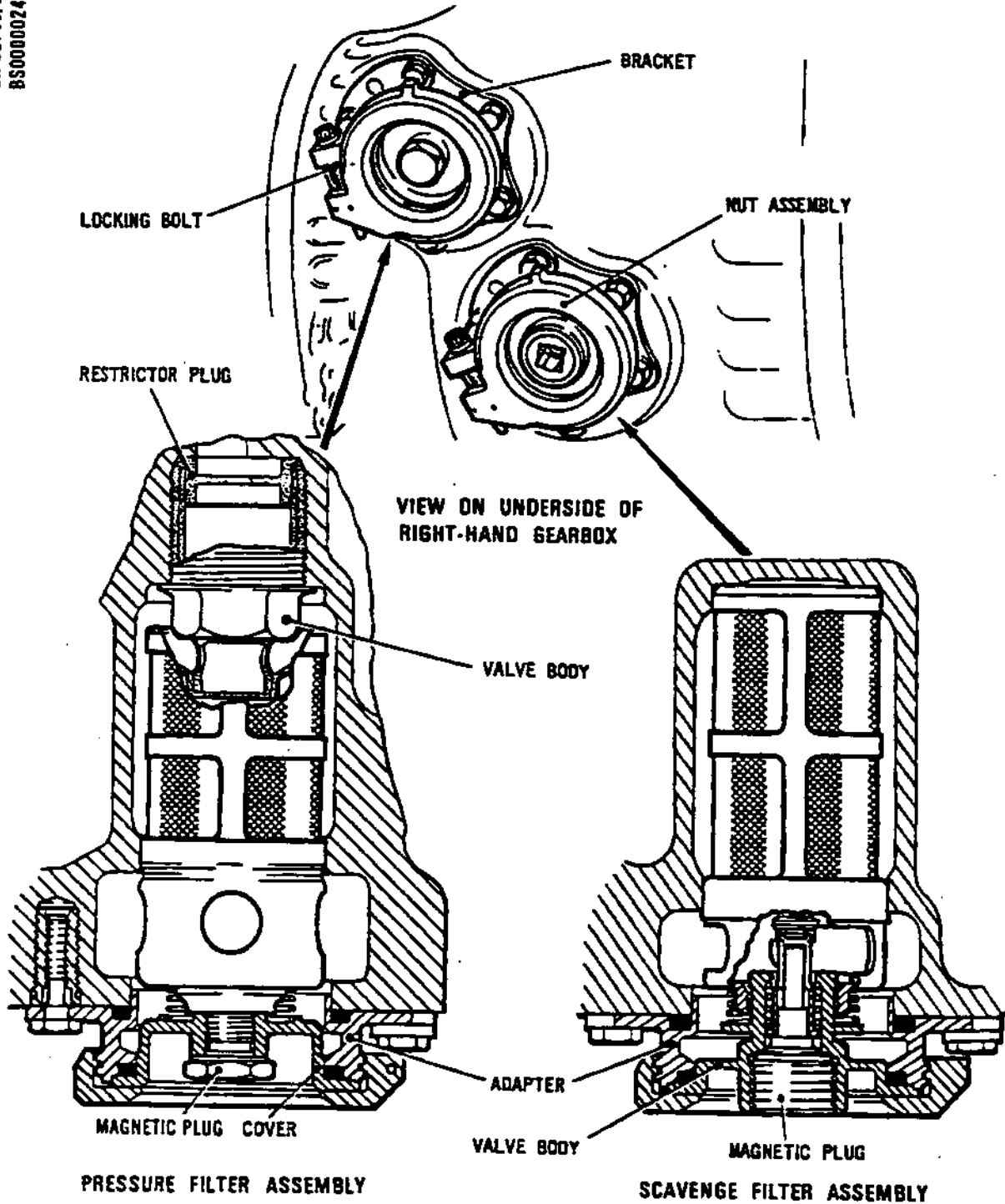


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Removal of Pressure and Scavenge Filters
(Pre S.B.OL.593-72-9036-419)
Figure 103

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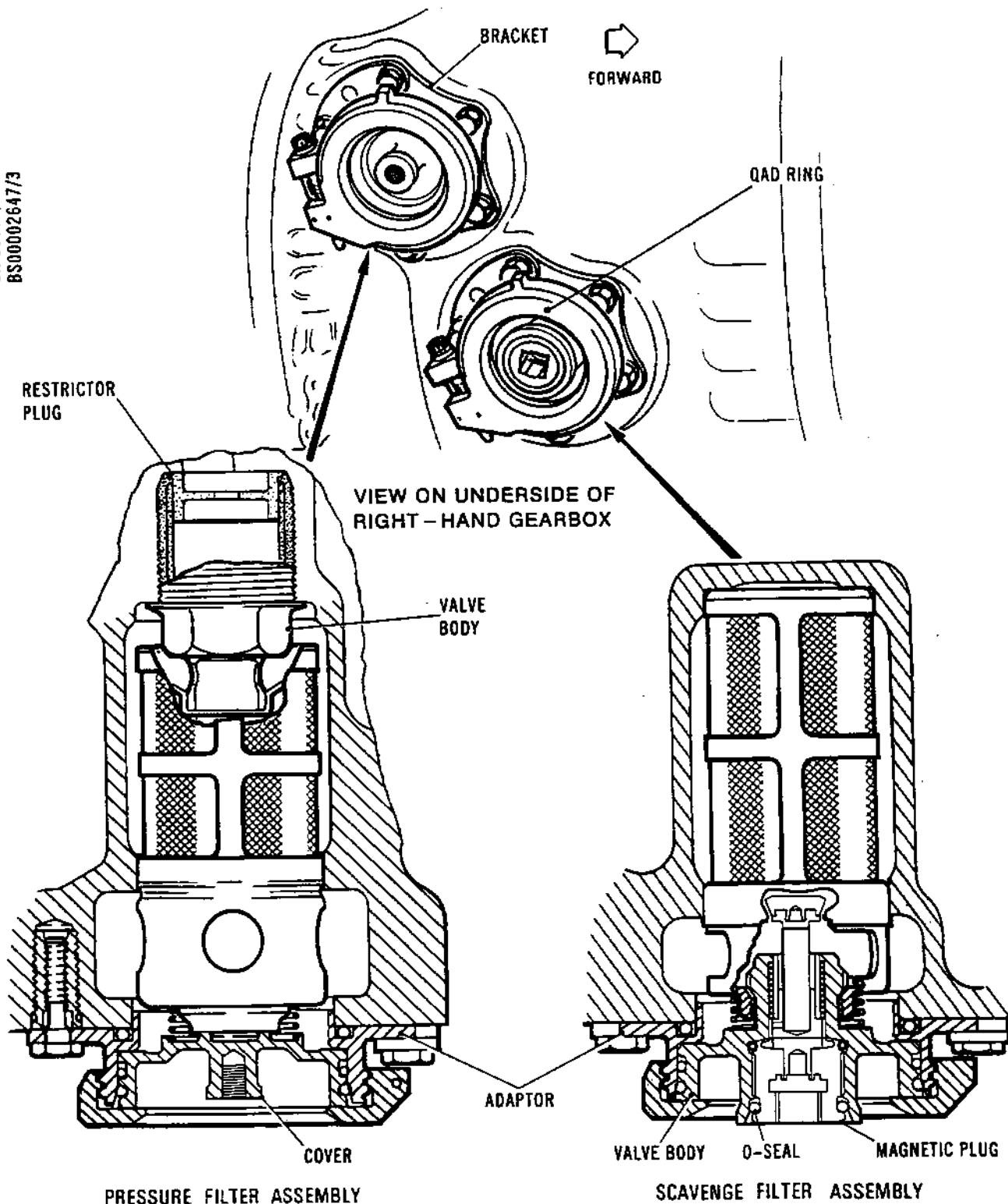


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Removal of Pressure and Scavenge Filters
(S.B.OL.593-72-9036-419)
Figure 104



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- (b) Rotate the nut assembly through 30 deg. to unlock, remove the nut then withdraw the cover, spring and filter assembly from the adapter. Remove, by unscrewing, the filter and spring from the cover.
- (c) Unscrew and remove the six bolts securing the bracket and adapter to the gearbox case. Remove the bracket and adapter, then remove both seals from the adapter.
- (d) Unscrew and remove the valve body and restrictor plug from the gearbox case.

CAUTION: ON PARTS TO SB 0L.593-72-9036-419 STANDARD, IT MAY BE NECESSARY (DUE TO THE POSSIBLE ADHERENCE OF THE "O" RING TO THE JOURNAL) TO USE CONVENTIONAL HAND TOOLS TO AID THE REMOVAL OF THE MCD BODY ASSEMBLY, AS PART OF THE FILTER REMOVAL SEQUENCE. DURING THIS OPERATION IS IS ESSENTIAL THAT EXTREME CARE IS TAKEN, SO AS TO NOT DAMAGE ANY PART OF THE ASSEMBLY.

- (3) Remove the scavenge filter
(Pre S.B.0L.593-72-9036-419) (Ref. Fig.103).
(S.B.0L.593-72-9036-419) (Ref. Fig.104).
- (a) Unscrew and remove the magnetic plug from the filter cover assembly.
- (b) Unscrew and remove the locking bolt and spherical washer from the bracket and nut assembly.
- (c) Rotate the nut assembly through 30 deg to unlock, remove the nut then withdraw the drain valve body, spring and filter assembly from the oil filter adapter. Remove, by unscrewing, the filter and spring from the valve body.
- (d) Unscrew and remove the six bolts securing the bracket and filter adapter to the gearbox case, then remove the bracket and adapter from the case.
- (e) Remove the seals from the grooves in the adapter.

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D. Remove the Inclined Bevel Gear, Drive and Bearing Assemblies from the Gearbox Case.

- (1) Remove the protector (Tool 3126) then withdraw the flexible coupling shaft and bearing housing assembly.
- (2) Using the depeening tool (Tool 1336), depeen the key-washer at the base of the coupling shaft.
- (3) Remove the nut and keywasher securing the flexible coupling shaft and bevel gear to the bearing housing assembly using the immobilizer (Tool 536) and wrench (Tool 535) (Ref.Fig.105).
 - (a) Position the immobilizer in a bench vice.



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- (b) Locating the bevel gear teeth with the teeth in the immobilizer and the three studs on the immobilizer with the corresponding holes in the bearing housing, position the assembly into the immobilizer. Secure the assembly to the immobilizer with three nuts (Tool 537).
- (c) Unscrew and remove the bearing housing assembly nut using the wrench.
- (d) Withdraw the keywasher, flexible coupling shaft and spacer sleeve then unscrew and remove the three securing nuts and remove the bearing housing from the immobilizer.
- (4) Withdraw the spacer sleeve from the flexible coupling shaft using the mechanical puller (Tool 743) (Ref.Fig.106).
 - (a) Locate the slotted body of the mechanical puller on the shaft and the puller extractor to the lip at the end of the spacer sleeve.
 - (b) Operate the thrust screw and withdraw the spacer sleeve from the shaft.
 - (c) Release and remove the mechanical puller.
- (5) Locate the bearing housing assembly, bevel gear teeth on the underside, on the support (Tool 717). With the driver (Tool 716) located in the gear shaft, press from the bearing housing, the gear, inner ring of the flanged roller bearing, adjusting washer and one half of the inner ring of the ball bearing. Remove the bearing housing from the support.
- (6) Remove the two inner bearing rings and the adjusting washer from the bevel gear using the mechanical puller (Tool 723) (Ref.Fig.107).
 - (a) Locate the claws of the mechanical puller in the three slots in the bevel gear wheel and under the bearing inner ring.
 - (b) Lock the claws into their locations by tightening the mechanical puller adjusting nut.

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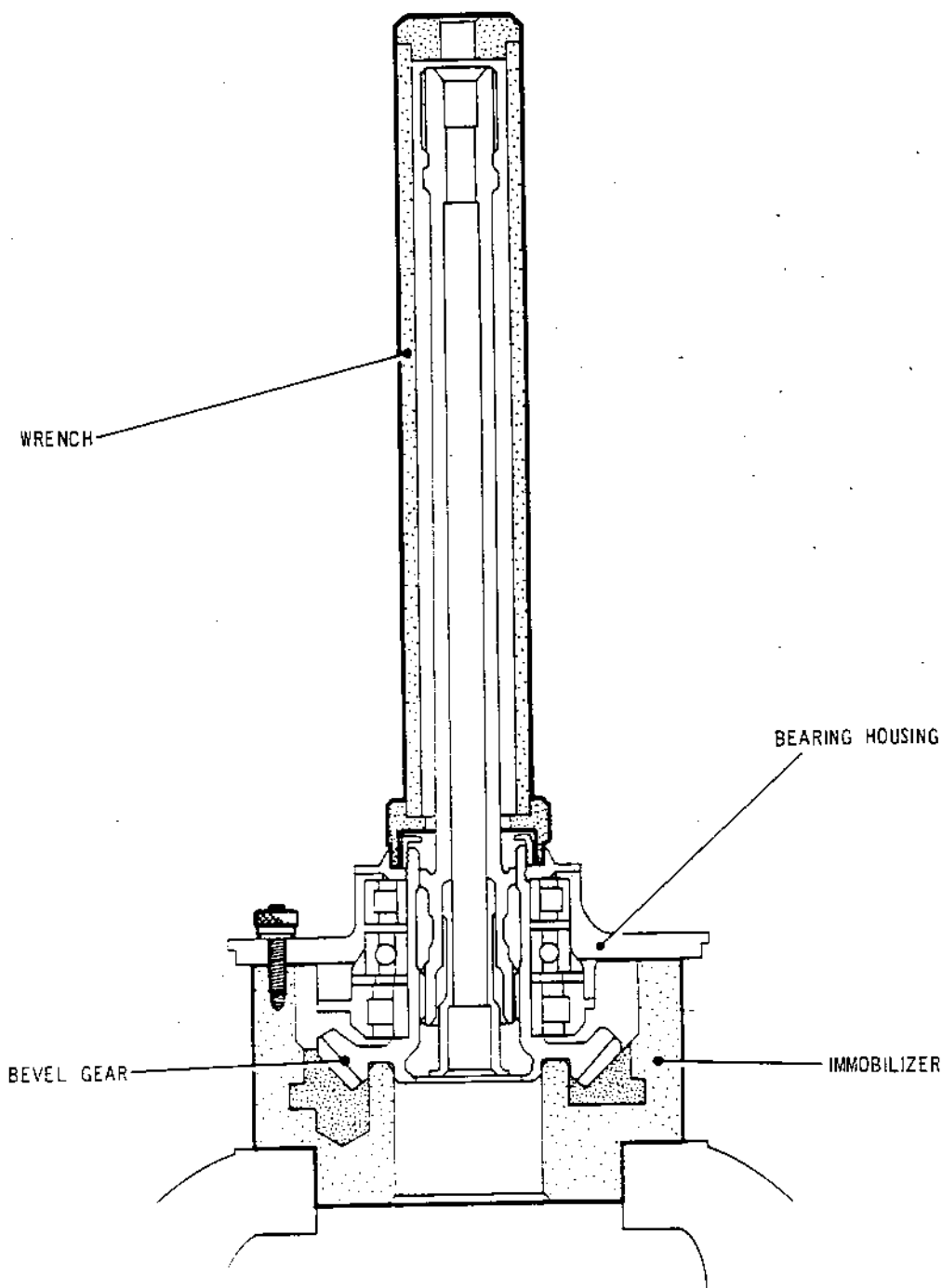


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Removal of the Flexible Coupling Shaft Retaining Nut
Figure 105

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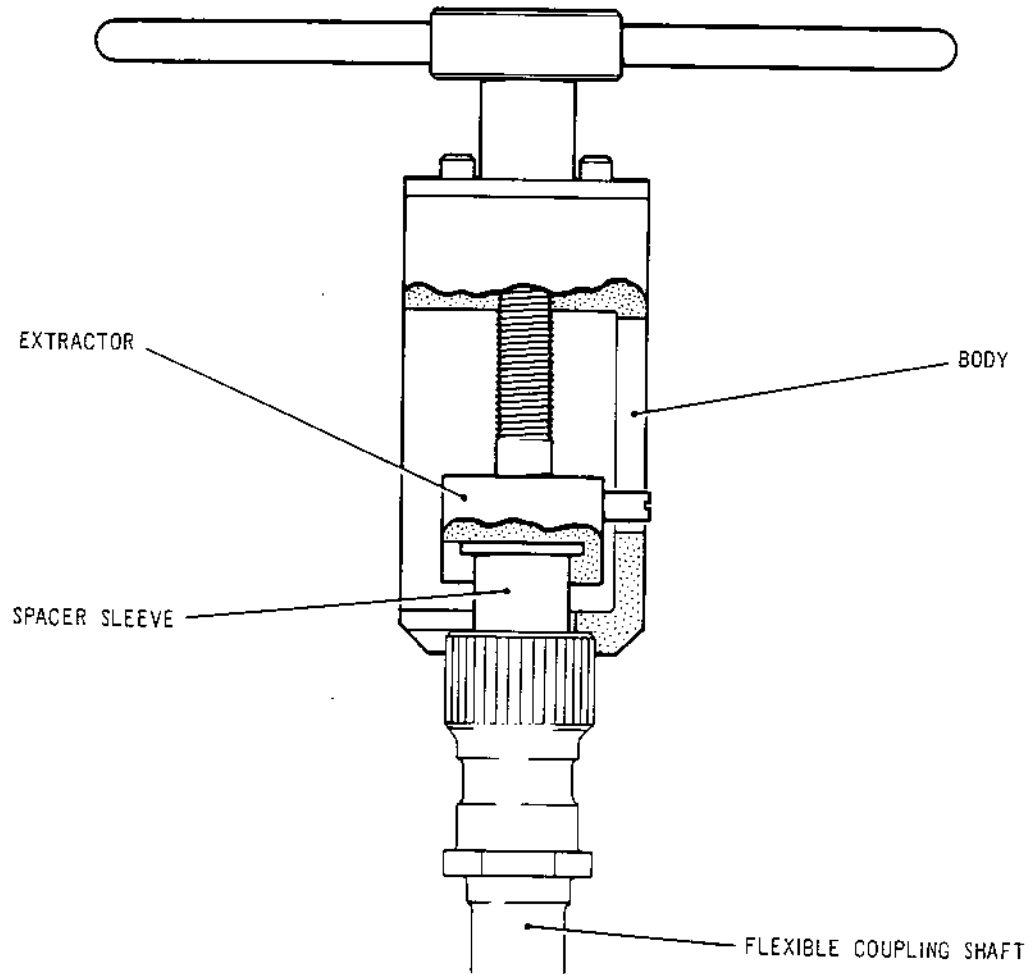


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Removal of the Spacer Sleeve from the Flexible Coupling
Figure 106

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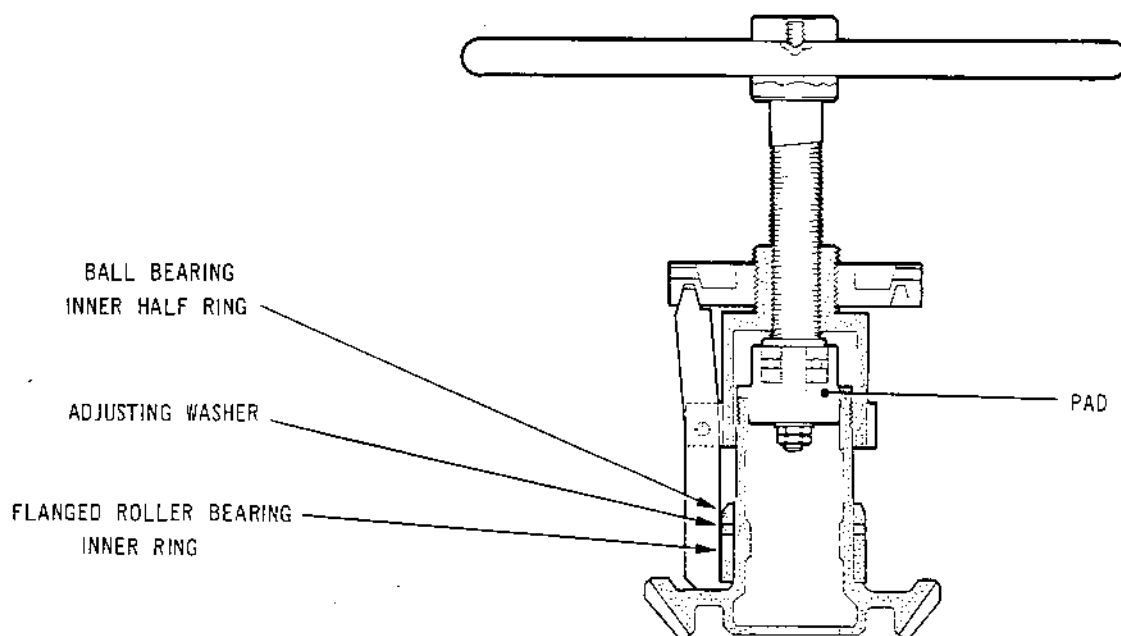
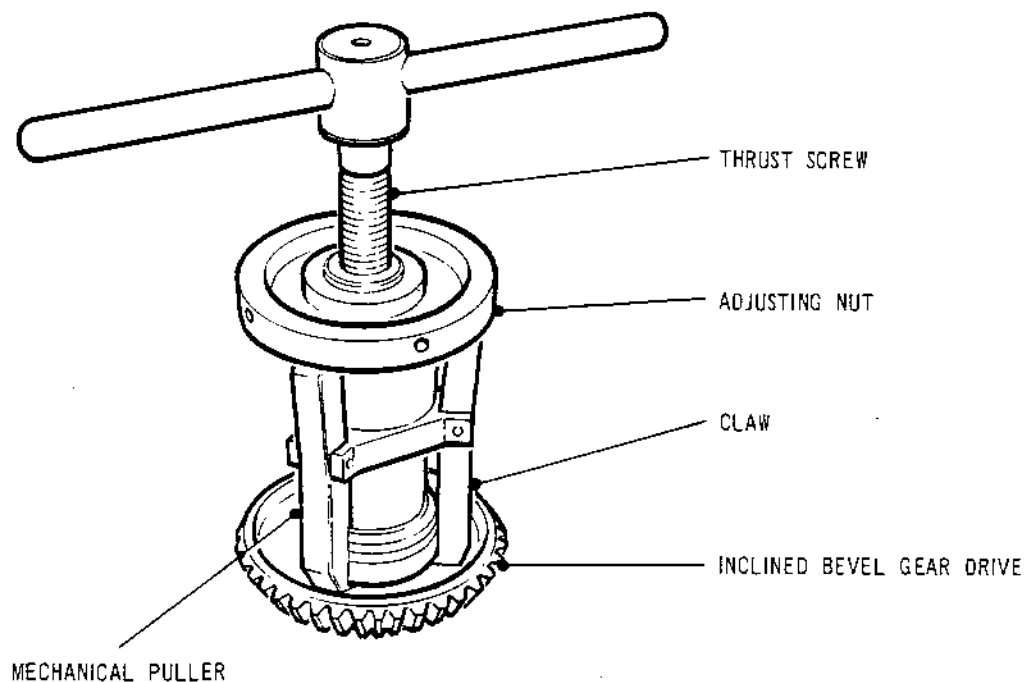


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Removal of Inner Bearing Rings and Adjusting Washer
from the Inclined Bevel Gear
Figure 107



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- (c) Operate the thrust screw and locate the puller pad into the internal circumference of the bevel gear drive shaft, continue to screw in the thrust screw and extract the two inner bearing rings and the adjusting washer.
- (d) Release and remove the mechanical puller.
- (7) Unscrew and remove the three 'D' headed bolts and self-locking nuts securing the flanged outer ring of the roller bearing to the inclined bevel gear bearing housing.
- (8) Remove the bearing outer ring, adjusting washer, one half of the inner ring and the outer ring of the ball bearing, inner and outer adjusting washers and the inner track of the roller bearing from the bearing housing.
- (9) Remove the outer ring of the roller bearing from the bearing housing using the support (Tool 685) and driver (Tool 686).
 - (a) Locate the bearing housing on the support and position the support on the base of a hand press.
 - (b) Engage the three points of the triangularly shaped driver (Tool 686) into the three cutaways in the lip on the end face of the bearing housing.
 - (c) Press the outer ring of the roller bearing from the bearing housing.
 - (d) Remove the support and the driver.
- E. Remove the Oil Pressure Switch and Transmitter (Pre SB. 72-96), or Covers (SB.72-96), from the Gearbox Front Cover (Ref.Fig.108).
 - (1) Unscrew and remove the seven bolts securing the oil pressure switch or cover to the gearbox front cover. Remove the switch or cover from the front cover and remove the Corruplus seals from the grooves in the mounting face of the switch or cover.
 - (2) Unscrew and remove the seven bolts securing the oil pressure transmitter or cover to the gearbox front cover. Remove the transmitter or cover from the cover and remove the Corruplus seals from the grooves in the mounting face of the transmitter or cover.

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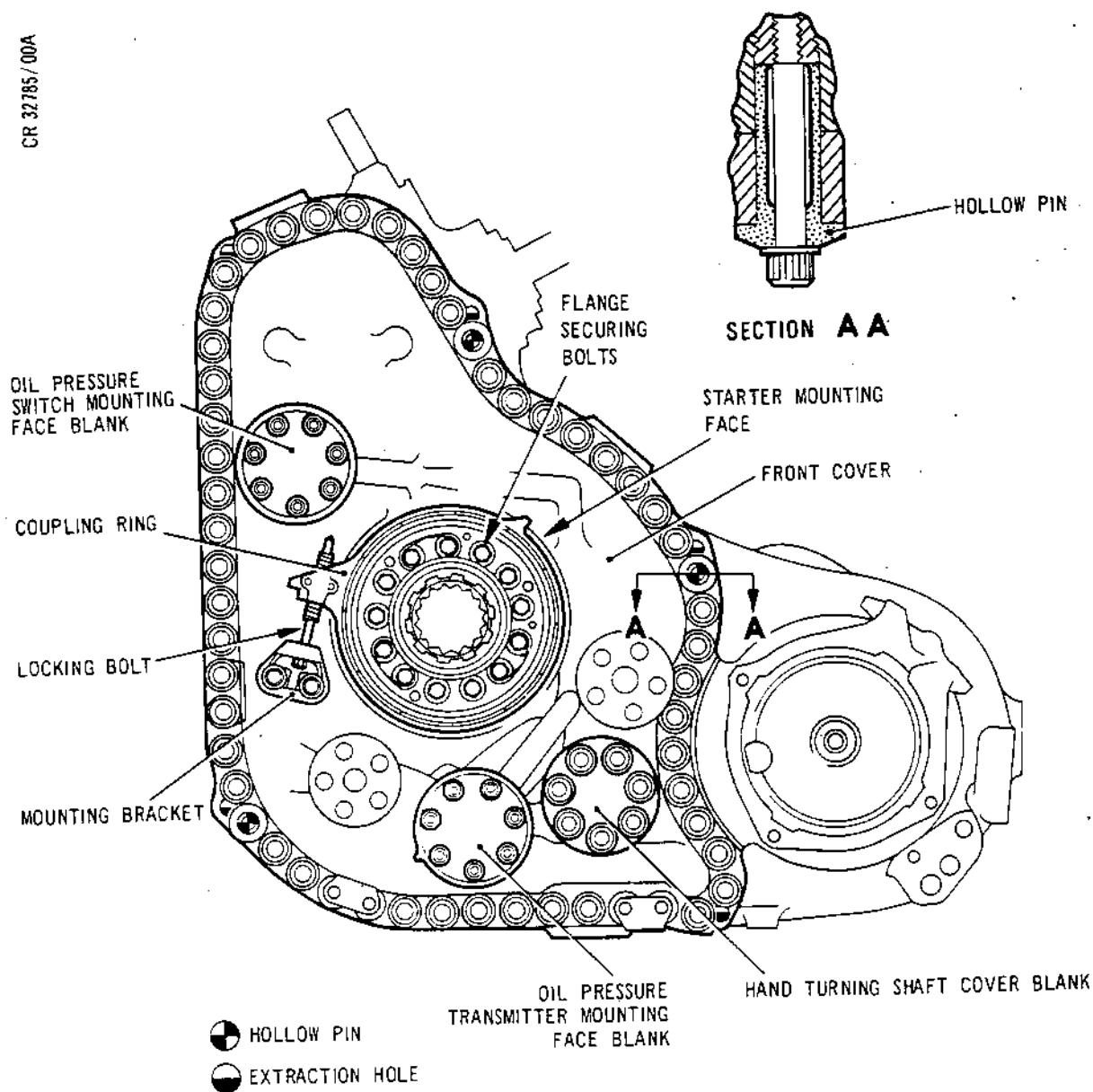


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Front Cover Removal Details
Figure 108

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F. Remove the Starter QAD Adapter from the Gearbox Front Cover (Ref.Fig.108).

- (1) Unscrew and remove the locking bolt from the coupling ring and mounting bracket, then remove the spherical washer from the bolt.
- (2) Unlock the coupling ring (Ref.72-09-00, Disassembly), then release and remove the protector (Tool 778) from the starter QAD coupling.
- (3) Unscrew and remove the 13 bolts securing the flange to the front cover, then remove the three flanged pins from the flange.
- (4) Remove the flange and coupling ring from the front cover. Separate the coupling ring from the flange.
- (5) Remove the gasket from the flange mounting face.
- (6) Unscrew and remove the two bolts securing the mounting bracket to the front cover, then remove the bracket.

G. Remove the Front Cover from the Gearbox Case (Ref.Fig.108).

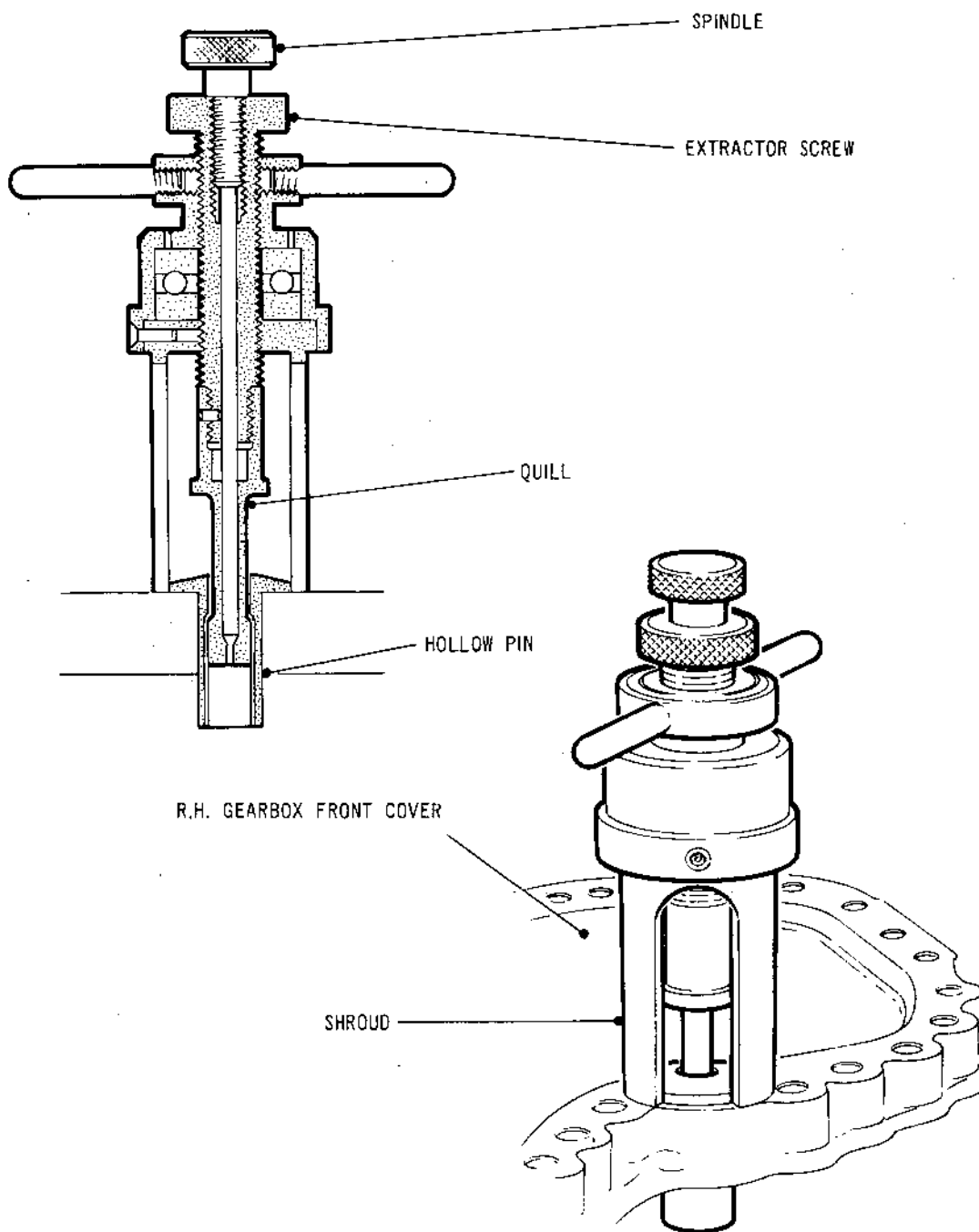
- (1) Unscrew the 56 bolts securing the front cover to the gearbox case then remove the bolts, 53 washers and brackets from the cover.
- (2) Remove the three hollow pins from their locations in the front cover using mechanical puller (Tool 715) (Ref.Fig.108 and 109).
 - (a) Locate the shroud of the mechanical puller around the hollow pin.
 - (b) Insert the puller quill into the pin and lock by tightening the spindle.
 - (c) Operate the extractor screw and withdraw the pin from the cover, then release and remove the puller from the pin.
- (3) Locate and screw in a locating pin (Tool 526, 527 and 528) into each hole vacated by a hollow pin.
- (4) Locate the extraction holes around the cover. Insert and engage a puller (Tool 1668) into each hole. Operate the pullers and withdraw the cover from the case.

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Removal of Hollow Pins from the Front Cover
Figure 109

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- (5) Remove the pullers from the front cover. Locate and screw the two captive bolts of the lifting fixture (Tool 1867) into two of the holes vacated by the pullers. Attach a hoist to the lifting fixture then raise the hoist and remove the front cover from the gearbox case. Position the cover on a work surface, taking care not to damage the oil pump drive shaft, then remove both the hoist and lifting fixture.
- (6) With the front cover holding fixture (Tool 430) in the horizontal position (Ref.Fig.110) secured to the Hydraclamp, locate the oil pressure switch and transmitter mounting faces of the front cover on the holding plate, secure the cover to the plate, with the 14 captive bolts.

H. Remove the Oil Pump from the Front Cover.

- (1) Unscrew and remove the seven bolts and washers securing the hand turning shaft cover blank to the front cover, refer to Fig.108, then remove the blank from the cover and the gasket from the blank.
- (2) Unscrew and remove the self-locking nut securing the hand turning shaft (Ref.Fig.110).
 - (a) Locate the immobilizer (Tool 787) onto the oil pump drive shaft and position both blocks of the immobilizer on the front cover mounting face. Insert the two securing bolts, from the under-side, through the cover flange and engage their respective threaded holes in the immobilizer. Tighten the bolts and secure the immobilizer to the cover.
 - (b) Unscrew and remove the self-locking nut, hand turning shaft end, then remove the hand turning shaft.
 - (c) Unscrew the two captive bolts securing the immobilizer, remove the immobilizer and withdraw the oil pump drive shaft.
- (3) Unscrew and remove the eight bolts and washers securing the scavenge oil pump assembly to the front cover.
- (4) Remove the oil pump assembly using the mechanical puller (Tool 969) (Ref.Fig.111).

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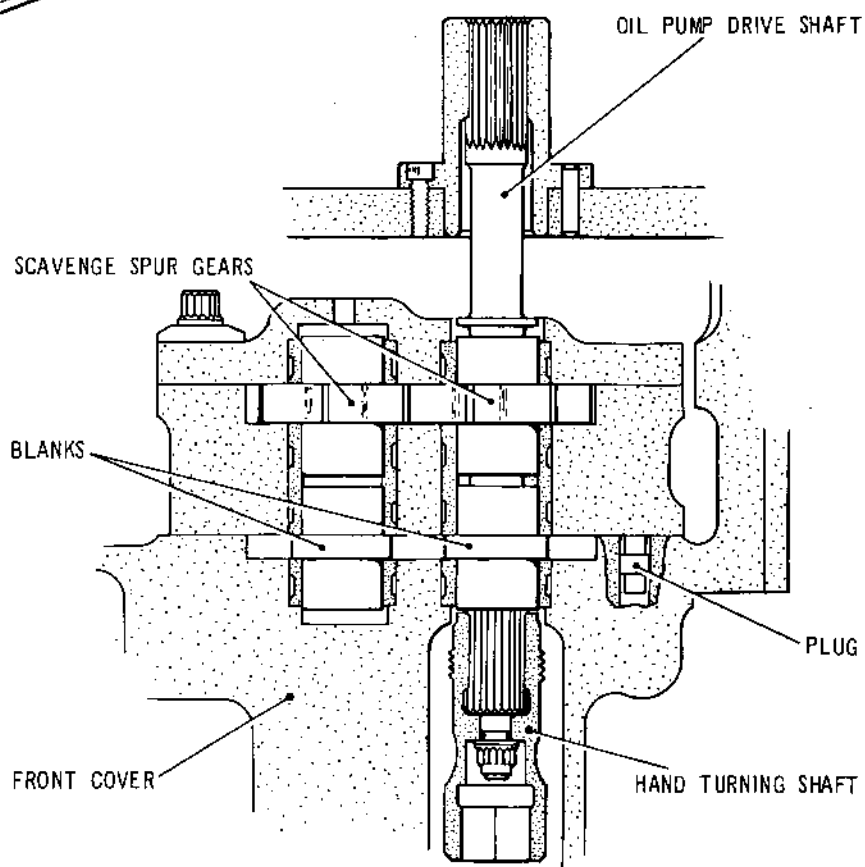
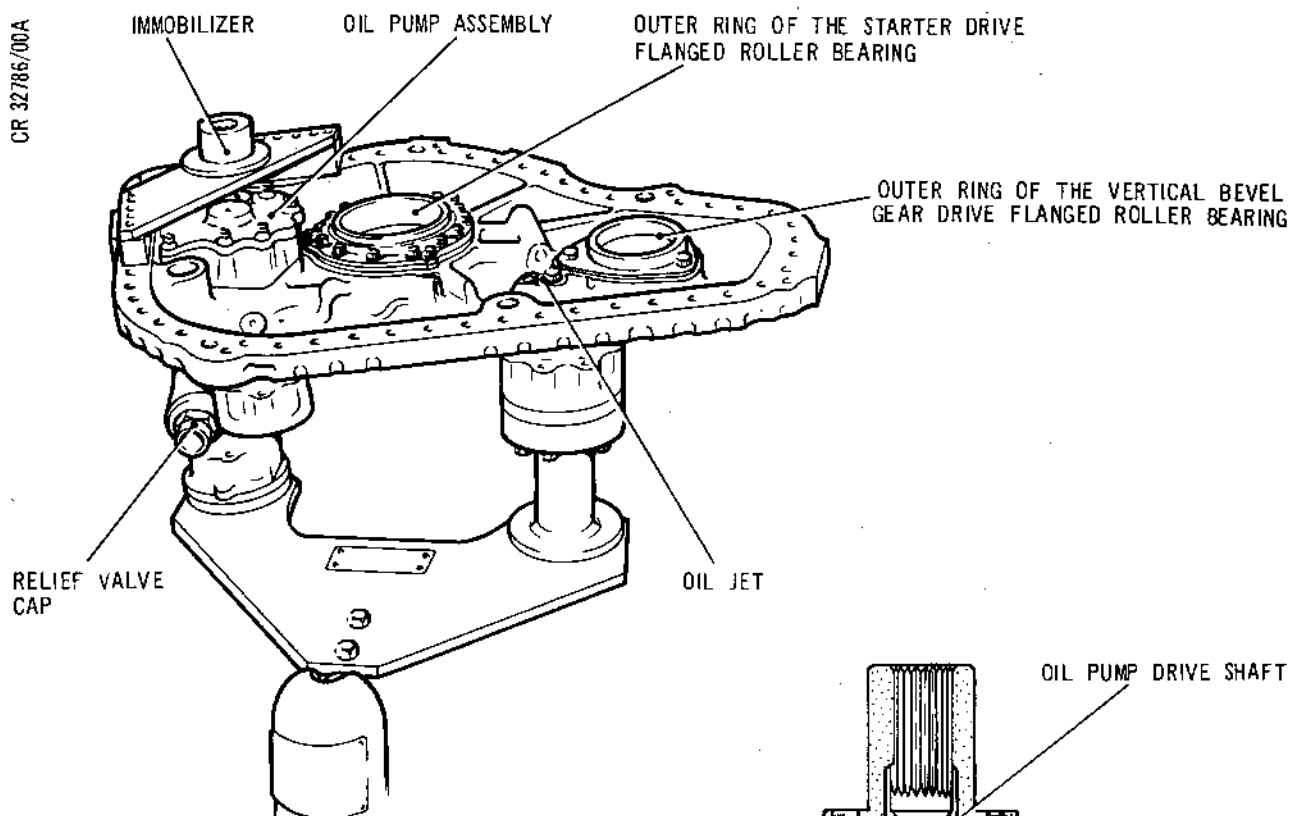
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SECTION THROUGH OIL PUMP ASSEMBLY

Assembling the Front Cover to the Holding Fixture
Figure 110

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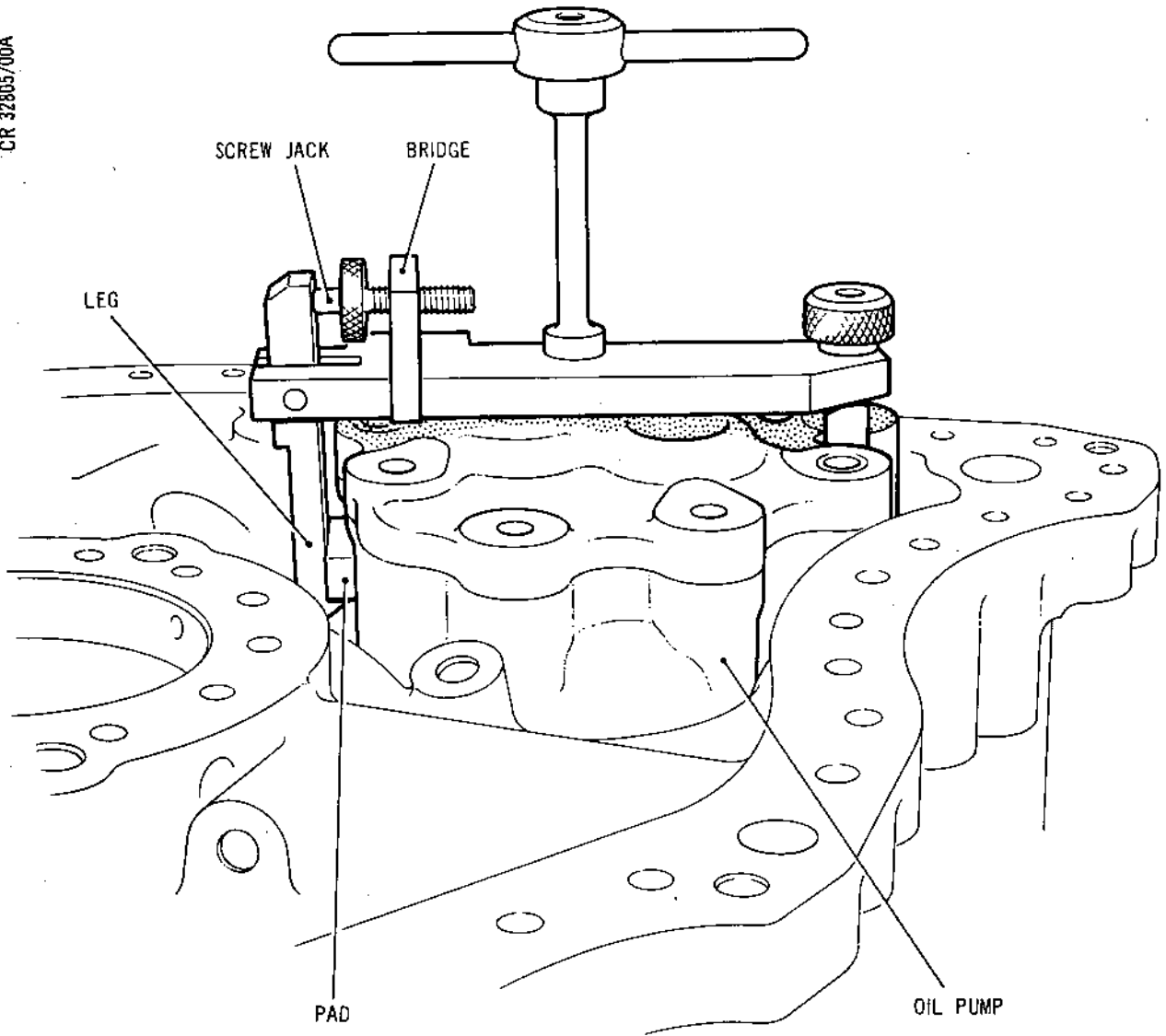


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TN9134

Removal of the Oil Pump from the Front Cover
Figure 111

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- (a) Disengage the bridge of the puller and swing the leg into the horizontal position.
- (b) Locate the puller onto the pump body and swing the leg into the vertical position. Engage the bridge and tighten the screwjack, so clamping the pads, on the two legs, onto the sides of the pump body.
- (c) Apply a vertical force to the handle on the puller and remove the pump body from the front cover.

NOTE: If difficulty is experienced in removing the pump body, the impact puller (Tool 1653) can be engaged in the handle of the mechanical puller.

- (d) Disengage and remove the mechanical puller from the pump body.
- (5) Remove the cover from the pump case and withdraw the two scavenge spur gears from the case.
- (6) On engines Pre-SB.72-23 remove the two pressure pump spur gears, on engines embodying SB.72-23 remove the blanks from the front cover.
- (7) Should it be necessary to remove the two hollow pins from the pump body, on engines embodying SB.72-2, use the mechanical puller (Tool 902).

J. Remove the Jets and Bearings from the Front Cover Inner Face (Ref.Fig.110).

- (1) Unscrew and remove the three bolts securing the flanged roller bearing outer ring to the vertical bevel gear drive location then withdraw the outer ring.
- (2) Unscrew and remove the bolt securing the oil jet to the location near the vertical bevel gear drive location, then withdraw the jet.
- (3) On engines Pre-SB.72-23 remove the oil jet and filter using the impact puller (Tool 1653) from the oil pump mounting face.
- (4) Remove the jet from the filter.

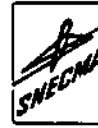
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- (a) Secure the support (Tool 431) in a bench vice.
 - (b) Lower the filter into the support and engage the castellations on the filter with those in the support.
 - (c) With the wrench (Tool 456) unscrew and remove the jet from the filter, then remove the filter from the support and the support from the vice.
- (5) On engines embodying SB.72-23 remove the plug using the impact puller (Tool 1653) from the oil pump mounting face.
 - (6) Unscrew and remove the three bolts securing the flanged roller bearing outer ring and its retaining ring to the starter drive location, then remove both from the case.
 - (7) Should it be necessary to remove the two hollow pins from the oil pump mounting face use the puller (Tool 1868).

K. Remove the Relief Valve Blank from the Front Cover.

- (1) Using the crowfoot wrench (Tool 1579 Pre-SB.72-8 or Tool 1972 SB.72-8) unscrew and remove the relief valve cap and Corruplus seal from its location on the front cover. Separate the Corruplus seal and the relief valve cap.
- (2) Using the wrench (Tool 1477) unscrew and remove the retaining sleeve from its location in the front cover, then remove the blanking plate.

L. Assemble the Protectors to the Gearbox Front Cover.

- (1) Unscrew the 14 captive bolts of the adapter (Tool 430) and remove the front cover.
- (2) Reassemble the cover blank to the hand turning gear mounting face and temporarily retain with suitable bolts.
- (3) Position the protectors (Ref.Table 101) to their respective locations and retain with their respective captive bolts (Ref.Fig.112).

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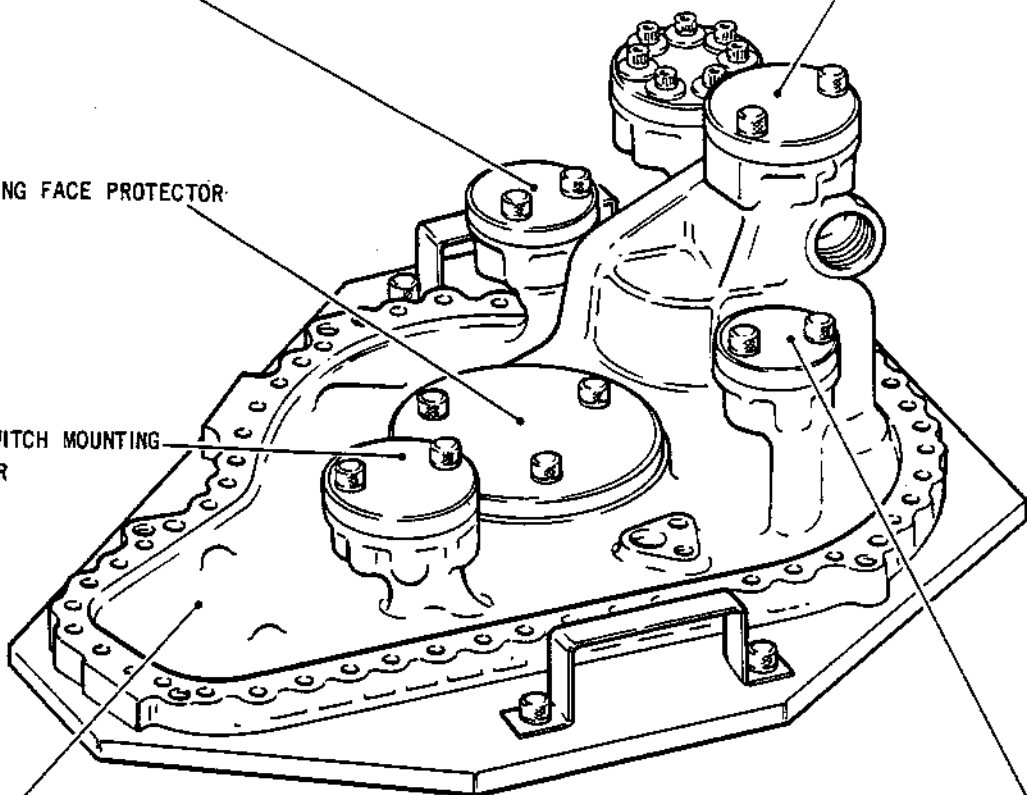
OIL INLET FACE PROTECTOR

OIL PRESSURE TRANSMITTER MOUNTING FACE PROTECTOR

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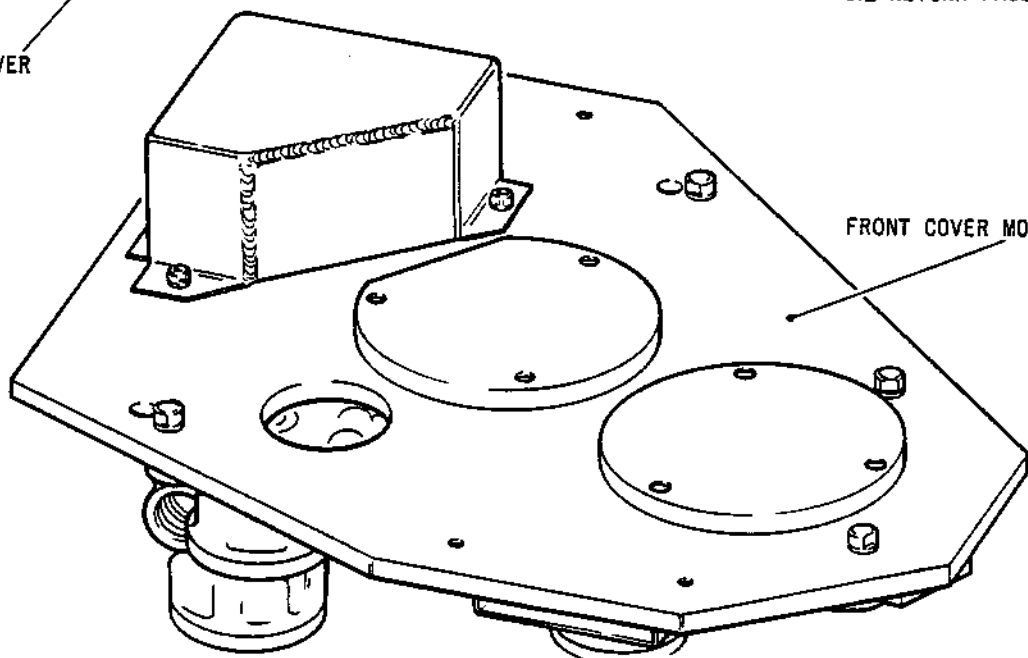
STARTER MOUNTING FACE PROTECTOR

OIL PRESSURE SWITCH MOUNTING
FACE PROTECTOR



OIL RETURN FACE PROTECTOR

FRONT COVER



FRONT COVER MOUNTING FACE
PROTECTOR

Location of Front Cover Protectors
Figure 112

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<u>Protector</u>	<u>Location on the Front Cover</u>
Tool 505	Oil inlet face
Tool 506	Oil return face
Tool 507	Oil pressure switch face
Tool 507	Oil pressure transmitting face
Tool 508	Starter mounting face
Tool 509	Mounting face

Assembly of the Protectors to the Front Cover
Table 101

- (4) Place the front cover into the container (Tool 510).
- M. Remove the Oil Transfer Assembly from the Gearbox (Ref.Fig.113).
- (1) Remove the bolt and retaining sleeve securing the splined shaft to its location in the end of the starter/IDG spur gear drive, as viewed from the IDG mounting location.
 - (a) Locate the splined spigot on the immobilizer (Tool 669) into the corresponding splines on the internal circumference at the starter mounting end of the spur gear drive assembly.
 - (b) Engage the captive bolts in the immobilizer strap with the corresponding thread inserts in the front cover mounting face location on the gearbox case.
 - (c) Unscrew and remove the retaining bolt and sleeve.
- NOTE: The immobilizer (Tool 669) is left assembled to the spur gear drive and gearbox case at this stage in the gearbox disassembly.
- (2) Withdraw the splined shaft from its location in the starter/IDG spur gear drive, then remove the two sealing rings from the grooves in the shaft.

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FRONT COVER MOUNTING FACE

OIL HOUSING

JET BODY

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SPUR GEAR

SELF LOCKING NUTS

BUILD STAND

CAPTIVE BOLT

IMMOBILIZER

RETAINING SLEEVE

OIL METERING PLATE

RETAINING BOLT

FLOATING KEY RING

SEALING RINGS

TRANSFER SLEEVE

OIL HOUSING

SPLINED SHAFT

Removal of the Oil Transfer Assembly
Figure 113

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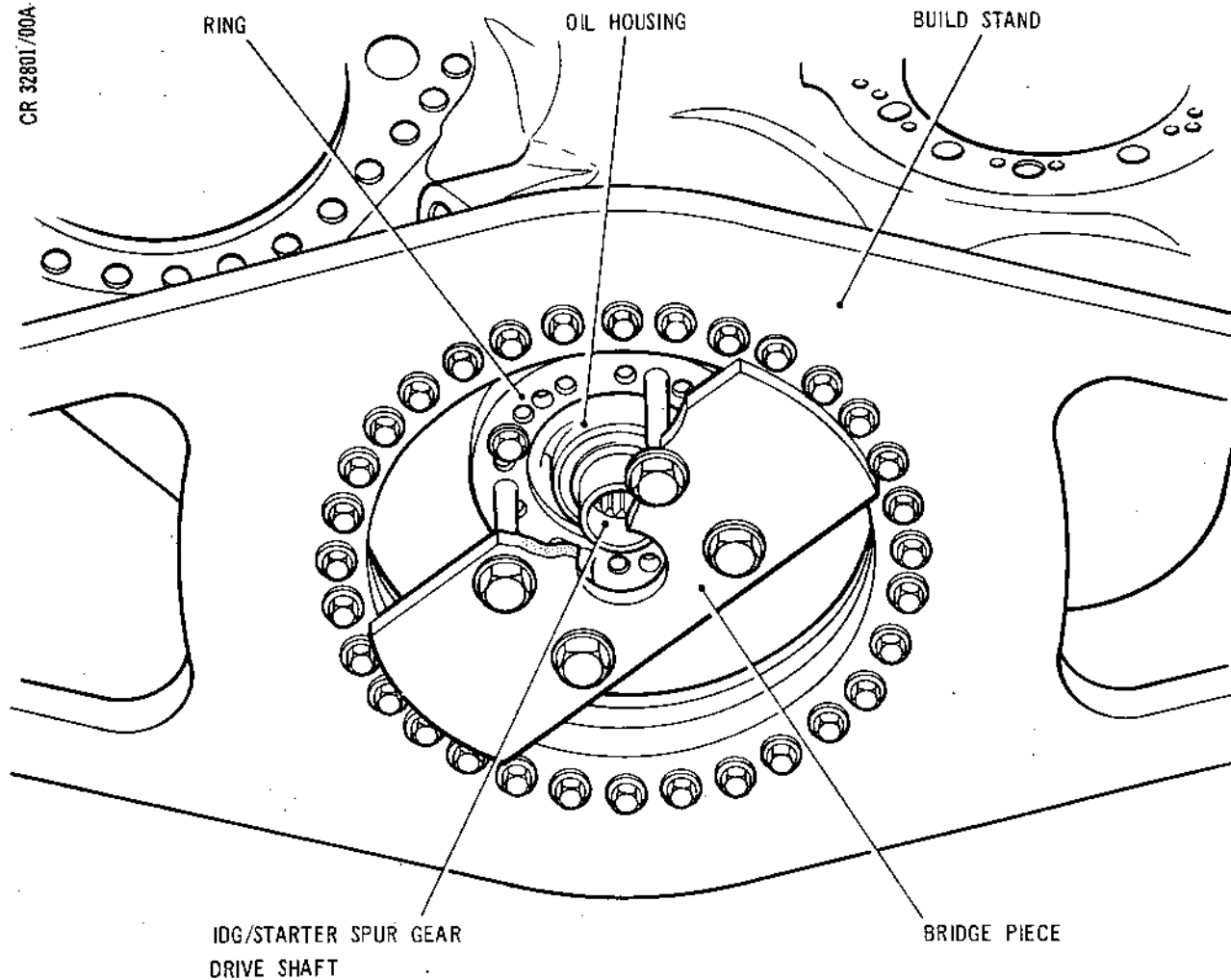
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Removal of the Oil Housing Assembly
Figure 114



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- (3) Unscrew and remove the 12 self-locking nuts securing the oil housing and jet body to their location on the IDG gear drive shaft support bearing mounting face on the gearbox case, then remove the jet body.
 - (4) Remove the oil housing, floating key-ring, oil metering plate and transfer sleeve from their location around the starter/IDG drive shaft using the puller (Tool 1700) (Ref.Fig.114).
 - (a) Assemble the ring of the puller to the oil housing and secure with its two captive bolts.
 - (b) Position the bridge piece across the aperture in the build stand and engage the four captive bolts in the bridge piece with their respective holes in the ring.
 - (c) Screw in the four bolts and withdraw the housing from its location, remove the puller from the gearbox and the housing from the ring.
 - (d) Remove the key-ring, metering plate and transfer sleeve then remove the two sealing rings from the sleeve.
- N. Remove the Starter/IDG Spur Gear Drive Shaft and Bearing Assemblies from the Gearbox.
- (1) Using the depeening tool (Tool 1336) depeen the key-washer retaining the nut at the IDG mounting end of the starter/IDG drive shaft.
 - (2) Unscrew and remove the nut and keywasher from the starter/IDG spur gear drive shaft using the wrench (Tool 670).
 - (a) Remove the wrench from the nut and release and remove the immobilizer (Tool 669) assembled to the starter mounting end of the starter/IDG spur gear drive (Ref.para.M.(1) (a) and (b)).
 - (3) Remove the starter/IDG spur gear shaft assembly, using the mechanical driver (Tool 724), from the flanged ball bearing assembled to the gearbox case (Ref.Fig.115).
 - (a) Locate the three claws of the driver to the lip on the flanged ball bearings inner ring, as viewed through the IDG mounting location.

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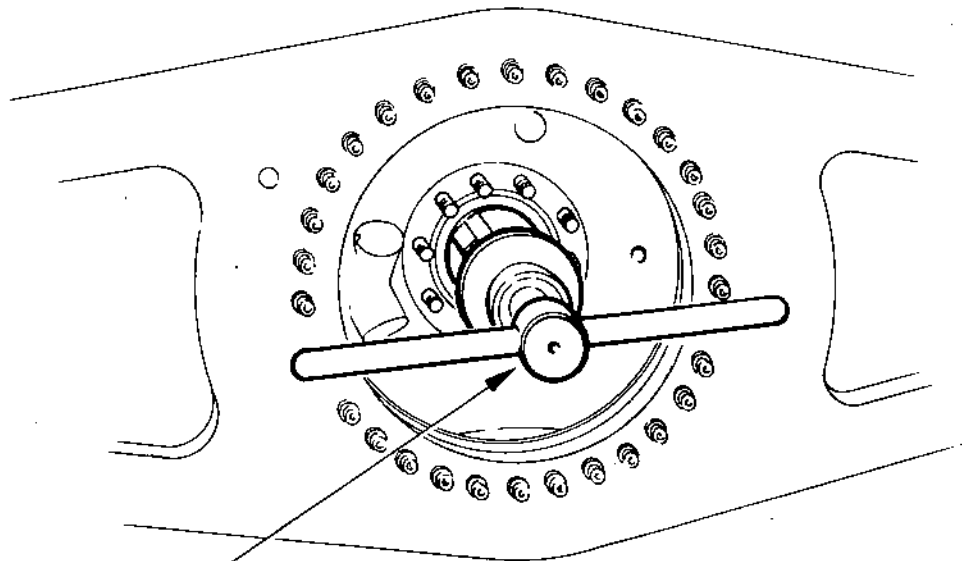
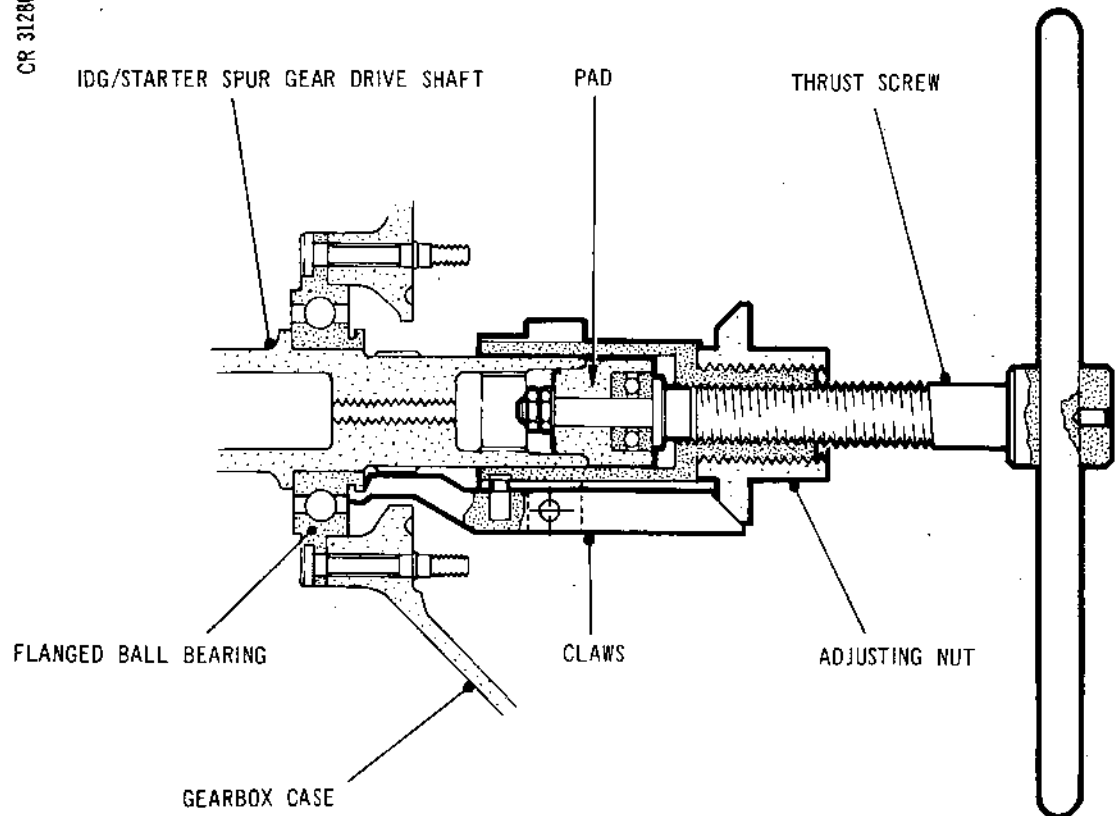
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MECHANICAL DRIVER

Removal of Starter/IDG Spur Gear Shaft
Figure 115

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- (b) Lock the claws into their location by tightening the adjusting nut on the driver.
 - (c) Operate the thrust screw, ensuring that the pad of the driver is located in the internal circumference of the spur gear drive shaft and press the spur gear drive shaft out of the bearing.
 - (d) Remove the spur gear drive shaft from the gearbox.
 - (e) Unlock the three claws and remove the mechanical puller from the flanged ball bearing.
- (4) Using the depeening tool (Tool 1336) depeen the keywasher retaining the nut to the starter mounting end of the starter/IDG spur gear drive.
- (5) Remove the nut using the wrench (Tool 653) and holder (Tool 654) from the starter/IDG spur gear drive.
- (a) Assemble the holder into a bench vice.
 - (b) Ensuring the correct engagement of the splines on the holder with the splines on the internal circumference of the spur gear drive shaft, locate the drive shaft (opposite end to that of the nut to be released) to the holder.
 - (c) Using the wrench unscrew and remove the nut.
 - (d) Remove the wrench from the nut and the spur gear drive assembly from the holder.
- (6) Remove the keywasher from the spur gear drive shaft.
- (7) Remove the bearing (inner ring and rollers) from the starter/IDG spur gear drive shaft using the mechanical puller (Tool 735) (Ref.Fig.116).
- (a) Locate the three claws of the puller under the bearing inner ring and into the three cutaways in the shaft.
 - (b) Lock the claws into their location by tightening the adjusting nut on the puller.
 - (c) Operate the thrust screw, ensuring that the pad on the puller is located in the spur gear drive shaft, and withdraw the inner bearing ring from the shaft.

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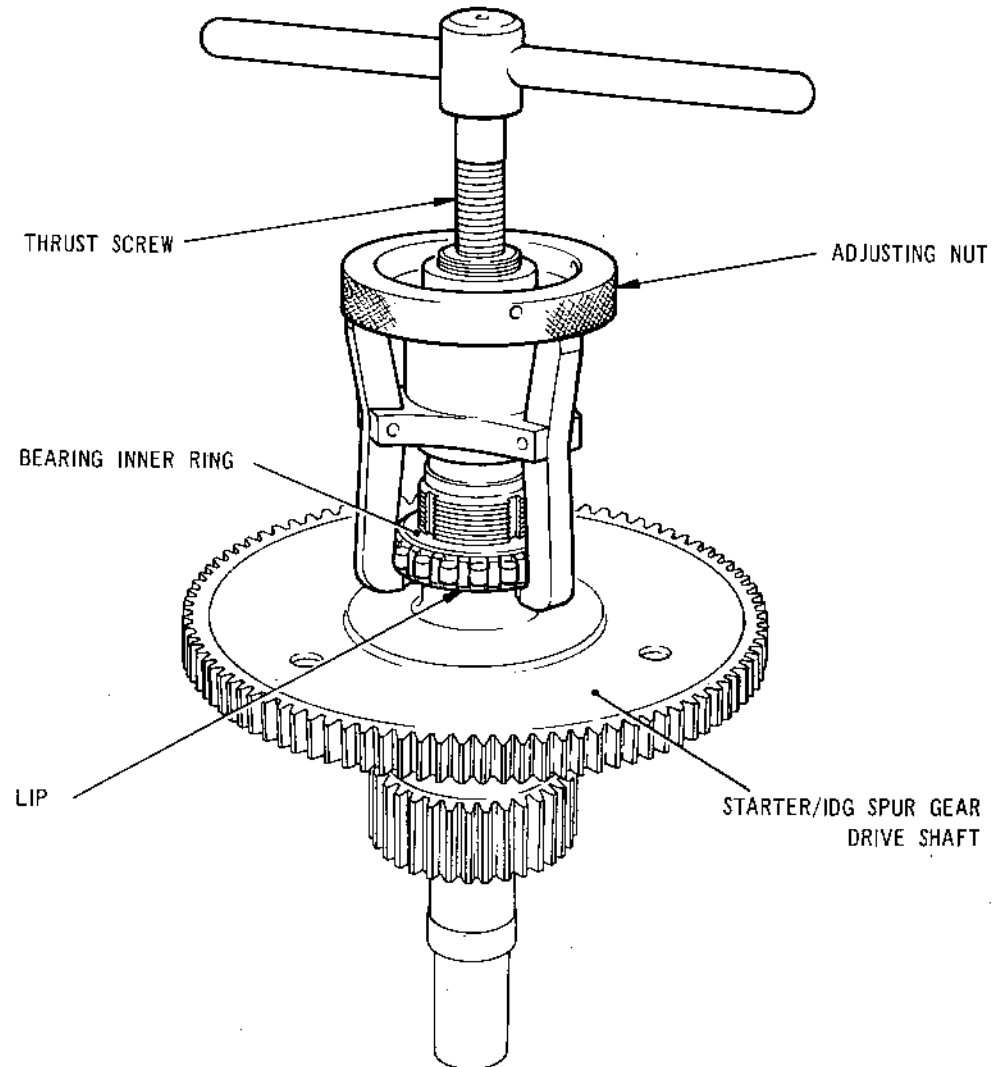
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Removal of the Bearing Inner Ring from the
Starter/IDG Spur Gear Shaft
Figure 116

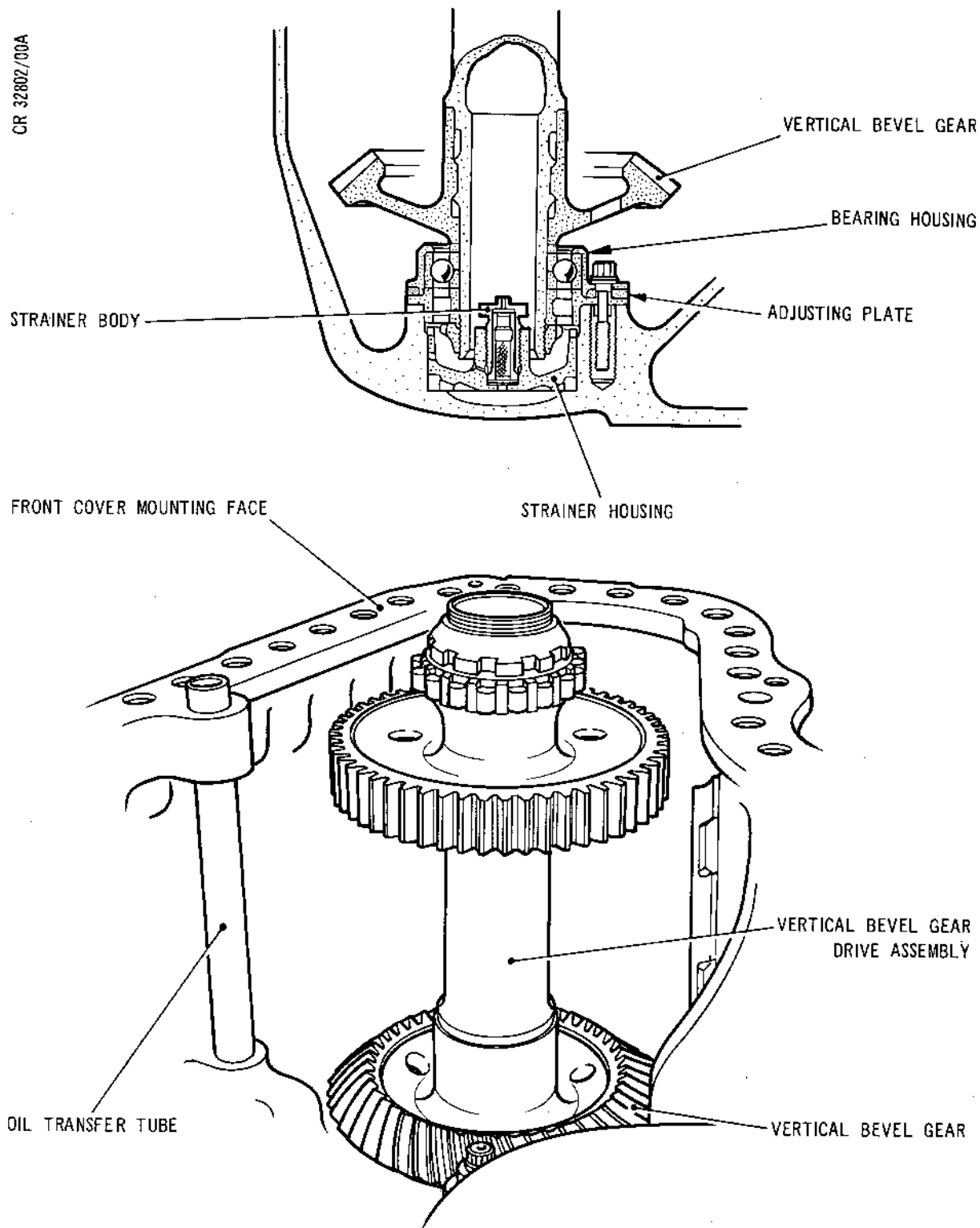


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Removal of the Vertical Bevel Gear Drive Assembly
Figure 117

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- (d) Unlock the three claws and remove the mechanical puller.

P. Remove the Vertical Bevel Gear Drive Assembly from the Gearbox.

- (1) Unscrew and remove the three bolts securing the bearing housing (as assembled to the base of the vertical bevel gear drive) to the gearbox case (Ref.Fig.117).

NOTE: Access to the bolts is gained through the aligned holes in the bevel and driving spur gears.

- (2) Withdraw the vertical bevel gear drive assembly, from the gearbox case.
- (3) Remove the flanged outer ring of the roller bearing and the adjusting plate from the gearbox case.
- (4) Remove the nut using the holder (Tool 658) and wrench (Tool 657) from the vertical bevel gear drive shaft (Ref.Fig.118).
- (a) Assemble the holder in a bench vice.
- (b) Position the spur gear into the holder and locate the pin on the holder with any one of the three access holes in the driving spur gear wheel.
- (c) Retain the gear wheel in the holder with the two holder clamp plates, locked with their respective thumbnuts.
- (d) Using the wrench unscrew and remove the nut from the drive shaft. Remove the holder and the wrench.
- (5) Remove the inner ring of the roller bearing, the ball bearing, bearing housing and the adjusting washer from the base of the vertical bevel gear drive shaft using the mechanical puller (Tool 736) (Ref. Fig.118).
- (a) Locate the three claws of the puller under the adjusting washer and into the three cutaways in the bevel gear wheel.

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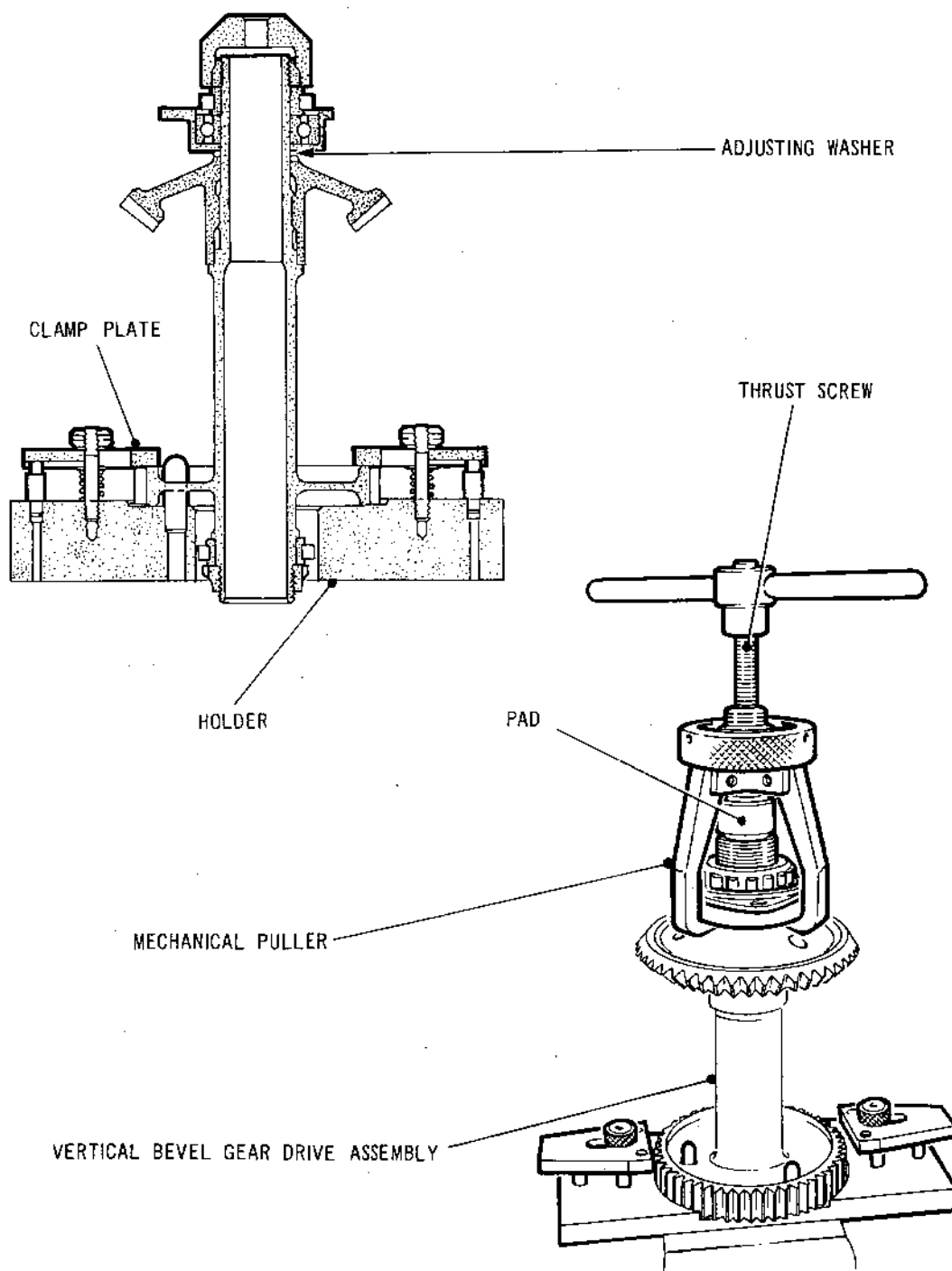
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Removal of the Retaining Nut and Bearings
from the Vertical Bevel Gear Drive Shaft
Figure 118

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- (b) Lock the claws into their locations by tightening the adjusting nut on the puller.
- (c) Operate the thrust screw, ensuring the pad on the puller is located in the internal circumference of the shaft, and withdraw the bearings, housing and adjusting washer from the shaft.
- (d) Unlock the three claws and remove the puller.
- (6) Withdraw the ball bearing and adjusting washer from the bearing housing.
- (7) Remove the roller bearing retaining nut from the vertical bevel gear drive shaft using the holder (Tool 646) and wrench (Tool 647).
 - (a) Assemble the holder into a bench vice.
 - (b) Locating the pin on the holder with any one of the three access holes in the bevel gear wheel, position the vertical bevel gear drive shaft into the holder.
 - (c) Using the wrench unscrew the nut, remove both wrench and nut from the drive shaft.
- (8) Remove the inner ring of the roller bearing from the vertical bevel gear drive shaft using the mechanical puller (Tool 746).
 - (a) Locate the three claws of the puller under the bearing inner ring and into the three cutaways in the lip of shaft.
 - (b) Lock the claws into their locations by tightening the adjusting nut on the puller.
 - (c) Operate the thrust screw, ensuring the pad on the puller is located in the internal circumference of the shaft, and withdraw the bearing inner ring from the shaft.
 - (d) Unlock the three claws and remove the mechanical puller.
- (9) Remove the bevel gear from the driving spur gear shaft using the mechanical puller (Tool 744) (Ref.Fig.119).

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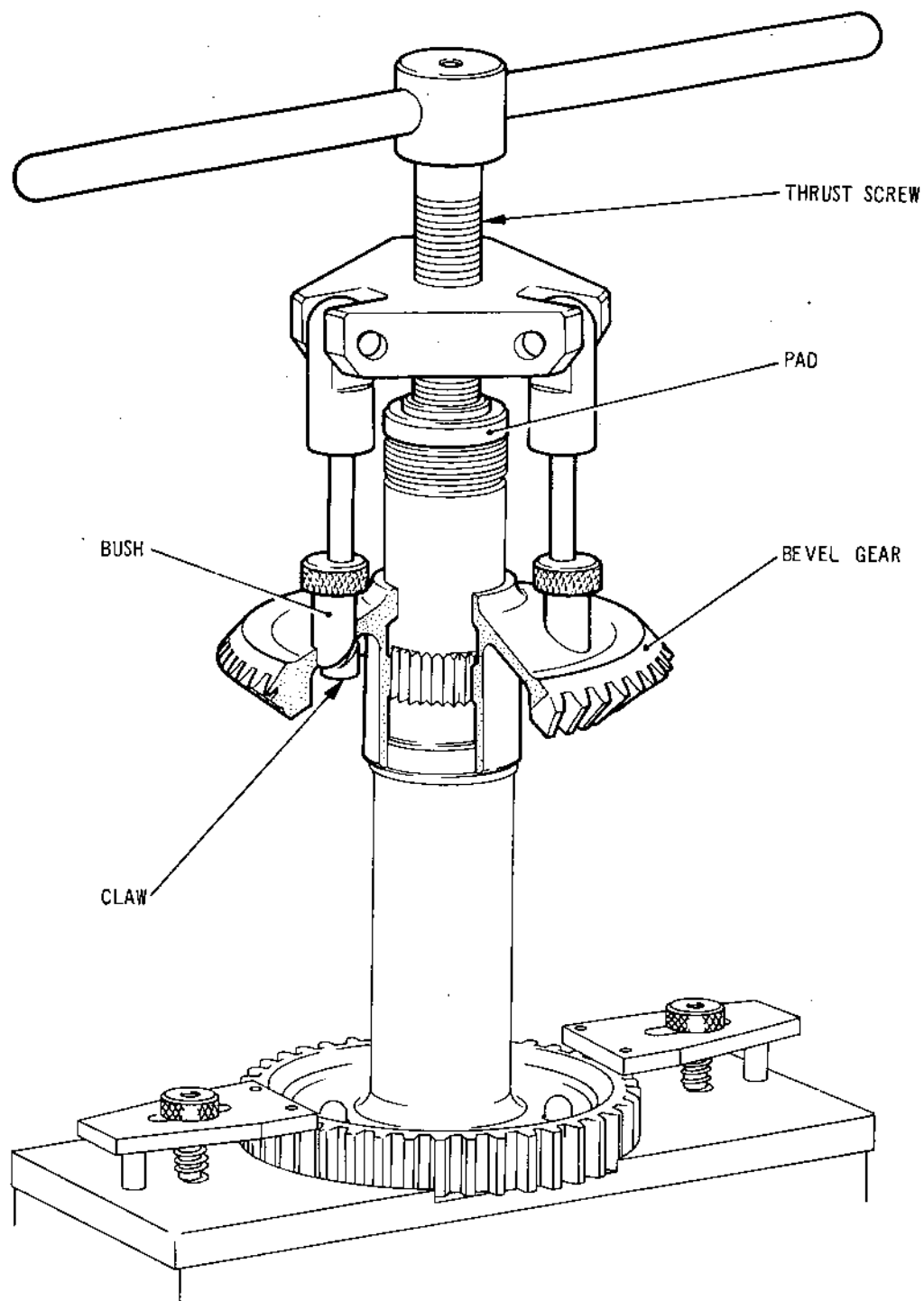


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Removal of the Vertical Bevel Gear from the
Driving Spur Gear Shaft
Figure 119

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- (a) Ensure the bushes are clear of the three claws of the puller and locate the claws through the three access holes in the bevel gear.
- (b) Locate the bushes into the access holes in the bevel gear, this will now place the claws, on the underside of the bevel gear, into the required position.
- (c) Operate the thrust screw, ensuring the pad on the puller is located in the internal circumference of the shaft and withdraw the bevel gear from the shaft, then release and remove the puller from the bevel gear.

Q. Remove the Main and Stand-by Hydraulic Pump Sealol Seals, and Adapter Assemblies from the Gearbox (Ref.Fig.120).

- (1) Unscrew and remove the two self-locking nuts, lock and spherical washers from the inner and outer eye-bolts retaining the clench clamp to the main hydraulic pump blank and adapter.

NOTE: The nuts must be replaced on the respective inner and outer eye-bolts from which they were removed.

- (2) Remove the clench clamp and blank from the adapter then remove the sealing ring from the blank.
- (3) Unscrew and remove the bolt, keywasher and parking bracket from their location on the stand-by hydraulic pump blank.
- (4) Unscrew and remove the two self-locking nuts lock and spherical washers from the inner and outer eye-bolts retaining the clench clamp to the stand-by hydraulic pump blank and adapter.

NOTE: The nuts must be replaced on the respective inner and outer eye-bolts from which they were removed.

- (5) Remove the clench clamp and blank from the gearbox case then remove the sealing ring from the blank.
- (6) Using the depeening tool (Tool 1336) depeen the keywasher located on the main hydraulic pump drive end of the spur gear shaft.

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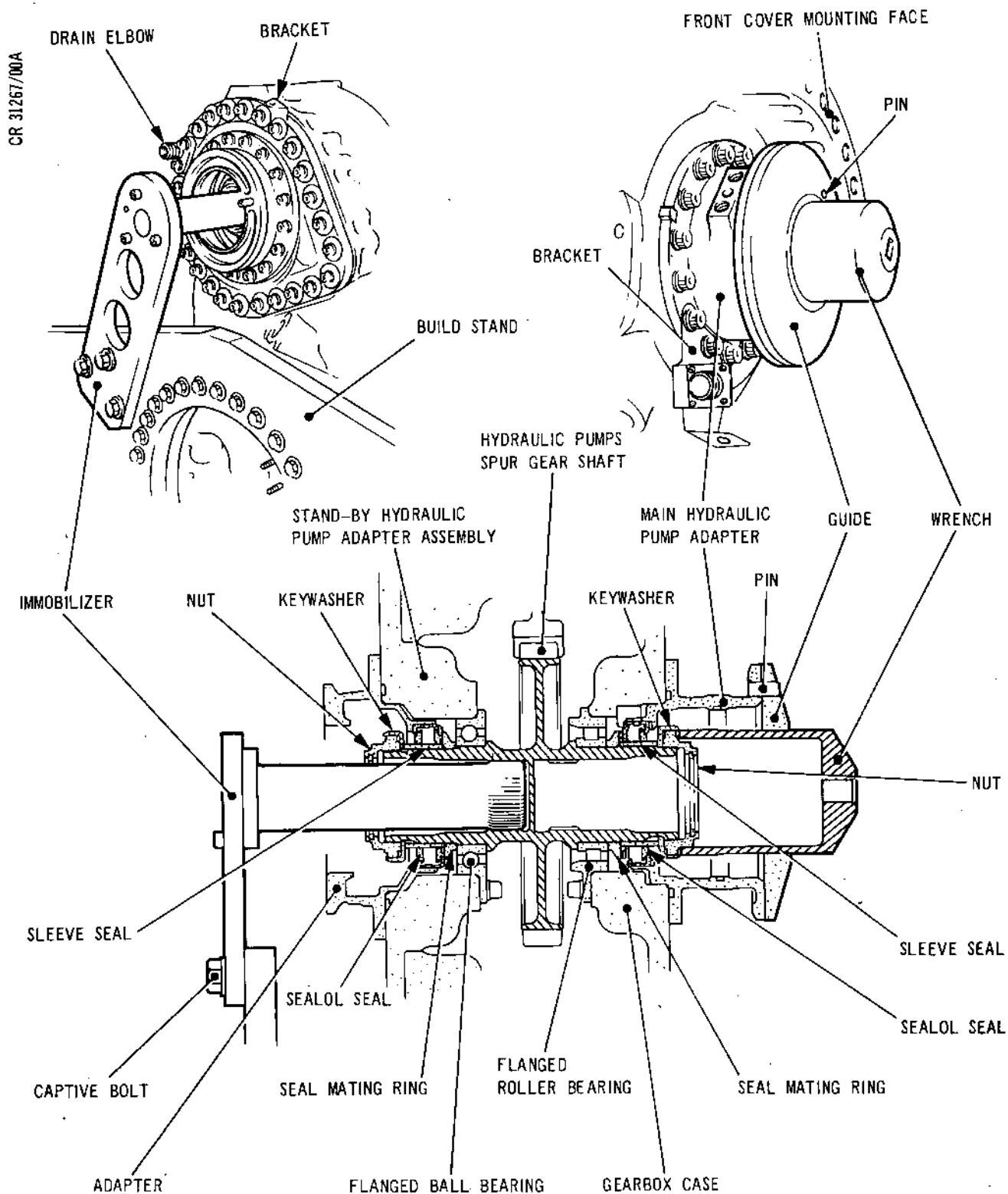
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Removal of Main and Stand-by Hydraulic Pump Drives
Figure 120

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- (7) Remove the nut located on the main hydraulic pump driving end of the spur gear shaft using the immobilizer (Tool 540) guide (Tool 1608) and wrench (Tool 1525).
- (a) Engage the splines on the immobilizer with the splines on the internal circumference of the shaft. (Stand-by hydraulic pump end).
 - (b) Locate the three triangularly spaced holes in the immobilizer plate with the corresponding tapped holes in the build stand (Tool 494). Retain the immobilizer to the stand with the three captive bolts.
 - (c) Assemble the guide to the wrench.
 - (d) Locate the lugs on the wrench with the corresponding castellations on the nut and the hole in the guide with the stepped pin in the main hydraulic pump adapter.
 - (e) Unscrew and remove the nut and keywasher from the shaft.
 - (f) Remove the guide and wrench. Unscrew the three captive bolts and remove the immobilizer.
- (8) Using the cranked wrench (Tool 645) unscrew and remove the 16 bolts securing the main hydraulic pump adapter and bracket to the gearbox case, then remove the adapter, Corruplus seal, adjusting washer and Sealol seal from the gearbox case.
- (9) Remove the Corruplus seal from the mounting face of the adapter.
- (10) Remove the Sealol seal from the main hydraulic pump adapter using the support (Tool 707) and driver (Tool 708).
- (a) Position the adapter on the support ensuring that the lip of the support is located in the Sealol seal.
 - (b) Position the driver onto the adapter flange and press the Sealol seal from its location in the adapter.
 - (c) Remove the driver and the support.

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- (11) From the gearbox remove the sleeve seal and the seal mating ring from the shaft.
- (12) Unscrew and remove the 26 bolts (outer ring) and 24 washers securing the drain elbow, bracket and stand-by hydraulic pump adapter assembly to the gearbox case.
- (13) Locate and engage a puller (Tool 1668) into the extractor hole in the adapter assembly. Screw in the puller and remove the adapter, spur gear shaft and assembled items from the gearbox case, then remove the gasket from the adapter mounting face.
- (14) Using the depeening tool (Tool 1336) depeen the keywasher located on the stand-by hydraulic pump drive end of the shaft.
- (15) Remove the nut from the stand-by hydraulic pump drive end of the spur gear shaft using the holder (Tool 512) and wrench (Tool 1525).
 - (a) Position the vice holder into a bench vice.
 - (b) Engage the splines on the vice holder into the splines on the internal circumference of the shaft.
 - (c) Using the wrench unscrew and remove the nut and keywasher from the shaft, then remove the wrench and vice holder.
- (16) Unscrew and remove the 17 bolts securing the adapter to the stand-by hydraulic pump adapter.
- (17) Remove the adapter then remove the Corruplus seal from the groove in the adapter mounting face.
- (18) Remove the Sealol seal from the adapter using the support (Tool 707) and driver (Tool 708).
 - (a) Position the adapter on the support ensuring that the lip of the support is located into the Sealol seal.
 - (b) Position the driver onto the adapter flange and press the Sealol seal from its location in the adapter.
 - (c) Remove the driver and support.

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- (19) Remove the sleeve seal and mating ring seal from the spur gear shaft.
- (20) Remove the inner ring of the roller bearing from the spur gear shaft, main hydraulic pump end, using the mechanical puller (Tool 747).
- (a) Locate the three claws of the puller under the bearing inner ring and into the cutaways in the lip of the shaft.
 - (b) Lock the claws into their locations by tightening the adjusting nut on the puller.
 - (c) Operate the puller thrust screw ensuring that the pad on the puller is located in the internal circumference of the shaft and withdraw the bearing inner ring.
 - (d) Unlock the three claws and remove the mechanical puller.
- (21) Unscrew and remove the three bolts securing the flanged roller bearing outer ring to the stand-by hydraulic pump adapter assembly.
- (22) Remove the adapter assembly from the bearing and the spur gear shaft.
- (23) Engage the adapter (Tool 1707) in the jet in the rear face of the pump adapter. Engage the impact puller (Tool 1701) into the adapter and withdraw the jet.
- (24) Remove the flanged ball bearing from the spur gear shaft using the mechanical puller (Tool 745).
- (a) Secure the vice holder on the puller in a bench vice.
 - (b) Position the shaft/roller bearing into the puller such that the three claws on the puller locate under the bearing and into the three cutaways in the lip on the shaft.
 - (c) Lock the claws into their locations by tightening the puller adjusting nut.
 - (d) Operate the puller thrust screw, ensuring that the pad on the puller is located into the internal circumference of the shaft and withdraw the bearing from the shaft.

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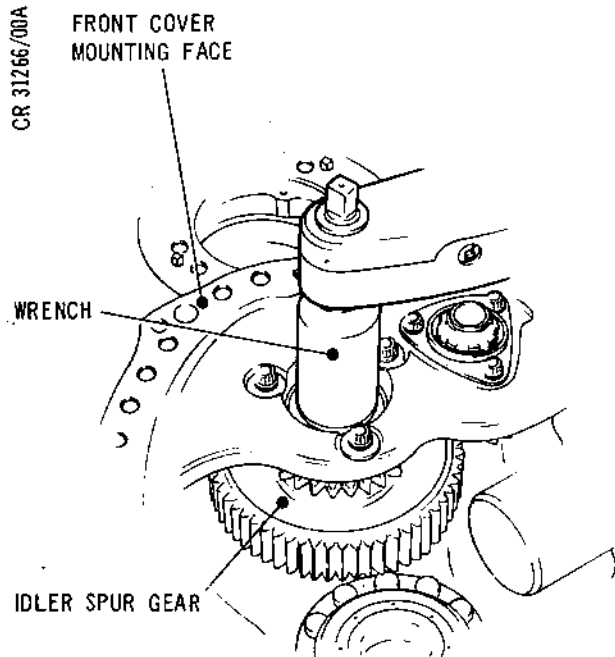


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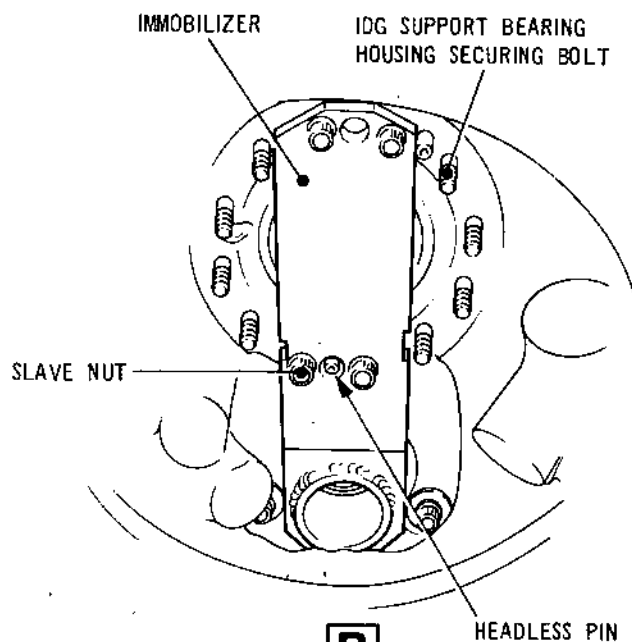
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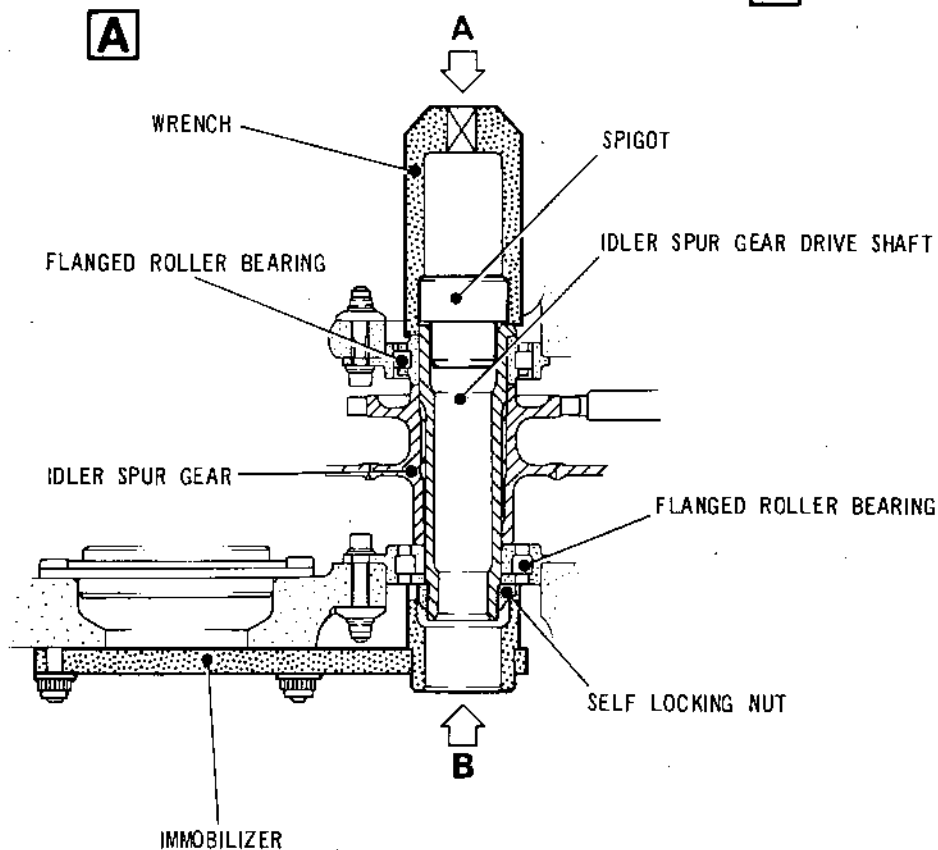
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A



B



Removal of Idler Spur Gear and Idler Shaft
Figure 121

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- (e) Unlock the three claws and remove the mechanical puller.

R. Remove the Idler Gear Oil Pump Drive Gear and their Associated Bearing Assemblies from the Gearbox Case.

- (1) Remove the self-locking nut securing the idler gear and the idler shaft in the gearbox case using the immobilizer (Tool 642) and wrench (Tool 643) (Ref.Fig.121).
 - (a) Locate the lugs on the immobilizer with the corresponding castellations in the self-locking nut and the five holes in the immobilizer body with four of the IDG support bearing housing securing 'D' headed bolts and the headless pin. Secure the immobilizer to the 'D' headed bolts with four slave nuts.
 - (b) Locate the spigot on the wrench into the internal bore of the idler shaft and the three equi-spaced lugs on the wrench into the corresponding cutaways in the idler shaft.
 - (c) Turn the wrench in a counter-clockwise direction in order to unscrew the nut held by the immobilizer. Remove the wrench then the immobilizer and nut.
- (2) Remove the side plate of the flanged roller bearing from the gearbox (build stand end).
- (3) Support the idler gear and remove the idler shaft from the gear and flanged roller bearings assembled to the gearbox case using the mechanical puller (Tool 741) (Ref.Fig.122).
 - (a) Disengage the nut from the thrust screw on the puller.
 - (b) Insert the thrust screw into the idler shaft from the front of the gearbox and locate the three keys, on the interior of the puller body, with the three cutaways in the idler shaft lip.
 - (c) Screw the nut on to the thrust screw protruding through the shaft.

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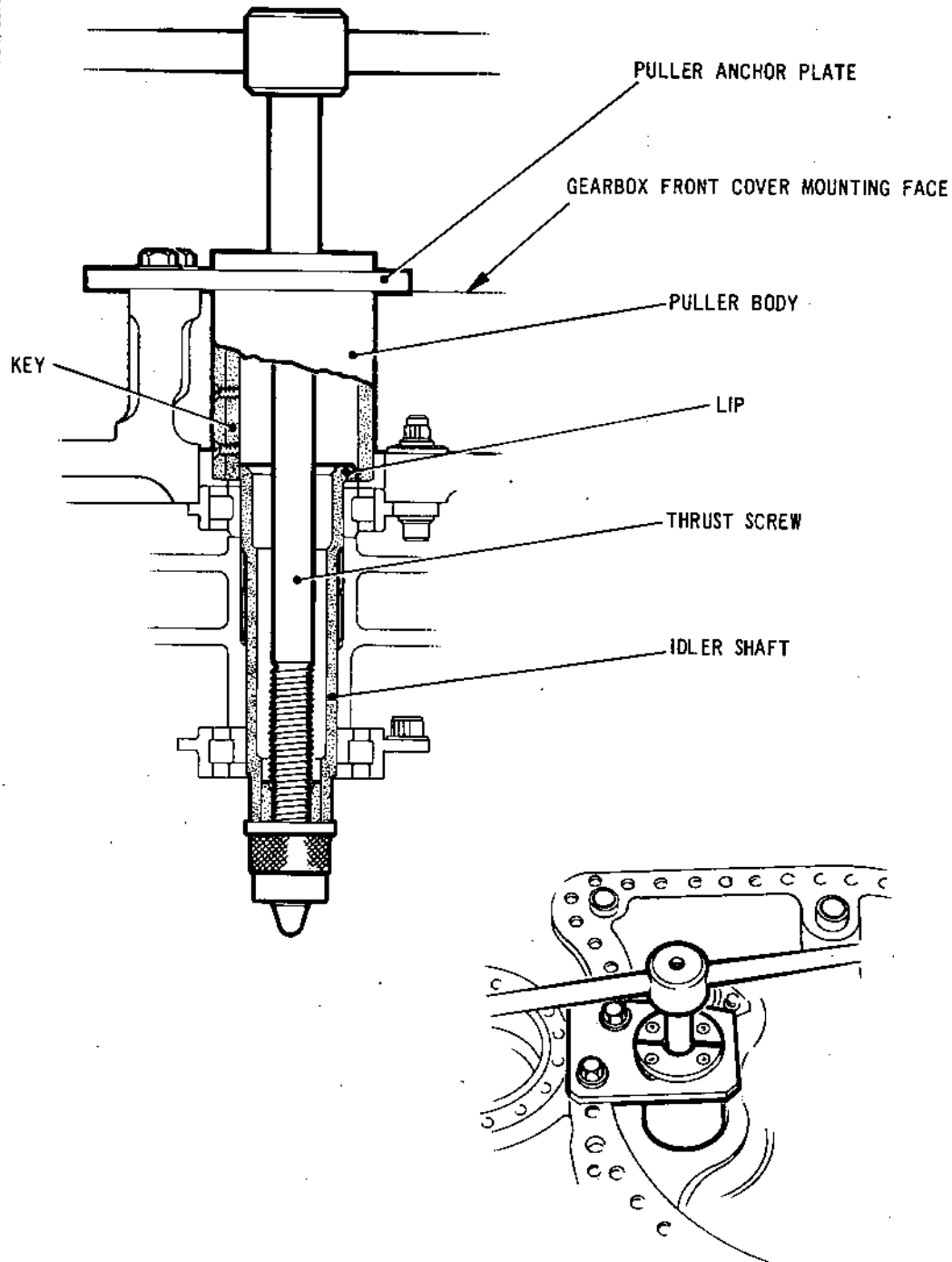


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Removal of the Idler Shaft from the Spur Gear
Figure 122

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- (d) Locate and engage the two captive bolts, in the puller anchor plate, with two of the front cover mounting bolt locations in the edge of the gearbox case.
- (e) Operate the thrust screw, ensuring the nut is located into the internal circumference of the idler shaft and withdraw the shaft, then release and remove the puller.
- (4) Remove the idler gear from the gearbox case.
- (5) Unscrew and remove the three self-locking nuts, flat washers and bolts securing the upper flanged roller bearing to the gearbox case, then remove the bearing from the case.
- (6) Unscrew and remove the three self-locking nuts, flat washers and bolts securing the lower flanged roller bearing to the gearbox case, then remove the bearing from the case.
- (7) Remove the self-locking nut securing the oil pump drive spur gear into its location in the gearbox case using the immobilizer (Tool 652) and wrench (Tool 651) (Ref.Fig.123).
- (a) Locate the lugs on the immobilizer sleeve with the corresponding castellations on the nut and the two captive bolts in the immobilizer plate with two of the front cover mounting bolt locations in the edge of the gearbox case.
- (b) Engage the splines on the wrench with the corresponding splines on the internal circumference of the spur gear, turn the wrench in a clockwise direction in order to unscrew the nut held by the immobilizer.
- (c) Remove the wrench then unscrew the captive bolts and remove the immobilizer and self-locking nut.
- (8) Remove the oil pump drive spur gear, two inner bearing rings and the spacer sleeve from their location in the gearbox case.
- (9) On engines Pre-SB.72-4 unscrew and remove the three self-locking nuts and bolts securing both flanged outer bearing rings to the gearbox case, then remove the bearing rings.

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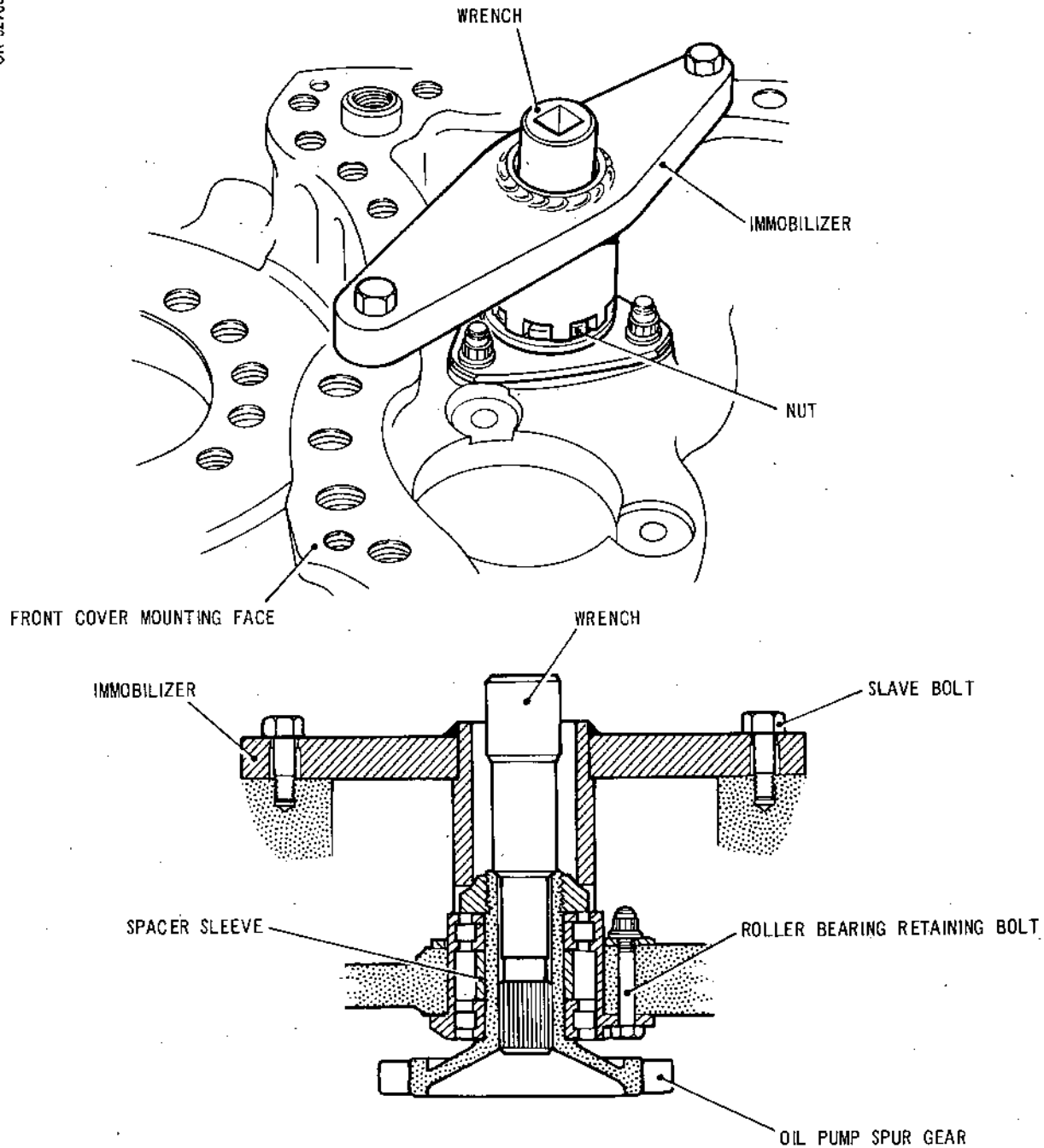
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Removal of Oil Pump Spur Gear
Figure 123



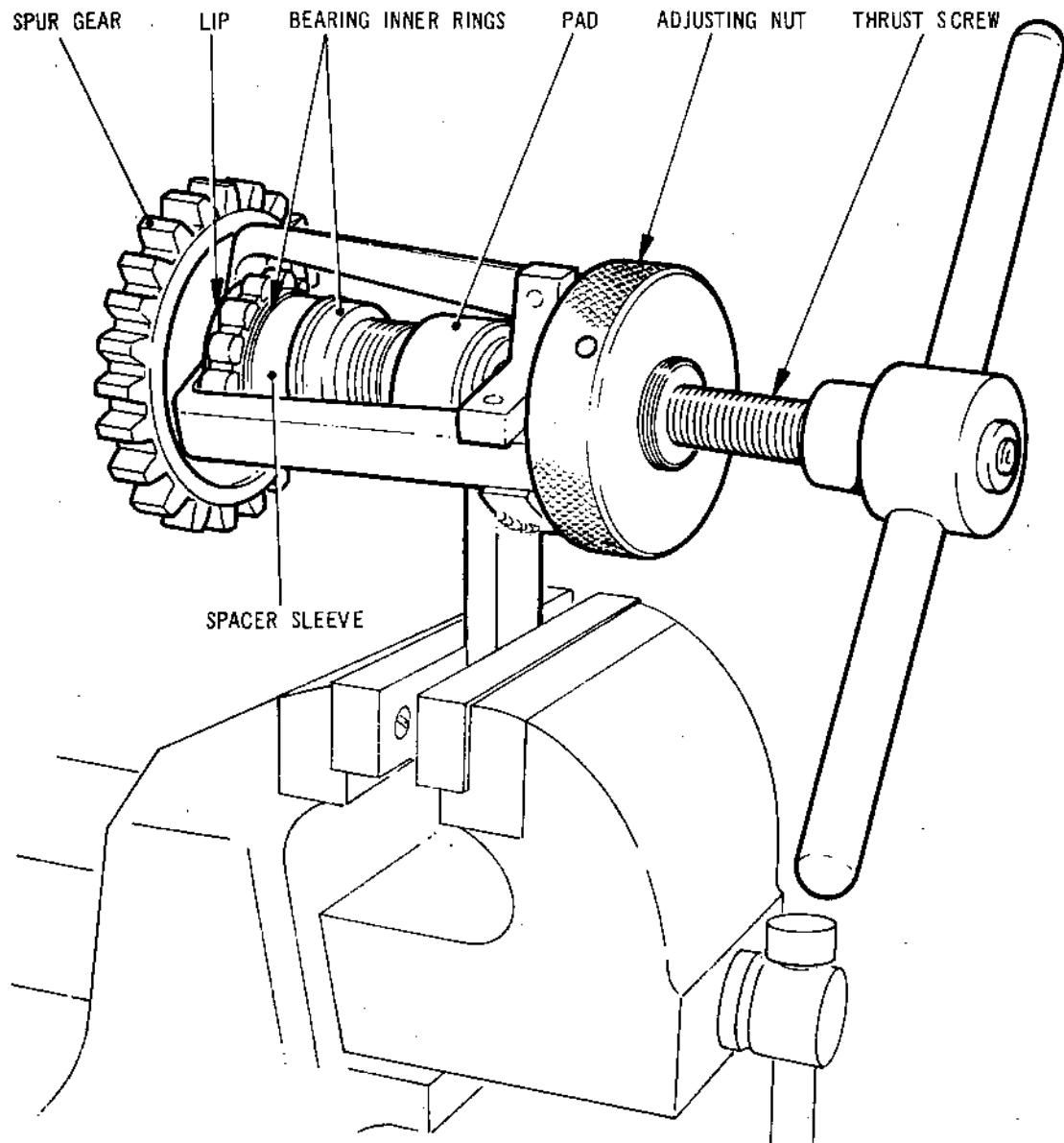
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Removal of Bearing Inner Rings and
Spacer Sleeve from the Oil Pump Spur Gear
Figure 124

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- (10) On engines embodying SB.72-4 unscrew and remove the three self-locking nuts and bolts securing the flanged bearing common outer ring. Remove the outer ring and plate washer.
 - (11) Remove the inner rings of both roller bearings and the spacer sleeve from the oil pump drive spur gear using the mechanical puller (Tool 739) (Ref.Fig.124).
 - (a) Secure the vice holder on the puller (Tool 739) in a bench vice.
 - (b) Position the spur gear and its assembled items into the puller so that the three claws on the puller locate under the inner ring of the bearing and into the three cutaways in the raised lip on the spur gear wheel.
 - (c) Lock the claws into their locations by tightening the puller adjusting nut.
 - (d) Operate the puller thrust screw ensuring the pad is located into the internal circumference of the shaft and extract the two bearing inner rings and the spacer sleeve from the spur gear.
 - (e) Unlock the three claws and remove the mechanical puller.
- S. Remove the Remaining Bearings, Strainers, Jets and the Cover from the Gearbox Case.
- (1) Release the 12 retainings rings retaining the 12 'D' headed bolts to the gearbox case at the location of the IDG gear shaft support bearing mounting face as viewed from the IDG mounting location.
 - (2) Remove the 12 bolts retaining the flanged ball bearing to the gearbox case, then remove the bearing.
 - (3) Unscrew and remove the four bolts securing the flanged outer ring of the bearing to the gearbox case at the rear of the main hydraulic pump adapter mounting face, then remove the outer ring.
 - (4) Unscrew and remove the three bolts securing the three segment assemblies to their locations on the interior of the gearbox case at the inclined bevel gear drive bearing housing mounting face, then remove the three segment assemblies from the six stepped pins.

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- (5) Unscrew and remove the five bolts securing the cover to its location on the exterior of the gearbox case, then remove the cover and gasket.
- (6) Using the retainer (Tool 493) to retain the strainer housing, unscrew and remove the strainer body, strainer and strainer sleeve from the strainer housing at its location in the interior of the gearbox case at the base of the vertical bevel gear drive assembly location, refer to Fig.117.
 - (a) Align the flat on the retainer with the projection on the gearbox case and the lugs with the castellations on the strainer housing.
 - (b) Secure the retainer to the gearbox case with the three captive bolts.
 - (c) Unscrew and remove the strainer body from the strainer housing.
 - (d) Release and remove the retainer from the gearbox.
- (7) Separate the strainer and sleeve from the strainer body and separate the strainer from the sleeve.
- (8) Remove the strainer housing from the gearbox case using the puller (Tool 742).
 - (a) Using the shorter threaded end, locate and secure the puller screw into the strainer housing.
 - (b) Engage the puller screw into the puller, operate the thrust screw and withdraw the housing from the case.
 - (c) Remove the puller from the case and the housing from the puller.
- (9) Unscrew and remove the two bolts securing the oil jet assembly to its location in the interior of the gearbox case, then remove the oil jet from the case.
- (10) Engage the adapter (Tool 765) into the hollow pin located in the gearbox case at the stand-by hydraulic pump adapter mounting face. Engage the impact puller (Tool 1701) into the adapter and extract the hollow pin. Release and remove the puller and adapter.

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- (11) Engage the adapter (Tool 779) into the jet (Pre SB.72-83) or extension (SB.72-83) assembled to the strainer assembly in its location in the stand-by hydraulic pump mounting face. Engage the impact puller (Tool 1701) into the adapter and withdraw the strainer assembly from the gearbox case. Release and remove the puller and adapter. On engines to Pre SB.72-83 remove the jet from each end of the strainer, or on engines to SB.72-83 remove the strainer extension.

T. Remove the Stepped Pins, Hollow Pins and Jet from the Gearbox Case.

NOTE: Removal of these items may only be necessary if required by inspection dept.

- (1) Remove the six stepped pins from their location in the rear of the inclined bevel gear drive bearing housing mounting face.
 - (a) Locate the thrust pin on the mechanical driver (Tool 777) into the stepped pin and the foot on the drivers clamp around the head of the pin.
 - (b) Screw in the thrust screw and withdraw the pin, release and remove the driver and carry out the same procedure for the remaining five pins.
- (2) Engage the adapter (Tool 780) into the front sleeve (Pre SB.72-83) or jet (SB.72-83) in its location in the rear of the main hydraulic pump mounting face. Engage the impact puller (Tool 1701) into the adapter and withdraw the sleeve or jet from the gearbox case. Release and remove the puller and adapter.
- (3) On engines Pre-SB.72-24 engage the adapter (Tool 734) into the hollow pin in its location in the front cover mounting face. On engines embodying SB.72-24 use the adapter (Tool 1869). Engage the impact puller (Tool 1701) in the adapter and withdraw the hollow pin from the gearbox case. Release and remove the puller and adapter.
- (4) On engines Pre-SB.72-24 engage the adapter (Tool 765) into the hollow pin in its location in the front cover mounting face. On engines embodying SB.72-24 use the adapter (Tool 1870). Engage the impact puller (Tool 1701) and withdraw the pin. Release and remove the puller and the adapter.

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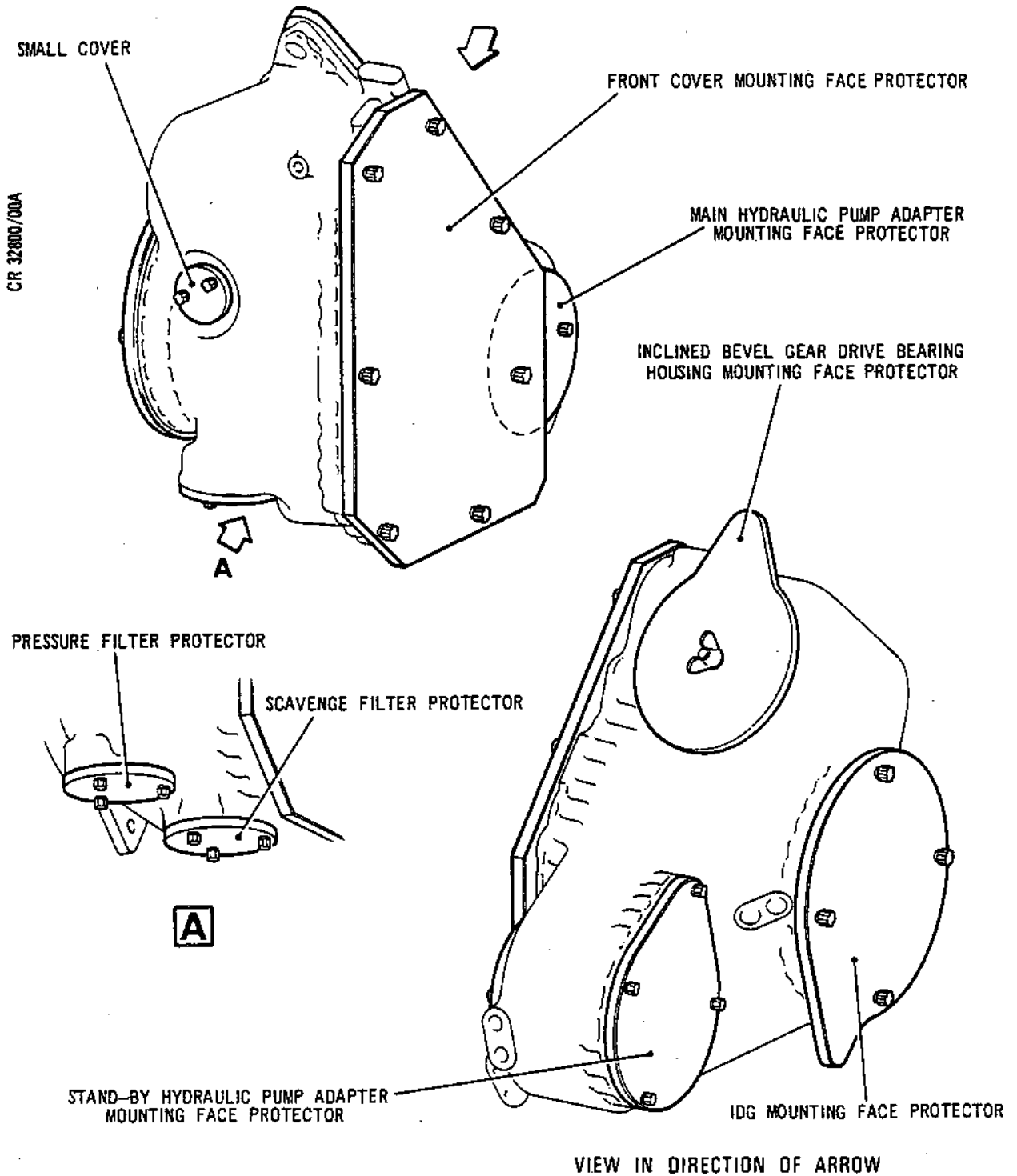


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Location of Gearbox Case Protectors
Figure 125

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- (5) On engines Pre-SB.72-24 engage the adapter (Tool 768) into the hollow pin located in the front cover mounting face. On engines embodying SB.72-24 use the adapter (Tool 767). Engage the impact puller (Tool 1701) in the adapter and extract the pin. Remove the adapter and puller.

U. Prepare the Gearbox for Removal from the Build Stand.

- (1) Assemble the protectors to the gearbox case as listed in Table 102 (Ref.Fig.125).

Protector	Location on the Gearbox Case
Tool 770	Inclined bevel gear drive bearing housing mounting face
Tool 1878	Main hydraulic pump adapter mounting face
Tool 3078	Stand-by hydraulic pump adapter assembly mounting face
Tool 3079	Front cover mounting face
Tool 3075	Small cover
Tool 776	Pressure filter
Tool 776	Scavenge filter

Assembly of Protectors to the Gearbox Case
Table 102

V. Position the Gearbox into a Pallet.

- (1) Assemble lifting adapter (Tool 794) to the gearbox case close to the main and stand-by hydraulic pump mounting locations. Secure the adapter to the gearbox case with the two captive bolts refer to Fig.102.
- (2) Assemble the lifting adapter (Tool 793) to the gearbox case close to the inclined bevel gear drive assembly location. Secure the adapter to the gearbox with the two captive bolts.
- (3) Assemble the lifting fixture (Tool 827) to the centre of the top slot in the lifting fixture (Tool 795), secure the two fixtures together with the captive bolt, washer and nut.

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- (4) Using a suitable lifting mechanism, position the fixture to the gearbox case, ensuring that the lifting plate (part of the fixture Tool 795), with the locking pin and fulcrum pin is next to the adapter (Tool 793).
- (5) Locate and tighten the fulcrum pin and locking pin on the lifting fixture to the adapter (Tool 793).
- (6) Locate and tighten the fulcrum pin on the lifting fixture to the adapter (Tool 794).
- (7) Operate the lifting mechanism so as to take-up the weight of the gearbox case, Unscrew the 32 captive bolts securing the gearbox case to the build stand (Tool 494). Remove the gearbox from the build stand.
- (8) Unscrew the locking pin on the lifting fixture and rotate the gearbox through approximately 90 deg, so access can be gained to the IDG mounting face on the gearbox case. Re-engage the locking pin.
- (9) Position the gearbox on a pallet then release and remove the lifting fixture.
- (10) Release and remove the two adapters from the gearbox case.
- (11) Position the protector (Tool 3076) to the IDG mounting face on the gearbox case.
- (12) Ensure all the disassembled items of the gearbox are identified and despatch all the items for cleaning.

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RIGHT-HAND ACCESSORY GEARBOX CASE ASSEMBLY - DISASSEMBLY

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For information on the Right-hand Accessory Gearbox Case Assembly, refer to 72-63-00 Disassembly.

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RIGHT-HAND ACCESSORY GEARBOX MAIN DRIVES - DISASSEMBLY

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For information on the Right-hand Accessory Gearbox
Main Drives, refer to 72-63-00 Disassembly.

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AIR STARTER DRIVE AND IDG DRIVE - DISASSEMBLY

For information on the Air Starter Drive and
IDG Drive, refer to 72-63-00 Disassembly.

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SCAVENGE OIL PUMP DRIVE AND IDLER SHAFT - DISASSEMBLY

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For information on the disassembly of the Scavenge Oil Pump and Idler Shaft, refer to 72-63-00 Disassembly.

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MAIN AND STAND-BY HYDRAULIC PUMP DRIVES - DISASSEMBLY

For information on the disassembly of the Main and Stand-by Hydraulic Pump Drives, refer to 72-63-00 Disassembly.

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DRAIN VALVE AND MAGNETIC PLUG ASSEMBLIES - DISASSEMBLY

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For information on the disassembly of the Drain Valve and Magnetic Plug Assemblies, refer to 72-63-00 Disassembly.

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DRIVE, PULSE PROBE AND HOUSING - DISASSEMBLY

For information on the disassembly of the Drive, Pulse Probe and Housing, refer to 72-32-00 Disassembly.

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MAIN OIL PUMP - DISASSEMBLY

1. General

- A. Prior to commencing disassembly, refer to 72-09-00, Disassembly, for general information.
- B. Throughout the text special tools are quoted by their Ref.No. e.g. (Tool 1234). For a complete list of tooling required for the disassembly and for the Manufacturers Part No., refer to Special Tools, Fixtures and Equipment Table 1001.

2. Prepare the Oil Pump for Disassembly

- A. Assemble the Oil Pump to the Holding Fixture.
- (1) Ensure that the protector (Tool 869) is assembled to the oil pump/gearbox mounting face.
 - (2) Assemble the holding fixture (Tool 852) to a Hydraclamp, then assemble the oil pump to the holding fixture and secure it with four slave nuts and washers (Ref.Fig.101).
- B. Assemble the Protectors to the Oil Pump.
- (1) Release and remove the eight bolts securing the cover to the flange on the side of the pressure pump case, then remove the cover, bracket and gasket.
 - (2) Assemble the protectors (as necessary) to the pump flange faces (Ref.Fig.102 and Table 101).

FIG.REF.NO.	TOOL REF.NO.	FIG.REF.NO.	TOOL REF.NO.
1	123	4	121
2	122	5	120
3	124	6	282

Oil Pump Flange Protectors
Table 101

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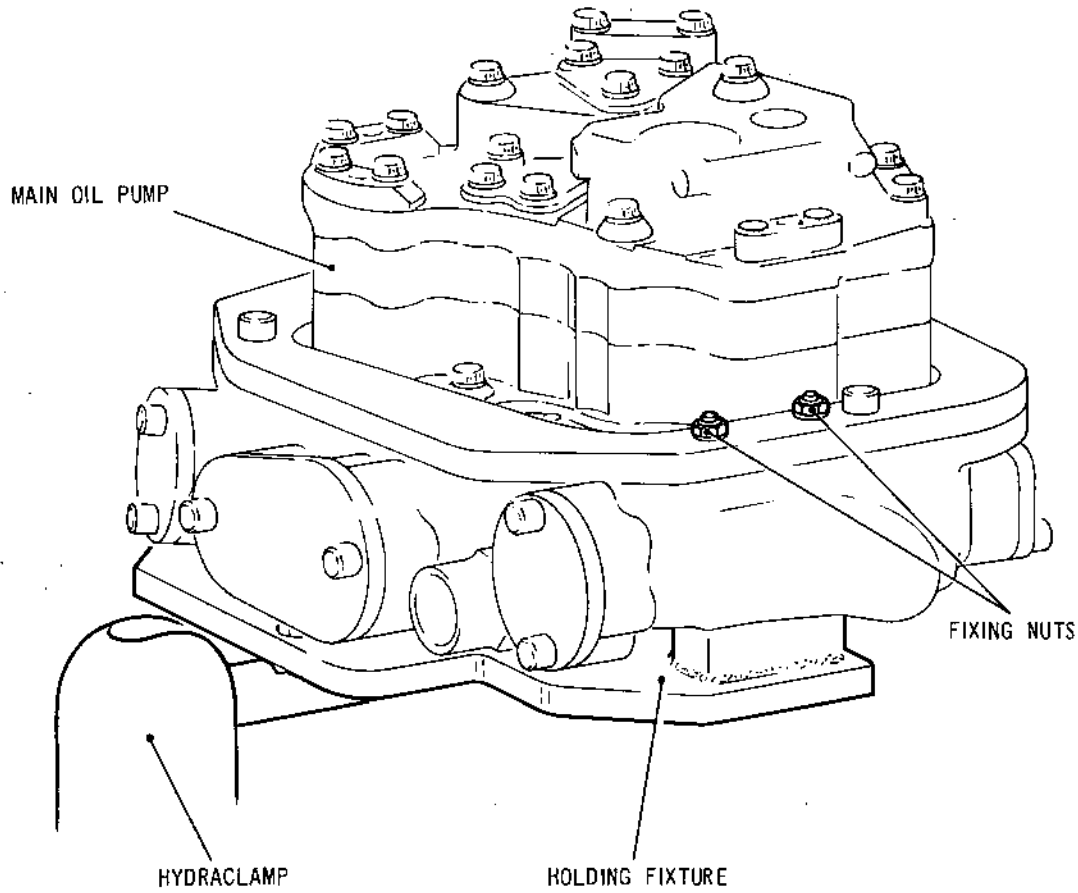


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Assembling Oil Pump to Holding Fixture
Figure 101

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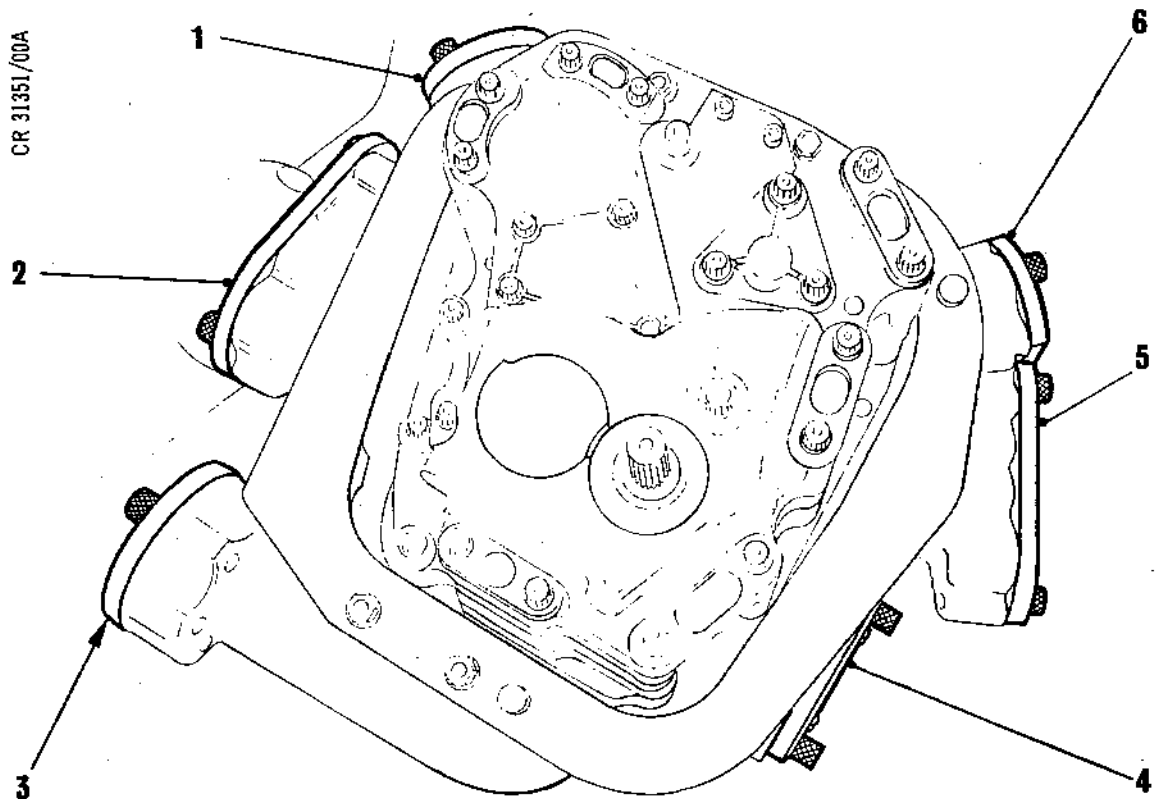
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Locating Oil Pump Flange Protectors
Figure 102

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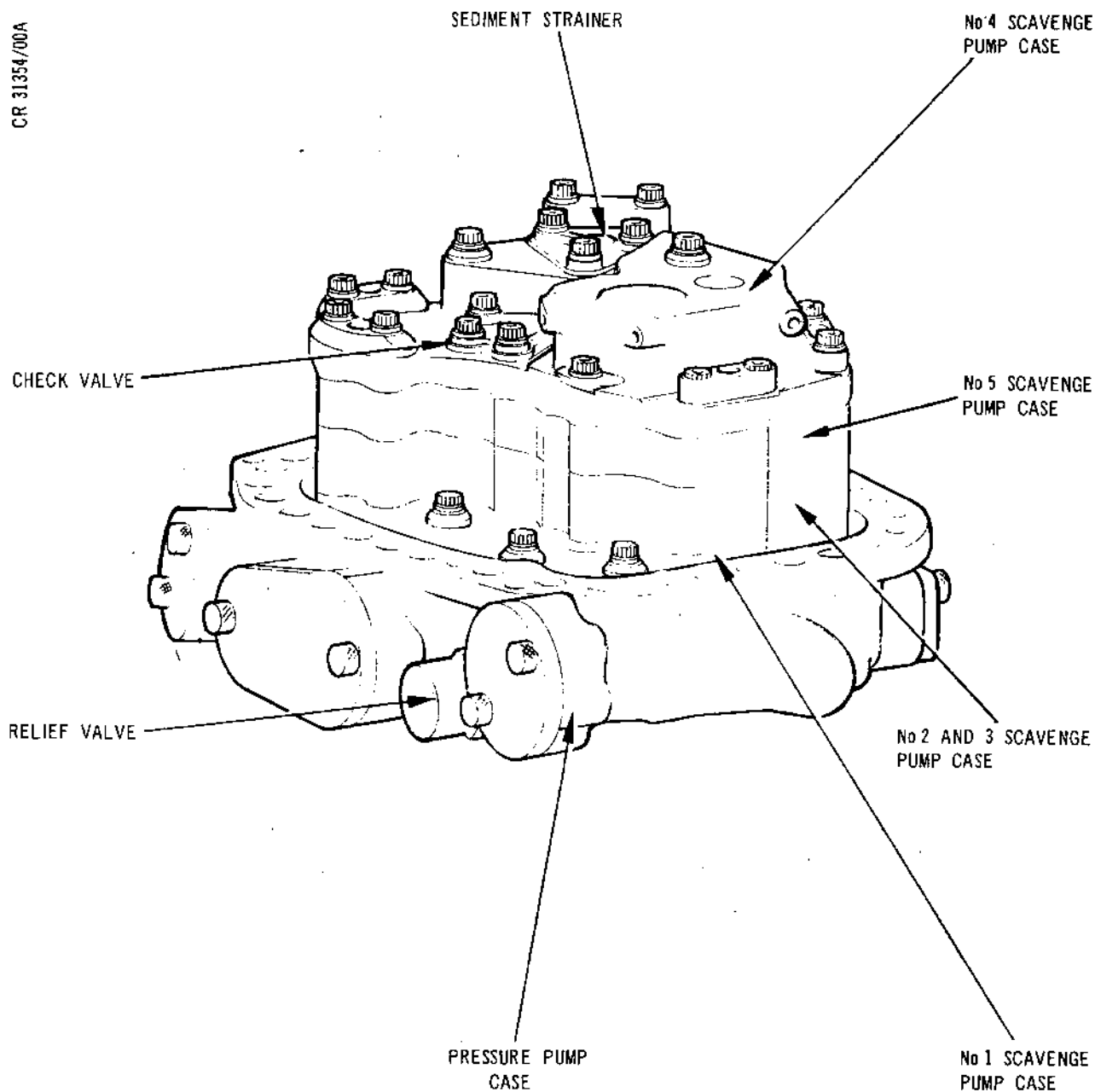
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Identification of Components of Oil Pump
Figure 103

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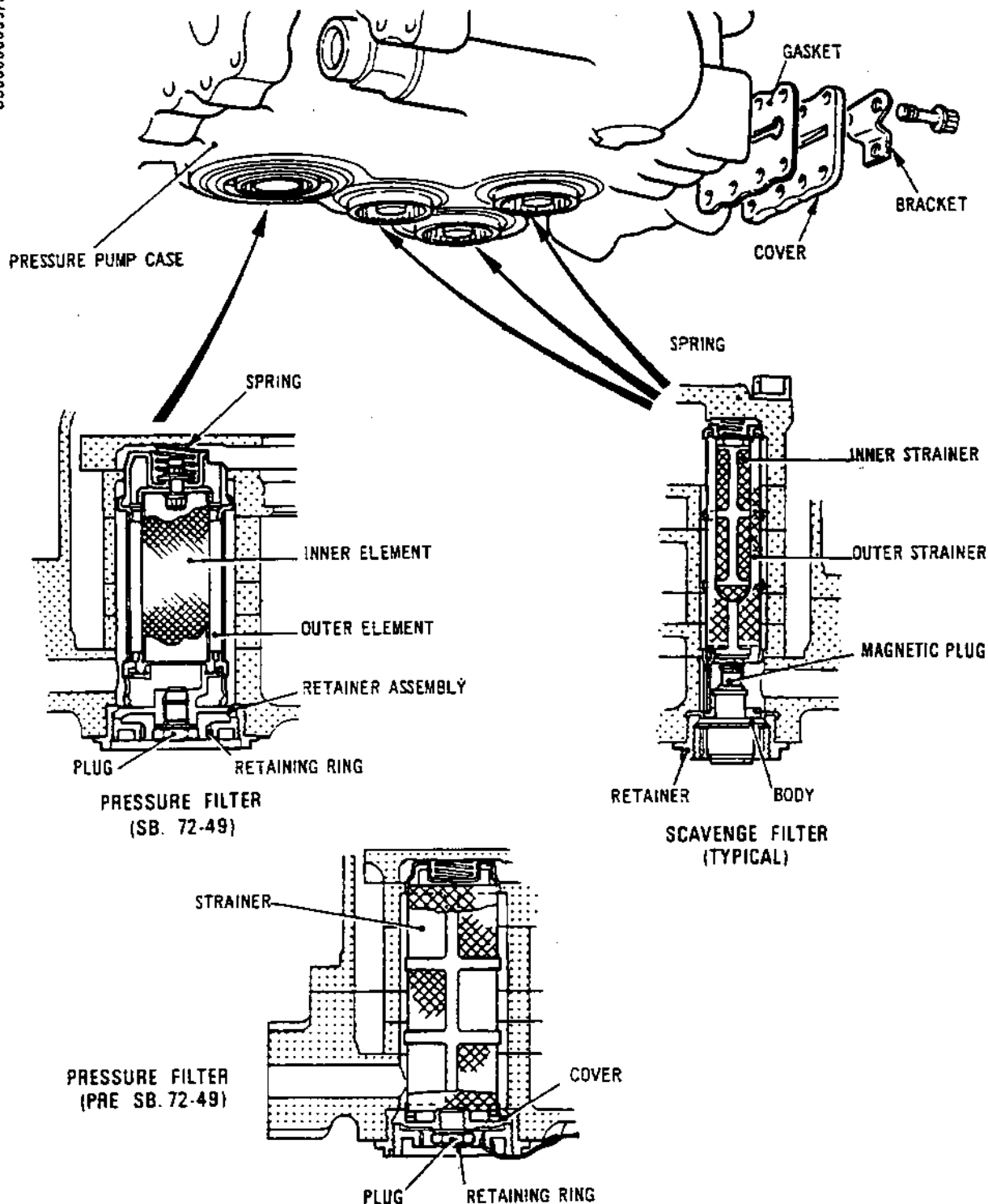


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Disassembling Oil Pump Filters
(Pre S.B.OL.593-72-9036-419)
Figure 104

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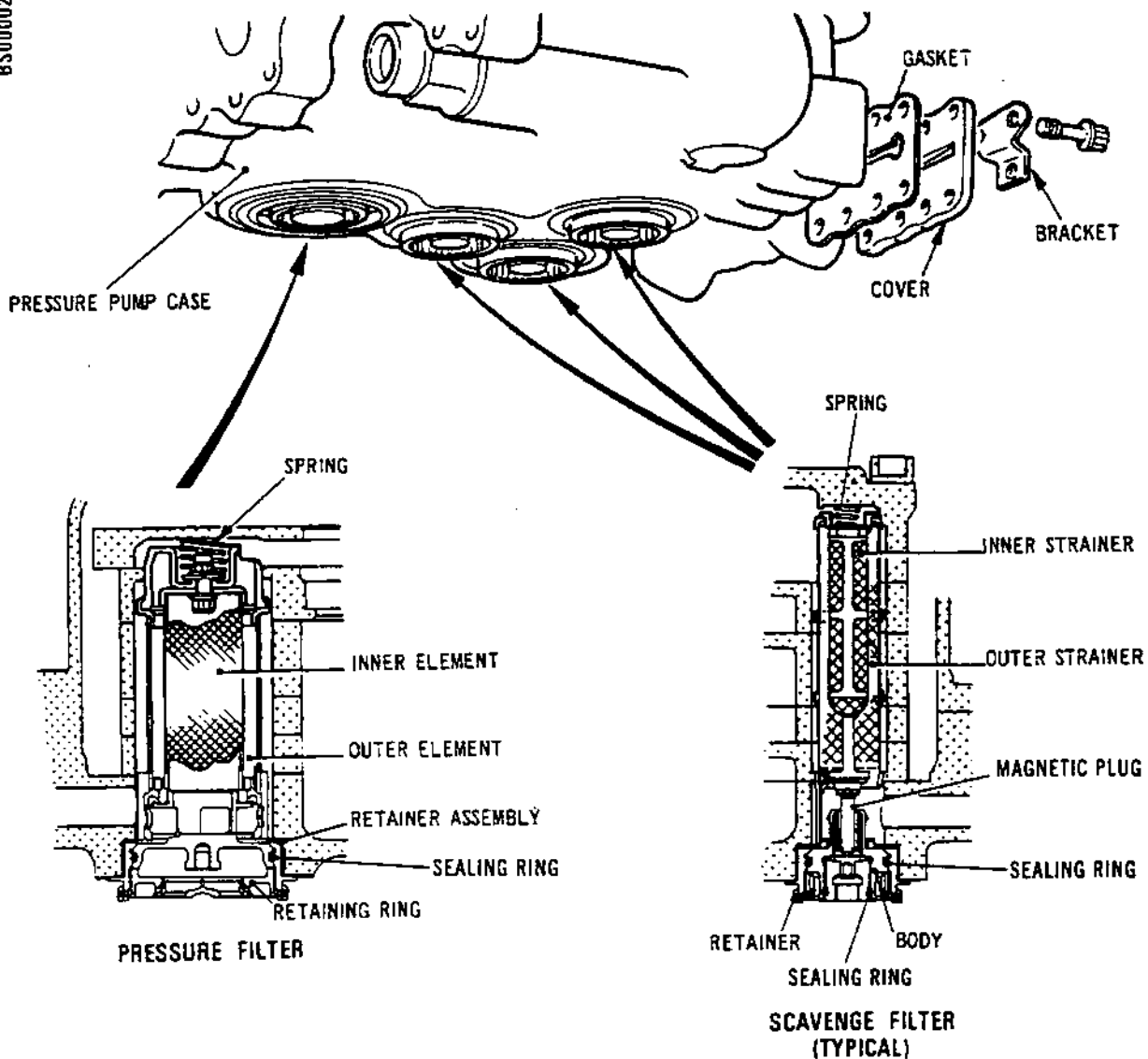


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Disassembling Oil Pump Filters
(S.B.OL.593-72-9036-419)
Figure 105



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3. Disassemble the Oil Pump

NOTE: For identification of the items/components of the oil pump refer to Fig.103.

CAUTION: ON PARTS TO SB OL.593-72-9036-419 STANDARD, IT MAY BE NECESSARY (DUE TO THE POSSIBLE ADHERENCE OF THE "O" RING TO THE JOURNAL) TO USE CONVENTIONAL HAND TOOLS TO AID THE REMOVAL OF THE MCD BODY ASSEMBLY, AS PART OF THE FILTER REMOVAL SEQUENCE. DURING THIS OPERATION IS IS ESSENTIAL THAT EXTREME CARE IS TAKEN, SO AS TO NOT DAMAGE ANY PART OF THE ASSEMBLY.

- A. Remove and Dismantle the Scavenge Filters
(Pre S.B.OL.593-72-9036-419) (Ref. Fig.104)
(S.B.OL.593-72-9036-419) (Ref. Fig.105).

- (1) Place a drip tray under the oil pump, then turn the Hydraclamp to a vertical position.
- (2) Loosen the three magnetic plugs, then using the serrated spanner (Tool 1478), unscrew the retaining rings which secure the three scavenge filters.
- (3) Withdraw the filters and remove the magnetic plugs, then unscrew and remove the filter bodies from the strainer units.
- (4) Withdraw the inner strainers from the outer strainers, then remove the springs from the inner strainers.

- B. Remove and Dismantle the Pressure Filter
(Pre S.B.OL.593-72-9036-419) (Ref. Fig.104).

- (1) Unscrew and remove the magnetic plug and its seal from the pressure filter cover (pre-SB.72-49) or filter retainer (SB.72-49).
- (2) Using the serrated spanner (Tool 1478) unscrew and remove the filter retaining ring then withdraw the filter assembly.
- (3) On pumps pre-SB.72-49 detach, by unscrewing, the strainer from the cover.
- (4) On pumps to SB.72-49 detach, by unscrewing, the outer element from the retainer. From the outer element recess unscrew and remove the self-locking nut to detach the inner element.

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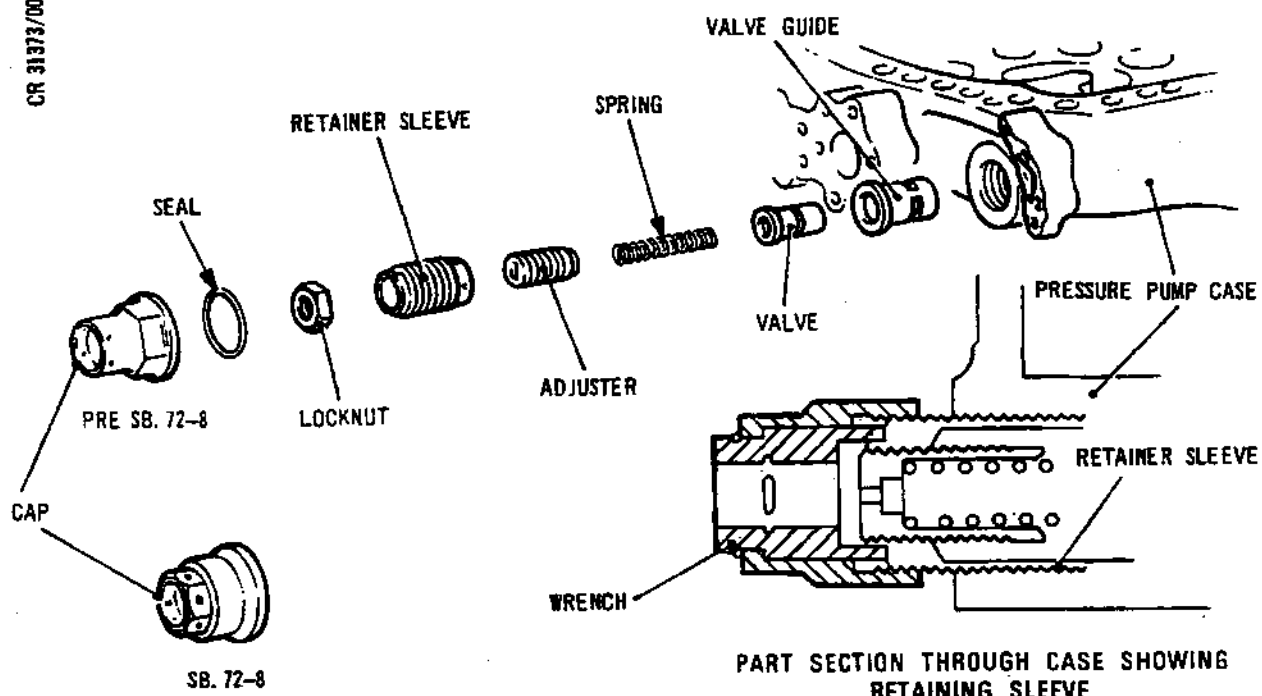


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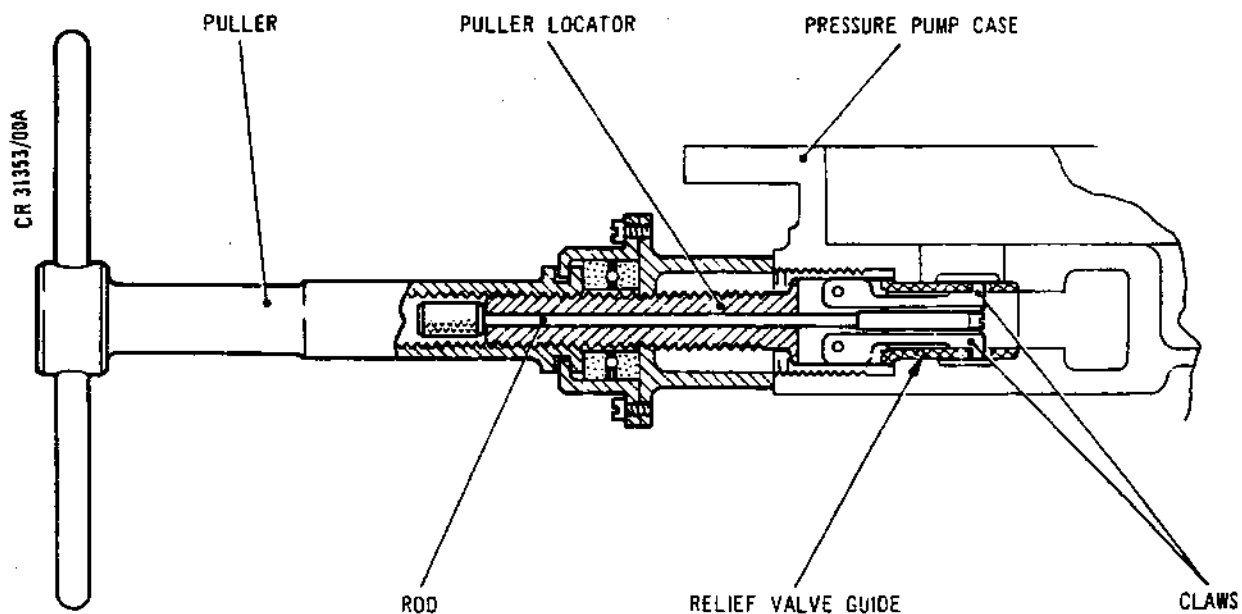


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Disassembling Relief Valve
Figure 106



Extracting Relief Valve Guide
Figure 107



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C. Remove and Dismantle the Pressure Filter
(S.B.OL.593-72-9036-419) (Ref.Fig.105).

- (1) Using the serrated spanner (Tool 1478) unscrew and remove the filter retaining ring then withdraw the filter assembly.
- (2) Detach, by unscrewing, the outer element from the retainer. From the outer element recess unscrew and remove the self-locking nut to detach the inner element.

D. Dismantle the Relief Valve (Ref.Fig.106).

- (1) Turn the oil pump to a horizontal position then release and remove the cap from the relief valve using the crowfoot wrench (Tool 1579 pre-SB.72-8 or Tool 1972, SB.72-8).
- (2) Release and remove the locknut from the adjuster, then install the torque adaptor assembly (Tool 3155) on to the retainer sleeve so that it engages the slots in the sleeve. Unscrew and remove the sleeve from the case, then remove the torque adaptor assembly (Tool 3155) from the sleeve.
- (3) Withdraw the spring from the case, then unscrew and remove the adjuster from the sleeve using the adjuster tool (Tool 1593).
- (4) Withdraw the valve from the valve guide in the case, then insert the puller locator (Tool 333) and push in the rod to locate the claws in the valve guide (Ref.Fig.107). Screw the puller (Tool 129) over the locator to extract the valve guide.
- (5) Unscrew the puller from the locator, then pull back the rod to release the valve guide.

E. Release the Pump Cases.

- (1) Release and remove the oil pump retaining bolts in the sequence shown (Ref.Fig.108), then remove the load spreading washers.
- (2) Remove the check valve cover, then detach the valve, spring and adjusting washer (if present).
- (3) Remove the cover from the sediment strainer.

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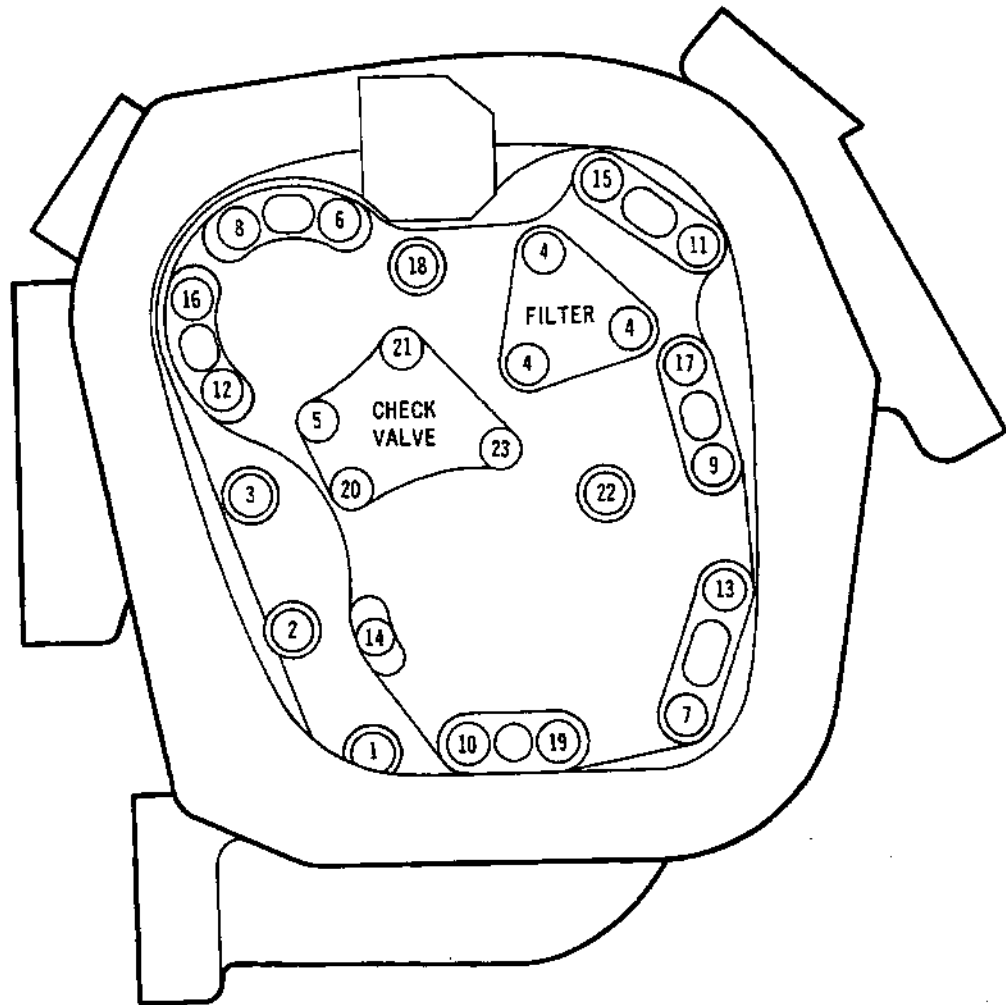
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CR 33810/00A



Sequence for Loosening Oil Pump Fixing Bolts
Figure 108

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F. Disassemble No.4 Scavenge Pump.

- (1) Screw three mechanical pullers (Tool 1021) through the threaded extraction holes in No.4 scavenge pump case to lift the case away from No.5 scavenge pump case, then remove the pullers from the case.
- (2) Remove the gears and the quillshaft, then tap out the sediment strainer from the inside of No.4 scavenge pump case using the driver (Tool 1479).
- (3) Assemble the holder (Tool 132) to a vice, then insert the sediment strainer unit into the holder so that the slots in the strainer locate over the pin in the holder. Unscrew the jet using tommy bar (Tool 1969) and withdraw the sleeve from the strainer.
- (4) Assemble the protector (Tool 119) to No.4 scavenge pump case.

G. Disassemble No.5 Scavenge Pump.

- (1) Screw the three mechanical pullers through the threaded holes in No.5 scavenge pump case to lift it away from No.2/3 scavenge pump case, then remove the pullers.
- (2) Remove the gears, then assemble the protector (Tool 126) to the case.

H. Disassemble No.2/3 Scavenge Pump.

- (1) Screw the three mechanical pullers through the threaded extraction holes in No.2/3 scavenge pump case to lift the case away from No.1 scavenge pump case, then remove the pullers.
- (2) Remove the gears, then assemble the protector (Tool 125) to the case.

I. Disassemble No.1 Scavenge Pump.

- (1) Screw the three mechanical pullers through the threaded extraction holes in No.1 scavenge pump case to lift it away from the CB scavenge pump case, then remove the pullers.
- (2) Remove the gears, then assemble the protector (Tool 127) to the case.

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J. Disassemble the CB Scavenge and Pressure Pumps.

- (1) Screw the three mechanical pullers through the threaded extraction holes in the CB scavenge pump case to lift it away from the pins in the pressure pump case, then remove the pullers.
- (2) Push the headed pin out of its location in the CB scavenge pump case, then remove the scavenge and pressure pump gears from the pressure pump case. Assemble the protector (Tool 127) to the CB scavenge pump case.
- (3) Remove the pressure pump case from the holding fixture, then place all the scavenge pump cases into the container (Tool 1463) and the pressure pump case into the container (Tool 1471). Place the pump gears, etc. into the container (Tool 1470).

NOTE: The oil pump is now ready to be despatched for cleaning.

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GENERAL (ENGINE ASSEMBLY) - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-120 **	SETTING DIMENSION BETWEEN REAR FACE OF STAGE 7 ROTOR BLADE AND FRONT FACE OF DELIVERY CASE UNIT	<u>2.3070</u> 2.3120	<u>58,598</u> 58,725	-	-
601-135 **	TIP CLEAR- ANCE OF EXIT GUIDE VANE TO DIFFUSER CASE	-	-	-	-
601-176 **	IGNITER Tip PLUG INSIDE Penetration ANNULAR COMBUSTION CHAMBER	-	-	-	-
601-177	FUEL PRES- Tip SURE ATOMI- Penetration ZING (PILOT) NOZZLE INSIDE ANNULAR COMBUSTION CHAMBER	- - - - - -	- - - - - -	- - - - - -	- - - - - -
602-235 **	CLEARANCE Clearance BETWEEN HP TURBINE ROTOR BLADE AND HP TUR- BINE STATOR SEGMENT UNIT	-	-	-	-

Table 601 (Continued) (Sheet 1 - LH)

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British airways
CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

Temporary Revision No. 72-582
Insert in 72-00-00 before page 603

REASON FOR ISSUE:

TR.72-545 reissued to align with RR Revision 61

ACTION

Amend Fig and Ref No. 601-177 as follows:

CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
Ins.	mm.	Ins.	mm.	
0.1400	3,556	NOT APPLICABLE		Pre S.B.73-12 Ref: 72-40-00, Fig.601-177
0.216	5,486			
0.1400	3,556	NOT APPLICABLE		S.B.73-12.
0.250	6,350			

NOTE: These dimensions refer to the distance from the end of the nozzle to the combustion chamber inside surface.



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SEE TR

REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	-	-	-	-	Ref.72-33-00 Fig.601-120
-	-	0.0850*	2,159*	-	-	*MINIMUM Ref.72-34-00 Fig.601-135 Ref.72-33-00 Fig.601-135
-	-	$\frac{0.1000}{0.2000}$	$\frac{2,540}{5,080}$	$\frac{0.1000}{0.2000}$	$\frac{2,540}{5,080}$	PRE-SB. 72-8679-282 Ref.72-40-00 Fig.601-176
		$\frac{0.1000}{0.1300}$	$\frac{2,540}{3,302}$	$\frac{0.1000}{0.1300}$	$\frac{2,540}{3,302}$	SB.72-8679-282 Ref.72-40-00 Fig.601-176
-	-	$\frac{0.1400}{0.2160}$	$\frac{3,556}{5,486}$	0.1360*	3,454*	PRE-SB.73-12 *MINIMUM Ref.72-40-00 Fig.601-177
-	-	$\frac{0.1400}{0.2500}$	$\frac{3,556}{6,350}$	0.1400*	3,556*	SB.73-12
-	-	$\frac{0.0420}{0.0635}$	$\frac{1,067}{1,613}$	0.0650	1,651	MODULE BREAK POSITION. Ref.72-51-03 Fig.601-235 Ref.72-51-03 Fig.601-235

Table 601 (Continued) (Sheet 1 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-236 **	VANE NOZZLE SUPPORT ASSEMBLY TO VANE NOZZLE ABUTMENT SEGMENT	Set Gap	-	-	-	-
602-237	CASE REAR FACE TO HP TURBINE HUB	Set Gap	-	-	-	-
602-239 **	CASE REAR FACE TO LP TURBINE HUB ADJUSTING WASHER	Set Gap	-	-	-	-
602-241 **	HP TURBINE ROTOR BLADE	Tip Clearance	-	-	-	-
602-242 **	LP TURBINE ROTOR BLADE	Tip Clearance	-	-	-	-
602-262 **	LABYRINTH HOUSING TO VANE NOZZLE SUPPORT ASSEMBLY	Set Gap	-	-	-	-

Table 601 (Continued) (Sheet 2 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	<u>7.3850</u> 7.3900	<u>187,579</u> 187,706	-	-	Ref.72-51-02 Fig.601-236
-	-	<u>6.5550</u> 6.5650	<u>166,497</u> 166,751	-	-	Ref.72-51-02 Fig.601-237 Ref.72-51-03 Fig.601-237
-	-	<u>3.8800</u> 3.8900	<u>98,552</u> 98,806	-	-	Ref.72-52-01 Fig.601-239 Ref.72-52-02 Fig.601-239
-	-	<u>0.0320</u> 0.0502	<u>0,813</u> 1,275	0.0550	1,397	MODULE BREAK POSITION. Ref.72-51-02 Fig.601-241 Ref.72-51-03 Fig.601-241
-	-	<u>0.1210</u> 0.1420	<u>3,073</u> 3,607	0.1450	3,683	MODULE BREAK POSITION. Ref.72-52-02 Fig.601-242 Ref.72-52-01 Fig.601-242
-	-	<u>2.9800</u> 2.9850	<u>75,692</u> 75,819	-	-	Ref.72-51-01 Fig.602-262

Table 601 (Continued) (Sheet 2 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
602-263 **	NOZZLE	Set Gap	23.7600*	603,504*	-
	DIAPHRAGM		23.7500	603,250	-
	LABYRINTH				
	FIN IN LP				
	TURBINE				
	ROTOR				
	BLADE				

Table 601 (Concluded (Sheet 3 - LH)

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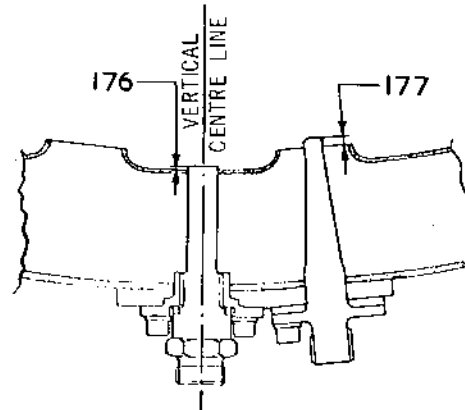
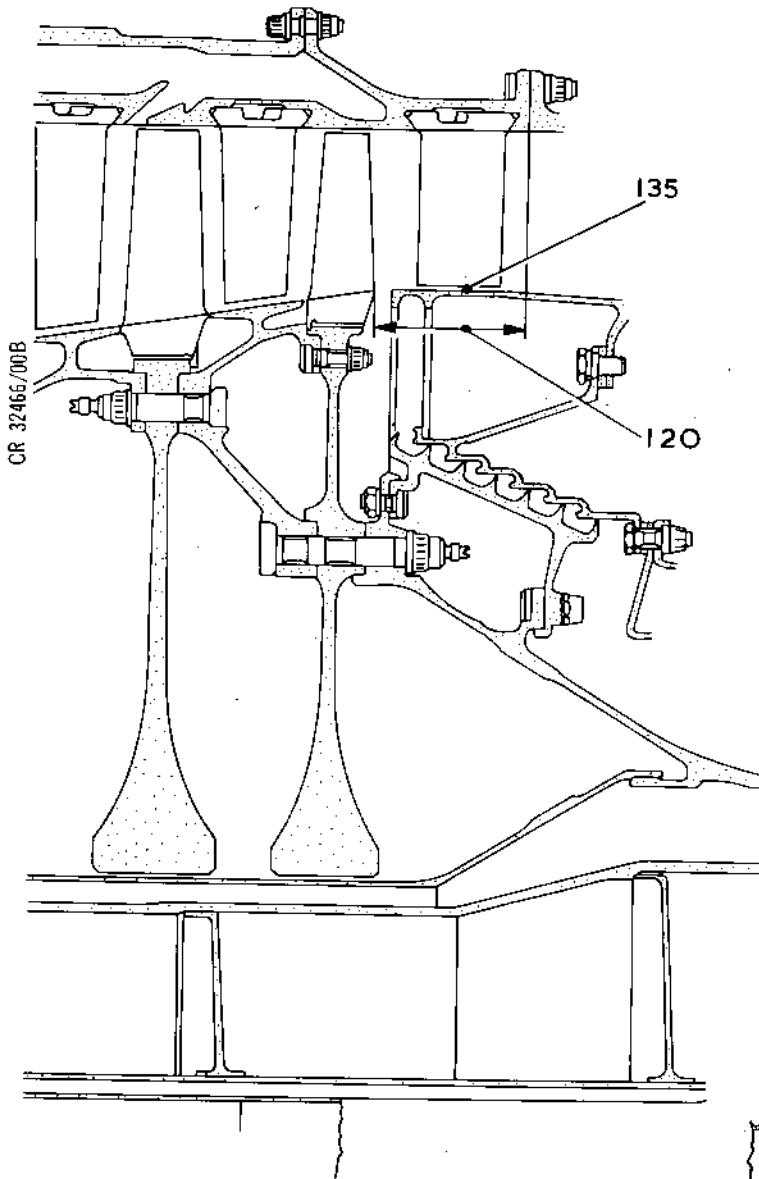
REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	-	-	-	-	*TO GIVE 0.040 IN. (0,916 mm) (REF.) CLEAR- ANCE AT CRUISE MOD.7433 Ref.72-52-02 Fig.601-263

Table 601 (Concluded) (Sheet 3 - RH)



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PART SECTION THROUGH PRIMARY ZONE
OF ANNULAR COMBUSTION CHAMBER

General (Engine Assembly)
Figure 601

FITS AND CLEARANCES

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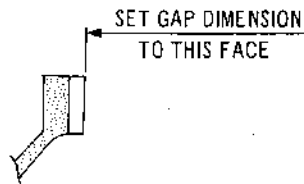
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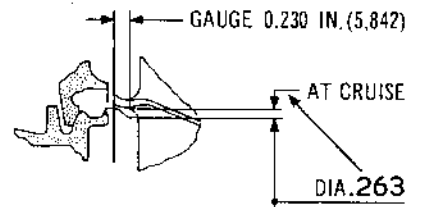


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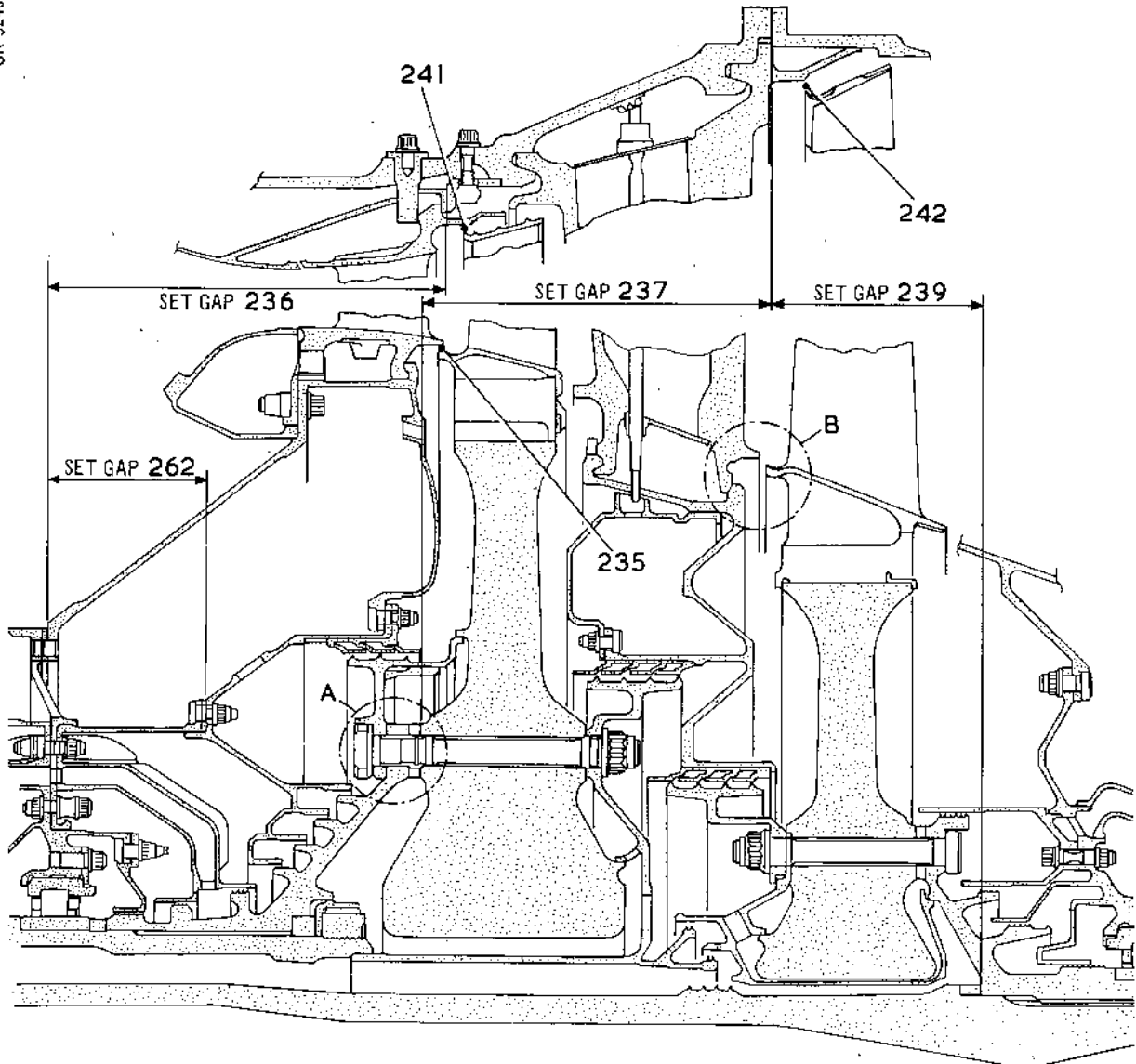


DETAIL A



ALTERNATIVE DETAIL B

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General (Engine Assembly)
Figure 602

FITS AND CLEARANCES

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STANDARD PRACTICES - FITS AND CLEARANCES

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STANDARD PRACTICES - FITS AND CLEARANCES

1. General

- A. Fits and clearances data is given in the form of tables and supporting illustrations. Each location where a fits and clearances check is required is assigned a Ref. No. to facilitate positive identification.
- B. Dimensional data in each table is specified under five headings, i.e. "Dimensions New", "Worn Dimensions (Non-Select)", "Reject if Over", "Clearance New" and "Permissible Worn Clearance". All dimensions are given in inches and millimeters.
- C. The "Dimensions New" column shows the drawing sizes to which components are manufactured. These dimensions are given as limits and represent the maximum and minimum acceptable sizes of the components when new.
- D. The "Worn Dimensions (Non-Select)" column shows the maximum wear allowable on a component which will still permit full interchangeability between components, i.e. selective assembly will not be required when mating components are both within the size limits shown in this column.
- E. Dimensions in the "Reject if Over" column are given only if all of the maximum allowable wear between components is not permitted to occur on the specified component. Where the column is left blank the maximum allowable wear, as shown by the difference between the "Clearance New" and "Permissible Worn Clearance" columns, may be borne by either component. If the dimension concerned refers to an external size, the "Reject if Over" heading shall be taken to mean "Reject if Under".
- F. At module break locations the "Reject if Over" dimension is controlled to make full interchangeability mandatory. These locations are identified in the "Remarks" column.
- G. The "Clearance New" column gives the maximum and minimum clearances when new components are assembled together. These clearances are functions of the maximum and minimum sizes of the components given in the "Dimensions New" column, i.e. the maximum clearance will be obtained with a minimum sized shaft installed in a maximum sized bush, conversely, the minimum clearance will be obtained with a maximum sized shaft installed in a minimum sized bush.

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- H. The "Permissible Worn Clearance" column shows the maximum working clearance allowed between any two components assembled together for a further period of service.

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AIR INLET SECTION - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-1	PARALLEL ROLLER JOURNAL BEARING IN BEARING HOUSING	Housing -	5.2575	133,540	5.2603	133,612
		Bore	5.2598	133,599		
		Bearing -	5.2482	133,304	5.2478	133,294
		Diameter	5.2485	133,312		
601-2	LABYRINTH SEAL IN BEARING HOUSING	Housing -	5.2000	132,080	5.2016	132,121
		Bore	5.2016	132,121		
		Seal -	5.1996	132,070	5.1996	132,070
		Diameter	5.2006	132,095		
601-3	BEARING FRONT INNER TRACK IN INSIDE ROLLERS	Rollers -	4.0977	104,082	4.0987	104,107
		Bore	4.0982	104,094		
		Track -	4.0932	103,967	4.0927	103,955
		Diameter	4.0937	103,980		
601-7	FRONT BEARING	Diametral - Clearance	-	-	-	-
601-8	ROTOR SHAFT FRONT LABY- RINTH NO.1 TO BEARING HOUSING	Housing -	4.3270	109,906	4.3285	109,944
		Bore	4.3275	109,918		
		Labyrinth -	4.3085	109,436	4.3075	109,410
		Diameter	4.3095	109,461		
601-9	ROTOR SHAFT FRONT LABY- RINTH NO.2 TO BEARING HOUSING	Housing -	4.3270	109,906	4.3290	109,957
		Bore	4.3275	109,918		
		Labyrinth -	4.3085	109,436	4.3070	109,398
		Diameter	4.3095	109,461		

Table 601 (LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
5.2607	133,622					
		<u>0.0090</u>	<u>0,228</u>	0.0125	0,317	
		0.0116	0,295			
5.2473	133,281					
		<u>-0.0006</u>	<u>-0,015</u>	+0.0020	+0,051	
		+0.0020	+0,051			
4.0987	104,107					MODULE BREAK POSITION. Ref.72-31-00 Fig.601-3
		<u>0.0040</u>	<u>0,102</u>	0.0060	0,152	
		0.0050	0,127			
4.0927	103,955					
-	-	<u>0.0040</u>	<u>0,102</u>	0.0050	0,127	Ref.72-31-00 Fig.601-7
		0.0050	0,127			
4.3285	109,944					MODULE BREAK POSITION. Ref.72-31-00 Fig.601-8
		<u>0.0175</u>	<u>0,444</u>	0.0210	0,533	
		0.0190	0,483			
4.3075	109,410					
4.3290	109,957					MODULE BREAK POSITION. Ref.72-31-00 Fig.601-9
		<u>0.0175</u>	<u>0,444</u>	0.0220	0,559	
		0.0190	0,483			
4.3070	109,398					

Table 601 (RH)

FITS AND CLEARANCES

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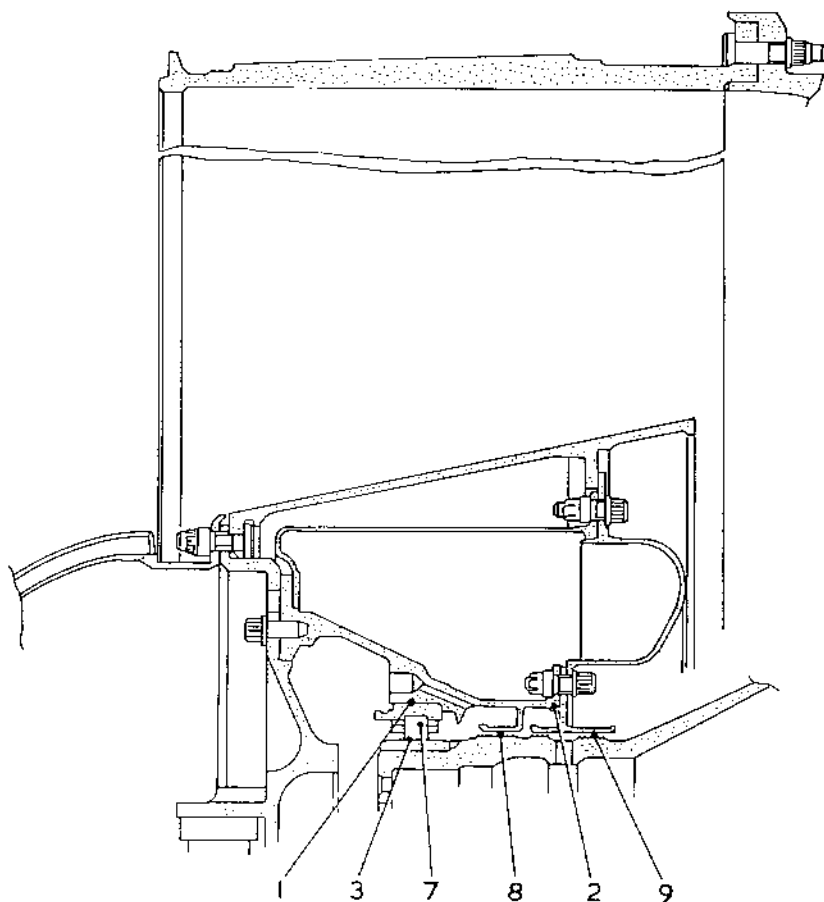
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Air Inlet Section
Figure 601

FITS AND CLEARANCES

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LP COMPRESSOR ASSEMBLY - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-3	BEARING FRONT INNER TRACK IN INSIDE ROLLERS	Rollers -	<u>4.0977</u>	<u>104,082</u>	4.0987	104,107
		Bore	<u>4.0982</u>	<u>104,094</u>		
		Track -	<u>4.0932</u>	<u>103,967</u>	4.0927	103,955
		Diameter	<u>4.0937</u>	<u>103,980</u>		
601-6	FRONT BEARING ON ROTOR SHAFT FRONT	Bearing -	<u>3.7497</u>	<u>95,242</u>	3.7505	95,263
		Bore	<u>3.7500</u>	<u>95,250</u>		
		Shaft -	<u>3.7530</u>	<u>95,326</u>	3.7525	95,313
		Diameter	<u>3.7535</u>	<u>95,339</u>		
601-7	FRONT BEARING	Diametral Clearance	-	-	-	-
601-8	ROTOR SHAFT FRONT LABYRINTH NO.1 TO BEARING HOUSING	Housing -	<u>4.3270</u>	<u>109,906</u>	4.3295	109,944
		Bore	<u>4.3275</u>	<u>109,918</u>		
		Labyrinth -	<u>4.3085</u>	<u>109,436</u>	4.3075	109,410
		Diameter	<u>4.3095</u>	<u>109,461</u>		
601-9	ROTOR SHAFT FRONT LABYRINTH NO.2 TO BEARING HOUSING	Housing -	<u>4.3270</u>	<u>109,906</u>	4.3290	109,957
		Bore	<u>4.3275</u>	<u>109,918</u>		
		Labyrinth -	<u>4.3085</u>	<u>109,436</u>	4.3070	109,398
		Diameter	<u>4.3095</u>	<u>109,461</u>		
601-10	BOLT IN ROTOR SHAFT FRONT	Shaft -	<u>0.5194</u>	<u>13,193</u>	0.5204	13,218
		Bore	<u>0.5204</u>	<u>13,218</u>		
		Bolt -	<u>0.5188</u>	<u>13,177</u>	0.5188	13,177
		Diameter	<u>0.5192</u>	<u>13,188</u>		

Table 601 (Continued) (Sheet 1 - LH)

FITS AND CLEARANCES

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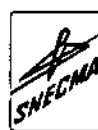
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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
4.0987	104,107					MODULE BREAK POSITION. Ref.72-20-00 Fig.601-3
		$\frac{0.0040}{0.0050}$	$\frac{0,102}{0,127}$	0.0060	0,152	
4.0927	103,955					
3.7510	95,275					Ref.72-20-00 Fig.601-7
		$\frac{-0.0038}{-0.0030}$	$\frac{-0,096}{-0,076}$	-0.0020	-0,051	
3.7520	95,301					
-	-	$\frac{0.0040}{0.0050}$	$\frac{0,102}{0,127}$	0.0050	0,127	MODULE BREAK POSITION. Ref.72-20-00 Fig.601-8
4.3285	109,944	$\frac{0.0175}{0.0190}$	$\frac{0,444}{0,483}$	0.0210	0,533	
4.3075	109,410					
4.3290	109,957					MODULE BREAK POSITION. Ref.72-20-00 Fig.601-9
		$\frac{0.0175}{0.0190}$	$\frac{0,444}{0,483}$	0.0220	0,559	
4.3070	109,398					
-	-	$\frac{0.0002}{0.0016}$	$\frac{0,005}{0,041}$	0.0016	0,041	
-	-					

Table 601 (Continued) (Sheet 1 - RH)

FITS AND CLEARANCES

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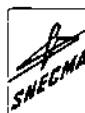
**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-11	BOLT IN STAGE 1 ROTOR DISK	Disk -	0.5194	13,193	0.5204	13,218
		Bore	0.5204	13,218		
		Bolt -	0.5188	13,177	0.5188	13,177
		Diameter	0.5192	13,188		
601-12	BOLT IN STAGE 1-2 SPACER RING	Ring -	0.5194	13,193	0.5204	13,218
		Bore	0.5204	13,218		
		Bolt -	0.5188	13,177	0.5188	13,177
		Diameter	0.5192	13,188		
601-13	STAGE 1-2 SPACER RING LABYRINTH FINS TO LABYRINTH RING BORE	Ring -	11.8900	302,006	11.8950	302,133
		Bore	11.8912	302,036		
		Fins -	11.8388	300,705	11.8090	299,949
		Diameter	11.8400	300,736		
601-14	BOLT IN STAGE 1-2 SPACER RING	Ring -	0.4594	11,669	0.4604	11,694
		Bore	0.4604	11,694		
		Bolt -	0.4588	11,653	0.4592	11,664
		Diameter	0.4592	11,664		
601-15	BOLT IN STAGE 2 ROTOR DISK	Disk -	0.4594	11,669	0.4604	11,694
		Bore	0.4604	11,694		
		Bolt -	0.4588	11,653	0.4592	11,664
		Diameter	0.4592	11,664		
601-16	BOLT IN STAGE 2-3 SPACER RING	Ring -	0.4594	11,669	0.4604	11,694
		Bore	0.4604	11,694		
		Bolt -	0.4588	11,653	0.4588	11,653
		Diameter	0.4592	11,664		

Table 601 (Continued) (Sheet 2 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	

-	-	$\frac{0.0002}{0.0016}$	$\frac{0.005}{0.041}$	0.0016	0.041	
---	---	-------------------------	-----------------------	--------	-------	--

-	-	$\frac{0.0002}{0.0016}$	$\frac{0.005}{0.041}$	0.0016	0.041	
---	---	-------------------------	-----------------------	--------	-------	--

-	-	$\frac{0.0500}{0.0524}$	$\frac{1.270}{1.331}$	0.0860	2.18	
---	---	-------------------------	-----------------------	--------	------	--

-	-	$\frac{0.0002}{0.0016}$	$\frac{0.005}{0.041}$	0.0016	0.041	
---	---	-------------------------	-----------------------	--------	-------	--

-	-	$\frac{0.0002}{0.0016}$	$\frac{0.005}{0.041}$	0.0016	0.041	
---	---	-------------------------	-----------------------	--------	-------	--

-	-	$\frac{0.0002}{0.0016}$	$\frac{0.005}{0.041}$	0.0016	0.041	
---	---	-------------------------	-----------------------	--------	-------	--

Table 601 (Continued) (Sheet 2 - RH)

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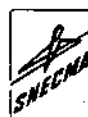
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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-17	STAGE 2-3 SPACER RING LABY- RINTH FINS TO LABY- RINTH RING BORE	Ring -	<u>14.2400</u>	<u>361,696</u>	14.2450	361,823
		Bore	14.2414	361,732		
		Fins -	<u>14.1886</u>	<u>360,390</u>	14.1590	359,639
		Diameter	14.1900	360,426		
601-18	BOLT IN STAGE 2-3 SPACER RING	Ring -	<u>0.3845</u>	<u>9,766</u>	0.3854	9,789
		Bore	0.3854	9,789		
		Bolt -	<u>0.3836</u>	<u>9,743</u>	0.3836	9,743
		Diameter	0.3840	9,754		
601-19	BOLT IN STAGE 3 ROTOR DISK	Disk -	<u>0.3845</u>	<u>9,766</u>	0.3854	9,789
		Bore	0.3854	9,789		
		Bolt -	<u>0.3836</u>	<u>9,743</u>	0.3836	9,743
		Diameter	0.3840	9,754		
601-20	BOLT IN STAGE 3-4 SPACER RING	Ring -	<u>0.3845</u>	<u>9,766</u>	0.3854	9,789
		Bore	0.3854	9,789		
		Bolt -	<u>0.3836</u>	<u>9,743</u>	0.3836	9,743
		Diameter	0.3840	9,754		
601-21	STAGE 3-4 SPACER RING LABYRINTH FINS TO LABYRINTH RING BORE	Ring -	<u>16.4500</u>	<u>417,830</u>	16.4550	417,956
		Bore	16.4516	417,871		
		Fins -	<u>16.3884</u>	<u>416,265</u>	16.3590	415,518
		Diameter	16.3900	416,306		
601-22	BOLT IN STAGE 3-4 SPACER RING	Ring -	<u>0.3945</u>	<u>10,020</u>	0.3954	10,043
		Bore	0.3954	10,043		
		Bolt -	<u>0.3936</u>	<u>9,997</u>	0.3936	9,997
		Diameter	0.3940	10,008		

Table 601 (Continued) (Sheet 3 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	<u>0.0500</u>	<u>1,270</u>	0.0860	2,184	
		0.0528	1,341			
-	-					
-	-	<u>0.0005</u>	<u>0,0127</u>	0.0018	0,046	
		0.0018	0,0460			
-	-					
-	-	<u>0.0005</u>	<u>0,013</u>	0.0018	0,046	
		0.0018	0,046			
-	-					
-	-	<u>0.0005</u>	<u>0,013</u>	0.0018	0,046	
		0.0018	0,046			
-	-					
-	-	<u>0.0600</u>	<u>1,524</u>	0.0960	2,420	
		0.0632	1,605			
-	-					
-	-	<u>0.0005</u>	<u>0,013</u>	0.0018	0,046	
		0.0018	0,046			
-	-					

Table 601 (Continued) (Sheet 3 - RH)

FITS AND CLEARANCES

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OVERHAUL



FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-23	BOLT IN STAGE 4 ROTOR DISK	Disk -	0.3945	10,020	0.3954	10,043
		Bore	0.3954	10,043		
		Bolt -	0.3936	9,997	0.3936	9,997
		Diameter	0.3940	10,008		
601-24	BOLT IN STAGE 4-5 SPACER RING	Ring -	0.3945	10,020	0.3954	10,043
		Bore	0.3954	10,043		
		Bolt -	0.3936	9,997	0.3936	9,997
		Diameter	0.3940	10,008		
601-25 **	RADIAL TIP CLEARANCE STAGE 1 ROTOR BLADE TO CASE		-	-	-	-
601-26 **	RADIAL TIP CLEARANCE STAGE 2 ROTOR BLADE TO CASE		-	-	-	-
601-27 **	RADIAL TIP CLEARANCE STAGE 3 ROTOR BLADE TO CASE		-	-	-	-
601-28 **	RADIAL TIP CLEARANCE STAGE 4 ROTOR BLADE TO CASE		-	-	-	-

Table 601 (Continued) (Sheet 4 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	

-	-					
		$\frac{0.0005}{0.0018}$	$\frac{0,013}{0,046}$	0.0018	0,046	
-	-					
-	-					
		$\frac{0.0005}{0.0018}$	$\frac{0,013}{0,046}$	0.0018	0,046	
-	-					
-	-	0.0950*	2,413*	0.0950*	2,413*	*MINIMUM
-	-					
-	-	0.1000*	2,540*	0.1000*	2,540*	*MINIMUM
-	-					
-	-	0.0950*	2,413	0.0950*	2,413*	*MINIMUM
-	-					
-	-	0.0900*	2,286	0.0900*	2,286*	*MINIMUM

Table 601 (Continued) (Sheet 4 - RH)

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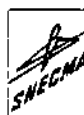
**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-29 **	RADIAL TIP CLEARANCE STAGE 5 ROTOR BLADE TO CASE		-	-	-	-
602-30 **	RADIAL TIP CLEARANCE STAGE 6 ROTOR BLADE TO CASE		-	-	-	-
602-31 **	RADIAL TIP CLEARANCE STAGE 7 ROTOR BLADE TO CASE		-	-	-	-
602-32	STAGE 4-5	Ring -	16.4350	417,449	16.4400	417,576
	SPACER RING	Bore	16.4366	417,490		
	LABYRINTH	Fins -	16.3834	416,138	16.3500	415,290
	FINS TO					
	LABYRINTH	Diameter	16.3850	416,179		
	RING BORE					
602-33	BOLT IN STAGE 4-5 SPACER RING	Ring -	0.3945	10,020	0.3954	10,043
		Bore	0.3954	10,043		
		Bolt -	0.3936	9,997	0.3936	9,997
		Diameter	0.3940	10,008		
602-34	BOLT IN STAGE 5 ROTOR DISK	Disk -	0.3945	10,020	0.3954	10,043
		Bore	0.3954	10,043		
		Bolt -	0.3936	9,997	0.3936	9,997
		Diameter	0.3940	10,008		

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Table 601 (Continued) (Sheet 5 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	0.075*	1,905	0.075*	1,905*	*MINIMUM
-	-	0.065*	1,651	0.065*	1,651*	*MINIMUM
-	-	0.065*	1,651	0.065*	1,651*	*MINIMUM
16.4400	417,576					
		$\frac{0.0500}{0.0532}$	$\frac{1,270}{1,351}$	0.0900	2,286	
16.3500	415,290					
-	-	$\frac{0.0005}{0.0018}$	$\frac{0,013}{0,046}$	0.0018	0,046	
-	-					
-	-	$\frac{0.0005}{0.0018}$	$\frac{0,013}{0,046}$	0.0018	0,046	
-	-					

Table 601 (Continued) (Sheet 5 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-35	BOLT IN STAGE 5-6 SPACER RING	Ring -	0.3945	10,020	0.3954	10,043
		Bore	0.3954	10,043		
		Bolt -	0.3936	9,997	0.3936	9,997
		Diameter	0.3940	10,008		
602-36	STAGE 5-6 SPACER RING LABYRINTH FINS TO LABYRINTH RING BORE	Ring -	16.4350	417,449	16.4400	417,576
		Bore	16.4366	417,490		
		Fins -	16.3834	416,138	16.3500	415,290
		Diameter	16.3850	416,179		
602-37	BOLT IN STAGE 5-6 SPACER RING	Ring -	0.4044	10,272	0.4054	10,297
		Bore	0.4054	10,297		
		Bolt -	0.4035	10,249	0.4035	10,249
		Diameter	0.4039	10,259		
602-38	BOLT IN STAGE 6 ROTOR DISK	Disk -	0.4044	10,272	0.4054	10,297
		Bore	0.4054	10,297		
		Bolt -	0.4035	10,249	0.4035	10,249
		Diameter	0.4039	10,259		
602-39	BOLT IN ROTOR SHAFT REAR	Shaft -	0.4044	10,272	0.4054	10,297
		Bore	0.4054	10,297		
		Bolt -	0.4035	10,249	0.4035	10,249
		Diameter	0.4039	10,259		

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Table 601 (Continued) (Sheet 6 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					
		$\frac{0.0005}{0.0018}$	$\frac{0,013}{0,046}$	0.0018	0,046	
-	-					
16.4400	417,576					
		$\frac{0.0500}{0.0532}$	$\frac{1,270}{1,351}$	0.0900	2,286	
16.3500	415,290					
-	-					
		$\frac{0.0005}{0.0019}$	$\frac{0,013}{0,048}$	0.0019	0,048	
-	-					
-	-					
		$\frac{0.0005}{0.0019}$	$\frac{0,013}{0,048}$	0.0019	0,048	
-	-					
-	-					
		$\frac{0.0005}{0.0019}$	$\frac{0,013}{0,048}$	0.0019	0,048	
-	-					

Table 601 (Continued) (Sheet 6 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-40	BOLT IN STAGE 6-7 SPACER RING	Ring -	0.4044	10,272	0.4054	10,297
		Bore	0.4054	10,297		
		Bolt -	0.4035	10,249	0.4035	10,249
		Diameter	0.4039	10,259		
602-41	STAGE 6-7 SPACER RING LABYRINTH FINS TO LABYRINTH RING BORE	Ring -	16.4350	417,449	16.4400	417,576
		Bore	16.4366	417,490		
		Fins -	16.3834	416,138	16.3500	415,290
		Diameter	16.3850	416,179		
602-42	BOLT IN STAGE 6-7 SPACER RING	Ring -	0.2600	6,604	0.2640	6,614
		Bore	0.2604	6,614		
		Bolt -	0.2596	6,594	0.2596	6,594
		Diameter	0.2600	6,604		
602-43	BOLT IN STAGE 7 ROTOR DISK	Disk -	0.2600	6,604	0.2604	6,614
		Bore	0.2604	6,614		
		Bolt -	0.2596	6,594	0.2596	6,594
		Diameter	0.2600	6,604		
602-44	BLADE RETAINING RING IN SEALING RING GROOVE	Ring -	0.0670	1,702	0.0550	1,397
		Width	0.0680	1,727		
		Groove -	0.0740	1,880	0.0900	2,286
		Width	0.0770	1,956		

Table 601 (Continued) (Sheet 7 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					
		$\frac{0.0005}{0.0019}$	$\frac{0,013}{0,048}$	0.0019	0,048	
-	-					
16.4400	417,576					
		$\frac{0.0500}{0.0532}$	$\frac{1,270}{1,351}$	0.0900	2,286	
16.3500	415,290					
-	-					
		$\frac{0.0000}{0.0008}$	$\frac{0,000}{0,020}$	0.0008	0,020	
-	-					
-	-					
		$\frac{0.0000}{0.0008}$	$\frac{0,000}{0,020}$	0.0008	0,020	
-	-					
0.0550	1,397					MODULE BREAK POSITION.
		$\frac{0.0060}{0.0100}$	$\frac{0,153}{0,254}$	0.0350	0,889	
0.0900	2,286					

Table 601 (Continued) (Sheet 7 - RH)

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OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-45	ROTOR	Unit -	<u>9.8000</u>	<u>248,920</u>	9.8065	249,085
	SHAFT REAR	Bore	<u>9.8020</u>	<u>248,971</u>		
	LABYRINTH					
	NO.3 IN					
602-46	LABYRINTH	Labyrinth -	<u>9.7790</u>	<u>248,387</u>	9.7745	248,272
	HOUSING	Diameter	<u>9.7800</u>	<u>248,412</u>		
	OUTER					
	UNIT					
602-47	ROTOR	Unit -	<u>9.6200</u>	<u>244,348</u>	9.6265	244,513
	SHAFT REAR	Bore	<u>9.6220</u>	<u>244,399</u>		
	LABYRINTH					
	NO.3 IN					
602-47	LABYRINTH	Labyrinth -	<u>9.5990</u>	<u>243,815</u>	9.5945	243,700
	HOUSING	Diameter	<u>9.6000</u>	<u>243,840</u>		
	OUTER					
	UNIT					
602-47	ROTOR	Unit -	<u>9.4400</u>	<u>239,776</u>	9.4465	239,941
	SHAFT REAR	Bore	<u>9.4420</u>	<u>239,827</u>		
	LABYRINTH					
	NO.3 IN					
602-47	LABYRINTH	Labyrinth -	<u>9.4190</u>	<u>239,243</u>	9.4145	239,128
	HOUSING	Diameter	<u>9.4200</u>	<u>239,268</u>		
	OUTER					
	UNIT					

Table 601 (Continued) (Sheet 8 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
9.8065	249,085					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-32-00 Fig.601-45
		<u>0.0200</u>	<u>0,508</u>	0.0320	0,813	
		0.0230	0,584			
9.7745	248,272					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-32-00 Fig.601-46
		<u>0.0200</u>	<u>0,503</u>	0.0320	0,813	
		0.0230	0,584			
9.5945	243,700					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-32-00 Fig.601-47
		<u>0.0200</u>	<u>0,508</u>	0.0320	0,813	
		0.0230	0,584			
9.4145	239,128					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-32-00 Fig.601-47
		<u>0.0200</u>	<u>0,508</u>	0.0320	0,813	
		0.0230	0,584			

Table 601 (Continued) (Sheet 8 - RH)

FITS AND CLEARANCES

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OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
602-48	ROTOR	Housing -	<u>7.5000</u>	<u>190,500</u>	7.5040 190,602
	SHAFT REAR	Bore	<u>7.5010</u>	<u>190,525</u>	
	LABYRINTH				
	NO.4 IN				
	LABYRINTH	Labyrinth -	<u>7.4830</u>	<u>190,068</u>	7.4800 189,992
	HOUSING	Diameter	<u>7.4840</u>	<u>190,094</u>	
	INNER				
602-49	ROTOR	Housing -	<u>6.2000</u>	<u>157,480</u>	6.2025 157,543
	SHAFT REAR	Bore	<u>6.2020</u>	<u>157,531</u>	
	LABYRINTH				
	NO.5 IN				
	LABYRINTH	Labyrinth -	<u>6.1830</u>	<u>157,048</u>	6.1825 157,035
	HOUSING	Diameter	<u>6.1840</u>	<u>157,074</u>	
	INNER				

Table 601 (Continued)(Sheet 9 - LH)

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MK.610-14-28 *sneema*
OVERHAUL

REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
7.5040	190,602					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.006/0.007 IN. (0,152/0,178 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-32-00 Fig.601-48
		<u>0.0160</u>	<u>0,406</u>	0,0240	0,610	
		0.0180	0,457			
7.4800	189,992					
6.2025	157,543					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.006 IN. (0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-32-00 Fig.601-49
		<u>0.0160</u>	<u>0,406</u>	0.0200	0,508	
		0.0190	0,483			
6.1825	157,035					

Table 601 (Continued) (Sheet 9 - RH)

FITS AND CLEARANCES

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SNECMA

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-50	ROTOR SHAFT REAR LABYRINTH NO.5 IN LABYRINTH HOUSING INNER	Housing -	<u>6.2050</u>	<u>157,607</u>	6.2080	157,683
		Bore	6.2070	157,658		
		Labyrinth -	<u>6.1830</u>	<u>157,048</u>	6.1820	157,023
		Diameter	6.1840	157,074		
602-51	LP THRUST BEARING ON ROTOR SHAFT REAR	Bearing -	<u>5.4997</u>	<u>139,692</u>	5.5001	139,702
		Bore	5.5000	139,700		
		Shaft -	<u>5.5002</u>	<u>139,705</u>	5.5001	139,702
		Diameter	5.5007	139,718		
602-52	ROTOR SHAFT REAR SPLINES IN BEVEL GEAR	Backlash	-	-	-	-
602-53	SLEEVE SERRATIONS IN HOUSING SLEEVE SERRATIONS	Housing	<u>1.1424</u>	<u>29,017</u>	1.1444	29,068
		Sleeve -	<u>1.1442</u>	<u>29,063</u>		
		Serrations (Square)				
		Sleeve	<u>1.1382</u>	<u>28,910</u>	1.1379	28,903
		Serrations (Square)	1.1406	28,971		

Table 601 (Continued) (Sheet 10 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
6.2080	157,683					MODULE BREAK POSITION. Ref.72-32-00 Fig.601-50
		<u>0.0210</u>	<u>0,533</u>	0.0260	0,660	
6.1820	157,023	0.0240	0,610			
5.5001	139,702					MODULE BREAK POSITION. Ref.72-32-00 Fig.601-51
		- <u>0.0010</u>	- <u>0,026</u>	0.0000	0,000	
		- 0.0002	- 0,005			
5.5001	139,702					MODULE BREAK. POSITION. Ref.72-32-00 Fig.601-52
-	-	<u>0.0000</u>	<u>0.000</u>	0.0050	0,127	
		0.0047	0,119			
1.1444	29,068					MODULE BREAK POSITION. Ref.72-31-04 Fig.601-53
		<u>0.0018</u>	<u>0,046</u>	0.0065	0,165	
		0.0060	0,152			
1.1379	28,903					

Table 601 (Continued) (Sheet 10 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-55	LOCKING SLEEVE SERRATION IN SPHERICAL MOUNTING CENTRE	Centre -	<u>1.1424</u>	<u>29,017</u>	1.1444	29,068
		Serrations	<u>1.1442</u>	<u>29,063</u>		
		(Square)				
		Sleeve -	<u>1.1382</u>	<u>28,910</u>	1.1379	28,903
602-64	ROTOR SHAFT REAR SERRATIONS WITH LP COMPRESSOR DRIVE SHAFT FRONT SERRATIONS	Serrations	<u>1.1406</u>	<u>28,971</u>		
		(Square)				
		Rotor	<u>2.9696</u>	<u>75,428</u>	2.9725	75,501
		Shaft -	<u>2.9723</u>	<u>75,496</u>		
		Serrations				
		(Square)				
		Drive	<u>2.9648</u>	<u>75,306</u>	2.9645	75,298
		Shaft -	<u>2.9695</u>	<u>75,425</u>		
		Serrations				
		(Square)				

Table 601 (Concluded) (Sheet 11 - LH)

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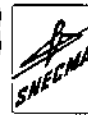
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OLYMPUS 593

MK.610-14-28

OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
1.1444	29,068					MODULE BREAK POSITION. Ref.72-31-04 Fig.601-55
		<u>0.0018</u>	<u>0,046</u>	0.0065	0,165	
		0.0060	0,152			
1.1379	28,903					
2.9725	75,501					MODULE BREAK POSITION. (Mid Section of Barrelled Splines) Ref.72-31-04 Fig.601-64
		<u>-0.0001</u>	<u>-0,003</u>	+0.0080	+0,203	
		+0.0075	+0,190			
2.9645	75,298					

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Table 601 (Concluded) (Sheet 11 - RH)

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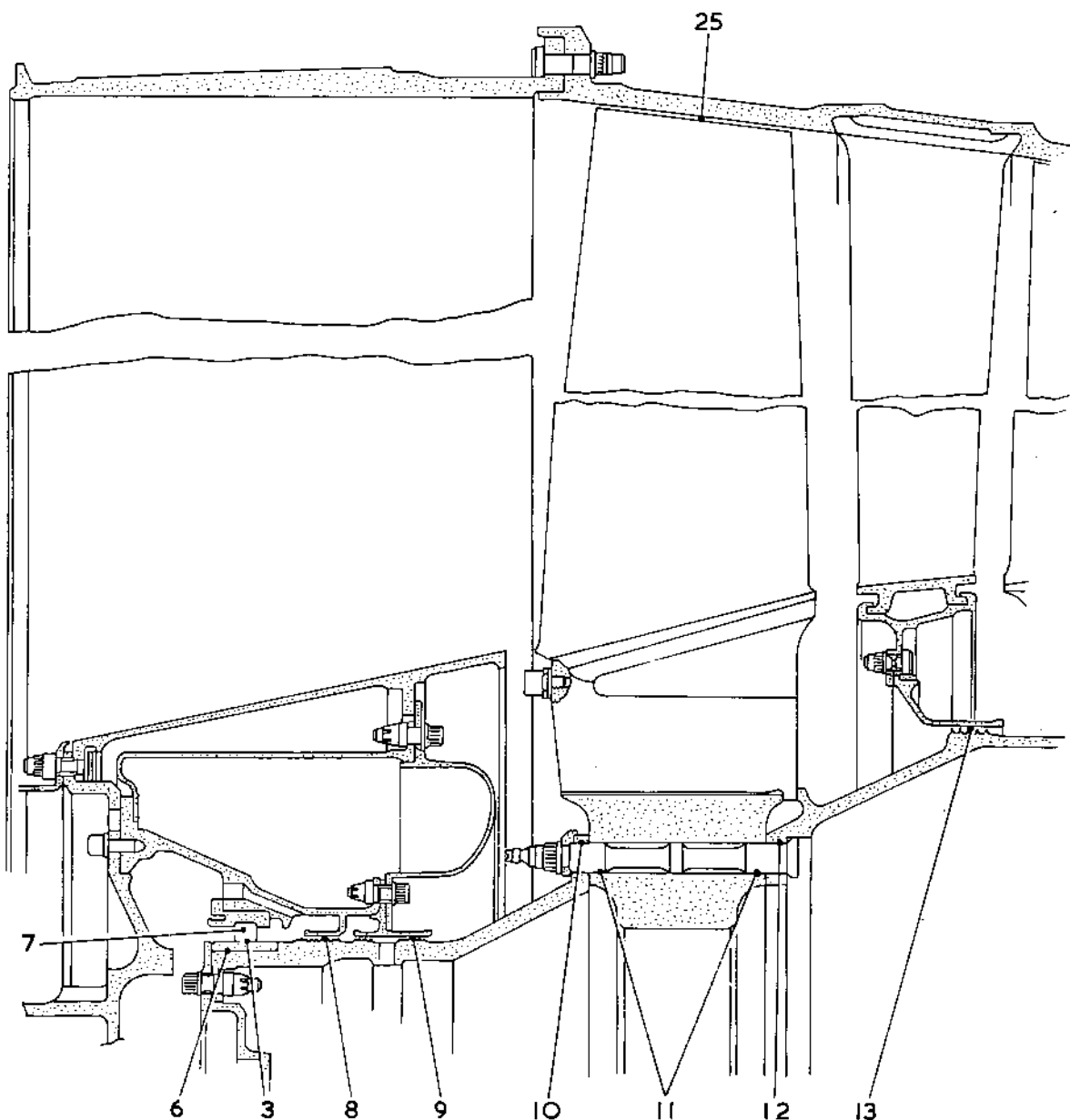
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OVERHAUL



LP Compressor Assembly
Figure 601 (Sheet 1 - LH)

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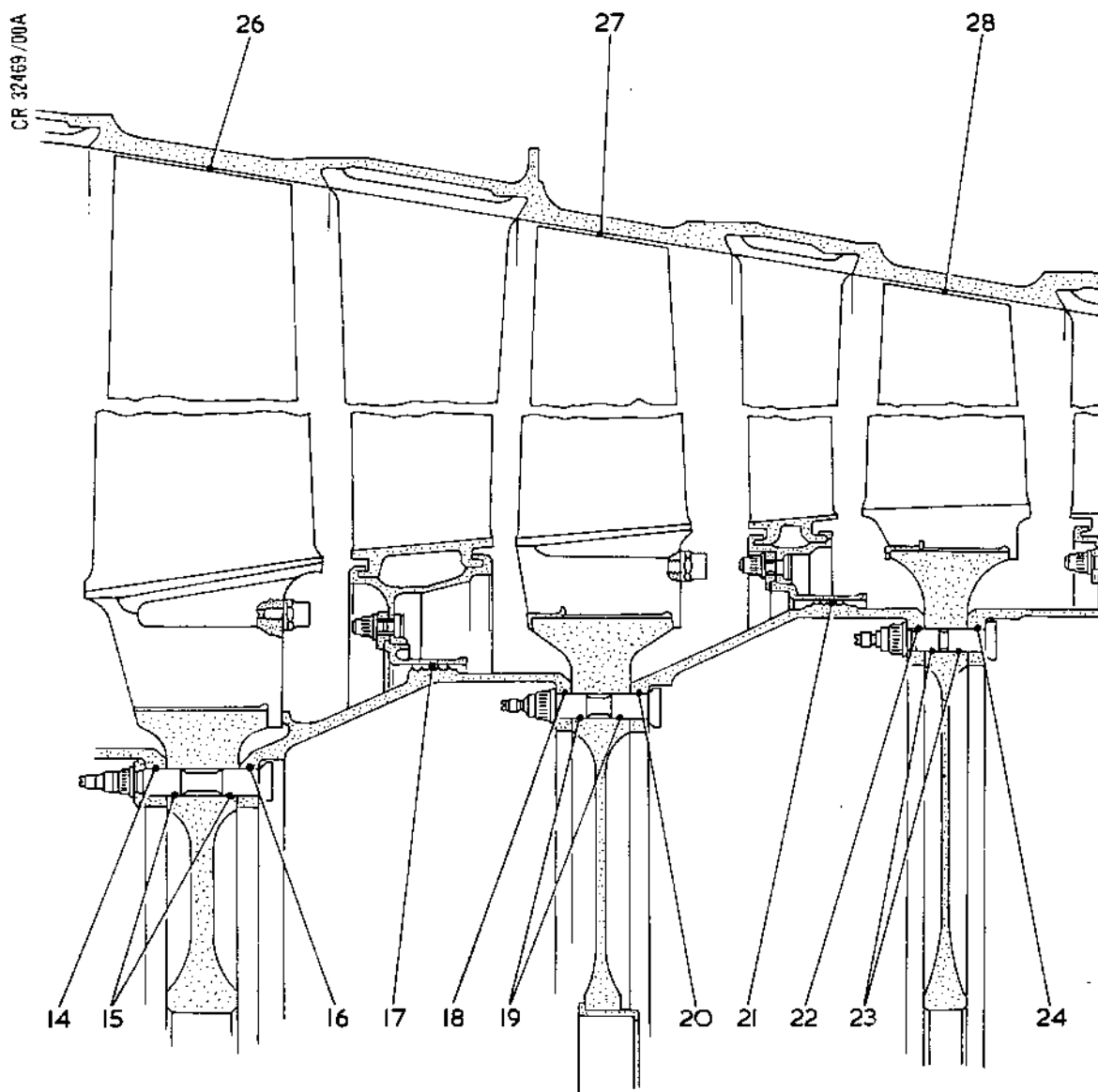
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LP Compressor Assembly
Figure 601 (Sheet 2 - RH)

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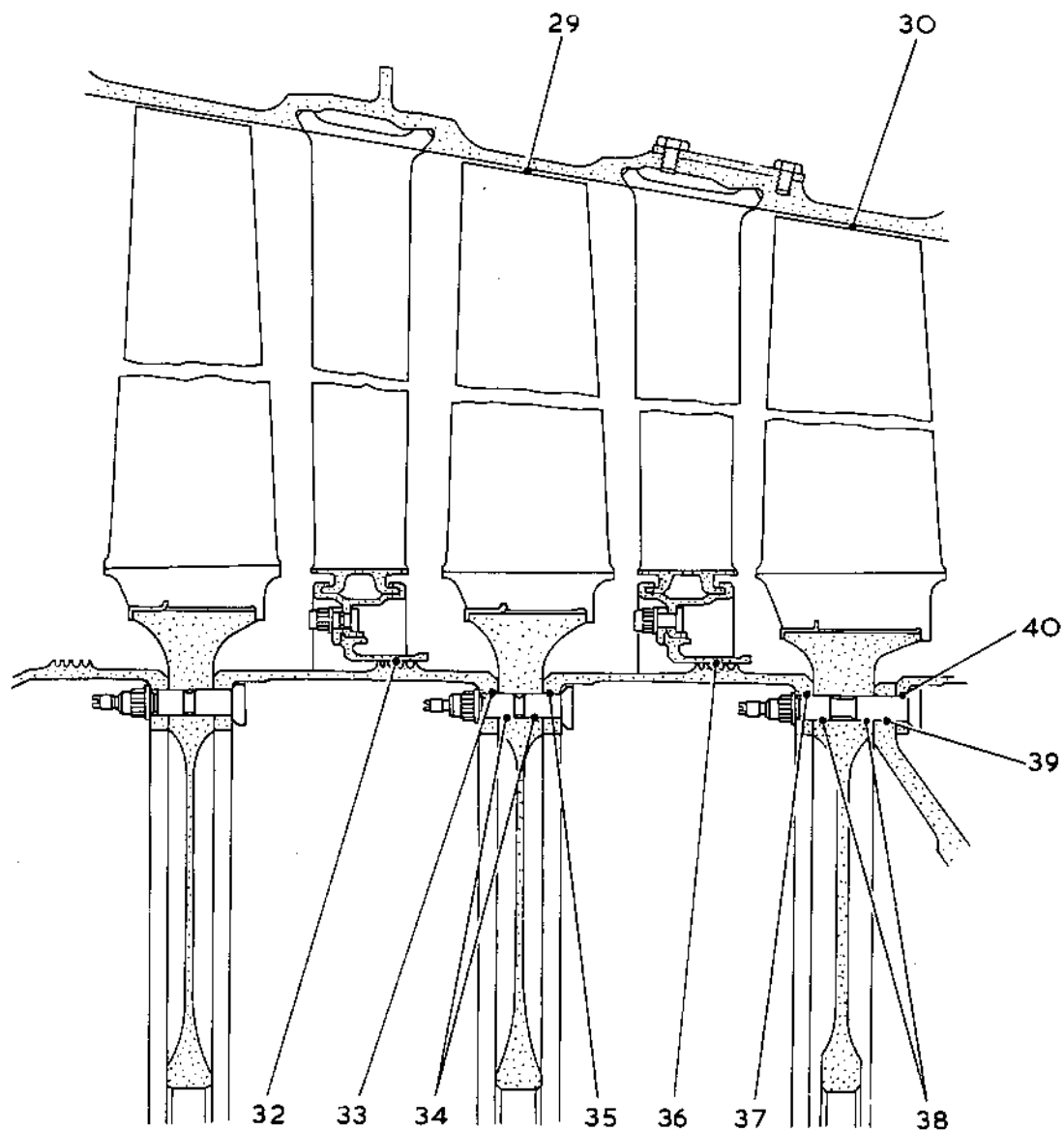
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LP Compressor Assembly
Figure 602 (Sheet 1 - LH)

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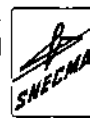
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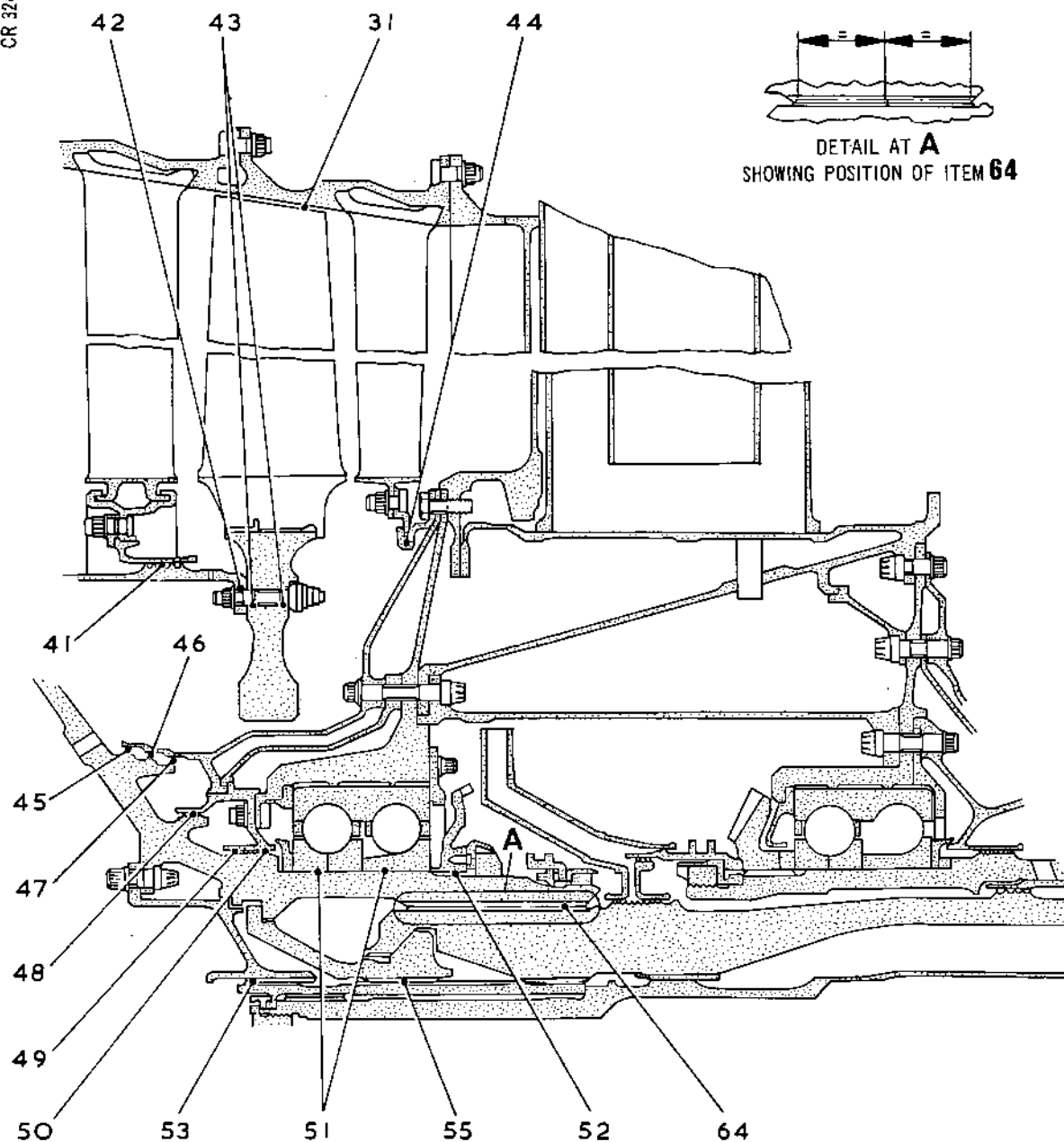
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LP Compressor Assembly
Figure 602 (Sheet 2 - RH)

FITS AND CLEARANCES

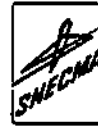
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LP COMPRESSOR DRIVE SHAFT - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-53	SLEEVE SERRATIONS IN HOUSING SLEEVE SERRATIONS	Housing	<u>1.1424</u>	<u>29,017</u>	1.1444	29,068
		Sleeve -	<u>1.1442</u>	<u>29,063</u>		
		Serrations (Square)				
		Sleeve -	<u>1.1382</u>	<u>28,910</u>	1.1379	28,903
		Serrations (Square)	<u>1.1406</u>	<u>28,971</u>		
601-54	TUBE UNIT SPLINES IN SERRATED SLEEVE SPLINES	Backlash	-	-	-	-
601-55	LOCKING SLEEVE SERRATION IN SPHERICAL MOUNTING CENTRE	Mounting -	<u>1.1424</u>	<u>29,017</u>	1.1444	29,068
		Serrations (Square)	<u>1.1442</u>	<u>29,063</u>		
		Sleeve -	<u>1.1382</u>	<u>28,910</u>	1.1379	28,903
		Serrations (Square)	<u>1.1406</u>	<u>28,971</u>		
601-56	LOCKING SLEEVE ON TUBE UNIT	Sleeve -	<u>1.1250</u>	<u>28,575</u>	1.1260	28,600
		Bore	<u>1.1258</u>	<u>28,595</u>		
		Unit -	<u>1.1237</u>	<u>28,542</u>	1.1235	28,537
		Diameter	<u>1.1242</u>	<u>28,555</u>		
601-57	LOCKING SLEEVE SER- RATION IN LP COMPRESSOR DRIVE SHAFT FRONT SER- RATIONS	Shaft -	<u>1.1424</u>	<u>29,017</u>	1.1444	29,068
		Serrations (Square)	<u>1.1442</u>	<u>29,063</u>		
		Sleeve-	<u>1.1382</u>	<u>28,910</u>	1.1379	28,903
		Serrations (Square)	<u>1.1406</u>	<u>28,971</u>		

Table 601 (Continued) (Sheet 1 - LH)

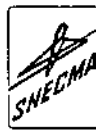
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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
1.1444	29,068					MODULE BREAK POSITION. Ref.72-31-00 Fig.602-53
		$\frac{0.0018}{0.0060}$	$\frac{0,046}{0,152}$	0.0065	0,165	
1.1379	28,903					
-	-	$\frac{0.0000}{0.0026}$	$\frac{0,000}{0,066}$	0.0030	0,076	
1.1444	29,068					MODULE BREAK POSITION. Ref.72-31-00 Fig.602-55
		$\frac{0.0018}{0.0060}$	$\frac{0,046}{0,152}$	0.0065	0,165	
1.1379	28,903					
1.1260	28,600					MODULE BREAK POSITION.
		$\frac{0.0008}{0.0021}$	$\frac{0,020}{0,053}$	0.0025	0,063	
1.1235	28,537					
1.1444	29,068					MODULE BREAK POSITION.
		$\frac{0.0018}{0.0060}$	$\frac{0,046}{0,152}$	0.0065	0,165	
1.1379	28,903					

Table 601 (Continued) (Sheet 1 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-58	LP COM- PRESSOR DRIVE SHAFT FRONT LABY- RINTH NO.9A IN STATIC SEAL HOUSING	Housing -	<u>4.5180</u>	<u>114,757</u>	4.5220 114,859
		Bore	4.5210	114,833	
	Labyrinth -	Labyrinth -	<u>4.4890</u>	<u>114,021</u>	4.4800 113,792
		Diameter	4.4900	114,046	
601-59	LP COM- PRESSOR DRIVE SHAFT FRONT LABY- RINTH NO.9B IN LABYRINTH RING	Ring -	<u>4.5180</u>	<u>114,757</u>	4.5220 114,859
		Bore	4.5210	114,833	
	Labyrinth -	Labyrinth -	<u>4.4890</u>	<u>114,021</u>	4.4800 113,792
		Diameter	4.4900	114,046	
601-64	ROTOR SHAFT REAR SER- RATIONS WITH LP DRIVE SHAFT FRONT SERRATIONS	Rotor Shaft -	<u>2.9696</u>	<u>75,428</u>	2.9725 75,501
		Serrations (Square)	2.9723	75,496	
	Drive Shaft - Serrations (Square)	Drive Shaft -	<u>2.9648</u>	<u>75,306</u>	2.9645 72,298
		Serrations (Square)	2.9695	75,425	

Table 601 (Continued) (Sheet 2 - LH)

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REJECT IF OVER	IN.	MM	CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
			IN.	MM	IN.	MM	
4.5220		114,859					MODULE BREAK POSITION. Ref.72-32-00 Fig.601-58
			<u>0.0280</u>	<u>0,711</u>	0.0420	1,067	
			0.0320	0,813			
4.4800		113,792					
4.5220		114,859					MODULE BREAK POSITION. Ref.72-32-00 Fig.601-59
			<u>0.0280</u>	<u>0,711</u>	0.0420	1,067	
			0.0320	0,813			
4.4800		113,792					
2.9725		75,501					MODULE BREAK POSITION. Mid Section of Barrelled Splines Ref.72-31-00 Fig.601-64
			<u>-0.0001</u>	<u>-0,003</u>	+0.0080	+0,203	
			+0.0075	+0,190			
2.9645		2,298					

Table 601 (Continued) (Sheet 2 - RH)

FITS AND CLEARANCES

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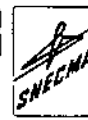


FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-75	TUBE ASSY. OF (LP SIGNAL TUBE) IN STIFFENING DISK ASSY. OF CARBON BEARINGS	Bearing Bore	<u>1.9715</u> <u>1.9725</u>	<u>50,076</u> <u>50,101</u>	1.9775*	50,228*
		Tube Diameter	<u>1.9650</u> <u>1.9670</u>	<u>49,911</u> <u>49,962</u>	1.9650	49,911
	SEAL RING ASSEMBLY IN TUBE ASSEMBLY	Tube - Groove Width	<u>0.2110</u> <u>0.2120</u>	<u>5,359</u> <u>5,384</u>	0.2130	5,410
		Ring - Width	<u>0.2070</u> <u>0.2100</u>	<u>5,258</u> <u>5,334</u>	0.2060	5,232
601-148	SLEEVE IN LP COM- PRESSOR DRIVE SHAFT REAR	Shaft - Bore	<u>2.6300</u> <u>2.6312</u>	<u>66,802</u> <u>66,832</u>	2.6313	66,835
		Sleeve - Diameter	<u>2.6316</u> <u>2.6323</u>	<u>66,843</u> <u>66,860</u>	2.6315	66,840
601-149	TUBE ASSEMBLY IN INNER GUIDE	Guide - Bore	<u>1.5400</u> <u>1.5410</u>	<u>39,116</u> <u>39,141</u>	1.5415	39,154
		Tube - Diameter	<u>1.5390</u> <u>1.5400</u>	<u>39,091</u> <u>39,116</u>	1.5385	39,078
601-150	TUBE ASSEMBLY SERRATIONS IN INNER GUIDE SERRATIONS	Guide - Serrations (Square)	<u>0.9384</u> <u>0.9399</u>	<u>23,385</u> <u>23,873</u>	0.9404	23,886
		Tube - Serrations (Square)	<u>0.9349</u> <u>0.9369</u>	<u>23,746</u> <u>23,797</u>	0.9344	23,734

Table 601 (Continued) (Sheet 3 - LH)

FITS AND CLEARANCES.

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
1.9775	50,228					2 POSITIONS * OR MAJOR AXIS OF BORE IF OVALITY IS PRESENT.
		$\frac{0.0045}{0.0075}$	$\frac{0,114}{0,190}$	0.0125	0,317	
1.9650	49,911					
		$\frac{0.0010}{0.0050}$	$\frac{0,025}{0,127}$	0.0070	0,178	
		$\frac{-0.0023}{-0.0004}$	$\frac{-0,058}{-0,010}$	-0.0002	-0,005	
		$\frac{0.0000}{0.0020}$	$\frac{0,000}{0,051}$	0.0030	0,076	Ref.72-31-05 Fig.601-149
		$\frac{0.0015}{0.0050}$	$\frac{0,038}{0,127}$	0.0060	0,152	Ref.72-31-05 Fig.601-150

Table 601 (Continued) (Sheet 3 - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-151	TUBE ASSEMBLY IN INNER GUIDE	Guide -	<u>1.1800</u>	<u>29,972</u>	1.1810	29,997
		Bore	<u>1.1808</u>	<u>29,992</u>		
		Tube -	<u>1.1784</u>	<u>29,931</u>	1.1782	29,926
		Diameter	<u>1.1792</u>	<u>29,951</u>		
601-154	LOCKING PIECE IN TUBE ASSEMBLY	Tube -	<u>0.7813</u>	<u>19,845</u>	0.7843	19,921
		Bore	<u>0.7833</u>	<u>19,896</u>		
		Locking Piece -	<u>0.7733</u>	<u>19,642</u>	0.7723	19,616
		Diameter	<u>0.7753</u>	<u>19,693</u>		
601-155	OUTER GUIDE SERRATIONS IN LP COM- PRESSOR DRIVE SHAFT SERRATIONS	Drive Shaft -	<u>1.8933</u>	<u>48,090</u>	1.8959	48,156
		Serrations (Square)	<u>1.8954</u>	<u>48,143</u>		
		Outer Guide -	<u>1.8884</u>	<u>47,965</u>	1.8879	47,953
		Serrations (Square)	<u>1.8912</u>	<u>48,036</u>		
601-157	OUTER GUIDE IN LP COMPRESSOR DRIVE SHAFT REAR	Shaft -	<u>2.6700</u>	<u>67,818</u>	2.6715	67,856
		Bore	<u>2.6712</u>	<u>67,848</u>		
		Guide -	<u>2.6688</u>	<u>67,787</u>	2.6685	67,780
		Diameter	<u>2.6700</u>	<u>67,818</u>		
601-159	ADJUSTING WASHER ON TUBE ASSEMBLY	Washer -	<u>1.5420</u>	<u>39,167</u>	1.5460	39,268
		Bore	<u>1.5450</u>	<u>39,243</u>		
		Tube -	<u>1.5390</u>	<u>39,091</u>	1.5380	39,065
		Diameter	<u>1.5400</u>	<u>39,116</u>		

Table 601 (Continued) (Sheet 4 - LH)

FITS AND CLEARANCES

72-31-04

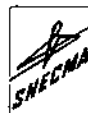
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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	

Ref.72-31-05
Fig.601-151

$\frac{0.0008}{0.0024}$	$\frac{0.020}{0.061}$	0.0028	0.071
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Ref.72-31-05
Fig.601-154

$\frac{0.0060}{0.0100}$	$\frac{0.152}{0.254}$	0.0120	0.305
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Ref.72-31-05
Fig.601-155

$\frac{0.0021}{0.0070}$	$\frac{0.053}{0.178}$	0.0080	0.203
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Ref.72-31-05
Fig.601-157

-	-	$\frac{0.0000}{0.0024}$	$\frac{0.000}{0.061}$	0.0030	0.076
---	---	-------------------------	-----------------------	--------	-------

Ref.72-31-05
Fig.601-159

-	-	$\frac{0.0020}{0.0060}$	$\frac{0.051}{0.152}$	0.0080	0.203
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Table 601 (Continued) (Sheet 4 -RH)

FITS AND CLEARANCES

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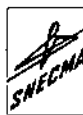


FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-160	SEAL RING ASSEMBLY	Gap in Position	-	-	-	-
602-161	INNER SEAL- ING RING IN OUTER SEALING RING	Ring - Bore	<u>6.4500</u>	<u>163,830</u>	6.4535	163,919
			<u>6.4525</u>	<u>163,893</u>		
		Ring - Diameter	<u>6.2450</u>	<u>158,623</u>	6.2435	158,585
			<u>6.2500</u>	<u>158,750</u>		
601-216	LP COM- PRESSOR DRIVE SHAFT REAR IN LP TURBINE HUB UNIT	Hub - Bore	<u>4.3496</u>	<u>110,480</u>	4.3502	110,495
			<u>4.3502</u>	<u>110,495</u>		
		Shaft - Diameter	<u>4.3501</u>	<u>110,492</u>	4.3500	110,490
			<u>4.3505</u>	<u>110,503</u>		
601-220	LP COM- PRESSOR DRIVE SHAFT REAR SERRATIONS IN LP TURBINE HUB UNIT SERRATIONS	Hub Unit - Serrations (Square)	<u>2.8881</u>	<u>73,358</u>	2.8910	73,431
			<u>2.8908</u>	<u>73,426</u>		
		Shaft - Serrations	<u>2.8862</u>	<u>73,309</u>	2.8860	73,304
			<u>2.8889</u>	<u>73,378</u>		
601-224	LP COM- PRESSOR DRIVE SHAFT REAR IN CENTERING RING	Ring - Bore	<u>4.0500</u>	<u>102,870</u>	4.0509	102,893
			<u>4.0509</u>	<u>102,893</u>		
		Shaft - Diameter	<u>4.0496</u>	<u>102,860</u>	4.0495	102,857
			<u>4.0505</u>	<u>102,883</u>		

Table 601 (Concluded) (Sheet 5 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0020}{0.0060}$	$\frac{0,051}{0,152}$	-	-	Ref. 72-33-00 Fig. 601-161
-	-	$\frac{0.2000}{0.2075}$	$\frac{5,080}{5,270}$	0.2100	5,334	
4.3502	110,495	$\frac{-0.0009}{+0.0001}$	$\frac{-0,023}{+0,002}$	+0.0002	+0,005	MODULE BREAK POSITION. Ref. 72-52-02 Fig. 601-216
4.3500	110,490					
2,8910	73,431	$\frac{-0.0008}{+0.0046}$	$\frac{-0,020}{+0,117}$	0.0050	0,127	MODULE BREAK POSITION. Ref. 72-52-02 Fig. 601-220
2.8860	73,304					
4.0509	102,893	$\frac{-0.0005}{+0.0013}$	$\frac{-0,013}{+0,033}$	+0.0014	+0,036	MODULE BREAK POSITION. Ref. 75-52-02 Fig. 601-224
4.0495	102,857					

Table 601 (Concluded) (Sheet 5 - RH)

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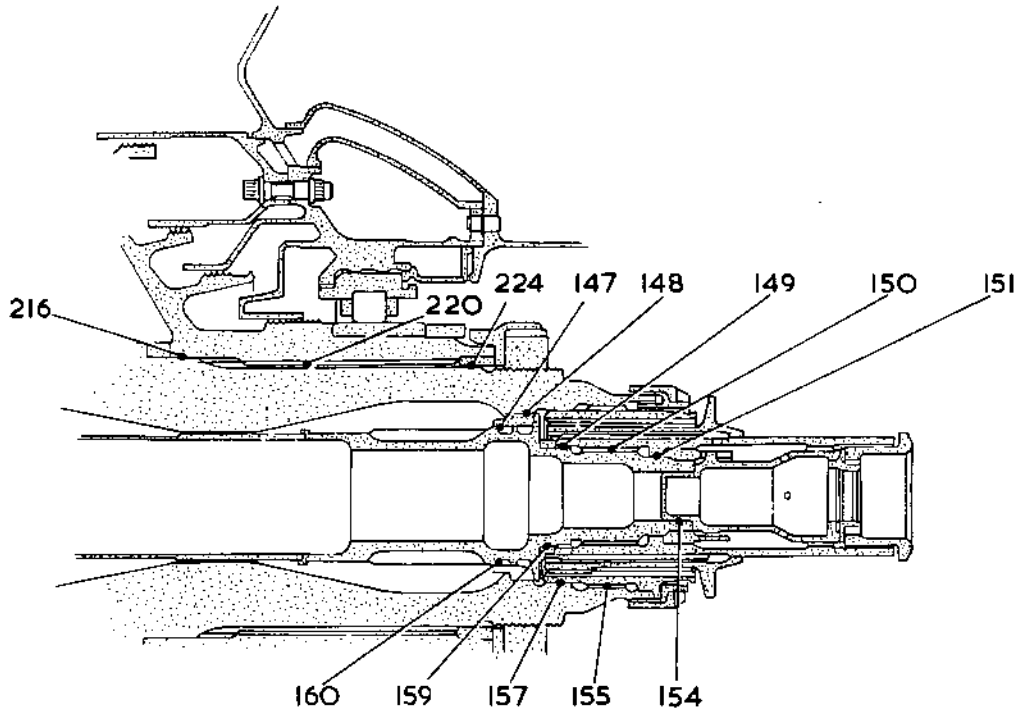
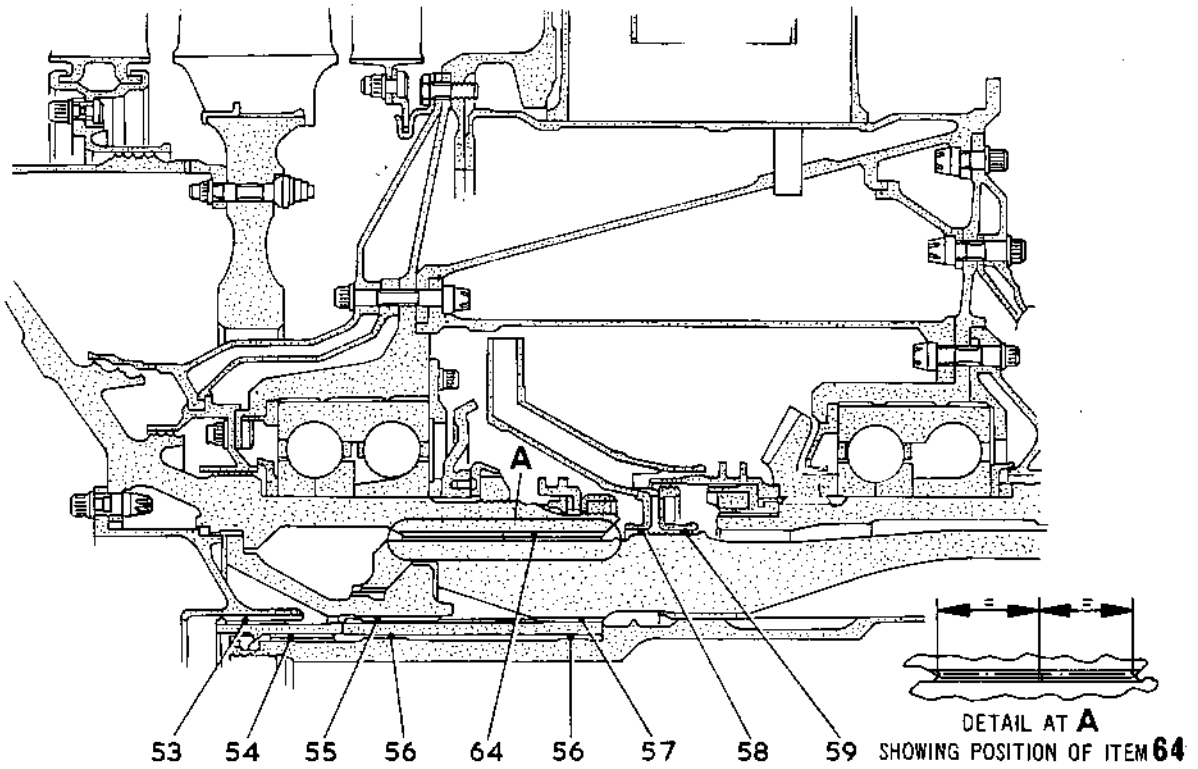
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TN24571

LP Compressor Drive Shaft
Figure 601

FITS AND CLEARANCES

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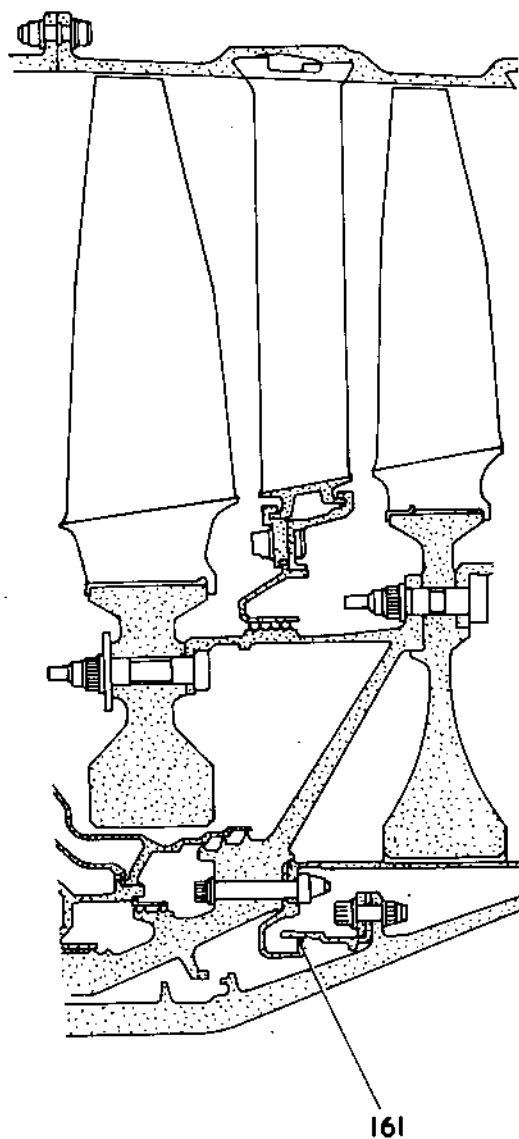
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OLYMPUS 593
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LP Compressor Drive Shaft
Figure 602

FITS AND CLEARANCES

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OVERHAUL



LP SHAFT SIGNAL GENERATING MECHANISM - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-149	TUBE ASSEMBLY IN INNER GUIDE	Guide - Bore	<u>1.5400</u> <u>1.5410</u>	<u>39,116</u> <u>39,141</u>	1.5415	39,154
		Tube - Diameter	<u>1.5390</u> <u>1.5400</u>	<u>39,091</u> <u>39,116</u>	1.5385	39,078
601-150	TUBE ASSEMBLY SERRATIONS IN INNER GUIDE SERRATIONS	Guide - Serrations (Square)	<u>0.9384</u> <u>0.9399</u>	<u>23,385</u> <u>23,873</u>	0.9404	23,886
		Tube - Serrations (Square)	<u>0.9349</u> <u>0.9369</u>	<u>23,746</u> <u>23,797</u>	0.9344	23,734
601-151	TUBE ASSEMBLY IN INNER GUIDE	Guide - Bore	<u>1.1800</u> <u>1.1808</u>	<u>29,972</u> <u>29,992</u>	1.1810	29,997
		Tube - Diameter	<u>1.1784</u> <u>1.1792</u>	<u>29,931</u> <u>29,951</u>	1.1782	29,926
601-152	INNER GUIDE IN HELICAL SPLINED NUT	Nut - Bore	<u>1.8660</u> <u>1.8680</u>	<u>47,396</u> <u>27,447</u>	1.8690	47,473
		Guide - Diameter	<u>1.8440</u> <u>1.8460</u>	<u>46,838</u> <u>46,888</u>	1.8430	46,812
601-153	LOCKING PIECE SPLINE IN INNER GUIDE SPLINE	Backlash	-	-	-	-
601-154	LOCKING PIECE IN TUBE ASSEMBLY	Tube - Bore	<u>0.7813</u> <u>0.7833</u>	<u>19,845</u> <u>19,896</u>	0.7843	19,921
		Locking Piece - Diameter	<u>0.7733</u> <u>0.7753</u>	<u>19,642</u> <u>19,693</u>	0.7723	19,616

Table 601 (Continued) (Sheet 1 - LH)

FITS AND CLEARANCES

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**OLYMPUS 593**MK.610-14-28
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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{0.0000}{0.0020}$	$\frac{0,000}{0,051}$	0.0030	0,076	Ref.72-31-04 Fig.601-149
		$\frac{0.0015}{0.0050}$	$\frac{0,038}{0,127}$	0.0060	0,152	Ref.72-31-04 Fig.601-150
		$\frac{0.0008}{0.0024}$	$\frac{0,020}{0,061}$	0.0028	0,071	Ref.72-31-04 Fig.601-151
		$\frac{0.0200}{0.0240}$	$\frac{0,508}{0,610}$	0.0260	0,660	
-	-	$\frac{0.0050}{0.0095}$	$\frac{0,127}{0,241}$	0.0100	0,254	
		$\frac{0.0060}{0.0100}$	$\frac{0,152}{0,254}$	0.0120	0,305	Ref.72-31-04 Fig.601-154

Table 601 (Continued) (Sheet 1 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-155	OUTER GUIDE SERRATIONS IN LP COM- PRESSOR DRIVE SHAFT SERRATIONS	Drive	<u>1.8933</u>	<u>48,090</u>	1.8959	48,156
		Shaft -	<u>1.8954</u>	<u>48,143</u>		
		Serrations				
		(Square)				
		Outer	<u>1.8884</u>	<u>47,965</u>	1.8879	47,953
		Guide -	<u>1.8912</u>	<u>48,036</u>		
		Serrations				
		(Square)				
601-156	INNER GUIDE SPLINES IN HELICAL NUT SPLINES	Backlash Including Error Allowance	-	-	-	-
601-157	OUTER GUIDE IN LP DRIVE SHAFT REAR	Shaft -	<u>2.6700</u>	<u>67,818</u>	2.6715	67,856
		Bore	<u>2.6712</u>	<u>67,848</u>		
		Guide -	<u>2.6688</u>	<u>67,787</u>	2.6685	67,780
		Diameter	<u>2.6700</u>	<u>67,818</u>		
601-158	HELICAL NUT SPLINES IN OUTER GUIDE SPLINES	Backlash	-	-	-	-
601-159	ADJUSTING WASHER ON TUBE ASSEMBLY	Washer -	<u>1.5420</u>	<u>39,167</u>	1.5460	39,268
		Bore	<u>1.5450</u>	<u>39,243</u>		
		Tube -	<u>1.5390</u>	<u>39,091</u>	1.5380	39,065
		Diameter	<u>1.5400</u>	<u>39,116</u>		

Table 601 (Concluded) (Sheet 2 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{0.0021}{0.0070}$	$\frac{0,053}{0,178}$	0.0080	0,203	Ref.72-31-04 Fig.601-155
-	-	$\frac{0.0018}{0.0052}$	$\frac{0,046}{0,132}$	0.0060	0,152	
		$\frac{0.0000}{0.0024}$	$\frac{0,000}{0,061}$	0.0030	0,076	Ref.72-31-04 Fig.601-157
-	-	$\frac{0.0018}{0.0052}$	$\frac{0,046}{0,132}$	0.0060	0,152	
		$\frac{0.0020}{0.0060}$	$\frac{0,051}{0,152}$	0.0080	0,203	Ref.72-31-04 Fig.601-159

Table 601 (Concluded) (Sheet 2 - RH)

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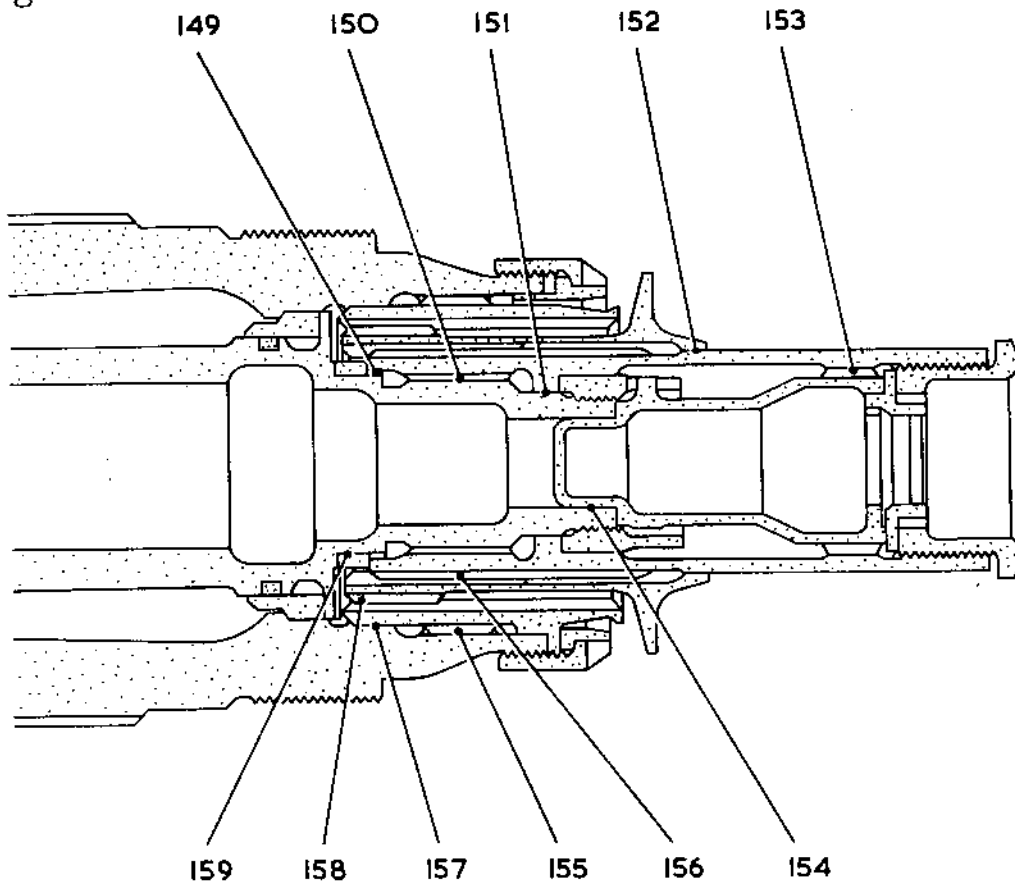


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TN24573

LP Shaft Signal Generating Mechanism
Figure 601

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COMPRESSOR INTERMEDIATE CASE ASSEMBLY - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-45	ROTOR SHAFT	Unit -	<u>9.8000</u>	<u>248,920</u>	9.8065	249,085
	REAR LABY-	Bore	<u>9.8020</u>	<u>248,971</u>		
	RINTH NO.3					
	IN LABYRINTH					
	HOUSING	Labyrinth -	<u>9.7790</u>	<u>248,387</u>	9.7745	248,272
	OUTER UNIT	Diameter	<u>9.7800</u>	<u>248,412</u>		
601-46	ROTOR SHAFT	Unit -	<u>9.6200</u>	<u>244,348</u>	9.6265	244,513
	REAR LABY-	Bore	<u>9.6220</u>	<u>244,399</u>		
	RINTH NO.3					
	IN LABYRINTH					
	HOUSING	Labyrinth -	<u>9.5990</u>	<u>243,815</u>	9.5945	243,700
	OUTER UNIT	Diameter	<u>9.6000</u>	<u>243,840</u>		
601-47	ROTOR SHAFT	Unit -	<u>9.4400</u>	<u>239,776</u>	9.4465	239,941
	REAR LABY-	Bore	<u>9.4420</u>	<u>239,827</u>		
	RINTH NO.3					
	IN LABYRINTH					
	HOUSING	Labyrinth -	<u>9.4190</u>	<u>239,243</u>	9.4145	239,128
	OUTER UNIT	Diameter	<u>9.4200</u>	<u>239,268</u>		

Table 601 (Continued) (Sheet 1 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
9.8065	249,085					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-31-00 Fig.602-45
		$\frac{0.0200}{0.0230}$	$\frac{0,508}{0,584}$	0.0320	0,813	
9.7745	248,272					
9.6265	244,513					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-31-00 Fig.602-46
		$\frac{0.0200}{0.0230}$	$\frac{0,503}{0,584}$	0.0320	0,813	
9.5945	243,700					
9.4465	239,941					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-31-00 Fig.602-47
		$\frac{0.0200}{0.0230}$	$\frac{0,508}{0,584}$	0.0320	0,813	
9.4145	239,128					

Table 601 (Continued) (Sheet 1 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-48	ROTOR SHAFT	Housing -	<u>7.5000</u>	<u>190,500</u>	7.5040	190,602
	REAR LABY-	Bore	<u>7.5010</u>	<u>190,525</u>		
	RINTH NO.4					
	IN LABYRINTH					
	HOUSING	Labyrinth -	<u>7.4830</u>	<u>190,068</u>	7.4800	189,992
	INNER	Diameter	<u>7.4840</u>	<u>190,094</u>		
601-49	ROTOR SHAFT	Housing -	<u>6.2000</u>	<u>157,480</u>	6.2025	157,543
	REAR LABY-	Bore	<u>6.2020</u>	<u>157,531</u>		
	RINTH NO.5					
	IN LABYRINTH					
	HOUSING	Labyrinth -	<u>6.1830</u>	<u>157,048</u>	6.1825	157,035
	INNER	Diameter	<u>6.1840</u>	<u>157,074</u>		

Table 601 (Continued) (Sheet 2 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
7.5040	190,602					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.006/0.007 IN. (0,152/0,178 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-31-00 Fig.602-48
		<u>0.0160</u>	<u>0,406</u>	0.0240	0,610	
		0.0180	0,457			
7.4800	189,992					
6.2025	157,543					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.006 IN. (0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-31-00 Fig.602-49
		<u>0.0160</u>	<u>0,406</u>	0.0200	0,508	
		0.0190	0,483			
6.1825	157,035					

Table 601 (Continued) (Sheet 2 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-50	ROTOR SHAFT Housing -	<u>6.2050</u>	<u>157,607</u>	6.2080	157,683
	REAR LABY- Bore	<u>6.2070</u>	<u>157,658</u>		
	RINTH NO.5				
	IN LABYRINTH				
	HOUSING Labyrinth -	<u>6.1830</u>	<u>157,048</u>	6.1820	157,023
	INNER Diameter	<u>6.1840</u>	<u>157,074</u>		
601-51	LP THRUST Bearing -	<u>5.4997</u>	<u>139,692</u>	5.5001	139,702
	BEARING ON Bore	<u>5.5000</u>	<u>139,700</u>		
	ROTOR SHAFT				
	REAR				
	Shaft -	<u>5.5002</u>	<u>139,705</u>	5.5001	139,702
	Diameter	<u>5.5007</u>	<u>139,718</u>		
601-52	ROTOR SHAFT Backlash	-	-	-	-
	REAR SPLINES				
	IN BEVEL				
	GEAR				
601-58	LP COM- Housing -	<u>4.5180</u>	<u>114,757</u>	4.5220	114,859
	PRESSOR Bore	<u>4.5210</u>	<u>114,833</u>		
	DRIVE SHAFT				
	FRONT LABY-				
	RINTH Labyrinth -	<u>4.4890</u>	<u>114,021</u>	4.4800	113,792
	NO.9A IN Diameter	<u>4.4900</u>	<u>114,046</u>		
	STATIC SEAL				
	HOUSING				

Table 601 (Continued) (Sheet 3 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
6.2080	157,683					MODULE BREAK POSITION.
		<u>0.0210</u>	<u>0,533</u>	0.0260	0,660	Ref.72-31-00
6.1820	157,023	0.0240	0,610			Fig.602-50
5.5001	139,702					MODULE BREAK POSITION.
		<u>-0.0010</u>	<u>-0,026</u>	0.0000	0,000	Ref.72-31-00
5.5001	139,702	-0.0002	-0,005			Fig.602-51
-	-	<u>0.0000</u>	<u>0,000</u>	0.0050	0,127	MODULE BREAK POSITION.
		0.0047	0,119			Ref.72-31-00
						Fig.602-52
4.5220	114,859					MODULE BREAK POSITION.
		<u>0.0280</u>	<u>0,711</u>	0.0420	1,067	Ref.72-31-04
		0.0320	0,813			Fig.601-58
4.4800	113,792					

Table 601 (Continued) (Sheet 3 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-59	LP COM- PRESSOR DRIVE SHAFT FRONT LABY- RINTH	Ring -	<u>4.5180</u>	<u>114,757</u>	4.5220 114,859
		Bore	<u>4.5210</u>	<u>114,833</u>	
	NO.9B IN LABYRINTH RING	Labyrinth -	<u>4.4890</u>	<u>114,021</u>	4.4800 113,792
		Diameter	<u>4.4900</u>	<u>114,046</u>	
601-62	LABYRINTH PROBE IN STATIC SEAL HOUSING	Labyrinth -	<u>6.2790</u>	<u>159,487</u>	6.2720 159,309
		Diameter	<u>6.2800</u>	<u>159,512</u>	
	NO.10B	Housing -	<u>6.3080</u>	<u>160,223</u>	6.3120 160,325
		Bore	<u>6.3110</u>	<u>160,299</u>	

Table 601 (Continued) (Sheet 4 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
4.5220	114,859					MODULE BREAK POSITION. Ref.72-31-04 Fig.601-59
		<u>0.0280</u>	<u>0,711</u>	0.0420	1,067	
		0.0320	0,813			
4.4800	113,792					
6.2720	159,309					Ref.72-61-00 Fig.601-62
		<u>0.0280</u>	<u>0,711</u>	0.0400	1,016	
		0.0320	0,813			
6.3120	160,325					

Table 601 (Continued) (Sheet 4 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-63	RING LABY- RINTH IN LABYRINTH PROBE NO.10A	Labyrinth - Diameter	<u>5.9200</u> 5.9220	<u>150,368</u> 150,419	5.9190 150,343
		Labyrinth - Bore	<u>5.9500</u> 5.9520	<u>151,130</u> 151,181	5.9530 151,206
601-66	THRUST BEARING	End Float	-	-	-
		Diametral Clearance - Inner Track	-	-	-
		Outer Track	-	-	-
601-67	BEARING HOUSING IN INNER CASE	Housing - Diameter	<u>10.5266</u> 10.5278	<u>267,376</u> 267,406	10.5263 267,368
		Case - Bore	<u>10.5300</u> 10.5320	<u>267,462</u> 267,513	10.4323 267,520
601-68	INNER CASE IN INTER- MEDIATE CASE	Inter- mediate Case - Bore	<u>12.4000</u> 12.4020	<u>314,960</u> 315,011	12.4025 315,023
		Inner Case - Diameter	<u>12.4070</u> 12.4082	<u>315,138</u> 315,168	12.4065 315,125

Table 601 (Continued) (Sheet 4A - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
5.9190	150,343					Ref.72-61-00 Fig.601-63
		<u>0.0280</u>	<u>0,711</u>	0.0340	0,864	
		0.0320	0,813			
5.9530	151,206					
-	-	0.0280*	0,711*	0.0280	0,711	*MAXIMUM
-	-	<u>0.0105</u>	<u>0,267</u>	-	-	
		0.0110	0,279			
-	-	<u>0.0110</u>	<u>0,279</u>	-	-	
		0.0115	0,292			
		<u>0.0022</u>	<u>0,056</u>	0.0060	0,152	
		0.0054	0,137			
-	-					
		<u>-0.0082</u>	<u>-0,208</u>	-0.0040	-0,102	
		-0.0050	-0,127			
-	-					

Table 601 (Continued) (Sheet 4A - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-69	THRUST BEAR- ING IN LP BEARING HOUSING	Housing -	<u>8.5125</u>	<u>216,217</u>	8.5145 216,268
		Bore	8.5142	216,261	
		Bearing -	<u>8.4982</u>	<u>215,854</u>	8.4980 215,849
		Diameter	8.4985	215,862	
		Housing -	<u>8.5125</u>	<u>216,217</u>	8.5146 216,271
		Bore	8.5142	216,261	
		Bearing -	<u>8.4975</u>	<u>215,836</u>	8.4971 215,826
		Diameter	8.4985	215,862	
601-70	AIR BAFFLE IN INTER- MEDIATE CASE	Case -	<u>15.2000</u>	<u>386,080</u>	15.2025 386,143
		Bore	15.2020	386,131	
		Baffle -	<u>15.2050</u>	<u>386,207</u>	15.2045 386,194
		Diameter	15.2070	386,258	
601-71	LABYRINTH HOUSING INNER IN HP BEARING HOUSING	Labyrinth	<u>10.9022</u>	<u>276,916</u>	10.9022 276,916
		Housing -	10.9034	276,946	
		Diameter			
		Bearing	<u>10.9000</u>	<u>276,860</u>	10.9020 276,911
		Housing -	10.9020	276,911	
		Bore			
601-72	HP BEARING HOUSING IN INNER CASE	Housing -	<u>9.1220</u>	<u>231,699</u>	9.1220 231,699
		Diameter	9.1225	231,711	
		Case -	<u>9.1200</u>	<u>231,648</u>	9.1210 231,673
		Bore	9.1210	231,673	
601-73	THRUST BEAR- ING IN HP BEARING HOUSING	Housing -	<u>8.5125</u>	<u>216,217</u>	8.5145 216,268
		Bore	8.5142	216,261	
		Bearing -	<u>8.4982</u>	<u>215,854</u>	8.4980 215,849
		Diameter	8.4985	215,862	

Table 601 (Continued) (Sheet 5 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
8.5152	216,286					PRE SB.72-17
		$\frac{0.0140}{0.0160}$	$\frac{0,355}{0,407}$	0.0165	0,419	
8.4972	215,829					
8.5152	216,286	$\frac{0.0140}{0.0167}$	$\frac{0,355}{0,425}$	0.0175	0,445	SB.72-17
8.4965	215,811					
-	-					
		$\frac{-0.0070}{-0.0030}$	$\frac{-0,178}{-0,076}$	-0.0020	-0,051	
-	-					
-	-					
		$\frac{-0.0034}{-0.0002}$	$\frac{-0,086}{-0,005}$	-0.0002	-0,005	
-	-					
-	-					
		$\frac{-0.0025}{-0.0010}$	$\frac{-0,063}{-0,025}$	-0.0010	-0,025	
-	-					
-	-					
		$\frac{0.0140}{0.0160}$	$\frac{0,356}{0,406}$	0.0165	0,419	
-	-					

Table 601 (Continued) (Sheet 5 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-74	THRUST BEARING	End Float	-	-	-	-
		Diametral Clearance	-	-	-	-
601-77	BEVEL GEAR FIN IN OIL BAFFLE	Gear Fin -	6.1218	155,494	6.1208	155,468
		Diameter	6.1234	155,534		
		Baffle -	6.1834	157,058	6.1928	157,297
601-78	THRUST BEAR- ING ON ROTOR SHAFT FRONT	Bore	6.1918	157,272		
		Bearing -	5.4997	139,692	5.5000	139,700
		Bore	5.5000	139,700		
601-79	ROTOR SHAFT FRONT LABY- RINTH NO.6 IN INNER HOUSING LABYRINTH UNIT (ENGINE VERTICAL)	Shaft -	5.5025	139,763	5.5025	139,763
		Diameter	5.5030	139,776		
		Unit -	6.2050	157,607	6.2085	157,696
601-80	ROTOR SHAFT FRONT LABY- RINTH NO.6 IN INNER HOUSING LABYRINTH UNIT (ENGINE VERTICAL)	Bore	6.2070	157,658		
		Thread -	6.1820	157,023	6.1685	156,680
		Diameter	6.1840	157,074		
601-80	ROTOR SHAFT FRONT LABY- RINTH NO.6 IN INNER HOUSING LABYRINTH UNIT (ENGINE VERTICAL)	Unit -	6.2000	157,480	6.2035	157,569
		Bore	6.2020	157,531		
		Thread -	6.1820	157,023	6.1685	156,680
601-80	ROTOR SHAFT FRONT LABY- RINTH NO.6 IN INNER HOUSING LABYRINTH UNIT (ENGINE VERTICAL)	Diameter	6.1840	157,074		

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Table 601 (Continued) (Sheet 6 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	<u>0.0240</u> 0.0280	<u>0,610</u> 0,711	0.0280	0,711	
-	-	<u>0.0105</u> 0.0110	<u>0,268</u> 0,279	0.0110	0,279	
-	-					Ref.72-61-00 Fig.601-77
-	-	<u>0.0600</u> 0.0700	<u>1,524</u> 1,778	0.0720	1,829	
5.5000	139,700					MODULE BREAK POSITION. Ref.72-33-00 Fig.601-78
		<u>-0.0033</u> -0.0025	<u>-0,084</u> -0,063	-0.0025	-0,063	
5.5025	139,763					
6.2085	157,696					MODULE BREAK POSITION. Ref.72-33-00 Fig.601-79
		<u>0.0210</u> 0.0250	<u>0,533</u> 0,635	0.0400	1,016	
6.1685	156,680					
6.2035	157,569					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.006 IN. (0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-33-00 Fig.601-80
		<u>0.0160</u> 0.0200	<u>0,406</u> 0,508	0.0350	0,889	
6.1685	156,680					

Table 601 (Continued) (Sheet 6 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-81	INNER LABY- RINTH HOUS- ING IN REAR AIR BAFFLE UNIT	Inner	<u>8.1220</u>	<u>206,299</u>	8.1220	206,299
		Housing -	8.1232	206,329		
		Baffle	<u>8.1200</u>	<u>206,248</u>	8.1212	206,279
		Unit - Bore	8.1212	206,279		
601-82	ROTOR SHAFT FRONT LABY- RINTH NO.7 IN INNER LABYRINTH HOUSING UNIT (ENGINE VERTICAL)	Unit -	<u>7.5000</u>	<u>190,500</u>	7.5035	190,589
		Bore	7.5010	190,525		
		Labyrinth -	<u>7.4820</u>	<u>190,043</u>	7.4615	189,522
		Diameter	7.4840	190,094		
601-83	ROTOR SHAFT FRONT LABY- RINTH NO.8 IN REAR AIR BAFFLE UNIT (ENGINE VERTICAL)	Unit -	<u>9.4400</u>	<u>239,776</u>	9.4440	239,878
		Bore	9.4420	239,827		
		Labyrinth -	<u>9.4180</u>	<u>239,217</u>	9.3950	238,633
		Diameter	9.4200	239,268		

Table 601 (Continued) (Sheet 7 - LH)

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REJECT, IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
8.1220	206,299					
		<u>-0.0032</u>	<u>-0,081</u>	-0.0008	-0,020	
		-0.0008	-0,020			
8.1212	206,279					
7.5035	190,589					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.006/0.007 IN. (0,152/0,178 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-33-00 Fig.601-82
		<u>0.0160</u>	<u>0,406</u>	0.0420	1,067	
		0.0190	0,482			
7.4615	189,522					
9.4440	239,878					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-33-00 Fig.601-83
		<u>0.0200</u>	<u>0,508</u>	0.0490	1,245	
		0.0240	0,610			
9.3950	238,633					

Table 601 (Continued) (Sheet 7 - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-84	ROTOR SHAFT Unit -	<u>9.6200</u>	<u>244,348</u>	9.5730	244,449
	FRONT LABY- Bore	9.6220	244,399		
	RINTH NO.8				
	IN REAR AIR				
	BAFFLE UNIT Labyrinth -	<u>9.5980</u>	<u>243,789</u>	9.6040	243,942
	(ENGINE Diameter	9.6000	243,840		
	VERTICAL)				

Table 601 (Continued) (Sheet 8 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
9.6240	244,449					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-33-00 Fig.601-84
		<u>0.0200</u>	<u>0,508</u>	0.0510	1,295	
		0.0240	0,610			
9.5730	243,154					

Table 601 (Continued) (Sheet 8 - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-85	ROTOR SHAFT FRONT LABY- RINTH NO.8 IN REAR AIR BAFFLE UNIT (ENGINE VERTICAL)	Unit -	9.8000	248,920	9.8040	249,021
		Bore	9.8020	248,971		
		Labyrinth -	9.7780	248,361	9.7540	247,751
		Diameter	9.7800	248,412		
602-425 **	BEVEL GEAR WITH BEVEL PINION, RH	Backlash	-	-	-	-
602-437 **	BEVEL GEAR WITH BEVEL PINION, LH	Backlash	-	-	-	-
602-438 **	BEVEL GEAR WITH BEVEL GEAR	Backlash	-	-	-	-

Table 601 (Concluded) (Sheet 9 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
9.8040	249,021					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM). MODULE BREAK POSITION. Ref.72-33-00 Fig.601-85
		<u>0.0200</u>	<u>0,508</u>	0.0500	1,270	
		0.0240	0,610			
9.7540	247,751					
-	-	MINIMUM BACKLASH FIGURE IS ENGRAVED ON BEVEL PINION, ACCEPTABLE BACKLASH IS +0.004 IN. (+0,102 MM)/-0.000 IN. (-0,000 MM) ON THIS FIGURE				Ref.72-61-00 Fig.602-425
-	-	MINIMUM BACKLASH FIGURE IS ENGRAVED ON BEVEL PINION, ACCEPTABLE BACKLASH IS +0.004 IN. (+0,102 MM)/-0.000 IN. (-0,000 MM) ON THIS FIGURE				Ref.72-61-00 Fig.602-437
-	-	<u>0.0260</u>	<u>0,660</u>	0.0340	0,864	Ref.72-61-00 Fig.602-438
		0.0320	0,813			

Table 601 (Concluded) (Sheet 9 - RH)

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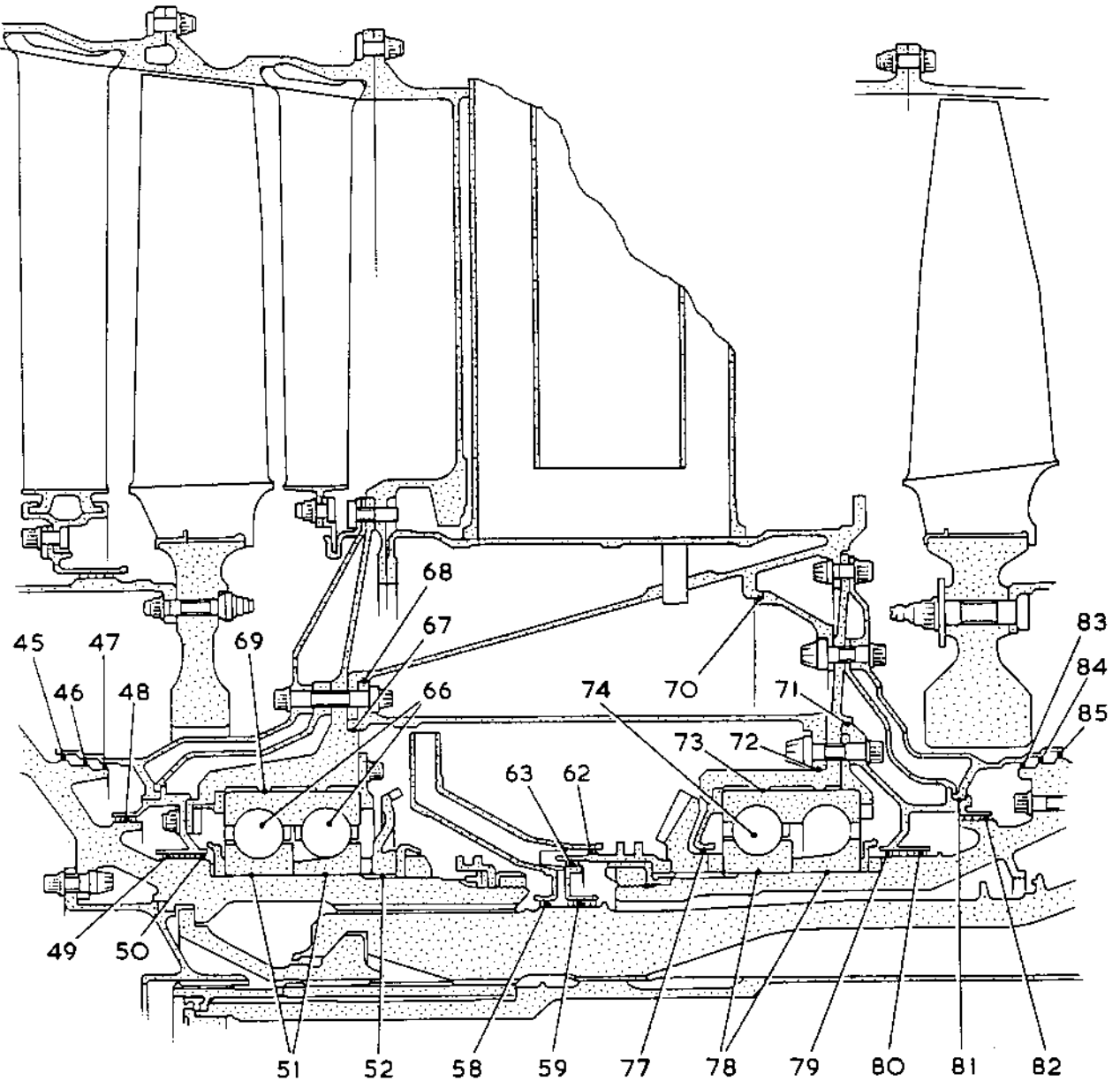


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Compressor Intermediate Case Assembly
Figure 601

FITS AND CLEARANCES

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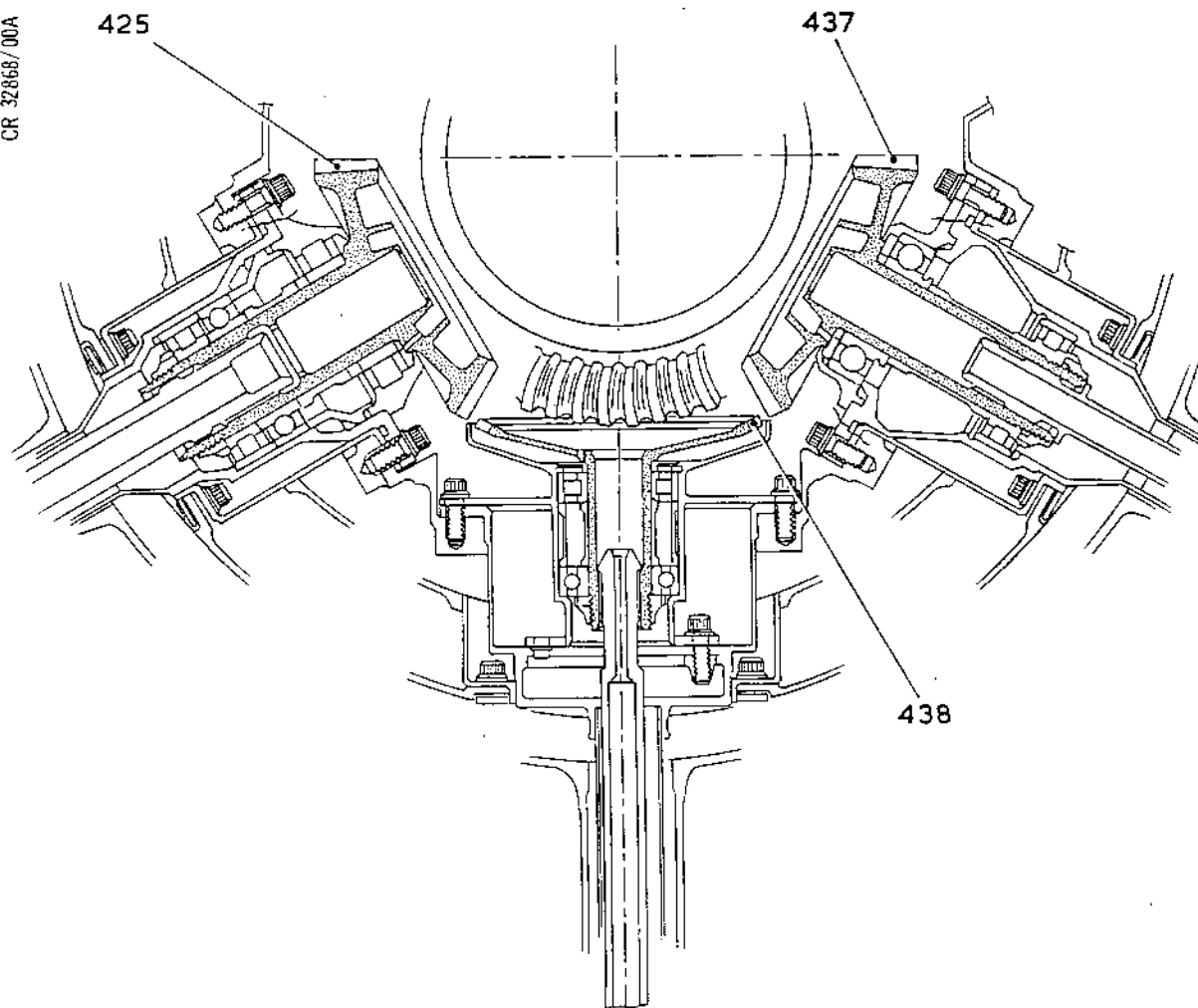
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Compressor Intermediate Case Assembly
Figure 602

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HP COMPRESSOR ASSEMBLY - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-60	LABYRINTH ON HP ROTOR SHAFT FRONT	Labyrinth -	<u>5.1500</u> <u>130,810</u>	5.1510	130,835
		Bore	<u>5.1510</u> <u>130,835</u>		
		Shaft - Diameter	<u>5.1484</u> <u>130,769</u> <u>5.1494</u> <u>130,795</u>	5.1484	130,769
601-61	BEVEL GEAR ON LABY- RINTH PROBE	Gear -	<u>5.9500</u> <u>151,130</u>	5.9511	151,158
		Bore	<u>5.9510</u> <u>151,155</u>		
		Labyrinth - Diameter	<u>5.9500</u> <u>151,130</u> <u>5.9510</u> <u>151,155</u>	5.9499	151,127
601-76	BEVEL GEAR SPLINES IN ROTOR SHAFT REAR SPLINES	Backlash	-	-	-
601-78	THRUST BEARING ON ROTOR SHAFT FRONT	Bearing -	<u>5.4997</u> <u>139,692</u>	5.5000	139,700
		Bore	<u>5.5000</u> <u>139,700</u>		
		Shaft - Diameter	<u>5.5025</u> <u>139,763</u> <u>5.5030</u> <u>139,776</u>	5.5025	139,763
601-79	ROTOR SHAFT FRONT LABYRINTH NO.6 IN INNER HOUSING LABYRINTH UNIT (ENGINE VERTICAL)	Unit -	<u>6.2050</u> <u>157,607</u>	6.2085	157,696
		Bore	<u>6.2070</u> <u>157,658</u>		
		Thread - Diameter	<u>6.1820</u> <u>157,023</u> <u>6.1840</u> <u>157,074</u>	6.1685	156,680

Table 601 (Continued) (Sheet 1 - LH)

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**OLYMPUS 593**MK. 610-14-28
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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
5.1510	130,835					Ref.72-61-00 Fig.601-60
		$\frac{0.0006}{0.0026}$	$\frac{0,015}{0,066}$	0.0026	0,066	
5.1484	130,769					
5.9511	151,158					Ref.72-61-00 Fig.601-61
		$\frac{-0.0010}{+0.0010}$	$\frac{-0,025}{+0,025}$	+0.0012	+0,031	
5.9499	151,127					
-	-	$\frac{0.0000}{0.0038}$	$\frac{0,000}{0,096}$	0.0038	0,096	MODULE BREAK POSITION. Ref.72-61-00 Fig.601-76
5.5000	139,700					MODULE BREAK POSITION. Ref.72-32-00 Fig.601-78
		$\frac{-0.0033}{-0.0025}$	$\frac{-0,084}{-0,063}$	-0.0025	-0,063	
5.5025	139,763					
6.2085	157,696					MODULE BREAK POSITION. Ref.72-32-00 Fig.601-79
		$\frac{0.0210}{0.0250}$	$\frac{0,533}{0,635}$	0.0400	1,016	
6.1685	156,680					

Table 601 (Continued) (Sheet 1 - RH)

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**OLYMPUS 593**MK. 610-14-28
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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-80	ROTOR SHAFT	Unit -	6.2000	157,480	6.2035	157,569
	FRONT	Bore	6.2020	157,531		
	LABYRINTH					
	NO.6 IN					
	INNER	Thread -	6.1820	157,023	6.1685	156,680
601-82	HOUSING	Diameter	6.1840	157,074		
	LABYRINTH					
	UNIT (ENGINE					
	VERTICAL)					
601-83	ROTOR SHAFT	Unit -	7.5000	190,500	7.5035	190,589
	FRONT	Bore	7.5010	190,525		
	LABYRINTH					
	NO.7 IN					
	INNER	Labyrinth -	7.4820	190,043	7.4615	189,522
601-83	LABYRINTH	Diameter	7.4840	190,094		
	HOUSING UNIT					
	(ENGINE					
	VERTICAL)					
601-83	ROTOR SHAFT	Unit -	9.4400	239,776	9.4440	239,878
	FRONT	Bore	9.4420	239,827		
	LABYRINTH					
	NO.8 IN REAR					
	AIR BAFFLE	Labyrinth -	9.4180	239,217	9.3950	238,633
601-83	UNIT (ENGINE	Diameter	9.4200	239,268		
	VERTICAL)					

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Table 601 (Continued) (Sheet 2 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
6.2035	157,569					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.006 IN. (0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-32-00 Fig.601-80
		<u>0.0160</u>	<u>0,406</u>	0.0350	0,889	
		0.0200	0,508			
6.1685	156,680					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.006/0.007 IN. (0,152/0,178 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-32-00 Fig.601-82
		<u>0.0160</u>	<u>0,406</u>	0.0420	1,067	
		0.0190	0,482			
7.4615	189,522					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-33-00 Fig.601-83
		<u>0.0200</u>	<u>0,508</u>	0.0490	1,245	
		0.0240	0,610			
9.4440	239,878					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-33-00 Fig.601-83
		<u>0.0200</u>	<u>0,508</u>	0.0490	1,245	
		0.0240	0,610			
9.3950	238,633					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-33-00 Fig.601-83
		<u>0.0200</u>	<u>0,508</u>	0.0490	1,245	
		0.0240	0,610			

Table 601 (Continued) (Sheet 2 - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-84	ROTOR SHAFT	Unit -	<u>9.6200</u>	<u>244,348</u>	9.6240	244,449
	FRONT LABY-	Bore	<u>9.6220</u>	<u>244,399</u>		
	RINTH NO.8					
	IN REAR AIR					
	BAFFLE UNIT	Labyrinth -	<u>9.5980</u>	<u>243,789</u>	9.5730	243,154
	(ENGINE	Diameter	<u>9.6000</u>	<u>243,840</u>		
	VERTICAL)					

Table 601 (Continued) (Sheet 2A - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
9.6240	244,449					ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM) AT BOTTOM VERTICAL CENTRE LINE. MODULE BREAK POSITION. Ref.72-33-00 Fig.601-84
		<u>0.0200</u>	<u>0,508</u>	0.0510	1,295	
		0.0240	0,610			
9.5730	243,154					

Table 601 (Continued) (Sheet 2A - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-85	ROTOR SHAFT Unit -	<u>9.8000</u>	<u>248,920</u>	9.8040	249,021
	FRONT LABY- Bore	<u>9.8020</u>	<u>248,971</u>		
	RINTH NO.8				
	IN REAR AIR				
	BAFFLE UNIT Labyrinth -	<u>9.7780</u>	<u>248,361</u>	9.7540	247,751
	(ENGINE Diameter	<u>9.7800</u>	<u>248,412</u>		
	VERTICAL)				

Table 601 (Continued) (Sheet 2B - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
9.8040	249,021					PRE-MOD.OLY 8370 ELONGATED BORE TO GIVE ADDI- TIONAL RADIAL CLEARANCE OF 0.005/0.006 IN. (0,127/0,152 MM). MODULE BREAK POSITION. Ref.72-33-00 Fig.601-85
		<u>0.0200</u>	<u>0,508</u>	0.0500	1,270	
		0.0240	0,610			
9.7540	247,751					

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Table 601 (Continued) (Sheet 2B - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-86	AIR TRANSFER TUBE IN ROTOR SHAFT FRONT	Tube -	<u>8.7762</u>	<u>222,915</u>	8.7760 222,910
		Diameter	8.7780	222,961	
		Shaft -	<u>8.7800</u>	<u>223,012</u>	
		Bore	8.7818	223,058	
601-87	BOLT IN STAGE 1 ROTOR DISK	Disk -	<u>0.4148</u>	<u>10,536</u>	0.4156 10,556
		Bore	0.4156	10,556	
		Bolt -	<u>0.4142</u>	<u>10,521</u>	
		Diameter	0.4146	10,531	
601-88	BOLT IN ROTOR SHAFT FRONT	Shaft -	<u>0.4148</u>	<u>10,536</u>	0.4154 10,551
		Bore	0.4154	10,551	
		Bolt -	<u>0.4142</u>	<u>10,521</u>	
		Diameter	0.4146	10,531	

Table 601 (Continued) (Sheet 3 - LH)

FITS AND CLEARANCES

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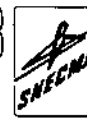
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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	

-	-					
		<u>0.0020</u>	<u>0,051</u>	0.0060	0,152	
		0.0056	0,143			
-	-					
-	-					
		<u>0.0002</u>	<u>0,005</u>	0.0014	0,036	
		0.0014	0,036			
-	-					
-	-					
		<u>0.0002</u>	<u>0,005</u>	0.0012	0,030	
		0.0012	0,030			
-	-					

Table 601 (Continued) (Sheet 3 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-89	ROTOR SHAFT FRONT LABYRINTH IN LABYRINTH RING	Ring -	<u>16.2900</u>	<u>413,766</u>	16.2944	413,878
		Bore	<u>16.2916</u>	<u>413,807</u>		
		Labyrinth	<u>16.1972</u>	<u>411,409</u>	16.1870	411,150
		- Diameter	<u>16.2000</u>	<u>411,480</u>		
601-90	LABYRINTH RING IN STATOR BLADE INNER FIXING RING	Ring -	<u>17.6650</u>	<u>448,691</u>	17.6670	448,742
		Bore	<u>17.6670</u>	<u>448,742</u>		
		Labyrinth	<u>17.6700</u>	<u>448,818</u>	17.6700	448,818
		Ring - Diameter	<u>17.6720</u>	<u>448,869</u>		
601-91	BOLT IN ROTOR SHAFT FRONT	Shaft -	<u>0.4020</u>	<u>10,211</u>	0.4036	10,251
		Bore	<u>0.4036</u>	<u>10,251</u>		
		Bolt -	<u>0.3942</u>	<u>10,013</u>	0.3942	10,013
		Diameter	<u>0.3946</u>	<u>10,023</u>		
601-92	STAGE 2 DISK IN ROTOR SHAFT FRONT	Disk -	<u>15.2620</u>	<u>387,655</u>	15.2605	387,617
		Diameter	<u>15.2640</u>	<u>387,706</u>		
		Shaft -	<u>15.2570</u>	<u>387,582</u>	15.2605	387,617
		Bore	<u>15.2590</u>	<u>387,579</u>		
601-93	BOLT IN STAGE 2 ROTOR DISK	Disk -	<u>0.3948</u>	<u>10,028</u>	0.3958	10,053
		Bore	<u>0.3958</u>	<u>10,053</u>		
		Bolt -	<u>0.3942</u>	<u>10,013</u>	0.3942	10,013
		Diameter	<u>0.3946</u>	<u>10,023</u>		

Table 601 (Continued) (Sheet 4 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					
		$\frac{0.0900}{0.0944}$	$\frac{2,286}{2,398}$	0.1074	2,728	
-	-					
-	-					
		$\frac{-0.0070}{-0.0030}$	$\frac{-0,178}{-0,076}$	-0.0030	-0,076	
-	-					
-	-					
		$\frac{0.0074}{0.0094}$	$\frac{0,188}{0,239}$	0.0094	0,239	
-	-					
-	-					
		$\frac{-0.0070}{0.0030}$	$\frac{-0,178}{-0,076}$	0.0000	0,000	
-	-					
-	-					
		$\frac{0.0002}{0.0016}$	$\frac{-0,005}{0,040}$	0.0016	0,040	
-	-					

Table 601 (Continued) (Sheet 4 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-94	STAGE 2 DISK IN STAGE 2-3 SPACER RING	Disk -	<u>15.9000</u>	<u>403,860</u>	15.8985 403,822
		Diameter	<u>15.9020</u>	<u>403,911</u>	
	Spacer - Bore		<u>15.8950</u>	<u>403,733</u>	15.8985 403,822
			<u>15.8970</u>	<u>403,784</u>	
601-95	BOLT IN STAGE 2-3 SPACER RING	Spacer -	<u>0.4020</u>	<u>10,211</u>	0.4036 10,251
		Bore	<u>0.4036</u>	<u>10,251</u>	
	Bolt - Diameter		<u>0.3942</u>	<u>10,013</u>	0.3942 10,013
			<u>0.3946</u>	<u>10,023</u>	
601-96	STAGE 2-3 SPACER RING LABYRINTH IN LABYRINTH RING	Ring -	<u>18.3300</u>	<u>465,582</u>	18.3392 465,816
		Bore	<u>18.3316</u>	<u>465,623</u>	
	Labyrinth - Diameter		<u>18.2368</u>	<u>463,215</u>	18.2070 462,458
			<u>18.2400</u>	<u>463,296</u>	
601-97	LABYRINTH RING IN STAGE 2-3 STATOR BLADE INNER FIXING RING	Ring -	<u>19.0700</u>	<u>484,378</u>	19.0720 484,429
		Bore	<u>19.0720</u>	<u>484,429</u>	
	Labyrinth Ring - Diameter		<u>19.0750</u>	<u>484,505</u>	19.0750 484,505
			<u>19.0770</u>	<u>484,556</u>	
601-98	STAGE 2-3 SPACER RING IN STAGE 3 ROTOR DISK	Disk -	<u>20.3000</u>	<u>515,620</u>	20.3035 515,709
		Bore	<u>20.3020</u>	<u>515,671</u>	
	Spacer - Diameter		<u>20.3050</u>	<u>515,747</u>	20.3035 515,709
			<u>20.3070</u>	<u>515,798</u>	

Table 601 (Continued) (Sheet 5 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{-0.0070}{0.0030}$	$\frac{-0,178}{0,076}$	0.0000	0,000	
-	-					
-	-	$\frac{0.0074}{0.0094}$	$\frac{0,188}{0,238}$	0.0094	0,238	
-	-					
-	-	$\frac{0.0900}{0.0948}$	$\frac{2,286}{2,408}$	0.1322	3,353	
-	-					
-	-	$\frac{-0.0070}{-0.0030}$	$\frac{-0,178}{-0,076}$	-0.0030	-0,076	
-	-					
-	-	$\frac{-0.0070}{-0.0030}$	$\frac{-0,178}{-0,076}$	0.0000	0,000	
-	-					

Table 601 (Continued) (Sheet 5 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-99	BOLT IN STAGE 2-3 SPACER RING	Spacer -	<u>0.4020</u>	<u>10,211</u>	0.4036	10,251
		Bore	0.4036	10,251		
		Bolt -	<u>0.3942</u>	<u>10,013</u>	0.3942	10,013
		Diameter	0.3946	10,023		
601-100	BOLT IN STAGE 3 ROTOR DISK	Disk -	<u>0.3948</u>	<u>10,028</u>	0.3958	10,053
		Bore	0.3958	10,053		
		Bolt -	<u>0.3942</u>	<u>10,013</u>	0.3942	10,013
		Diameter	0.3946	10,023		
601-101	BOLT IN STAGE 3-4 SPACER RING	Spacer -	<u>0.4020</u>	<u>10,211</u>	0.4036	10,251
		Bore	0.4036	10,251		
		Bolt -	<u>0.3942</u>	<u>10,013</u>	0.3942	10,013
		Diameter	0.3946	10,023		
601-102	STAGE 3-4 SPACER RING IN STAGE 3 ROTOR DISK	Disk -	<u>20.4800</u>	<u>520,192</u>	20.4865	520,332
		Bore	20.4820	520,243		
		Spacer -	<u>20.4850</u>	<u>520,319</u>	20.4825	520,230
		Diameter	20.4870	520,370		
601-103	STAGE 3-4 SPACER RING IN STAGE 4 ROTOR DISK	Disk -	<u>22.3000</u>	<u>566,420</u>	22.3035†	566,509†
		Bore	22.3020	566,471	(O/size)	(O/size)
					22.2950†	566,293†
					(U/size)	(U/size)
		Spacer -	<u>22.3050</u>	<u>566,547</u>	22.3035†	566,509†
		Diameter	22.3070	566,598	(O/size)	(O/size)
				22.3070†	566,598†	
				(Max.	(Max.	
				U/size)	U/size)	
				22.3000†	566,420†	
				(Min.	(Min.	
				U/size)	U/size)	

† Select Assembly Dimensions

† Select Assembly Dimensions

Table 601 (Continued) (Sheet 6 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					
		<u>0.0074</u>	<u>0,188</u>	0.0094	0,238	
		0.0094	0,238			
-	-					
-	-					
		<u>0.0002</u>	<u>0,005</u>	0.0016	0,040	
		0.0016	0,040			
-	-					
-	-					
		<u>0.0074</u>	<u>0,188</u>	0.0094	0,238	
		0.0094	0,238			
-	-					
*20.4875	*520,383					*Worn parts may be mated providing resulting diametral clearance does not exceed 0.0040 in. (0,102 mm)
		<u>-0.0070</u>	<u>-0,178</u>	+0.0040	+0,102	
		-0.0030	-0,076			
*20.4795	*520,179					
<u>22.3035</u>	<u>566,509</u>					Disks and spacers up to 0.005 (0,127) U/size may be used. Fits in range -0.003/-0.007 (0,076/-0,178) are preferred (Select fit). Fits in range 0.000/-0.012 (0,000/-0,305) are acceptable.
22.2950	566,293					
		<u>-0.0070</u>	<u>-0,178</u>	<u>0.0000</u>	<u>0,000</u>	
		-0.0030	-0,076	-0.012	-0,305	
<u>22.3070</u>	<u>566,598</u>					
22.3000	566,420					

Table 601 (Continued) (Sheet 6 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-104	BOLT IN STAGE 3-4 SPACER RING	Spacer -	<u>0.3920</u>	<u>9,957</u>	0.3936	9,997
		Bore	0.3936	9,997		
		Bolt -	<u>0.3842</u>	<u>9,759</u>	0.3842	9,759
		Diameter	0.3846	9,769		
601-105	BOLT IN STAGE 4 ROTOR DISK	Disk -	<u>0.3848</u>	<u>9,774</u>	0.3858	9,799
		Bore	0.3858	9,799		
		Bolt -	<u>0.3842</u>	<u>9,759</u>	0.3842	9,759
		Diameter	0.3846	9,769		
601-106	BOLT IN STAGE 4-5 SPACER RING	Spacer -	<u>0.3920</u>	<u>9,957</u>	0.3936	9,997
		Bore	0.3936	9,997		
		Bolt -	<u>0.3842</u>	<u>9,759</u>	0.3842	9,759
		Diameter	0.3846	9,769		
601-107	STAGE 4-5 SPACER RING IN STAGE 4 ROTOR DISK	Disk -	<u>22.3000</u>	<u>566,420</u>	22.3035†	566,509†
		Bore	22.3020	566,471	(O/size) (O/size)	
					22.2950†	566,293†
					(U/size) (U/size)	
		Spacer -	<u>22.3050</u>	<u>566,547</u>	22.3035†	566,509†
		Diameter	22.3070	566,598	(O/size) (O/size)	
					22.3070†	566,598†
					(Max. (Max.	
					U/size) U/size)	
					22.3000†	566,420†
					(Min. (Min.	
					U/size) U/size)	

† Select Assembly Dimensions

Table 601 (Continued) (Sheet 7 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					
		<u>0.0074</u>	<u>0,188</u>	0.0094	0,238	
		0.0094	0,238			
-	-					
-	-					
		<u>0.0002</u>	<u>0,005</u>	0.0016	0,040	
		0.0016	0,040			
-	-					
-	-					
		<u>0.0074</u>	<u>0,188</u>	0.0094	0,238	
		0.0094	0,238			
<u>22.3035</u>	<u>566,509</u>					Disks and spacers up to 0.005 (0,127) U/size may be used. Fits in range -0.003/ -0.007 (0,076/ -0,178) are preferred (Select fit). Fits in range 0.000/-0.012 (0,000/-0,305) are acceptable.
22.2950	566,293					
		<u>-0.0070</u>	<u>-0,178</u>	<u>0.0000</u>	<u>0,000</u>	
		-0.0030	-0,076	-0.012	-0,305	
<u>22.3070</u>	<u>566,598</u>					
22.3000	566,420					

Table 601 (Continued) (Sheet 7 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-108	STAGE 4-5 SPACER RING IN STAGE 5 ROTOR DISK	Disk - Bore	<u>23.6420</u>	<u>600,507</u>	23.6455†	600,596†
			23.6440	600,558	(O/size)	(O/size)
		Spacer - Diameter	<u>23.6470</u>	<u>600,634</u>	23.6370†	600,380†
			23.6490	600,685	(U/size)	(U/size)
					23.6455†	600,596†
					(O/size)	(O/size)
601-109	BOLT IN STAGE 4-5 SPACER RING	Spacer - Bore	<u>0.3920</u>	<u>9,957</u>	0.3936	9,997
			0.3936	9,997		
		Bolt - Diameter	<u>0.3842</u>	<u>9,759</u>	0.3842	9,759
			0.3846	9,769		
601-110	BOLT IN STAGE 5 ROTOR DISK	Disk - Bore	<u>0.3848</u>	<u>9,774</u>	0.3858	9,799
			0.3858	9,799		
		Bolt - Diameter	<u>0.3842</u>	<u>9,759</u>	0.3842	9,759
			0.3846	9,769		
601-111	BOLT IN STAGE 5-6 SPACER RING	Spacer - Bore	<u>0.3920</u>	<u>9,957</u>	0.3936	9,997
			0.3936	9,997		
		Bolt - Diameter	<u>0.3842</u>	<u>9,759</u>	0.3842	9,759
			0.3846	9,769		

† Select Assembly Dimensions

Table 601 (Continued) (Sheet 8 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
<u>23.6455</u>	<u>600,596</u>					Disks and spacers up to 0.005 (0,127) U/size may be used. Fits in range -0.003/ -0.007 (0,076/ -0,178) are preferred (Select fit). Fits in range 0.000/-0.012 (0,000/-0,305) are acceptable.
23.6370	600,380					
		<u>-0.0070</u>	<u>-0,178</u>	<u>0.0000</u>	<u>0,000</u>	
		<u>-0.0030</u>	<u>-0,076</u>	<u>-0.012</u>	<u>-0,305</u>	
<u>23.6490</u>	<u>600,685</u>					
23.6420	600,507					
-	-					
		<u>0.0074</u>	<u>0,188</u>	0.0094	0,238	
		0.0094	0,238			
-	-					
		<u>0.0002</u>	<u>0,005</u>	0.0016	0,040	
		0.0016	0,040			
-	-					
		<u>0.0074</u>	<u>0,188</u>	0.0094	0,238	
		0.0094	0,238			
-	-					

Table 601 (Continued) (Sheet 8 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-112	STAGE 5-6 SPACER RING IN STAGE 5 ROTOR DISK	Disk -	<u>23.6420</u>	<u>600,507</u>	23.6455†	600,596†
			23.6440	600,558	(O/size)	(O/size)
		Bore			23.6370†	600,380†
					(U/size)	(U/size)
		Spacer -	<u>23.6470</u>	<u>600,634</u>	23.6455†	600,596†
			23.6490	600,685	(O/size)	(O/size)
		Diameter			23.6490†	600,685†
					(Max.	(Max.
					U/size)	U/size)
					23.6420†	600,507†
					(Min.	(Min.
					U/size)	U/size)
601-113	STAGE 5-6 SPACER RING IN STAGE 6 ROTOR DISK	Disk -	<u>24.5000</u>	<u>622,300</u>	24.5035†	622,389†
			24.5020	622,351	(O/size)	(O/size)
		Bore			24.4950†	622,173†
					(U/size)	(U/size)
		Spacer -	<u>24.5050</u>	<u>622,427</u>	24.5035†	622,389†
			24.5070	622,478	(O/size)	(O/size)
		Diameter			24.5070†	622,478†
					(Max.	(Max.
					U/size)	U/size)
					24.5000†	622,300†
					(Min.	(Min.
					U/size)	U/size)
601-114	BOLT IN STAGE 5-6 SPACER RING	Spacer -	<u>0.4120</u>	<u>10,465</u>	0.4136	10,505
			0.4136	10,505		
		Bolt -	<u>0.4042</u>	<u>10,267</u>	0.4042	10,267
			0.4046	10,277		
601-115	BOLT IN STAGE 6 ROTOR DISK	Disk -	<u>0.4048</u>	<u>10,282</u>	0.4058	10,307
			0.4058	10,307		
		Bolt -	<u>0.4042</u>	<u>10,267</u>	0.4042	10,267
			0.4046	10,277		

† Select Assembly Dimensions

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Table 601 (Continued) (Sheet 9 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
<u>23.6455</u>	<u>600,596</u>					Disks and spacers up to 0.005 (0,127) U/size may be used. Fits in range -0.003/ -0.007 (0,076/ -0,178) are preferred (Select fit). Fits in range 0.000/-0.012 (0,000/-0,305) are acceptable.
23.6370	600,380					
		<u>-0.0070</u>	<u>-0,178</u>	<u>0.0000</u>	<u>0,000</u>	
		-0.0030	-0,076	-0.012	0,305	
<u>23.6490</u>	<u>600,685</u>					Disks and spacers up to 0.005 (0,127) U/size may be used. Fits in range -0.003/ -0.007 (0,076/ -0,178) are preferred (Select fit). Fits in range 0.000/-0.012 (0,000/-0,305) are acceptable.
23.6420	600,507					
		<u>-0.0070</u>	<u>-0,178</u>	<u>0.0000</u>	<u>0,000</u>	
		-0.0030	-0,076	-0.012	-0,305	
<u>24.5035</u>	<u>622,389</u>					Disks and spacers up to 0.005 (0,127) U/size may be used. Fits in range -0.003/ -0.007 (0,076/ -0,178) are preferred (Select fit). Fits in range 0.000/-0.012 (0,000/-0,305) are acceptable.
24.4950	622,173					
		<u>-0.0070</u>	<u>-0,178</u>	<u>0.0000</u>	<u>0,000</u>	
		-0.0030	-0,076	-0.012	-0,305	
<u>24.5070</u>	<u>622,478</u>					Disks and spacers up to 0.005 (0,127) U/size may be used. Fits in range -0.003/ -0.007 (0,076/ -0,178) are preferred (Select fit). Fits in range 0.000/-0.012 (0,000/-0,305) are acceptable.
24.5000	622,300					
		<u>-0.0070</u>	<u>-0,178</u>	<u>0.0000</u>	<u>0,000</u>	
		-0.0030	-0,076	-0.012	-0,305	
-	-					Disks and spacers up to 0.005 (0,127) U/size may be used. Fits in range -0.003/ -0.007 (0,076/ -0,178) are preferred (Select fit). Fits in range 0.000/-0.012 (0,000/-0,305) are acceptable.
		<u>0.0074</u>	<u>0,188</u>	0.0094	0,238	
		0.0094	0,238			
-	-					
-	-					Disks and spacers up to 0.005 (0,127) U/size may be used. Fits in range -0.003/ -0.007 (0,076/ -0,178) are preferred (Select fit). Fits in range 0.000/-0.012 (0,000/-0,305) are acceptable.
		<u>0.0002</u>	<u>0,005</u>	0.0016	0,040	
		0.0016	0,040			
-	-					

Table 601 (Continued) (Sheet 9 - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-116	BOLT IN STAGE 6-7 SPACER RING	Spacer -	<u>0.4120</u>	<u>10,465</u>	0.4136	10,505
		Bore	0.4136	10,505		
		Bolt - Diameter	<u>0.4042</u> 0.4046	<u>10,267</u> 10,277	0.4042	10,267
601-117	STAGE 6-7 SPACER RING IN STAGE 6 ROTOR DISK	Disk -	<u>24.5000</u>	<u>622,300</u>	24.5035†	622,389†
			24.5020	622,351	(O/size)	(O/size)
		Spacer - Diameter			24.4950†	622,173†
					(U/size)	(U/size)
			<u>24.5050</u>	<u>622,427</u>	24.5035†	622,389†
			24.5070	622,478	(O/size)	(O/size)
601-118	STAGE 6-7 SPACER RING IN STAGE 7 ROTOR DISK	Disk -	<u>25.7200</u>	<u>653,288</u>	25.7220	653,339
			25.7220	653,339		
		Spacer - Diameter	<u>25.7160</u> 25.7180	<u>653,186</u> 653,237	25.7160	653,186
601-119	BOLT IN STAGE 6-7 SPACER RING	Spacer -	<u>0.2500</u>	<u>6,350</u>	0.2535	6,439
		Bore	0.2535	6,439		
		Bolt - Diameter	<u>0.2489</u> 0.2495	<u>6,322</u> 6,337	0.2489	6,322

† Select Assembly Dimensions

Table 601 (Continued) (Sheet 10 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					
		<u>0.0074</u>	<u>0,188</u>	0.0094	0,238	
		0.0094	0,238			
-	-					
<u>24.5035</u>	<u>622,389</u>					Disks and spacers up to 0.005 (0,127) U/size may be used. Fits in range -0.003/ -0.007 (0,076/ -0,178) are preferred (Select fit). Fits in range 0.000/-0.012 (0,000/-0,305) are acceptable.
24.4950	622,173					
		<u>-0.0070</u>	<u>-0,178</u>	<u>0.0000</u>	<u>0,000</u>	
		-0.0030	-0,076	-0.012	-0,305	
<u>24.5070</u>	<u>622,478</u>					
24.5000	622,300					
-	-					
		<u>0.0020</u>	<u>0,051</u>	0.0060	0,153	
		0.0060	0,153			
-	-					
-	-					
		<u>0.0005</u>	<u>0,013</u>	0.0046	0,117	
		0.0046	0,117			
-	-					

Table 601 (Continued) (Sheet 10 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-120	SETTING DIMENSION BETWEEN REAR FACE OF STAGE 7 ROTOR BLADE AND FRONT FACE OF DIFFUSER CASE UNIT		<u>2.3070</u> 2.3120	<u>58,598</u> 58,725	-	-
601-121	STAGE 6-7 SPACER RING IN STAGE 7 ROTOR DISK	Disk -	<u>19.8980</u>	<u>505,409</u>	19.9015†	505,498†
		Bore	19.9000	505,460	(O/size)	(O/size)
	Spacer - Diameter		<u>19.9030</u> 19.9050	<u>505,536</u> 505,587	19.8930†	505,282†
					(U/size)	(U/size)
					19.9015†	505,498†
					(O/size)	(O/size)
601-122	BOLT IN STAGE 6-7 SPACER RING	Spacer - Bore	<u>0.4570</u> 0.4586	<u>11,608</u> 11,648	19.9050†	505,587†
					(Max. U/size)	(Max. U/size)
					19.8980†	505,409†
					(Min. U/size)	(Min. U/size)
601-123	BOLT IN STAGE 7 ROTOR DISK	Disk - Bore	<u>0.4492</u> 0.4496	<u>11,410</u> 11,420	0.4586	11,648
					0.4492	11,410
		Bolt - Diameter	<u>0.4498</u> 0.4508	<u>11,425</u> 11,450	0.4492	11,410
					0.4508	11,450

† Select Assembly Dimensions

Table 601 (Continued) (Sheet 10A - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	

-	-	-	-	-	-	Ref.72-00-00 Fig.601-120
---	---	---	---	---	---	-----------------------------

<u>19.9015</u>	<u>505,498</u>
19.8930	505,282

<u>-0.0070</u>	<u>-0,178</u>	<u>0.0000</u>	<u>0,000</u>
-0.0030	-0,076	-0.012	-0,305

<u>19,9050</u>	<u>505,587</u>
19,8980	505,409

Disks and spacers up to 0.005 (0,127) U/size may be used. Fits in range -0.003/-0.007 (0,076/-0,178) are preferred (Select fit). Fits in range 0.000/-0.012 (0,000/-0,305) are acceptable.

-	-	<u>0.0074</u>	<u>0,188</u>	0.0094	0,238
-	-	0.0094	0,238		
-	-				
-	-	<u>0.0002</u>	<u>0,005</u>	0.0016	0,040
-	-	0.0016	0,040		

Table 601 (Continued) (Sheet 10A - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-124	HP DRIVE SHAFT IN STAGE 7 ROTOR DISK	Disk -	18.1500	461,010	18.1520	461,061
		Bore	18.1520	461,061		
		Shaft -	18.1550	461,137	18.1520	461,061
		Diameter	18.1570	461,188		
601-125	BOLT IN HP DRIVE SHAFT	Shaft -	0.4570	11,608	0.4586	11,648
		Bore	0.4586	11,648		
		Bolt -	0.4492	11,410	0.4492	11,410
		Diameter	0.4496	11,420		
601-126	LABYRINTH NO.12 IN HP COMPRESSOR DRIVE SHAFT	Shaft -	21.2000	538,480	21.2028	538,551
		Bore	21.2028	538,551		
		Labyrinth	21.2030	538,556	21.2030	538,556
		- Diameter	21.2058	538,627		
601-127	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 2	Seal -	22.3300	567,182	22.3360	567,334
		Bore	22.3350	567,309		
		Labyrinth	22.2500	565,150	22.2410	564,921
		- Diameter	22.2550	565,277		
		Seal -	22.3300	567,182	22.3360	567,334
		Bore	22.3350	567,309		
		Labyrinth	22.2450	565,023	22.2410	564,921
		- Diameter	22.2500	565,150		

Table 601 (Continued) (Sheet 11 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	-0.0070	-0,178	0.0000	0,000	
		-0.0030	-0,076			
-	-					
-	-	0.0074	0,188	0.0094	0,238	
		0.0094	0,238			
-	-					
-	-	-0.0058	-0,147	-0.0002	-0,005	
		-0.0002	-0,005			
-	-					
		0.0750*	1,905*	0.0950	2,413	Ref.72-34-00 Fig.601-127 S.B.72-8430- 123 PART 1
22.2400	564,896	0.0850	2,159			
-	-					
		0.0800*	2,032*	0.0950	2,413	Pre S.B. 72-8430-123 PART 2
22.2400	564,896	0.0900	2,286			

* CLEARANCE AT HORIZONTAL ϕ . NO.12 LABYRINTH HOUSING ECCENTRIC TO GIVE ADDITIONAL RADIAL CLEARANCE OF 0.0080 to 0.010 (0,203 to 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 11 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-127	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 2	Seal -	<u>22.3120</u>	<u>566,725</u>	22.3180 566,877
		Bore	<u>22.3170</u>	<u>566,852</u>	
		Labyrinth	<u>22.2500</u>	<u>565,150</u>	22.2410 564,921
		- Diameter	<u>22.2550</u>	<u>565,277</u>	
		Seal -	<u>22.3120</u>	<u>566,725</u>	22.3180 566,877
		Bore	<u>22.3170</u>	<u>566,852</u>	
601-128	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 3	Labyrinth	<u>22.2450</u>	<u>565,023</u>	22.2410 564,921
		- Diameter	<u>22.2500</u>	<u>565,150</u>	
		Seal -	<u>21.9000</u>	<u>556,260</u>	21.9050 556,387
		Bore	<u>21.9050</u>	<u>556,387</u>	
		Labyrinth	<u>21.8100</u>	<u>553,974</u>	21.8100 553,974
		- Diameter	<u>21.8150</u>	<u>554,101</u>	
		Seal -	<u>21.9000</u>	<u>556,260</u>	21.9050 556,387
		Bore	<u>21.9050</u>	<u>556,387</u>	
		Labyrinth	<u>21.8150</u>	<u>554,101</u>	21.8100 553,974
		- Diameter	<u>21.8200</u>	<u>554,228</u>	

Table 601 (Continued) (Sheet 12 - LH)

FITS AND CLEARANCES

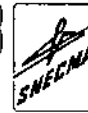
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OLYMPUS 593

MK. 610-14-28
OVERHAUL

REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0570^*}{0.0670}$	$\frac{1,448^*}{1,702}$	0.0770	1,956	S.B.72-8574- 278 Ref. 72-34-00 Fig.601-127
22.240	564,896					
-	-	$\frac{0.0620^*}{0.0720}$	$\frac{1,575^*}{1,829}$	0.0770	1,956	
22.240	564,896					
-	-	$\frac{0.0850^*}{0.0950}$	$\frac{2,159^*}{2,413}$	0.0950	2,413	Ref.72-34-00 Fig.601-128 S.B.72-8430- 123 PART 1
-	-					
-	-	$\frac{0.0800^*}{0.0900}$	$\frac{2,032^*}{2,286}$	0.0950	2,413	S.B.72-8430- 123 PART 2 Pre S.B. 72-8574-278

* CLEARANCE AT HORIZONTAL ϕ . NO.12 LABYRINTH HOUSING ECCENTRIC TO GIVE RADIAL CLEARANCE OF 0.0080 TO 0.0100 (0,203 TO 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 12 - RH)

FITS AND CLEARANCES

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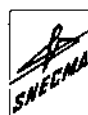
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**OLYMPUS 593**

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OVERHAUL



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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-128	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 3	Seal -	<u>21.8820</u>	<u>555,803</u>	21.8870 555,930
		Bore	<u>21.8870</u>	<u>555,930</u>	
		Labyrinth	<u>21.8100</u>	<u>553,974</u>	21.8100 553,974
		- Diameter	<u>21.8150</u>	<u>554,101</u>	
		Seal -	<u>21.8820</u>	<u>555,803</u>	21.8870 555,930
		Bore	<u>21.8870</u>	<u>555,930</u>	
		Labyrinth	<u>21.8150</u>	<u>554,101</u>	21.8100 553,974
		- Diameter	<u>21.8200</u>	<u>554,228</u>	
601-129	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 4	Seal -	<u>21.4600</u>	<u>545,084</u>	21.4650 545,211
		Bore	<u>21.4650</u>	<u>545,211</u>	
		Labyrinth	<u>21.3700</u>	<u>542,798</u>	21.3700 542,798
		- Diameter	<u>21.3750</u>	<u>542,925</u>	
		Seal -	<u>21.4600</u>	<u>545,084</u>	21.4650 545,211
		Bore	<u>21.4650</u>	<u>545,211</u>	
		Labyrinth	<u>21.3750</u>	<u>542,925</u>	21.3700 542,798
		- Diameter	<u>21.3800</u>	<u>543,052</u>	

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Table 601 (Continued) (Sheet 13 - LH)

FITS AND CLEARANCES

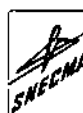
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REJECT IF OVER	IN.	MM	CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
			IN.	MM	IN.	MM	
-	-	-					Ref.72-34-00 Fig.601-128
			$\frac{0.0670^*}{0.0770}$	$\frac{1,702^*}{1,956}$	0.0770	1,956	S.B.72-8574-278
22.2400	-	-					
-	-	-					
			$\frac{0.0620^*}{0.0720}$	$\frac{1,575^*}{1,829}$	0.0770	1,956	S.B.72-8574-278
22.2400	-	-					
-	-	-					Ref.72-34-00 Fig.601-129
			$\frac{0.0850^*}{0.0950}$	$\frac{2,159^*}{2,413}$	0.0950	2,413	S.B.72-8430-123 PART 1.
-	-	-					
-	-	-					
			$\frac{0.0800^*}{0.0900}$	$\frac{2,032^*}{2,286}$	0.0950	2,413	S.B.72-8430-123 PART 2.
-	-	-					Pre S.B. 72-8574-278

* CLEARANCE AT HORIZONTAL ϵ . NO.12 LABYRINTH HOUSING ECCENTRIC TO GIVE RADIAL CLEARANCE OF 0.0080 TO 0.0100 (0,203 TO 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 13 - RH)

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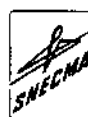
**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-129	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 4	Seal -	<u>21.4420</u>	<u>544,627</u>	21.4470 544,754
		Bore	<u>21.4470</u>	<u>544,754</u>	
		Labyrinth	<u>21.3700</u>	<u>542,798</u>	21.3700 542,798
		- Diameter	<u>21.3750</u>	<u>542,925</u>	
		Seal -	<u>21.4420</u>	<u>544,627</u>	21.4470 544,754
		Bore	<u>21.4470</u>	<u>544,754</u>	
		Labyrinth	<u>21.3750</u>	<u>542,925</u>	21.3700 542,798
		- Diameter	<u>21.3800</u>	<u>543,052</u>	
601-130	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 5	Seal -	<u>21.0140</u>	<u>533,756</u>	21.0190 533,883
		Bore	<u>21.0190</u>	<u>533,883</u>	
		Labyrinth	<u>20.9300</u>	<u>531,622</u>	20.9240 531,470
		- Diameter	<u>20.9350</u>	<u>531,749</u>	
		Seal -	<u>21.0140</u>	<u>533,756</u>	21.0190 533,883
		Bore	<u>21.0190</u>	<u>533,883</u>	
		Labyrinth	<u>20.9290</u>	<u>531,597</u>	20.9240 531,470
		- Diameter	<u>20.9340</u>	<u>531,724</u>	

Table 601 (Continued) (Sheet 14 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					S.B.72-8574-278 Ref.
		$\frac{0.0670^*}{0.0770}$	$\frac{1,702^*}{1,956}$	0.0770	1,956	72-34-00 Fig.601-129
-	-					
-	-					
		$\frac{0.0620^*}{0.0720}$	$\frac{1,575^*}{1,829}$	0.0770	1,956	S.B.72-8574-278
-	-					
-	-					Ref.72-34-00 Fig.601-130
		$\frac{0.0790^*}{0.0890}$	$\frac{2,007^*}{2,261}$	0.0950	2,413	S.B.72-8430-123 PART 1.
-	-					
-	-					
		$\frac{0.0800^*}{0.0900}$	$\frac{2,032^*}{2,286}$	0.0950	2,413	S.B.72-8430-123 PART 2.
-	-					Pre S.B. 72-8574-278

* CLEARANCE AT HORIZONTAL C. NO.12 LABYRINTH HOUSING ECCENTRIC TO GIVE RADIAL CLEARANCE OF 0.0080 TO 0.0100 (0,203 TO 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 14 - RH)

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SNECMA

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-130	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 5	Seal -	<u>20.9960</u>	<u>533,298</u>	21.0010	533,425
		Bore	21.0010	533,425		
		Labyrinth	<u>20.9300</u>	<u>531,622</u>	20.9240	531,470
		- Diameter	20.9350	531,749		
		Seal -	<u>20.9960</u>	<u>533,299</u>	21.0010	533,425
		Bore	21.0010	533,425		
		Labyrinth	<u>20.9290</u>	<u>531,597</u>	20.9240	531,470
		- Diameter	20.9340	531,724		
601-131	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 6	Seal -	<u>20.5650</u>	<u>522,351</u>	20.5700	522,478
		Bore	20.5700	522,478		
		Labyrinth	<u>20.4900</u>	<u>520,446</u>	20.4750	520,065
		- Diameter	20.4950	520,573		
		Seal -	<u>20.5650</u>	<u>522,351</u>	20.5700	522,478
		Bore	20.5700	522,478		
		Labyrinth	<u>20.4800</u>	<u>520,192</u>	20.4750	520,065
		- Diameter	20.4850	520,319		

Table 601 (Continued) (Sheet 14A - LH)

FITS AND CLEARANCES

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OVERHAUL



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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					Ref.72-34-00 Fig.601-130
		<u>0.0610*</u>	<u>1,549*</u>	0.0770	1,956	S.B.72-8574-
		0.0710	1,803			278
-	-					
-	-					
		<u>0.0620*</u>	<u>1,575*</u>	0.0770	1,956	
		0.0720	1,828			
-	-					
-	-					Ref.72-34-00 Fig.602-131
		<u>0.0700*</u>	<u>1,778*</u>	0.0950	2,413	S.B.72-8430-
		0.0800	2,032			123 PART 1
-	-					
-	-					
		<u>0.0800*</u>	<u>2,032*</u>	0.0950	2,413	S.B.72-8430-
		0.0900	2,286			123 PART 2
-	-					Pre S.B.
						72-8574-278

* CLEARANCE AT HORIZONTAL ^C. NO.12 LABYRINTH HOUSING ECCENTRIC TO
GIVE RADIAL CLEARANCE OF 0.0080 TO 0.0100 (0,203 TO 0,254) AT
BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 14A - RH)

FITS AND CLEARANCES

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sneema

FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-131	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 6	Seal -	<u>20.5470</u>	<u>521,894</u>	20.5520 522,021
		Bore	<u>20.5520</u>	<u>522,021</u>	
		Labyrinth	<u>20.4900</u>	<u>520,446</u>	20.4750 520,065
		- Diameter	<u>20.4950</u>	<u>520,573</u>	
		Seal -	<u>20.5470</u>	<u>521,894</u>	20.5520 522,021
		Bore	<u>20.5520</u>	<u>522,021</u>	
		Labyrinth	<u>20.4800</u>	<u>520,192</u>	20.4750 520,065
		- Diameter	<u>20.4850</u>	<u>520,319</u>	
601-132	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 7	Seal -	<u>20.1170</u>	<u>510,972</u>	20.1220 511,099
		Bore	<u>20.1220</u>	<u>511,099</u>	
		Labyrinth	<u>20.0500</u>	<u>509,270</u>	20.0270 508,686
		- Diameter	<u>20.0550</u>	<u>509,397</u>	
		Seal -	<u>20.1170</u>	<u>510,972</u>	20.1220 511,099
		Bore	<u>20.1220</u>	<u>511,099</u>	
		Labyrinth	<u>20.0320</u>	<u>508,813</u>	20.0270 508,686
		- Diameter	<u>20.0370</u>	<u>508,940</u>	

Table 601 (Continued) (Sheet 14B - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					Ref.72-34-00 Fig.602-131
		<u>0.0520</u> *	<u>1,321*</u>	0.0770	1,956	S.B.72-8574- 278
		0.0620	1,575			
-	-					
-	-					
		<u>0.0620*</u>	<u>1,575*</u>	0.0770	1,956	S.B.72-8574- 278
		0.0720	1,829			
-	-					
-	-					Ref.72-34-00 Fig.601-132
		<u>0.0620*</u>	<u>1,575*</u>	0.0950	2,413	S.B.72-8430- 123 PART 1.
		0.0720	1,829			
-	-					
-	-					
		<u>0.0800*</u>	<u>2,032*</u>	0.0950	2,413	S.B.72-8430- 123 PART 2.
		0.0900	2,286			Pre S.B. 72-8574-278
-	-					

* CLEARANCE AT HORIZONTAL^CL. NO.12 LABYRINTH HOUSING ECCENTRIC
TO GIVE ADDITIONAL RADIAL CLEARANCE OF 0.0080 TO 0.010 (0,203
TO 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 14B - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-132	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 7	Seal -	<u>20.0990</u>	<u>510,515</u>	20.1040 510,642
		Bore	20.1040	510,642	
		Labyrinth	<u>20.0500</u>	<u>509,270</u>	20.0270 508,686
		- Diameter	20.0550	509,397	
		Seal -	<u>20.0990</u>	<u>510,515</u>	20.1040 510,642
		Bore	20.1040	510,642	
601-133	LABYRINTH NO.12 IN HP DRIVE SHAFT	Labyrinth	<u>20.0320</u>	<u>508,813</u>	20.0270 508,686
		- Diameter	20.0370	508,940	
		Shaft -	<u>16.6000</u>	<u>421,640</u>	16.6025 421,703
		Bore	16.6025	421,703	
		Labyrinth	<u>16.6028</u>	<u>421,711</u>	16.6028 421,711
			16.6044	421,752	

Table 601 (Continued) (Sheet 14C - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					Ref.72-34-00 Fig.601-132 S.B.72-8574- 278
		<u>0.0440*</u> 0.0540	<u>1,118*</u> 1,372	0.0770	1,956	
-	-					
-	-					
		<u>0.0620*</u> 0.0720	<u>1,575*</u> 1,829	0.0770	1,956	
-	-					
-	-					
		<u>-0.0044</u> -0.0003	<u>-0,112</u> -0,008	-0.0003	-0,008	
-	-					

* CLEARANCE AT HORIZONTAL ^CL. NO.12 LABYRINTH HOUSING ECCENTRIC TO GIVE ADDITIONAL RADIAL CLEARANCE OF 0.0080 TO 0.010 (0,203 TO 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 14C - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-134	HP DRIVE SHAFT IN AIR TRANSFER TUBE	Tube -	<u>12.0000</u>	<u>304,800</u>	12.0057	304,445
		Bore	12.0020	304,851		
		Shaft -	<u>12.0017</u>	<u>304,843</u>	12.0017	304,843
		Diameter	12.0047	304,919		
601-134	HP DRIVE SHAFT IN AIR TRANSFER TUBE	Tube -	<u>12.009</u>	<u>305,028</u>	12.011	305,079
		Bore	12.011	305,079		
		Shaft -	<u>12.0017</u>	<u>304,843</u>	12.0017	305,843
		Diameter	12.0047	304,919		
601-135 **	TIP CLEAR- ANCE OF EXIT GUIDE VANE TO DIFFUSER CASE		-	-	-	-
601-136 **	TIP CLEAR- ANCE OF STAGE 6 STATOR VANE TO STAGE 6-7 SPACER RING		-	-	-	-
601-137 **	TIP CLEAR- ANCE OF STAGE 5 STATOR VANE TO STAGE 5-6 SPACER RING		-	-	-	-
601-138 **	TIP CLEAR- ANCE OF STAGE 4 STATOR VANE TO STAGE 4-5 SPACER RING		-	-	-	-

Table 601 (Continued) (Sheet 15 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					
		<u>-0.0047</u>	<u>-0,119</u>	+0.0040	+0,102	PRE SB.OL.593- 72-8975-381
		+0.0003	+0,008			
-	-					
						INCREASED DIA. ON AIR TRANSFER TUBE BORE (REF.SB.OL.593- 72-8975-381)
		<u>0.0043</u>	<u>0,109</u>	-	-	
		0.0093	0,236			
-	-					
		0.0850*	2,159*	-	-	*MINIMUM Ref.72-34-00 Fig.601-135 Ref.72-00-00 Fig.601-135
-	-					
		0.1100	2,794*	-	-	*MINIMUM
-	-					
		0.0900*	2,286*	-	-	*MINIMUM
-	-					
		0.0850*	2,159*	-	-	*MINIMUM

Table 601 (Continued) (Sheet 15 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-139 **	TIP CLEAR- ANCE OF STAGE 3 STATOR VANE TO STAGE 3-4 SPACER RING	-	-	-	-
601-140 **	TIP CLEAR- ANCE OF STAGE 1 ROTOR BLADE TO FRONT COM- PRESSOR CASE	-	-	-	-
601-141 **	TIP CLEAR- ANCE OF STAGE 2 ROTOR BLADE TO FRONT COM- PRESSOR CASE	-	-	-	-
601-142 **	TIP CLEAR- ANCE OF STAGE 3 ROTOR BLADE TO FRONT COM- PRESSOR CASE	-	-	-	-
601-143 **	TIP CLEAR- ANCE OF STAGE 4 ROTOR BLADE TO FRONT COM- PRESSOR CASE	-	-	-	-

Table 601 (Continued) (Sheet 16 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	0.0800*	2,032*	-	-	*MINIMUM
-	-	0.0750*	1,905*	-	-	*MINIMUM
-	-	0.0750*	1,905*	-	-	*MINIMUM
-	-	0.0800*	2,032*	-	-	*MINIMUM
-	-	0.0850*	2,159*	-	-	*MINIMUM

Table 601 (Continued) (Sheet 16 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-144 **	TIP CLEAR- ANCE OF STAGE 5 ROTOR BLADE TO FRONT COM- PRESSOR CASE	-	-	-	-
601-145 **	TIP CLEAR- ANCE OF STAGE 6 ROTOR BLADE TO FRONT COM- PRESSOR CASE	-	-	-	-
601-146 **	TIP CLEAR- ANCE OF STAGE 7 ROTOR BLADE TO REAR COM- PRESSOR CASE	-	-	-	-
601-161	INNER Ring -	6.4500	163,830	6.4535	163,919
	SEALING RING Bore	6.4525	163,893		
	IN OUTER				
	SEALING RING				
	Ring -	6.2450	158,623	6.2435	158,585
	Diameter	6.2500	158,750		
601-162	FRONT COM- Set Gap PRESSOR CASE FRONT FACE TO FRONT FACE OF ADJUSTING WASHER	-	-	-	-
602-163	INNER SEAL- Tube -	7.6000	193,040	7.6022	193,096
	ING RING IN Bore	7.6018	193,086		
	AIR TRANSFER				
	TUBE				
	Ring -	7.5995	193,027	7.5992	193,020
	Diameter	7.6007	193,058		

Table 601 (Continued) (Sheet 17 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	0.0880*	2,235*	-	-	*MINIMUM
-	-	0.0900*	2,286*	-	-	*MINIMUM
-	-	0.1000*	2,540*	-	-	*MINIMUM
-	-					Ref.72-31-04 Fig.602-161
-	-	<u>0.2000</u> 0.2075	<u>5,080</u> 5,270	0.2100	5,334	
-	-	<u>0.8050</u> 0.8200	<u>20,447</u> 20,828	-	-	
-	-	<u>-0.0007</u> +0.0023	<u>-0,018</u> +0,059	+0.0023	+0,076	

Table 601 (Continued) (Sheet 17 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-192	LABYRINTH NO.13 CLEAR- ANCE BETWEEN COVER UNIT AND HP DRIVE SHAFT LABYRINTH	Housing -	8.7200	221,488	8.7290	221,717
		Bore	8.7230	221,564		
		Labyrinth -	8.6990	220,955	8.6930	220,802
		Diameter	8.7000	220,980		
602-193	LABYRINTH NO.14 CLEAR- ANCE BETWEEN BEARING HOUSING ASSEMBLY AND HP DRIVE SHAFT LABYRINTH	Housing -	7.8200	198,628	7.8290	198,857
		Bore	7.8230	198,704		
		Labyrinth -	7.7990	198,095	7.7930	197,942
		Diameter	7.8000	198,120		
602-194	LABYRINTH NO.15 CLEAR- ANCE BETWEEN BEARING HOUSING ASSEMBLY AND HP DRIVE SHAFT LABYRINTH	Housing -	7.4200	188,468	7.4240	188,570
		Bore	7.4230	188,544		
		Labyrinth -	7.3990	187,935	7.3980	187,909
		Diameter	7.4000	187,960		
602-195	HP TURBINE BEARING IN BEARING HOUSING ASSEMBLY	Housing -	8.7540	222,352	8.7555	222,390
		Bore	8.7552	222,382		
		Bearing -	8.7482	222,204	8.7480	222,199
		Diameter	8.7485	222,212		
		Housing -	8.7540	222,352	-	-
		Bore	8.7552	222,382		
		Bearing -	8.7475	222,186	-	-
		Diameter	8.7485	222,212		

Table 601 (Continued) (Sheet 18 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					Ref.72-51-01 Fig.602-192
		$\frac{0.0200}{0.0240}$	$\frac{0,508}{0,610}$	0.0360	0,914	
-	-					
-	-					Ref.72-51-01 Fig.602-193
		$\frac{0.0200}{0.0240}$	$\frac{0,508}{0,610}$	0.0360	0,914	
-	-					
-	-					Ref.72-51-01 Fig.602-194
		$\frac{0.0200}{0.0240}$	$\frac{0,508}{0,610}$	0.0260	0,660	
-	-					
8.7557	222,395					Pre SB.72-17
		$\frac{0.0055}{0.0070}$	$\frac{0,140}{0,178}$	0.0075	0,190	Ref.72-51-01 Fig.602-195
8.7477	222,192					
-	-	$\frac{0.0055}{0.0077}$	$\frac{0,140}{0,196}$	-	-	SB.72-17

Table 601 (Continued) (Sheet 18 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-196	HP TURBINE BEARING	Diametrical Clearance	-	-	-	-
602-197	HP TURBINE BEARING ON HP DRIVE SHAFT	Bearing - Bore	<u>6.7512</u> 6.7517	<u>171,480</u> 171,493	6.7518	171,496
		Shaft - Diameter	<u>6.7507</u> 6.7512	<u>171,468</u> 171,480	6.7506	171,465
602-198	HP TURBINE HUB UNIT ON HP DRIVE SHAFT	Hub - Bore	<u>6.7200</u> 6.7210	<u>170,688</u> 170,713	6.7211	170,716
		Shaft - Diameter	<u>6.7196</u> 6.7206	<u>170,678</u> 170,703	6.7196	170,678
602-202	HP DRIVE SHAFT SERRATIONS IN HP TURBINE HUB SERRATIONS	Hub Unit - Serrations (Square)	<u>4.6110</u> 4.6140	<u>117,119</u> 117,196	4.6145	117,208
		Shaft - Serrations (Square)	<u>4.6090</u> 4.6120	<u>117,069</u> 117,145	4.6085	117,056
602-206	CENTERING RING ON HP DRIVE SHAFT	Ring - Bore	<u>6.5200</u> 6.5210	<u>165,608</u> 165,633	6.5210	165,633
		Shaft - Diameter	<u>6.5196</u> 6.5206	<u>165,598</u> 165,623	6.5195	165,595
602-207	LABYRINTH NO.24 AND 26 IN HP DRIVE SHAFT	Shaft - Bore	<u>5.8500</u> 5.8510	<u>148,590</u> 148,615	5.8511	148,618
		Labyrinth - Diameter	<u>5.8496</u> 5.8506	<u>148,580</u> 148,605	5.8494	148,575

Table 601 (Concluded) (Sheet 19 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0100}{0.0110}$	$\frac{0,254}{0,279}$	0.0110	0,279	
6.7519	171,498					
		$\frac{0.0000}{0.0010}$	$\frac{0,000}{0,025}$	0.0012	0,031	
6.7505	171,463					
6.7211	170,716					MODULE BREAK POSITION.
		$\frac{-0.0006}{+0.0014}$	$\frac{-0,015}{+0,036}$	+0.0015	0,038	Ref.72-51-03 Fig.601-198
6.7196	170,678					
4.6145	117,208					MODULE BREAK POSITION.
		$\frac{-0.0010}{+0,0050}$	$\frac{-0,025}{+0,127}$	+0.0060	0,152	Ref.72-51-03 Fig.601-202
4.6085	117,056					
6.5210	165,633					MODULE BREAK POSITION.
		$\frac{-0.0006}{+0.0014}$	$\frac{-0,015}{+0,035}$	+0.0015	0,038	Ref.72-51-03 Fig.601-206
6.5195	165,595					
5.8511	148,618					MODULE BREAK POSITION.
		$\frac{-0.0006}{+0.0014}$	$\frac{-0,015}{+0,036}$	+0.0017	+0,043	Ref.72-51-03 Fig.601-207
5.8494	148,575					

Table 601 (Concluded) (Sheet 19 - RH)

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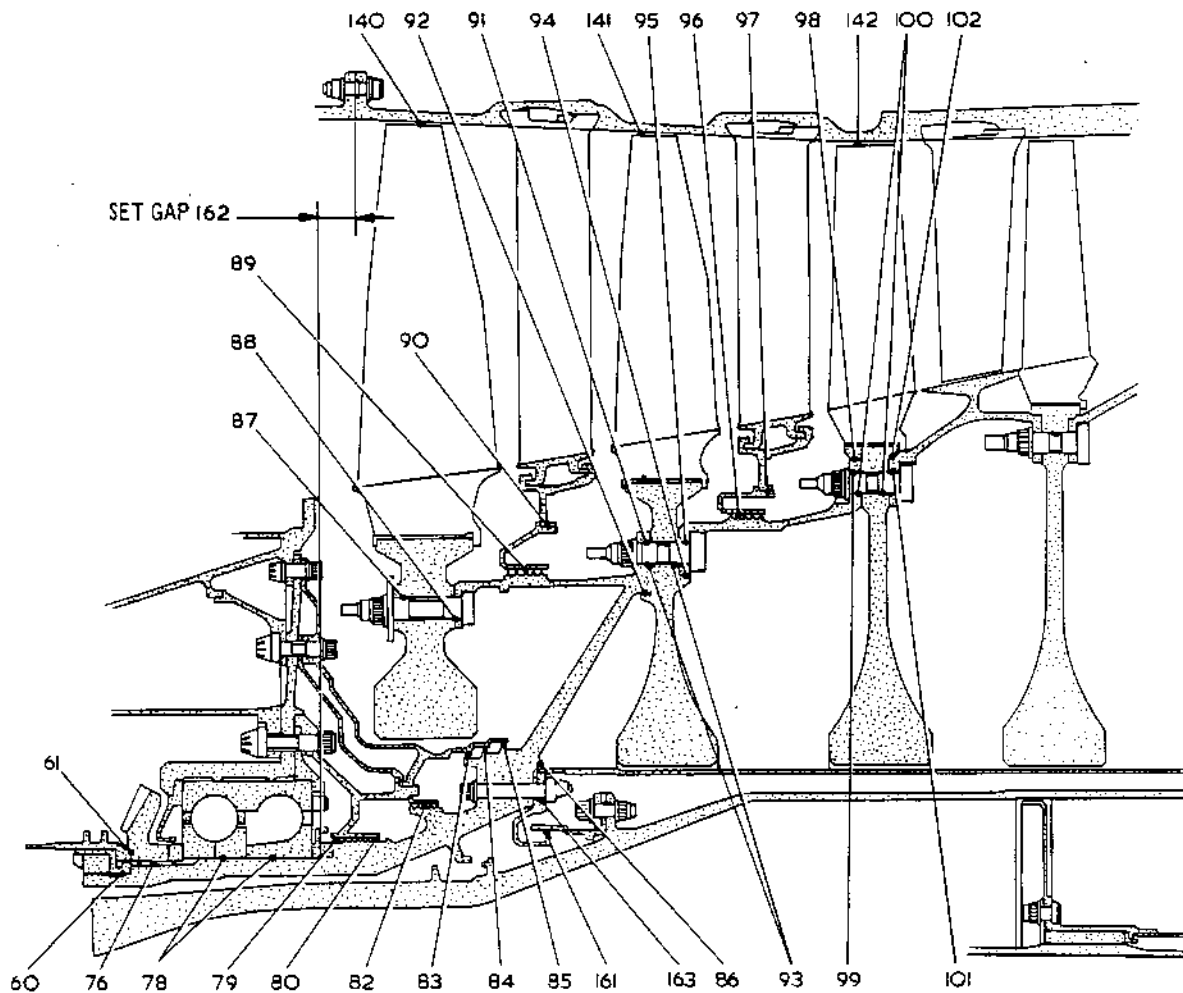
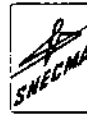
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HP Compressor Assembly
Figure 601 (Sheet 1 - LH)

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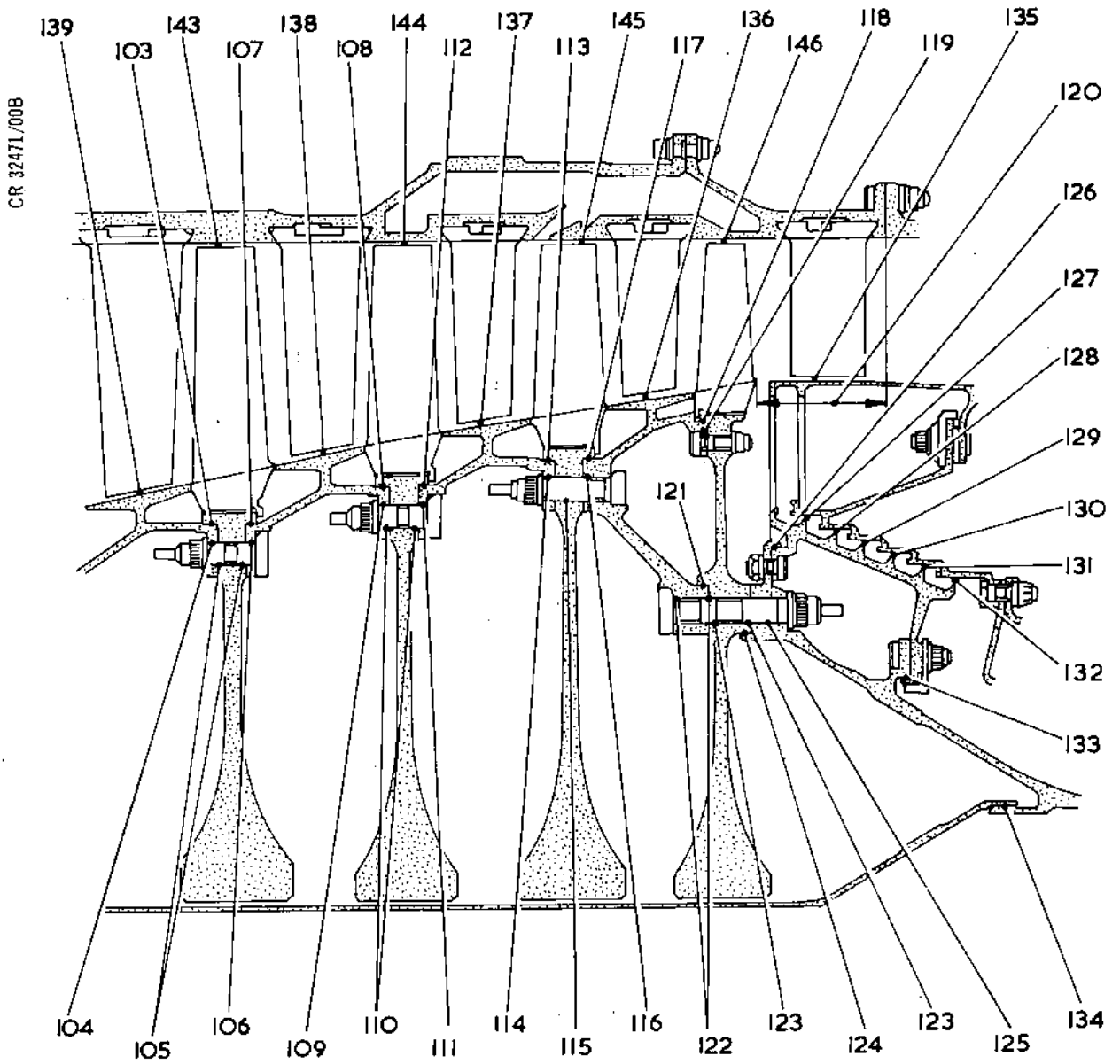


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HP Compressor Assembly
Figure 601 (Sheet 2 - RH)

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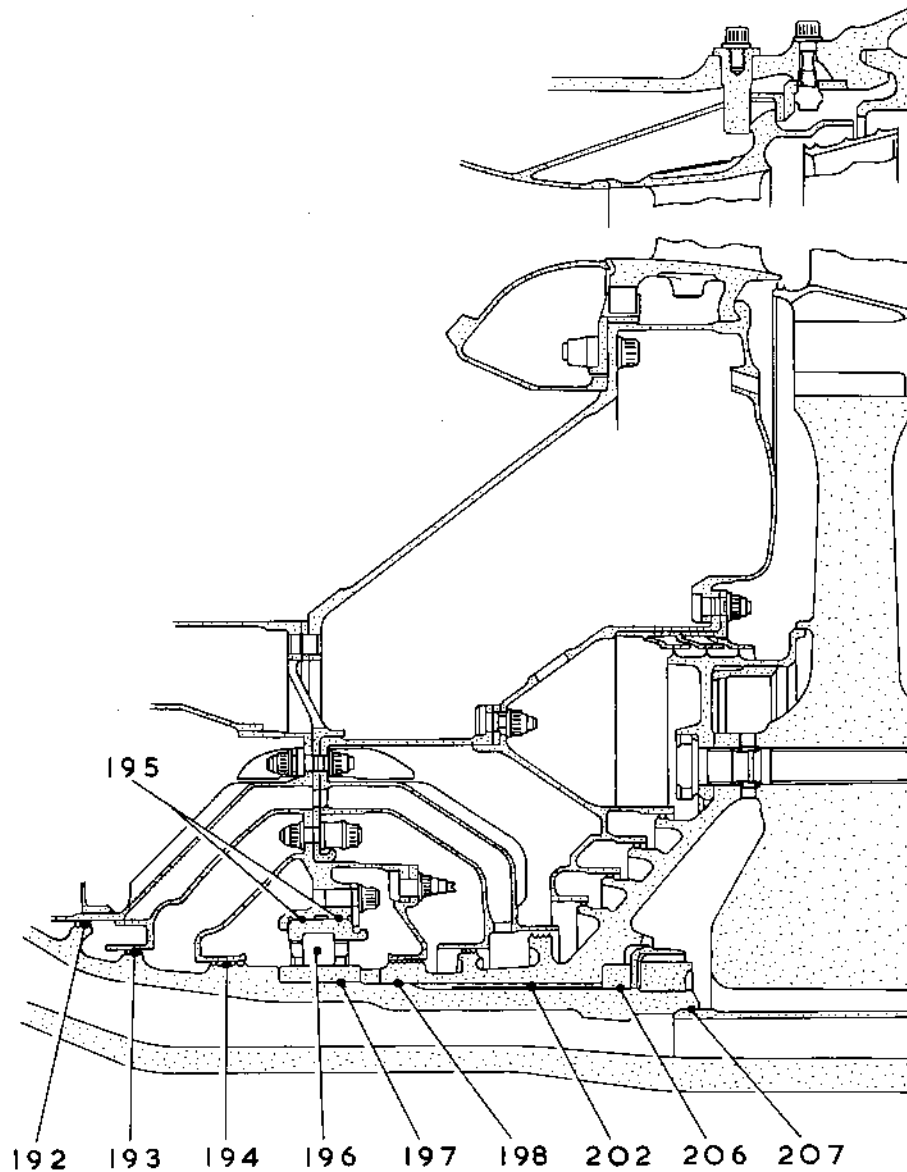


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CR 32451/DDA



HP Compressor Assembly
Figure 602

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HP COMPRESSOR DIFFUSER CASE ASSEMBLY - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-127	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 2	Seal -	<u>22.3300</u>	<u>567,182</u>	22.3360 567,334
		Bore	<u>22.3350</u>	<u>567,309</u>	
		Labyrinth	<u>22.2500</u>	<u>565,150</u>	22.2410 564,921
		- Diameter	<u>22.2550</u>	<u>565,277</u>	
		Seal -	<u>22.3300</u>	<u>567,182</u>	22.3360 567,334
		Bore	<u>22.3350</u>	<u>567,309</u>	
601-128	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 3	Labyrinth	<u>22.2450</u>	<u>565,023</u>	22.2410 564,921
		- Diameter	<u>22.2500</u>	<u>565,150</u>	
		Seal -	<u>21.9000</u>	<u>556,260</u>	21.9050 556,387
		Bore	<u>21.9050</u>	<u>556,387</u>	
		Labyrinth	<u>21.8100</u>	<u>553,974</u>	21.8100 553,974
		- Diameter	<u>21.8150</u>	<u>554,101</u>	
		Seal -	<u>21.9000</u>	<u>556,260</u>	21.9050 556,387
		Bore	<u>21.9050</u>	<u>556,387</u>	
		Labyrinth	<u>21.8150</u>	<u>554,101</u>	21.8100 553,974
		- Diameter	<u>21.8200</u>	<u>554,228</u>	

Table 601 (Continued) (Sheet 1 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					Ref.72-33-00 Fig.601-127 S.B.72-8430- 123 PART 1
22.2400	564,896	$\frac{0.0750^*}{0.0850}$	$\frac{1,905^*}{2,159}$	0.0950	2,413	
-	-					
22.2400	564,896	$\frac{0.0800^*}{0.0900}$	$\frac{2,032^*}{2,286}$	0.0950	2,413	S.B.72-8430- 123 PART 2
-	-					
-	-	$\frac{0.0850^*}{0.0950}$	$\frac{2,159^*}{2,413}$	0.0950	2,413	Ref.72-33-00 Fig.601-128 S.B.72-8430- 123 PART 1
-	-					
-	-	$\frac{0.0800^*}{0.0900}$	$\frac{2,032^*}{2,286}$	0.0950	2,413	S.B.72-8430- 123 PART 2 PRE SB.72-8574- 287
-	-					

* CLEARANCE AT HORIZONTAL C. NO.12 LABYRINTH HOUSING ECCENTRIC TO GIVE ADDITIONAL RADIAL CLEARANCE OF 0.0080 TO 0.010 (0,203 TO 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 1 - RH)

FITS AND CLEARANCES

72-34-00

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**OLYMPUS 593**MK.610-14-28
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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)		
		IN.	MM	IN.	MM	
601-128	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 3	Seal -	<u>21.8820</u>	<u>555,803</u>	21.887	555,930
		Bore	<u>21.8870</u>	<u>555,930</u>		
		Labyrinth	<u>21.8100</u>	<u>553,974</u>	21.8100	553,974
		- Diameter	<u>21.8150</u>	<u>554,101</u>		
		Seal -	<u>21.8820</u>	<u>555,803</u>	21.8870	555,930
		Bore	<u>21.8870</u>	<u>555,930</u>		
601-129	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 4	Labyrinth	<u>21.8150</u>	<u>554,101</u>	21.8100	553,974
		- Diameter	<u>21.8200</u>	<u>554,228</u>		
		Seal -	<u>21.4600</u>	<u>545,084</u>	21.4650	545,211
		Bore	<u>21.4650</u>	<u>545,211</u>		
		Labyrinth	<u>21.3700</u>	<u>542,798</u>	21.3700	542,798
		- Diameter	<u>21.3750</u>	<u>542,925</u>		
		Seal -	<u>21.4600</u>	<u>545,084</u>	21.4650	545,211
		Bore	<u>21.4650</u>	<u>545,211</u>		
		Labyrinth	<u>21.3750</u>	<u>542,925</u>	21.3700	542,798
		- Diameter	<u>21.3800</u>	<u>543,052</u>		

Table 601 (Continued) (Sheet 2 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					Ref.72-33-00 Fig.601-128
		$\frac{0.0670^*}{0.0770}$	$\frac{1,702^*}{1,956}$	0.0770	1,956	S.B.72-8574- 278
-	-					
-	-					
		$\frac{0.0620^*}{0.0720}$	$\frac{1,575^*}{1,829}$	0.0770	1,956	S.B.72-8574- 278
-	-					
-	-					Ref.72-33-00 Fig.601-129
		$\frac{0.0850^*}{0.0950}$	$\frac{2,159^*}{2,413}$	0.0950	2,413	S.B.72-8430- 123 PART 1
-	-					
-	-					
		$\frac{0.0800^*}{0.0900}$	$\frac{2,032^*}{2,286}$	0.0950	2,413	S.B.72-8430- 123 PART 2
-	-					PRE S.B.72- 8574-278

* CLEARANCE AT HORIZONTAL C. NO.12 LABYRINTH HOUSING ECCENTRIC TO GIVE ADDITIONAL RADIAL CLEARANCE OF 0.0080 TO 0.010 (0,203 TO 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 2 - RH)

FITS AND CLEARANCES

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**OLYMPUS 593**MK.610-14-28
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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-129	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 4	Seal -	<u>21.4420</u>	<u>544,627</u>	21.4470 544,754
		Bore	<u>21.4470</u>	<u>544,754</u>	
		Labyrinth	<u>21.3700</u>	<u>542,798</u>	21.3700 542,798
		- Diameter	<u>21.3750</u>	<u>542,925</u>	
		Seal -	<u>21.4420</u>	<u>544,627</u>	21.4470 544,754
		Bore	<u>21.4470</u>	<u>544,754</u>	
		Labyrinth	<u>21.3750</u>	<u>542,925</u>	21.3700 542,798
		- Diameter	<u>21.3800</u>	<u>543,052</u>	
		Seal -	<u>21.0140</u>	<u>533,756</u>	21.0190 533,883
		Bore	<u>21.0190</u>	<u>533,883</u>	
		Labyrinth	<u>20.9300</u>	<u>531,622</u>	20.9240 531,470
		- Diameter	<u>20.9350</u>	<u>531,749</u>	
601-130	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 5	Seal -	<u>21.0140</u>	<u>533,756</u>	21.0190 533,883
		Bore	<u>21.0190</u>	<u>533,883</u>	
		Labyrinth	<u>20.9300</u>	<u>531,622</u>	20.9240 531,470
		- Diameter	<u>20.9350</u>	<u>531,749</u>	
		Seal -	<u>21.0140</u>	<u>533,756</u>	21.0190 533,883
		Bore	<u>21.0190</u>	<u>533,883</u>	
		Labyrinth	<u>20.9290</u>	<u>531,597</u>	20.9240 531,470
		- Diameter	<u>20.9340</u>	<u>531,724</u>	

Table 601 (Continued) (Sheet 3 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					S.B.72-8574-278
		$\frac{0.0670^*}{0.0770}$	$\frac{1,702^*}{1,956}$	0.0770	1,956	Ref.72-33-00
-	-					Fig.601-129
-	-					
		$\frac{0.0620^*}{0.0720}$	$\frac{1,575^*}{1,829}$	0.0770	1,956	S.B.72-8574-278
-	-					
-	-					Ref.72-33-00
		$\frac{0.0790^*}{0.0890}$	$\frac{2,007^*}{2,261}$	0.0950	2,413	Fig.601-130
-	-					S.B.72-8430-
-	-					123 PART 1
		$\frac{0.0800^*}{0.0900}$	$\frac{2,032^*}{2,286}$	0.0950	2,413	S.B.72-8430-
-	-					123 PART 2
-	-					PRE S.B.72-
						8574-278

* CLEARANCE AT HORIZONTAL C. NO.12 LABYRINTH HOUSING ECCENTRIC TO GIVE ADDITIONAL RADIAL CLEARANCE OF 0.0080 TO 0.010 (0,203 TO 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 3 - RH)

FITS AND CLEARANCES

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**OLYMPUS 593**MK.610-14-28
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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-130	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 5	Seal -	<u>20.9960</u>	<u>533,298</u>	21.0010 533,425
		Bore	<u>21.0190</u>	<u>533,425</u>	
		Labyrinth	<u>20.9300</u>	<u>531,622</u>	20.9240 531,470
		- Diameter	<u>20.9350</u>	<u>531,749</u>	
		Seal -	<u>20.9960</u>	<u>533,299</u>	21,0010 533,883
		Bore	<u>21.0010</u>	<u>533,425</u>	
		Labyrinth	<u>20.9290</u>	<u>531,597</u>	20.9240 531,470
		- Diameter	<u>20.9340</u>	<u>531,724</u>	
601-131	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 6	Seal -	<u>20.5650</u>	<u>522,351</u>	20.5700 522,478
		Bore	<u>20.5700</u>	<u>522,478</u>	
		Labyrinth	<u>20.4900</u>	<u>520,446</u>	20.4750 520,065
		- Diameter	<u>20.4950</u>	<u>520,573</u>	
		Seal -	<u>20.5650</u>	<u>522,351</u>	20.5700 522,478
		Bore	<u>20.5700</u>	<u>522,478</u>	
		Labyrinth	<u>20.4800</u>	<u>520,192</u>	20.4750 520,065
		- Diameter	<u>20.4850</u>	<u>520,319</u>	

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Table 601 (Continued) (Sheet 4 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					Ref.72-33-00
		$\frac{0.0610^*}{0.0710}$	$\frac{1,549^*}{1,803}$	0.0770	1,956	Fig.601-130
-	-					S.B.72-8574-278
-	-					
		$\frac{0.0620^*}{0.0720}$	$\frac{1,575^*}{1,828}$	0.0770	1,956	
-	-					
		$\frac{0.0700^*}{0.0800}$	$\frac{1,778^*}{2,032}$	0.0950	2,413	Ref.72-33-00
-	-					Fig.601-131
						S.B.72-8430-123 PART 1
-	-					
		$\frac{0.0800^*}{0.0900}$	$\frac{2,032^*}{2,286}$	0.0950	2,413	S.B.72-8430-123 PART 2
-	-					PRE S.B.
						72-8574-278

* CLEARANCE AT HORIZONTAL ϕ . NO.12 LABYRINTH HOUSING ECCENTRIC TO GIVE ADDITIONAL RADIAL CLEARANCE OF 0.0080 TO 0.010 (0,203 TO 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 4 - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)		
		IN.	MM	IN.	MM	
601-131	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 6	Seal -	<u>20.5470</u>	<u>521,894</u>	20.5520	522,021
		Bore	<u>20.5520</u>	<u>522,021</u>		
		Labyrinth	<u>20.4900</u>	<u>520,446</u>	20.4750	520,065
		- Diameter	<u>20.4950</u>	<u>520,573</u>		
		Seal -	<u>20.5470</u>	<u>522,351</u>	20.5520	522,021
		Bore	<u>20.5520</u>	<u>522,478</u>		
		Labyrinth	<u>20.4800</u>	<u>520,192</u>	20.4750	520,065
		- Diameter	<u>20.4850</u>	<u>520,319</u>		
601-132	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 7	Seal -	<u>20.1170</u>	<u>510,972</u>	20.1220	511,099
		Bore	<u>20.1220</u>	<u>511,099</u>		
		Labyrinth	<u>20.0500</u>	<u>509,270</u>	20.0270	508,686
		- Diameter	<u>20.0550</u>	<u>509,397</u>		
		Seal -	<u>20.1170</u>	<u>510,972</u>	20.1220	511,099
		Bore	<u>20.1220</u>	<u>511,099</u>		
		Labyrinth	<u>20.0320</u>	<u>508,813</u>	20.0270	508,686
		- Diameter	<u>20.0370</u>	<u>508,940</u>		

Table 601 (Continued) (Sheet 5 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					Ref.72-33-00 Fig.602-131
		$\frac{0.0520^*}{0.0620}$	$\frac{1,321^*}{1,575}$	0.0770	1,956	S.B.72-8574- 278
-	-					
-	-					
		$\frac{0.0620^*}{0.0720}$	$\frac{1,575^*}{1,829}$	0.0770	1,956	
-	-					
-	-					Ref.72-33-00 Fig.601-132
		$\frac{0.0620^*}{0.0720}$	$\frac{1,575^*}{1,829}$	0.0950	2,413	S.B.72-8430- 123 PART 1
-	-					
-	-					
		$\frac{0.0800^*}{0.0900}$	$\frac{2,032^*}{2,286}$	0.0950	2,413	S.B.72-8430- 123 PART 2
-	-					PRE S.B. 72-8574-278

* CLEARANCE AT HORIZONTAL ϕ . NO.12 LABYRINTH HOUSING ECCENTRIC TO GIVE ADDITIONAL RADIAL CLEARANCE OF 0.0080 TO 0.010 (0,203 TO 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Continued) (Sheet 5 - RH)

FITS AND CLEARANCES

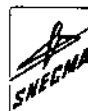
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OVERHAUL

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-132	LABYRINTH NO.12 IN LABYRINTH SEAL STATION 7	Seal -	<u>20.0990</u>	<u>510,515</u>	20.1040 510,642
		Bore	<u>20.1040</u>	<u>510,642</u>	
	Labyrinth - Diameter	<u>20.0500</u>	<u>509,270</u>	20.0270	508,686
		<u>20.0550</u>	<u>509,397</u>		
	Seal - Bore	<u>20.0990</u>	<u>510,515</u>	20.1040	510,642
		<u>20.1040</u>	<u>510,642</u>		
	Labyrinth - Diameter	<u>20.0320</u>	<u>508,813</u>	20.0270	508,686
		<u>20.0370</u>	<u>508,940</u>		
601-135 **	TIP CLEAR- ANCE OF EXIT GUIDE VANE TO DIFFUSER CASE	-	-	-	-

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Table 601 (Concluded) - (Sheet 6 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					Ref.72-33-00 Fig.601-132
		$\frac{0.0440^*}{0.0540}$	$\frac{1,118^*}{1,372}$	0.0770	1,956	S.B.72-8574- 278
-	-					
-	-					
		$\frac{0.0620^*}{0.0720}$	$\frac{1,575^*}{1,829}$	0.0770	1,956	
-	-					
-	-	0.0850*	2,159*	-	-	*MINIMUM Ref.72-33-00 Fig.601-135 Ref.72-00-00 Fig.601-135

* CLEARANCE AT HORIZONTAL ϕ . NO.12 LABYRINTH HOUSING ECCENTRIC TO GIVE ADDITIONAL RADIAL CLEARANCE OF 0.0080 TO 0.010 (0,203 TO 0,254) AT BOTTOM DEAD CENTRE.

Table 601 (Concluded) - (Sheet 6 - RH)

FITS AND CLEARANCES

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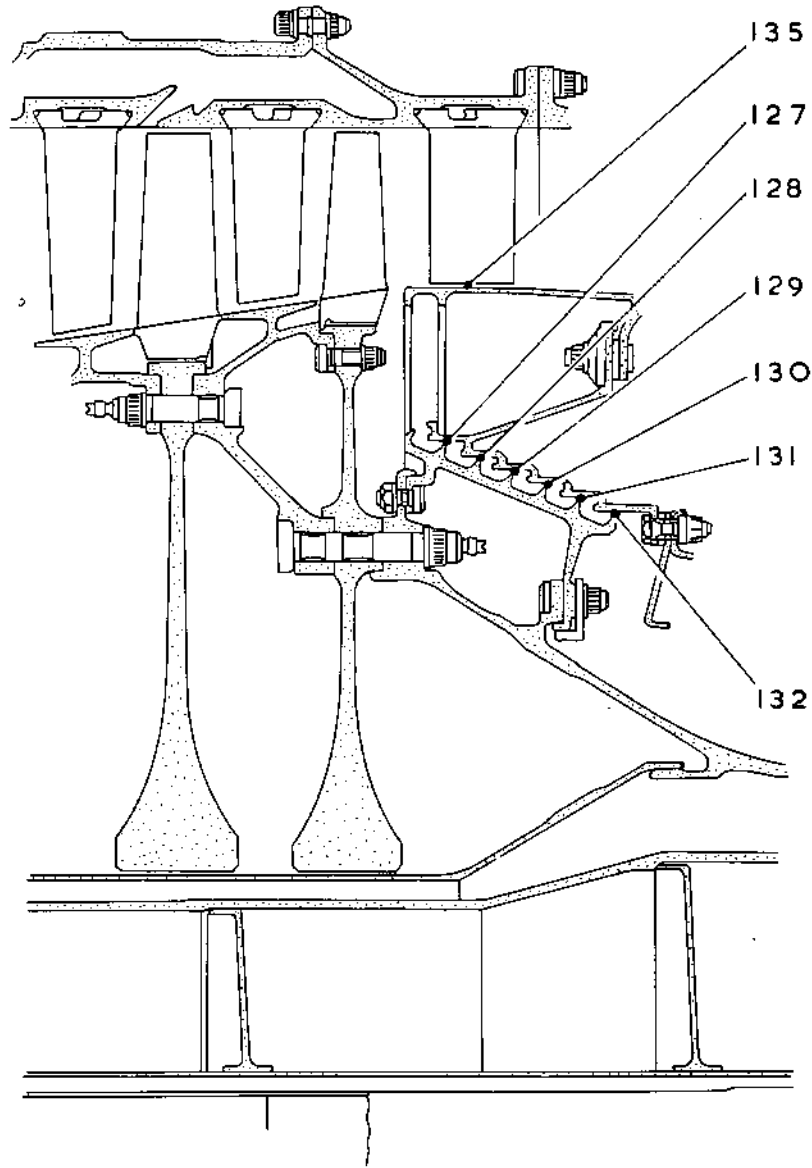
TN7744

CR 32453/008



OLYMPUS 593

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TN22278

HP Compressor Diffuser Case Assembly
Figure 601

FITS AND CLEARANCES

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OVERHAUL



COMBUSTION SECTION - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FITS AND CLEARANCES

72-40-00

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Aug 1/75

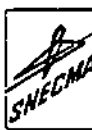
**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-175 **	TURBINE ENTRY DUCT TO HP STATOR SEGMENT	Gap (Inner)	-	-	-
		Gap (Inner)	-	-	-
601-176	IGNITER PLUG INSIDE ANNULAR COMBUSTION CHAMBER	Tip Penetration	-	-	-
601-177	FUEL PRES- SURE ATOMI- ZING (PILOT) NOZZLE INSIDE ANNULAR COMBUSTION CHAMBER	Tip Penetration	-	-	-
			-	-	-

Table 601 (LH)

FITS AND CLEARANCES

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TN27944

British airways

CONCORDE

OLYMPUS 539 OVERHAUL MANUAL

Temporary Revision No. 72-583
Insert in 72-40-00 before page 603

REASON FOR ISSUE:

Reissue of TR.72-546 to align with RR Revision 61

ACTION

Amend Fig and Ref No. 601-177 as follows:

CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
Ins.	mm.	Ins.	mm.	
0.1400	3,556	NOT APPLICABLE		Pre S.B.73-12 Ref: 72-40-00, Fig.601-177
0.216	5,486			
0.1400	3,556	NOT APPLICABLE		S.B.73-12.
0.250	6,350			

NOTE: These dimensions refer to the distance from the end of the nozzle to the combustion chamber inside surface.

28 Feb.83

TR.72-583
72-40-00
TR. Page 1 of 1



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OVERHAUL



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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	0.0020* 0.0480	0,051* 1,219	0.0020 0.0480	0,051* 1,219	PRE-S.B.72-64 'INDIVIDUAL' ACCEPTABLE GAP WITH HP NOZZLE VANE LOADED REAR- WARD AND INBOARD
-	-	0.0080* 0.0240	0,203* 0,610	0.0080* 0.0240	0,203* 0,610	S.B.72-64 'AVERAGE' ACCEPTABLE GAP OF ALL NOZZLE VANES WITH HP NOZZLE VANES LOADED REARWARD AND INBOARD *OUTER GAP MUST HAVE CLEARANCE WHEN CHECKING THE INNER GAP Ref.72-51-02 Fig.601-175
-	-	<u>0.1000</u> 0.2000	<u>2,540</u> 5,080	<u>0.1000</u> 0.2000	<u>2,540</u> 5,080	PRE-S.B. 72-8679-282 Ref.72-00-00 Fig.601-176
-	-	<u>0.1000</u> 0.1300	<u>2,540</u> 3,302	<u>0.1000</u> 0.1300	<u>2,540</u> 3,302	S.B.72-8679-282 Ref.72-00-00 Fig.601-176
-	-	<u>0.1400</u> 0.2160	<u>3,556</u> 5,486	0.1360* 0.1400*	3,454* 3,556*	PRE-S.B.73-12 *MINIMUM Ref.72-00-00 Fig.601-177
-	-	<u>0.1400</u> 0.2500	<u>3,556</u> 6,350	0.1400*	3,556*	S.B.73-12

Table 601 (RH)

FITS AND CLEARANCES

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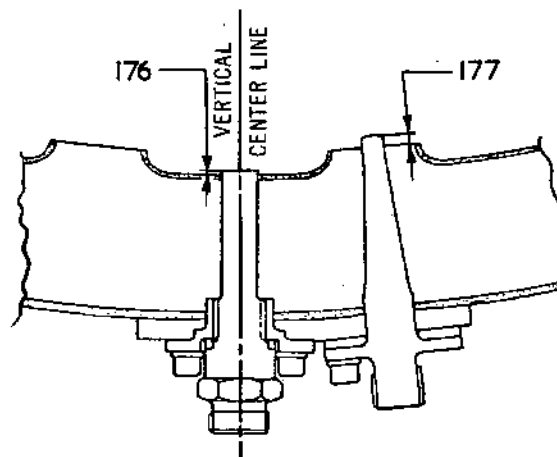
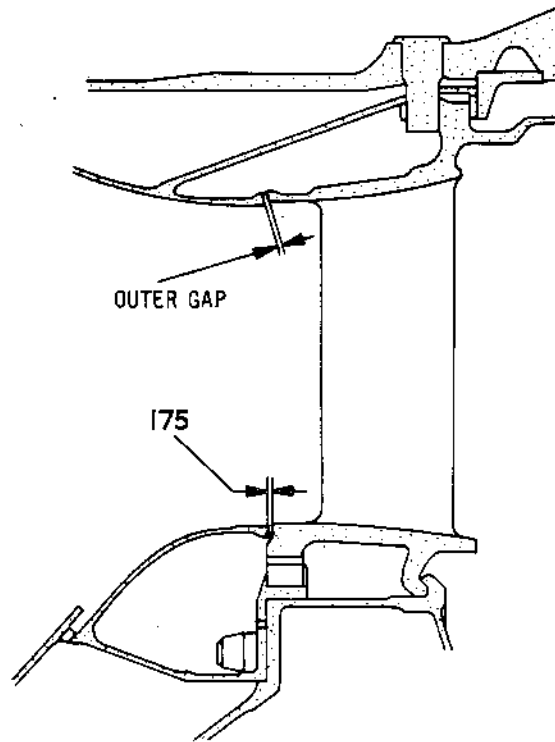
OLYMPUS 593

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OVERHAUL



CR 32520/00C



PART SECTION THROUGH PRIMARY ZONE OF
ANNULAR COMBUSTION CHAMBER

Combustion Section
Figure 601

FITS AND CLEARANCES

72-40-00

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Nov 1/76

191311



OLYMPUS 593

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OVERHAUL



HP TURBINE BEARING SUPPORT - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-180	SEAL RING ASSEMBLY IN COUPLING GROOVE	Coupling -	0.1260	3,200	0.1275	3,238
		Groove	0.1270	3,226		
		Width				
		Ring -	0.1220	3,099		
601-181	SEAL RING ASSEMBLY IN HP COM- PRESSOR DIFFUSER SEAL HOUS- ING, VANES 1 AND 4	Assembly	0.1240	3,150	0.1215	3,086
		Width				
		Gap in -	-	-		
		Position				
601-182	SEAL RING ASSEMBLY IN COUPLING GROOVE	Seal	4.2500	107,950	0.1275	3,238
		Housing	4.2520	108,001		
		Bore				
		Coupling -	0.1260	3,200		
601-183	SEAL RING ASSEMBLY IN HP COM- PRESSOR DIFFUSER SEAL HOUS- ING, VANES 3 AND 6	Groove	0.1270	3,226	0.1215	3,086
		Width				
		Ring -	0.1220	3,099		
		Assembly	0.1240	3,150		
601-184	SEAL RING ASSEMBLY	Width			0.1212	3,078
		Coupling -	0.1260	3,200		
		Groove	0.1270	3,226		
		Width				
601-185	SEAL RING ASSEMBLY IN HP COM- PRESSOR DIFFUSER SEAL HOUS- ING, VANES 3 AND 6	Ring -	0.1220	3,099	0.1212	3,078
		Assembly	0.1240	3,150		
		Width				
		Gap in -	-	-		
601-186	SEAL RING ASSEMBLY IN HP COM- PRESSOR DIFFUSER SEAL HOUS- ING, VANES 3 AND 6	Position			0.1212	3,078
		Seal	4.0000	101,600		
		Housing	4.0020	101,651		
		Bore				

Table 601 (Continued (Sheet 1 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		<u>0.0020</u> 0.0050	<u>0,051</u> 0,127	0.0060	0,152	
-	-	<u>0.0020</u> 0.0080	<u>0,051</u> 0,203	-	-	
		<u>0.0020</u> 0.0050	<u>0,051</u> 0,127	0.0060	0,152	
-	-	<u>0.0020</u> 0.0080	<u>0,051</u> 0,203	-	-	
		<u>0.0020</u> 0.0050	<u>0,051</u> 0,127	0.0060	0,152	

Table 601 (Continued) (Sheet 1 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-185	SEAL RING ASSEMBLY	Gap in - Position	-	-	-
601-186	SEAL RING ASSEMBLY IN COUPLING GROOVE	Coupling - Groove	<u>0.1260</u> <u>0.1270</u>	<u>3,200</u> <u>3,226</u>	0.1275 3,238
		Ring - Assembly	<u>0.1220</u> <u>0.1240</u>	<u>3,099</u> <u>3,150</u>	0.1215 3,086
		Width			
		Width			
601-187	SEAL RING ASSEMBLY	Gap in - Position	-	-	-
601-188	SEAL RING ASSEMBLY IN COUPLING GROOVE	Coupling - Groove	<u>0.1260</u> <u>0.1270</u>	<u>3,200</u> <u>3,226</u>	0.1275 3,238
		Ring - Assembly	<u>0.1220</u> <u>0.1240</u>	<u>3,099</u> <u>3,150</u>	0.1215 3,086
		Width			
		Width			
601-189	SEAL RING ASSEMBLY IN HP COM- PRESSOR DIFFUSER SEAL HOUS- ING, VANE 5	Gap in Position	-	-	-
		Seal Housing	<u>4.0000</u> <u>4.0020</u>	<u>101,600</u> <u>101,651</u>	
		Bore			
602-190	BEARING HOUSING IN COVER UNIT	Cover - Bore	<u>8.7200</u> <u>8.7230</u>	<u>221,488</u> <u>221,564</u>	8.7231 221,567
		Housing - Diameter	<u>8.7188</u> <u>8.7200</u>	<u>221,457</u> <u>221,488</u>	8.7186 221,452

Table 601 (Continued (Sheet 2 - LH)

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OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	<u>0.0020</u> 0.0080	<u>0,051</u> 0,203	-	-	
-	-					
-	-	<u>0.0020</u> 0.0050	<u>0,051</u> 0,127	0.0060	0,152	
-	-					
-	-	<u>0.0020</u> 0.0080	<u>0,051</u> 0,203	-	-	
-	-					
-	-	<u>0.0020</u> 0.0050	<u>0,051</u> 0,127	0.0060	0,152	
-	-					
-	-	<u>0.0020</u> 0.0080	<u>0,051</u> 0,203	-	-	
-	-	-	-	-	-	
-	-					
-	-	<u>0.0000</u> 0.0042	<u>0,000</u> 0,107	0.0045	0,114	
-	-					

Table 601 (Continued (Sheet 2 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-192	LABYRINTH	Housing -	8.7200	221,488	8.7290	221,717
	NO.13	Bore	8.7230	221,564		
	CLEARANCE BETWEEN					
	COVER UNIT	Labyrinth -	8.6990	220,955	8.6930	220,802
	AND HP DRIVE	Diameter	8.7000	220,980		
	SHAFT					
	LABYRINTH					
602-193	LABYRINTH	Housing -	7.8200	198,628	7.8290	198,857
	NO.14 CLEAR-	Bore	7.8230	198,704		
	ANCE BETWEEN					
	BEARING					
	HOUSING	Labyrinth -	7.7990	198,095	7.7930	197,942
	ASSEMBLY AND	Diameter	7.8000	198,120		
	HP DRIVE					
	SHAFT					
602-194	LABYRINTH	Housing -	7.4200	188,468	7.4240	188,569
	NO.15 CLEAR-	Bore	7.4230	188,544		
	ANCE BETWEEN					
	BEARING					
	HOUSING	Labyrinth -	7.3990	187,935	7.3980	187,909
	ASSEMBLY AND	Diameter	7.4000	187,960		
	HP DRIVE					
	SHAFT					
	LABYRINTH					

Table 601 (Continued) (Sheet 3 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					Ref.72-33-00 Fig.602-192
		$\frac{0.0200}{0.0240}$	$\frac{0,508}{0,610}$	0.0360	0,914	
-	-					
-	-					Ref.72-33-00 Fig.602-193
		$\frac{0.0200}{0.0240}$	$\frac{0,508}{0,610}$	0.0360	0,914	
-	-					
-	-					Ref.72-33-00 Fig.602-194
		$\frac{0.0200}{0.0240}$	$\frac{0,508}{0,609}$	0.0260	0,660	
-	-					

Table 601 (Continued) (Sheet 3 - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-195	HP TURBINE BEARING IN BEARING HOUSING ASSEMBLY	Housing -	8.7540	222,352	8.7555	222,390
		Bore	8.7552	222,382		
		Bearing -	8.7482	222,204	8.7480	222,199
		Diameter	8.7485	222,212		
		Housing -	8.7540	222,352	-	-
		Bore	8.7552	222,382		
		Bearing -	8.7475	222,186	-	-
		Diameter	8.7485	222,212		
602-199	LABYRINTH NO.16 CLEAR- ANCE BETWEEN HP TURBINE HUB UNIT FINS AND LABYRINTH RING	Ring -	7.4200	188,468	7.4240	188,570
		Bore	7.4230	188,544		
		Fin -	7.4000	187,960	7.3980	187,909
		Diameter	7.4010	187,985		
602-200	LABYRINTH NO.17 CLEAR- ANCE BETWEEN HP TURBINE HUB UNIT FINS AND SHROUD UNIT	Shroud -	7.8240	198,730	7.8330	198,958
		Bore	7.8270	198,806		
		Fin -	7.7990	198,095	7.7930	197,942
		Diameter	7.8000	198,120		
602-201	LABYRINTH NO.18 CLEAR- ANCE BETWEEN HP TURBINE HUB UNIT FINS AND SHROUD UNIT	Shroud -	8.3240	211,430	8.3330	211,658
		Bore	8.3270	211,506		
		Fin -	8.2990	210,795	8.2930	210,642
		Diameter	8.3000	210,820		

Table 601 (Continued) (Sheet 4 - LH)

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OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
8.7557	222,395					PRE SB.72-17 Ref.72-33-00 Fig.602-195
		<u>0.0055</u> 0.0070	<u>0,140</u> 0,178	0.0075	0,190	
8.7477	222,192					
-	-	<u>0.0055</u> 0.0077	<u>0,140</u> 0,196	-	-	SB.72-17
-	-					
7.4240	188,570					MODULE BREAK POSITION. Ref.72-51-03 Fig.601-199
		<u>0.0190</u> 0.0230	<u>0,483</u> 0,584	0.0260	0,660	
7.3980	187,909					
7.8330	198,958					MODULE BREAK POSITION. Ref.72-51-03 Fig.601-200
		<u>0.0240</u> 0.0280	<u>0,610</u> 0,711	0.0400	1,016	
7.7930	197,942					
8.3330	211,658					MODULE BREAK POSITION. Ref.72-51-03 Fig.601-201
		<u>0.0240</u> 0.0280	<u>0,610</u> 0,711	0.0400	1,016	
8.2930	210,642					

Table 601 (Continued) (Sheet 4 - RH)

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**OLYMPUS 593**MK. 610-14-28
OVERHAUL

FIG. AND REF. NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
602-232	LABYRINTH HOUSING IN SHROUD UNIT	Shroud -	14.2000	360,680	14.2015 360,718
		Bore	14.2014	360,716	
		Housing -	14.1986	360,644	14.1985 360,642
		Diameter	14.2000	360,680	
602-233	SHROUD UNIT IN FRONT BEARING SUPPORT	Support Unit -	14.4500	367,030	14.4515 367,068
		Bore	14.4514	367,066	
		Shroud Unit -	14.4486	366,994	14.4485 366,992
		Diameter	14.4500	367,030	
602-234	COVER UNIT IN AIR DUCT UNIT	Duct Unit -	14.6500	372,110	14.6520 372,161
		Bore	14.6514	372,146	
		Cover -	14.6486	372,074	14.6480 372,059
		Diameter	14.6500	372,110	
601-243	DUCT ASSEMBLY IN COVER UNIT	Cover Unit -	1.3750	34,925	1.3762 34,955
		Bore	1.3760	34,950	
		Duct Assembly -	1.3740	34,900	1.3737 34,892
		Spherical Diameter	1.3746	34,915	
601-244	SEALING RING ASSEMBLY	Gap in Position	-	-	-

Table 601 (Continued) (Sheet 5 - LH)

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IN8070



OLYMPUS 593
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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
14.2015	360,718					MODULE BREAK POSITION. Ref.72-51-02 Fig.601-232
		$\frac{0.0000}{0.0028}$	$\frac{0,000}{0,071}$	0.0030	0,076	
14.1985	360,642					
-	-	$\frac{0.0000}{0.0028}$	$\frac{0,000}{0,071}$	0.0030	0,076	
-	-					
-	-	$\frac{0.0000}{0.0028}$	$\frac{0,000}{0,071}$	0.0040	0,102	
-	-					
-	-	$\frac{0.0004}{0.0020}$	$\frac{0,010}{0,050}$	0.0025*	0,063*	*ACCEPTABLE UP TO 0.0100 IN. (0,254 MM) FOR LIGHT OVERHAUL ONLY
-	-	$\frac{0.0020}{0.0080}$	$\frac{0,051}{0,203}$	-	-	

TABLE 601 (Continued) (Sheet 5 - RH)

FITS AND CLEARANCES

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-245	SEALING RING ASSEMBLY IN PIPE END GROOVE TUBE END WIDTH	0.0770	1,956	0.0795	2,019
		0.0790	2,007		
		0.0740	1,880	0.0735	1,867
		0.0750	1,905		
601-246	SLEEVE IN BEARING HOUSING UNIT	0.7200	18,288	0.7210	18,313
		0.7208	18,308		
		0.7192	18,268	0.7190	18,263
		0.7197	18,280		
601-255	DUCT ASSEMBLY IN ELBOW	1.3750	34,925	1.3762	34,955
		1.3760	34,950		
		1.3740	34,900	1.3737	34,892
		1.3746	34,915		
602-256	BEARING HOUSING ASSEMBLY IN FRONT BEARING SUPPORT	10.5500	267,970	10.5512	268,000
		10.5512	268,000		
		10.5522	268,026	10.5522	268,026
		10.5534	268,056		
602-262 **	LABYRINTH HOUSING TO VANE NOZZLE SUPPORT ASSEMBLY	Set Gap -	-	-	-

Table 601 (Concluded) (Sheet 6 - LH)

FITS AND CLEARANCES

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IN8009



OLYMPUS 593

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OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					
		$\frac{0.0020}{0.0050}$	$\frac{0,051}{0,127}$	0.0060	0,152	
-	-					
-	-					
		$\frac{0.0003}{0.0016}$	$\frac{0,008}{0,041}$	0.0020	0,051	
-	-					
-	-					
		$\frac{0.0004}{0.0020}$	$\frac{0,010}{0,050}$	0.0025*	0,063*	*ACCEPTABLE UP TO 0.0100 IN. (0,254 MM) FOR LIGHT OVERHAUL ONLY
-	-					
-	-					
		$\frac{-0.0034}{-0.0010}$	$\frac{-0,086}{-0,026}$	-0.0010	-0,026	
-	-					
-	-	$\frac{2.9800}{2.9850}$	$\frac{75,692}{75,819}$	-	-	Ref.72-00-00 Fig.602-262

Table 601 (Concluded) (Sheet 6 - RH)

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TN28228

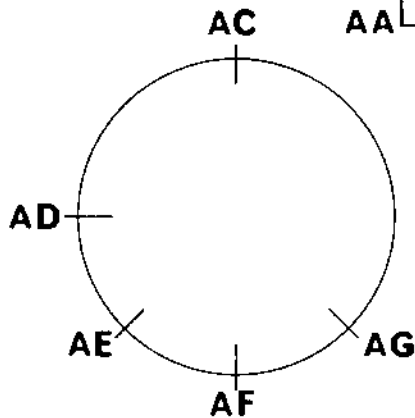
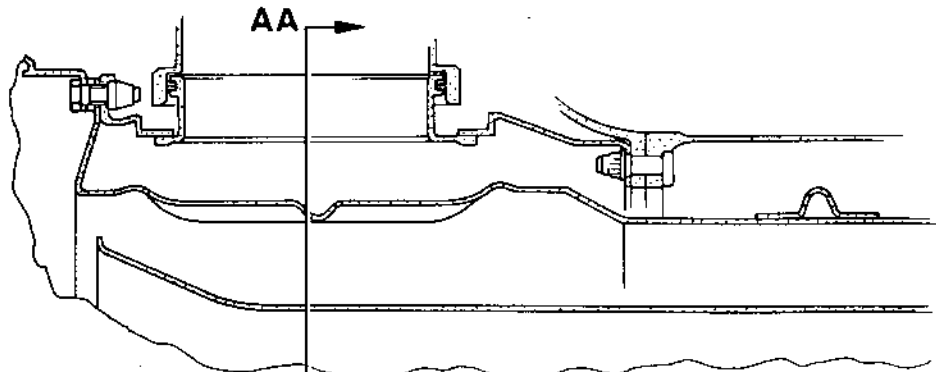


OLYMPUS 593

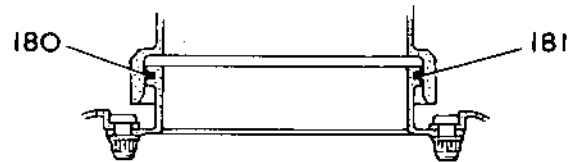
MK.610-14-28
OVERHAUL



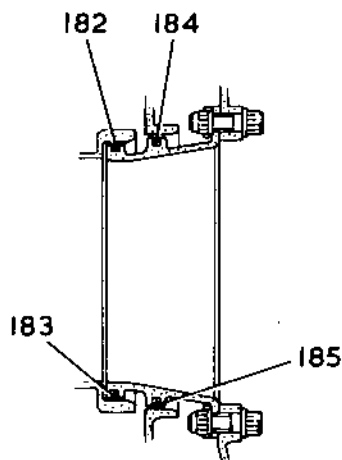
CR 32456/00A



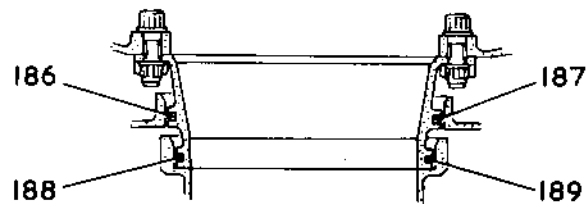
DIAGRAMMATIC VIEW AT SECTION AA



SECTION AT AC
SECTION AT AE SIMILAR



SECTION AT AD
SECTION AT AG SIMILAR



SECTION AT AF

HP Turbine Bearing Support
Figure 601 (Sheet 1 - LH)

FITS AND CLEARANCES

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TN24575



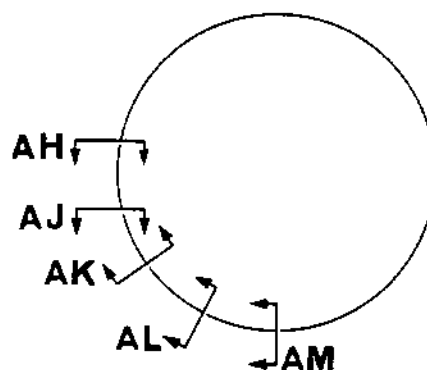
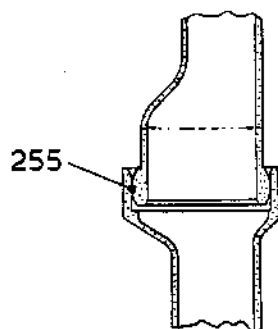
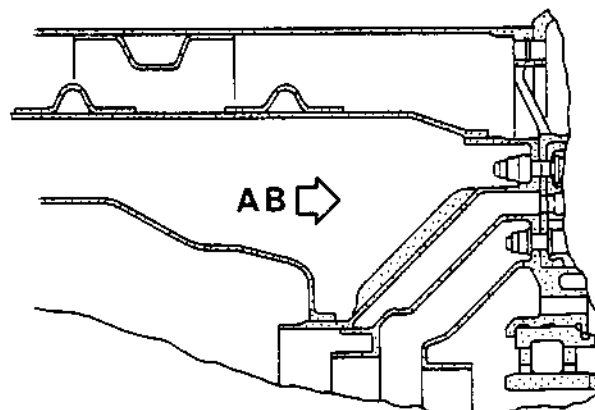
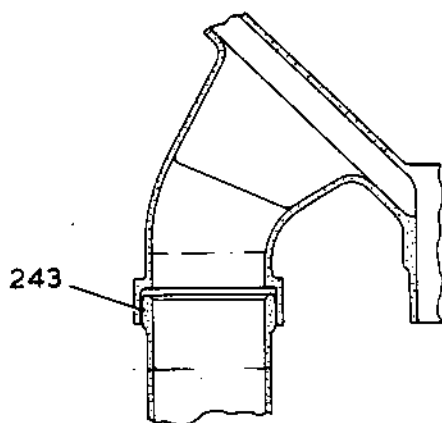
OLYMPUS 593

MK.610-14-28

OVERHAUL

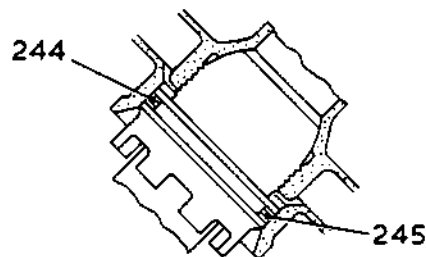
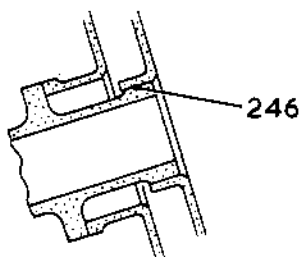


CR 32472/00B



SECTION AT AH
SECTION AT AJ SIMILAR

DIAGRAMMATIC VIEW IN DIRECTION OF ARROW AB



SECTION AT AL

SECTION AT AM
SECTION AT AK SIMILAR

HP Turbine Bearing Support
Figure 601 (Sheet 2 - RH)

FITS AND CLEARANCES

72-51-01

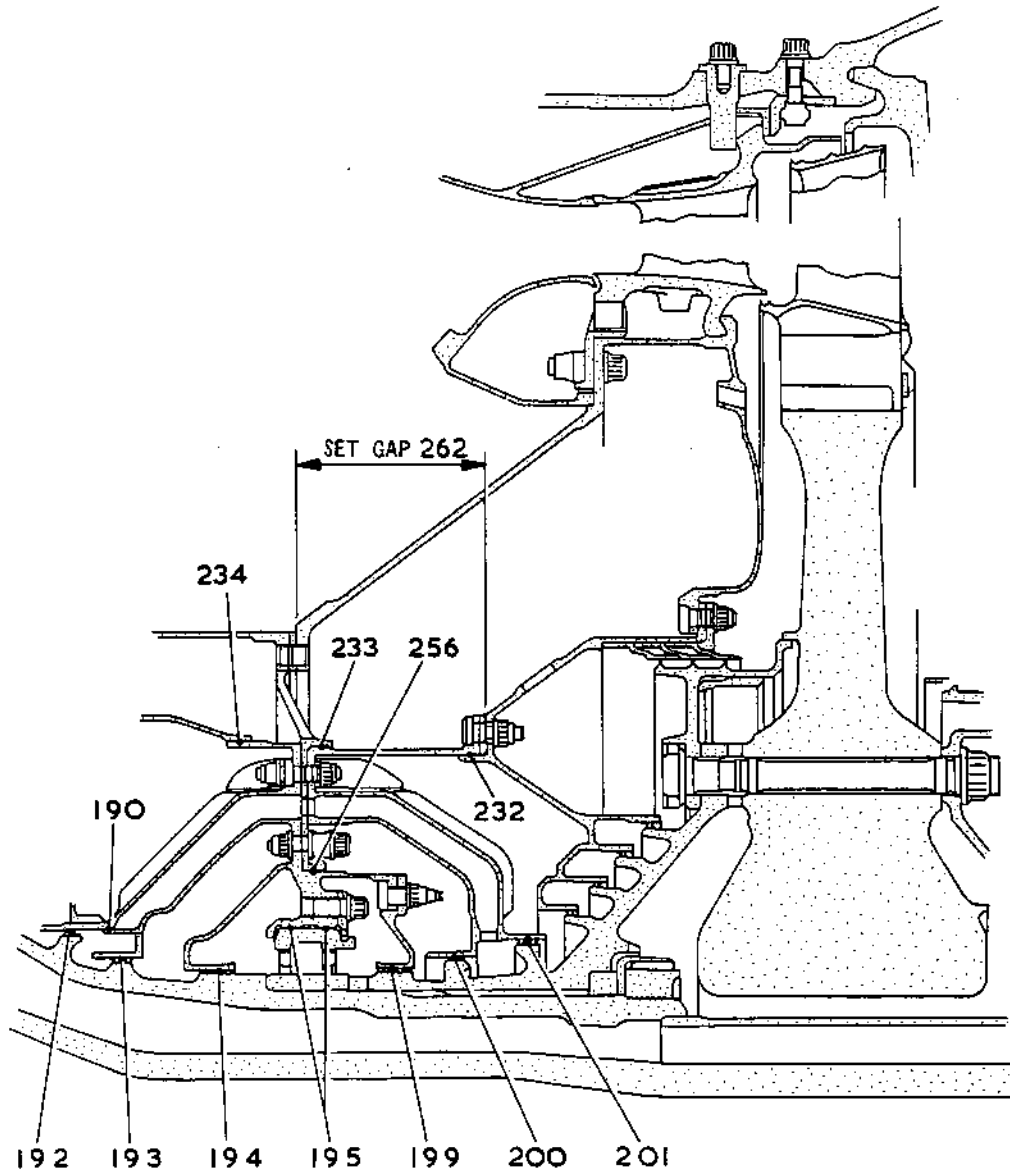
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CR 32457/00D



TN27943

HP Turbine Bearing Support
Figure 602

FITS AND CLEARANCES

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OVERHAUL



HP TURBINE NOZZLES - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FITS AND CLEARANCES

72-51-02

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**OLYMPUS 593**

MK.610-14-28

OVERHAUL



FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-175 **	TURBINE ENTRY DUCT TO HP STATOR SEGMENT	Gap (Inner)	-	-	-	-
		Gap (Inner)	-	-	-	-
601-203	LABYRINTH NO.19 CLEAR- ANCE BETWEEN HP TURBINE HUB FINS AND LABYRINTH HOUSING	Housing - Bore	<u>9.2280</u> 9.2300	<u>234,391</u> 234,442	9.2340	234,544
		Fin - Diameter	<u>9.1990</u> 9.2000	<u>233,655</u> 233,680	9.1940	233,528
601-204	LABYRINTH NO.20 CLEAR- ANCE BETWEEN HP TURBINE HUB FINS AND LABYRINTH HOUSING	Housing - Bore	<u>10.1880</u> 10.1900	<u>258,775</u> 258,826	10.1940	258,928
		Fin - Diameter	<u>10.1590</u> 10.1600	<u>258,039</u> 258,064	10.1540	257,912

Table 601 (Continued) (Sheet 1 - LH)

FITS AND CLEARANCES

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FN14522

**OLYMPUS 593**MK.610-14-28
OVERHAUL

REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	0.0020* 0.0480	0,051* 1,219	0.0020* 0.0480	0,051* 1,219	PRE-S.B.72-64 'INDIVIDUAL' ACCEPTABLE GAP WITH HP NOZZLE VANE LOADED REARWARD AND INBOARD
-	-	0.0080* 0.0240	0,203* 0,610	0.0080* 0.0240	0,203* 0,610	POST S.B.72-64 'AVERAGE' ACCEPTABLE GAP OF ALL NOZZLE VANES WITH HP NOZZLE VANES LOADED REAR- WARD AND INBOARD. *OUTER GAP MUST HAVE CLEARANCE WHEN CHECKING THE INNER GAP. Ref.72-40-00 Fig.601-175
9.2340	234,544					MODULE BREAK POSITION. Ref.72-51-03 Fig.601-203
		0.0280 0.0310	0,711 0,787	0.0400	1,016	
9.1940	233,528					
10.1940	258,928					MODULE BREAK POSITION. Ref.72-51-03 Fig.601-204
		0.0280 0.0310	0,711 0,787	0.0400	1,016	
10.1540	257,912					

Table 601 (Continued) (Sheet 1 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-208	LABYRINTH NO.21 CLEAR- ANCE BETWEEN HP TURBINE HUB FINS AND LABYRINTH HOUSING	Housing - Bore	11.1480	283,159	11.1540	283,312
			11.1500	283,210		
		Fin - Diameter	11.1190	282,423	11.1140	282,296
			11.1200	282,448		
601-209	LABYRINTH NO.22 CLEAR- ANCE BETWEEN HP TURBINE HUB FINS AND LABYRINTH HOUSING	Housing - Bore	12.1080	307,543	12.1140	307,696
			12.1100	307,594		
		Fin - Diameter	12.0790	306,807	12.0740	306,680
			12.0800	306,832		
601-231	LABYRINTH NO.23 CLEAR- ANCE BETWEEN LABYRINTH HOUSING AND LABYRINTH	Housing - Bore	17.2500	438,150	17.2550	438,277
			17.2510	438,175		
		Fin - Diameter	17.1790	436,347	17.1750	436,245
			17.1800	436,372		
601-232	LABYRINTH HOUSING IN SHROUD UNIT	Shroud - Bore	14.2000	360,680	14.2015	360,718
			14.2014	360,716		
		Housing - Diameter	14.1986	360,644	14.1985	360,642
			14.2000	360,680		
601-235 **	CLEARANCE BETWEEN HP TURBINE ROTOR BLADE AND HP TURBINE STATOR SEG- MENT UNIT	Clearance	-	-	-	-

Table 601 (Continued) (Sheet 2 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
11.1540	283,312					MODULE BREAK POSITION. Ref.72-51-03 Fig.601-208
		<u>0.0280</u>	<u>0,711</u>	0.0400	1,016	
		0.0310	0,787			
11.1140	282,296					
12.1140	307,696					MODULE BREAK POSITION. Ref.72-51-03 Fig.601-209
		<u>0.0280</u>	<u>0,711</u>	0.0400	1,016	
		0.0310	0,787			
12.0740	306,680					
17.2550	438,277					MODULE BREAK POSITION. Ref.72-51-03 Fig.601-231
		<u>0.0700</u>	<u>1,778</u>	0.0800	2,032	
		0.0720	1,829			
17.1750	436,245					
14.2015	360,718					MODULE BREAK POSITION. Ref.72-51-01 Fig.602-232
		<u>0.0000</u>	<u>0,000</u>	0.0030	0,076	
		0.0028	0,071			
14.1985	360,642					
-	-	<u>0.0420</u>	<u>1,067</u>	0.0650	1,651	MODULE BREAK POSITION. Ref.72-00-00 Fig.602-235 Ref.72-51-03 Fig.601-235
		0.0635	1,613			

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Table 601 (Continued) (Sheet 2 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-236 **	VANE NOZZLE Set Gap SUPPORT ASSEMBLY TO VANE NOZZLE ABUTMENT SEGMENT	-	-	-	-
601-237 **	CASE REAR Set Gap FACE TO HP TURBINE HUB	-	-	-	-
601-240	PIN IN HP Stator TURBINE Slot - STATOR Width	$\frac{0.3500}{0.3520}$	$\frac{8,890}{8,941}$	0.3530	8,966
	Pin (Straight) - Width	$\frac{0.3470}{0.3490}$	$\frac{8,814}{8,865}$	0.3460	8,788
	Pin (Cranked) - Width	$\frac{0.3400}{0.3450}$	$\frac{8,636}{8,763}$	0.3390	8,611
601-241 **	HP TURBINE Tip - ROTOR BLADE Clearance	-	-	-	-

Table 601 (Concluded) (Sheet 3 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	<u>7.3850</u> 7.3900	<u>187,579</u> 187,706	-	-	Ref.72-00-00 Fig.602-236
-	-	<u>6.5550</u> 6.5650	<u>166,497</u> 166,751	-	-	Ref.72-00-00 Fig.602-237 Ref.72-51-03 Fig.601-237
-	-	<u>0.0010</u> 0.0050	<u>0,025</u> 0,127	0.0070	0,178	
-	-	<u>0.0050</u> 0.0120	<u>0,127</u> 0,305	0.0140	0,356	
-	-	<u>0.0320</u> 0.0502	<u>0,813</u> 1,275	0.0550	1,397	MODULE BREAK POSITION. Ref.72-00-00 Fig.602-241 Ref.72-51-03 Fig.601-241

Table 601 (Concluded) (Sheet 3 - RH)

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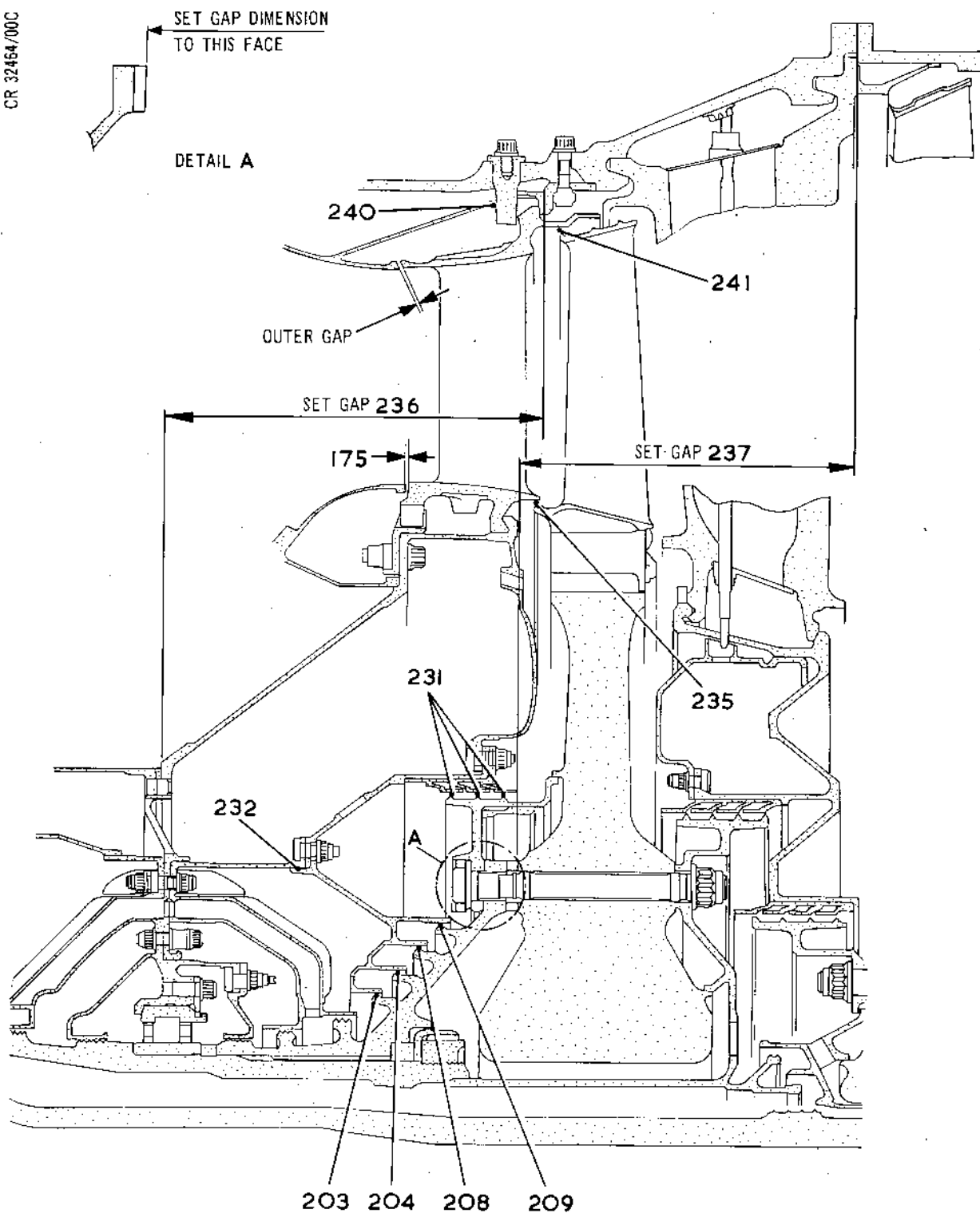


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CR 32464/00C



HP Turbine Nozzles
Figure 601

FITS AND CLEARANCES

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HP TURBINE ROTOR - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)		
		IN.	MM	IN.	MM	
601-198	HP TURBINE HUB UNIT ON HP DRIVE SHAFT	Hub -	6.7200	170,688	6.7211	170,716
		Bore	6.7210	170,713		
		Shaft -	6.7196	170,678	6.7196	170,678
		Diameter	6.7206	170,703		
601-199	LABYRINTH NO.16 CLEAR- ANCE BETWEEN HP TURBINE HUB UNIT FINS AND LABYRINTH RING	Ring -	7.4200	188,468	7.4240	188,570
		Bore	7.4230	188,544		
		Fin -	7.4000	187,960	7.3980	187,909
		Diameter	7.4010	187,985		
601-200	LABYRINTH NO.17 CLEAR- ANCE BETWEEN HP TURBINE HUB UNIT FINS AND SHROUD UNIT	Shroud -	7.8240	198,730	7.8330	198,958
		Bore	7.8270	198,806		
		Fin -	7.7990	198,095	7.7930	197,942
		Diameter	7.8000	198,120		
601-201	LABYRINTH NO.18 CLEAR- ANCE BETWEEN HP TURBINE HUB UNIT FINS AND SHROUD UNIT	Shroud -	8.3240	211,430	8.3330	211,658
		Bore	8.3270	211,506		
		Fin -	8.2990	210,795	8.2930	210,642
		Diameter	8.3000	210,820		
601-202	HP DRIVE SHAFT SERRATIONS IN HP TURBINE HUB SERRATIONS	Hub Unit -	4.6110	117,119	4.6145	117,208
		Serrations (Square)	4.6140	117,196		
		Shaft -	4.6090	117,069	4.6085	117,056
		Serrations (Square)	4.6120	117,145		

Table 601 (Continued) (Sheet 1 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
6.7211	170,716					MODULE BREAK POSITION. Ref.72-33-00 Fig.602-198
		-0.0006 +0.0014	-0,015 +0,036	+0.0015	0,038	
6.7196	170,678					
7.4240	188,570					MODULE BREAK POSITION. Ref.72-51-01 Fig.602-199
		0.0190 0.0230	0,483 0,584	0.0260	0,660	
7.3980	187,909					
7.8330	198,958					MODULE BREAK POSITION. Ref.72-51-01 Fig.602-200
		0.0240 0.0280	0,610 0,711	0.0400	1,016	
7.7930	197,942					
8.3330	211,658					MODULE BREAK POSITION. Ref.72-51-01 Fig.602-201
		0.0240 0.0280	0,610 0,711	0.0400	1,016	
8.2930	210,642					
4.6145	117,208					MODULE BREAK POSITION. Ref.72-33-00 Fig.602-202
		-0.0010 +0.0050	-0,025 +0,127	+0.0060	0,152	
4.6085	117,056					

Table 601 (Continued) (Sheet 1 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-203	LABYRINTH NO.19 CLEAR- ANCE BETWEEN HP TURBINE	Housing -	9.2280	234,391	9.2340	234,544
		Bore	9.2300	234,442		
	HUB FINS AND LABY- RINTH HOUSING	Fin -	9.1990	233,655	9.1940	233,528
		Diameter	9.2000	233,680		
601-204	LABYRINTH NO.20 CLEAR- ANCE BETWEEN HP TURBINE	Housing -	10.1880	258,775	10.1940	258,928
		Bore	10.1900	258,826		
	HUB FINS AND LABY- RINTH HOUSING	Fin -	10.1590	258,039	10.1540	257,912
		Diameter	10.1600	258,064		
601-205	CENTERING RING IN HP TURBINE HUB	Hub -	7.3000	185,420	7.3012	185,450
		Bore	7.3012	185,450		
		Ring -	7.3030	185,496	7.3030	185,496
		Diameter	7.3042	185,527		
601-206	CENTERING RING ON HP DRIVE SHAFT	Ring -	6.5200	165,608	6.5210	165,633
		Bore	6.5210	165,633		
		Shaft -	6.5196	165,598	6.5195	165,595
		Diameter	6.5206	165,623		
601-207	LABYRINTH NO.24 AND 26 IN HP DRIVE SHAFT	Shaft -	5.8500	148,590	5.8511	148,618
		Bore	5.8510	148,615		
		Labyrinth -	5.8496	148,580	5.8494	148,575
		Diameter	5.8506	148,605		

Table 601 (Continued) (Sheet 2 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
9.2340	234,544					MODULE BREAK POSITION. Ref.72-51-02 Fig.601-203
		<u>0.0280</u>	<u>0,711</u>	0.0400	1,016	
		0.0310	0,787			
9.1940	233,528					
10.1940	258,928					MODULE BREAK POSITION. Ref.72-51-02 Fig.601-204
		<u>0.0280</u>	<u>0,711</u>	0.0400	1,016	
		0.0310	0,787			
10.1540	257,912					
		<u>-0.0042</u>	<u>-0,107</u>	-0.0018	-0,046	
		-0.0018	-0,046			
6.5210	165,633					MODULE BREAK POSITION. Ref.72-33-00 Fig.602-206
		<u>-0.0006</u>	<u>-0,015</u>	+0.0015	0,038	
		+0.0014	+0,035			
6.5195	165,595					
5.8511	148,618					MODULE BREAK POSITION. Ref.72-33-00 Fig.602-207
		<u>-0.0006</u>	<u>-0,015</u>	+0.0017	+0,043	
		+0.0014	+0,036			
5.8494	148,575					

Table 601 (Continued) (Sheet 2 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-208	LABYRINTH NO.21 CLEAR- ANCE BETWEEN HP TURBINE HUB FINS AND LABY- RINTH HOUSING	Housing -	<u>11.1480</u>	<u>283,159</u>	11.1540 283,312
		Bore	<u>11.1500</u>	<u>283,210</u>	
		Fin -	<u>11.1190</u>	<u>282,423</u>	11.1140 282,296
		Diameter	<u>11.1200</u>	<u>282,448</u>	
601-209	LABYRINTH NO.22 CLEAR- ANCE BETWEEN HP TURBINE HUB FINS AND LABY- RINTH HOUSING	Housing -	<u>12.1080</u>	<u>307,543</u>	12.1140 307,696
		Bore	<u>12.1100</u>	<u>307,594</u>	
		Fin -	<u>12.0790</u>	<u>306,807</u>	12.0740 306,680
		Diameter	<u>12.0800</u>	<u>306,832</u>	
601-210	HP TURBINE DISK IN LABYRINTH (NO.24 AND NO.26)	Labyrinth -	<u>9.4000</u>	<u>238,760</u>	9.4015 238,798
		Bore	<u>9.4012</u>	<u>238,790</u>	
		Disk -	<u>9.3988</u>	<u>238,729</u>	9.3985 238,722
		Diameter	<u>9.4000</u>	<u>238,760</u>	
601-211	SEAL RING LABYRINTH NO.26A IN LABYRINTH HOUSING	Fin -	<u>6.9850</u>	<u>177,419</u>	6.9830 177,368
		Diameter	<u>6.9860</u>	<u>177,444</u>	
		Housing -	<u>7.1200</u>	<u>180,848</u>	7.1230 180,924
		Bore	<u>7.1210</u>	<u>180,873</u>	
601-212	SEAL RING LABYRINTH NO.26B IN LABYRINTH HOUSING	Fin -	<u>5.9050</u>	<u>149,987</u>	5.9030 149,936
		Diameter	<u>5.9060</u>	<u>150,012</u>	
		Housing -	<u>6.0400</u>	<u>153,416</u>	6.0430 153,492
		Bore	<u>6.0410</u>	<u>153,441</u>	

Table 601 (Continued) (Sheet 3 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
11.1540	283,312					MODULE BREAK POSITION. Ref.72-51-02 Fig.601-208
		$\frac{0.0280}{0.0310}$	$\frac{0,711}{0,787}$	0.0400	1,016	
11.1140	282,296					
12.1140	307,696					MODULE BREAK POSITION. Ref.72-51-02 Fig.601-209
		$\frac{0.0280}{0.0310}$	$\frac{0,711}{0,787}$	0.0400	1,016	
12.0740	306,680					
9.4015	238,798					
		$\frac{0.0000}{0.0024}$	$\frac{0,000}{0,061}$	0.0030	0,076	
9.3985	238,722					
6.9830	177,368					MODULE BREAK POSITION Ref.72-52-02 Fig.601-211
		$\frac{0.1340}{0.1360}$	$\frac{3,404}{3,454}$	0.1400	3,556	
7.1230	180,924					
5.9030	149,936					MODULE BREAK POSITION. Ref.72-52-02 Fig.601-212
		$\frac{0.1340}{0.1360}$	$\frac{3,404}{3,454}$	0.1400	3,556	
6.0430	153,492					

Table 601 (Continued) (Sheet 3 - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-229	LABYRINTH NO.24 CLEAR- ANCE BETWEEN STATOR SUPPORT DIAPHRAGM AND LABY- RINTH FINS	Diaphragm	16.5000	419,100	16.5070	419,278
		- Bore	16.5030	419,176		
		Fin -	16.4090	416,789	16.4050	416,687
		Diameter	16.4100	416,814		
601-230	LABYRINTH IN HP TURBINE DISK	Disk -	17.8000	452,120	17.8018	452,166
		Bore	17.8016	452,161		
		Labyrinth	17.7986	452,084	17.7983	452,077
		- Diameter	17.8000	452,120		
601-231	LABYRINTH NO.23 CLEAR- ANCE BETWEEN LABYRINTH HOUSING AND LABYRINTH	Housing -	17.2500	438,150	17.2550	438,277
		Bore	17.2510	438,175		
		Fin -	17.1790	436,347	17.1750	436,245
		Diameter	17.1800	436,372		
601-235 **	CLEARANCE BETWEEN HP TURBINE ROTOR BLADE AND HP TUR- BINE STATOR SEGMENT UNIT	Clearance	-	-	-	-
601-237 **	CASE REAR FACE TO HP TURBINE HUB	Set Gap	-	-	-	-
601-241 **	HP TURBINE ROTOR BLADE	Tip Clearance	-	-	-	-

Table 601 (Concluded) (Sheet 4 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
16.5070	419,278					MODULE BREAK POSITION. Ref.72-52-01 Fig.601-229
		<u>0.0900</u>	<u>2,268</u>	0.1020	2,591	
		0.0940	2,388			
16.4050	416,687					
17.8018	452,166					
		<u>0.0000</u>	<u>0,000</u>	0.0035	0,089	
		0.0030	0,076			
17.7983	452,077					
17.2550	438,277					MODULE BREAK POSITION. Ref.72-51-02 Fig.601-231
		<u>0.0700</u>	<u>1,778</u>	0.0800	2,032	
		0.0720	1,829			
17.1750	436,245					
-	-	<u>0.0420</u>	<u>1,067</u>	0.0650	1,651	MODULE BREAK POSITION. Ref.72-00-00 Fig.602-235 Ref.72-51-02 Fig.601-235
		0.0635	1,613			
-	-	<u>6.5550</u>	<u>166,497</u>	-	-	Ref.72-00-00 Fig.602-237 Ref.72-51-02 Fig.601-237
		6.5650	166,751			
-	-	<u>0.0320</u>	<u>0,813</u>	0.0550	1,397	MODULE BREAK POSITION. Ref.72-00-00 Fig.602-241 Ref.72-51-02 Fig.601-241
		0.0502	1,275			

Table 601 (Concluded) (Sheet 4 - RH)

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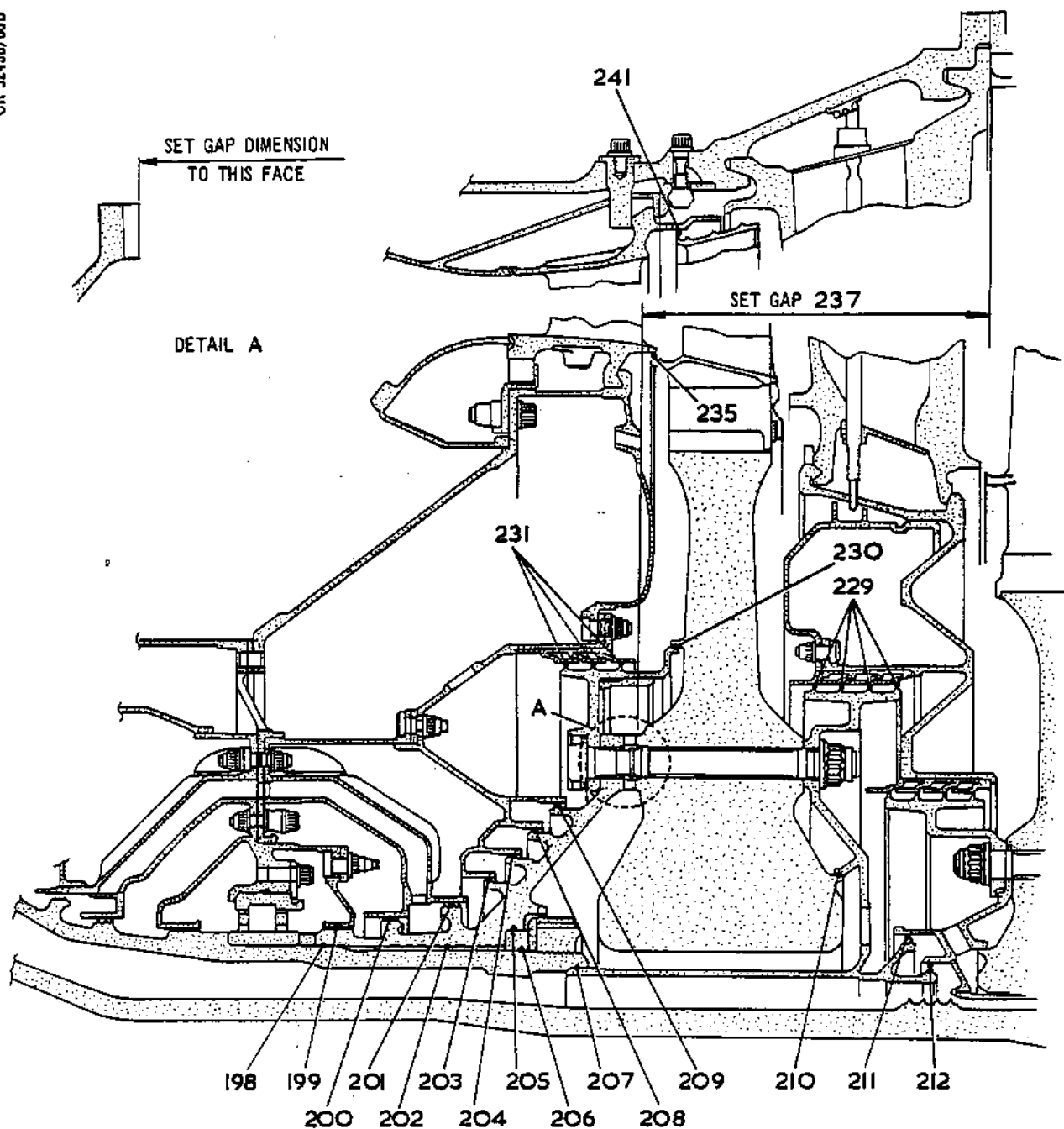


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CR 32458/00B



HP Turbine Rotor
Figure 601

FITS AND CLEARANCES

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LP TURBINE NOZZLES - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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OVERHAUL



FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-228	LABYRINTH NO.25 CLEAR- ANCE BETWEEN DIAPHRAGM	Diaphragm	<u>12.5000</u>	<u>317,500</u>	12.5070	317,678
		- Bore	<u>12.5030</u>	<u>317,576</u>		
	VANE SUPPORT ASSEMBLY AND LABYRINTH	Labyrinth	<u>12.4330</u>	<u>315,798</u>	12.4290	315,697
		- Diameter	<u>12.4340</u>	<u>315,824</u>		
601-229	LABYRINTH NO.24 CLEAR- ANCE BETWEEN STATOR	Diaphragm	<u>16.5000</u>	<u>419,100</u>	16.5070	419,278
		- Bore	<u>16.5030</u>	<u>419,176</u>		
	SUPPORT DIAPHRAGM AND LABY- RINTH FINS	Fin -	<u>16.4090</u>	<u>416,789</u>	16.4050	416,687
		Diameter	<u>16.4100</u>	<u>416,814</u>		
601-238	COVER ASSEMBLY IN STATOR SUPPORT	Diaphragm	<u>22.5200</u>	<u>572,008</u>	22.5228	572,079
		- Bore	<u>22.5228</u>	<u>572,079</u>		
	DIAPHRAGM	Cover -	<u>22.5260</u>	<u>572,160</u>	22.5260	572,160
		Diameter	<u>22.5305</u>	<u>572,275</u>		
601-239 **	CASE REAR FACE TO LP TURBINE HUB ADJUSTING WASHER	Set Gap	-	-	-	-
601-242 **	LP TURBINE ROTOR BLADE	Tip Clearance	-	-	-	-

Table 601 (LH)

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**OLYMPUS 593**

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OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					Ref.72-52-02 Fig.601-228
		<u>0.0660</u>	<u>1,676</u>	0.0780	1,981	
		0.0700	1,778			
16.5070	419,278					MODULE BREAK POSITION. Ref.72-51-03 Fig.601-229
		<u>0.0900</u>	<u>2,268</u>	0.1020	2,591	
		0.0940	2,388			
16.4050	416,687					
		<u>-0.0105</u>	<u>-0,267</u>	0.0032	-0,081	
		-0.0032	-0,081			
		<u>3.8800</u>	<u>98,552</u>	-	-	Ref.72-00-00 Fig.602-239 Ref.72-52-02 Fig.601-239
		3.8900	98,806			
		<u>0.1210</u>	<u>3,073</u>	0.1450	3,683	MODULE BREAK POSITION. Ref.72-00-00 Fig.602-242 Ref.72-52-02 Fig.601-242
		0.1420	3,607			

Table 601 (RH)

FITS AND CLEARANCES

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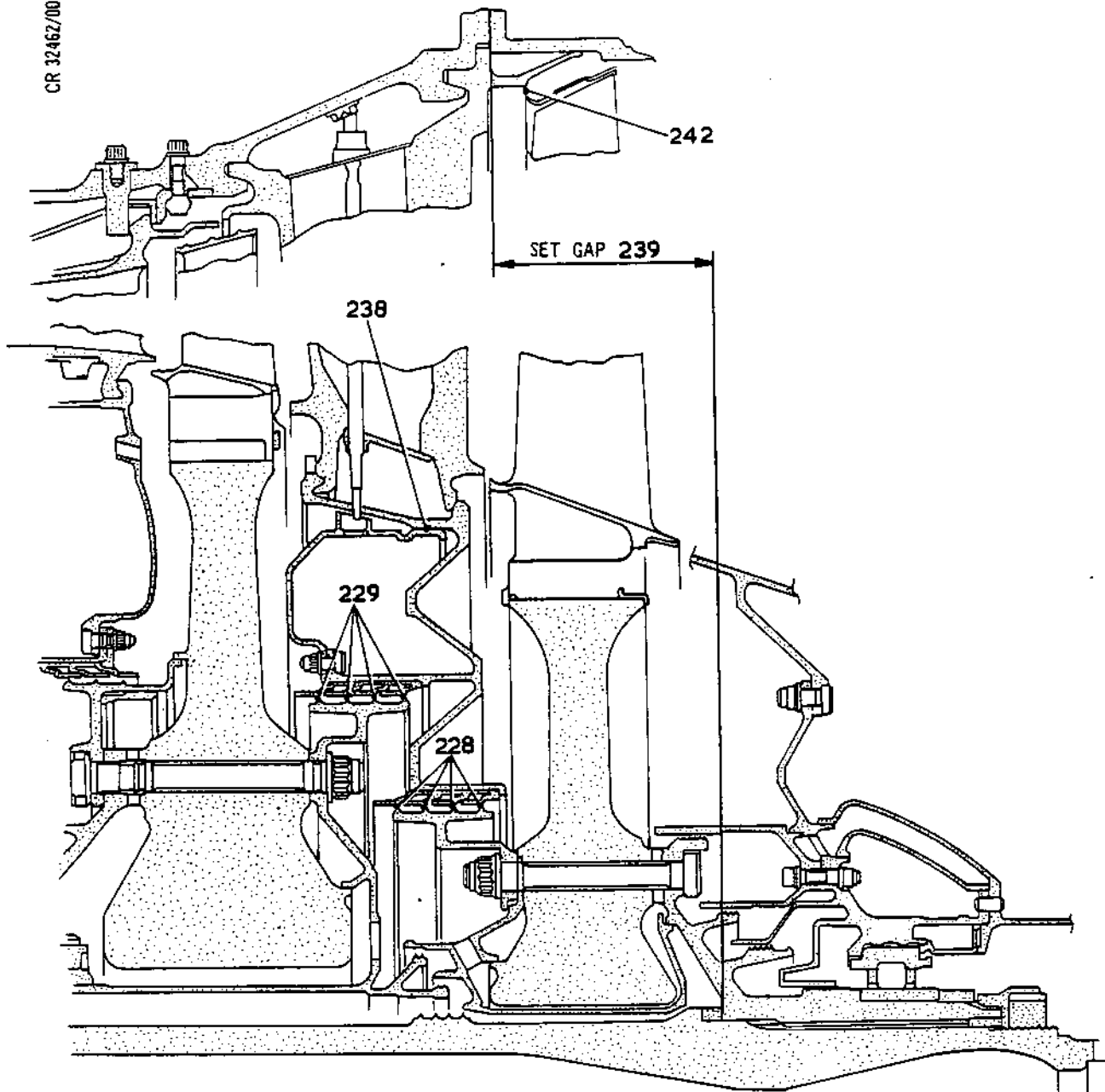
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CR 32462/00B



TN27939

LP Turbine Nozzles
Figure 601

FITS AND CLEARANCES

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OLYMPUS 593

MK.610-14-28

OVERHAUL



LP TURBINE ROTOR - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-211	SEAL RING LABYRINTH NO.26A IN LABYRINTH HOUSING	Fin -	6.9850	177,419	6.9830	177,368
		Diameter	6.9860	177,444		
		Housing -	7.1200	180,848	7.1230	180,924
		Bore	7.1210	180,873		
601-212	SEAL RING LABYRINTH NO.26B IN LABYRINTH HOUSING	Fin -	5.9050	149,987	5.9030	149,936
		Diameter	5.9060	150,012		
		Housing -	6.04 0	153,416	6.0430	153,492
		Bore	6.0410	153,441		
601-213	FLANGED DUCT IN LABYRINTH HOUSING	Duct -	5.0040	127,102	5.0035	127,089
		Diameter	5.0050	127,127		
		Housing -	5.0000	127,000	5.0015	127,038
		Bore	5.0010	127,025		
601-214	LP TURBINE DISK IN HOUSING LABYRINTH NO.26	Housing -	6.6626	169,230	6.6646	169,281
		Bore	6.6636	169,255		
		Disk -	6.6496	168,900	6.6486	168,874
		Diameter	6.6506	168,925		
601-215	FLANGED DUCT IN LP TURBINE HUB	Duct -	7.8942	200,513	7.8932	200,487
		Diameter	7.8960	200,558		
		Hub -	7.9000	200,600	7.9028	200,731
		Bore	7.9018	200,706		

Table 601 (Continued) (Sheet 1 - LH)

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OVERHAUL



REJECT IF OVER IN. MM	CLEARANCE NEW IN. MM	PERMISSIBLE WORN CLEARANCE IN. MM	REMARKS
-----------------------------	----------------------------	---	---------

6.9830 177,368

$\frac{0.1340}{0.1360}$

$\frac{3,404}{3,454}$

0.1400 3,556

MODULE BREAK
POSITION.
Ref.72-51-03
Fig.601-211

7.1230 180,924

5.9030 149,936

$\frac{0.1340}{0.1360}$

$\frac{3,404}{3,454}$

0.1400 3,556

MODULE BREAK
POSITION.
Ref.72-51-03
Fig.601-212

6.0430 153,492

$\frac{-0.0050}{-0.0030}$

$\frac{-0,127}{-0,076}$

-0.0020 -0,051

$\frac{0.0120}{0.0140}$

$\frac{0,305}{0,356}$

0.0160 0,406

$\frac{0.0040}{0.0076}$

$\frac{0,102}{0,193}$

0.0096 0,244

Table 601 (Continued) (Sheet 1 - RH)

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OVERHAUL



FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-216	LP COM- PRESSOR DRIVE SHAFT REAR IN LP TURBINE HUB UNIT	Hub -	4.3496	110,480	4.3502	110,495
		Bore	4.3502	110,495		
		Shaft -	4.3501	110,492	4.3500	110,490
		Diameter	4.3505	110,503		
601-217	LABYRINTH NO.28 CLEARANCE BETWEEN LABYRINTH HOUSING OUTER AND LP TURBINE HUB FINS	Housing -	8.4630	214,960	8.4700	215,138
		Bore	8.4640	214,986		
		Hub -	8.4450	214,503	8.4390	214,351
		Diameter	8.4460	214,528		
601-218	LABYRINTH NO.29 CLEARANCE BETWEEN LP TURBINE HUB AND BEARING HOUSING ASSEMBLY	Housing -	7.1010	180,365	7.1060	180,492
		Bore	7.1020	180,391		
		Hub -	7.0830	179,908	7.0790	179,807
		Diameter	7.0840	179,934		
601-219	LABYRINTH NO.30 CLEARANCE BETWEEN LP TURBINE HUB AND BEARING HOUSING ASSEMBLY	Housing -	5.5200	140,208	5.5230	140,284
		Bore	5.5210	140,233		
		Hub -	5.4990	139,675	5.4970	139,624
		Diameter	5.5000	139,700		

Table 601 (Continued) (Sheet 2 - LH)

FITS AND CLEARANCES

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OLYMPUS 593

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OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
4.3502	110,495					MODULE BREAK POSITION. Ref.72-31-04 Fig.601-216
		$\frac{-0.0009}{+0.0001}$	$\frac{-0,023}{+0,002}$	+0.0002	+0,005	
4.3500	110,490					
8.4700	215,138					MODULE BREAK POSITION. Ref.72-52-03 Fig.601-217
		$\frac{0.0170}{0.0190}$	$\frac{0,432}{0,483}$	0.0310	0,787	
8.4390	214,351					
7.1060	180,492					MODULE BREAK POSITION. Ref.72-52-03 Fig.601-218
		$\frac{0.0170}{0.0190}$	$\frac{0,432}{0,483}$	0.0270	0,686	
7.0790	179,807					
5.5230	140,284					MODULE BREAK POSITION. Ref.72-52-03 Fig.601-219
		$\frac{0.0200}{0.0220}$	$\frac{0,508}{0,559}$	0.0260	0,660	
5.4970	139,624					

Table 601 (Continued (Sheet 2 - RH)

FITS AND CLEARANCES

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OLYMPUS 593

MK.610-14-28
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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-220	LP COM- PRESSOR DRIVE SHAFT (REAR) SER- RATIONS IN LP TURBINE HUB UNIT SERRATIONS	Hub - Unit	2.8881	73,358	2.8910	73,431
		Serrations	2.8908	73,426		
		(Square)				
		Shaft -	2.8862	73,309	2.8860	73,304
601-221	LP TURBINE HUB IN LP TURBINE BEARING	Serrations	2.8889	73,378		
		(Square)				
		Bearing -	5.0012	127,030	5.0016	127,041
		Bore	5.0015	127,038		
601-222	LP TURBINE BEARING	Hub -	5.0007	127,018	5.0006	127,015
		Diameter	5.0012	127,030		
		Diametral	-	-	-	-
		Clearance				
601-224	LP COMPRES- SOR DRIVE SHAFT (REAR) IN CENTERING RING	Ring -	4.0500	102,870	4.0509	102,893
		Bore	4.0509	102,893		
		Shaft -	4.0496	102,860	4.0495	102,857
		Diameter	4.0505	102,883		
601-225	CENTERING RING IN LP TURBINE HUB	Hub -	4.3800	111,252	4.3809	111,275
		Bore	4.3809	111,275		
		Ring -	4.3820	111,303	4.3820	111,303
		Diameter	4.3829	111,326		

Table 601 (Continued) (Sheet 3 - LH)

FITS AND CLEARANCES

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**OLYMPUS 593**MK. 610-14-28
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REJECT IF OVER IN. MM	CLEARANCE NEW IN. MM		PERMISSIBLE WORN CLEARANCE IN. MM		REMARKS
2.8910 73,431					MODULE BREAK POSITION. Ref. 72-31-04 Fig. 601-220
	$\frac{-0.0008}{+0.0046}$	$\frac{-0,020}{+0,117}$	+0.0050	0,127	
2.8860 73,304					
5.0017 127,051					
	$\frac{0.0000}{0.0008}$	$\frac{0,000}{0,020}$	0.0010	0,025	
5.0005 127,000					
- -	$\frac{0.0075}{0.0085}$	$\frac{0,190}{0,216}$	0.0085	0,216	Ref. 72-52-03 Fig. 601-222
4.0509 102,893					
	$\frac{-0.0005}{+0.0013}$	$\frac{-0,013}{+0,033}$	+0.0014	+0,036	MODULE BREAK POSITION. Ref. 72-31-04 Fig. 601-224
4.0495 102,857					
	$\frac{-0.0029}{-0.0011}$	$\frac{-0,074}{-0,028}$	-0.0011	-0,028	

Table 601 (Continued) (Sheet 3 - RH)

FITS AND CLEARANCES

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OLYMPUS 593

MK.610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-227	LABYRINTH NO.27 CLEARANCE BETWEEN LABYRINTH HOUSING OUTER AND LP TURBINE HUB FINS	Housing -	11.1870	284,150	11.1950	284,353
		Bore	11.1890	284,201		
		Fin -	11.1690	283,693	11.1620	283,515
		Diameter	11.1700	283,718		
601-228	LABYRINTH NO.25 CLEARANCE BETWEEN DIAPHRAGM VANE SUP- PORT ASSEMBLY AND LABYRINTH	Dia-	12.5000	317,500	12.5070	317,678
		phragm -	12.5030	317,576		
		Bore				
		Laby-	12.4330	315,798	12.4290	315,697
		rinth -	12.4340	315,824		
		Diameter				
601-239 **	CASE REAR FACE TO LP TURBINE HUB ADJUSTING WASHER	Set Gap	-	-	-	-
601-242 **	LP TURBINE ROTOR BLADE	Tip Clearance	-	-	-	-
601-263 **	NOZZLE DIAPHRAGM LABYRINTH FIN IN LP TURBINE ROTOR BLADE	Set Gap	23.760* 23.750	603,504* 603,250	-	-

Table 601 (Concluded) (Sheet 4 - LH)

FITS AND CLEARANCES

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OLYMPUS 593
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OVERHAUL



REJECT IF OVER IN.	MM	CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
		IN.	MM	IN.	MM	
11.1950	284,353					MODULE BREAK POSITION. Ref.72-52-03 Fig.601-227
		<u>0.0170</u> 0.0200	<u>0,432</u> 0,508	0.033	0,838	
11.1620	283,515					
-	-					Ref.72-52-01 Fig.601-228
		<u>0.0660</u> 0.0700	<u>1,676</u> 1,778	0.0780	1,981	
-	-					
-	-	<u>3.8800</u> 3.8900	<u>98,552</u> 98,806	-	-	Ref.72-00-00 Fig.602-239 Ref.72-52-01 Fig.601-239
-	-	<u>0.1210</u> 0.1420	<u>3,073</u> 3.607	0.1450	3,683	MODULE BREAK POSITION. Ref.72-00-00 Fig.602-242 Ref.72-52-01 Fig.601-242
-	-	-	-	-	-	*TO GIVE 0.040 IN. (1,016 mm) (REF.) CLEAR- ANCE AT CRUISE SB.72-7433-274 Ref.72-00-00 Fig.602-263

Table 601 (Concluded) (Sheet 4 - RH)

FITS AND CLEARANCES

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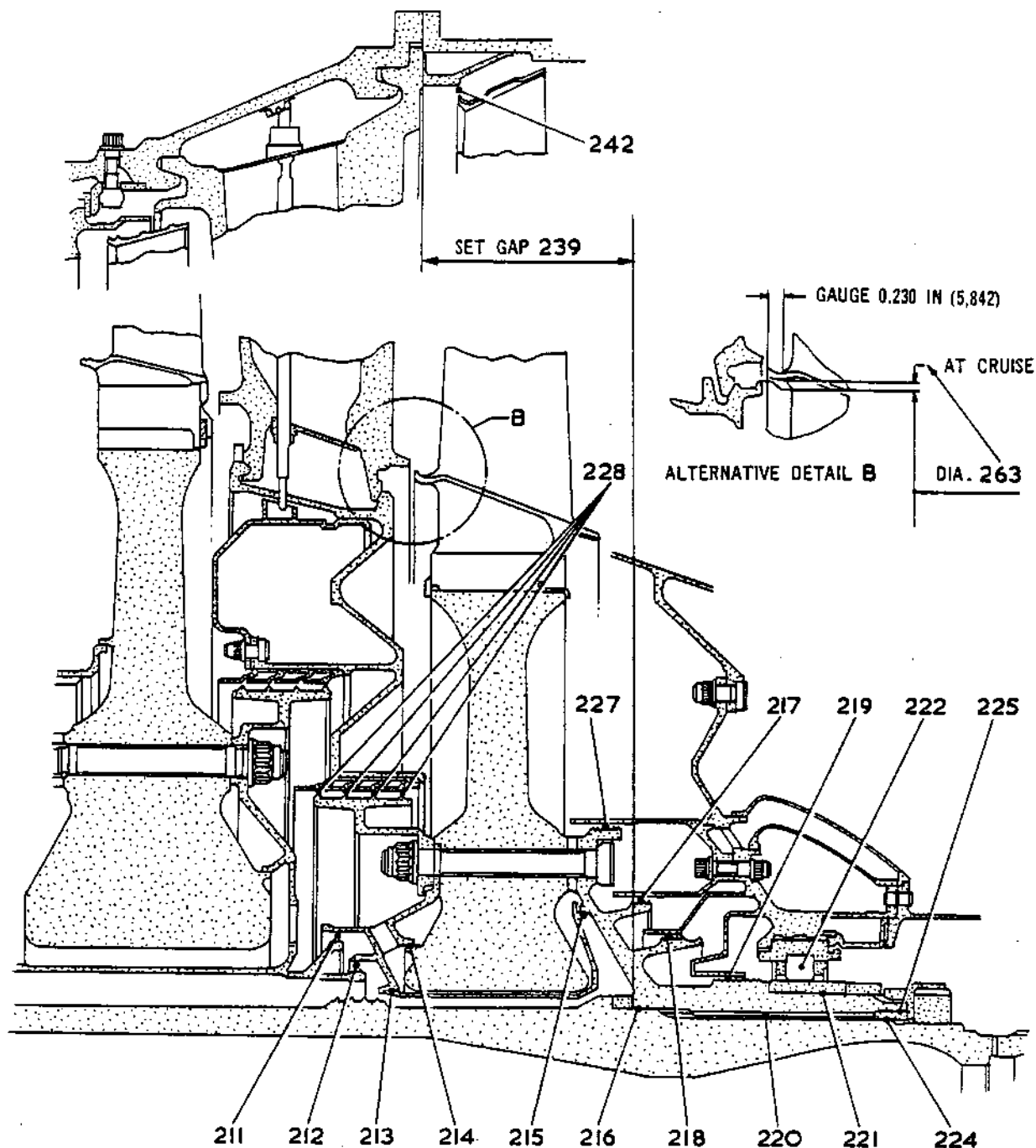


OLYMPUS 593

MK.610-14-28
OVERHAUL



CR 32463/00B



LP Turbine Rotor
Figure 601

FITS AND CLEARANCES

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OLYMPUS 593

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OVERHAUL



LP TURBINE BEARING SUPPORT - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-Q9-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FITS AND CLEARANCES

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**OLYMPUS 593**MK. 610-14-28
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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-217	LABYRINTH NO.28 CLEARANCE BETWEEN LABYRINTH HOUSING OUTER AND LP TURBINE HUB FINS	Housing - Bore	<u>8.4630</u> 8.4640	<u>214,960</u> 214,986	8.4700	215,138
		Hub - Diameter	<u>8.4450</u> 8.4460	<u>214,503</u> 214,528	8.4390	214,351
	LABYRINTH NO.29 CLEARANCE BETWEEN LP TURBINE HUB AND BEARING HOUSING ASSEMBLY	Housing - Bore	<u>7.1010</u> 7.1020	<u>180,365</u> 180,391	7.1060	180,492
		Hub - Diameter	<u>7.0830</u> 7.0840	<u>179,908</u> 179,934	7.0790	179,807
601-219	LABYRINTH NO.30 CLEARANCE BETWEEN LP TURBINE HUB AND BEARING HOUSING ASSEMBLY	Housing - Bore	<u>5.5200</u> 5.5210	<u>140,208</u> 140,233	5.5230	140,284
		Hub - Diameter	<u>5.4990</u> 5.5000	<u>139,675</u> 139,700	5.4970	139,624
	LP TURBINE BEARING	Diametral Clearance	-	-	-	-

Table 601 (Continued) (Sheet 1 - LH)

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
8.4700	215,138					MODULE BREAK POSITION. Ref.72-52-02 Fig.601-217
		<u>0.0170</u>	<u>0,432</u>	0.0310	0,787	
		0.0190	0,483			
8.4390	214,351					
7.1060	180,492					MODULE BREAK POSITION. Ref.72-52-02 Fig.601-218
		<u>0.0170</u>	<u>0,432</u>	0.0270	0,686	
		0.0190	0,483			
7.0790	179,807					
5.5230	140,284					MODULE BREAK POSITION. Ref.72-52-02 Fig.601-219
		<u>0.0200</u>	<u>0,508</u>	0.0260	0,660	
		0.0220	0,559			
5.4970	139,624					
-	-	<u>0.0075</u>	<u>0,190</u>	0.0085	0,216	Ref.72-52-02 Fig.601-222
		0.0085	0,216			

Table 601 (Continued) (Sheet 1 - RH)

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MK.610-14-28
OVERHAUL



FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-223	LP TURBINE BEARING IN HOUSING	Housing -	7.0040	177,902	7.0052	177,932
		Bore	7.0050	177,927		
		Bearing -	6.9982	177,754	6.9979	177,747
		Diameter	6.9985	177,762		
		Housing -	7.0040	177,902	7.0054	177,937
		Bore	7.0050	177,927		
		Bearing -	6.9975	177,736	6.9971	177,726
		Diameter	6.9985	177,762		
601-226	LABYRINTH HOUSING OUTER IN BEARING HOUSING ASSEMBLY	Bearing	11.1500	283,210	11.1520	283,261
		Housing -	11.1520	283,261		
		Bore				
		Labyrinth	11.1522	283,266	11.1522	283,266
		Housing -	11.1534	283,296		
		Diameter				
601-227	LABYRINTH NO.27 CLEARANCE BETWEEN LABYRINTH HOUSING OUTER AND LP TURBINE HUB FINS	Housing -	11.1870	284,150	11.1950	284,353
		Bore	11.1890	284,201		
		Fin -	11.1690	283,693	11.1620	283,515
		Diameter	11.1700	283,718		
601-248	SEAL RING ASSEMBLY	Gap in Position	-	-	-	-
601-252	SEAL RING ASSEMBLY	Gap in Position	-	-	-	-
602-254	SEAL RING ASSEMBLY	Gap in Position	-	-	-	-

Table 601 (Continued) (Sheet 2 - LH)

FITS AND CLEARANCES

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OLYMPUS 593

MK.610-14-28
OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
7.0060	177,952	$\frac{0.0055}{0.0068}$	$\frac{0,140}{0,173}$	0.0078	0,198	PRE SB.72-17
6.9972	177,729					
7.0060	177,952	$\frac{0.0050}{0.0075}$	$\frac{0,140}{0,191}$	0.0083	0,211	SB.72-17
6.9965	177,711					
		$\frac{-0.0034}{-0.0002}$	$\frac{-0,086}{-0,005}$	-0.0002	-0,005	
11.1950	284,353	$\frac{0.0170}{0.0200}$	$\frac{0,432}{0,508}$	0.033	0,838	MODULE BREAK POSITION, Ref.72-52-02 Fig.601-227
11.1620	283,515					
-	-	$\frac{0.0020}{0.0060}$	$\frac{0,051}{0,152}$	-	-	Ref.72-53-00 Fig.601-248
-	-	$\frac{0.0020}{0.0060}$	$\frac{0,051}{0,152}$	-	-	Ref.72-53-00 Fig.601-252
-	-	$\frac{0.0010}{0.0030}$	$\frac{0,025}{0,076}$	-	-	Ref.72-53-00 Fig.601-254

Table 601 (Continued) (Sheet 2 - RH)

FITS AND CLEARANCES

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**OLYMPUS 593**MK. 610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-257	BEARING HOUSING ASSEMBLY IN COVER ASSEMBLY	Cover -	11.4500	290,830	11.4520	290,881
		Bore	11.4520	290,881		
		Housing -	11.4522	290,886	11.4522	290,886
		Diameter	11.4534	290,916		
601-258	BEARING HOUSING ASSEMBLY IN SLEEVE ASSEMBLY	Sleeve -	10.2500	260,350	10.2520	260,401
		Bore	10.2520	260,401		
		Housing -	10.2522	260,406	10.2522	260,406
		Diameter	10.2534	260,436		
601-259	BEARING HOUSING ASSEMBLY IN SLEEVE ASSEMBLY	Sleeve -	8.9700	227,838	8.9718	227,884
		Bore	8.9718	227,884		
		Housing -	8.9720	227,889	8.9720	227,889
		Diameter	8.9732	227,919		
601-260	REAR COVER ASSEMBLY IN COVER ASSEMBLY	Cover -	8.9000	226,060	8.9020	226,111
		Bore	8.9018	226,106		
		Rear Cover -	8.8982	226,014	8.8980	226,009
		Diameter	8.8994	226,045		
601-261	REAR COVER ASSEMBLY IN BEARING HOUSING ASSEMBLY	Housing -	7.7700	197,358	7.7720	197,409
		Bore	7.7718	197,404		
		Cover -	7.7682	197,312	7.7680	197,307
		Diameter	7.7700	197,358		

Table 601 (Concluded) (Sheet 3 - LH)

FITS AND CLEARANCES

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OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	-0.0034	-0.086	-0.0002	-0.005	
-	-	-0.0002	-0.005			
-	-	-0.0034	-0.086	-0.0002	-0.005	
-	-	-0.0002	-0.005			
-	-	-0.0032	-0.081	-0.0002	-0.005	
-	-	-0.0002	-0.005			
-	-	0.0006	0.015	0.0040	0.102	
-	-	0.0036	0.092			
		0.0000	0.000	0.0040	0.102	
		0.0036	0.092			

Table 601 (Concluded) (Sheet 3 - RH)

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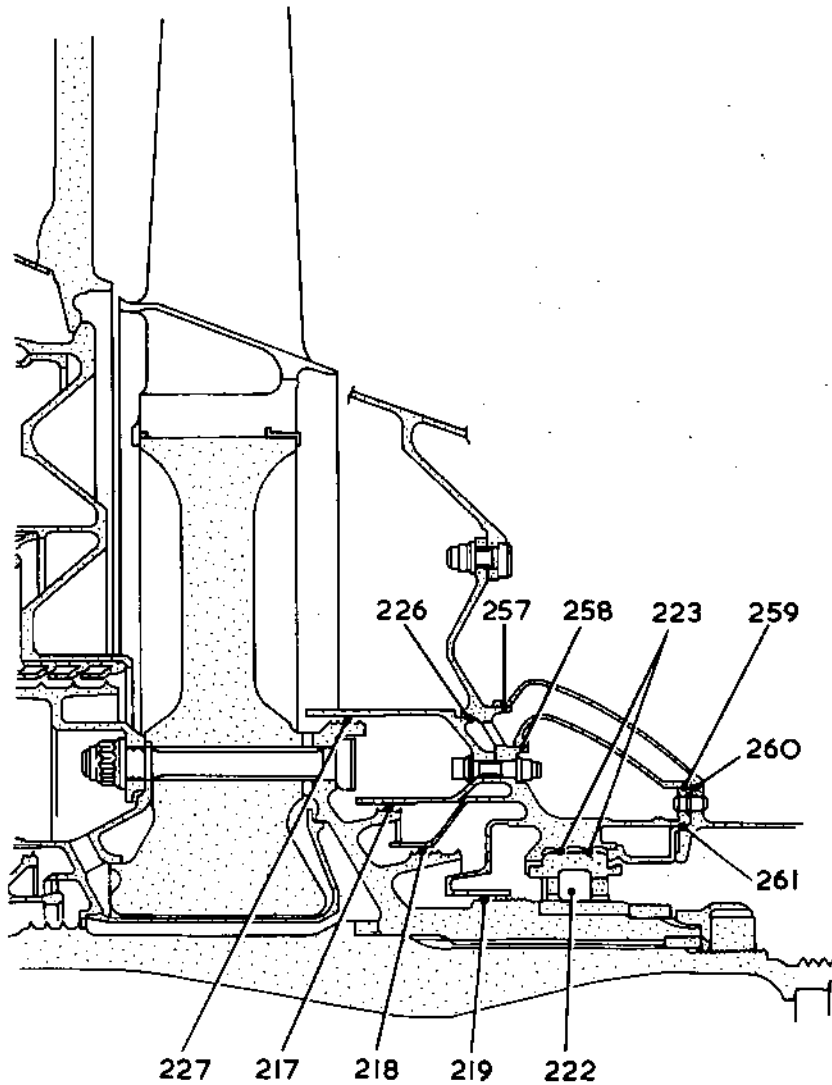
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TN5836

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OLYMPUS 593
MK.610-14-28
OVERHAUL



LP Turbine Bearing Support
Figure 601

FITS AND CLEARANCES

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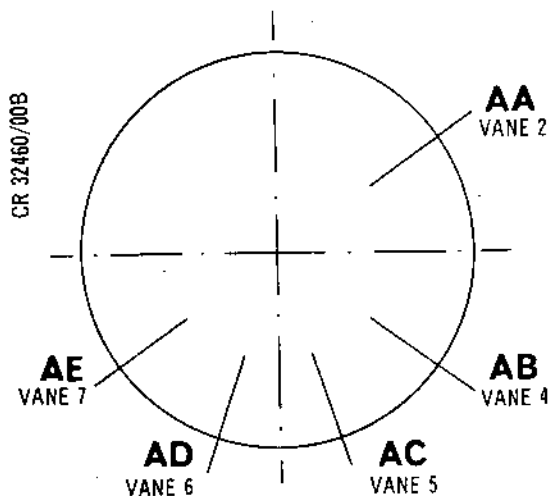
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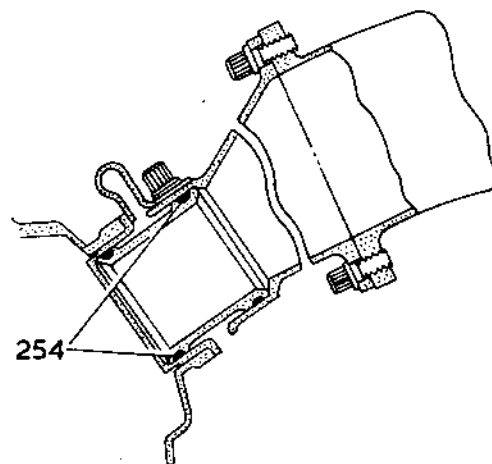
OLYMPUS 593

MK. 610-14-28

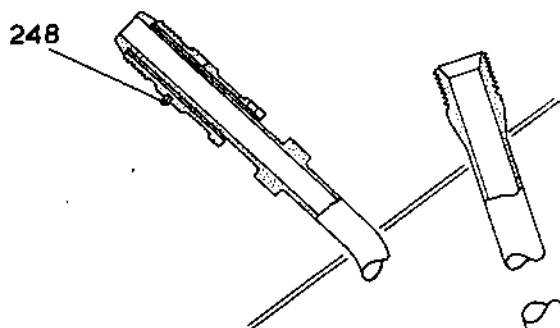
OVERHAUL



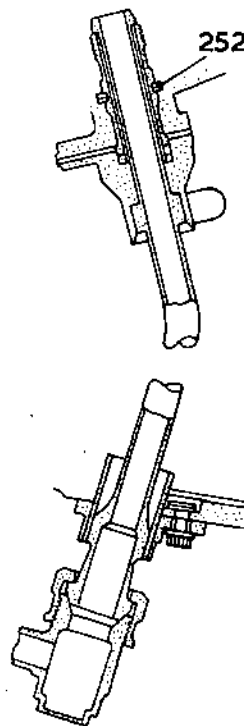
DIAGRAMMATIC VIEW LOOKING FORWARD
ON TURBINE EXHAUST DIFFUSER



SECTION AT **AA**
SECTIONS AT **AB** AND **AE** SIMILAR



SECTION AT **AC**



SECTION AT **AD**

LP Turbine Bearing Support
Figure 602

FITS AND CLEARANCES

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OLYMPUS 593

MK. 610-14-28

OVERHAUL



TURBINE EXHAUST DIFFUSER ASSEMBLY - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FITS AND CLEARANCES

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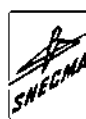
**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-247	SEAL RING ASSEMBLY IN TUBE GROOVE	Pipe	0.1270	3,226	0.1285	3,264
		Groove -	0.1280	3,251		
		Width				
		Seal Ring	0.1240	3,150	0.1235	3,137
		Assembly -	0.1260	3,200		
		Width				
601-248	SEAL RING ASSEMBLY	Gap in Position	-	-	-	-
601-249	OIL SCAVENGE TUBE ASSEMBLY IN SEAL HOUSING	Housing	0.9200	23,368	0.9220	23,419
		Bush Bore	0.9220	23,419		
		Tube	0.9150	23,241	0.8550*	21,717*
		Sleeve -	0.9170	23,292		
		Diameter				
601-250	COLD VENT TUBE IN ELBOW	Elbow -	0.6680	16,967	0.6700	17,018
		Bore	0.6700	17,018		
		Tube -	0.6630	16,840	0.6630	16,840
		Spherical	0.6650	16,891		
601-251	SEAL RING ASSEMBLY IN TUBE GROOVE	Pipe	0.1270	3,226	0.1285	3,264
		Groove -	0.1280	3,251		
		Width				
		Seal Ring	0.1240	3,150	0.1235	3,137
		Assembly -	0.1260	3,200		
		Width				

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Table 601 (Continued) (Sheet 1 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					
		$\frac{0.0010}{0.0040}$	$\frac{0,026}{0,101}$	0.0050	0,127	
-	-					
		$\frac{0.0020}{0.0060}$	$\frac{0,051}{0,152}$	-	-	Ref.72-52-03 Fig.602-248
0.9220	23,419	$\frac{0.0030}{0.0070}$	$\frac{0,076}{0,178}$	0.0670	1,702	*Bearing land position, worn dimension into parallel
0.8550	21,717	-	-	-	-	position (Ref.Fig.601) 0.8050 (20,447)
-	-					
		$\frac{0.0030}{0.0070}$	$\frac{0,076}{0,178}$	0.0070	0,178	
-	-					
		$\frac{0.0010}{0.0040}$	$\frac{0,025}{0,102}$	0.0050	0,127	
-	-					

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Table 601 (Continued) (Sheet 1 - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-252	SEAL RING ASSEMBLY	Gap in Position	-	-	-
601-253	OIL FEED TUBE ASSEMBLY IN	Housing	0.9200	23,368	0.9220 23,419
		Bush -	0.9220	23,419	
	SEAL HOUSING	Bore			0.8550* 21,717*
		Tube	0.9150	23,241	
		Sleeve -	0.9170	23,292	
		Diameter			
601-254	SEAL RING ASSEMBLY	Gap in Position	-	-	-

Table 601 (Concluded) (Sheet 2 - LH)

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0020}{0.0060}$	$\frac{0,051}{0,152}$	-	-	Ref.72-52-03 Fig.602-252
0.9220	23,419	$\frac{0.0030}{0.0070}$	$\frac{0,766}{0,178}$	0.0670	1,702	*Bearing land position, worn dimension into parallel
0.8550	21,717	-	-	-	-	position (Ref.Fig.601) 0.8050 (20,447)
-	-	$\frac{0.0010}{0.0030}$	$\frac{0,025}{0,076}$	-	-	Ref.72-52-03 Fig.602-254

Table 601 (Concluded) (Sheet 2 - RH)

FITS AND CLEARANCES

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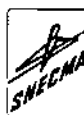
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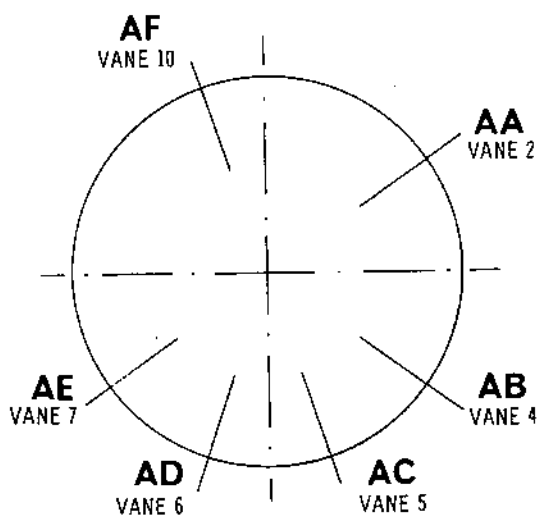


OLYMPUS 593

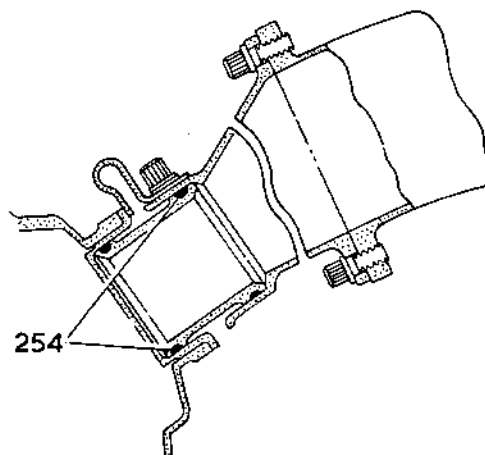
MK.610-14-28
OVERHAUL



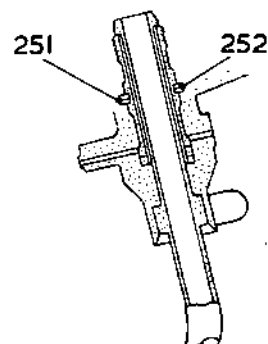
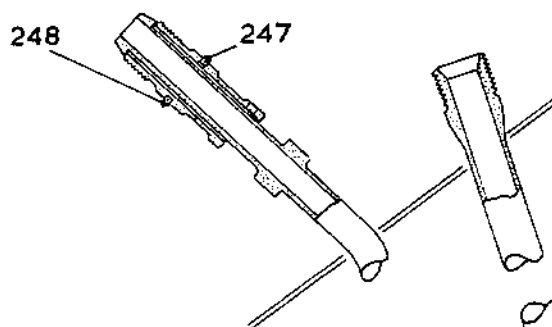
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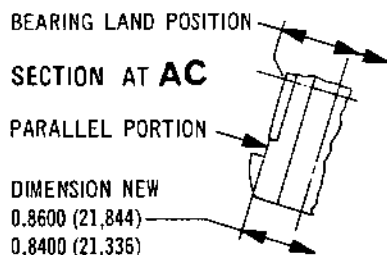
DIAGRAMMATIC VIEW LOOKING FORWARD
ON TURBINE EXHAUST DIFFUSER



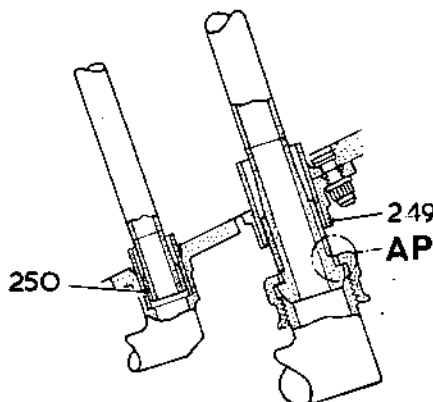
SECTION AT **AA**
SECTIONS AT **AB** AND **AE** SIMILAR



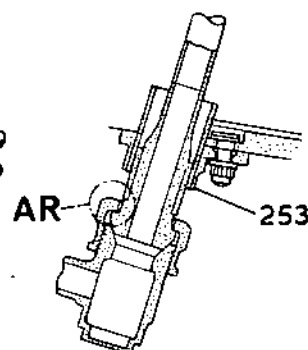
DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



ENLARGED DETAIL AT **AR**
DETAIL AT **AP** SIMILAR



SECTION AT **AC**



SECTION AT **AD**

Turbine Exhaust Diffuser Assembly
Figure 601

FITS AND CLEARANCES

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OVERHAUL



INTERNAL ACCESSORY DRIVES - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-60	LABYRINTH ON HP ROTOR SHAFT FRONT	Labyrinth -	<u>5.1500</u>	<u>130,810</u>	5.1510	130,835
		Bore	5.1510	130,835		
		Shaft -	<u>5.1484</u>	<u>130,769</u>	5.1484	130,769
		Diameter	5.1494	130,795		
601-61	BEVEL GEAR ON LABYRINTH PROBE	Gear -	<u>5.9500</u>	<u>151,130</u>	5.9511	151,158
		Bore	5.9510	151,155		
		Labyrinth -	<u>5.9500</u>	<u>151,130</u>	5.9499	151,127
		Diameter	5.9510	151,155		
601-62	LABYRINTH PROBE IN STATIC SEAL HOUSING NO.10B	Labyrinth -	<u>6.2790</u>	<u>159,487</u>	6.2720	159,309
		Diameter	6.2800	159,512		
		Housing -	<u>6.3080</u>	<u>160,223</u>	6.3120	160,325
		Bore	6.3110	160,299		
601-63	RING LABYRINTH IN LABYRINTH PROBE NO.10A	Labyrinth -	<u>5.9200</u>	<u>150,368</u>	5.9190	150,343
		Diameter	5.9220	150,419		
		Labyrinth -	<u>5.9500</u>	<u>151,130</u>	5.9530	151,206
		Bore	5.9520	151,181		

Table 601 (Continued) (Sheet 1 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
5.1510	130,835					Ref.72-33-00 Fig.601-60
		<u>0.0006</u> 0.0026	<u>0,015</u> 0,066	0.0026	0,066	
5.1484	130,769					
5.9511	151,158					Ref.72-33-00 Fig.601-61
		<u>-0.0010</u> +0.0010	<u>-0,025</u> +0,025	+0.0012	+0,031	
5.9499	151,127					
6.2720	159,461					Ref.72-32-00 Fig.601-62
		<u>0.0280</u> 0.0320	<u>0,711</u> 0,813	0.0400	0,864	
6.3120	160,325					
5.9190	150,343					Ref.72-32-00 Fig.601-63
		<u>0.0280</u> 0.0320	<u>0,711</u> 0,813	0.0340	0,864	
5.9530	151,206					

Table 601 (Continued) (Sheet 1 - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-76	BEVEL GEAR SPLINES IN ROTOR SHAFT REAR SPLINES	Backlash	-	-	-	-
601-77	BEVEL GEAR FIN IN OIL BAFFLE	Gear Fin -	<u>6.1218</u>	<u>155,494</u>	6.1208	155,468
		Diameter	<u>6.1234</u>	<u>155,534</u>		
		Baffle -	<u>6.1834</u>	<u>157,058</u>	6.1928	157,297
		Bore	<u>6.1918</u>	<u>157,272</u>		
602-415	BEVEL GEAR IN SPACER SLEEVE	Gear -	<u>1.3877</u>	<u>35,248</u>	1.3870	35,230
		Diameter	<u>1.3882</u>	<u>35,260</u>		
		Sleeve -	<u>1.3900</u>	<u>35,306</u>	1.4010	35,585
		Bore	<u>1.4000</u>	<u>35,560</u>		
602-416	ROLLER BEAR- ING IN HOUSING ASSEMBLY	Bearing -	<u>2.4404</u>	<u>61,986</u>	2.4403	61,984
		Diameter	<u>2.4409</u>	<u>62,000</u>		
		Housing -	<u>2.4405</u>	<u>61,989</u>	2.4413	62,009
		Bore	<u>2.4412</u>	<u>62,007</u>		
602-417	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-418	ROLLER BEAR- ING ON BEVEL GEAR	Bearing -	<u>1.3774</u>	<u>34,987</u>	1.3781	35,004
		Bore	<u>1.3780</u>	<u>35,000</u>		
		Gear -	<u>1.3777</u>	<u>34,994</u>	1.3776	34,991
		Diameter	<u>1.3782</u>	<u>35,006</u>		
602-419	COUPLING SHAFT IN BEVEL GEAR	Backlash	-	-	-	-

Table 601 (Continued) - (Sheet 2 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0000}{0.0038}$	$\frac{0,000}{0,096}$	0.0038	0,096	MODULE BREAK POSITION. Ref.72-33-00 Fig.601-76
		$\frac{0.0600}{0.0700}$	$\frac{1,524}{1,778}$	0.0720	1,829	Ref.72-32-00 Fig.601-77
		$\frac{0.0018}{0.0123}$	$\frac{0,046}{0,312}$	0.0140	0,356	
2.4401	61,979	$\frac{-0.0004}{+0.0008}$	$\frac{-0,011}{+0,021}$	0.0010	0,025	
2.4415	62,014					
-	-	$\frac{0.0015}{0.0019}$	$\frac{0,038}{0,048}$	0.0029	0,074	
1.3781	35,009	$\frac{-0.0008}{+0.0003}$	$\frac{-0,019}{+0,006}$	+0.0005	+0,013	
1.3774	34,986					
-	-	$\frac{0.0040}{0.0081}$	$\frac{0,102}{0,206}$	0.0090	0,229	Ref.72-63-00 Fig.601-419

Table 601 (Continued) - (Sheet 2 - RH)

FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-420	BALL BEAR- ING ON BEVEL GEAR	Bearing - Bore	<u>1.3875</u> 1.3880	<u>35,241</u> 35,254	1.3881	35,258
		Gear - Diameter	<u>1.3877</u> 1.3882	<u>35,248</u> 35,260	1.3876	35,245
602-421	BALL BEARING	Diametral Clearance	-	-	-	-
		End-float	-	-	-	-
602-422	BALL BEAR- ING IN HOUSING ASSEMBLY	Bearing - Diameter	<u>2.4350</u> 2.4380	<u>61,848</u> 61,924	2.4347	61,841
		Housing - Bore	<u>2.4500</u> 2.4512	<u>62,230</u> 62,261	2.4515	62,268
602-423	ROLLER BEAR- ING ON BEVEL GEAR	Bearing - Bore	<u>1.3978</u> 1.3980	<u>35,504</u> 35,509	1.3981	35,512
		Gear - Diameter	<u>1.3977</u> 1.3982	<u>35,502</u> 35,514	1.3976	35,499
602-424	ROLLER BEAR- ING	Diametral Clearance	-	-	-	-
602-425 **	BEVEL GEAR WITH BEVEL PINION, RH	Backlash	-	-	-	-
602-426	ROLLER BEAR- ING IN HOUSING ASSEMBLY	Bearing - Diameter	<u>1.8500</u> 1.8504	<u>46,990</u> 47,000	1.8499	46,987
		Housing - Bore	<u>1.8500</u> 1.8507	<u>46,990</u> 47,008	1.8509	47,013

Table 601 (Continued) - (Sheet 3 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
1.3883	35,263					
		$\frac{-0.0007}{+0.0003}$	$\frac{-0,019}{+0,006}$	+0.0005	0,013	
1.3874	35,240					
-	-	-	-	-	-	
-	-	$\frac{0.0060}{0.0075}$	$\frac{0,152}{0,191}$	0.0105	0,267	
2.4347	61,841					
		$\frac{0.0120}{0.0162}$	$\frac{0,306}{0,413}$	0.0168	0,427	
2.4515	62,268					
1.3983	35,517					
		$\frac{-0.0004}{+0.0003}$	$\frac{-0.010}{+0.007}$	+0.0005	0,013	
1.3974	35,494					
-	-	$\frac{0.0015}{0.0019}$	$\frac{0,038}{0,048}$	0.0029	0,074	
-	-	MINIMUM BACKLASH FIGURE IS ENGRAVED ON BEVEL PINION, ACCEPTABLE BACKLASH IS +0.004 IN. (+0,102 MM)/-0.000 IN. (-0,000 MM) ON THIS FIGURE				Ref.72-32-00 Fig.602-425
1.8497	46,982					
		$\frac{-0.0004}{+0.0007}$	$\frac{-0,010}{+0,018}$	+0.0010	0,025	
1.8510	47,015					

Table 601 (Continued) - (Sheet 3 - RH)

FITS AND CLEARANCES

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OVERHAUL



FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-427	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-428	ROLLER BEARING ON BEVEL GEAR	Bearing - Bore	$\frac{0.9838}{0.9842}$	$\frac{24,990}{25,000}$	0.9843	25,001
		Gear - Diameter	$\frac{0.9839}{0.9844}$	$\frac{24,991}{25,004}$	0.9838	24,989
602-429	BALL BEARING IN BEARING HOUSING	Bearing - Diameter	$\frac{2.4404}{2.4409}$	$\frac{61,987}{62,000}$	2.4403	61,984
		Housing - Bore	$\frac{2.4405}{2.4412}$	$\frac{61,989}{62,007}$	2.4413	62,009
602-430	BALL BEARING	Diametral Clearance	-	-	-	-
		End-float	-	-	-	-
602-431	BEVEL GEAR IN BALL BEARING	Gear - Diameter	$\frac{1.1908}{1.1931}$	$\frac{30,246}{30,259}$	1.1907	30,244
		Bearing - Bore	$\frac{1.1906}{1.1911}$	$\frac{30,241}{30,254}$	1.1912	30,256
602-432	BEVEL GEAR IN SPACER SLEEVE	Gear - Diameter	$\frac{1.1808}{1.1813}$	$\frac{29,992}{30,005}$	1.1804	29,982
		Sleeve - Bore	$\frac{1.1850}{1.1900}$	$\frac{30,099}{30,226}$	1.1904	30,236
602-433	ROLLER BEARING IN HOUSING ASSEMBLY	Bearing - Diameter	$\frac{2.1649}{2.1654}$	$\frac{54,987}{55,000}$	2.1648	54,986
		Housing - Bore	$\frac{2.1650}{2.1657}$	$\frac{54,991}{55,009}$	2.1658	55,011

Table 601 (Continued) (Sheet 4 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0011}{0.0015}$	$\frac{0,028}{0,038}$	0.0025	0,063	
0.9845	25,006	$\frac{-0.0006}{+0.0003}$	$\frac{-0,014}{+0,009}$	+0.0005	0,013	
0.9836	24,983					
2.4401	61,979					
		$\frac{-0.0004}{+0.0008}$	$\frac{-0,011}{+0,020}$	+0.0010	0,025	
2.4415	62,014					
-	-	$\frac{0.0007}{0.0011}$	$\frac{0,018}{0,028}$	0.0021	0,053	
-	-	$\frac{0.0040}{0.0080}$	$\frac{0,102}{0,203}$	0.0110	0,279	
1.1905	30,239					
		$\frac{-0.0007}{+0.0003}$	$\frac{-0,018}{+0,008}$	+0.0005	0,013	
1.1914	30,262					
		$\frac{0.0037}{0.0092}$	$\frac{0,094}{0,234}$	0.0100	0,254	
2.1646	54,981					
		$\frac{-0.0004}{+0.0008}$	$\frac{-0,009}{+0,022}$	+0.0010	0,025	
2.1660	55,016					

Table 601 (Continued) - (Sheet 4 - RH)
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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-434	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-435	BEVEL GEAR IN ROLLER BEARING	Bearing - Bore	<u>1.1807</u> 1.1811	<u>29,990</u> 30,000	1.1812	30,002
		Gear - Diameter	<u>1.1808</u> 1.1813	<u>29,992</u> 30,005	1.1807	29,990
602-436	DRIVING SHAFT IN BEVEL GEAR	Backlash	-	-	-	-
602-437 **	BEVEL GEAR WITH BEVEL PINION, LH	Backlash	-	-	-	-
602-438 **	BEVEL GEAR WITH BEVEL GEAR	Backlash	-	-	-	-
602-439	BEVEL GEAR IN INNER DISTANCE PIECE	Spacer - Bore	<u>0.9850</u> 0.9900	<u>25,019</u> 25,146	0.9902	25,151
		Gear - Diameter	<u>0.9839</u> 0.9844	<u>24,991</u> 25,004	0.9837	24,986
602-440	DRIVE SHAFT SPLINES IN BEVEL GEAR SPLINES	Backlash	-	-	-	-
602-441	BALL BEARING ON BEVEL GEAR	Gear - Diameter	<u>0.9839</u> 0.9844	<u>24,990</u> 25,000	0.9838	24,989
		Bearing - Bore	<u>0.9839</u> 0.9843	<u>24,991</u> 25,004	0.9844	25,004

Table 601 (Continued) - (Sheet 5 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	<u>0.0015</u> 0.0019	<u>0,038</u> 0,048	0.0029	0,074	
1.1814	30,008					
		<u>-0.0006</u> +0.0003	<u>-0,015</u> +0,008	+0.0005	0,013	
1.1805	29,985					
-	-	<u>0.0030</u> 0.0070	<u>0,076</u> 0,178	0.0080	0,203	Ref.72-62-00 Fig.601-436
-	-	MINIMUM BACKLASH FIGURE IS ENGRAVED ON BEVEL PINION, ACCEPTABLE BACKLASH IS +0.004 IN. (+0,102 MM)/-0.000 IN. (-0,000 MM) ON THIS FIGURE				Ref.72-32-00 Fig.602-437
-	-	<u>0.0260</u> 0.0320	<u>0,660</u> 0,813	0.0340	0,864	Ref.72-32-00 Fig.602-438
		<u>0.0006</u> 0.0061	<u>0,015</u> 0,155	0.0065	0,165	
-	-	<u>0.0030</u> 0.0067	<u>0,076</u> 0,170	0.0070	0,178	
0.9836	24,983					
		<u>-0.0005</u> +0.0004	<u>-0,009</u> +0,014	+0.0006	0,015	
0.9847	25,011					

Table 601 (Continued) - (Sheet 5 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-442	BALL BEARING	Diametral Clearance	-	-	-	-
		End-float	-	-	-	-
602-443	BALL BEARING IN HOUSING ASSEMBLY	Bearing - Diameter	<u>1.8500</u> 1.8504	<u>46,989</u> 47,000	1.8499	46,987
		Housing - Bore	<u>1.8500</u> 1.8507	<u>46,990</u> 47,008	1.8509	47,013
602-444	DISTANCE PIECE OUTER IN BEARING HOUSING	Distance Piece - Diameter	<u>1.8440</u> 1.8490	<u>46,838</u> 46,965	1.8438	46,833
		Housing - Bore	<u>1.8500</u> 1.8507	<u>46,990</u> 47,008	1.8508	47,010

Table 601 (Concluded) - (Sheet 6 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0007}{0.0011}$	$\frac{0,018}{0,028}$	0.0021	0,053	
-	-	$\frac{0.0030}{0.0070}$	$\frac{0,076}{0,178}$	0.0100	0,254	
1.8497	46,982					
		$\frac{-0.0004}{+0.0007}$	$\frac{-0,010}{+0,019}$	0.0010	0,025	
1.8510	47,015					
		$\frac{0.0010}{0.0067}$	$\frac{0,025}{0,170}$	0.0070	0,178	

Table 601 (Concluded) - (Sheet 6 - RH)

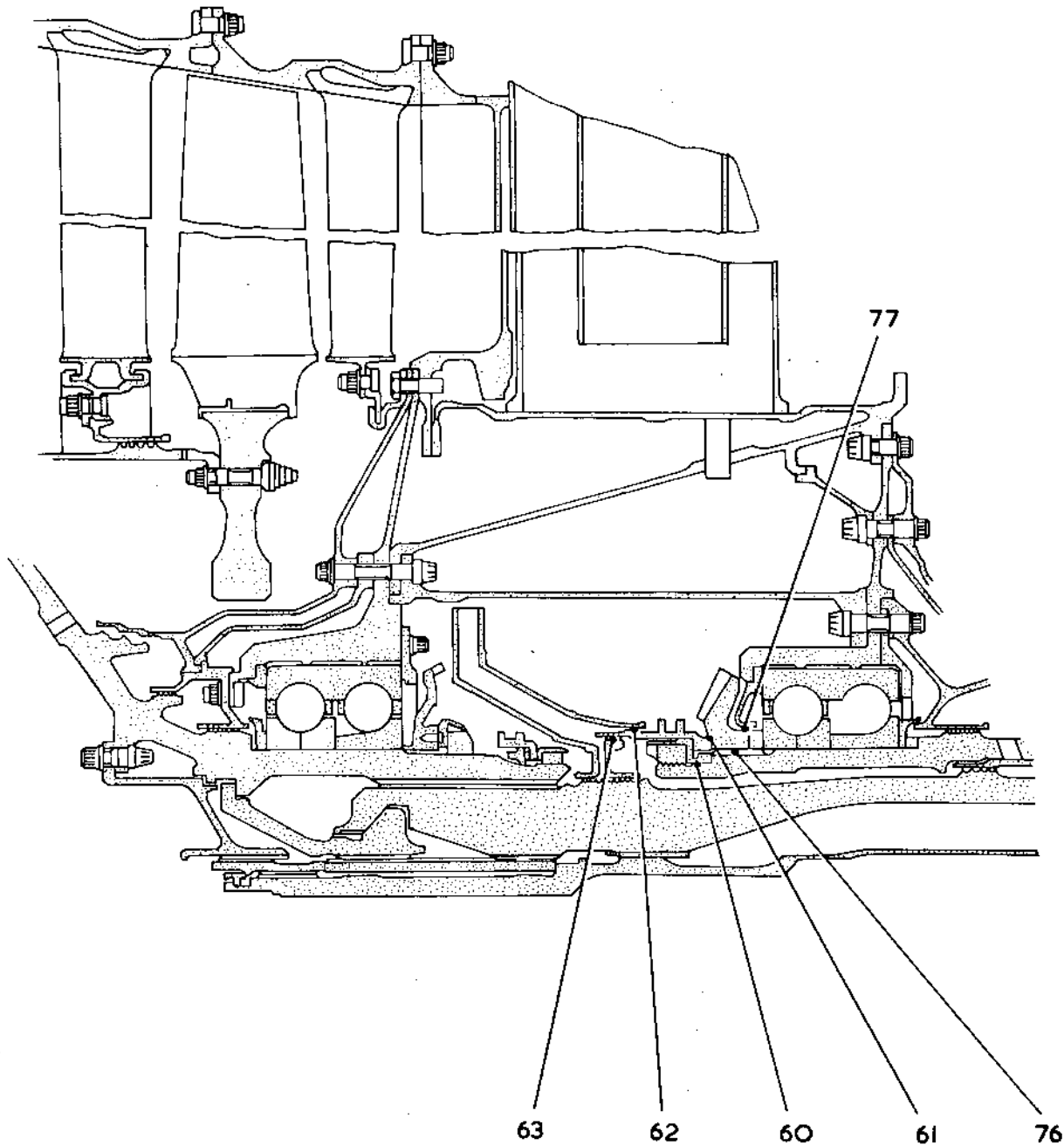


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TN22633

Internal Accessory Drives
Figure 601

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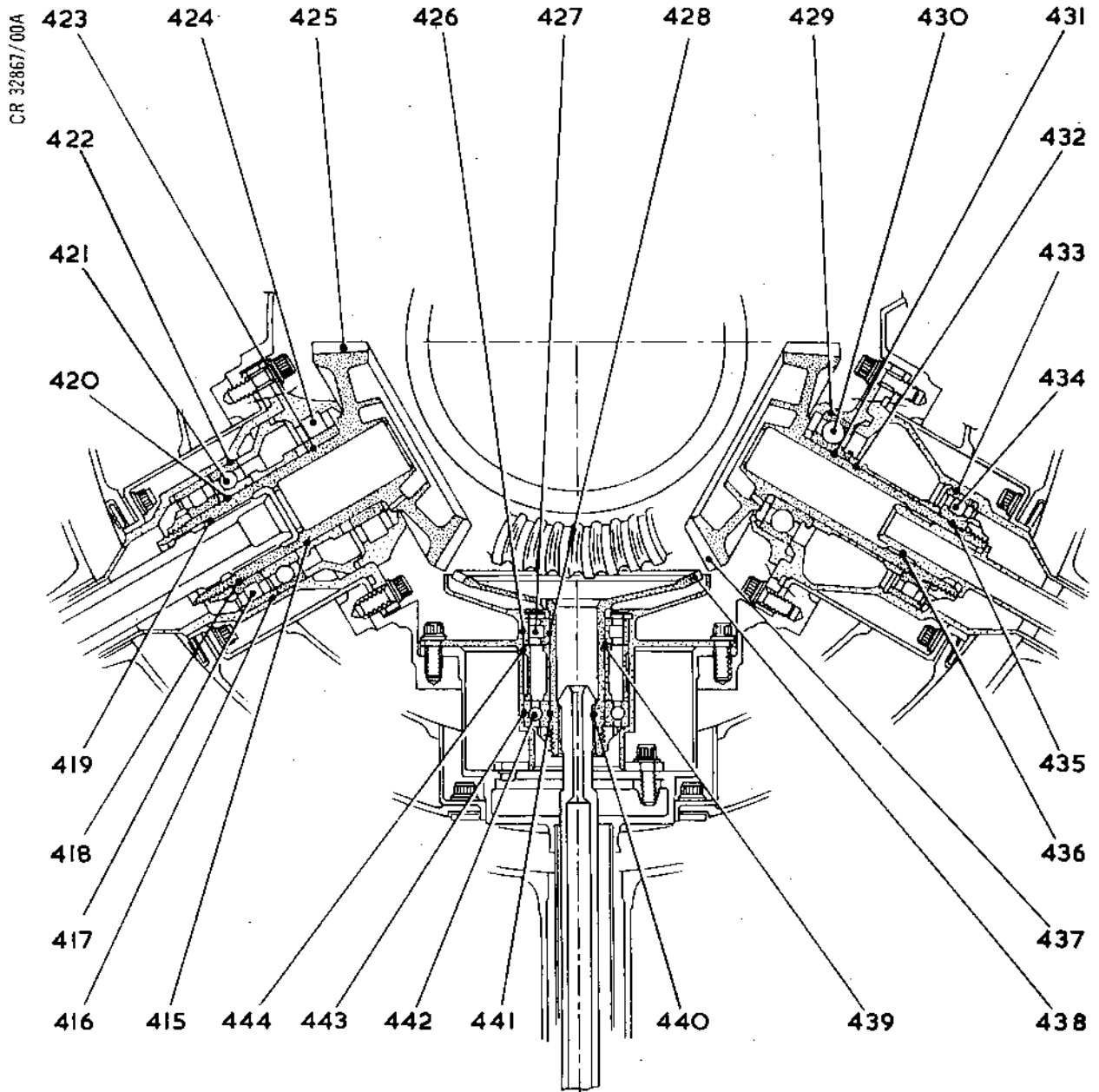
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Figure 602

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LEFT-HAND ACCESSORY GEARBOX ASSEMBLY - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-270	BALL BEARING Case -	2.1659	55,014	2.1668	55,037
	IN GEARBOX Bore	2.1665	55,029		
	CASE				
	Bearing -	2.1640	54,966	2.1638	54,961
	Diameter	2.1644	54,976		
601-271	BALL BEARING Bearing -	1.1809	29,995	1.1812	30,002
	ON BEVEL Bore	1.1811	30,000		
	PINION				
	Pinion -	1.1808	29,992	1.1807	29,990
	Diameter	1.1813	30,005		
601-272	BALL BEARING Diametral	-	-	-	-
	Clearance				
	End-float	-	-	-	-
601-273	BEVEL PINION Backlash	-	-	-	-
	SPLINES WITH				
	DRIVING SHAFT				
	SPLINES				
601-274	DIMENSIONAL				
	CHECK NO				
	LONGER				
	REQUIRED				
601-275	ROLLER Case -	2.4414	62,012	2.4424	62,037
	BEARING IN Bore	2.4421	62,029		
	GEARBOX				
	CASE				
	Bearing -	2.4406	61,991	2.4404	61,986
	Diameter	2.4409	61,999		

Table 601 (Continued) (Sheet 1 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
2.1668	55,037					
		$\frac{0.0015}{0.0025}$	$\frac{0,038}{0,063}$	0.0030	0,076	
2.1637	54,958					
1.1814	30,008					
		$\frac{-0.0004}{+0.0003}$	$\frac{-0,010}{+0,008}$	+0.0005	0,013	
1.1805	29,985					
-	-	$\frac{0.0009}{0.0014}$	$\frac{0,023}{0,036}$	0.0024	0,061	
-	-	$\frac{0.0061}{0.0083}$	$\frac{0,155}{0,211}$	0.0113	0,287	
-	-	$\frac{0.0030}{0.0070}$	$\frac{0,076}{0,178}$	-	-	
2.4424	62,037					
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
2.4403	61,984					

Table 601 (Continued) (Sheet 1 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-276	ROLLER BEARING ON BEVEL PINION	Bearing - Bore	<u>1.1879</u> 1.1881	<u>30,173</u> 30,178	1.1882	30,180
		Pinion - Diameter	<u>1.1878</u> 1.1883	<u>30,170</u> 30,183	1.1877	30,168
601-277	ROLLER BEARING	Diametral Clearance	-	-	-	-
601-277	ROLLER BEARING	Diametral Clearance	-	-	-	-
601-278 **	BEVEL PINION WITH BEVEL GEAR	Backlash	-	-	-	-
601-279	ROLLER BEARING IN GEARBOX CASE	Case - Bore	<u>2.1658</u> 2.1665	<u>55,011</u> 55,029	2.1668	55,037
		Bearing - Diameter	<u>2.1650</u> 2.1653	<u>54,991</u> 54,999	2.1648	54,986
601-280	ROLLER BEARING	Diametral Clearance	-	-	-	-
601-281	ROLLER BEARING ON GEARSHAFT	Bearing - Bore	<u>1.1879</u> 1.1881	<u>30,173</u> 30,178	1.1882	30,180
		Gear - Diameter	<u>1.1878</u> 1.1883	<u>30,170</u> 30,183	1.1877	30,168
601-282 **	GEARSHAFT WITH GEARSHAFT	Backlash	-	-	-	-

Table 601 (Continued) (Sheet 2 - LH)

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OVERHAUL

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
1.1884	30,185					PRE SB.72-383
		$\frac{-0.0004}{+0.0003}$	$\frac{-0,010}{+0,008}$	+0.0005	0,013	
1.1875	30,162					
-	-	$\frac{0.0010}{0.0014}$	$\frac{0,025}{0,036}$	0.0024	0,061	PRE SB.72-383
-	-	$\frac{0.0010}{0.0018}$	$\frac{0,026}{0,046}$	0.0024	0,061	SB.72-383
-	-	$\frac{0.0030}{0.0090}$	$\frac{0,076}{0,229}$	-	-	
2.1668	55,037					
		$\frac{0.0005}{0.0015}$	$\frac{0,012}{0,038}$	0.0020	0.051	
2.1647	54,983					
-	-	$\frac{0.0010}{0.0014}$	$\frac{0,025}{0,036}$	0.0024	0,061	
1.1884	30,185					
		$\frac{-0.0004}{+0.0003}$	$\frac{-0,010}{+0,008}$	+0.0005	0,013	
1.1875	30,162					
-	-	$\frac{0.0055}{0.0140}$	$\frac{0,140}{0,356}$	-	-	

Table 601 (Continued) (Sheet 2 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
601-283	BALL BEARING Bearing - ON GEARSHAFT Bore	$\frac{1.3776}{1.3780}$	$\frac{34,991}{35,001}$	1.3781	35,004
	Gear - Diameter	$\frac{1.3777}{1.3782}$	$\frac{34,994}{35,006}$	1.3776	34,991
601-284	BALL BEARING Diametral Clearance	-	-	-	-
	End-float	-	-	-	-
601-285	BALL BEARING Diaphragm - IN DIAPHRAGM Bore	$\frac{2.4414}{2.4421}$	$\frac{62,012}{62,029}$	2.4424	62,037
	Bearing - Diameter	$\frac{2.4406}{2.4409}$	$\frac{61,991}{61,999}$	2.4404	61,986
601-286	QUILLSHAFT SPLINES IN GEARSHAFT SPLINES	-	-	-	-
602-287	BALL BEARING Bearing - ON DRIVING Bore SHAFT	$\frac{1.1809}{1.1811}$	$\frac{29,995}{30,000}$	1.1812	30,002
	Shaft - Diameter	$\frac{1.1808}{1.1813}$	$\frac{29,992}{30,005}$	1.1807	29,990
602-288	BALL BEARING Diametral Clearance	-	-	-	-
	End-float	-	-	-	-

Table 601 (Continued) (Sheet 3 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
1.3783	35,009					
		$\frac{-0.0006}{+0.0003}$	$\frac{-0,015}{+0,007}$	+0.0005	0,013	
1.3774	34,986					
-	-	$\frac{0.0008}{0.0012}$	$\frac{0,020}{0,030}$	0.0022	0,056	
-	-	0.0087 MAXIMUM	0,021 MAXIMUM	-	-	
2.4424	62,037					
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
2.4403	61,984					
-	-	$\frac{0.0030}{0.0070}$	$\frac{0,076}{0,178}$	-	-	
		$\frac{-0.0004}{+0.0003}$	$\frac{-0,010}{+0,008}$	+0.0005	0,013	
-	-	$\frac{0.0007}{0.0011}$	$\frac{0,018}{0,028}$	0.0021	0,053	
-	-	0.0069 MAXIMUM	0,175 MAXIMUM	-	-	

Table 601 (Continued) (Sheet 3 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-289	BALL BEARING IN DIAPHRAGM	Diaphragm -	<u>2.1659</u>	<u>55,014</u>	2.1668	55,037
		Bore	<u>2.1665</u>	<u>55,029</u>		
		Bearing -	<u>2.1650</u>	<u>54,991</u>	2.1648	54,986
		Diameter	<u>2.1654</u>	<u>55,001</u>		
602-290 **	GEARSHAFT WITH GEARSHAFT	Backlash	-	-	-	-
602-291	ROLLER BEARING IN DIAPHRAGM	Diaphragm -	<u>1.6540</u>	<u>42,012</u>	1.6551	42,040
		Bore	<u>1.6548</u>	<u>42,032</u>		
		Bearing -	<u>1.6533</u>	<u>41,994</u>	1.6531	41,989
		Diameter	<u>1.6535</u>	<u>41,999</u>		
602-292	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-293	ROLLER BEARING ON GEARSHAFT	Bearing -	<u>0.7872</u>	<u>19,995</u>	0.7875	20,002
		Bore	<u>0.7874</u>	<u>20,000</u>		
		Gear -	<u>0.7871</u>	<u>19,992</u>	0.7870	19,990
		Diameter	<u>0.7876</u>	<u>20,005</u>		
602-294	BALL BEARING IN DIAPHRAGM	Diaphragm -	<u>2.8351</u>	<u>72,012</u>	2.8361	72,037
		Bore	<u>2.8358</u>	<u>72,029</u>		
		Bearing -	<u>2.8343</u>	<u>71,991</u>	2.8341	71,986
		Diameter	<u>2.8346</u>	<u>71,999</u>		
602-295	BALL BEARING	Diametral Clearance	-	-	-	-
		End-float	-	-	-	-

Table 601 (Continued) (Sheet 4 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
2.1668	55,037					
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
2.1647	54,983					
-	-	$\frac{0.0055}{0.0140}$	$\frac{0,140}{0,356}$	-	-	
1.6551	42,040					
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
1.6530	41,986					
-	-	$\frac{0.0010}{0.0014}$	$\frac{0,025}{0,036}$	0.0024	0,061	
0.7877	20,008					
		$\frac{-0.0004}{+0.0003}$	$\frac{-0,010}{+0,008}$	+0.0005	0,013	
0.7868	19,985					
2.8361	72,037					
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
2.8340	71,984					
-	-	$\frac{0.0009}{0.0013}$	$\frac{0,023}{0,033}$	0.0023	0,058	
-	-	$\frac{0.0074}{0.0095}$	$\frac{0,188}{0,242}$	0.0125	0,317	

Table 601 (Continued) (Sheet 4 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
602-296	BALL BEARING Bearing - ON SPUR GEAR Bore SHAFT	<u>1.3776</u>	<u>34,991</u>	1.3781	35,004
		<u>1.3780</u>	<u>35,001</u>		
	Gear shaft - Diameter	<u>1.3777</u>	<u>34,994</u>	1.3776	34,991
		<u>1.3782</u>	<u>35,006</u>		
602-297	CENTERING RING ON SPUR GEAR SHAFT	<u>1.3846</u>	<u>35,169</u>	1.3853	35,186
		<u>1.3851</u>	<u>35,182</u>		
	Gear shaft - Diameter	<u>1.3861</u>	<u>35,207</u>	1.3858	35,199
		<u>1.3866</u>	<u>35,220</u>		
602-298	CENTERING RING IN BEVEL GEAR	<u>1.6555</u>	<u>42,050</u>	1.6562	42,067
		<u>1.6560</u>	<u>42,063</u>		
	Ring - Diameter	<u>1.6570</u>	<u>42,088</u>	1.6567	42,080
		<u>1.6575</u>	<u>42,101</u>		
602-299	BEVEL GEAR SPLINES IN SPUR GEAR SPLINES	Backlash	-	-	-

Table 601 (Continued) (Sheet 5 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
1.3783	35,009					
		$\frac{-0.0006}{+0.0003}$	$\frac{-0,015}{+0,007}$	+0.0005	0,013	
1.3774	34,986					
		$\frac{-0.0020}{-0.0010}$	$\frac{-0,051}{-0,025}$	-0.0005	-0,013	SB.72-90 PRE SB.72-383
		$\frac{-0.0020}{-0.0010}$	$\frac{-0,051}{-0,025}$	-0.0005	-0,013	SB.72-90 PRE SB.72-383
-	-	$\frac{0.0000}{0.0028}$	$\frac{0,000}{0,071}$	0.0030	0,076	PRE SB.72-383

Table 601 (Continued) (Sheet 5 - RH)

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**OLYMPUS 593**

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OVERHAUL



FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-300	BEVEL GEAR ON SPUR GEAR	Gear -	<u>1.5325</u>	<u>38,926</u>	1.5332	38,943
		Bore	<u>1.5330</u>	<u>38,938</u>		
		Gear -	<u>1.5355</u>	<u>39,002</u>	1.5352	38,994
		Diameter	<u>1.5360</u>	<u>39,014</u>		
602-301	ROLLER BEARING ON SPUR GEAR	Bearing -	<u>0.7872</u>	<u>19,995</u>	0.7875	20,003
		Bore	<u>0.7874</u>	<u>20,000</u>		
		Gear -	<u>0.7871</u>	<u>19,992</u>	0.7870	19,990
		Diameter	<u>0.7876</u>	<u>20,005</u>		
602-302	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-303	ROLLER BEARING IN GEARBOX CASE	Case -	<u>1.6540</u>	<u>42,012</u>	1.6551	42,040
		Bore	<u>1.6548</u>	<u>42,032</u>		
		Bearing -	<u>1.6533</u>	<u>41,994</u>	1.6531	41,989
		Diameter	<u>1.6535</u>	<u>41,999</u>		
602-304 **	SPUR GEAR WITH SPUR GEAR	Backlash	-	-	-	-
602/305	ROLLER BEARING	Diametral Clearance	-	-	-	-

Table 601 (Continued) (Sheet 6 - LH)

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**OLYMPUS 593**MK.610-14-28 *sneema*
OVERHAUL

REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		<u>-0.0035</u> +0.0025	<u>-0,088</u> +0,064	-0.0020	-0,051	SB.72-90 PRE SB.72-383
0.7877	20,008					
		<u>-0.0004</u> +0.0003	<u>-0,010</u> +0,008	+0.0005	0,013	
0.7868	19,985					
-	-	<u>0.0008</u> 0.0014	<u>0,020</u> 0,036	0.0024	0,061	
1.6551	42,040					
		<u>0.0005</u> 0.0015	<u>0,013</u> 0,038	0.0020	0,051	
1.6530	41,986					
-	-	<u>0.0055</u> 0.0140	<u>0,140</u> 0,356	-	-	
-	-	<u>0.0010</u> 0.0014	<u>0,025</u> 0,035	0.0024	0,061	

Table 601 (Continued) (Sheet 6 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-306	ROLLER BEARING ON SPUR GEAR	Bearing - Bore	<u>1.1879</u> 1.1881	<u>30,173</u> 30,178	1.1882	30,180
		Gear - Diameter	<u>1.1878</u> 1.1883	<u>30,170</u> 30,183	1.1877	30,168
602-307	ROLLER BEARING IN GEARBOX CASE	Case - Bore	<u>2.1658</u> 2.1665	<u>55,011</u> 55,029	2.1668	55,037
		Bearing - Diameter	<u>2.1650</u> 2.1653	<u>54,991</u> 54,999	2.1648	54,986
602-308	ROLLER BEARING ON DRIVING SHAFT	Bearing - Bore	<u>0.9840</u> 0.9843	<u>24,994</u> 25,001	0.9844	25,004
		Shaft - Diameter	<u>0.9840</u> 0.9845	<u>24,994</u> 25,006	0.9839	24,991
602-309	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-310	ROLLER BEARING IN GEARBOX CASE	Case - Bore	<u>1.8509</u> 1.8516	<u>47,013</u> 47,031	1.8519	47,038
		Bearing - Diameter	<u>1.8501</u> 1.8504	<u>46,993</u> 47,000	1.8499	46,987
602-311	ROLLER BEARING	Diametral Clearance	-	-	-	-

Table 601 (Continued) (Sheet 7 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
1.1884	30,185					
		$\frac{-0.0004}{+0.0003}$	$\frac{-0,010}{+0,008}$	0.0005	0,013	
1.1875	30,162					
2.1668	55,037					
		$\frac{0.0005}{0.0015}$	$\frac{0,012}{0,038}$	0.0020	0,051	
2.1647	54,983					
0.9846	25,009					
		$\frac{-0.0005}{+0.0003}$	$\frac{-0,012}{+0,007}$	0.0005	0,013	
0.9837	24,986					
-	-	$\frac{0.0010}{0.0014}$	$\frac{0,025}{0,036}$	0.0024	0,061	
1.8519	47,038					
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
1.8498	46,985					
-	-	$\frac{0.0008}{0.0014}$	$\frac{0,020}{0,036}$	0.0024	0,061	

Table 601 (Continued) (Sheet 7 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-312	ROLLER BEARING IN GEARBOX CASE	Case -	<u>2.1659</u>	<u>55,014</u>	2.1668	55,014
		Bore	<u>2.1665</u>	<u>55,029</u>		
		Bearing -	<u>2.1650</u>	<u>54,991</u>	2.1648	54,986
		Diameter	<u>2.1654</u>	<u>55,001</u>		
		Case -	<u>2.3509</u>	<u>59,713</u>	2.3518	59,736
602-313	ROLLER BEARING ON BEVEL GEAR	Bore	<u>2.3515</u>	<u>59,728</u>		
		Bearing -	<u>2.3500</u>	<u>59,690</u>	2.3498	59,685
		Diameter	<u>2.3504</u>	<u>59,700</u>		
		Bearing -	<u>1.1879</u>	<u>30,173</u>	1.1882	30,180
		Bore	<u>1.1881</u>	<u>30,178</u>		
602-314	BALL BEARING ON BEVEL GEAR	Gear -	<u>1.1878</u>	<u>30,170</u>	1.1877	30,168
		Diameter	<u>1.1883</u>	<u>30,183</u>		
		Bearing -	<u>1.1809</u>	<u>29,995</u>	1.1812	30,002
		Bore	<u>1.1811</u>	<u>30,000</u>		
		Gear -	<u>1.1808</u>	<u>29,992</u>	1.1807	29,990
602-315	BALL BEARING	Diameter	<u>1.1813</u>	<u>30,005</u>		
		Diametral Clearance	-	-	-	-
		End-float	-	-	-	-
			-	-	-	-
			-	-	-	-
602-316 **	BEVEL GEAR WITH BEVEL GEAR	Backlash	-	-	-	-

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Table 601 (Continued) (Sheet 8 - LH)

FITS AND CLEARANCES

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
2.1668	55,037					PRE S.B.72- 7510-166
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
2.1647	54,983					
2.3518	59,736					S.B.72- 7510-166
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
2.3497	59,682					
1.1884	30,185					
		$\frac{-0.0004}{+0.0003}$	$\frac{-0,010}{+0,008}$	+0.0005	0,013	
1.1875	30,162					
1.1814	30,008					
		$\frac{-0.0004}{+0.0003}$	$\frac{-0,010}{+0,008}$	+0.0005	0,013	
1.1805	29,985					
-	-	$\frac{0.0007}{0.0011}$	$\frac{0,018}{0,028}$	0.0021	0,053	
-	-	0.0069*	0,175*	-	-	* MAXIMUM
-	-	$\frac{0.0055}{0.0120}$	$\frac{0,140}{0,305}$	-	-	

Table 601 (Continued) (Sheet 8 - RH)

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-317	BEVEL GEAR ON DRIVING SHAFT	Gear -	<u>1.3550</u>	<u>34,417</u>	1.3563	34,450
		Bore	<u>1.3560</u>	<u>34,442</u>		
		Shaft -	<u>1.3540</u>	<u>34,392</u>	1.3538	34,387
		Diameter	<u>1.3546</u>	<u>34,407</u>		
602-318	BEVEL GEAR SPLINES IN DRIVING SHAFT SPLINES	Backlash	-	-	-	-
602-319	LOCATING SLEEVE IN BEVEL GEAR	Gear -	<u>1.4800</u>	<u>37,592</u>	1,4813	37,625
		Bore	<u>1.4810</u>	<u>37,617</u>		
		Sleeve -	<u>1.4790</u>	<u>37,567</u>	1.4788	37,562
		Diameter	<u>1.4796</u>	<u>37,582</u>		
602-320	LOCATING SLEEVE ON DRIVING SHAFT	Sleeve -	<u>1.1817</u>	<u>30,015</u>	1.1830	30,048
		Bore	<u>1.1828</u>	<u>30,043</u>		
		Shaft -	<u>1.1808</u>	<u>29,992</u>	1.1805	29,985
		Diameter	<u>1.1813</u>	<u>30,005</u>		
602-321	QUILLSHAFT SPLINES IN DRIVING SHAFT SPLINES	Backlash	-	-	-	-
601-436	DRIVING SHAFT IN BEVEL GEAR	Backlash	-	-	-	-

Table 601 (Continued) (Sheet 9 - LH)

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MK.610-14-28

OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{0.0004}{0.0020}$	$\frac{0,010}{0,050}$	0.0025	0,063	
-	-	$\frac{0.0000}{0.0028}$	$\frac{0,000}{0,071}$	-	-	
		$\frac{0.0004}{0.0020}$	$\frac{0,010}{0,050}$	0.0025	0,063	
		$\frac{0.0004}{0.0020}$	$\frac{0,010}{0,051}$	0.0025	0,063	
-	-	$\frac{0.0030}{0.0069}$	$\frac{0,076}{0,175}$	-	-	
-	-	$\frac{0.0030}{0.0070}$	$\frac{0,076}{0,178}$	0.0080	0,203	Ref.72-61-00 Fig.602/436

Table 601 (Continued) (Sheet 9 - RH)

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-521	SPACER WASHER ON GEARSHAFT	Washer -	<u>1.6845</u>	<u>42,786</u>	1.6850	42,799
		Bore	<u>1.6850</u>	<u>42,799</u>		
		Gearshaft -	<u>1.6850</u>	<u>42,799</u>	1.6850	42,799
		Diameter	<u>1.6855</u>	<u>42,812</u>		
602-522	ADJUSTING WASHER ON GEARSHAFT	Washer -	<u>1.3874</u>	<u>35,240</u>	1.3887	35,273
		Bore	<u>1.3884</u>	<u>35,265</u>		
		Gearshaft -	<u>1.3861</u>	<u>35,207</u>	1.3857	35,197
		Diameter	<u>1.3866</u>	<u>35,220</u>		

Table 601 (Concluded) (Sheet 10 - LH)

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MK.610-14-28 *sneema*
OVERHAUL

REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-					
		<u>-0.0010</u>	<u>-0,026</u>	0.0000	0,000	S.B.72-90
		0.0000	0,000			PRE SB.72-383
-	-					
-	-					
		<u>0.0008</u>	<u>0,020</u>	0.0030	0,076	S.B.72-90
		0.0023	0,058			PRE SB.72-383
-	-					

Table 601 (Concluded) (Sheet 10 - RH)

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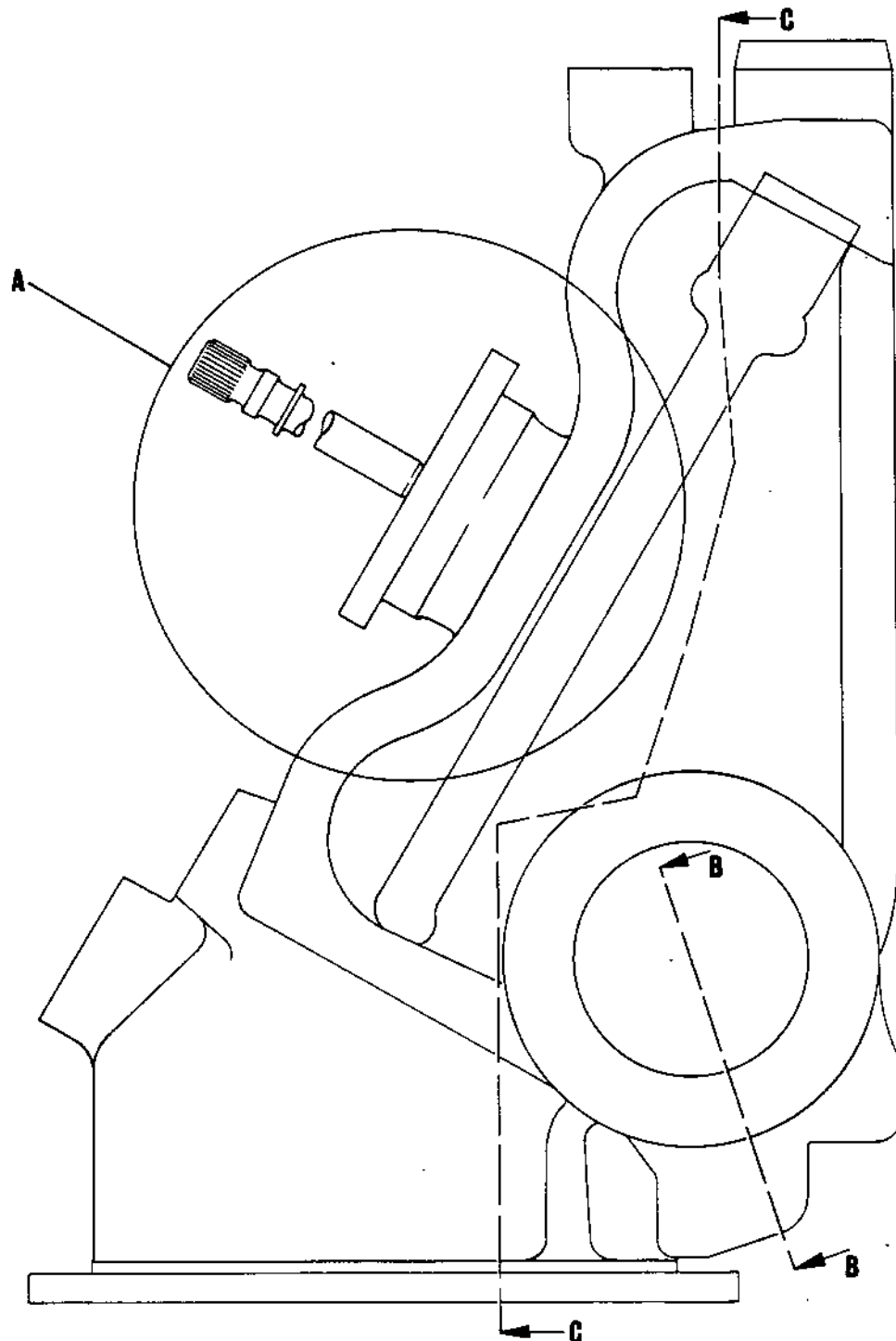


OLYMPUS 593

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CR 32874/00A



Left-hand Accessory Gearbox Assembly
Figure 601 (Sheet 1 - LH)

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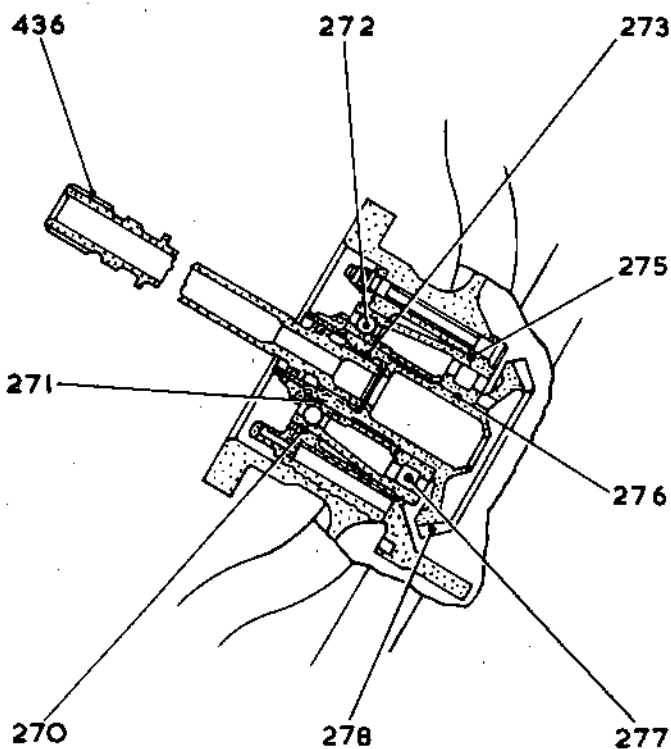
MK. 610-14-28

OVERHAUL

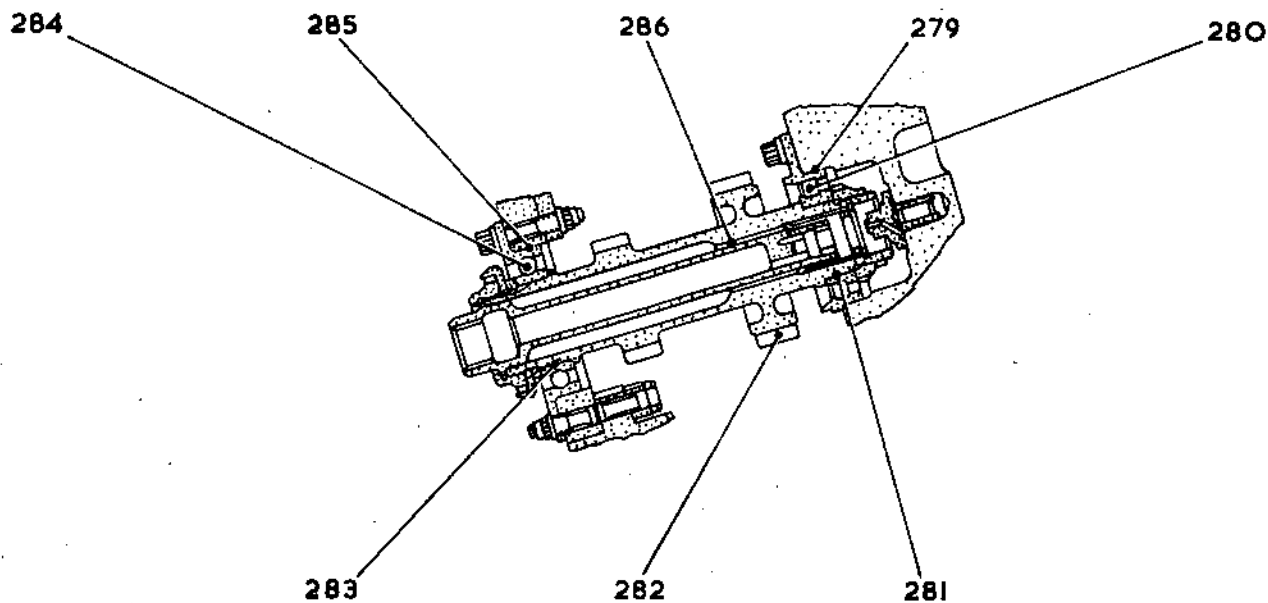


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SECTION DETAIL AT A



SECTION BB

Left-hand Accessory Gearbox Assembly
Figure 601 (Sheet 2 - RH)

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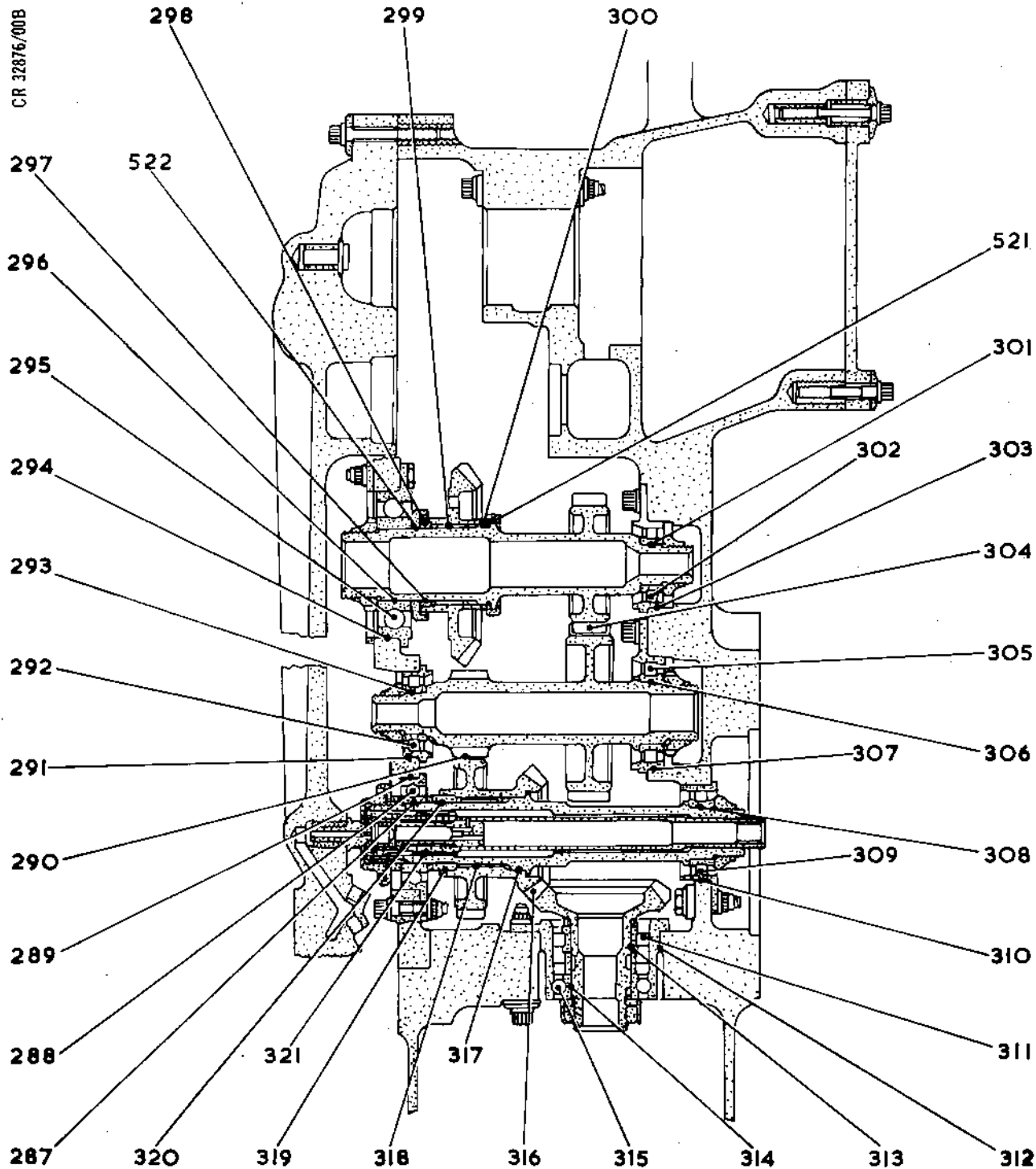
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SECTION C-C (REF. FIG. 601 SHEET 1)

Left-hand Accessory Gearbox Assembly
Figure 602

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OVERHAUL



RIGHT-HAND ACCESSORY GEARBOX ASSEMBLY - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)		
		IN.	MM	IN.	MM	
601-322 **	SPIRAL BEVEL Gear WITH BEVEL GEAR	-	-	-	-	
601-323	ROLLER BEAR- ING	Diametral Clearance	-	-	-	
601-324	ROLLER BEAR- ING IN BEAR- ING HOUSING	Housing - Bore	<u>3.3459</u> 3.3469	<u>84,986</u> 85,011	3.3471	85,016
		Bearing - Diameter	<u>3.3462</u> 3.3465	<u>84,994</u> 85,001	3.3461	84,991
601-325	BALL BEARING IN BEARING HOUSING	Housing - Bore	<u>2.9900</u> 3.0000	<u>75,946</u> 76,200	3.0003	76,208
		Bearing - Diameter	<u>2.9468</u> 2.9498	<u>74,849</u> 74,925	2.9465	74,841
601-326	ROLLER BEAR- ING	Diametral Clearance	-	-	-	
601-327	ROLLER BEAR- ING ON BEVEL GEAR	Bearing - Bore	<u>1.7714</u> 1.7716	<u>44,994</u> 44,999	1.7717	45,001
		Gear - Diameter	<u>1.7714</u> 1.7719	<u>44,994</u> 45,006	1.7712	44,988
601-328	BEVEL GEAR ON COUPLING SHAFT	Gear - Bore	<u>1.4200</u> 1.4216	<u>36,068</u> 36,109	1.4240	36,170
		Shaft - Diameter	<u>1.3980</u> 1.4000	<u>35,509</u> 35,560	1.3960	35,458

Table 601 (Continued) (Sheet 1 - LH)



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OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0280}{0.0440}$	$\frac{0,711}{1,118}$	-	-	
-	-	$\frac{0.0015}{0.0019}$	$\frac{0,038}{0,048}$	0.0029	0,074	
3.3472	85,019					
		$\frac{-0.0006}{+0.0007}$	$\frac{-0,015}{+0,017}$	+0.0010	0,025	
3.3459	84,986					
3.0003	76,208					
		$\frac{0.0402}{0.0532}$	$\frac{1,021}{1,351}$	0.0538	1,366	
2.9465	74,841					
-	-	$\frac{0.0015}{0.0019}$	$\frac{0,038}{0,048}$	0.0029	0,074	
1.7719	45,006					
		$\frac{-0.0005}{+0.0002}$	$\frac{-0,012}{+0,005}$	+0.0005	0,013	
1.7711	44,986					
		$\frac{0.0200}{0.0236}$	$\frac{0,508}{0,600}$	0.0280	0,711	

Table 601 (Continued) (Sheet 1 - RH)

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-329	SPACER SLEEVE SPLINES IN COUPLING SHAFT	Sleeve - Diameter	0.7512 0.7517	19,081 19,093	0.7511	19,078
		Shaft - Bore	0.7500 0.7508	19,050 19,070	0.7509	19,073
601-330	ROLLER BEARING IN BEARING HOUSING	Housing - Bore	2.9524 2.9531	74,991 75,009	2.9533	75,014
		Bearing - Diameter	2.9525 2.9528	74,993 75,001	2.9523	74,988
601-331	BALL BEARING ON BEVEL GEAR	Bearing - Bore	1.7811 1.7816	45,240 45,253	1.7817	45,255
		Gear - Diameter	1.7814 1.7819	45,248 45,260	1.7813	45,245
601-332	ROLLER BEAR- ING ON BEVEL GEAR	Bearing - Bore	1.7914 1.7916	45,502 45,507	1.7917	45,509
		Gear - Diameter	1.7914 1.7919	45,502 45,514	1.7913	45,499
601-333	COUPLING SHAFT SPLINES IN BEVEL GEAR SPLINES	Backlash	-	-	-	-
601-334	BALL BEARING	End-float	-	-	-	-

Table 601 (Continued) (Sheet 2 - LH)

FITS AND CLEARANCES

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OLYMPUS 593

MK. 610-14-28

OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{-0.0017}{-0.0004}$	$\frac{-0,043}{-0,011}$	-0.0002	-0,005	
2.9534	75,016					
		$\frac{-0.0004}{+0.0006}$	$\frac{-0,010}{+0,016}$	0.0010	0,025	
2.9522	74,986					
1.7819	45,260					
		$\frac{-0.0008}{+0.0002}$	$\frac{-0,020}{+0,005}$	+0.0004	0,010	
1.7811	45,240					
1.7919	45,514					
		$\frac{-0.0005}{+0.0002}$	$\frac{-0,012}{+0,005}$	+0.0004	0,010	
1.7911	45,494					
-	-	$\frac{0.0040}{0.0081}$	$\frac{0,102}{0,206}$	-	-	
-	-	$\frac{0.0040}{0.0055}$	$\frac{0,102}{0,140}$	0.0085	0,216	

Table 601 (Continued) (Sheet 2 - RH)

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-335	ROLLER BEARING IN COVER ASSEMBLY	Cover -	<u>2.6777</u>	<u>68,014</u>	2.6785	68,034
		Bore	<u>2.6782</u>	<u>68,026</u>		
		Bearing -	<u>2.6767</u>	<u>67,988</u>	2.6765	67,983
		Diameter	<u>2.6772</u>	<u>68,001</u>		
602-336	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-337	ROLLER BEARING ON SPUR GEAR	Bearing -	<u>1.5743</u>	<u>39,987</u>	1.5749	40,002
		Bore	<u>1.5748</u>	<u>40,000</u>		
		Gear -	<u>1.5745</u>	<u>39,992</u>	1.5744	39,990
		Diameter	<u>1.5750</u>	<u>40,005</u>		
602-338 **	SPUR GEAR WITH SPUR GEAR	Backlash	-	-	-	-
602-339	ROLLER BEARING IN COVER ASSEMBLY	Cover -	<u>2.9533</u>	<u>75,014</u>	2.9541	75,034
		Bore	<u>2.9538</u>	<u>75,027</u>		
		Bearing -	<u>2.9523</u>	<u>74,988</u>	2.9521	74,983
		Diameter	<u>2.9528</u>	<u>75,000</u>		
602-340	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-341	ROLLER BEARING ON SPUR GEAR	Bearing -	<u>1.7711</u>	<u>44,986</u>	1.7717	45,001
		Bore	<u>1.7716</u>	<u>45,000</u>		
		Gear -	<u>1.7714</u>	<u>44,994</u>	1.7713	44,991
		Diameter	<u>1.7719</u>	<u>45,006</u>		

Table 601 (Continued) (Sheet 3 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
2.6785	68,034					
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
2.6764	67,981					
-	-	$\frac{0.0015}{0.0020}$	$\frac{0,038}{0,048}$	0.0030	0,076	
1.5751	40,008					
		$\frac{-0.0007}{+0.0003}$	$\frac{-0,018}{+0,008}$	+0.0005	0,013	
1.5742	39,985					
-	-	$\frac{0.0098}{0.0173}$	$\frac{0,249}{0,439}$	-	-	
2.9541	75,034					
		$\frac{0.0005}{0.0015}$	$\frac{0,014}{0,039}$	0.0020	0,051	
2.9520	74,981					
-	-	$\frac{0.0015}{0.0020}$	$\frac{0,038}{0,048}$	0.0030	0,076	
1.7719	45,006					
		$\frac{-0.0008}{+0.0002}$	$\frac{-0,020}{+0,006}$	+0.0004	0,010	
1.7711	44,986					

Table 601 (Continued) (Sheet 3 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-342 **	SPUR GEAR WITH GEAR ASSEMBLY	Backlash	-	-	-	-
602-343	ROLLER BEARING IN GEARBOX CASE	Case -	<u>2.4414</u>	<u>62,012</u>	2.4422	62,032
		Bore	<u>2.4419</u>	<u>62,024</u>		
		Bearing - Diameter	<u>2.4405</u> <u>2.4410</u>	<u>61,988</u> <u>62,000</u>	2.4402	61,981
602-344	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-345	ROLLER BEARING ON IDLER SHAFT	Bearing -	<u>1.3775</u>	<u>34,988</u>	1.3781	35,004
		Bore	<u>1.3780</u>	<u>35,000</u>		
		Shaft - Diameter	<u>1.3777</u> <u>1.3782</u>	<u>34,994</u> <u>35,006</u>	1.3776	34,991
602-346	GEAR ASSEMBLY ON IDLER SHAFT	Gear -	<u>1.3786</u>	<u>35,016</u>	1.3799	35,049
		Bore	<u>1.3797</u>	<u>35,044</u>		
		Shaft - Diameter	<u>1.3777</u> <u>1.3782</u>	<u>34,994</u> <u>35,006</u>	1.3774	34,986
602-347	IDLER SHAFT SPLINES IN GEAR ASSEMBLY SPLINES	Backlash	-	-	-	-
602-348 **	GEAR ASSEMBLY WITH SPUR GEAR SHAFT	Backlash	-	-	-	-

Table 601 (Continued) (Sheet 4 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0095}{0.0165}$	$\frac{0,241}{0,419}$	-	-	
2.4422	62,032					
		$\frac{0.0004}{0.0014}$	$\frac{0,012}{0,036}$	0.0020	0,051	
2.4402	61,981					
-	-	$\frac{0.0015}{0.0019}$	$\frac{0,038}{0,048}$	0.0029	0,074	
1.3783	35,009					
		$\frac{-0.0007}{+0.0003}$	$\frac{-0,020}{+0,006}$	+0.0005	0,013	
1.3774	34,986					
		$\frac{0.0004}{0.0020}$	$\frac{0,010}{0,050}$	0.0025	0,063	
-	-	$\frac{0.0000}{0.0028}$	$\frac{0,000}{0,071}$	-	-	
-	-	$\frac{0.0058}{0.0166}$	$\frac{0,147}{0,422}$	-	-	

Table 601 (Continued) (Sheet 4 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-349	ROLLER BEARING IN GEARBOX CASE	Case -	<u>3.1501</u>	<u>80,013</u>	3.1509	80,033
		Bore	<u>3.1506</u>	<u>80,025</u>		
		Bearing -	<u>3.1491</u>	<u>79,987</u>	3.1489	79,982
		Diameter	<u>3.1496</u>	<u>80,000</u>		
602-350	SEAL SLEEVE ON SPUR GEAR SHAFT	Sleeve -	<u>1.9520</u>	<u>49,581</u>	1.9580	49,733
		Bore	<u>1.9570</u>	<u>49,708</u>		
		Gear -	<u>1.9490</u>	<u>49,505</u>	1.9480	49,479
		Diameter	<u>1.9496</u>	<u>49,520</u>		
602-351	SEAL RING ON SPUR GEAR SHAFT	Ring -	<u>1.9500</u>	<u>49,530</u>	1.9513	49,563
		Bore	<u>1.9510</u>	<u>49,555</u>		
		Gear -	<u>1.9490</u>	<u>49,505</u>	1.9488	49,500
		Diameter	<u>1.9496</u>	<u>49,520</u>		
602-352	PUMP ADAPTER IN GEARBOX CASE	Case -	<u>3.6000</u>	<u>91,440</u>	3.6012	91,470
		Bore	<u>3.6009</u>	<u>91,463</u>		
		Adapter -	<u>3.5991</u>	<u>91,417</u>	3.5987	91,407
		Diameter	<u>3.6000</u>	<u>91,440</u>		
602-353	ROLLER BEARING ON SPUR GEAR SHAFT	Bearing -	<u>1.9780</u>	<u>50,241</u>	1.9786	50,256
		Bore	<u>1.9785</u>	<u>50,254</u>		
		Gear -	<u>1.9782</u>	<u>50,246</u>	1.9781	50,243
		Diameter	<u>1.9787</u>	<u>50,259</u>		

Table 601 (Continued) (Sheet 5 - LH)



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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
3.1509	80,033					
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
3.1488	79,980					
		$\frac{0.0024}{0.0080}$	$\frac{0,061}{0,203}$	0.0100	0,254	
		$\frac{0.0004}{0.0020}$	$\frac{0,010}{0,050}$	0.0025	0,062	
		$\frac{0.0000}{0.0018}$	$\frac{0,000}{0,045}$	0.0025	0,063	
1.9788	50,262					
		$\frac{-0.0007}{+0.0003}$	$\frac{-0,018}{+0,008}$	+0.0005	0,013	
1.9779	50,239					

Table 601 (Continued) (Sheet 5 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-354	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-355	BALL BEARING	End-float	-	-	-	-
		Diametral Clearance	-	-	-	-
602-356	BALL BEARING ON SPUR GEAR SHAFT	Bearing - Bore	<u>1.9680</u> 1.9685	<u>49,987</u> 50,000	1.9686	50,002
		Gear - Diameter	<u>1.9682</u> 1.9687	<u>49,992</u> 50,005	1.9681	49,990
602-357	SPUR GEAR SHAFT IN SLEEVE SEAL	Seal - Bore	<u>1.9520</u> 1.9570	<u>49,581</u> 49,708	1.9580	49,733
		Gear - Diameter	<u>1.9490</u> 1.9496	<u>49,505</u> 49,520	1.9480	49,497
602-358	ADAPTER IN ADAPTER	Adapter - Bore	<u>3.8000</u> 3.8014	<u>96,520</u> 96,556	3.8017	96,563
		Adapter - Diameter	<u>3.7986</u> 3.8000	<u>96,484</u> 96,520	3.7982	96,474
602-359	SPUR GEAR SHAFT IN SEAL RING	Ring - Bore	<u>1.9500</u> 1.9510	<u>49,530</u> 49,555	1.9513	49,563
		Gear - Diameter	<u>1.9490</u> 1.9496	<u>49,505</u> 49,520	1.9488	49,500

Table 601 (Continued) (Sheet 6 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0015}{0.0019}$	$\frac{0,038}{0,048}$	0.0029	0,074	
-	-	$\frac{0.0040}{0.0090}$	$\frac{0,102}{0,229}$	0.0120	0,305	
-	-	$\frac{0.0010}{0.0014}$	$\frac{0,025}{0,036}$	0.0024	0,061	
1.9688	50,008					
		$\frac{-0.0007}{+0.0003}$	$\frac{-0,018}{+0,008}$	+0.0005	0,013	
1.9679	49,985					
		$\frac{0.0024}{0.0080}$	$\frac{0,061}{0,203}$	0.0100	0,254	
		$\frac{0.0000}{0.0028}$	$\frac{0,000}{0,070}$	0.0035	0,089	
		$\frac{0.0004}{0.0020}$	$\frac{0,010}{0,050}$	0.0025	0,063	

Table 601 (Continued) (Sheet 6 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-360	BALL BEARING Adapter - IN ADAPTER Bore		<u>3.1501</u>	<u>80,013</u>	3.1509	80,033
			3.1506	80,025		
	Bearing - Diameter		<u>3.1491</u>	<u>79,987</u>	3.1489	79,982
			3.1496	80,000		
602-361	IDLER SHAFT Gear - IN GEAR Bore ASSEMBLY		<u>1.1924</u>	<u>30,287</u>	1.1940	30,328
			1.1935	30,315		
	Shaft - Diameter		<u>1.1915</u>	<u>30,264</u>	1.1910	30,251
			1.1920	30,277		
602-362	ROLLER BEARING ON IDLER SHAFT	Bearing - Bore	<u>1.1807</u>	<u>29,990</u>	1.1812	30,002
			1.1811	30,000		
	Shaft - Diameter		<u>1.1808</u>	<u>29,992</u>	1.1807	29,990
			1.1813	30,005		
602-363	ROLLER BEARING ON IDLER SHAFT	Bearing - Bore	<u>1.1826</u>	<u>30,038</u>	1.1837	30,066
			1.1836	30,064		
	Shaft - Diameter		<u>1.1808</u>	<u>29,992</u>	1.1807	29,990
			1.1813	30,005		
602-364	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-365	ROLLER BEARING IN GEARBOX CASE	Case - Bore	<u>2.4414</u>	<u>62,012</u>	2.4422	62,032
			2.4419	62,024		
	Bearing - Diameter		<u>2.4405</u>	<u>61,987</u>	2.4402	61,981
			2.4410	62,000		

Table 601 (Continued) (Sheet 7 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
3.1509	80,033					
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
3.1488	79,980					
		$\frac{0.0004}{0.0020}$	$\frac{0,010}{0,050}$	0.0030	0,076	
1.1814	30,008					
		$\frac{-0.0006}{+0.0003}$	$\frac{-0,015}{+0,008}$	+0.0005	0,013	
1.1805	29,985					
1.1839	30,071					
		$\frac{0.0013}{0.0028}$	$\frac{0,033}{0,072}$	0.0030	0,076	
1.1805	29,985					
-	-	$\frac{0.0015}{0.0019}$	$\frac{0,038}{0,048}$	0.0029	0,074	
2.4422	62,032					
		$\frac{0.0004}{0.0014}$	$\frac{0,012}{0,037}$	0.0020	0,051	
2.4402	61,981					

Table 601 (Continued) (Sheet 7 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-366	RING IN HOUSING	Groove -	0.0950	2,413	0.0970	2,464
		Width	0.0960	2,438		
		Ring -	0.0930	2,362	0.0920	2,337
		Width	0.0940	2,388		
602-367	SLEEVE ON SPUR GEAR ASSEMBLY	Sleeve -	1.3800	35,052	1.3808	35,072
		Bore	1.3806	35,067		
		Gear	1.3784	35,011	1.3782	35,006
		Shaft - Diameter	1.3790	35,027		
602-368	SHAFT SPLINES IN SPUR GEAR ASSEMBLY SPLINES	Backlash	-	-	-	-
602-369	SLEEVE ON SPUR GEAR ASSEMBLY	Sleeve -	1.3800	35,052	1.3808	35,072
		Bore	1.3806	35,067		
		Gear	1.3784	35,011	1.3782	35,006
		Shaft - Diameter	1.3790	35,027		
602-370	RING IN HOUSING	Gap in Position	-	-	-	-
602-371	BALL BEARING ON SPUR GEAR ASSEMBLY	Bearing -	1.5743	39,987	1.5749	40,002
		Bore	1.5748	40,000		
		Gear	1.5745	39,992	1.5744	39,990
		Shaft - Diameter	1.5750	40,005		

Table 601 (Continued) (Sheet 8 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{0.0010}{0.0030}$	$\frac{0,025}{0,076}$	0.0050	0,127	
		$\frac{0.0010}{0.0022}$	$\frac{0,025}{0,056}$	0.0026	0,066	
-	-	$\frac{0.0060}{0.0084}$	$\frac{0,152}{0,213}$	0.0084	0,213	
		$\frac{0.0010}{0.0022}$	$\frac{0,025}{0,056}$	0.0026	0,066	
-	-	$\frac{0.0020}{0.0070}$	$\frac{0,051}{0,178}$	0.0080	0,203	
1.5751	40,008	$\frac{-0.0007}{+0.0003}$	$\frac{-0,018}{+0,008}$	+0.0005	0,013	
1.5742	39,985					

Table 601 (Continued) (Sheet 8 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION	DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
		IN.	MM	IN.	MM
602-372	BALL BEARING End-float	-	-	-	-
	Diametral Clearance	-	-	-	-
602-373	BALL BEARING Case -	<u>3.1501</u>	<u>80,013</u>	3.1509	80,033
	IN GEARBOX Bore	<u>3.1506</u>	<u>80,025</u>		
	CASE				
	Bearing -	<u>3.1491</u>	<u>79,987</u>	3.1489	79,982
	Diameter	<u>3.1496</u>	<u>80,000</u>		
602-374	ROLLER BEARING ON SPUR GEAR				
	Bearing -	<u>1.3775</u>	<u>34,988</u>	1.3781	35,003
	Bore	<u>1.3780</u>	<u>35,000</u>		
	Gear -	<u>1.3777</u>	<u>34,994</u>	1.3776	34,991
	Diameter	<u>1.3782</u>	<u>35,006</u>		
602-375	BALL BEARING ON SPUR GEAR				
	Bearing -	<u>1.3775</u>	<u>34,988</u>	1.3781	35,004
	Bore	<u>1.3780</u>	<u>35,000</u>		
	Gear -	<u>1.3777</u>	<u>34,994</u>	1.3776	34,991
	Diameter	<u>1.3782</u>	<u>35,006</u>		
602-376	STRAINER HOUSING IN GEARBOX CASE				
	Case -	<u>2.3000</u>	<u>58,420</u>	2.3013	58,453
	Bore	<u>2.3012</u>	<u>58,450</u>		
	Housing -	<u>2.3014</u>	<u>58,456</u>	2.3013	58,453
	Diameter	<u>2.3021</u>	<u>58,473</u>		
602-377	ROLLER BEARING IN GEARBOX CASE				
	Case -	<u>2.4414</u>	<u>62,012</u>	2.4422	62,032
	Bore	<u>2.4419</u>	<u>62,024</u>		
	Bearing -	<u>2.4405</u>	<u>61,987</u>	2.4402	61,981
	Diameter	<u>2.4410</u>	<u>62,000</u>		

Table 601 (Continued) (Sheet 9 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0060}{0.0100}$	$\frac{0,152}{0,254}$	0.0130	0,330	
-	-	$\frac{0.0009}{0.0013}$	$\frac{0,023}{0,033}$	0.0023	0,058	
3.1509	80,033					
		$\frac{0.0005}{0.0015}$	$\frac{0,013}{0,038}$	0.0020	0,051	
3.1488	79,980					
1.3783	35,008					
		$\frac{-0.0007}{+0.0003}$	$\frac{-0,018}{+0,006}$	+0.0005	0,013	
1.3774	34,985					
1.3783	35,009					
		$\frac{-0.0007}{+0.0003}$	$\frac{-0,018}{+0,006}$	+0.0005	0,013	
1.3774	34,986					
		$\frac{-0.0021}{-0.0002}$	$\frac{-0,053}{-0,006}$	0.0000	0,000	
2.4422	62,032					
		$\frac{0.0004}{0.0014}$	$\frac{0,012}{0,037}$	0.0020	0,051	
2.4402	61,981					

Table 601 (Continued) (Sheet 9 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-378	ROLLER BEARING	Diametral Clearance	-	-	-	-
602-379	BALL BEARING	End-float	-	-	-	-
602-380	BALL BEARING IN BEARING HOUSING	Housing - Bore	$\frac{2.4500}{2.4512}$	$\frac{62,230}{62,261}$	2.4515	62,268
		Bearing - Diameter	$\frac{2.4350}{2.4380}$	$\frac{61,848}{61,924}$	2.4347	61,841
602-381	BEVEL GEAR SPLINES IN SPUR GEAR SPLINES	Backlash	-	-	-	-
602-382	BEVEL GEAR ON SPUR GEAR	Gear - Bore	$\frac{1.6000}{1.6010}$	$\frac{40,640}{40,665}$	1.6013	40.673
		Gear - Diameter	$\frac{1.5990}{1.5996}$	$\frac{40,615}{40,630}$	1.5988	40,609
601-383	ROLLER BEARING IN GEARBOX CASE	Case - Bore	$\frac{1.8509}{1.8515}$	$\frac{47,013}{47,028}$	1.8518	47,036
		Bearing - Diameter	$\frac{1.8500}{1.8504}$	$\frac{46,989}{47,000}$	1.8498	46,985
601-384	ROLLER BEARING	Diametral Clearance	-	-	-	-
601-385	ROLLER BEARING ON SPUR GEAR	Bearing - Bore	$\frac{0.9939}{0.9943}$	$\frac{25,244}{25,254}$	0.9944	25,258
		Gear - Diameter	$\frac{0.9940}{0.9945}$	$\frac{25,248}{25,260}$	0.9939	25,245

Table 601 (Continued) (Sheet 10 - LH)

FITS AND CLEARANCES

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sneema

OVERHAUL

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	<u>0.0015</u> 0.0019	<u>0,038</u> 0,048	0.0029	0,074	
-	-	<u>0.0040</u> 0.0055	<u>0,102</u> 0,140	0.0085	0,216	
2.4515	62,268					
		<u>0.0120</u> 0.0162	<u>0,306</u> 0,413	0.0168	0,427	
2.4347	61,841					
-	-	<u>0.0000</u> 0.0040	<u>0,000</u> 0,102	0.0060	0,152	
		<u>0.0004</u> 0.0020	<u>0,010</u> 0,050	0.0025	0,063	
1.8518	47,036					
		<u>0.0005</u> 0.0015	<u>0,013</u> 0,039	0.0020	0,051	
1.8497	46,982					
-	-	<u>0.0006</u> 0.0010	<u>0,015</u> 0,025	0.0020	0,051	
0.9946	25,263					
		- <u>0.0006</u> + 0.0003	- <u>0,016</u> + 0,006	+0.0005	0,013	
0.9937	25,240					

Table 601 (Continued) (Sheet 10 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-386	ROLLER BEARING	Diametral Clearance	-	-	-	-
601-387	ROLLER BEARING ON SPUR GEAR	Bearing - Bore	$\frac{0.9839}{0.9843}$	$\frac{24,991}{25,001}$	0.9844	25,004
		Gear - Diameter	$\frac{0.9840}{0.9845}$	$\frac{24,993}{25,006}$	0.9839	24,991
601-388 **	SPUR GEAR WITH SPUR GEAR	Backlash	-	-	-	-
601-389	ROLLER BEARING ON SPUR GEAR	Bearing - Bore	$\frac{0.9857}{0.9868}$	$\frac{25,037}{25,065}$	0.9871	25,072
		Gear - Diameter	$\frac{0.9840}{0.9845}$	$\frac{24,994}{25,006}$	0.9836	24,983
601-390	GEAR IN SCAVENGE PUMP COVER BUSH	Bush - Bore	$\frac{0.7500}{0.7505}$	$\frac{19,050}{19,063}$	0.7509	19,073
		Gear - Diameter	$\frac{0.7482}{0.7487}$	$\frac{19,004}{19,017}$	0.7479	18,997
601-391	GEAR SPLINES IN SHAFT SPLINES	Backlash	-	-	-	-
601-392	GEAR IN SCAVENGE PUMP CASE	Case - Bore	$\frac{1.8315}{1.8325}$	$\frac{46,520}{46,546}$	1.8330	46,558
		Gear - Diameter	$\frac{1.8275}{1.8280}$	$\frac{46,419}{46,431}$	1.8270	46,406

Table 601 (Continued) (Sheet 11 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0006}{0.0010}$	$\frac{0,015}{0,025}$	0.0020	0,051	
0.9846	25,009					
		$\frac{-0.0006}{+0.0003}$	$\frac{-0,015}{+0,008}$	+0.0005	0,013	
0.9837	24,986					
-	-	$\frac{0.0040}{0.0156}$	$\frac{0,102}{0,396}$	0.0160	0,406	
		$\frac{0.0012}{0.0028}$	$\frac{0,031}{0,071}$	0.0035	0,089	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0030	0,076	
-	-	$\frac{0.0030}{0.0056}$	$\frac{0,076}{0,142}$	0.0056	0,142	
		$\frac{0.0035}{0.0050}$	$\frac{0,089}{0,127}$	0.0060	0,152	

Table 601 (Continued) (Sheet 11 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-393	GEAR IN SCAVENGE PUMP CASE	Gear - Width	$\frac{0.3595}{0.3600}$	$\frac{9,131}{9,144}$	0.3594	9,129
		Recess - Width	$\frac{0.3617}{0.3622}$	$\frac{9,187}{9,200}$	0.3624	9,205
601-394	GEAR IN SCAVENGE PUMP CASE BUSH	Bush - Bore	$\frac{0.7500}{0.7505}$	$\frac{19,050}{19,063}$	0.7509	19,073
		Gear - Diameter	$\frac{0.7482}{0.7487}$	$\frac{19,004}{19,017}$	0.7479	18,997
601-395	BUSH IN SCAVENGE PUMP CASE	Case - Bore	$\frac{1.0000}{1.0008}$	$\frac{25,400}{25,420}$	1.0010	25,425
		Bush - Diameter	$\frac{1.0027}{1.0032}$	$\frac{25,469}{25,481}$	1.0025	25,463
601-396	GEAR BLANK IN SCAVENGE PUMP CASE BUSH	Bush - Bore	$\frac{0.7500}{0.7505}$	$\frac{19,050}{19,063}$	0.7509	19,073
		Gear - Diameter	$\frac{0.7492}{0.7497}$	$\frac{19,030}{19,042}$	0.7479	18,997
601-397	ROLLER BEARING IN GEARBOX CASE	Case - Bore	$\frac{1.8509}{1.8515}$	$\frac{47,013}{47,028}$	1.8518	47,036
		Bearing - Diameter	$\frac{1.8475}{1.8489}$	$\frac{46,927}{46,962}$	1.8472	46,919
601-398	GEAR BLANK IN CASE COVER BUSH	Bush - Bore	$\frac{0.7500}{0.7505}$	$\frac{19,050}{19,063}$	0.7509	19,073
		Gear - Diameter	$\frac{0.7492}{0.7497}$	$\frac{19,030}{19,942}$	0.7489	19,022

Table 601 (Continued) (Sheet 12 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{0.0017}{0.0027}$	$\frac{0,043}{0,069}$	0.0030	0,076	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0030	0,076	
		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	0,038	
		$\frac{0.0003}{0.0013}$	$\frac{0,008}{0,033}$	0.0030	0,076	
1.8518	47,036					
		$\frac{0.0020}{0.0040}$	$\frac{0,051}{0,101}$	0.0046	0,117	
1.8472	46,919					
		$\frac{0.0003}{0.0013}$	$\frac{0,008}{0,033}$	0.0020	0,051	

Table 601 (Continued) (Sheet 12 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-399	DRIVING SHAFT SPLINES IN SHAFT SPLINES	Backlash	-	-	-	-
601-400	BUSH IN CASE COVER	Cover - Bore	$\frac{1.0000}{1.0008}$	$\frac{25,400}{25,420}$	1.0010	25,425
		Bush - Diameter	$\frac{1.0027}{1.0052}$	$\frac{25,469}{25,481}$	1.0025	25,463
601-401	BUSH IN CASE COVER	Cover - Bore	$\frac{1.0000}{1.0008}$	$\frac{25,400}{25,420}$	1.0010	25,425
		Bush - Diameter	$\frac{1.0027}{1.0032}$	$\frac{25,469}{25,481}$	1.0025	25,463
601-402	DIMENSIONAL CHECK NO LONGER REQUIRED		-	-	-	-
601-403	GEAR BLANK IN CASE COVER BUSH	Bush - Bore	$\frac{0.7500}{0.7505}$	$\frac{19,050}{19,063}$	0.7509	19,073
		Gear - Diameter	$\frac{0.7492}{0.7497}$	$\frac{19,030}{19,042}$	0.7489	19,022
601-404	GEAR BLANK IN SCAVENGE PUMP CASE BUSH	Bush - Bore	$\frac{0.7500}{0.7505}$	$\frac{19,050}{19,063}$	0.7509	19,073
		Gear - Diameter	$\frac{0.7492}{0.7497}$	$\frac{19,030}{19,042}$	0.7489	19,022

Table 601 (Continued) (Sheet 13 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	$\frac{0.0000}{0.0026}$	$\frac{0,000}{0,066}$	0.0026	0,066	
		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
-	-	-	-	-	-	
		$\frac{0.0003}{0.0013}$	$\frac{0,008}{0,033}$	0.0020	0,051	
		$\frac{0.0003}{0.0013}$	$\frac{0,008}{0,033}$	0.0020	0,051	

Table 601 (Continued) (Sheet 13 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-405	BUSH IN SCAVENGE PUMP CASE	Case -	<u>1.0000</u>	<u>25,400</u>	1.0010	25,425
		Bore	<u>1.0008</u>	<u>25,420</u>		
		Bush -	<u>1.0027</u>	<u>25,469</u>	1.0025	25,463
		Diameter	<u>1.0032</u>	<u>25,481</u>		
601-406	GEAR IN SCAVENGE PUMP CASE BUSH	Bush -	<u>0.7500</u>	<u>19,050</u>	0.7509	19,073
		Bore	<u>0.7505</u>	<u>19,063</u>		
		Gear -	<u>0.7482</u>	<u>19,004</u>	0.7479	18,997
		Diameter	<u>0.7487</u>	<u>19,017</u>		
601-407	GEAR IN SCAVENGE PUMP CASE	Gear -	<u>0.3595</u>	<u>9,131</u>	0.3594	9,129
		Width	<u>0.3600</u>	<u>9,144</u>		
		Recess -	<u>0.3617</u>	<u>9,187</u>	0.3624	9,205
		Width	<u>0.3622</u>	<u>9,200</u>		
601-408	GEAR IN SCAVENGE PUMP CASE	Case -	<u>1.8315</u>	<u>46,520</u>	1.8330	46,558
		Bore	<u>1.8325</u>	<u>46,546</u>		
		Gear -	<u>1.8275</u>	<u>46,419</u>	1.8270	46,406
		Diameter	<u>1.8280</u>	<u>46,431</u>		
601-409	GEAR IN SCAVENGE PUMP COVER BUSH	Bush -	<u>0.7500</u>	<u>19,050</u>	0.7509	19,073
		Bore	<u>0.7505</u>	<u>19,063</u>		
		Gear -	<u>0.7482</u>	<u>19,004</u>	0.7479	18,997
		Diameter	<u>0.7487</u>	<u>19,017</u>		
601-410 **	SPUR GEAR WITH SPUR GEAR	Backlash	-	-	-	-

Table 601 (Continued) (Sheet 14 - LH)

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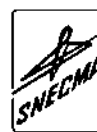
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**OLYMPUS 593**

MK.610-14-28

OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	

-0.0032	-0,081	-0.0015	-0,038		
-0.0019	-0,049				

0.0013	0,033	0.0030	0,076		
0.0023	0,059				

0.0017	0,043	0.0030	0,076		
0.0027	0,069				

0.0035	0,089	0.0060	0,152		
0.0050	0,127				

0.0013	0,033	0.0030	0,076		
0.0023	0,059				

0.0091	0,231	0.0300	0,762		
0.0288	0,731				

Table 601 (Continued) (Sheet 14 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-411	BUSH IN SCAVENGE PUMP COVER	Cover -	1.0000	25,400	1.0010	25,425
		Bore	1.0008	25,420		
		Bush -	1.0027	25,469	1.0025	25,463
		Diameter	1.0032	25,481		
601-412	BUSH IN SCAVENGE PUMP COVER	Cover -	1.0000	25,400	1.0010	25,425
		Bore	1.0008	25,420		
		Bush -	1.0027	25,469	1.0025	25,463
		Diameter	1.0032	25,481		
603-413	SPRING	Load to	48 ozs	13,345 N	-	-
		compress spring to 0.3500 (8,890)	64 ozs	17,793 N		
603-414	SPRING	Load to	48 ozs	13,345 N	-	-
		compress spring to 0.3500 (8,890)	64 ozs	17,793 N		
601-419	COUPLING SHAFT IN BEVEL GEAR	Backlash	-	-	-	-

Table 601 (Continued) (Sheet 15 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	$\frac{0.0040}{0.0081}$	$\frac{0,102}{0,206}$	0.0090	0,229	Ref.72-61-00 Fig.602-419

Table 601 (Continued) (Sheet 15 - RH)

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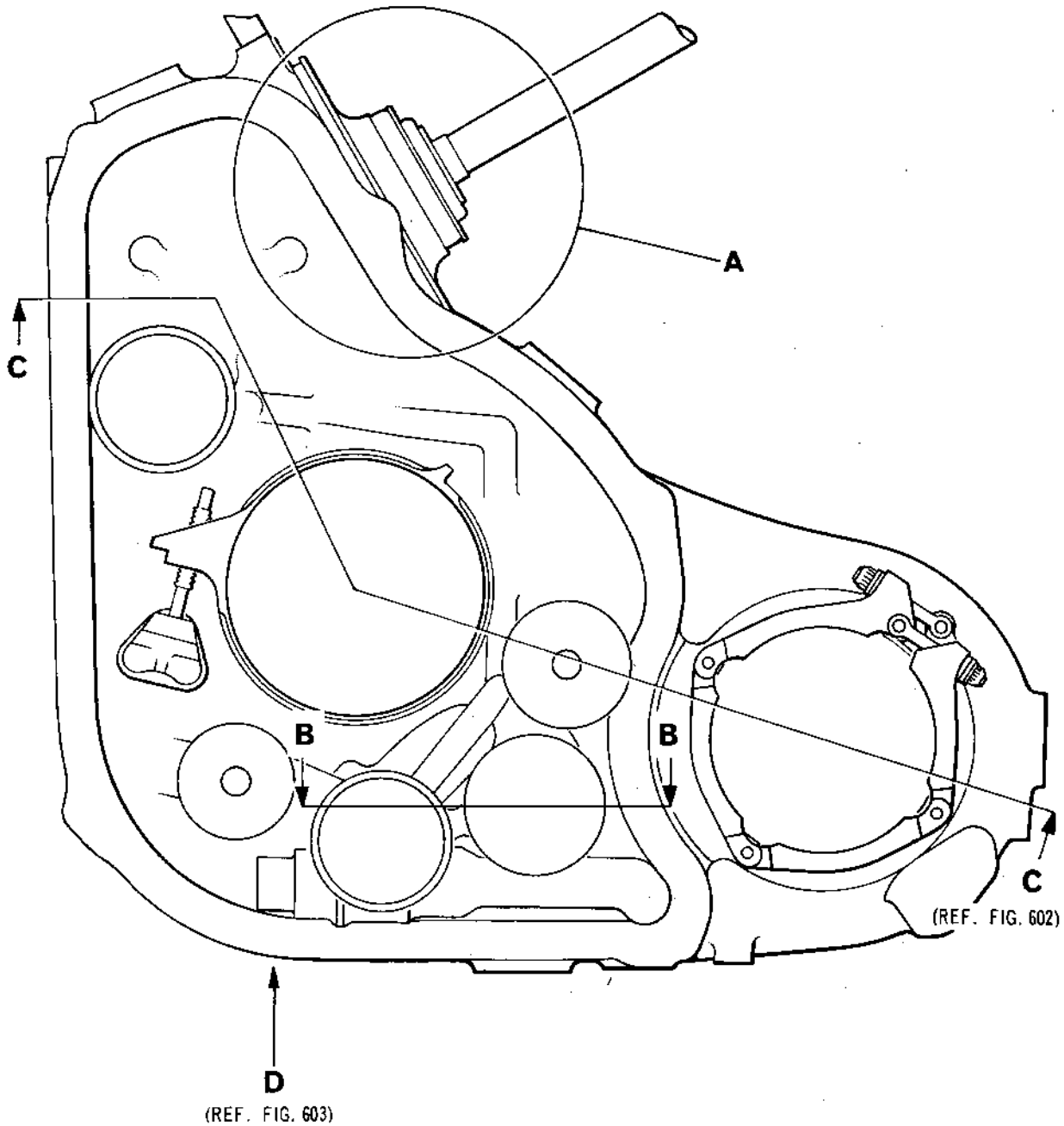
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CR 32869/00A



Right-hand Accessory Gearbox Assembly
Figure 601 (Sheet 1 - LH)

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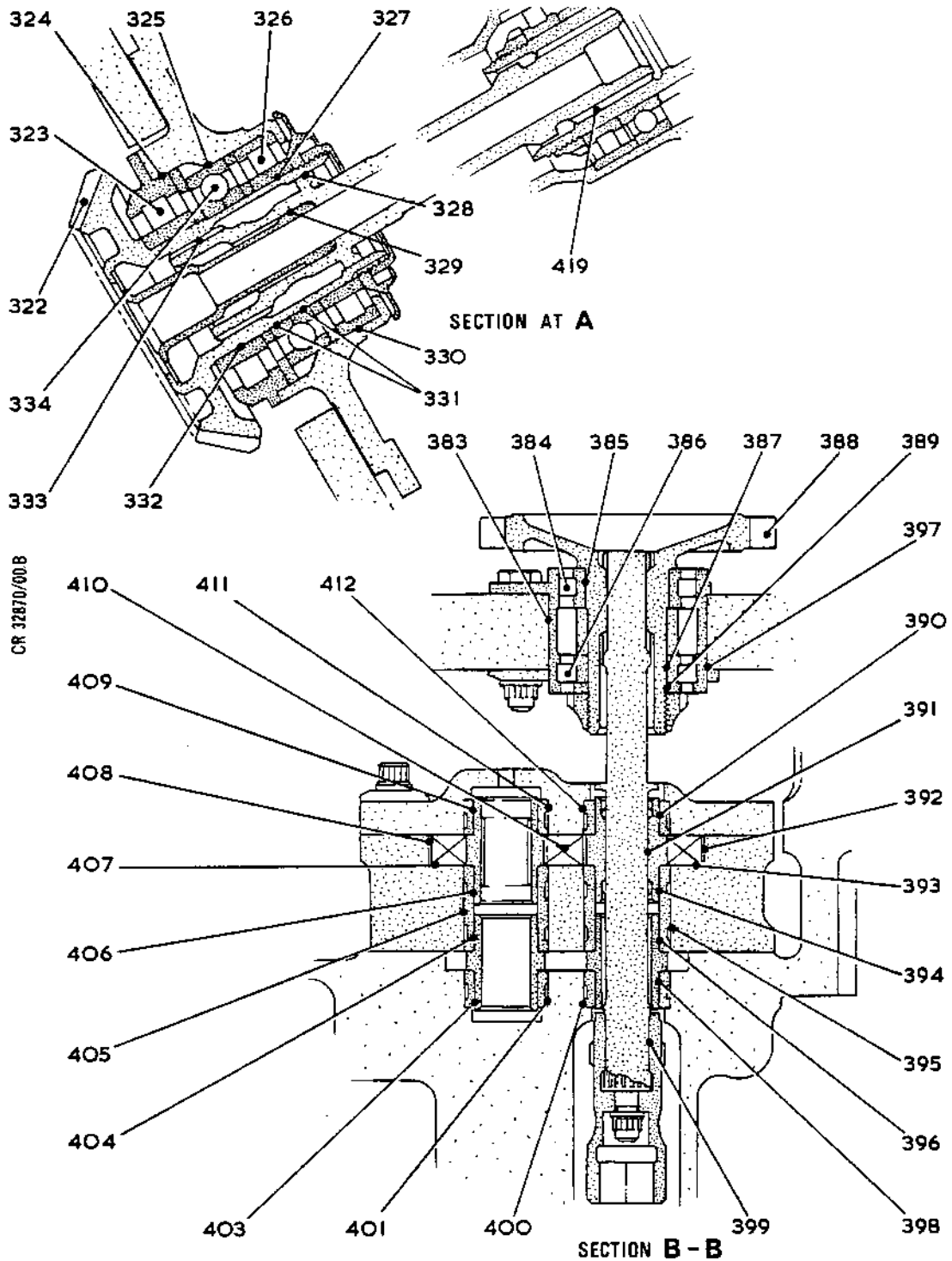
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Right-hand Accessory Gearbox Assembly
Figure 601 (Sheet 2 - RH)

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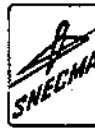
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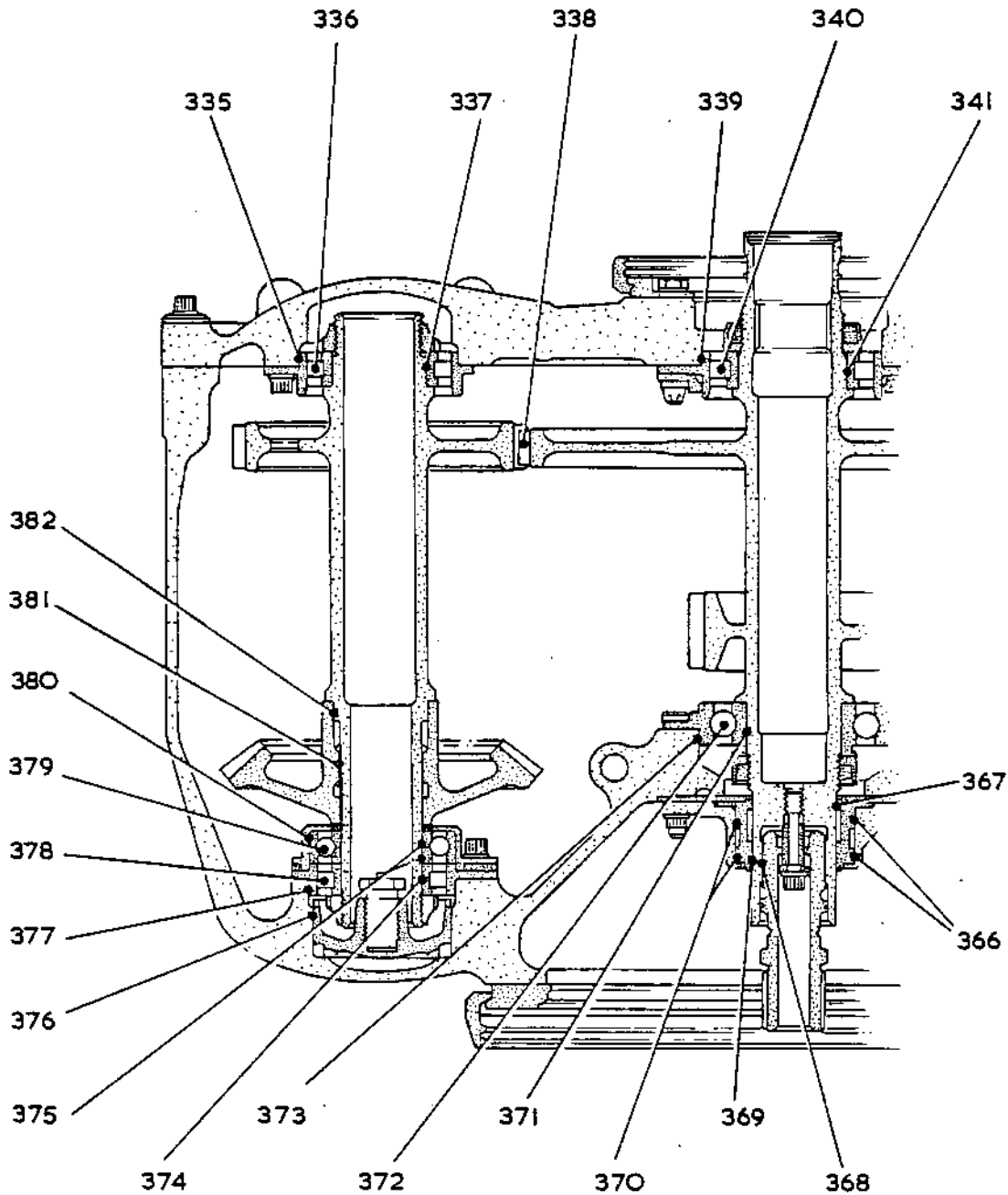


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CR 32871/00A



SECTION CC

(REF. FIG. 601 SHEET 1)

Right-hand Accessory Gearbox Assembly
Figure 602 (Sheet 1 - LH)

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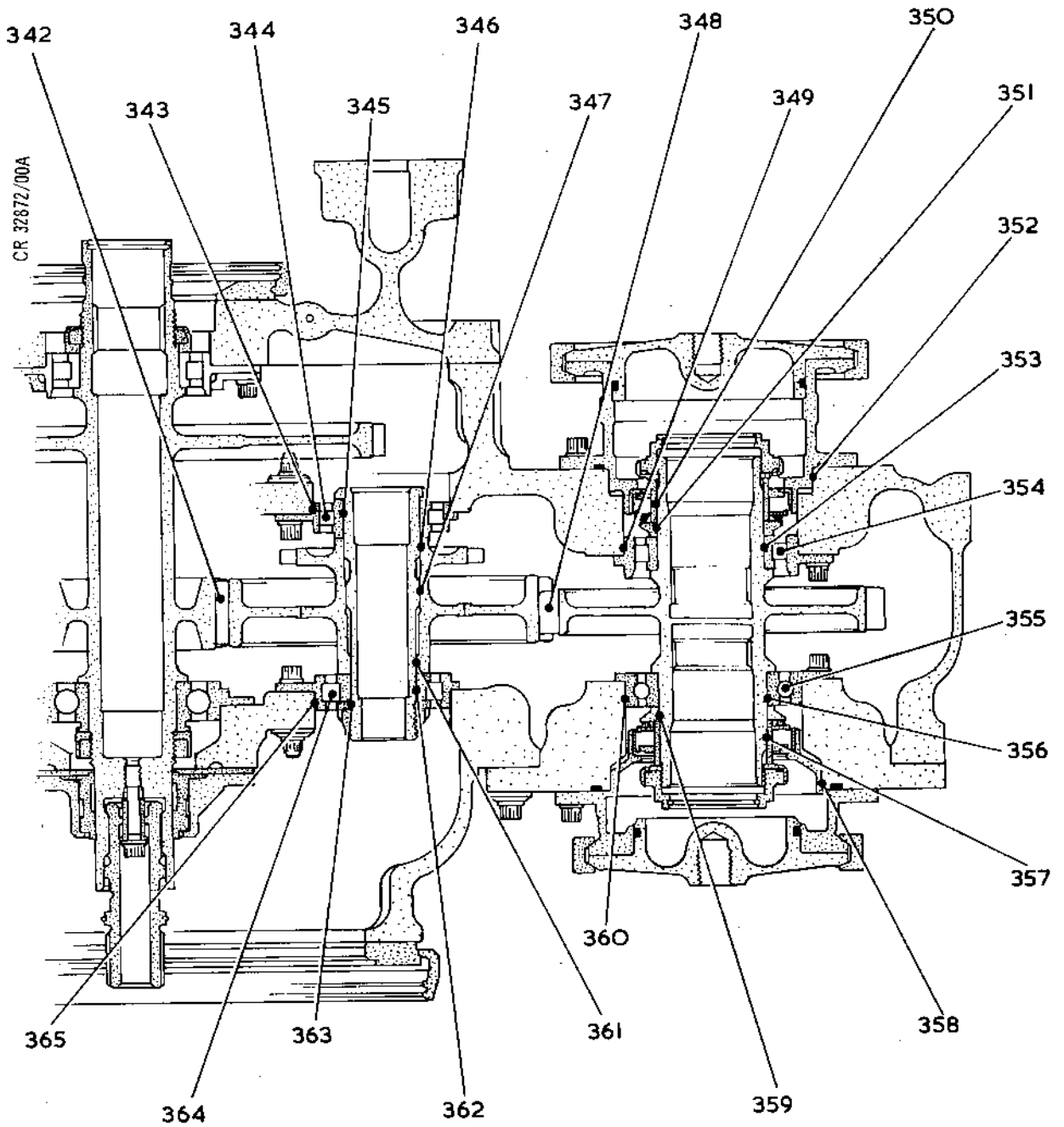


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SECTION CC
(REF. FIG. 601 SHEET 1)

Right-hand Accessory Gearbox Assembly
Figure 602 (Sheet 2 - RH)

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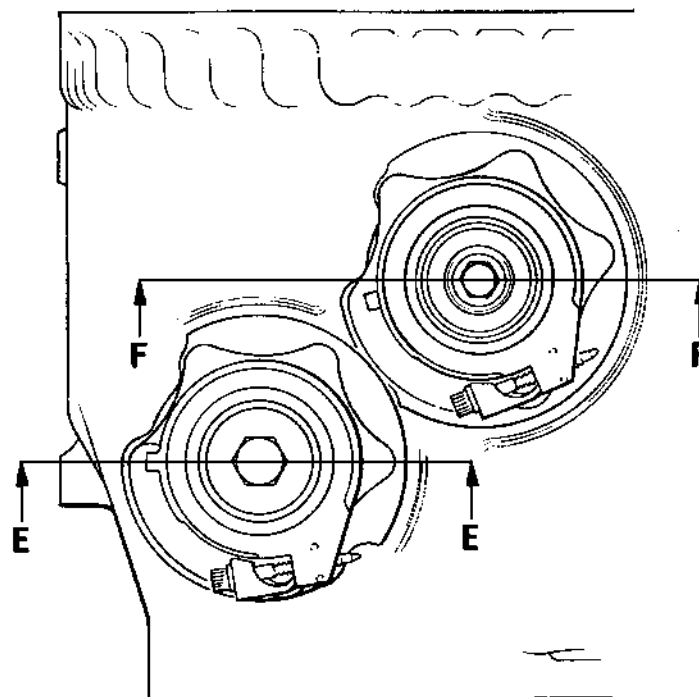


OLYMPUS 593

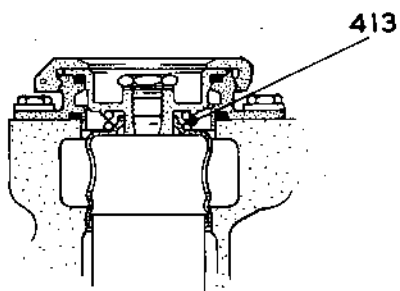
MK.610-14-28
OVERHAUL



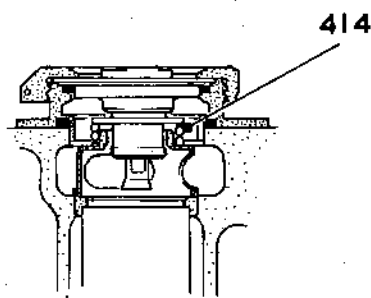
CR 32955/00A



VIEW D (REF. FIG 601 SHEET 1)



SECTION E E



SECTION F F

Right-hand Accessory Gearbox Assembly
Figure 603

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MAIN OIL PUMP - FITS AND CLEARANCES

1. General

- A. Prior to using the Fits and Clearances (FCS) refer to 72-09-00 Fits and Clearances for general information on the content and use of the following Table.
- B. The Table extends onto facing pages and each column provides two sets of figures, the first in inches and decimals of inches and the second in millimeters and decimals of millimeters.
- C. Where a dimensional check is required between two items in the Inspection/Check and only one of the items is contained in this breakdown, a cross-reference to the breakdown number of its mating part is given in the remarks column.
- D. When a dimensional or backlash check is required between two items that cannot be carried out during the Inspection/Check, but must be checked during or after the assembly of the sub-assembly, an ** is given in the first column against the item concerned.

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FITS AND CLEARANCES

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-445	SPRING	Load to compress spring to 2.375 (60,325)	$\frac{18.4 \text{ lb}}{19.6 \text{ lb}}$	$\frac{81,847 \text{ N}}{87,185 \text{ N}}$	-	-
601-446	BUSH IN PRESSURE PUMP CASE	Bush - Diameter	$\frac{0.8025}{0.8030}$	$\frac{20,384}{20,396}$	0.8024	20,381
		Case - Bore	$\frac{0.8000}{0.8008}$	$\frac{20,320}{20,340}$	0.8009	20,343
601-447	PIN IN PRESSURE PUMP CASE	Pin - Diameter	$\frac{0.5496}{0.5500}$	$\frac{13,960}{13,970}$	0.5495	13,957
		Case - Bore	$\frac{0.5500}{0.5504}$	$\frac{13,970}{13,980}$	0.5505	13,983
601-448	GEAR IN PRESSURE PUMP CASE	Gear - Width	$\frac{1.1995}{1.2000}$	$\frac{30,467}{30,480}$	1.1990	30,455
		Case - Depth	$\frac{1.2023}{1.2033}$	$\frac{30,538}{30,564}$	1.2040	30,582
601-449	GEAR IN PRESSURE PUMP CASE	Gear - Diameter	$\frac{1.4933}{1.4940}$	$\frac{37,930}{37,948}$	1.4932	37,927
		Case - Bore	$\frac{1.4975}{1.4980}$	$\frac{38,037}{38,049}$	1.4982	38,054
601-450	PIN IN PRESSURE PUMP BUSH	Pin - Diameter	$\frac{0.5496}{0.5500}$	$\frac{13,960}{13,970}$	0.5495	13,957
		Bush - Bore	$\frac{0.5513}{0.5519}$	$\frac{14,003}{14,018}$	0.5520	14,021

Table 601 (Continued) (Sheet 1 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	-	-	-	-	
		$\frac{-0.0030}{-0.0017}$	$\frac{-0,076}{-0,043}$	-0.0015	-0,038	
		$\frac{0.0000}{0.0008}$	$\frac{0,000}{0,020}$	0.0010	0,025	
		$\frac{0.0023}{0.0038}$	$\frac{0,058}{0,097}$	0.0050	0,127	
		$\frac{0.0035}{0.0047}$	$\frac{0,089}{0,119}$	0.0050	0,127	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,058}$	0.0025	0,063	

Table 601 (Continued) (Sheet 1 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-451	PIN IN SCAVENGE PUMP CASE	Pin - Diameter	$\frac{0.4596}{0.5500}$	$\frac{13,960}{13,970}$	0.5495	13,957
		Case - Bore	$\frac{0.5500}{0.5504}$	$\frac{13,970}{13,980}$	0.5505	13,983
601-452 **	PRESSURE PUMP GEARS	Backlash	-	-	-	-
601-453	GEAR IN PRESSURE PUMP CASE	Gear - Diameter	$\frac{1.4933}{1.4940}$	$\frac{37,930}{37,948}$	1.4932	37,927
		Case - Bore	$\frac{1.4975}{1.4980}$	$\frac{38,037}{38,049}$	1.4982	38,054
601-454	GEAR IN PRESSURE PUMP CASE	Gear - Width	$\frac{1.1995}{1.2000}$	$\frac{30,467}{30,480}$	1.1994	30,465
		Recess - Depth	$\frac{1.2023}{1.2033}$	$\frac{30,538}{30,564}$	1.2034	30,566
601-455	GEAR IN PRESSURE PUMP BUSH	Gear - Diameter	$\frac{0.5981}{0.5987}$	$\frac{15,192}{15,207}$	0.5980	15,189
		Bush - Bore	$\frac{0.6000}{0.6004}$	$\frac{15,240}{15,250}$	0.6005	15,253
601-456	SPRING	Load to compress spring to 0.350 (8,890)	$\frac{44.4 \text{ oz}}{51.6 \text{ oz}}$	$\frac{12,344 \text{ N}}{14,346 \text{ N}}$	-	-
601-457	SPRING	Load to compress spring to 0.780 (19,812)	$\frac{45.6 \text{ oz}}{50.4 \text{ oz}}$	$\frac{12,677 \text{ N}}{14,012 \text{ N}}$	-	-

Table 601 (Continued) (Sheet 2 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{0.0000}{0.0008}$	$\frac{0,000}{0,020}$	0.0010	0,025	
-	-	$\frac{0.0057}{0.0228}$	$\frac{0,145}{0,579}$	0.0250	0,635	
		$\frac{0.0035}{0.0047}$	$\frac{0,089}{0,119}$	0.0050	0,127	
		$\frac{0.0023}{0.0038}$	$\frac{0,058}{0,097}$	0.0040	0,102	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,058}$	0.0025	0,063	
-	-	-	-	-	-	
-	-	-	-	-	-	SB.72-49

Table 601 (Continued) (Sheet 2 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-458	SPRING	Load to compress spring to 0.720 (18,288)	$\frac{51.8 \text{ oz}}{60.2 \text{ oz}}$	$\frac{14,401 \text{ N}}{16,736 \text{ N}}$	-	-
601-459	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	$\frac{1.1975}{1.1980}$	$\frac{30,417}{30,429}$	1.1971	30,406
		Case - Bore	$\frac{1.2007}{1.2017}$	$\frac{30,498}{30,523}$	1.2021	30,533
601-460	QUILLSHAFT SPLINES IN GEAR SPLINES	Backlash	-	-	-	-
601-461	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	$\frac{0.4982}{0.4987}$	$\frac{12,654}{12,667}$	0.4981	12,652
		Case - Bore	$\frac{0.5000}{0.5005}$	$\frac{12,700}{12,713}$	0.5006	12,715
601-462 **	SCAVENGE PUMP GEARS	Backlash	-	-	-	-
601-463	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	$\frac{0.4982}{0.4987}$	$\frac{12,654}{12,667}$	0.4981	12,652
		Case - Bore	$\frac{0.5000}{0.5005}$	$\frac{12,700}{12,713}$	0.5006	12,715
601-464	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	$\frac{1.1975}{1.1980}$	$\frac{30,417}{30,429}$	1.1971	30,406
		Case - Bore	$\frac{1.2007}{1.2017}$	$\frac{30,498}{30,523}$	1.2021	30,533

Table 601 (Continued) (Sheet 3 - LH)

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OVERHAUL



REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
-	-	-	-	-	-	
		$\frac{0.0027}{0.0042}$	$\frac{0,069}{0,106}$	0.0050	0,127	
-	-	$\frac{0.0030}{0.0066}$	$\frac{0,076}{0,168}$	0.0075	0,190	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025	0,063	
-	-	$\frac{0.0045}{0.0184}$	$\frac{0,114}{0,467}$	0.0200	0,508	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025	0,063	
		$\frac{0.0027}{0.0042}$	$\frac{0,069}{0,106}$	0.0050	0,127	

Table 601 (Continued) (Sheet 3 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
601-465	GEAR IN SCAVENGE PUMP CASE	Gear - Width	<u>0.2495</u> 0.2500	<u>6,337</u> 6,350	0.2491	6,327
		Recess - Depth	<u>0.2517</u> 0.2527	<u>6,393</u> 6,419	0.2531	6,429
601-466	GEAR IN PRESSURE PUMP CASE	Gear - Diameter	<u>0.4982</u> 0.4987	<u>12,654</u> 12,667	0.4981	12,652
		Case - Bore	<u>0.5000</u> 0.5005	<u>12,700</u> 12,713	0.5006	12,715
601-467	GEAR IN PRESSURE PUMP CASE	Gear - Diameter	<u>0.4982</u> 0.4987	<u>12,654</u> 12,667	0.4981	12,652
		Case - Bore	<u>0.5000</u> 0.5005	<u>12,700</u> 12,713	0.5006	12,715
601-468	GEAR IN SCAVENGE PUMP CASE	Gear - Width	<u>0.2495</u> 0.2500	<u>6,337</u> 6,350	0.2491	6,327
		Recess - Depth	<u>0.2517</u> 0.2527	<u>6,393</u> 6,419	0.2531	6,429
602-469	GEAR IN SCAVENGE PUMP CASE	Gear - Width	<u>1.5995</u> 1.6000	<u>40,627</u> 40,640	1.5991	40,617
		Recess - Depth	<u>1.6026</u> 1.6036	<u>40,706</u> 40,731	1.6041	40,744
602-470	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	<u>2.1765</u> 2.1770	<u>55,283</u> 55,296	2.1762	55,275
		Case - Bore	<u>2.1809</u> 2.1819	<u>55,395</u> 55,420	2.1822	55,428

Table 601 (Continued) (Sheet 4 - LH)

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REJECT IF OVER	CLEARANCE		PERMISSIBLE		REMARKS
	IN.	MM	IN.	MM	
		$\frac{0.0017}{0.0032}$	$\frac{0,043}{0,082}$	0.0040 0,102	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025 0,063	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025 0,063	
		$\frac{0.0017}{0.0032}$	$\frac{0,043}{0,082}$	0.0040 0,102	
		$\frac{0.0026}{0.0041}$	$\frac{0,066}{0,104}$	0.0050 0,127	
		$\frac{0.0039}{0.0054}$	$\frac{0,099}{0,137}$	0.0060 0,152	

Table 601 (Continued) (Sheet 4 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-471	GEAR IN SCAVENGE PUMP GEAR	Gear - Bore	<u>0.8987</u> 0.8992	<u>22,827</u> 22,840	0.8995	22,847
		Gear - Diameter	<u>0.8982</u> 0.8987	<u>22,814</u> 22,827	0.8980	22,809
602-472	BUSH IN SCAVENGE PUMP CASE	Bush - Diameter	<u>1.1527</u> 1.1532	<u>29,279</u> 29,291	1.1525	29,273
		Case - Bore	<u>1.1500</u> 1.1508	<u>29,210</u> 29,230	1.1510	29,235
602-473	GEAR IN SCAVENGE PUMP BUSH	Gear - Diameter	<u>0.8982</u> 0.8987	<u>22,814</u> 22,827	0.8981	22,812
		Bush - Bore	<u>0.9000</u> 0.9005	<u>22,860</u> 22,873	0.9006	22,875
602-474	BUSH IN SCAVENGE PUMP CASE	Bush - Diameter	<u>1.1527</u> 1.1532	<u>29,279</u> 29,291	1.1525	29,273
		Case - Bore	<u>1.1500</u> 1.1508	<u>29,210</u> 29,230	1.1510	29,235
602-475 **	SCAVENGE PUMP GEARS	Backlash	-	-	-	-
602-476	BUSH IN SCAVENGE PUMP CASE	Bush - Diameter	<u>1.1527</u> 1.1532	<u>29,279</u> 29,291	1.1525	29,273
		Case - Bore	<u>1.1500</u> 1.1508	<u>29,210</u> 29,230	1.1510	29,235
602-477	QUILLSHAFT SPLINES IN GEAR SPLINES	Backlash	-	-	-	-

Table 601 (Continued) (Sheet 5 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{0.0000}{0.0010}$	$\frac{0,000}{0,026}$	0.0015	0,038	
		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025	0,063	
		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
-	-	$\frac{0.0109}{0.0308}$	$\frac{0,277}{0,782}$	0.0320	0,813	
		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
-	-	$\frac{0.0030}{0.0070}$	$\frac{0,076}{0,178}$	0.0080	0,203	

Table 601 (Continued) (Sheet 5 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-478	GEAR IN SCAVENGE PUMP BUSH	Gear - Diameter	$\frac{0.9082}{0.9087}$	$\frac{23,068}{23,081}$	0.9081	23,066
		Bush - Bore	$\frac{0.9100}{0.9105}$	$\frac{23,114}{23,127}$	0.9106	23,129
602-479	GEAR IN SCAVENGE PUMP CASE	Gear - Width	$\frac{1.5995}{1.6000}$	$\frac{40,627}{40,640}$	1.5991	40,617
		Recess - Depth	$\frac{1.6026}{1.6036}$	$\frac{40,706}{40,731}$	1.6041	40,744
602-480	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	$\frac{2.1765}{2.1770}$	$\frac{55,283}{55,296}$	2.1762	55,275
		Case - Bore	$\frac{2.1809}{2.1818}$	$\frac{55,395}{55,418}$	2.1821	55,425
602-481	BUSH IN SCAVENGE PUMP CASE	Bush - Diameter	$\frac{1.1527}{1.1532}$	$\frac{29,279}{29,291}$	1.1525	29,273
		Case - Bore	$\frac{1.1500}{1.1508}$	$\frac{29,210}{29,230}$	1.1510	29,235
602-482	QUILLSHAFT SPLINES IN GEAR SPLINES	Backlash	-	-	-	-
602-483 **	SCAVENGE PUMP GEARS	Backlash	-	-	-	-
602-484	GEAR IN SCAVENGE PUMP BUSH	Gear - Diameter	$\frac{0.8982}{0.8987}$	$\frac{22,814}{22,827}$	0.8981	22,812
		Bush - Bore	$\frac{0.9000}{0.9005}$	$\frac{22,860}{22,873}$	0.9006	22,875

Table 601 (Continued) (Sheet 6 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025	0,063	
		$\frac{0.0026}{0.0041}$	$\frac{0,066}{0,104}$	0.0050	0,127	
		$\frac{0.0039}{0.0053}$	$\frac{0,099}{0,135}$	0.0059	0,150	
		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
-	-	$\frac{0.0030}{0.0071}$	$\frac{0,076}{0,180}$	0.0080	0,203	
-	-	$\frac{0.0109}{0.0308}$	$\frac{0,277}{0,782}$	0.0320	0,813	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025	0,063	

Table 601 (Continued) (Sheet 6 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-485	GEAR IN SCAVENGE PUMP GEAR	Gear - Diameter	$\frac{0.8982}{0.8987}$	$\frac{22,814}{22,827}$	0.8980	22,809
		Gear - Bore	$\frac{0.8987}{0.8992}$	$\frac{22,827}{22,840}$	0.8995	22,847
602-486	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	$\frac{2.1765}{2.1770}$	$\frac{55,283}{55,296}$	2.1762	55,275
		Case - Bore	$\frac{2.1809}{2.1819}$	$\frac{55,395}{55,420}$	2.1822	55,428
602-487	GEAR IN SCAVENGE PUMP CASE	Gear - Width	$\frac{0.6395}{0.6400}$	$\frac{16,243}{16,256}$	0.6392	16,236
		Recess - Depth	$\frac{0.6419}{0.6429}$	$\frac{16,304}{16,330}$	0.6432	16,337
602-488	BUSH IN SCAVENGE PUMP CASE	Bush - Diameter	$\frac{1.1527}{1.1532}$	$\frac{29,279}{29,291}$	1.1525	29,273
		Case - Bore	$\frac{1.1500}{1.1508}$	$\frac{29,210}{29,230}$	1.1510	29,235
602-489	GEAR IN SCAVENGE PUMP BUSH	Gear - Diameter	$\frac{0.8982}{0.8987}$	$\frac{22,814}{22,827}$	0.8981	22,812
		Bush - Bore	$\frac{0.9000}{0.9005}$	$\frac{22,860}{22,873}$	0.9006	22,875
602-490	GEAR IN SCAVENGE PUMP GEAR	Gear - Diameter	$\frac{0.8982}{0.8987}$	$\frac{22,814}{22,827}$	0.8981	22,812
		Gear - Bore	$\frac{0.8987}{0.8992}$	$\frac{22,827}{22,840}$	0.8993	22,842

Table 601 (Continued) (Sheet 7 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	

	$\frac{0.0000}{0.0010}$	$\frac{0,000}{0,026}$	0.0015	0,038	
--	-------------------------	-----------------------	--------	-------	--

	$\frac{0.0039}{0.0054}$	$\frac{0,099}{0,137}$	0.0060	0,152	
--	-------------------------	-----------------------	--------	-------	--

	$\frac{0.0019}{0.0034}$	$\frac{0,048}{0,087}$	0.0040	0,102	
--	-------------------------	-----------------------	--------	-------	--

	$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
--	---------------------------	-------------------------	---------	--------	--

	$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025	0,063	
--	-------------------------	-----------------------	--------	-------	--

	$\frac{0.0000}{0.0010}$	$\frac{0,000}{0,026}$	0.0012	0,030	
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Table 601 (Continued) (Sheet 7 - RH)

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FIG. AND REF. NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-491	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	$\frac{2.1765}{2.1770}$	$\frac{55,283}{55,296}$	2.1762	55,275
		Case - Bore	$\frac{2.1809}{2.1819}$	$\frac{55,395}{55,420}$	2.1821	55,425
602-492	QUILLSHAFT SPLINES IN GEAR SPLINES	Backlash	-	-	-	-
602-493	GEAR IN SCAVENGE PUMP CASE	Gear - Width	$\frac{0.9495}{0.9500}$	$\frac{24,117}{24,130}$	0.9494	24,115
		Recess - Depth	$\frac{0.9522}{0.9532}$	$\frac{24,186}{24,211}$	0.9534	24,216
602-494	QUILLSHAFT SPLINES IN GEAR SPLINES	Backlash	-	-	-	-
602-495	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	$\frac{2.1765}{2.1770}$	$\frac{55,283}{55,296}$	2.1762	55,275
		Case - Bore	$\frac{2.1809}{2.1819}$	$\frac{55,395}{55,420}$	2.1822	55,428
602-496	BUSH IN SCAVENGE PUMP CASE	Bush - Diameter	$\frac{1.1527}{1.1532}$	$\frac{29,279}{29,291}$	1.1525	29,273
		Case - Bore	$\frac{1.1500}{1.1508}$	$\frac{29,210}{29,230}$	1.1510	29,235
602-497	GEAR IN SCAVENGE PUMP CASE	Gear - Width	$\frac{0.2695}{0.2700}$	$\frac{6,845}{6,858}$	0.2694	6,843
		Recess - Depth	$\frac{0.2717}{0.2727}$	$\frac{6,901}{6,927}$	0.2729	6,932

Table 601 (Continued) (Sheet 8 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{0.0039}{0.0054}$	$\frac{0,099}{0,137}$	0.0060	0,152	
-	-	$\frac{0.0030}{0.0071}$	$\frac{0,076}{0,180}$	0.0080	0,203	
		$\frac{0.0022}{0.0037}$	$\frac{0,056}{0,094}$	0.0040	0,102	
-	-	$\frac{0.0030}{0.0071}$	$\frac{0,076}{0,180}$	0.0080	0,203	
		$\frac{0.0039}{0.0054}$	$\frac{0,099}{0,137}$	0.0060	0,152	
		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
		$\frac{0.0017}{0.0032}$	$\frac{0,043}{0,082}$	0.0035	0,089	

Table 601 (Continued) (Sheet 8 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-498	GEAR IN SCAVENGE PUMP BUSH	Gear - Diameter	<u>0.8982</u> 0.8987	<u>22,814</u> 22,827	0.8981	22,812
		Bush - Bore	<u>0.9000</u> 0.9005	<u>22,860</u> 22,873	0.9006	22,875
602-499	BUSH IN SCAVENGE PUMP CASE	Bush - Diameter	<u>1.1527</u> 1.1532	<u>29,279</u> 29,291	1.1525	29,273
		Case - Bore	<u>1.1500</u> 1.1508	<u>29,210</u> 29,230	1.1510	29,235
602-500	GEAR IN SCAVENGE PUMP GEAR	Gear - Diameter	<u>0.8982</u> 0.8987	<u>22,814</u> 22,827	0.8980	22,809
		Gear - Bore	<u>0.8987</u> 0.8992	<u>22,827</u> 22,840	0.8995	22,847
602-501	GEAR IN SCAVENGE PUMP BUSH	Gear - Diameter	<u>0.8982</u> 0.8987	<u>22,814</u> 22,827	0.8981	22,812
		Bush - Bore	<u>0.9000</u> 0.9005	<u>22,860</u> 22,873	0.9006	22,875
602-502 **	SCAVENGE PUMP GEARS	Backlash	-	-	-	-
602-503 **	SCAVENGE PUMP GEARS	Backlash	-	-	-	-
602-504	GEAR IN SCAVENGE PUMP BUSH	Gear - Diameter	<u>0.5981</u> 0.5987	<u>15,192</u> 15,207	0.5980	15,189
		Bush - Bore	<u>0.6000</u> 0.6004	<u>15,240</u> 15,250	0.6005	15,253

Table 601 (Continued) (Sheet 9 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	

		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025	0,063	
--	--	-------------------------	-----------------------	--------	-------	--

		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
--	--	---------------------------	-------------------------	---------	--------	--

		$\frac{0.0000}{0.0010}$	$\frac{0,000}{0,025}$	0.0015	0,038	
--	--	-------------------------	-----------------------	--------	-------	--

		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025	0,063	
--	--	-------------------------	-----------------------	--------	-------	--

-	-	$\frac{0.0109}{0.0308}$	$\frac{0,277}{0,782}$	0.0320	0,813	
---	---	-------------------------	-----------------------	--------	-------	--

-	-	$\frac{0.0109}{0.0308}$	$\frac{0,277}{0,782}$	0.0320	0,813	
---	---	-------------------------	-----------------------	--------	-------	--

		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,058}$	0.0025	0,063	
--	--	-------------------------	-----------------------	--------	-------	--

Table 601 (Continued) (Sheet 9 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-505	BUSH IN SCAVENGE PUMP CASE	Bush - Diameter	<u>0.8025</u> 0.8030	<u>20,384</u> 20,396	0.8024	20,381
		Case - Bore	<u>0.8000</u> 0.8008	<u>20,320</u> 20,340	0.8009	20,343
602-506	PRESSURE PUMP GEAR IN SCAVENGE PUMP GEAR	Gear - Diameter	<u>0.5981</u> 0.5987	<u>15,192</u> 15,207	0.5979	15,187
		Gear - Bore	<u>0.5987</u> 0.5991	<u>15,207</u> 15,217	0.5994	15,225
602-507	GEAR IN SCAVENGE PUMP CASE	Gear - Width	<u>0.2695</u> 0.2700	<u>6,845</u> 6,858	0.2694	6,843
		Recess - Depth	<u>0.2717</u> 0.2727	<u>6,901</u> 6,927	0.2729	6,932
602-508	BUSH IN SCAVENGE PUMP CASE	Bush - Diameter	<u>1.1527</u> 1.1532	<u>29,279</u> 29,291	1.1525	29,273
		Case - Bore	<u>1.1500</u> 1.1508	<u>29,210</u> 29,230	1.1510	29,235
602-509	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	<u>2.1765</u> 2.1770	<u>55,283</u> 55,296	2.1762	55,275
		Case - Bore	<u>2.1809</u> 2.1819	<u>55,395</u> 55,420	2.1822	55,428
602-510	GEAR IN SCAVENGE PUMP BUSH	Gear - Diameter	<u>0.8982</u> 0.8987	<u>22,814</u> 22,827	0.8981	22,812
		Bush - Bore	<u>0.9000</u> 0.9005	<u>22,860</u> 22,873	0.9006	22,875

Table 601 (Continued) (Sheet 10 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	
		$\frac{-0.0030}{-0.0017}$	$\frac{-0,076}{-0,044}$	-0.0015	-0,038	
		$\frac{0.0000}{0.0010}$	$\frac{0,000}{0,025}$	0.0015	0,038	
		$\frac{0.0017}{0.0032}$	$\frac{0,043}{0,082}$	0.0035	0,089	
		$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038	
		$\frac{0.0039}{0.0054}$	$\frac{0,099}{0,137}$	0.0060	0,152	
		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025	0,063	

Table 601 (Continued) (Sheet 10 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-511	GEAR IN SCAVENGE PUMP GEAR	Gear - Diameter	$\frac{0.8982}{0.8987}$	$\frac{22,814}{22,827}$	0.8980	22,809
		Gear - Bore	$\frac{0.8987}{0.8992}$	$\frac{22,827}{22,840}$	0.8995	22,847
602-512	GEAR IN SCAVENGE PUMP CASE	Gear - Width	$\frac{0.9495}{0.9500}$	$\frac{24,117}{24,130}$	0.9494	24,115
		Recess - Depth	$\frac{0.9522}{0.9532}$	$\frac{24,186}{24,211}$	0.9534	24,216
602-513	PRESSURE PUMP GEAR SPLINES IN GEAR SPLINES	Backlash	-	-	-	-
602-514	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	$\frac{2.1765}{2.1770}$	$\frac{55,283}{55,296}$	2.1762	55,275
		Case - Bore	$\frac{2.1809}{2.1819}$	$\frac{55,395}{55,420}$	2.1822	55,428
602-515	SCAVENGE PUMP GEAR SPLINES IN GEAR SPLINES	Backlash	-	-	-	-
602-516	GEAR IN SCAVENGE PUMP BUSH	Gear - Diameter	$\frac{0.8982}{0.8987}$	$\frac{22,814}{22,827}$	0.8981	22,812
		Bush - Bore	$\frac{0.9000}{0.9005}$	$\frac{22,860}{22,873}$	0.9006	22,875

Table 601 (Continued) (Sheet 11 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	

		$\frac{0.0000}{0.0010}$	$\frac{0,000}{0,026}$	0.0015	0,038	
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		$\frac{0.0022}{0.0037}$	$\frac{0,056}{0,094}$	0.0040	0,102	
--	--	-------------------------	-----------------------	--------	-------	--

-	-	$\frac{0.0030}{0.0067}$	$\frac{0,076}{0,170}$	0.0070	0,178	
---	---	-------------------------	-----------------------	--------	-------	--

		$\frac{0.0039}{0.0054}$	$\frac{0,099}{0,137}$	0.0060	0,152	
--	--	-------------------------	-----------------------	--------	-------	--

-	-	$\frac{0.0030}{0.0071}$	$\frac{0,076}{0,180}$	0.0080	0,203	
---	---	-------------------------	-----------------------	--------	-------	--

		$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025	0,063	
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Table 601 (Continued) (Sheet 11 - RH)

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FIG. AND REF.NO.	PARTS AND DESCRIPTION		DIMENSIONS NEW		WORN DIMENSIONS (NON-SELECT)	
			IN.	MM	IN.	MM
602-517	GEAR IN SCAVENGE PUMP CASE	Gear - Width	$\frac{0.6395}{0.6400}$	$\frac{16,243}{16,256}$	0.6392	16,236
		Recess - Depth	$\frac{0.6419}{0.6429}$	$\frac{16,304}{16,330}$	0.6432	16,337
602-518	GEAR IN SCAVENGE PUMP CASE	Gear - Diameter	$\frac{2.1765}{2.1770}$	$\frac{55,283}{55,296}$	2.1762	55,275
		Case - Bore	$\frac{2.1809}{2.1819}$	$\frac{55,395}{55,420}$	2.1822	55,428
602-519	BUSH IN SCAVENGE PUMP CASE	Bush - Diameter	$\frac{1.1527}{1.1532}$	$\frac{29,279}{29,291}$	1.1525	29,273
		Case - Bore	$\frac{1.1500}{1.1508}$	$\frac{29,210}{29,230}$	1.1510	29,235
602-520	GEAR IN SCAVENGE PUMP BUSH	Gear - Diameter	$\frac{0.8982}{0.8987}$	$\frac{22,814}{22,827}$	0.8981	22,812
		Bush - Bore	$\frac{0.9000}{0.9005}$	$\frac{22,860}{22,873}$	0.9006	22,875

Table 601 (Concluded) (Sheet 12 - LH)

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REJECT IF OVER		CLEARANCE NEW		PERMISSIBLE WORN CLEARANCE		REMARKS
IN.	MM	IN.	MM	IN.	MM	

$\frac{0.0019}{0.0034}$	$\frac{0,048}{0,087}$	0.0040	0,102		
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$\frac{0.0039}{0.0054}$	$\frac{0,099}{0,137}$	0.0060	0,152		
-------------------------	-----------------------	--------	-------	--	--

$\frac{-0.0032}{-0.0019}$	$\frac{-0,081}{-0,049}$	-0.0015	-0,038		
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$\frac{0.0013}{0.0023}$	$\frac{0,033}{0,059}$	0.0025	0,063		
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Table 601 (Concluded) (Sheet 12 - RH)

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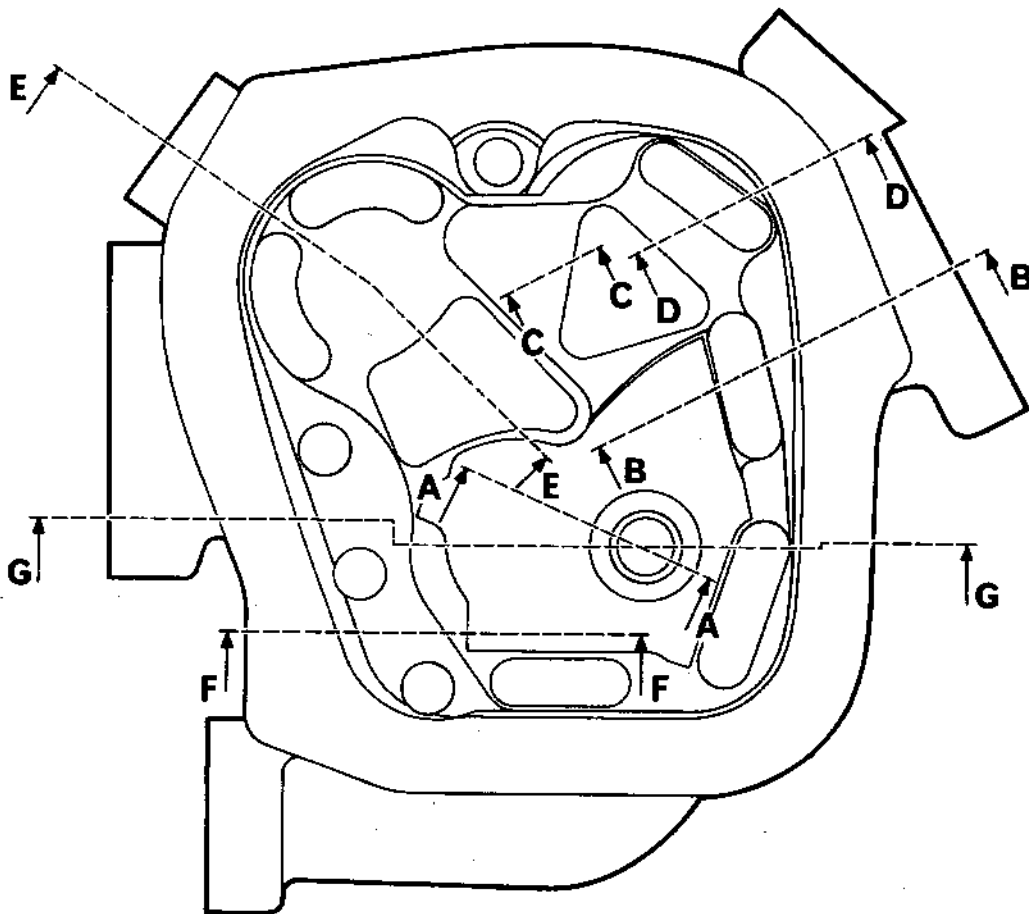


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TN9225

Main Oil Pump
Figure 601 (Sheet 1 - LH)

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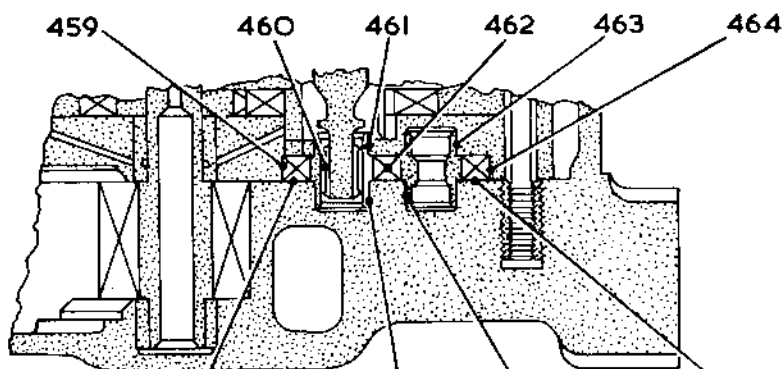
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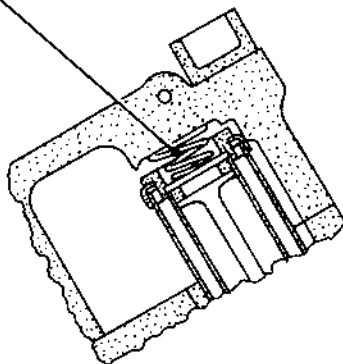


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PART SECTION GG



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SECTION BB

(SECTIONS CC AND DD SIMILAR)

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SECTION AA

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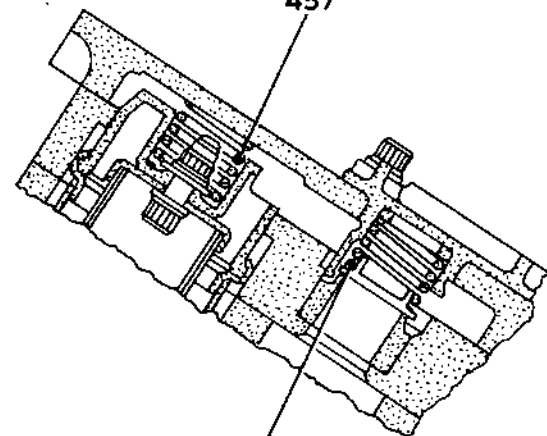
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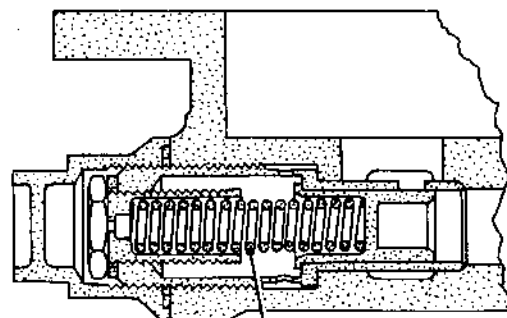
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SECTION EE

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SECTION FF

Main Oil Pump
Figure 601 (Sheet 2 - RH)

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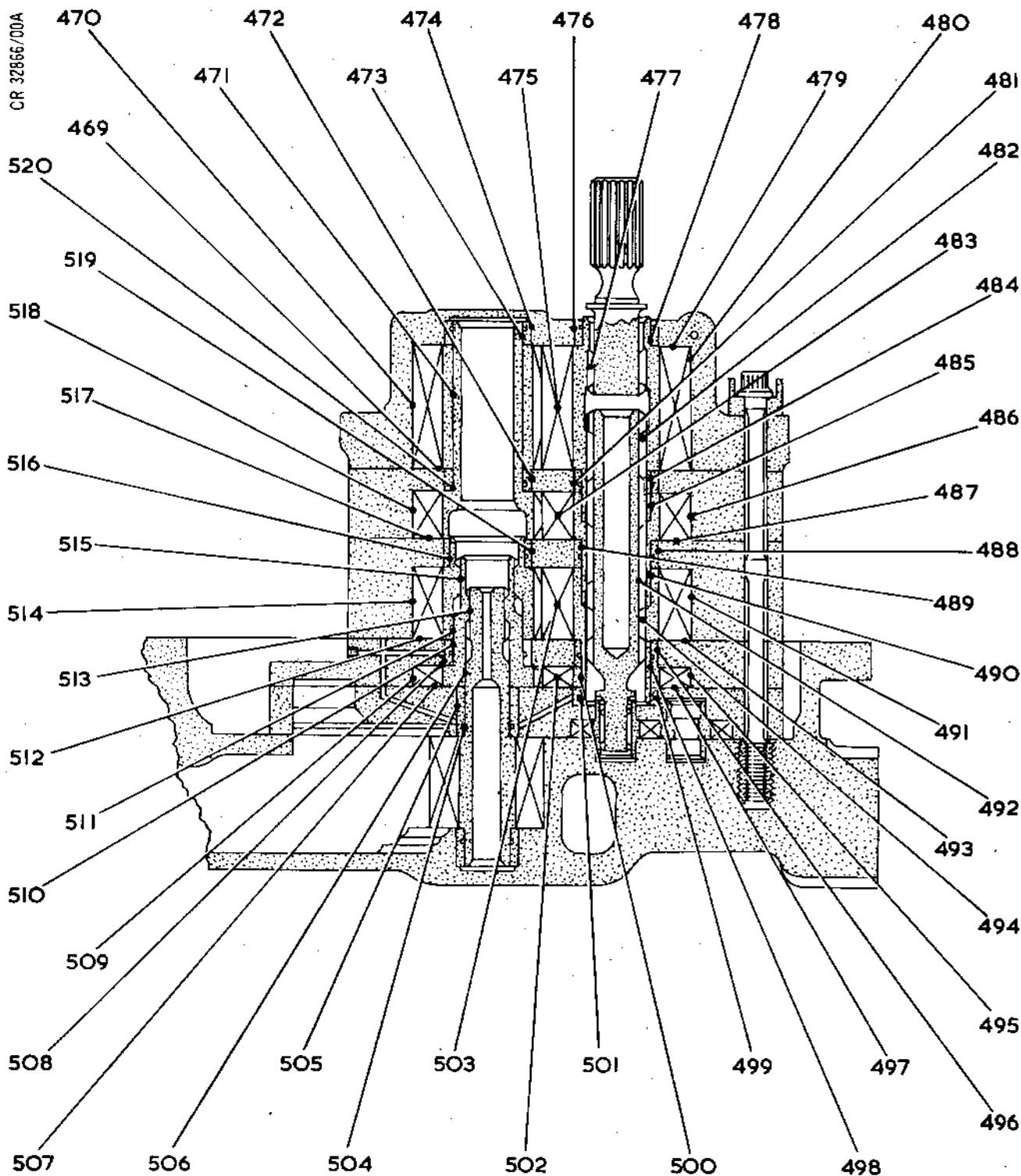
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SECTION **GG**
(REF. FIG 601 SHEET 1)
Main Oil Pump
Figure 602

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	311	Jun 1/92		310A	Dec 31/01
	312	Dec 31/99		310B	Jan 4/93
	312A	Dec 31/99		311	Dec 31/99
	312B	Jun 1/92		312	Dec 31/99
	313	Dec 31/99		312A	Dec 31/99
	314	Jul 1/76		312B	Dec 31/99
	315	Oct 1/79		313	Apr 1/76
	316	Apr 1/77		314	Apr 1/76
	317	Dec 1/78		315	Apr 1/76
	318	Jul 1/76		316	Sep 1/81
	319	Dec 31/99		317	Apr 1/76
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	305	Jun 1/77		352	Dec 1/75
	306	Jun 1/77		353	Dec 1/75
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	307	Aug 1/81	Contents	3	Dec 1/85
	308	Aug 1/81		301	Apr 1/77
	309	Aug 1/81		302	Mar 1/80
	310	May 1/76		303	Jun 1/77
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				310	Aug 1/81
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SPECIAL INCIDENTS - INSPECTION/CHECK

1. General

- A. This section contains appendices relating to essential inspection requirements following specific incidents in service.

The purpose of the appendices is to assist the overhaul base in defining work programmes for engines returned to overhaul base for investigation, repair and/or refurbishment.

- B. The appendices refer to essential inspection requirements.

In addition to essential inspection requirement, all parts exposed during the essential inspection procedure are to be inspected in accordance with the relevant inspection/check procedures, acceptance limits and fits and clearances detailed in the Overhaul Manual.

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APPENDIX S1

INSPECTION FOLLOWING HP TURBINE BLADE FAILURE

1. General

This appendix details the essential inspection procedures to be applied following failure of HP turbine blades in service.

The essential inspection requirements of this appendix relate to a primary failure of the HP turbine but would also apply supplemented by further inspection, to a secondary failure resulting from failures in other areas of the engine.

All items and locations are to be inspected in accordance with the relevant inspection/check procedures, acceptance limits and fits and clearances detailed in the Overhaul Manual.

2. Engine Internal Examination

A. Inspect LP Compressor.

- (1) Inspect LP compressor case for evidence of stage 1 rotor blade tip rubbing. Reject if tip rub is evident at more than two positions around the case circumference (Ref. para.5, additional checks).
- (2) Inspect stage 1 rotor blades and vanes for damage (Ref. 72-09-03, Inspection/Check).
- (3) Inspect stages 2 to 7 rotor blades for damage (Ref. 72-09-03, Inspection/Check).

B. Inspect HP Compressor.

- (1) Inspect HP compressor rotor blades for damage (Ref. 72-09-03, Inspection/Check).

3. Essential Inspection Requirement

A. Inspect Turbine Exhaust Diffuser (Ref. 72-53-00, Inspection/Check).

- (1) Visually inspect exhaust diffuser inner and outer case for impact damage, cracking, distortion, scoring, fretting and local overheating.
- (2) Examine the turbine exhaust diffuser inner assembly for evidence of cracking around the vane ends.

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- (3) Inspect LP turbine bearing and bearing housing
(Ref. 72-52-03, Inspection/Check).
- (a) Disassemble bearing outer race (Ref.72-52-03, Disassembly).
 - (b) Carry out crack detection procedure and inspection of bearing outer race.
 - (c) Carry out visual inspection of bearing housing.
 - (d) Inspect labyrinth seals as detailed in paragraph L.
- B. Inspect LP Turbine Rotor (Ref. 72-52-02, Inspection/Check).
- (1) Visually inspect turbine blades, disk and hub for impact damage, cracking, distortion, scoring, fretting and local overheating.
 - (2) Disassemble LP turbine rotor (Ref. 72-52-02, Disassembly).
 - (3) Inspect LP turbine rotor disk.
 - (a) Carry out crack detection procedure on disk.
 - (b) Carry out detail inspection of disk.
 - (c) If overheating of the disk is evident or suspected, carry out hardness check.
 - (4) Carry out crack detection procedure and inspection of turbine blades.
 - (5) Inspect LP turbine rotor hub and labyrinth assemblies.
 - (a) Carry out crack detection procedure on hub.
 - (b) Carry out detail inspection of hub.
 - (c) Carry out crack detection procedure and inspection of externally relieved bolts (72-52-02/1-120).
 - (d) Carry out crack detection procedure and inspection of bearing inner track.
 - (e) Inspect labyrinth seals as detailed in paragraph L.

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- C. Inspect LP Turbine Nozzle (Ref. 72-52-01, Inspection/Check).
- (1) Visually inspect the turbine nozzle for impact damage, cracking, distortion, scoring, fretting and local overheating in the following regions.
 - (a) Nozzle vanes.
 - (b) Nozzle vane support diaphragm.
 - (2) Disassemble LP turbine nozzle (Ref. 72-52-01, Disassembly).
 - (3) Carry out crack detection procedure and inspection of nozzle vanes.
 - (4) Inspect labyrinth seals as detailed in paragraph L.
- D. Inspect HP Turbine Rotor (Ref. 72-51-03, Inspection/Check).
- (1) Visually inspect turbine blades, disk and hub for impact damage, cracking, distortion, scoring, fretting and local overheating,
 - (2) Disassemble HP turbine rotor (Ref. 72-51-03, Disassembly).
 - (3) Inspect HP turbine rotor disk.
 - (a) Carry out crack detection procedure on disk.
 - (b) Carry out detail inspection of disk.
 - (c) If overheating of the disk is evident or suspected, carry out hardness check.
 - (4) Carry out crack detection procedure and inspection of turbine blades.
- E. Inspect HP Turbine Rotor Hub and Labyrinth Assemblies (Ref. 72-51-04, Inspection/Check).
- (a) Carry out crack detection procedure on hub.
 - (b) Carry out detail inspection of hub.
 - (c) Carry out crack detection procedure and inspection of externally relieved bolts (72-51-04/1-180).

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(d) Inspect labyrinth seals as detailed in paragraph L.

F. Inspect HP Turbine Nozzle (Ref. 72-42-01, 72-51-02, Inspection/Check).

(1) Visually inspect the turbine nozzle for impact damage, cracking, distortion, scoring, fretting and local overheating in the following regions.

(a) Nozzle vanes.

(b) Nozzle vane support cone.

(c) Nozzle vane abutment segments.

(d) Nozzle vane locking pins and location bolts.

(2) Disassemble HP turbine nozzle and combustion chamber assembly (Ref. 72-00-51).

(3) Carry out crack detection procedure and inspection of nozzle vanes.

(4) Carry out a detail inspection of the nozzle vane support cone for possible distortion (Ref. Fig.301).

(a) Check the locating diameter for roundness within the acceptable limits shown.

(b) Check the sloping face is true to the locating diameter within the acceptable angular limits shown.

NOTE: Should the limits shown be exceeded at checking positions where local fretting has occurred, the check is acceptable provided that the fretting is within the acceptable limit.

(5) Inspect labyrinth seals as detailed in paragraph L.

G. Inspect Combustion Chamber (Ref. 72-41-01, Inspection/Check).

(1) Visually inspect for impact damage, cracking, distortion, scoring, fretting and local overheating.

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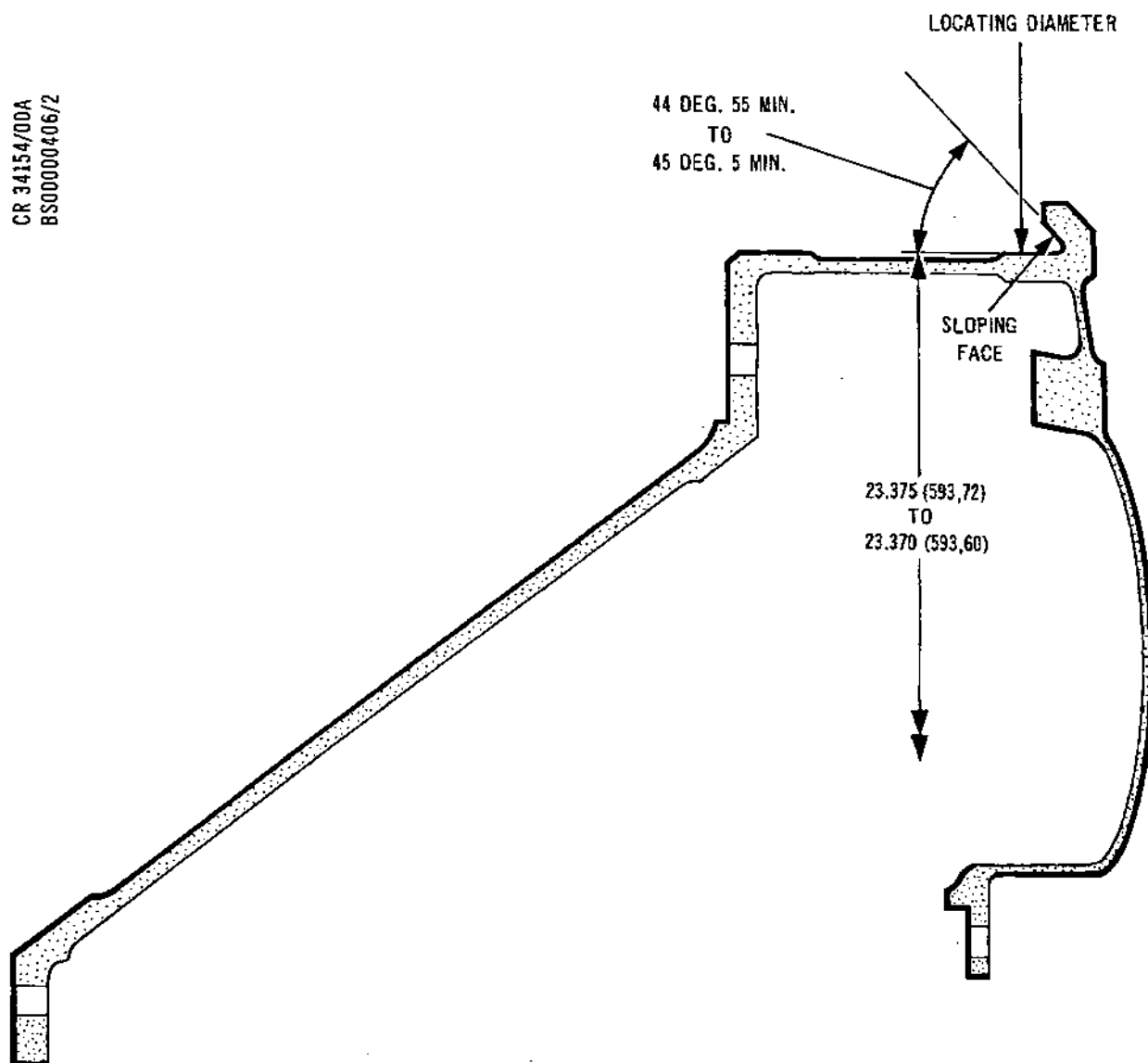
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Examination of Nozzle Vane Support Cone
Figure 301

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- H. Inspect HP Turbine Bearing Support and HP Turbine Bearing (Ref. 72-51-01, Inspection/Check).
- (1) Visually inspect the HP turbine bearing support rear face for impact damage, cracking, distortion, scoring and local overheating. Pay particular attention to the area around the bearing housing retaining bolt locations.
 - (2) Check the tightness of HP turbine bearing housing retaining nuts and bolts.
 - (a) Apply a tightening torque of 70 lbf in. (7,9 Nm) to each of the eighteen bolts. Movement of the bolt indicates looseness. It will not be possible to tighten any loose nut and bolt without first removing the combustion chamber outer case and the HP compressor diffuser case (Ref. 72-00-00, 72-00-51, Disassembly).
 - (3) Disassemble HP turbine bearing outer race (Ref. 72-00-51, Disassembly).
 - (4) Inspect HP turbine bearing outer race.
 - (a) Carry out crack detection procedure and inspection of bearing outer race (Ref. 72-33-00, Inspection/Check).
- J. Inspect Combustion Chamber Outer Case (Ref. 72-42-01, Inspection/Check).
- (1) Visually inspect combustion chamber outer case for impact damage, cracking, distortion, scoring, fretting and local overheating.
- K. Inspect HP Compressor Diffuser Case (Ref. 72-34-00, Inspection/Check).
- (1) Visually inspect outer skin of the diffuser case for evidence of cracking, particularly around the leading edge of the vane ends.
- L. Inspect Labyrinth Seals (Ref. Fig.302).
- (1) Inspect labyrinths 16 to 30.
 - (a) Measure and record all labyrinth seal fin diameters and bores.

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NOTE: Some of the labyrinth rotating parts, particularly the fins of the 24/26 labyrinth, may be worn eccentrically. Heavier wear would be evident on the side corresponding to the light side of the rotor, the side where the blades failed.

- (2) Carry out crack detection procedures on all labyrinth rotating parts and housings that show evidence of rubbing.
- (3) Inspect bore of No.26 rotating labyrinth seal fin carrier for evidence of rubbing contact with the LP compressor driveshaft.

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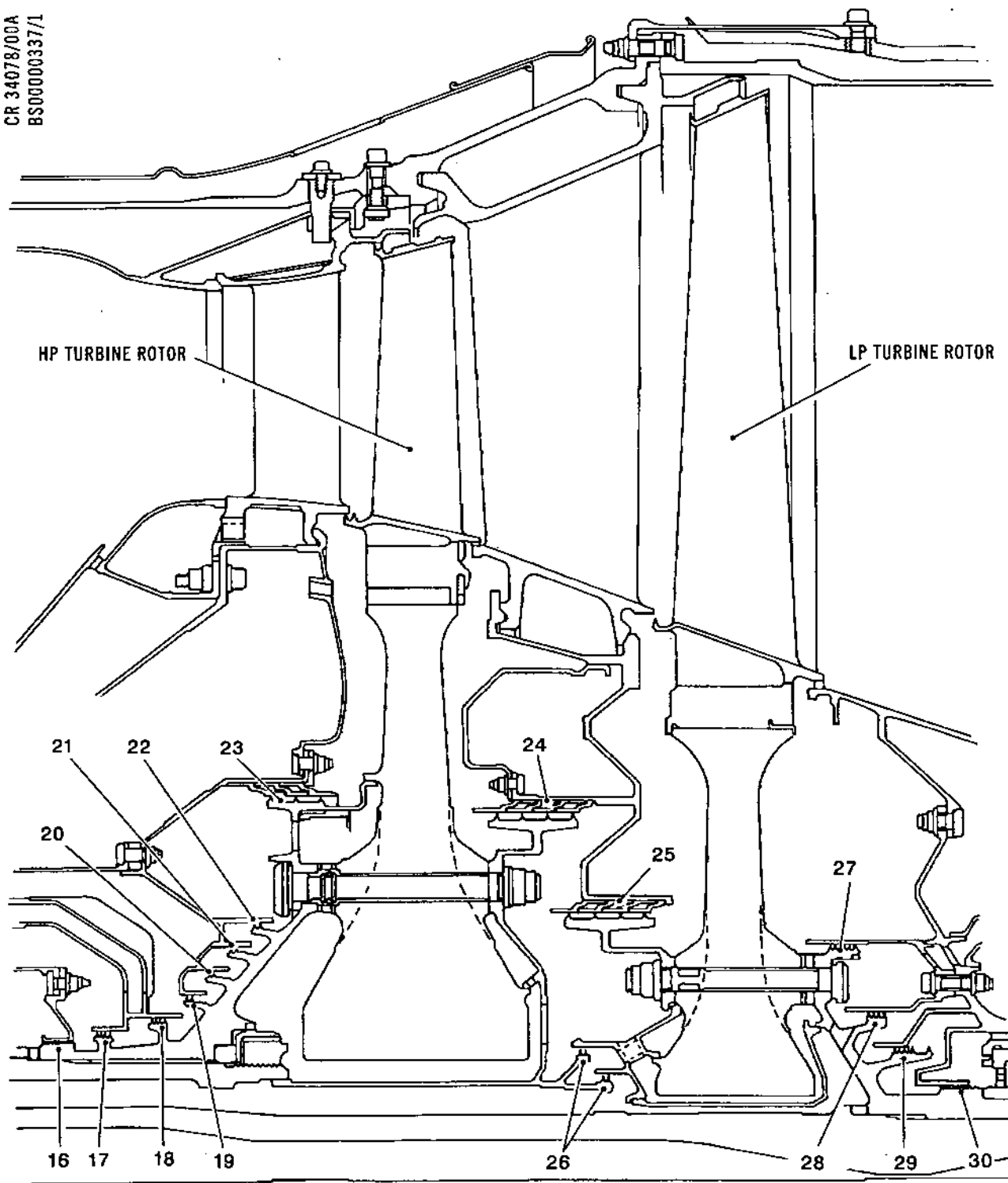
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Labyrinth Identification
Figure 302

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OVERHAULAPPENDIX S2CLEANING OF OIL SYSTEM FOLLOWING ENGINE BEARING OR
GEARBOX FAILURE1. General

This appendix details the disassembly and cleaning procedures to be applied when failure of an engine bearing or gearbox has resulted in contamination of the engine oil system.

Although this appendix relates to disassembly and cleaning procedures, reference is made to inspection/check and the appendix is therefore included in this section for information.

On receipt of contaminated sub-assemblies/modules, carry out the disassembly and cleaning procedures required depending on the extent of contamination found on magnetic plugs and filters.

Visually inspect all exposed items and interface surfaces to the requirements of the relevant Inspection/Check chapter.

NOTE: Sub-assemblies/modules disassembled for investigation into the source of contamination should be inspected in accordance with the relevant Inspection/Check chapter of the Overhaul Manual.

When disassembly of the engine main bearing compartments is necessary, only disassemble to the extent required to remove all contaminated items.

2. Disassembly and Cleaning Requirement When Any Magnetic Plug or Filter is Abnormally Contaminated

A. Oil Tank.

- (1) Disassemble the oil tank (Ref. 79-11-01, Disassembly).
- (2) Clean the oil tank (Ref. 79-11-01, Cleaning).

B. Oil Cooler.

- (1) Clean the oil cooler in accordance with the vendor's overhaul manual.

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C. Filters and Magnetic Plugs.

(1) Master magnetic plug

- (a) Retain sample of debris if plug is abnormally contaminated.
- (b) Clean the master magnetic plug (Ref. 79-23-01, Cleaning).

(2) Left-hand gearbox

- (a) Retain sample of debris from any abnormally contaminated filter and/or magnetic plug for investigation into source of contamination. Identify the location from which the sample was taken.
- (b) Clean filters and magnetic plugs (Ref.72-65-00, Cleaning).

(3) Right-hand gearbox

- (a) Retain sample of debris if magnetic plug and/or filter is abnormally contaminated.
- (b) Clean magnetic plug and filter (Ref.72-63-01, Cleaning).

(4) LP compressor front bearing scavenge filter

- (a) Retain sample of debris if filter is abnormally contaminated.
- (b) Clean the filter (Ref. 72-01-01, Cleaning).

D. Sub-assemblies/Modules.

- (1) Disassemble and clean sub-assemblies/modules to the requirements of paragraphs 3, 4, 5 and 6.

3. Disassembly and Cleaning Requirement When Magnetic Plug and/or Filter Checks Indicate Abnormal Contamination in Left-Hand Gearbox

A. Left-hand gearbox Sub-Assembly/Module.

- (1) Disassemble the left-hand gearbox (Ref. 72-62-00, Disassembly).

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- (2) Disassemble the main oil pump (Ref. 72-65-00, Disassembly).
- (3) Clean the left-hand gearbox (Ref. 72-62-01 to 72-62-04, Cleaning).
- (4) Clean the main oil pump (Ref. 72-65-00, Cleaning).
4. Disassembly and Cleaning Requirement When Magnetic Plug and/or Filter Checks Indicate No Abnormal Contamination in Left Hand Gearbox
 - A. Main Oil Pump
 - (1) Disassemble the main oil pump (Ref. 72-65-00, Disassembly).
 - (2) Clean the main oil pump (Ref. 72-65-00, Cleaning).
5. Disassembly and Cleaning Requirement When Magnetic Plug and/or Filter Checks Indicate Abnormal Contamination in Engine Bearing Compartments
 - A. Engine Bearing Departments
 - (1) Disassemble and clean contaminated engine bearing compartment in accordance with the procedures of the relevant disassembly and cleaning chapters.
 - B. Oil Tubes
 - (1) Clean all oil feed tubes removed during disassembly (Ref. 72-01-03, Cleaning).
 - (2) Clean all oil scavenge tubes removed during disassembly (Ref. 72-01-04, Cleaning).
6. Disassembly and Cleaning Requirement When Magnetic Plug and/or Filter Checks Indicate Abnormal Contamination in Right-Hand Gearbox
 - A. Right-hand gearbox Sub-Assembly/Module.
 - (1) Disassemble the right-hand gearbox (Ref. 72-63-00, Disassembly).
 - (2) Clean the right-hand gearbox (Ref. 72-62-01 to 72-62-04, Cleaning).

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B. Left-hand gearbox Sub-Assembly/Module.

- (1) Disassemble the main oil pump (Ref. 72-65-00, Disassembly).
- (2) Clean the main oil pump (Ref. 72-65-00, Cleaning).

C. Oil Tubes.

- (1) Clean the oil cooler to oil tank tube (79-22-02/3-150) and the right-hand gearbox oil return tubes (79-22-02/2-10, 2-250). (Ref. 79-22-02, Cleaning).

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APPENDIX S3INSPECTION OF ENGINE FOLLOWING AN N1 OVERSPEED1. General

This appendix details the essential inspection procedures to be carried out following:

- (a) an N1 overspeed at or above 120%
- (b) LP compressor blade tip rub at stages 1 and/or 4 as a result of N1 overspeed between 108.5 and 120%.
- (c) N1 overspeed between normal maximum limit and 108.5% for a period in excess of 20 seconds.

2. Remove Modules for Inspection/Check Purposes

- A. Disassemble engine to sub-assemblies (Ref.71-00-01, 72-00-00, Disassembly).

3. Essential Inspection Requirement

A. Inspect the LP Compressor

- (1) Disassemble the LP compressor (Ref. 72-31-00, 72-31-01, 72-31-02, 72-31-03, Disassembly).
- (2) Inspect the LP compressor
 - (a) Inspect all compressor blades for cracks and tip rubbing (Ref. 72-31-02, Inspection/Check).
 - (b) Inspect all compressor disks for cracks (Ref. 72-31-02, Inspection/Check).
 - (c) Inspect all compressor vanes for cracks (Ref. 72-31-01, 72-31-03, Inspection/Check).

B. Inspect the LP Turbine Rotor

- (1) Disassemble the LP turbine rotor (Ref. 72-52-02, Disassembly).
- (2) Inspect the LP turbine rotor (Ref. 72-52-02, Inspection/Check).
 - (a) Inspect rotor disk for cracks.

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- (b) Check rotor disk diameter and axial set.
- (c) Inspect rotor blades for cracks.

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APPENDIX S4INSPECTION OF ENGINE FOLLOWING AN N2 OVERSPEED1. General

This appendix details the essential inspection procedures to be carried out following an N2 overspeed.

2. Remove Modules for Inspection/Check Purposes

A. Disassemble engine to sub-assemblies (Ref. 71-00-01, 72-00-00, Disassembly).

3. Essential Inspection Requirement

A. Inspect the LP Compressor

(1) Disassemble the LP compressor (Ref. 72-31-00, 72-31-01, 72-31-02, 72-31-03, Disassembly).

(2) Inspect the LP compressor (Ref. 72-31-01, 72-31-02, 72-31-03, Inspection/Check).

(a) Inspect all compressor blades for cracks and evidence of tip rubbing.

(b) Inspect all compressor disks for cracks

(c) Inspect all compressor vanes for cracks

B. Inspect the HP Compressor

(1) Disassemble the HP compressor (Ref. 72-33-00, 72-33-01, 72-33-02, Disassembly).

(2) Inspect the HP compressor (Ref. 72-33-02, Inspection/Check).

(a) Inspect all compressor blades for cracks.

(b) Inspect all compressor disks.

(i) Carry out crack detection procedure.

(ii) Carry out dimensional check of spigot location diameters (Ref. 72-33-00, Fits and Clearances).

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- (c) Carry out dimensional check of all spacer ring spigot location diameters (Ref. 72-33-00, Fits and Clearances).
- (d) Inspect the HP driveshaft for cracks.
- C. Inspect the HP Turbine Rotor Hub (Ref. 72-51-03, Inspection/Check).
 - (1) Disassemble the hub and labyrinth assembly (Ref. 72-51-03, Disassembly).
 - (2) Inspect the hub for cracks.
- D. Inspect the HP Turbine Rotor (Ref. 72-51-03, Inspection/Check).
 - (1) Disassemble the HP turbine rotor (Ref. 72-51-03, Disassembly).
 - (2) Inspect the HP turbine rotor
 - (a) Inspect rotor disk for cracks.
 - (b) Check rotor disk diameter and axial set.
 - (3) Inspect HP turbine rotor blades.
 - (a) Inspect rotor blades for evidence of overheating.
 - (b) Inspect rotor blades for cracks.
- E. Inspect the HP Turbine Nozzle (Ref. 72-51-02, Inspection/Check).
 - (1) Disassemble the HP turbine nozzle (Ref. 72-00-51).
 - (2) Inspect the HP turbine nozzle vanes.
 - (a) Inspect nozzle vanes for evidence of burning.
 - (b) Inspect the nozzle vanes for cracks.
- F. Inspect the Combustion Chamber (Ref. 72-41-01, Inspection/Check).
 - (1) Visually inspect the combustion chamber for distortion and evidence of burning.

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- G. Inspect the LP Turbine Nozzle (Ref. 72-52-01, Inspection/Check).
 - (1) Disassemble the LP turbine nozzle (Ref. 72-52-01, Disassembly).
 - (2) Inspect the LP turbine nozzle vanes for cracks.
- H. Inspect the LP Turbine Rotor (Ref.72-52-02, Inspection/Check).
 - (1) Disassemble the LP turbine rotor (Ref. 72-52-02, Disassembly).
 - (2) Inspect LP turbine rotor disk.
 - (a) Inspect the rotor disk for cracks.
 - (b) Check rotor disk diameter and axial set.
 - (3) Inspect LP turbine rotor blades for cracks.
- J. Inspect the Turbine Exhaust Diffuser (Ref. 72-53-00, Inspection/Check).
 - (1) Visually inspect the vanes of the inner case assembly for cracks.

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OVERHAULAPPENDIX S5INSPECTION OF THE HP TURBINE DISK FOLLOWING DETACHMENT
OF LP TURBINE NOZZLE VANE INNER PLATFORM1. General

This appendix details the essential inspection procedures to be carried out following the complete detachment of a combustion chamber vaporiser which has resulted in the severance and disengagement of one or more LP turbine nozzle vane inner platforms.

2. Essential Inspection Requirement

A. Inspect HP turbine rotor (Ref. 72-51-02, Inspection/Check).

- (1) Visually inspect turbine blades and disk for impact damage, cracking, distortion, scoring, fretting and local overheating.
- (2) Disassemble the HP turbine rotor (Ref. 72-51-03, Disassembly).
- (3) Inspect HP turbine rotor disk.
 - (a) Carry out crack detection procedure on disk.
 - (b) Check rotor disk diameter and axial set.
 - (c) Carry out hardness check of disk.
- (4) Inspect HP turbine rotor blades.
 - (a) Inspect rotor blades for evidence of overheating.
 - (b) Inspect rotor blades for cracks.

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APPENDIX S6

INSPECTION OF TURBINES FOLLOWING BLOCKAGE/
OBSTRUCTION BY DEBRIS1. General

This appendix details the essential inspection procedures and actions to be carried out following blockage/obstruction of the HP turbine nozzle by debris.

In-service inspection and acceptance standards for blockage/obstruction of the HP turbine nozzle are detailed in Appendix 6 of the Heavy Maintenance Manual and are repeated here for information. Refer paragraph 2.

2. Inspection of Turbine Modules

A. Establish the Blockage Number (B.No.).

- (1) When debris obstructs the gas flow passages of the nozzle annulus, estimate and record the following data.
 - (a) The total, forward facing, area of the blockage/s.
 - (b) The maximum height (h) of the blockage. Measure the blockage radially, in line with the adjacent vanes, from the inner to the outer edge.
 - (c) Take the annulus height (H) as 4.2 in. and calculate h/H.
- (2) Using the h/H value calculated, apply the estimated blockage area and determine the B.No. from the graph (Ref. Fig.301).
- (3) Inspect to the standards specified in paragraph B.

B. Inspection and Acceptance Standards.

CAUTION: BEFORE PROCEEDING TO DISASSEMBLE HP AND/OR LP TURBINE BLADES FROM DISKS AS RECOMMENDED IN TABLE 301, OBSERVE AND COMPLY WITH REQUIREMENT OF PARAGRAPH (2).

- (1) Refer to Table 301 and carry out the recommended Action relevant to the B.No. obtained.

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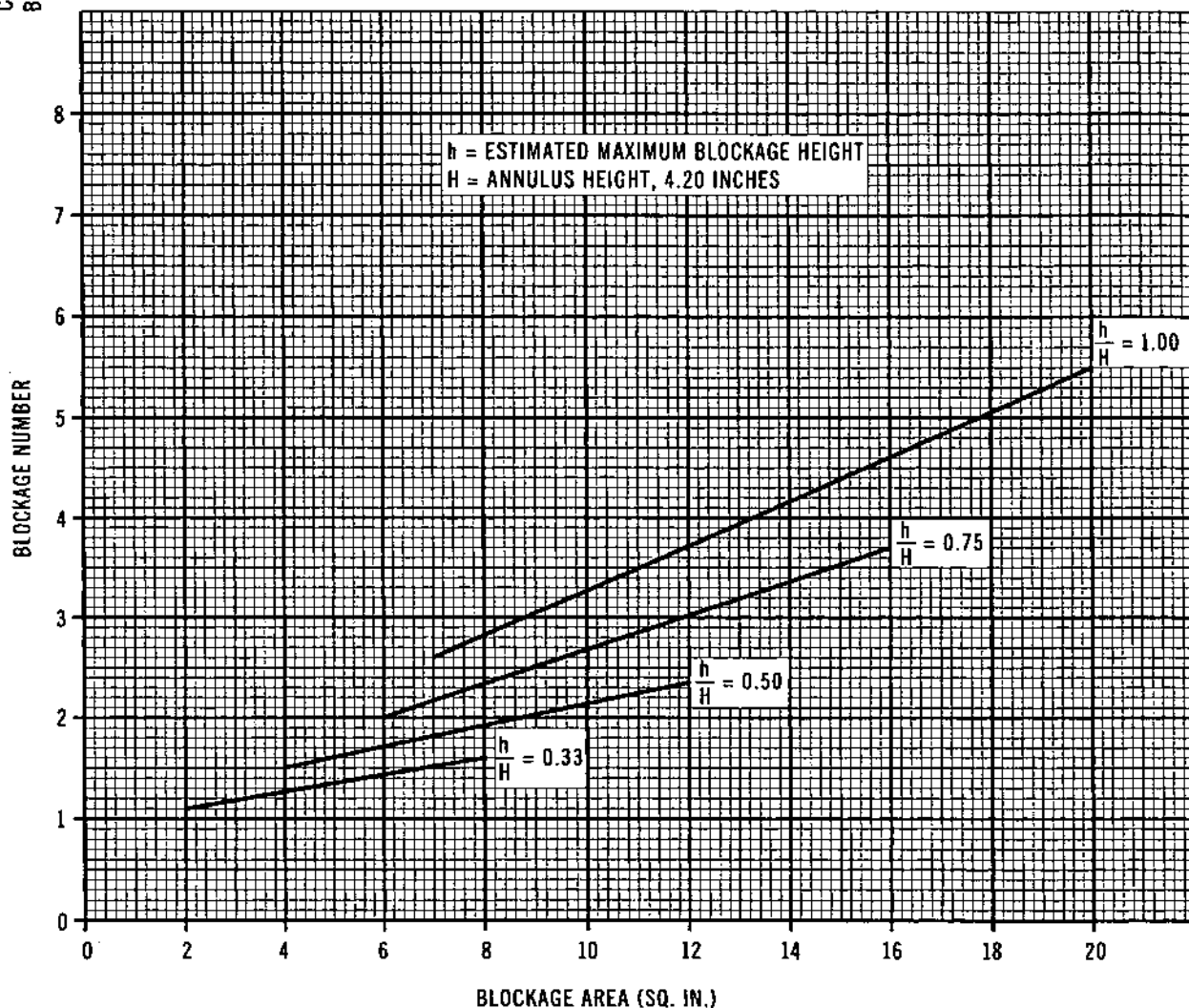
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CR 35812/00A
BS00001889/1



Blockage Number
Figure 301

INSPECTION/CHECK

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- (2) Prior to disassembling HP and/or LP turbine rotor blades from disks, carry out the blade slackness checks specified in the Overhaul Manual 72-51-03 and 72-52-02, Disassembly. If any clearance exists at the centre section of the shroud interlocking joints, reject the blades irrespective of the B.No.

B.No.	Action
Up to 1.50	Continued engine operation is acceptable while the engine remains installed (Ref. Maintenance Manual 72-51-00 Inspection/Check). Blockage must be removed when engine is removed from aircraft.
1.51 to 2.00	Remove LP turbine rotor module and visually inspect blades. (Ref. 72-00-00, General, Inspection/Check). Accept if satisfactory.
2.01 to 2.50	Remove LP turbine rotor module and carry out full crack detection checks and inspection on LP turbine rotor blades (Ref. Overhaul Manual). Accept if satisfactory.
2.51 to 3.00	Reject LP turbine rotor blades. Install new rotor blades in accordance with Overhaul Manual procedures.
3.01 to 4.00	Reject LP turbine rotor blades. Visually inspect LP turbine disk (Ref. 72-00-00, General, Inspection/Check) and accept if satisfactory. Install new rotor blades in accordance with Overhaul Manual procedures.

Blockage Numbers and Related Action
Table 301 (continued)

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B.No.	Action
4.01 to 4.50	Reject LP turbine blades. Remove HP turbine rotor module and visually inspect HP turbine rotor blades and LP turbine disk. (Ref. 72-00-00, General, Inspection/Check). Accept if satisfactory. Install new LP turbine rotor blades in accordance with Overhaul Manual procedures.
4.51 to 5.50	Reject LP turbine rotor blades. Remove HP turbine rotor module. Carry out full crack detection checks and inspection on HP turbine rotor blades and LP turbine disk. Accept if satisfactory. Refer to Overhaul Manual for disassembly, crack detection and assembly procedures.
above 5.51	Reject LP and HP turbine rotor blades. Agreement with Olympus Project Office, Rolls-Royce, Bristol, is necessary before re-installing the LP and HP turbine disks.

Blockage Numbers and Related Action
Table 301 (concluded)

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APPENDIX S7INSPECTION OF THE HP TURBINE AND LP TURBINE BEARING
AND HOUSING FOR OIL COKING AND LACQUERING1. General

Carbon shedding has been responsible for several IFSD incidents, where blockage of the engine oil pressure filter with carbon deposits results in low oil pressure in flight.

Carbon shedding incidents are monitored and reviewed by Rolls-Royce with a view to making appropriate recommendations to prevent further IFSD's due to this problem. Data from long life (2000 hours plus) modules, and engines which have been involved in carbon shedding incidents, or where exceptional amounts of carbon are noted during engine strip, is of particular benefit.

This appendix relates to information requested by Rolls-Royce whenever an incident of carbon shedding arises, an exceptional amount of carbon is noted during engine strip, or a long life module (2000 hours plus) is available.

2. Inspect HP Turbine Bearing and Housing

NOTE: If heavy coking (i.e. rough carbon) is found during inspection of the bearing and housing, carry out additional checks in accordance with paragraph 4.

- A. Disassemble HP turbine bearing and housing (Ref. 72-33-00, 72-51-01, Disassembly).
- B. Inspect for, and record the amount of, coking/lacquering at the following locations (Ref. Fig.301).
 - (1) HP turbine bearing.
 - (2) No.16 labyrinth ring.
 - (3) Bore of the oil feed elbow.
 - (4) Bore of the oil scavenge elbow.
 - (5) Oil feed jets.
 - (6) Bore of the oil feed tube, at both connector positions.
 - (7) Bore of the oil scavenge tube, at both connector positions.

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- C. Inspect and record condition of insulation blankets (Ref. Fig.301).

3. Inspect LP Turbine Bearing and Housing

NOTE: If heavy coking (i.e. rough carbon) is found during inspection of the bearing and housing, carry out additional checks in accordance with paragraph 4.

- A. Disassemble LP turbine bearing and housing (Ref. 72-52-03, Disassembly).
- B. Inspect for, and record the amount of, coking/lacquering at the following locations (Ref. Fig.302).
- (1) LP turbine bearing.
 - (2) Bearing retaining ring.
 - (3) LP turbine bearing housing.
 - (4) Rear cover assembly.
 - (5) Bore of oil feed tube in rear cover assembly.
 - (6) LP shaft signal generating mechanism.
 - (7) Oil feed jet.
 - (8) Bore of oil feed tube.
 - (9) Bore of oil scavenge tube.
- C. Inspect and record condition of insulation blankets (Ref. Fig.302).
- D. Inspect for signs of external oil leakage at LP signal system operating lever location in rear cover assembly and record findings (Ref. Fig.302).
- E. Inspect seal carriers removed from vane locations 2, 4 and 7 for wear (Ref. 72-52-03, Fits and Clearances, Fig.602, locations AA, AB and AE). Record amount of wear (Ref. Fig.302).
- F. Inspect cold vent tube outer spherical location for wear (Ref. 72-53-00/601-250, Fits and Clearances). Record the amount of wear (Ref. Fig.302).

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4. Additional Inspection if Heavy Coking is Found

A. Measure and record dimensions at the following locations (Ref. Table 301).

- (1) Outer air duct in cover unit (Ref. 72-51-01/602-234, Fits and Clearances).
- (2) Duct assembly in elbow (Ref. 72-51-01/601-255, Fits and Clearances).
- (3) Labyrinths 13 to 22 (Ref. 72-51-01, 72-51-02, Fits and Clearances).
- (4) No.12 labyrinth (Ref. 72-33-00/601-127 to 601-132, Fits and Clearances).

B. Inspect HP diffuser case for wear in the bore of coupling assembly locations at vanes 3, 4 and 5 (Ref. 72-51-01, Fits and Clearances, Fig.601, locations AD, AE and AF). Measure and record the amount of fretting/wear caused by the piston rings (Ref. Table 301).

5. Service Bulletin Status

A. Record Service Bulletin embodiment status at time of inspection (Ref. Table 302).

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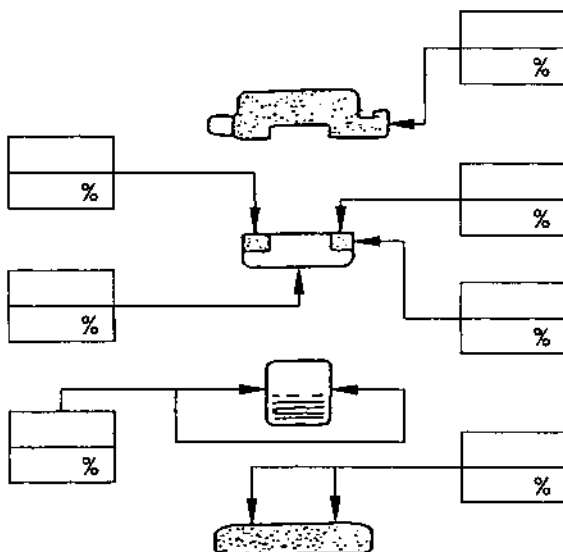


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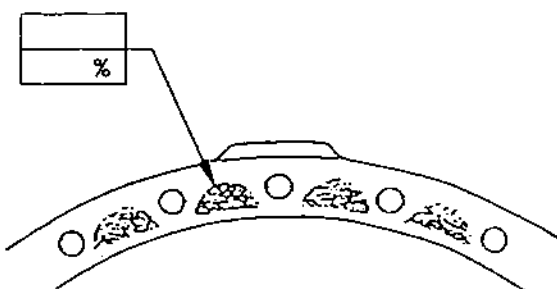
BS00025439/1

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TSN (hrs/cyos) :	
TSRef / Repair :	

ENGINE NO :	
DATE :	

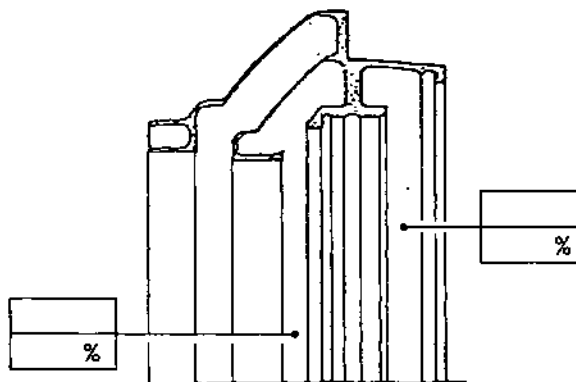
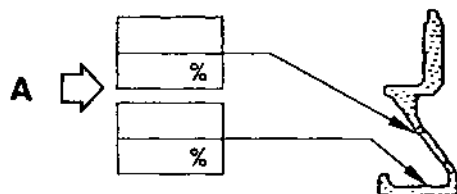


HP TURBINE BEARING



A

NO. 16 LABYRINTH RING



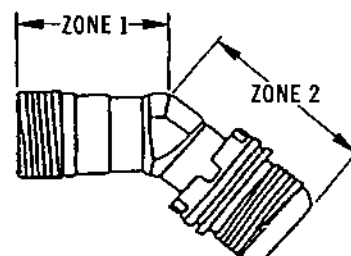
HP TURBINE BEARING HOUSING

KEY

1. ROUGH CARBON
2. LACQUER
3. TAN DISCOLOURATION
- A. LESS THAN 0.005 (0,13) DEPTH
- B. 0.005-0.025 (0,13-0,64) DEPTH
- C. MORE THAN 0.025 (0,64) DEPTH

EXAMPLE

2A
50%



OIL ELBOW	ZONE 1	ZONE 2
FEED		
SCAVENGE		

OIL INLET AND OUTLET ELBOWS

Inspection for Oil Coking and Lacquering - HP Turbine Bearing
Figure 301 (Sheet 1 of 2)

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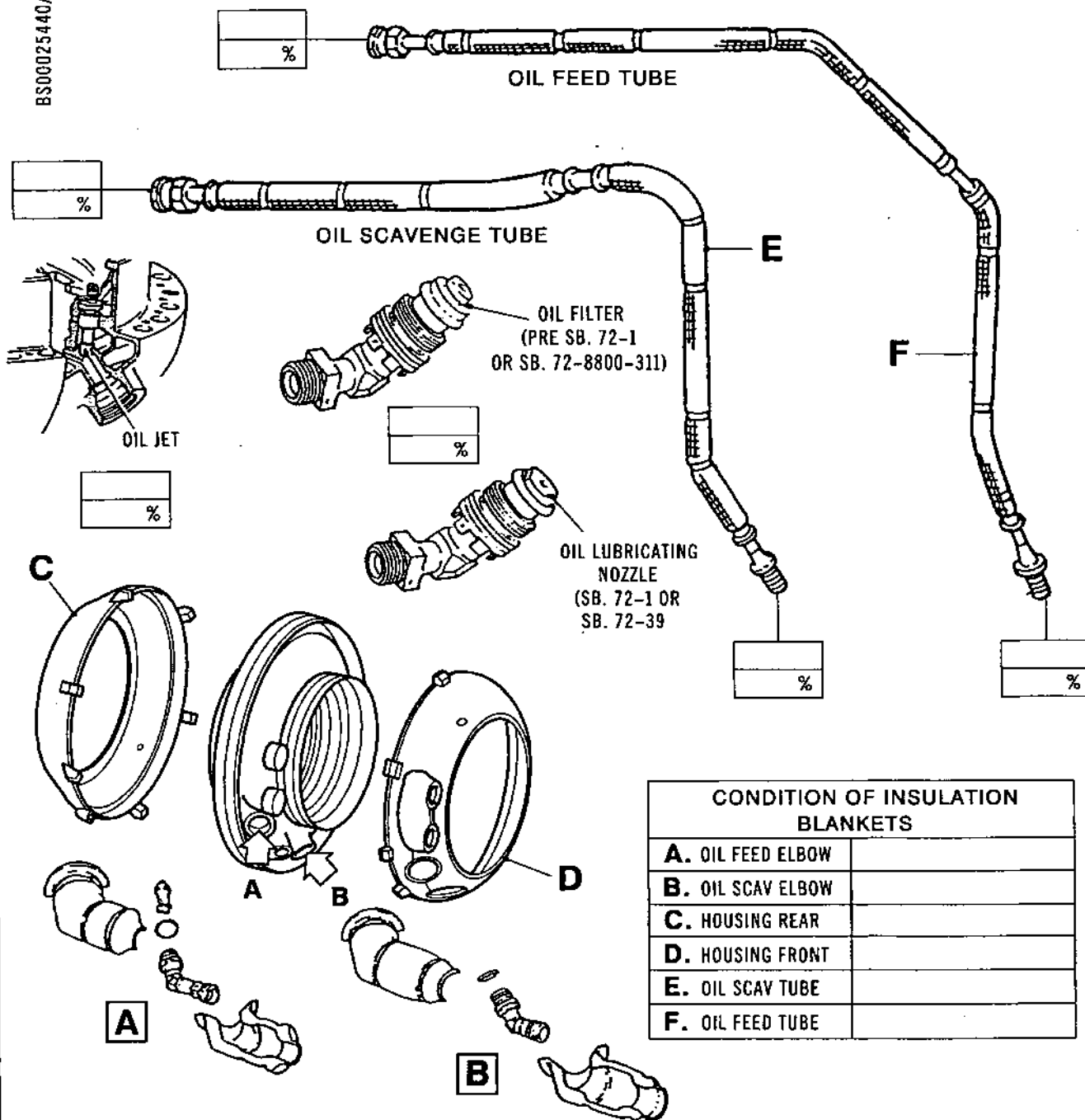


SNECMA

ENGINE NO :

DATE :

BS00025440/1



Inspection for Oil Coking and Lacquering - HP Turbine Bearing
Figure 301 (Sheet 2 of 2)

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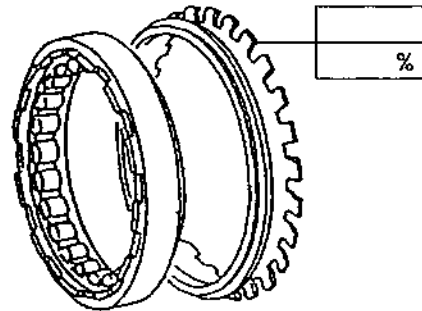
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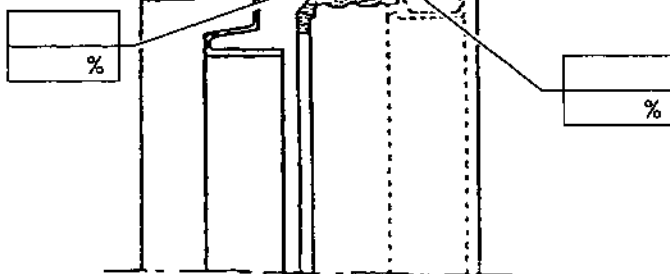
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TSN (hrs/cycs) :	
TSRef / Repair :	

ENGINE NO :	
DATE :	

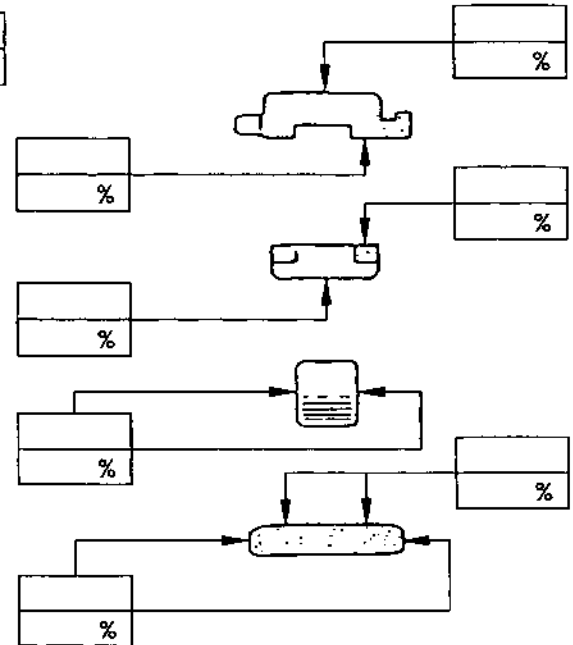
BS00025441/1



RETAINING RING



LP TURBINE BEARING HOUSING



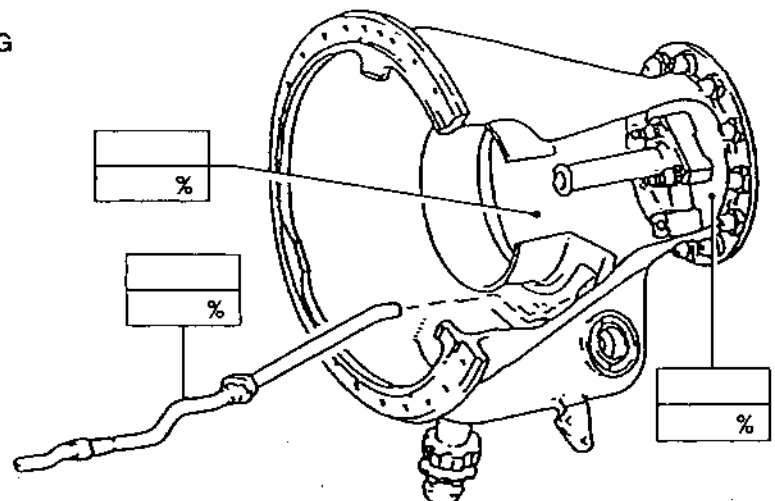
LP TURBINE BEARING

KEY

1. ROUGH CARBON
2. LACQUER
3. TAN DISCOLOURATION
- A. LESS THAN 0.005 (0,13) DEPTH
- B. 0.005-0.025 (0,13-0,64) DEPTH
- C. MORE THAN 0.025 (0,64) DEPTH

EXAMPLE

2A
50%



LP TURBINE BEARING REAR COVER ASSEMBLY

Inspection for Oil Coking and Lacquering - LP Turbine Bearing
Figure 302 (Sheet 1 of 3)

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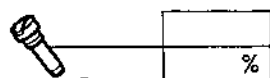
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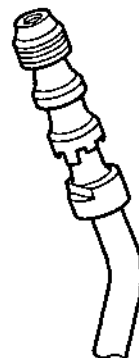
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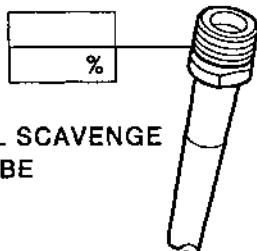
ENGINE NO :	
DATE :	



VENT TUBE



OIL SCAVENGE
TUBE

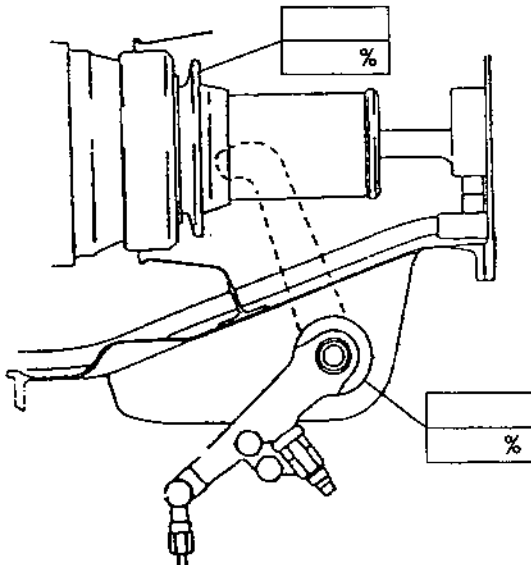
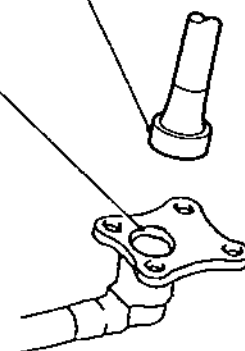
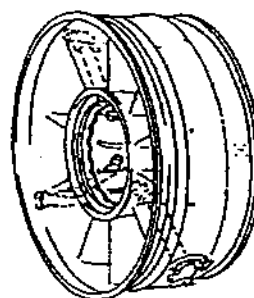
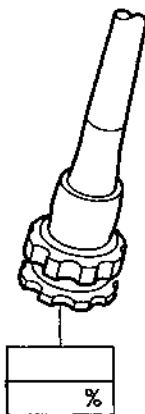
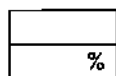


SPHERICAL WEAR	
DEPTH	
ARC	

SOCKET WEAR	
DEPTH	
ARC	

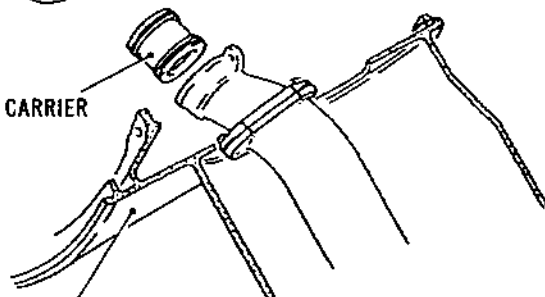
BS00025442/1

OIL FEED
TUBE



LP SHAFT SIGNAL GENERATING MECHANISM

SEAL CARRIER



INNER CASE

SEAL CARRIERS IN DUCT ASSEMBLY

VANE POSN	WEAR ON SEAL CARRIER AND DUCT			
	SEAL CARRIER		DUCT BORE	
	DEPTH	ARC	DEPTH	ARC
2				
4				
7				

Inspection for Oil Coking and Lacquering - HP Turbine Bearing
Figure 302 (Sheet 2 of 3)

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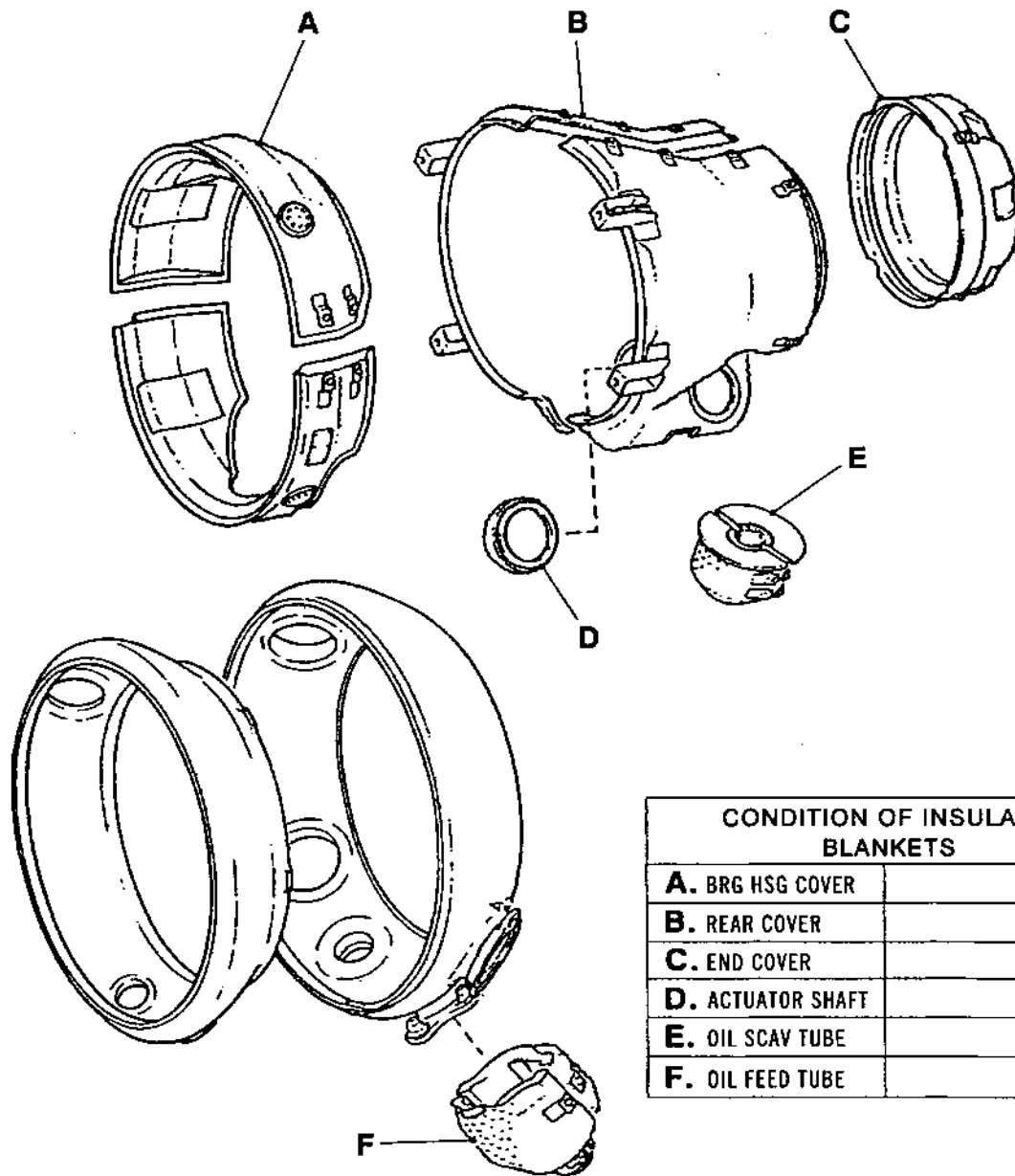
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ENGINE NO :	
DATE :	



CONDITION OF INSULATION BLANKETS	
A. BRG HSG COVER	
B. REAR COVER	
C. END COVER	
D. ACTUATOR SHAFT	
E. OIL SCAV TUBE	
F. OIL FEED TUBE	

Inspection for Oil Coking and Lacquering - LP Turbine Bearing
Figure 302 (Sheet 3 of 3)

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ENGINE NO :

DATE :

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72-33-00	ROTATING	12 LAB	72-34-00	STATIC	NO. 12 LABYRINTH		
DIMS NEW & (WORN)	ACTUAL DIMENSION	FCS REF	DIMS NEW & (WORN)	ACTUAL DIMENSION	CLEARANCE NEW (WORN)	ACTUAL CLEARANCE	VARIATION FROM MIN.
22.2450 22.2500 (22.2410)		601-127 STN 2	22.3120 22.3170 (22.3180)		0.0620 0.0720 (0.0770)		
21.8150 21.8200 (21.8100)		601-128 STN 3	21.9000 21.9050 (21.9050)		0.0800 0.0900 (0.0950)		
21.3750 21.3800 (21.3700)		601-129 STN 4	21.4600 21.4650 (21.4650)		0.0800 0.0900 (0.0950)		
20.9290 20.9340 (20.9240)		601-130 STN 5	21.0140 21.0190 (21.0190)		0.0800 0.0900 (0.0950)		
20.4800 20.4850 (20.4750)		601-131 STN 6	20.5650 20.5700 (20.5700)		0.0800 0.0900 (0.0950)		
20.0320 20.0370 (20.0270)		601-132 STN 7	20.1170 20.1220 (20.1220)		0.0800 0.0900 (0.0950)		

72-51-01/2	ROTATING	HPT BRG	72-51-01	STATIC	HP TURBINE BEARING SUPPORT		
DIMS NEW & (WORN)	ACTUAL DIMENSION	FCS REF	DIMS NEW & (WORN)	ACTUAL DIMENSION	CLEARANCE NEW (WORN)	ACTUAL CLEARANCE	VARIATION FROM MIN.
8.6990 8.7000 (8.6930)		602-192 13 LAB	8.7200 8.7230 (8.7290)		0.0200 0.0240 (0.0360)		
7.7990 7.8000 (7.7930)		602-193 14 LAB	7.8200 7.8230 (7.8290)		0.0200 0.0240 (0.0360)		
7.3990 7.4000 (7.3980)		602-194 15 LAB	7.4200 7.4230 (7.4240)		0.0200 0.0240 (0.0260)		
7.4000 7.4010 (7.3980)		602-199 16 LAB	7.4200 7.4230 (7.4240)		0.0190 0.0230 (0.0260)		
7.7990 7.8000 (7.7930)		602-200 17 LAB	7.8240 7.8270 (7.8330)		0.0240 0.0280 (0.0400)		
8.2990 8.3000 (8.2930)		602-201 18 LAB	8.3240 8.3270 (8.3330)		0.0240 0.0280 (0.0400)		
9.1990 9.2000 (9.1940)		601-203 19 LAB	9.2280 9.2300 (9.2340)		0.0280 0.0310 (0.0400)		
10.1590 10.1600 (10.1540)		601-204 20 LAB	10.1880 10.1900 (10.1940)		0.0280 0.0310 (0.0400)		
11.1190 11.1200 (11.1140)		601-208 21 LAB	11.1480 11.1500 (11.1540)		0.0280 0.0310 (0.0400)		
12.0790 12.0800 (12.0740)		601-209 22 LAB	12.1080 12.1100 (12.1140)		0.0280 0.0310 (0.0400)		

Inspection for Oil Coking and Lacquering - Dimensional Checks
Table 301 (continued)

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ENGINE NO :	
DATE :	

72-51-01 DIMS NEW & (WORN)	DIAMETER ACTUAL DIMENSION	BRG HSG FCS REF	72-51-01 DIMS NEW & (WORN)	BORE ACTUAL DIMENSIONS	CLEARANCE NEW (WORN)	HP TURBINE BEARING SUPPORT ACTUAL CLEARANCE	VARIATION FROM MIN.
14.6486 14.6500 (14.6480)		602-234 AIR DUCT	14.6500 14.6514 (14.6520)		0.0000 0.0028 (0.0040)		
1.3740 1.3746 (1.3737)		602-255 DUCT ELBOW	1.3750 1.3760 (1.3762)		0.0004 0.0020 (0.0025)		

72-51-01 DIMENSION NEW	BORE ACTUAL DIMENSION	HPC DIFF FCS REF	DEPTH OF FRETTING	* ARC AFFECTED	HP DIFFUSER CASE SEAL HOUSING (VANES 3, 4 & 5)
VANE 4 4.2500 4.2520		601-181 SEAL HSG AE			
VANE 3 4.0000 4.0020		601-183 SEAL HSG AD			
VANE 5 4.0000 4.0020		601-189 SEAL HSG AF			

Inspection for Oil Coking and Lacquering - Dimensional Checks
Table 301 (concluded)

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MODULE M06 SERVICE BULLETIN	DESCRIPTION	EMBODIED YES/NO
72-7650-20	Improved insulation blankets	
72-7790-84	Revised insulation material	
72-8627-209	Deletion of inner air duct	
72-8375-222	Anti-fretting treatment on air tube spherical ends	
72-8758-299	Flame plated spigot on outer air duct	
72-8800-311	Increased oil flow to No.4 bearing and new blankets	

MODULE M12 SERVICE BULLETIN	DESCRIPTION	EMBODIED YES/NO
72-7650-20	Improved insulation blankets	
72-7871-40	No.5 bearing oil feed orifices increased in size	

Inspection for Oil Coking and Lacquering - Service Bulletin Status
Table 302

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APPENDIX S8

INSPECTION OF MAJOR COMPONENTS FOUND CRACKED
FOLLOWING ENGINE FAILURE IN SERVICE

1. Procedure

If, during routine inspection following a major in-service engine failure, a major component and/or attaching part(s) are found cracked, the relevant local Inspection Authority and the Olympus Project Office, Rolls-Royce plc should be contacted for advice regarding the need for additional inspections on related components.

Contact address: Olympus Project Office, WH61,
Rolls-Royce plc,
P.O. Box 3,
Filton,
Bristol,
England

Contact Olympus Project Office or the local Rolls-Royce plc Representative for confirmation of despatch address for parts returned to Rolls-Royce plc for defect investigation.

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APPENDIX S9INSPECTION OF AIR DRIVEN ACCESSORIES/AIR
CONTROL SYSTEMS FOLLOWING ENGINE FAILURE1. General.

- A. This appendix details the Disassembly, Cleaning and Inspection/Check procedures to be applied when engine failure has resulted in contamination of the external air system.

2. Disassembly, Cleaning and Inspection/Check Requirement when
Engine Failure has led to LP and HP Compressor Damage.

A. Second Stage Pump.

- (1) Disassemble the Second Stage Pump as per vendors Overhaul Manual (Ref.73-11-02, Disassembly).
- (2) Clean the Second Stage Pump as per vendors Overhaul Manual (Ref.73-11-02, Cleaning).
- (3) Carry out Inspection/Check of Second Stage Pump as per vendors Overhaul Manual (Ref.73-11-02, Inspection/Check).

B. Fuel Heater.

- (1) Disassemble the Fuel Heater as per vendors Overhaul Manual (Ref.73-10-03, Disassembly).
- (2) Clean the Fuel Heater as per vendors Overhaul Manual (Ref.73-10-02, Cleaning).
- (3) Carry out Inspection/Check of the Fuel Heater as per vendors Overhaul Manual (Ref.73-10-03, Inspection/Check).

C. Fuel Heater Valve.

- (1) Disassemble the Fuel Heater Valve as per vendors Overhaul Manual (Ref.73-10-03, Disassembly).
- (2) Clean the Fuel Heater Valve as per vendors Overhaul Manual (Ref.73-10-03, Cleaning).
- (3) Carry out Inspection/Check of the Fuel Heater Valve as per vendors Overhaul Manual (Ref.73-10-03, Inspection/Check).

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D. Anti-Icing Valve.

- (1) Disassemble the Anti-Icing Valve as per vendors Overhaul Manual (Ref.75-10-03, Disassembly).
- (2) Clean the Anti-Icing Valve as per vendors Overhaul Manual (Ref.75-10-03, Cleaning).
- (3) Carry out Inspection/Check of the Anti-Icing Valve as per vendors Overhaul Manual (Ref.75-10-03, Inspection/Check).

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APPENDIX S10

INSPECTION OF ENGINE FOLLOWING INTERNAL
CONTAMINATION BY DRY POWDER FIRE EXTINGUISHANT

1. General.

- A. This appendix details the essential procedures to be applied following internal contamination by Dry Powder fire extinguishant.
- B. Although this appendix relates to disassembly and cleaning procedures, reference is made to inspection/check and the appendix is therefore included in this section for information.
- C. Contamination by this substance into a running or hot engine can lead to the following:
 - (1) Fused/glacéous deposits, this could be apparent in the hotter combustor/turbine regions.
 - (2) Material attack of light alloys/steels etc. if the residue powder is allowed to become wet.
 - (3) Physical blockage/contamination due to powder entrapment.
 - (4) Oil system sludging/blockage due to fine powder contamination.

2. Remove Modules and Air Driven Accessories/Air Control Systems for Disassembly, Cleaning and Inspection/Check Purposes

- A. Strip, clean and inspect/check all modules in accordance with the existing procedures.
- B. Strip, clean and inspect/check oil system in accordance with the existing procedures.



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C. Strip, clean and inspect the following in accordance with the existing procedures in the relevant Venders Overhaul Manual.

- (1) Second Stage Pump.
- (2) Fuel Heater.
- (3) Fuel Heater Valve.
- (4) Anti-Icing Valve.

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ENGINE LUBRICATION SYSTEM - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

(1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

No current requirement

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

302	10	Filter	FlA
302	40	Blanking Ferrule	FlA
302	50	Filter	FlA
303	270	Tube	FlA
304	70	Tube	FlA
304	80	Tube	FlA
304	240	Tube	FlA
305	150	Tube	FlA
305	250	Tube	FlA
306	70	Tube	FlA
306	330	Tube	FlA
307	230	Tube	FlA
307	280	Elbow	FlA
308	80	Blank	FlA
308	160	Tube	FlA
308	240	Tube	FlA
308	260	Flange Assembly	FlA

Items to be Fluorescent Dye Crack Tested
Table 302 (Continued)

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FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
309	50	Blank	FlA
309	60	Tube	FlA
310	100	Blank	FlA
310	110	Tube	FlA
310	350	Tube	FlA
311	10	Tube	FlA
311	90	Tube	FlA

Items to be Fluorescent Dye Crack Tested
Table 302 (Concluded)

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No current requirement

TN28109

Crack Detection Test Diagram
Figure 301

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FIG. NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-01-01	Fig.1
303	72-01-03	Fig.1
304	72-01-03	Fig.2
305	72-01-03	Fig.3
306	72-01-03	Fig.4
307	72-01-03	Fig.5
308	72-01-04	Fig.1
309	72-01-04	Fig.2
310	72-01-04	Fig.3
311	72-01-04	Fig.4

Cross References to Illustrated Parts Catalogue
Table 303

4. Filter Assemblies (302-10/50)

A. Inspect Screen.

- | | |
|---|---------|
| (1) Punctures, tears or separation from cage. | Reject. |
|---|---------|

B. Inspect Cage.

- | | |
|---|---|
| (1) Cracks and distortion. | Reject. |
| (2) Nicks and burrs. | Accept, if sealing capability is unimpaired after repair. |
| (3) Scores. | |
| (a) Not more than 0.005 in. (0,130 mm) deep at sealing faces and not extending more than half-way across face. | Accept, if sealing capability is unimpaired after repair. |
| (b) Not more than 0.010 in. (0,250 mm) deep at contact faces, but not extending more than half-way across face. | Accept, if sealing capability is unimpaired after repair. |

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- (c) Not more than 0.005 in.
(0,130 mm) deep, regardless
of extent.

Accept, if sealing
capability is
unimpaired after
repair.

(4) Wear and fretting.

- (a) Contact faces worn;
sealing capability
unimpaired.

Accept.

C. Inspect Jet Bores (302-10 only).

NOTE: This is a multi-jet unit.

CAUTION: DO NOT PROBE THE JET ORIFICES WITH HARD OBJECTS,
DAMAGE MAY RESULT AND GIVE INCORRECT FLOW.

- (1) Check for damage to jet bores and outlets, using
magnifier.

- (a) Any damage, other than
minor scratches in bores.

Accept, if flow
check satisfactory
after repair (Ref.
72-01-00 Testing).

- (b) No damage, other than
minor scratches in bores.

Accept.

- (2) Check for obstruction.

- (a) Obstructed.

Reject for cleaning
and investigation
(Ref.72-01-00
Testing).

5. Tube Assemblies (303-270, 304-70/80/240, 305-150/250,
306-70/330, 307-230, 308-160/240, 309-60, 310-110/350 and
311-10/90)

- A. Inspect Tubes (Ref.72-09-00, Inspection/Check).

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B. Inspect Joint and Thermometer Flange Abutment Faces.

(1) Scores.

- (a) Not more than 0.010 in.
(0,250 mm) deep, and not
extending more than
half-way across face.

Accept, if repair
preserves surface
flatness and
sealing capability
and is within 5 per
cent of flange
thickness.

(2) Nicks and burrs.

Accept, if repair
preserves surface
flatness and
sealing capability
and is within 5 per
cent of flange
thickness.

C. Inspect Bolt Locations.

(1) Wear and fretting.

- (a) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

D. Inspect Thread Inserts (Ref.72-09-00, Inspection/Check).

E. Inspect Bracket Mounting Flange (308-240).

(1) Nicks and burrs.

Accept after
repair.

(2) Wear and fretting.

- (a) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.



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6. Elbow (307-280), Flange Assembly (308-260) and Blanks (308-80, 309-50 and 310-100)

A. Inspect Abutment Faces.

(1) Scores.

- (a) Less than 0.010 in.
(0,250 mm) deep, and not
extending more than
half-way across face.

Accept if repair
preserves surface
flatness and
sealing capability
and is within 5 per
cent of flange
thickness.

(2) Nicks and burrs.

Accept, if repair
preserves surface
flatness and
sealing capability
and is within 5 per
cent of flange
thickness.

B. Inspect Bolt Locations.

(1) Wear and fretting.

- (a) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

7. Blanking Ferrule (302-40)

A. Inspect Spherical Face.

(1) Nicks, burrs and scores.

Accept, if repair
preserves sealing
capability.

B. Inspect Retaining Ring Location.

(1) Nicks and burrs.

Accept after
repair.

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8. Brackets (308-70/230/300, 309-30/110 and 310-380)

A. Inspect Brackets.

(1) Wear and fretting.

(a) Attachment face thickness not reduced more than 10 per cent. Accept.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

(2) Scoring.

(a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing material thickness is not reduced by more than 10 per cent.

(3) Nicks and burrs. Accept after repair.

(4) Distortion. Accept if compatibility is preserved.

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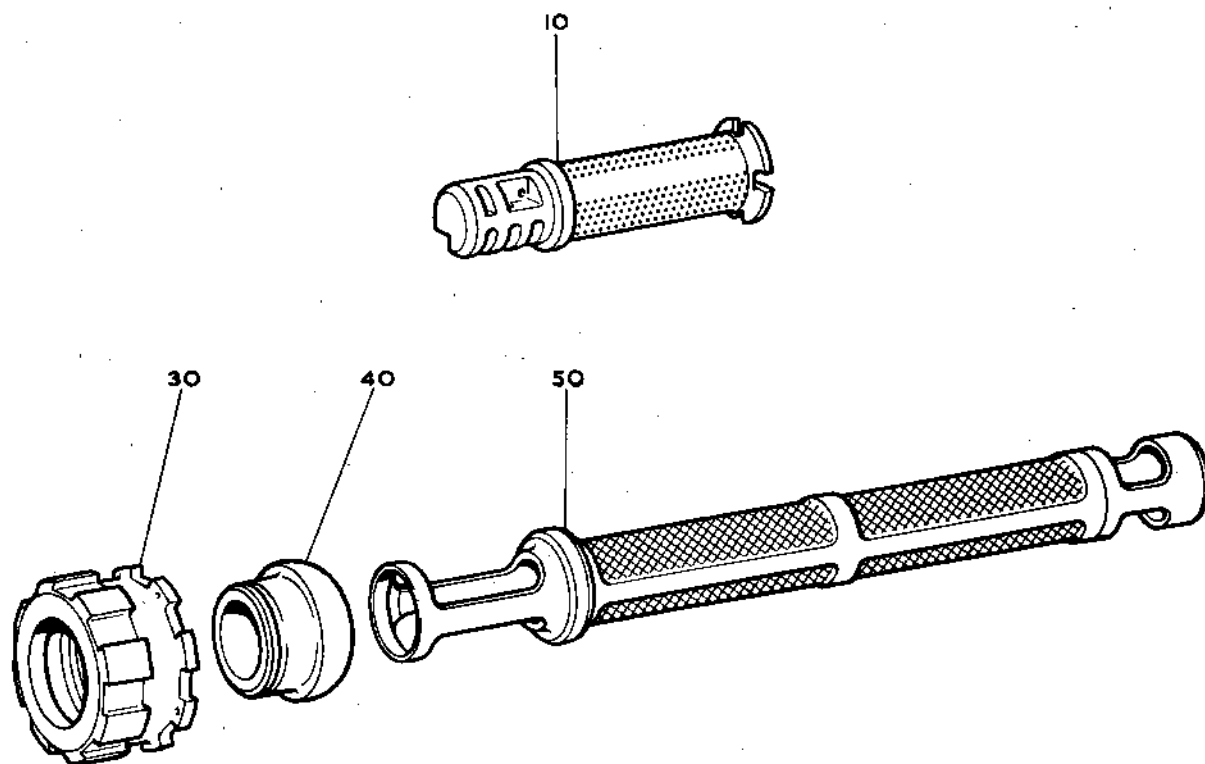
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TN17009

Engine Lubrication System Filters
Figure 302

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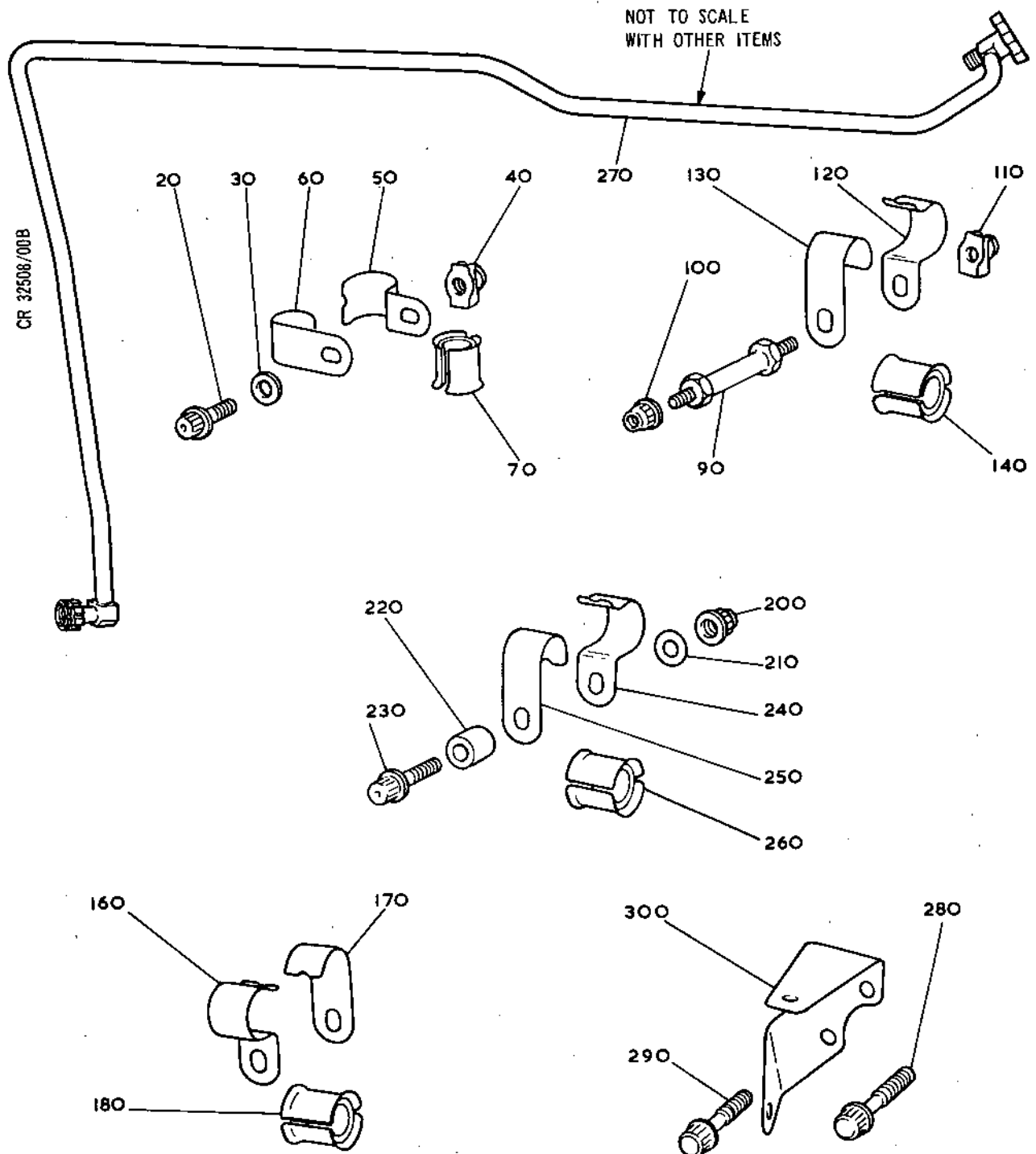


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TN17010

Oil Feed Tubes, Pump to LP Compressor Front Bearing
Figure 303

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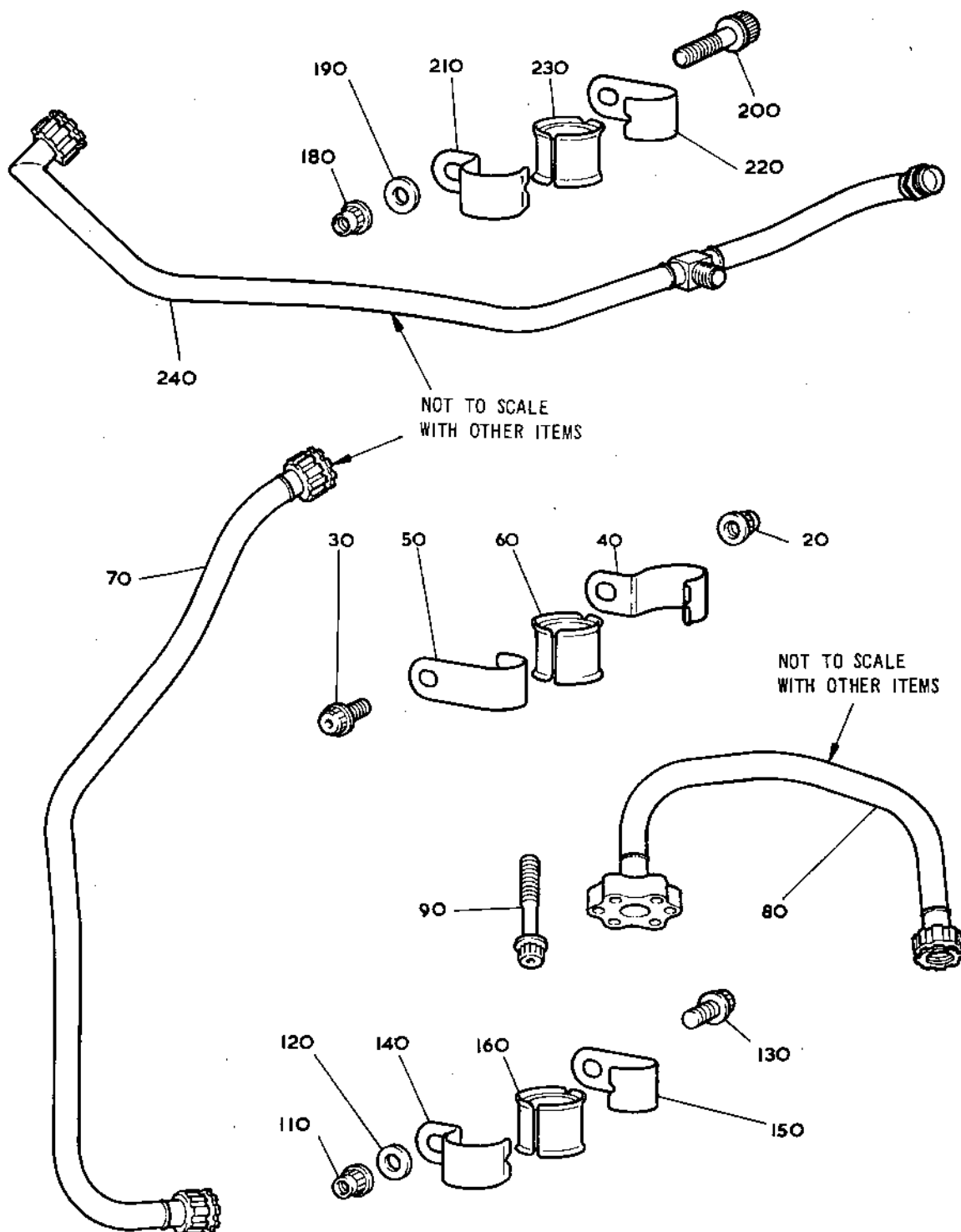
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CR 32509/008



Oil Feed Tubes, Pump to LP and HP Compressor
Thrust and Accessory Oil Pump Bearings
Figure 304

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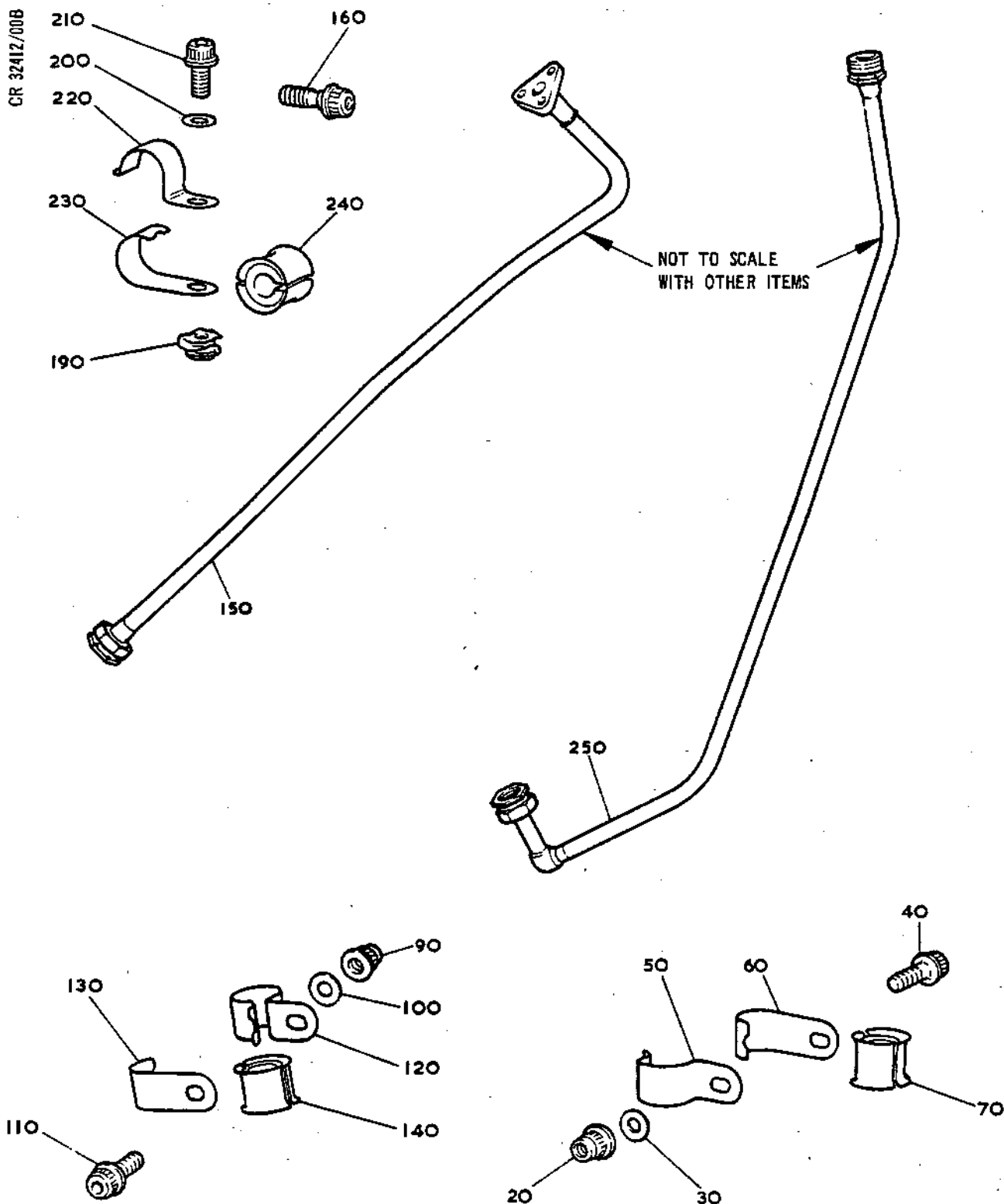
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Oil Feed Tubes, Pump to LP and HP Compressor
Thrust Bearing Oil Failure Warning Light
Figure 305

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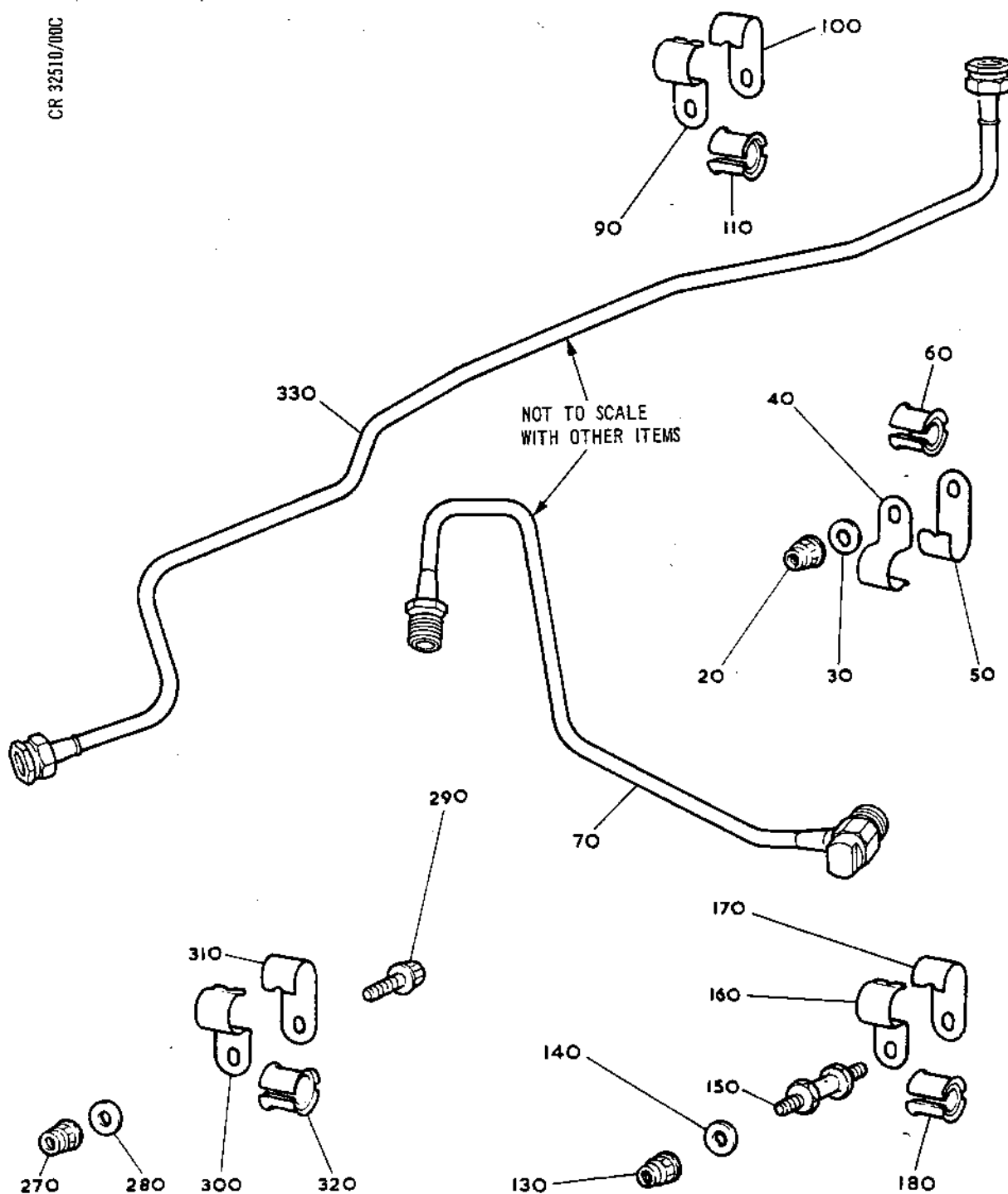


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CR 32510/00C



Oil Feed Tubes, Pump to LP Turbine Bearing
Figure 306

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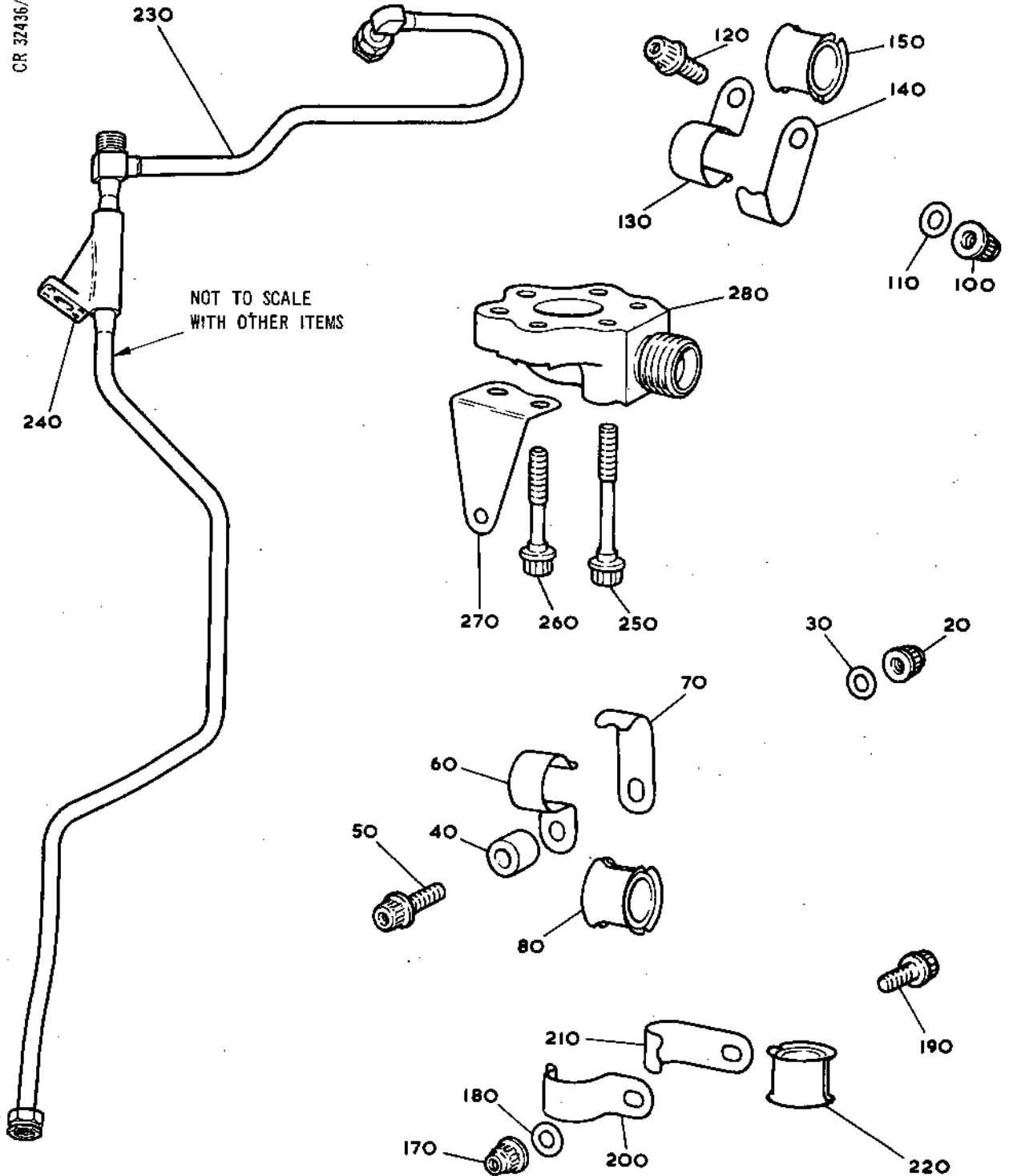
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CR 32436/00B



Oil Feed Tubes, Pump to HP and LP Turbine Bearings
Figure 307

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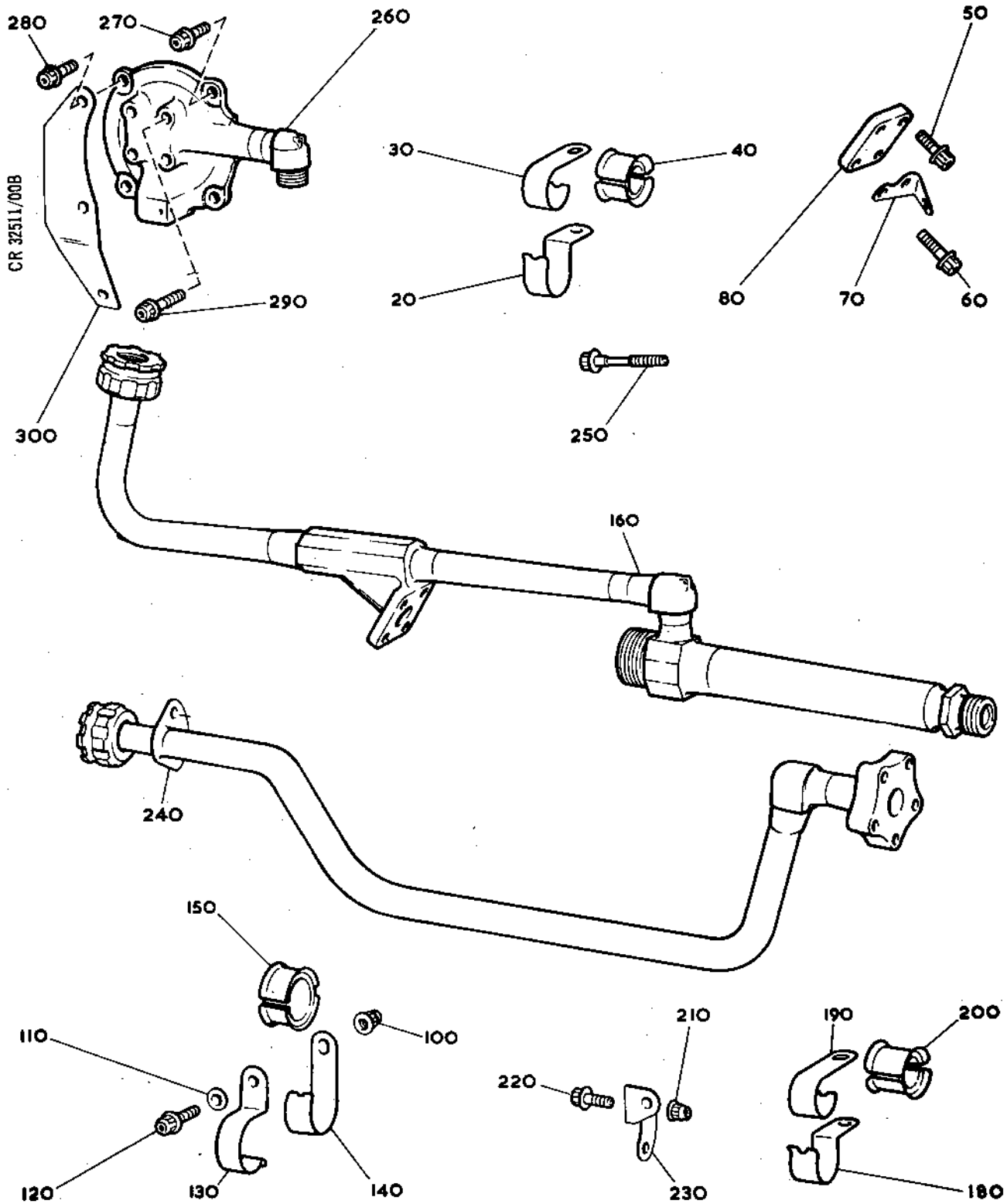
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Oil Scavenge Tubes, LP Compressor Front Bearing to Pump
Figure 308

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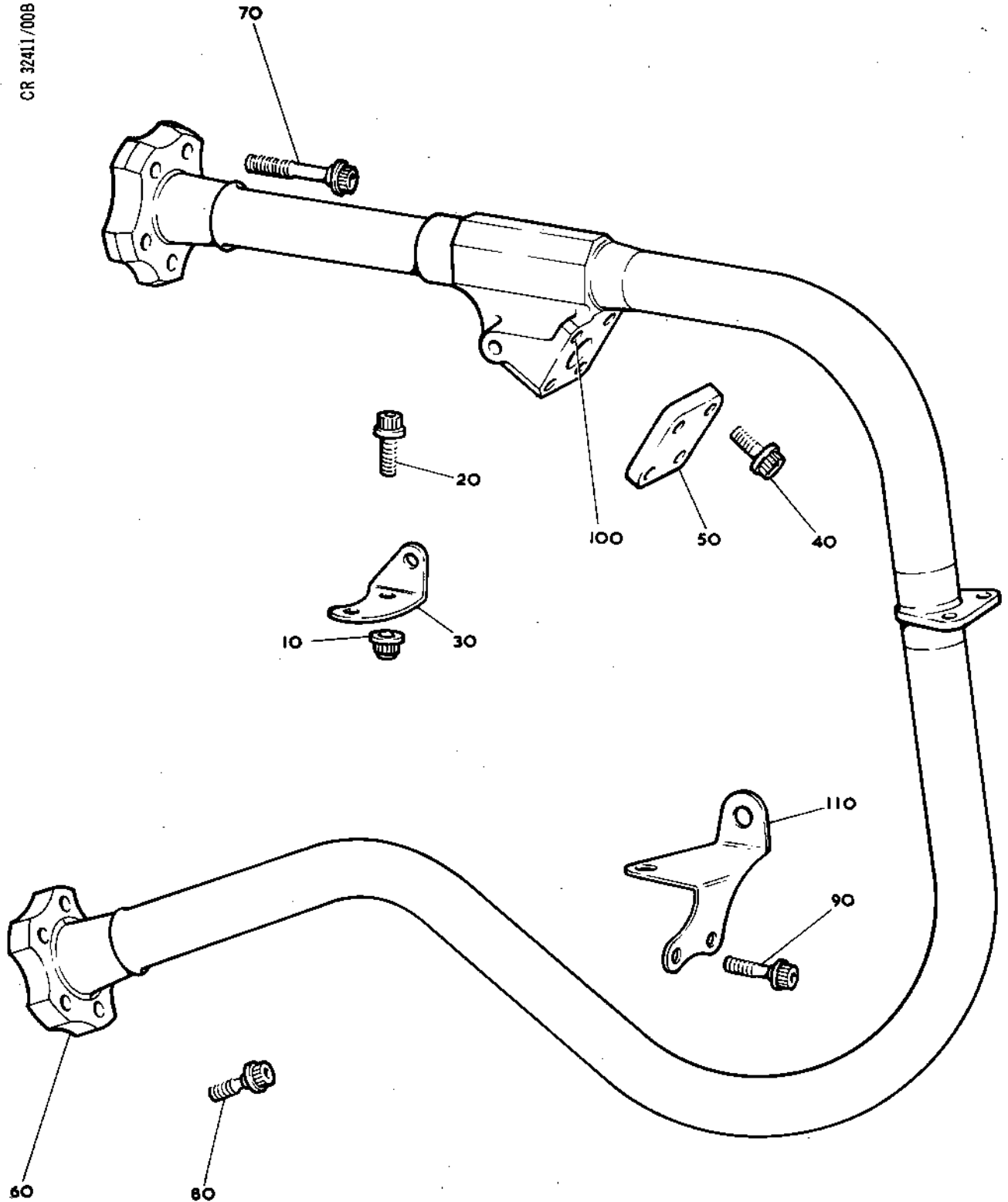
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Oil Scavenge Tubes, LP and HP Compressor Thrust
Bearing to Pump
Figure 309

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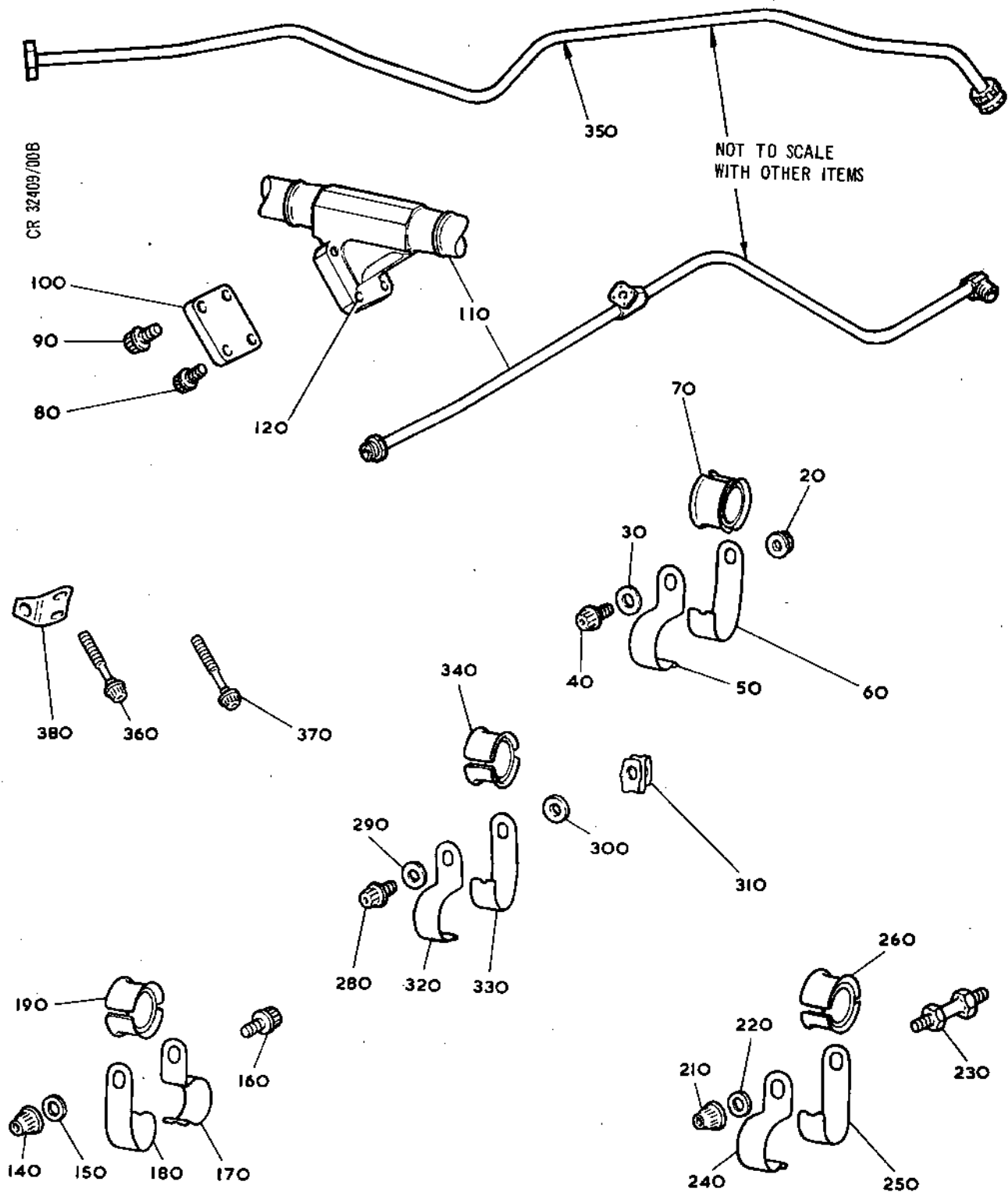
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Oil Scavenge Tubes, LP Turbine Bearing to Pump
Figure 310

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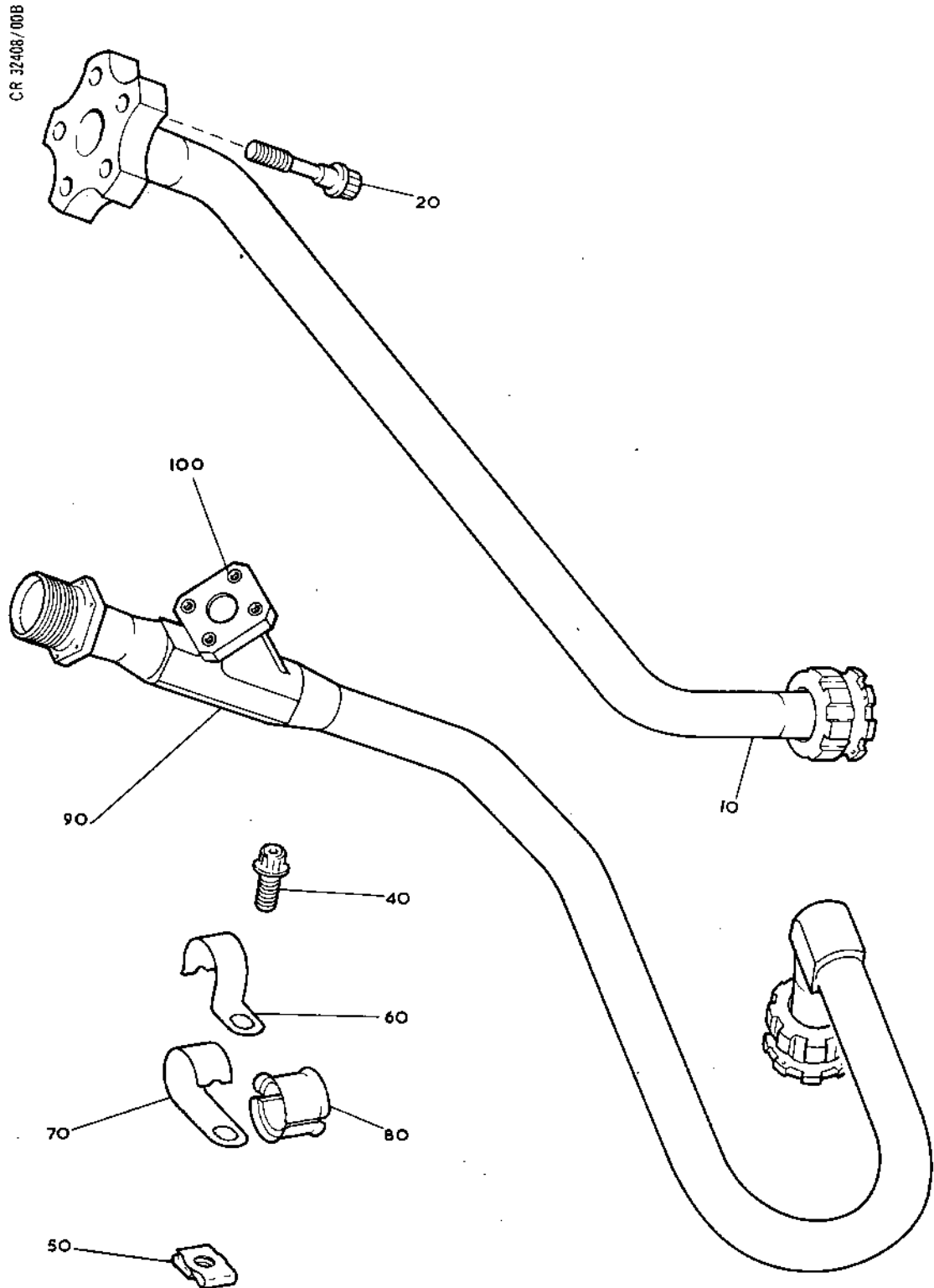
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Oil Scavenge Tubes, HP Turbine Bearing to Pump
Figure 311

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ENGINE LUBRICATION SYSTEM, FILTERS - INSPECTION/CHECK

For information on the inspection/check of the Engine Lubrication System, Filters, refer to 72-01-00 Inspection/Check.

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TUBES - OIL FEED, PUMP TO BEARINGS - INSPECTION/CHECK

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For information on the inspection/check of the Tubes - Oil
Feed, Pump to Bearings, refer to 72-01-00 Inspection/Check.

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TUBES - OIL SCAVENGE, BEARINGS TO PUMP - INSPECTION/CHECK

For information on the inspection/check of the Tubes - Oil
Scavenge, Bearings to Pump, refer to 72-01-00 Inspection/Check.

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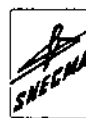
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STANDARD PRACTICES - INSPECTION/CHECK

1. General

- A. Inspection comprises general inspection and special inspection checks. General inspection consists of visual examination of components for condition and dimensional checking of components for wear and/or distortion. Special inspection checks are detailed in the Chapter applicable to the assembly concerned.
- AA. If a component(s) that is being inspected has come from an engine/module which has suffered a major in service failure and is found to be cracked, report the findings to the local Inspection Authority or CESO Service Centre since additional inspection on related components may now be required. Similarly, if a major component or attaching part(s) are found to be cracked during normal overhaul, then the Inspection Authority or CESO Service Centre should be contacted for similar advice before proceeding.
- B. An Inspection Report shall be provided for each assembly. Each report shall provide for the following information to be recorded and countersigned where required:
- (1) All component identification and code numbers.
 - (2) All reconditioning requirements, including blending and polishing.
 - (3) The results of crack detection tests.
 - (4) Satisfactory completion of all dimensional checks.
 - (5) Satisfactory completion of all pressure tests.
 - (6) Embodiment of all mandatory modifications.
 - (7) All reconditioning has been effected within the repair limits given in the Chapter applicable to the assembly concerned.
 - (8) Satisfactory completion of general inspection.
- C. The Inspection Reports will therefore provide a complete history of the assemblies during overhaul.

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sneema

CAUTION: TO ENSURE ADEQUATE INSPECTION OF GROUP A ROTATING COMPONENTS. IT IS IMPORTANT DURING THE OVERALL VISUAL EXAMINATION THAT SPECIAL ATTENTION IS ALSO PAID TO DEFINED CRITICAL AREAS. THE CRITICAL AREAS OF SPECIFIED COMPONENTS ARE IDENTIFIED IN THE RELEVANT CHAPTER.

- D. All components must be visually examined for general condition to ensure that they are satisfactory for a further engine or module life. Refer to Table 321 for inspection terminology used throughout the inspection/check procedures and the definition of all types of defects that may be encountered, and for which all components must be examined as appropriate.
- E. When the inspection of a component discloses a minor defect that requires rectification, it is defined throughout the inspection/check procedures as 'Accept after repair'. On all such occasions the component must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref. No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified.
- F. Components that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair. But to prevent the re-use of rejected components, they should be clearly identified by temporary markings (Ref.para.3.), distinctive colours being used to denote components which are to be scrapped, held for possible repair, and those which are to be modified or salvaged.
- G. When dimensionally checking the inside diameters of parts not requiring a run-out measurement, a reading shall be taken at four equi-spaced locations and the results averaged to determine the measurement.
- H. Oil holes and passageways shall be examined to ensure that they are clean and unobstructed.
- J. If an obstructed oil passageway is found, the component(s) fed by that oil supply shall be examined for evidence of oil starvation.

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sneema

- K. Blanking plugs and union nuts which are not required to be removed for overhaul shall be checked for security and locking.
- L. Shims shall be examined for distortion and damage.
- M. Flanges and similar flat abutment faces shall be checked for bedding using a 0.0015 in. (0,040 mm) feeler gauge.
- N. Serrations and splines shall be examined for fretting and oxidation and their fit in mating components shall be checked.
- P. Gear teeth shall be examined on the driving and driven flanks for witness marks of incorrect running alignment.

NOTE: The backlash of mating gears is checked during assembly.

- Q. Protect components against corrosion after each operation, and place in containers for protection against damage during transit between operations (Ref.72-09-20 Repair).

2. Crack Detection

A. General.

- (1) Two methods of checking for cracks are recommended for use during overhaul of the engine, magnetic particle examination and fluorescent penetrant examination.

CAUTION: TO ENSURE ADEQUATE INSPECTION OF GROUP A ROTATING COMPONENTS, IT IS IMPORTANT DURING THE OVERALL CRACK DETECTION EXAMINATION THAT SPECIAL ATTENTION IS ALSO PAID TO DEFINED CRITICAL AREAS. THE CRITICAL AREAS OF SPECIFIED COMPONENTS ARE IDENTIFIED IN THE RELEVANT CHAPTER.

- (2) The method applicable to individual components is detailed in the Chapter applicable to the assembly concerned, and is dependent upon the material and configuration of the component. Some components require both methods to be applied.

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sneema

B. Magnetic Particle Examination.

- (1) It is assumed that the magnetic particle examination equipment in use is capable of accommodating each of the components to be examined and that the operator is fully conversant with its operation.

WARNING: WEAR P.V.C. GLOVES TO PROTECT HANDS FROM
DETECTOR FLUID. SKIN DISEASE MAY RESULT.

- (2) Components requiring magnetic particle examination are illustrated in their relevant Chapters in the form of diagrams showing the specific method and current values to be used. Interpretation of these diagrams is shown in Fig.301.
- (3) Each component is to be examined in accordance with Process MP1 (Ref.Table 302).



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- (4) Different types of magnetic particle inspection equipment in use have various types of current output, the amperages read from the equipment may not be the same meter scaling as those specified in this manual. The amperages quoted in this manual are Peak Amps and the relevant conversion factors for the type of magnetising current in use is tabulated in tables 303 and 304.
- (5) All components must be degreased using Triklone N only.

SEQUENCE	OPERATION	REMARKS
1	Clean to relevant Chapter.	-
2	Demagnetize.	-
3	Degrease.	Until clean.
4*	Carry out first magnetization sequence shown on diagram.	Refer to diagram for full details.
5	Examine.	Visual, use X2½ to X10 magnification for detailed examination.
6	Demagnetize.	-
7*	Repeat sequence 4, 5 and 6 for each magnetizing sequence shown on diagram.	-
8	Check for demagnetization using a calibrated instrument. Value to be less than <u>±3</u> oersteds.	Use portable field indicator.
9	Clean and protect as necessary.	-
* <u>NOTE</u> : Magnetic ink to be applied simultaneously with magnetization by pouring, spraying or immersion.		

Process MP1 - Magnetic Particle Examination
Table 302

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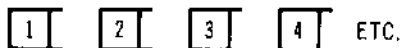
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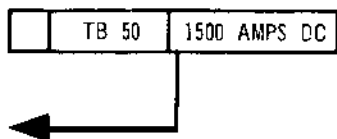
CR 32626.00B

SYMBOL

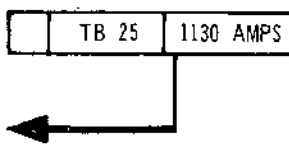
DEFINITION



MAGNETIZING SEQUENCE

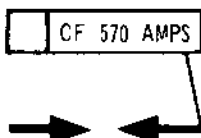


USING A CENTRALIZED THREADING
BAR OF THE SPECIFIED DIAMETER
IN MILLIMETRES AND SHOWING THE
DC OR PEAK CURRENT VALUE UTILIZED

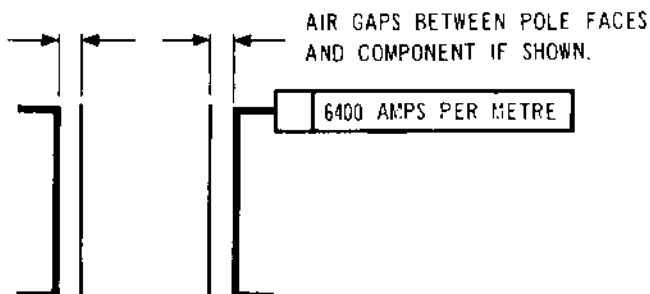


USING AN OFF CENTRE THREADING
BAR OF THE SPECIFIED DIAMETER
IN MILLIMETRES AND SHOWING THE
DC OR PEAK CURRENT VALUE UTILIZED

NOTE: THE COMPONENT IS TO BE ROTATED
THROUGH 360 DEGREES AROUND THE
THREADING BAR.



PASSING CURRENT THROUGH THE
PART. SHOWING THE DC OR
PEAK CURRENT VALUE UTILIZED.



BETWEEN POLE PIECES. SHOWING
THE MAGNETIC PEAK FIELD
VALUE (80 OERSTEDS)

NOTE: ALL VALUES SHOWN IN MAGNETIC PARTICLE EXAMINATION
DIAGRAMS ARE PEAK CURRENTS OR TANGENTIAL FIELD
STRENGTHS. SUITABLE CORRECTIONS FOR EQUIPMENT
INSTRUMENTATION MUST BE MADE WHERE NECESSARY.
ALL CURRENTS ARE AC UNLESS OTHERWISE STATED.

Key - Magnetic Particle Examination Diagrams
Figure 301 (Sheet 1 of 2)

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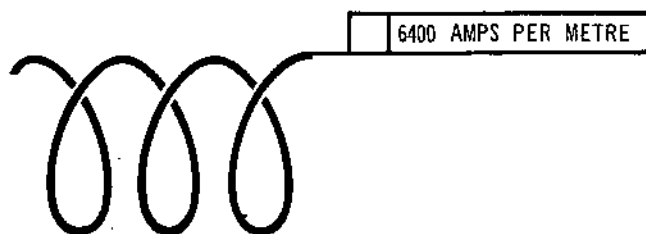
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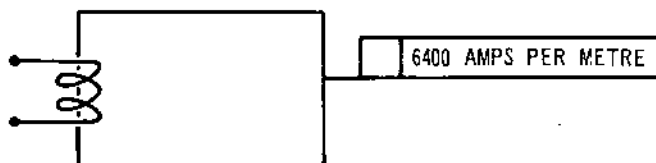
CR 32625/008

SYMBOL

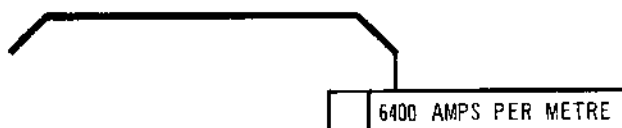
DEFINITION



COIL METHOD. SHOWING
THE MAGNETIC PEAK
FIELD VALUE (80 OERSTEDS)



CURRENT INDUCTION
METHOD SHOWING THE
MAGNETIC PEAK FIELD
VALUE (80 OERSTEDS)



PANCAKE COIL OR PLATE
METHOD WITH SWITCH IN
SECONDARY CIRCUIT
SHOWING THE MAGNETIC
PEAK FIELD VALUE (80 OERSTEDS)

NOTE: IF THE MAGNETIC PEAK
FIELD VALUE ONLY IS
SHOWN IT MUST BE USED
WITH THE RECOMMENDED
FIXTURE.



KNIFE METHOD. SHOWING
THE MAGNETIC PEAK
FIELD VALUE (80 OERSTEDS)

NOTE: THE COMPONENT IS TO BE ROTATED
THROUGH 360 DEGREES WITH CONTINUOUS
INKING AND MAGNETIZATION IN THE
KNIFE APERTURE.



COMPONENT TO BE ROTATED
THROUGH 360 DEGREES IN
ITS OWN PLANE

Key - Magnetic Particle Examination Diagrams
Figure 301 (Sheet 2 of 2)

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C. Fluorescent and Dye Penetrant Examination

- (1) It is assumed that the fluorescent penetrant examination equipment in use is capable of accommodating each of the components to be examined and that the operator is fully conversant with its operation.

WARNING: WEAR P.V.C. GLOVES TO PROTECT HANDS FROM PENETRANT FLUIDS. SKIN DISEASE MAY RESULT.

- (2) Approved penetrant systems are detailed in Table 303. In the table groups F1 and F2 correspond to ascending order of sensitivity. In each group sensitivity is considered to be approximately equivalent.
- (3) Penetrants in Process F1A are water washable, whereas penetrants in Process F2A are post emulsified.

GROUP	PROCESS	PENETRANT	REMOVER	DEVELOPER
F1	F1A	Ardrox 970P4	Water	Ardrox 9D3
		Ardrox 970PO	Water	Ardrox 9D3
		Zyglo ZL16	Water	Zyglo ZP4
		Zyglo ZL17B	Water	Zyglo ZP4
		Turco WP100	Water	Fluorocheck
F2	F2A	Ardrox 985P1	Water/Ardrox 9PR4*/Water	Ardrox 9D3
		Zyglo ZL2A	Water/Zyglo ZR1*/Water	Zyglo ZP4
		Ardrox 985P1	Water/Ardrox 9PR6+/Water	Ardrox 9D3
	F2A ALTERNATIVE	Ardrox 985P3	Ardrox 9PR4/Water	Ardrox 9D3
S3	S3B	Ardrox 996	Trichloroethylene vapour and/or liquid	Ardrox 9D2

NOTE: * Five per cent solution in water.
+ Ten per cent solution in water.
Group S3 - special requirements only.

Approved Penetrant Systems
Table 303

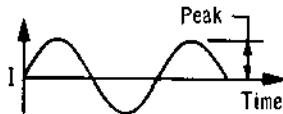
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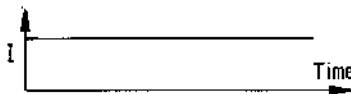
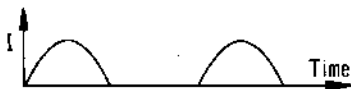
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Type of current	Type of field on the tangential field measuring instrument	Theoretical relationship between indicated reading and peak field.	Value * shown on TFS meter for a peak field of 6400 A/m (80 oe)
-----------------	--	--	---

Alternating current

RMS

H.Peak = $\sqrt{2}$ H
indicated4520 A/m
(56.5 oe)
(Ref.Table 310)Direct currentD.C.
FieldH.Peak = H
indicated6400 A/m
(80 oe)Half wave rectified

Average

H.Peak = $\frac{\pi}{2}$ H
indicated2032 A/m
(25.4 oe)
(Ref.Table 308)Full wave rectified

Average

H.Peak = $\frac{\pi}{2}$ H
indicated4064 A/m
(50.8 oe)
(Ref.Table 307)Three phase full wave rectified

Average

H.Peak = $\frac{\pi}{3}$ H
indicated6096 A/m
(76.2 oe)
(Ref.Table 309)

*These values are theoretical and do not allow for the factors relating to the characteristics of the measuring device which can be found by calibration, similarly this column applies to meters reading average fields and does not apply to equipment which measures directly peak amps.

NOTE: TFS = Tangential field strength meter.

Relationship Between Peak Field and Indicated Field (TFS)
Table 304

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Peak Amps.	0	10	20	30	40	50	60	70	80	90
100	71	78	85	92	99	106	113	120	127	134
200	141	148	156	163	170	177	184	191	198	205
300	212	219	226	233	240	247	255	262	269	276
400	283	290	297	304	311	318	325	332	339	346
500	354	361	368	375	382	389	396	403	410	417
600	424	431	438	445	452	460	467	474	481	488
700	495	502	509	516	523	530	537	544	551	559
800	566	573	580	587	594	601	608	615	622	629
900	636	643	650	658	665	672	679	686	693	700
1000	707	714	721	728	735	742	749	756	764	771
1100	778	785	792	799	806	813	820	827	834	841
1200	848	855	863	870	877	884	891	898	905	912
1300	919	926	933	940	947	954	962	969	976	983
1400	990	997	1004	1011	1018	1025	1032	1039	1046	1053
1500	1061	1068	1075	1082	1089	1096	1103	1110	1117	1124
1600	1131	1138	1145	1152	1159	1167	1174	1181	1188	1195
1700	1202	1209	1216	1223	1230	1237	1244	1251	1258	1266
1800	1273	1280	1287	1294	1301	1308	1315	1322	1329	1336
1900	1343	1350	1357	1365	1372	1379	1386	1393	1400	1407
2000	1414	1421	1428	1435	1442	1449	1456	1463	1471	1478
2100	1485	1492	1499	1506	1513	1520	1527	1534	1541	1548
2200	1555	1562	1570	1577	1584	1591	1598	1605	1612	1619
2300	1626	1633	1640	1647	1654	1661	1669	1676	1683	1690
2400	1697	1704	1711	1718	1725	1732	1739	1746	1753	1760
2500	1768	1775	1782	1789	1796	1803	1810	1817	1824	1831
2600	1838	1845	1852	1859	1866	1874	1881	1888	1895	1902
2700	1909	1916	1923	1930	1937	1944	1951	1958	1965	1973
2800	1980	1987	1994	2001	2008	2015	2022	2029	2036	2043
2900	2050	2057	2064	2072	2079	2086	2093	2100	2107	2114
3000	2121	2128	2135	2142	2149	2156	2163	2170	2178	2185
3100	2192	2199	2206	2213	2220	2227	2234	2241	2248	2255
3200	2262	2269	2277	2284	2291	2298	2305	2312	2319	2326
3300	2333	2340	2347	2354	2361	2368	2376	2383	2390	2397
3400	2404	2411	2418	2425	2432	2439	2446	2453	2460	2467
3500	2475	2482	2489	2496	2503	2510	2517	2524	2531	2538
3600	2545	2552	2559	2566	2573	2581	2588	2595	2602	2609
3700	2616	2623	2630	2637	2644	2651	2658	2665	2672	2680
3800	2687	2694	2701	2708	2715	2722	2729	2736	2743	2750
3900	2757	2764	2771	2779	2786	2793	2800	2807	2814	2821
4000	2828	2835	2842	2849	2856	2863	2870	2877	2885	2892
4100	2899	2906	2913	2920	2927	2934	2941	2948	2955	2962
4200	2969	2976	2984	2991	2998	3005	3012	3019	3026	3033

Conversion of Peak Amps. to AC. RMS. (70.7% of Peak)
Table 305 (Continued)

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Peak Amps.	0	10	20	30	40	50	60	70	80	90
4300	3040	3047	3054	3061	3068	3075	3083	3090	3097	3104
4400	3111	3118	3125	3132	3139	3146	3153	3160	3167	3174
4500	3182	3189	3196	3203	3210	3217	3224	3231	3238	3245
4600	3252	3259	3266	3273	3280	3288	3295	3302	3309	3316
4700	3323	3330	3337	3344	3351	3358	3365	3372	3379	3387
4800	3394	3401	3408	3415	3422	3429	3436	3443	3450	3457
4900	3464	3471	3478	3486	3493	3500	3507	3514	3521	3528
5000	3535	3542	3549	3556	3563	3570	3577	3584	3592	3599
5100	3606	3613	3620	3627	3634	3641	3648	3655	3662	3669
5200	3676	3683	3691	3698	3705	3712	3719	3726	3733	3740
5300	3747	3754	3761	3768	3775	3782	3790	3797	3804	3811
5400	3818	3825	3832	3839	3846	3853	3860	3867	3874	3881
5500	3889	3896	3903	3910	3917	3924	3931	3938	3945	3952
5600	3959	3966	3973	3980	3987	3995	4002	4009	4016	4023
5700	4030	4037	4044	4051	4058	4065	4072	4079	4086	4094
5800	4101	4108	4115	4122	4129	4136	4143	4150	4157	4164
5900	4171	4178	4185	4193	4200	4207	4214	4221	4228	4235
6000	4242	4249	4256	4263	4270	4277	4284	4291	4299	4306
6100	4313	4320	4327	4334	4341	4348	4355	4362	4369	4376
6200	4383	4390	4398	4405	4412	4419	4426	4433	4440	4447
6300	4454	4461	4468	4475	4482	4489	4497	4504	4511	4518
6400	4525	4532	4539	4546	4553	4560	4567	4574	4581	4588
6500	4596	4603	4610	4617	4624	4631	4638	4645	4652	4659
6600	4666	4673	4680	4687	4694	4702	4709	4716	4723	4730
6700	4737	4744	4751	4758	4765	4772	4779	4786	4793	4801
6800	4808	4815	4822	4829	4836	4843	4850	4857	4864	4871
6900	4878	4885	4892	4900	4907	4914	4921	4928	4935	4942
7000	4949	4956	4963	4970	4977	4984	4991	4998	5006	5013
7100	5020	5027	5034	5041	5048	5055	5062	5069	5076	5083
7200	5090	5097	5105	5112	5119	5126	5133	5140	5147	5154
7300	5161	5168	5175	5182	5189	5196	5204	5211	5218	5225
7400	5232	5239	5246	5253	5260	5267	5274	5281	5288	5295
7500	5303	5310	5317	5324	5331	5338	5345	5352	5359	5366
7600	5373	5380	5387	5394	5401	5409	5416	5423	5430	5437
7700	5444	5451	5458	5465	5472	5479	5486	5493	5500	5508
7800	5515	5522	5529	5536	5543	5550	5557	5564	5571	5578
7900	5585	5592	5599	5607	5614	5621	5628	5635	5642	5649

Conversion of Peak Amps. to AC. RMS. (70.7% of Peak)
Table 305 (Concluded)

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Peak Amps.	0	10	20	30	40	50	60	70	80	90
100	64	70	77	83	89	96	102	108	115	121
200	128	134	140	147	153	160	166	172	179	185
300	191	198	204	211	217	223	230	236	242	249
400	255	262	268	274	281	287	293	300	306	313
500	319	325	332	338	345	351	357	364	370	376
600	383	389	396	402	408	415	421	427	434	440
700	447	453	459	466	472	479	485	491	498	504
800	510	517	523	530	536	542	549	555	561	568
900	574	581	587	593	600	606	612	619	625	632
1000	638	644	651	657	664	670	676	683	689	695
1100	702	708	715	721	727	734	740	746	753	759
1200	766	772	778	785	791	798	804	810	817	823
1300	829	836	842	849	855	861	868	874	880	887
1400	893	900	906	912	919	925	931	938	944	951
1500	957	963	970	976	983	989	995	1002	1008	1014
1600	1021	1027	1034	1040	1046	1053	1059	1065	1072	1078
1700	1085	1091	1097	1104	1110	1117	1123	1129	1136	1142
1800	1148	1155	1161	1168	1174	1180	1187	1193	1199	1206
1900	1212	1219	1225	1231	1238	1244	1250	1257	1263	1270
2000	1276	1282	1289	1295	1302	1308	1314	1321	1327	1333
2100	1340	1346	1353	1359	1365	1372	1378	1384	1391	1397
2200	1404	1410	1416	1423	1429	1436	1442	1448	1455	1461
2300	1467	1474	1480	1487	1493	1499	1506	1512	1518	1525
2400	1531	1538	1544	1550	1557	1563	1569	1576	1582	1589
2500	1595	1601	1608	1614	1621	1627	1633	1640	1646	1652
2600	1659	1665	1672	1678	1684	1691	1697	1703	1710	1716
2700	1723	1729	1735	1742	1748	1755	1761	1767	1774	1780
2800	1786	1793	1799	1806	1812	1818	1825	1831	1837	1844
2900	1850	1857	1863	1869	1876	1882	1888	1895	1901	1908
3000	1914	1920	1927	1933	1940	1946	1952	1959	1965	1971
3100	1978	1984	1991	1997	2003	2010	2016	2022	2029	2035
3200	2042	2048	2054	2061	2067	2074	2080	2086	2093	2099
3300	2105	2112	2118	2125	2131	2137	2144	2150	2156	2163
3400	2169	2176	2182	2188	2195	2201	2207	2214	2220	2227
3500	2233	2239	2246	2252	2259	2265	2271	2278	2284	2290
3600	2297	2303	2310	2316	2322	2329	2335	2341	2348	2354
3700	2361	2367	2373	2380	2386	2393	2399	2405	2412	2418
3800	2424	2431	2437	2444	2450	2456	2463	2469	2475	2482
3900	2488	2495	2501	2507	2514	2520	2526	2533	2539	2546
4000	2552	2558	2565	2571	2578	2584	2590	2597	2603	2609

Conversion of $\frac{1}{2}$ Wave Rectified Single Phase AC
From Peak Value to Twice Average (63.8% of Peak)
Table 306 (Continued)

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Peak Amps.	0	10	20	30	40	50	60	70	80	90
4100	2616	2622	2629	2635	2641	2648	2654	2660	2667	2673
4200	2680	2686	2692	2699	2705	2712	2718	2724	2731	2737
4300	2743	2750	2756	2763	2769	2775	2782	2788	2794	2801
4400	2807	2814	2820	2826	2833	2839	2845	2852	2858	2865
4500	2871	2877	2884	2890	2897	2903	2909	2916	2922	2928
4600	2935	2941	2948	2954	2960	2967	2973	2979	2986	2992
4700	2999	3005	3011	3018	3024	3031	3037	3043	3050	3056
4800	3062	3069	3075	3082	3088	3094	3101	3107	3113	3120
4900	3126	3133	3139	3145	3152	3158	3164	3171	3177	3184
5000	3190	3196	3203	3209	3216	3222	3228	3235	3241	3247
5100	3254	3260	3267	3273	3279	3286	3292	3298	3305	3311
5200	3318	3324	3330	3337	3343	3350	3356	3362	3369	3375
5300	3381	3388	3394	3401	3407	3413	3420	3426	3432	3439
5400	3445	3452	3458	3464	3471	3477	3483	3490	3496	3503
5500	3509	3515	3522	3528	3535	3541	3547	3554	3560	3566
5600	3573	3579	3586	3592	3598	3605	3611	3617	3624	3630
5700	3637	3643	3649	3656	3662	3669	3675	3681	3688	3694
5800	3700	3707	3713	3720	3726	3732	3739	3745	3751	3758
5900	3764	3771	3777	3783	3790	3796	3802	3809	3815	3822
6000	3828	3834	3841	3847	3854	3860	3866	3873	3879	3885
6100	3892	3898	3905	3911	3917	3924	3930	3936	3943	3949
6200	3956	3962	3968	3975	3981	3988	3994	4000	4007	4013
6300	4019	4026	4032	4039	4045	4051	4058	4064	4070	4077
6400	4083	4090	4096	4102	4109	4115	4121	4128	4134	4141
6500	4147	4153	4160	4166	4173	4179	4185	4192	4198	4204
6600	4211	4217	4224	4230	4236	4243	4249	4255	4262	4268
6700	4275	4281	4287	4294	4300	4307	4313	4319	4326	4332
6800	4338	4345	4351	4358	4364	4370	4377	4383	4389	4396
6900	4402	4409	4415	4421	4428	4434	4440	4447	4453	4460
7000	4466	4472	4479	4485	4492	4498	4504	4511	4517	4523
7100	4530	4536	4543	4549	4555	4562	4568	4574	4581	4587
7200	4594	4600	4606	4613	4619	4626	4632	4638	4645	4651
7300	4657	4664	4670	4677	4683	4689	4696	4702	4708	4715
7400	4721	4728	4734	4740	4747	4753	4759	4766	4772	4779
7500	4785	4791	4798	4804	4811	4817	4823	4830	4836	4842
7600	4849	4855	4862	4868	4874	4881	4887	4893	4900	4906
7700	4913	4919	4925	4932	4938	4945	4951	4957	4964	4970
7800	4976	4983	4989	4996	5002	5008	5015	5021	5027	5034
7900	5040	5047	5053	5059	5066	5072	5078	5085	5091	5098

Conversion of $\frac{1}{2}$ Wave Rectified Single Phase AC
 From Peak Value to Twice Average (63.8% of Peak)
 Table 306 (Concluded)

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Indi- cated value	0	1	2	3	4	5	6	7	8	9
0	0	2	3	5	6	8	9	11	13	14
10	16	17	19	20	22	24	25	27	28	30
20	31	33	35	36	38	39	41	42	44	46
30	47	49	50	52	53	55	57	58	60	61
40	63	64	66	68	69	71	72	74	75	77
50	79	80	82	83	85	86	88	90	91	93
60	94	96	97	99	101	102	104	105	107	108
70	110	112	113	115	116	118	119	121	123	124
80	126	127	129	130	132	134	135	137	138	140
90	141	143	145	146	148	149	151	152	154	156
100	157	159	160	162	163	165	167	168	170	171
110	173	174	176	178	179	181	182	184	185	187
120	189	190	192	193	195	196	198	200	201	203
130	204	206	207	209	211	212	214	215	217	218
140	220	222	223	225	226	228	229	231	233	234
150	236	237	239	240	242	244	245	247	248	250
160	251	253	255	256	258	259	261	262	264	265
170	267	269	270	272	273	275	276	278	280	281
180	283	284	286	287	289	291	292	294	295	297
190	298	300	302	303	305	306	308	309	311	313
200	314	316	317	319	320	322	324	325	327	328
<p>Conversion of reading on T.F.S. meter when measuring full wave rectified single phase current to Peak value i.e. Peak value = $\frac{\sqrt{2}}{2} H$ where H is indicated value.</p>										

Magnetic Field Values
Table 307

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Indi- cated value	0	1	2	3	4	5	6	7	8	9
0	0	3	6	9	13	16	19	22	25	28
10	31	35	38	41	44	47	50	53	57	60
20	63	66	69	72	75	79	82	85	88	91
30	94	97	101	104	107	110	113	116	119	123
40	126	129	132	135	138	141	145	148	151	154
50	157	160	163	167	170	173	176	179	182	185
60	189	192	195	198	201	204	207	211	214	217
70	220	223	226	229	233	236	239	242	245	248
80	251	255	258	261	264	267	270	273	276	280
90	283	286	289	292	295	298	302	305	308	311
100	314	317	320	324	327	330	333	336	339	342
110	346	349	352	355	358	361	364	368	371	374
120	377	380	383	386	390	393	396	399	402	405
130	408	412	415	418	421	424	427	430	434	437
140	440	443	446	449	452	456	459	462	465	468
150	471	474	478	481	484	487	490	493	496	500
160	503	506	509	512	515	518	522	525	528	531
170	534	537	540	544	547	550	553	556	559	562
180	566	569	572	577	578	581	584	588	591	594
190	597	600	603	606	610	613	616	619	622	625
200	628	632	635	638	641	644	647	650	654	657

Conversion of readings on T.F.S. meter on
½ wave rectified AC to Peak value i.e. Peak
value = $\sqrt{2}$ x H where H is indicated reading

Magnetic Field Values
Table 308

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Indi- cated value	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
10	10	12	13	14	15	16	17	18	19	20
20	21	22	23	24	25	26	27	28	29	30
30	31	32	34	35	36	37	38	39	40	41
40	42	43	44	45	46	47	48	49	50	51
50	52	53	54	56	57	58	59	60	61	62
60	63	64	65	66	67	68	69	70	71	72
70	73	74	75	76	78	79	80	81	82	83
80	84	85	86	87	88	89	90	91	92	93
90	94	95	96	97	98	99	101	102	103	104
100	105	106	107	108	109	110	111	112	113	114
110	115	116	117	118	119	120	121	123	124	125
120	126	127	128	129	130	131	132	133	134	135
130	136	137	138	139	140	141	142	143	145	146
140	147	148	149	150	151	152	153	154	155	156
150	157	158	159	160	161	162	163	164	165	167
160	168	169	170	171	172	173	174	175	176	177
170	178	179	180	181	182	183	184	185	186	187
180	189	190	191	192	193	194	195	196	197	198
190	199	200	201	202	203	204	205	206	207	208
200	209	211	212	213	214	215	216	217	218	219
<p>Conversion of readings on T.F.S. meter when measuring full wave rectified three phase current to peak value, i.e. Peak value = $\frac{\sqrt{3}}{3} H$ where H is indicated reading.</p>										

Magnetic Field Values
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RMS Field Value	0	1	2	3	4	5	6	7	8	9
0	0	1	3	4	6	7	8	10	11	13
10	14	16	17	18	20	21	23	24	25	27
20	28	30	31	33	34	35	37	38	40	41
30	42	44	45	47	48	49	51	52	54	55
40	57	58	59	61	62	64	65	66	68	69
50	71	72	74	75	76	78	79	81	82	83
60	85	86	88	89	91	92	93	95	96	98
70	99	100	102	103	105	106	107	109	110	112
80	113	115	116	117	119	120	122	123	124	126
90	127	129	130	132	133	134	136	137	139	140
100	141	143	144	146	147	148	150	151	153	154
110	156	157	158	160	161	163	164	165	167	168
120	170	171	173	174	175	177	178	180	181	182
130	184	185	187	188	190	191	192	194	195	197
140	198	199	201	202	204	205	206	208	209	211
150	212	214	215	216	218	219	221	222	223	225
160	226	228	229	231	232	233	235	236	238	239
170	240	242	243	245	246	247	249	250	252	253
180	255	256	257	259	260	262	263	264	266	267
190	269	270	272	273	274	276	277	279	280	281
200	283	284	286	287	288	290	291	293	294	296

Conversion of RMS field values to Peak field
values for AC currents i.e.:

Peak value = 2 x H where H
= indicated value

Magnetic Field Values
Table 310

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C. Fluorescent Dye Penetrant Examination.

- (1) It is assumed that the fluorescent penetrant examination equipment in use is capable of accommodating each of the components to be examined and that the operator is fully conversant with its operation.

WARNING: WEAR P.V.C. GLOVES TO PROTECT HANDS FROM PENETRANT FLUIDS. SKIN DISEASE MAY RESULT IF THIS PRECAUTION IS NOT TAKEN.

- (2) Approved penetrant materials are detailed in Table 311. In the table processes F1A, F2A and F3A correspond to ascending order of sensitivity. In each process sensitivity is considered to be approximately equivalent.
- (3) Penetrants in Process F1A are water washable, whereas penetrants in Process F2A and F3A are post emulsified.
- (4) Materials from more than one manufacturer must not be used together.

PROCESS	PENETRANT	REMOVER	DEVELOPER
F1A	Ardrox 970P4	Water	Ardrox 9D3
	Ardrox 970P5	Water	Ardrox 9D3
	Ardrox 970P23	Water	Ardrox 9D4A
	Ardrox 970P25	Water	Ardrox 9D4A
	Zyglo ZL1C	Water	Zyglo ZP4 or ZP4A
	Zyglo ZL15	Water	Zyglo ZP4 or ZP4A
	Sherwin HM-406	Water	Sherwin D90G or D100
F2A	Ardrox 985P1	Ardrox 9PR4*	Ardrox 9D3
	Ardrox 985P2	Ardrox 9PR4*	Ardrox 9D3
	Ardrox 985P12	Ardrox 9PR4 or Ardrox 9PR12	Ardrox 9D4A
	Zyglo ZL2A	Zyglo ZR10A*	Zyglo ZP4 or ZP4A
	Sherwin RC65	Sherwin ER-834	Sherwin D90G or D100
F3A	Ardrox 985P3	Ardrox 9PR4*	Ardrox 9D3
	Ardrox 985P13	Ardrox 9PR4 or Ardrox 9PR12	Ardrox 9D4A
	Ardrox 985P14	Ardrox 9PR4 or Ardrox 9PR12	Ardrox 9D4A
	Zyglo ZL30A	Zyglo ZR10A*	Zyglo ZP4 or ZP4A
	Zyglo ZL37		Zyglo ZP9C
			Ardrox 9D6F or 9D1B
	Sherwin RC77	Sherwin ER-834	Sherwin D90G or D100
NOTE: *Five per cent solution in water.			
Group F3A - special requirements only.			

Approved Penetrant Materials
Table 311

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- (5) Components requiring fluorescent or dye penetrant examination are tabulated in the relevant Chapter. The tables also detail the process applicable to each component and include an alternative where necessary.
- (6) Refer to Table 312 for Process F1A, Table 313 for Process F2A, Table 314 for Process F3A and to Table 315 for Process S3B.
- (7) All components must be degreased using Triklone N only.

SEQUENCE	OPERATION	TIME	REMARKS
1	Clean.	-	Refer to relevant component Cleaning Chapter.
2	Degrease.	-	Ref.72-09-00, Cleaning.
3	Cool to 40 deg C.	-	To allow components to be handled comfortably.
4	Apply penetrant to surfaces for examination by immersion, spray, brush or flow on techniques.	See sequence 5.	Fully cover designated surfaces.
5	Drain.	20 to 30 min includes sequence 4 time.	Surfaces must remain wetted. If max drain time is exceeded reprocess from sequence 2.

Process F1A - Fluorescent Penetrant Examination
Table 312 (Continued)

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SEQUENCE	OPERATION	TIME	REMARKS
6	Water wash by spray or immersion in air agitated water to remove surplus penetrant. Check under UV light for removal.	Immediately.	Use water at room temperature when practicable but not in excess of 35 deg C or 50 deg C when using ZL1C.
7 (optional)	Dip in clean water at 80 to 90 deg C.	20 sec max.	To assist drying and reduce back-ground.
8	Dry with air blast and/or Oven dry.	- Keep minimal, 10 min max.	25 psi (175 kPa) max pressure. 70 deg C max temperature.
9	Apply developer and allow to develop.)))) Total elapsed time for	Powder must contact all surfaces to be examined.
10	Remove surplus powder.) sequence 9, 10 and 11:) 3 hr max.)	Shake or blow off with air (5 psi (35 kPa) max).
11	Examine under UV light in darkened area.)))	-
12	Clean and protect as necessary.	-	-

Process F1A - Fluorescent Penetrant Examination
Table 312 (Concluded)

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**ATP
TEMPORARY
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British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

Dennis Howard

For Chief Technical and Industrial Services Engineer CAA Design Approval No.DAI/8566/78

TEMPORARY REVISION NO.72-561

Insert in 72-09-00 before page 321

REASON FOR ISSUE

Amendment to Table 213

ACTION

Process F2A - Table 213 delete sequence 4 and read the following:-

4. Apply penetrant to surfaces for examination, spray, brush or flow on techniques. Electrostatic equipment can be used for the application of Ardrex 985 Pl.

NOTE: Ensure sufficient penetrant is applied to give adequate soak into any crack that may exist.

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SEE TR

SEQUENCE	OPERATION	TIME	REMARKS
1	Clean.	-	Refer to relevant Cleaning Chapter.
2	Degrease.	-	Ref.72-09-00, Cleaning.
3	Cool to 40 deg C.	-	Acceptable when components can be handled comfortably.
4	Apply penetrant to surfaces for examination by immersion, spray, brush or flow on techniques.	See sequence 5.	Fully cover designated surfaces.
5	Drain.	20 to 30 min includes sequence 4 time.	Surfaces must remain wetted. If max. drain time is exceeded reprocess from sequence 2.
6	Water spray wash to remove obvious surplus penetrant.	Immediately.	Use water at room temperature when practicable but not in excess of 35 deg C.
7	Immerse in penetrant remover	3 min max.	Use minimum contact time consistent with acceptable background.

Process F2A - Fluorescent Penetrant Examination
Table 313 (Continued)

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SEQUENCE	OPERATION	TIME	REMARKS
8	Water wash by spray or immersion in air agitated water to disperse remaining surplus penetrant and remover. Check under UV light for removal.	Immediately after sequence 7.	Use water at room temperature when practicable but not in excess of 35 deg C.
9 (optional)	Dip in clean water at 80 to 90 deg C.	20 sec max.	To assist drying and reduce background.
10	Dry with air blast and/or Oven dry.	- Keep minimal, 10 min max.	25 psi (175 kPa) max pressure. 70 deg C. max temperature.
11	Apply developer and allow to develop.))))	Powder must contact all surfaces to be examined.
12	Remove surplus powder.) Total elapsed time for sequence 9, 10 and 11:) 3 hr max.	Shake or blow off with air (5 psi (35 kPa) max).
13	Examine under UV light in a darkened area.)))	-
14	Clean and protect as necessary.		-

Process F2A - Fluorescent Penetrant Examination
Table 313 (Concluded)

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SEQUENCE	OPERATION	TIME	REMARKS
1	Clean.	-	Refer to relevant component Cleaning Chapter.
2	Degrease.	-	Ref.72-09-00, Cleaning.
3	Cool to 40 deg C.		To allow components to be handled comfortably.
4	Apply penetrant to surfaces for examination by immersion, spray, brush or flow on techniques.	See sequence 5.	Fully cover designated surfaces.
5	Drain.	20 to 30 min includes sequence 4 time.	Surfaces must remain wetted. If max. drain time is exceeded reprocess from sequence 2.
6	Water spray wash to remove obvious surplus penetrant.	Immediately.	Use water at room temperature when practicable but not in excess of 35 deg C.
7	Immerse in penetrant remover.	3 min max.	Use minimum contact time consistent with acceptable background.

Process F3A - Fluorescent Penetrant Examination
Table 314 (Continued)

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SEQUENCE	OPERATION	TIME	REMARKS
8	Water wash by spray or immersion in air 7. agitated water to disperse remaining surplus penetrant and remover. Check under UV light for removal.	Immediately after sequence	Use water at room temperature when practicable but not in excess of 35 deg C.
9 (optional)	Dip in clean water at 80 to 90 deg C.	20 sec max.	To assist drying and reduce background.
10	Dry with air blast and/or Oven dry.	- Keep minimal, 10 min max.	25 psi (175 kPa) max pressure. 70 deg C. max temperature.
11	Apply developer and allow to develop.))))	Powder must contact all surfaces to be examined.
12	Remove surplus powder.) Total elapsed) time for) sequence) 9, 10 and 11:) 3 hr max.))	Shake or blow off with air (5 psi (35 kPa) max).
13	Examine under UV light in a darkened area.)))	-
14	Clean and protect as necessary.	-	-

Process F3A - Fluorescent Penetrant Examination
Table 314 (Concluded)

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SEQUENCE	OPERATION	TIME	REMARKS
1	Clean.	-	Refer to relevant component Cleaning Chapter.
2	Degrease.	-	Ref.72-09-00, Cleaning.
3	Cool to 40 deg C or less.	-	To allow components to be handled comfortably.
4	Apply penetrant to surfaces for examination by immersion, spray, brush or flow on techniques.	See sequence 5.	Fully cover designated surfaces.
5	Drain.	20 to 30 min includes sequence 4 time.	Surfaces must remain wetted. If max drain time is exceeded reprocess from sequence 2.
6	Immerse in a. Vapour phase or b. Vapour phase and liquid.	Minimum consistent with good background.	Normally 6 sec approx. is sufficient.
7	Spray develop. Fine spray an even coat over surface.	-	Component should be warm for best results.

Process S3B - Dye Penetrant Examination
Table 315 (Continued)

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SEQUENCE	OPERATION	TIME	REMARKS
8	Inspect.	1 hr max.	1. Immediately for coarse defects. 2. After 10 min, for fine defects.
9	Remove developer with paraffin or water wash.	-	-
10	Protect as necessary.	-	-

Process S3B - Dye Penetrant Examination
Table 315 (Concluded)

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British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

TEMPORARY REVISION No. 72-555

Insert in 72-09-00 before page 327

REASON FOR ISSUE:

BEOL amendment to marking of components

ACTION

Delete paragraphs D (1) and (2) and read the following:

- (1) Markings should be of rapid drying ink applied using felt point pencils. The use of 'VERITHIN' white pencil is an approved method of temporary marking on components.
- (2) When a temporary marking is no longer required it should be removed using a suitable solvent.

NOTE: One of the following agents must be used to remove the temporary markings when no longer required (a) Genklene (b) Methylated spirits (c) Cellulose thinners

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3. Temporary Marking

- A. During overhaul it is necessary to apply temporary markings to components in order to monitor them through the overhaul procedure and to indicate defects, condition, etc.
- B. Two means of temporary marking are employed, attaching labels to the components and marking on the components.
- C. Attaching Labels.
 - (1) Labels and attaching wire used during disassembly and cleaning/stripping should be of metal resistant to the solutions involved; type 18/8 austenitic stainless steel is recommended.
 - (2) During inspection the metal labels should be replaced by cardboard labels of a colour denoting the component condition, e.g. green for acceptable components, yellow or orange for repairable components and red for rejected components.
- D. Marking on Components.

CAUTION: DO NOT USE LEAD PENCIL OR METALLIC PENCIL OR ANY MARKING MEDIUM THAT LEAVES A DEPOSIT OF CARBON, ZINC, COPPER OR LEAD. THESE DEPOSITS MAY CAUSE CEMENTATION OR INTERGRANULAR ATTACK AT HIGH TEMPERATURE AND RESULT IN STRENGTH LOSS AND SUBSEQUENT FAILURE. IF SURFACES ARE ACCIDENTLY CONTAMINATED WITH THESE DEPOSITS, CAREFULLY REMOVE THE DEPOSIT USING A METHOD APPROPRIATE TO THE TYPE OF DEPOSIT AND THE COMPONENT MATERIAL.

- (1) Markings should be of rapid drying ink applied using felt point pencils.
- (2) When a temporary marking is no longer required it should be removed using a suitable solvent.

4. Ball and Roller Bearings

A. General

- (1) For the purpose of examination ball and roller bearings are categorized as Main Bearings, i.e. those supporting the LP and HP rotating assemblies, and Auxiliary Bearings, i.e. all other bearings.

CAUTION: UNLESS OTHERWISE STATED, DO NOT INTERMIX COMPONENTS OF BALL AND ROLLER BEARINGS. REJECT BEARINGS CONCERNED IF INTERMIXING OCCURS AND POSITIVE IDENTIFICATION CANNOT BE ESTABLISHED. FAILURE MAY RESULT.

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- (2) All work on bearings must be carried out in a 'CLEAN ROOM'.
- (3) It is assumed that the bearings are received for examination after disassembly in clean containers and protected with anti-corrosive lubricants.
- (4) Bearings should be inspected without removal of the oil film, but if necessary surplus oils can be removed with a lint free cloth.
- (5) During inspection bearings and their components should not be exposed outside their protective bags for periods longer than 10 hours.
- (6) If bearings and their individual components are not required for immediate examination they should be temporarily protected for a 14 day period by immersing in engine lubricating oil or light mineral oil D.E.R.D.2490 at a temperature of between 105 and 110 deg.C for a period of 5 min. duration. For periods exceeding 14 days and less than 3 months immerse the bearings in mineral jelly J.S.D. PX.7 or Shell S.4181 maintained at a temperature of between 105 and 120 deg.C rotating the bearings to ensure complete protection. Allow to cool and drain, then place in clean polythene or PVC bags to await examination.

B. Examine the Bearings.

- (1) Examine bearing components for discoloration due to overheating. Reject the complete bearing if evidence of overheating is found.
- (2) Visually examine bearing components in accordance with Table 316, using X2 magnification. If there is any doubt concerning the acceptance of a particular defect, re-examine using X5 magnification.

NOTE: A limited number of main bearing components may be changed for serviceable components (Ref.72-09-00 Repair). If bearing components are rejected and no substitution is permitted, the complete bearing shall be rejected.

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DEFECT	BALLS AND ROLLERS	TRACK BEARING SURFACES	OTHER SURFACES
Light scores and scratches up to 0.003 in. (0,0762 mm) wide	Accept	Accept	Accept
Medium scores and scratches 0.004 to 0.005 in. (0,1016 to 0,127 mm) wide	Accept irrespective of length provided such defects do not cross other scores or scratches of similar or larger size.		Accept
Scores and scratches 0.006 to 0.010 in. (0,1524 to 0,254 mm) wide	Balls - reject Rollers - accept single circumferential score provided it does not cross medium scores or scratches	Accept single circumferential score provided it does not cross medium scores or scratches	Accept
Heavy scores and scratches 0.011 in. (0,276 mm) wide and above	Reject	Reject	Accept up to 0.025 in. (0,635 mm) wide, reject larger scores and scratches
Fine corrosion pitting up to 0.005 in. (0,127 mm) max. dia.	Accept provided the pits are well dispersed and not densely packed in any particular area.		Accept
Medium corrosion pitting 0.006 to 0.010 in. (0,1524 to 0,254 mm) max. dia.	Accept up to two 0.250 in. (0,635 mm) dia. clusters at least 0.500 in. (12,7 mm) apart. Not more than three pits per cluster	Accept clusters at least 0.500 in. (12,7 mm) apart. Not more than three pits per cluster. Number of clusters not to exceed number of inches in track dia.	Accept

Acceptance Standards for Visual Examination of Bearings
Table 316 (Continued)

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DEFECT	BALLS AND ROLLERS	TRACK BEARING SURFACES	OTHER SURFACES
Heavy corrosion pitting 0.011 to 0.020 in. (0,276 to 0,508 mm) max. dia.	Accept random pits not less than 0.500 in. (12,7 mm) apart provided they are shallow and not felt with a scriber*		Accept
Heavy corrosion pitting 0.021 in. (0,5308 mm) max. dia. and above	Reject	Reject	Accept up to 0.030 in. (0,762 mm) max. dia.
Clearly defined indentations (sharp edged) up to 0.005 in. (0,127 mm) wide by 0.035 in. (0,889 mm) long	Accept up to three provided they do not touch or cross	Accept provided they are at least 0.500 in. (12,7 mm) apart	Accept
Wide indentations (soft edged) up to 0.025 in. (0,635 mm) greatest dimension	Accept up to three provided they are shallow and not felt with a scriber*	Accept provided they are at least 0.500 in. (12,7 mm) apart and are shallow and not felt with a scriber*	Accept
Clearly defined indentations 0.006 in. (0,1524 mm) wide by 0.036 in. (0,9144 mm) long and above; wide indentations 0.026 in. (0,6604 mm) greatest dimen- sion and above	Reject	Reject	Accept any number up to 0.060 in. (1,524 mm) greatest dimension
Scuffs and fretting	Accept if not felt with a scriber*		-

Acceptance Standards for Visual Examination of Bearings
Table 316 (Continued)

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DEFECT	BALLS AND ROLLERS	TRACK BEARING SURFACES	OTHER SURFACES
Plucking, pick-up and brinelling i.e. transfer of metal	Reject	Reject	Accept pluck- ing and pick- up of less than 0.015 in. (0,381 mm) max. dia.
Spalling, cracking and peeling	Reject	Reject	Reject

* NOTE: The scribe used to assess defects shall have the end ground and polished to a 0.040 in. (1,016 mm) spherical rad.

Acceptance Standards for Visual Examination
of Bearings
Table 316 (Concluded)

- (3) Carry out a magnetic particle examination of the bearing tracks and cages in accordance with the relevant Chapter. Refer to Table 317 for acceptance standards and to Fig.302 for definition of loaded areas and angle of defects.

DEFECT	TRACK BEARING LOADED AREAS	SURFACES UNLOADED AREAS	ALL OTHER SURFACES
Cracks	Reject	Reject	Reject
Sub-surface defects	Reject	Reject	Reject

Acceptance Standards for Magnetic Particle
Examination of Bearings
Table 317 (Continued)

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DEFECT	TRACK BEARING SURFACES		ALL OTHER SURFACES
	LOADED AREAS	UNLOADED AREAS	
Surface in- clusions, not in line or clustered, ball bearing members	Accept up to 0.0075 in. (0,1905 mm) wide by 0.015 in. (0,381 mm) long if major axis is greater than 30 deg to ball path. Accept up to 0.0075 in. (0,1905 mm) wide by 0.0225 in. (0,5715 mm) long if major axis is less than 30 deg to ball path	Accept up to 0.0075 in. (0,1905 mm) wide by 0.034 in. long	Accept except on radii and chamfers
Carbide segre- gation, not in line or clustered, ball bearing members	Accept up to 0.0075 in. (0,1905 mm) wide by 0.030 in. (0,762 mm) long if major axis is greater than 30 deg to ball path. Accept up to 0.0075 in. (0,1905 mm) wide by 0.045 in. (1,143 mm) long if major axis is less than 30 deg to ball path	Accept up to 0.0075 in. (0,1905 mm) wide by 0.0675 in. (1,715 mm) long	Accept ex- cept on radii and chamfers
Surface in- clusions, not in line or clustered, roller bearing members	Accept up to 0.0075 in. (0,1905 mm) wide by 0.0225 in. (0,5715 mm) long	Accept up to 0.0075 in. (0,1905 mm) wide by 0.034 in. (0,8636 mm) long	Accept ex- cept on radii and chamfers

Acceptance Standards for Magnetic Particle
Examination of Bearings
Table 317 (Continued)

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DEFECT	TRACK BEARING SURFACES		ALL OTHER SURFACES
	LOADED AREAS	UNLOADED AREAS	
Carbide segregation, not in line or clustered, roller bearing members	Accept up to 0.0075 in. (0,1905 mm) wide by 0.045 in. (1,143 mm) long	Accept up to 0.0075 in. (0,1905 mm) wide by 0.0675 in. (1,715 mm) long	Accept except on radii and chamfers
Surface inclusions and carbide segregation, in line or clustered, ball and roller bearing members	Reject	Reject	Reject

Acceptance Standards for Magnetic Particle
Examination of Bearings
Table 317 (Concluded)

C. Examine the Auxiliary Bearings.

CAUTION: BEARINGS INTRODUCED BY SERVICE BULLETIN
OL.593-72-8976-374 MUST NOT BE DISASSEMBLED.

- (1) For bearings which can be partially or completely disassembled to their component parts, examine the disassembled parts and apply the acceptance standards as specified in para.4.B.
- (2) For bearings or bearing sub-assemblies where further disassembly is not practicable without unrivetting cages, etc., visually examine as far as practicable for defects such as cracks, corrosion pitting, scores, scratches, indentations, etc. Reject the bearing if any defects are found.
- (3) Check for wear in accordance with the relevant Fits and Clearances Chapter. Reject the bearing if worn outside the specified limits.

D. Reprotect the Bearings.

- (1) If bearings are not to be installed in the engine immediately following inspection, reprotect them with the 14 day or extended (3 month) protective treatment (Ref. para. 4.A.).

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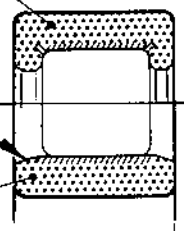


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LEAD

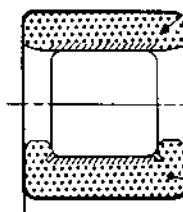
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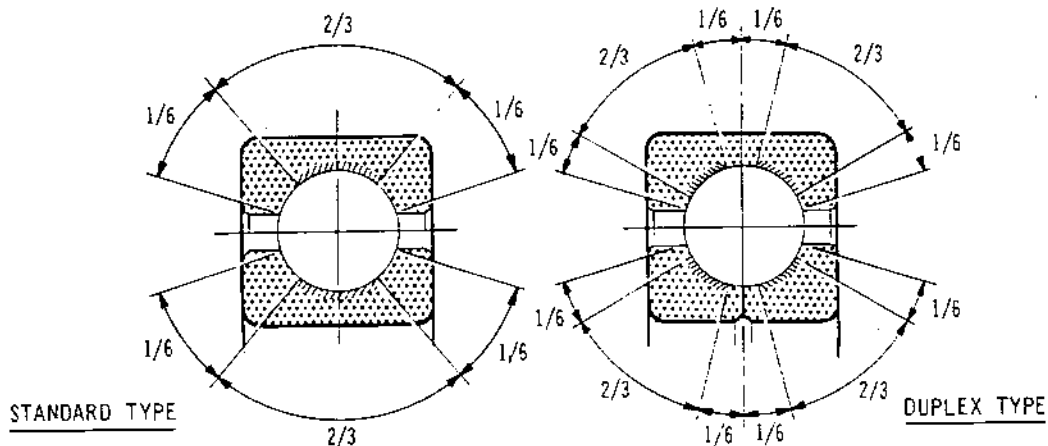
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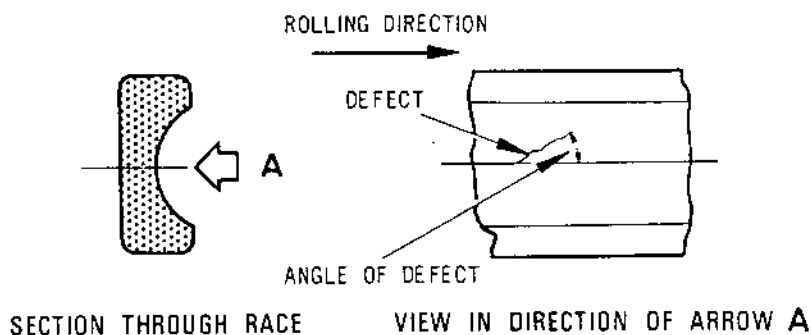


SECTIONS THROUGH TYPICAL ROLLER BEARINGS

LOADED AREAS SHOWN THUS:



SECTIONS THROUGH TYPICAL BALL BEARINGS



Definition of Loaded Areas and Angle of
Defect on Bearing Track Bearing Surfaces
Figure 302

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OLYMPUS 593 OVERHAUL MANUAL

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

David L. H. H. H.

For Chief Technical and Industrial Services Engineer CAA Design Approval No.DAI/8566/78

TEMPORARY REVISION NO.72-562

Insert in 72-09-00 before page 335

REASON FOR ISSUE

BEOL NOTE added

ACTION

Read the following BEOL NOTE after paragraph 5A:-

BEOL NOTE: Self Locking Shaft Nuts

At first overhaul of all left and right hand gearboxes, and intermediate casing internal drives of engines up to and including CBE 065.

Inspect the self locking features of all self locking shaft nuts of the following part numbers:

U755062, U755065, U755068, U755069, U755070,
U755072 and U755074.

Reject all nuts with a four lobe locking feature (i.e. end threads deformed squarely).

All elliptically deformed nuts are suitable for further use if satisfactory in all other respects.

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E. Compile Inspection Records.

- (1) Compile a record for each main bearing and other bearings if required, to show:
 - (a) Part number.
 - (b) Serial number.
 - (c) Engine type and serial number.
 - (d) Manufacturers cast code letters, outer and inner race pairing numbers (if applicable).
 - (e) Running time.
 - (f) Reason for rejection (if applicable).
 - (g) Components.

5. Threaded Components

A. General Examination - All Components.

- (1) Examine all threaded components as described in para.1 of this Chapter.
- (2) Examine all threads for chipping, pick-up, peeling of any plating, tearing, stretching and distortion.
- (3) Examine all components for obvious signs of over-stressing, e.g. waisting of bolts, local distortion of bolt locations, etc.
- (4) Check all threads for wear using a thread gauge to suit the thread standard.
- (5) Examine spanner locations for excessive bruising.
- (6) Examine specific types of threaded components as described in subsequent paragraphs.

B. Examine Self-locking Nuts.

NOTE: All self-locking nuts are reusable providing that they satisfy the following examination and meet the minimum locking (run-down) torque specified in the appropriate Sub-assembly Chapter, or if not specified, must be as quoted in Table 318.

- (1) Examine for damage, cracking and corrosion. Reject defective nuts.

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C. Examine Captive Self-locking Nuts (Esna and Kaylock Type).

- (1) Examine for security, damage, cracking and corrosion. Renew defective nuts (Ref. 72-09-00 Repair).
- (2) Check the locking (run-down) torque.
 - (a) Lubricate the thread of the mating bolt as required for assembly (Ref. appropriate Sub-assembly Chapter).
 - (b) Screw the bolt into the nut until the end of the bolt is flush with, or slightly protruding from, the outer face of the nut. Ensure that the thrust face of the bolt is clear of the component face.
 - (c) Using a direct reading torque spanner or driver and the appropriate socket, check the locking (run-down) torque required to turn the bolt in the nut. This torque shall be within the limits quoted in the appropriate Sub-assembly Chapter, or if not specified, shall be as quoted in Table 318.
- (3) Renew nuts which fail to meet the locking torque requirements (Ref. 72-09-00 Repair).

UNF SIZE	T.P.I.	LOCKING TORQUE	
		MINIMUM	MAXIMUM
O.1900 (No.10)	32	2.0 lbf in. (0,23 N.m)	17 lbf in. (1,9 N.m)
O.2500	28	3.5 lbf in. (0,40 N.m)	35 lbf in. (3,9 N.m)
O.3125	24	6.5 lbf in. (0,73 N.m)	72 lbf in. (8,1 N.m)
O.3750	24	9.5 lbf in. (1,07 N.m)	96 lbf in. (11 N.m)
O.4375	20	14.0 lbf in. (1,58 N.m)	120 lbf in. (14 N.m)
O.5000	20	18.0 lbf in. (2,03 N.m)	180 lbf in. (20 N.m)

Locking Torque Limits for Captive and None Captive
Self-locking Nuts and Locking Screw Thread Inserts
Table 318

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OLYMPUS 593 OVERHAUL MANUAL

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

Dennis Howard

For Chief Technical and Industrial Services Engineer CAA Design Approval No.DAI/8566/78

TEMPORARY REVISION NO.72-563

Insert in 72-09-00 after page 336

REASON FOR ISSUE

BEOL CAUTION added

ACTION

Add the following CAUTION after heading for paragraph 5C

CAUTION: REJECT ALL CAPTIVE SELF-LOCKING NUTS ON ROTATING
ASSEMBLIES AND ANNOTATE THE INSPECTION REPORT ACCORDINGLY
REFER TO 72-09-00 REPAIR FOR RENEWAL PROCEDURE.

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D. Examine Captive Self-locking Shank Nuts.

- (1) Check security of nut in component. Replace any nut that permits axial movement (Ref.72-09-00 Repair); radial movement, to abut the nut trap, is acceptable.
- (2) Examine locking element for distortion; replace any nut so damaged (Ref.72-09-00 Repair).
- (3) Examine all swaging for damage; replace any nut with flange damage (Ref.72-09-00 Repair).

NOTE: Silver coating inside shank may be rubbed off during installation. Such damage is acceptable, but any loose flakes must be removed.

- (4) When nuts are found to be otherwise satisfactory, check the locking (run-down) torque as described in sub-para.C.

E. Examine Locking Screw Thread Inserts (Helicoil Type).

- (1) Examine for displacement of inserts from their correct position in tapped holes. Generally, the top of the insert should be between 0.75 and 1.5 thread pitches below the component surface. Renew defective inserts (Ref. 72-09-00 Repair).
- (2) Check the locking (run-down) torque.
 - (a) Lubricate the thread of the mating bolt as required for assembly (Ref. appropriate Assembly Chapter).
 - (b) Screw the bolt into the insert until it is fully engaged with the locking coils in the insert. Ensure that the thrust face of the bolt is clear of the component face.
 - (c) Using a direct reading torque spanner or driver and the appropriate socket, check the locking (run-down) torque required to turn the bolt in the insert. This torque shall be within the limits quoted in the appropriate Sub-assembly Chapter, or if not specified, shall be as quoted in Table 318.

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- (3) Renew inserts which fail to meet the locking torque requirements (Ref. 72-09-00 Repair).

F. Examine Self-locking Nut and Clip Assemblies.

- (1) Examine for security, damage, cracking and corrosion. Renew defective nuts (Ref. 72-09-00 Repair).
- (2) Check the minimum locking (run-down) torque.
 - (a) Lubricate the thread of the mating bolt as required for assembly (Ref. appropriate Sub-assembly Chapter).
 - (b) Screw the bolt into the nut until the end of the bolt is flush with, or slightly protruding from, the outer face of the nut. Ensure that the thrust face of the bolt is clear of the component face.
 - (c) Using a direct reading torque spanner or driver and the appropriate socket, check the locking torque required to turn the bolt in the nut. This torque shall not be below the limits quoted in the appropriate Sub-assembly Chapter, or if not specified, shall be as quoted in Table 318.
- (3) Renew assemblies which fail to meet the locking torque requirements.

6. Rigid Tubes

A. Examine for Damage.

- (1) Examine for fretting, gouging, scratches and scores, i.e. where metal is displaced.
 - (a) Where the maximum depth of the defect exceeds 15 per cent of the nominal thickness and is not greater than an absolute depth of 0.007 in. (0,180 mm) or 0.005 in. (0,130 mm) fretting at loop clamp locations, proceed as follows:
 - (i) Measure the wall thickness of the undamaged material around the defect (using a Forester Magnetoscope or similar instrument) and subtract the defect depth from this measurement.

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TEMPORARY REVISION No. 72-522
Insert in 72-09-00 before page 339

REASON FOR ISSUE:

Fretting limits for No.4 bearing oil feed, scavenge and vent pipes (MRA 78).

ACTION

Read the following NOTE after paragraph 6.A.(1)(a)(ii):

NOTE: Accept fretting on No.4 bearing oil pipes to a maximum depth of 0.010 in. prior to Tribomet plating to CM 425278. Fret marks to be dressed to remove burrs and sharp edges only i.e. do not blend.

Pipes - Oil feed - IPC Ref 72-34-00 Fig.1/80
Oil scavenge - IPC Ref 72-34-00 Fig.1/210
Oil vent - IPC Ref 72-34-00 Fig.1/340



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- (ii). Accept fretting up to 0.005 in. (0,130 mm) in depth at loop clamp positions, or damage up to 0.007 in. (0,180 mm) in depth at other areas, provided the minimum section across the defect is not less than the minimum drawing section. Refer to Table 320 for the interpretation of the minimum drawing section after forming and the maximum permissible depth of defect.
- (2) Blend acceptable defects to completely remove them, ensure that a minimum amount of metal is removed.
- (3) Examine for indentations, i.e. no obvious metal displacement.
- (4) Accept indentations provided that:
- (a) They are of smooth contour.
 - (b) They are not deeper than five per cent of the tube outside diameter.
 - (c) The minimum section at the indentation is not less than the minimum drawing section after forming.
- (5) Identify acceptable indentations by electro-chemically marking the letter A adjacent to each indentation (Ref. 72-09-00 Repair).

TUBE THICKNESS			MIN. DRAWING SECTION AFTER FORMING		MAX. PERMISS-IBLE DEPTH OF DEFECT (EXCLUDING CLAMP FRETTING)		MAX. PERMISS-IBLE DEPTH OF LOOP CLAMP FRETTING	
SWG.	IN.	MM	IN.	MM	IN.	MM	IN.	MM
24	0.022	0,558	0.017	0,4318	0.005	0,130	0.005	0,130
22	0.028	0,711	0.021	0,5334	0.007	0,180	0.005	0,130
20	0.036	0,914	0.027	0,6858	0.007	0,180	0.005	0,130
18	0.048	1,219	0.036	0,9144	0.007	0,180	0.005	0,130

Interpretation of Minimum Drawing Section after Forming and Acceptance Standards of Rigid Tubes
Table 320

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7. Tube End Fittings

A. Union Bodies.

- (1) Examine the conical seating to ensure that it has not become spherical due to previous overtightening.
- (2) Check the thread diameter to ensure that it has not become enlarged due to previous overtightening.
- (3) Reject the union body if any defect is found.

B. Union Nuts.

- (1) Check the thread diameter to ensure that it has not become enlarged due to previous overtightening.
- (2) Examine for cracking at the thread undercut (standard type) or in the vicinity of the wire insert (Bowden type).
- (3) Examine the locking wire holes; a minimum of two holes must be sound.
- (4) Examine the spanner locations to ensure that they are not excessively bruised.
- (5) Ensure that the nut is free to rotate on the tube end.
- (6) Examine the end of the thrust wire for corrosion (if applicable).
- (7) Reject the tube if any defect is found.

C. Nipple Ends.

- (1) Examine for distortion and damage, and for ridging or knifing of the seat.
- (2) Reject the tube if any defect is found.

8. Hardness Testing

- A. Hardness testing is used to verify that a component or its surface coating has the required hardness to perform its design function, and is normally carried out on a component when it is subjected to one of the following.

- (1) A case hardened component that has been ground in order to incorporate a modification.

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Dennis Howard

For Chief Technical and Industrial Services Engineer CAA Design Approval No.DA1/8566/78

TEMPORARY REVISION NO.72-564

Insert in 72-09-00 after page 340

REASON FOR ISSUE

BEOL NOTE added

ACTION

Add the following NOTE after heading for paragraph 7B

BEOL NOTE: All pipes with union nut connections should have the part number etched in the neck of the union nut.

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- (2) Damage to a hardened steel component that has been blended by stoning.
- (3) A component that has been salvaged by hard chromium plating.
- (4) A component that is suspected of having been overheated. In this case check the hardness on the part of the component which has been subjected to the highest temperature. Except for hot-end components, overheating will be indicated by discolouration of the metal. If there is doubt regarding the cause of discolouration, hardness test the component.

- B. The testing is normally achieved by applying an indenter, at a specific load and for a specific time, to the surface of the component and measuring the resultant impression. This measurement is interpreted in terms of a "hardness value" which must lie within the range quoted in the relevant Chapter for the component concerned.
- C. One of three types of test may be specified, Vickers, Brinell or Rockwell (Scale 'C'). These are denoted by, respectively, the letters HV, HB and HRC preceding the hardness value.
- D. On completion of a hardness test, submit the harness number and the exact location of the test to the Engineering Department for consideration.

9. Surface Roughness

- A. Surface roughness requirements are specified on repair illustrations where necessary (Ref. 72-09-00 Repair). Normally, inspection will be carried out using test equipment designed for this purpose. In certain instances, inspection may be by a tactile and visual comparison between the component and a test piece of known surface roughness.
- B. It is not intended that all locations where a surface roughness is specified are 100 per cent inspected for this requirement. The number of components and the frequency of checks to be carried out will be decided by the inspection and quality departments of the repair facility concerned, with the object of ensuring that the equipment used is capable of producing the required finish.

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- C. The direction in which the measurement for surface roughness is made should be approximately at right angles to the "lay" (direction of tool marks in the surface), unless otherwise specified. The measurement should preferably be taken in five locations and the results averaged to determine the surface roughness value.
- D. In locations which do not permit ready access of the stylus or probe of the surface roughness test equipment, a plastic mould of the location should be made and the roughness checked on the surface of the mould.
- E. It is emphasized that checking the surface roughness using test equipment will not necessarily reveal irregularities in machining, isolated scratches or similar imperfections. Therefore, normal visual inspection for such defects must be carried out on all surfaces affected by a repair.

10. Rim Clenching Clamp Assemblies

A. Bedding Check.

- (1) Install the appropriate checking gauge in a vice. For the main hydraulic pump securing clamp use Tool 74 and for the standby hydraulic pump securing clamp use Tool 75.
- (2) Clean the taper surfaces of the checking gauge using a clean, lint-free cloth moistened with a group 1 or 3 solvent (Ref.72-09-00 - Cleaning) then apply a thin coat of "engineer's blue" to these surfaces.
- (3) Install the clamp assembly on the checking gauge (Ref. 72-09-00 Assembly), omitting the lubrication of the taper surfaces, and torque-tighten as specified.
- (4) Remove the clamp assembly from the checking gauge and examine the clamp segment taper surfaces. These surfaces must show a minimum of 80 per cent circular contact and 60 per cent radial contact with the checking gauge, as indicated by the blue marking.
- (5) Remove the blue from the checking gauge and clamp assembly using a suitable solvent and apply de-watering oil as a temporary protective.

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11. Cupwashers

A. Cupwasher can be accepted for further service provided that:

- (1) General condition is acceptable.
- (2) Lugs are not damaged.
- (3) There is no evidence of incipient cracking.
- (4) Reconditioning limits can be met (Ref. 72-09-00 Repair).

12. Springs

A. Springs shall be visually examined for corrosion, damage, distortion or evidence of overheating.

B. Where a load check is specified in the relevant Chapter, the spring shall be checked on a calibrated machine designed for this purpose.

- (1) Install a slip gauge of the specified spring length in the machine, bring the compression pad into contact with the gauge and zero the dial test indicator (dti); remove the gauge.
- (2) Install the spring in the machine and lower the compression pad to compress the spring until the dti reads zero.
- (3) Read off the spring load on the load scale. This load must be within the limits specified for the spring in the relevant Chapter.
- (4) Remove the spring from the machine.

C. Springs which fail the visual examination or the load check shall be scrapped.

13. Light Band Surface Flatness Check

A. General.

- (1) This check is used to determine the flatness of surfaces on certain critical components, especially where a leak-resistant joint between running or mating components is required.

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B. Prepare the Component.

- (1) Lightly lap the surface to be checked to remove any slight burrs.
- (2) Degrease the component using a clean, lint-free cloth moistened with a group 1 or 3 solvent (Ref.72-09-00 - Cleaning)
- (3) Polish the surface to be checked using a clean, dry, lint-free cloth.

C. Examine the Component (Ref.Fig.303).

- (1) Switch on and warm up the monochromatic helium light source.
- (2) Place the component, surface to be checked up, centrally in the illuminated area.
- (3) Place the optical flat, working surface (indicated by arrow) down, centrally on top of the component.
- (4) Examine the light band pattern displayed at the component/optical flat interface (Ref.Fig.304).

NOTE: An acceptable pattern should have well defined bands of uniform width. The bands should be straight or uniformly curved. If they are curved, a straight line drawn tangentially to the centre of one band must not intersect more than the number of bands specified in the applicable Chapter.

NOTE: The configuration of most components which are checked by this method is such that the overall pattern of light bands will have to be estimated from the portion of the pattern actually displayed.

- (5) If the pattern displayed indicates that the component is not acceptable, repeat the lapping, degreasing and polishing procedure, then re-check the component. Reject the component if still not acceptable.
- (6) Temporarily protect the component using approved dewatering oil.

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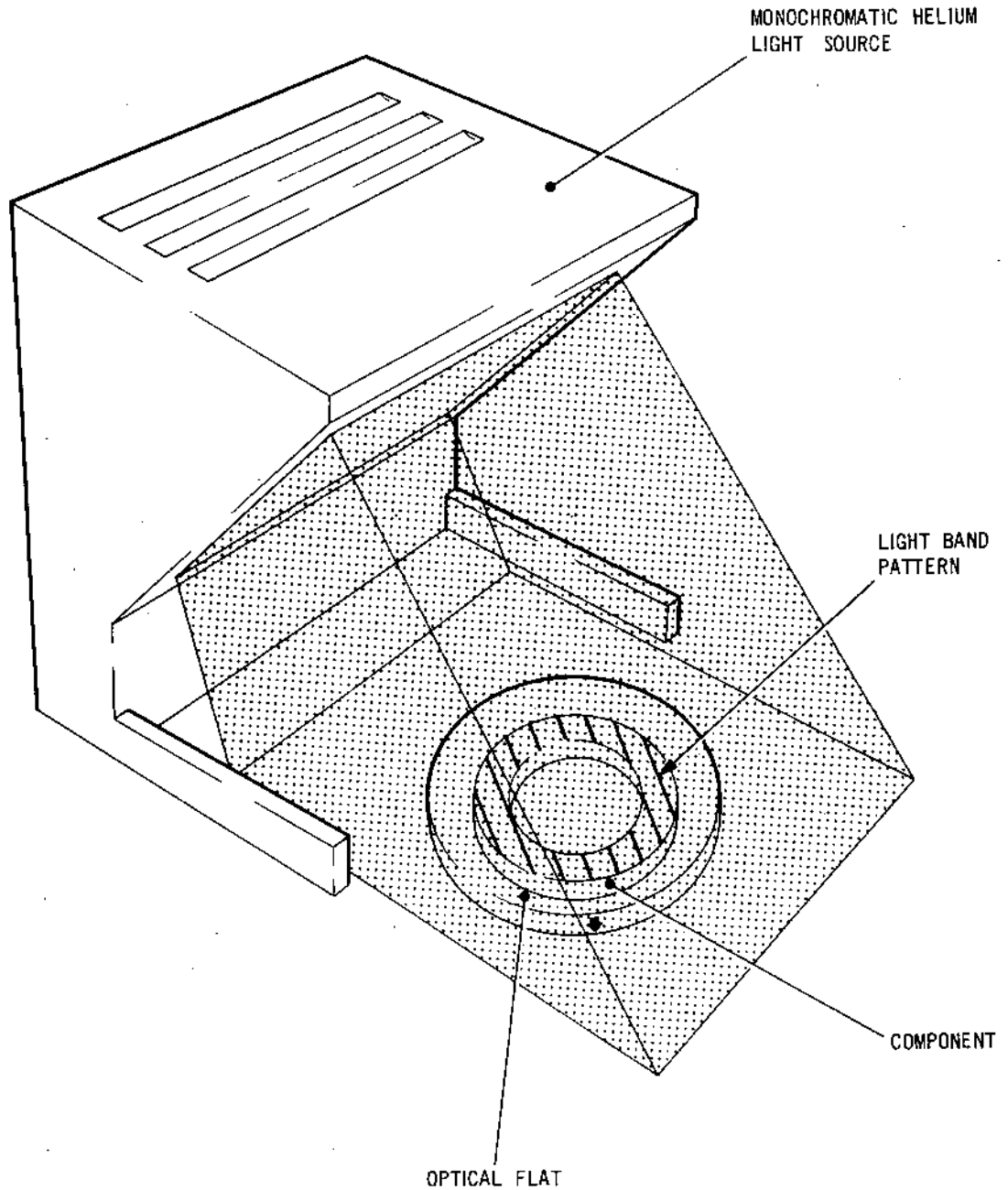
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Light Band Surface Flatness Check
Figure 303

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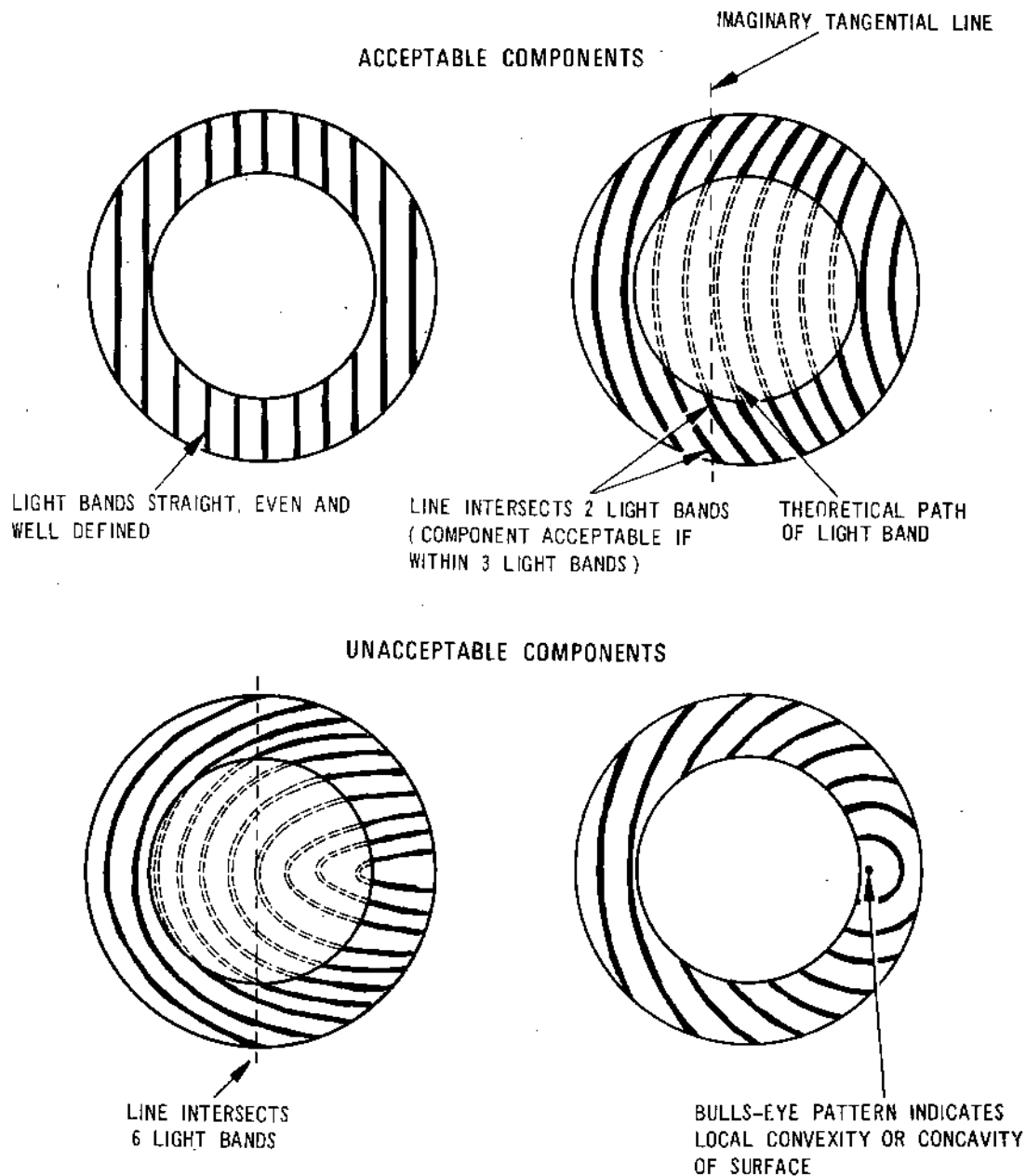


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Examples of Light Band Patterns
Figure 304

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14. Squareness Checks on Splined Components

NOTE: For the purposes of squareness checks the master spline on internal splines will count as two splines with one serration uncut, conversely the master slot on external splines will count as two serrations with one spline removed.

A. General.

- (1) This check is used to ensure that distortion has not occurred during engine run and that compatibility of mating components is maintained.

B. Prepare the Component (Ref.Fig.305).

- (1) Select four equally spaced splines as datum points for the dimensional checks. A convenient method of identifying the correct splines is as follows.

NOTE: The dimensions, on a component containing 87 splines and pitched as for 88 for example, are taken across 22 splines.

- (a) Establish the number of splines on the component and identify the master spline.
- (b) Identify the second spline clockwise from the master spline. Temporarily mark this spline (Ref.para.3) and identify it as No.1 spline. Continuing clockwise, identify and mark the four splines required for the dimensional check e.g. in the case of a spline pitched as for 88 splines, the 22nd, 44th, 66th and 88th splines clockwise from the No.1 spline will be marked. Ensure that the 88th spline, as in the example, is immediately anti-clockwise of No.1 spline. Recheck if necessary.

- (2) Mark the selected splines (Ref.para.3).

C. Carry Out Dimensional Check.

- (1) Using suitable inspection equipment, determine the squareness of the component by taking the dimensions across the flanks of the marked splines.
- (2) Check and record the dimensions for each component as specified in the Fits and Clearances Schedule.

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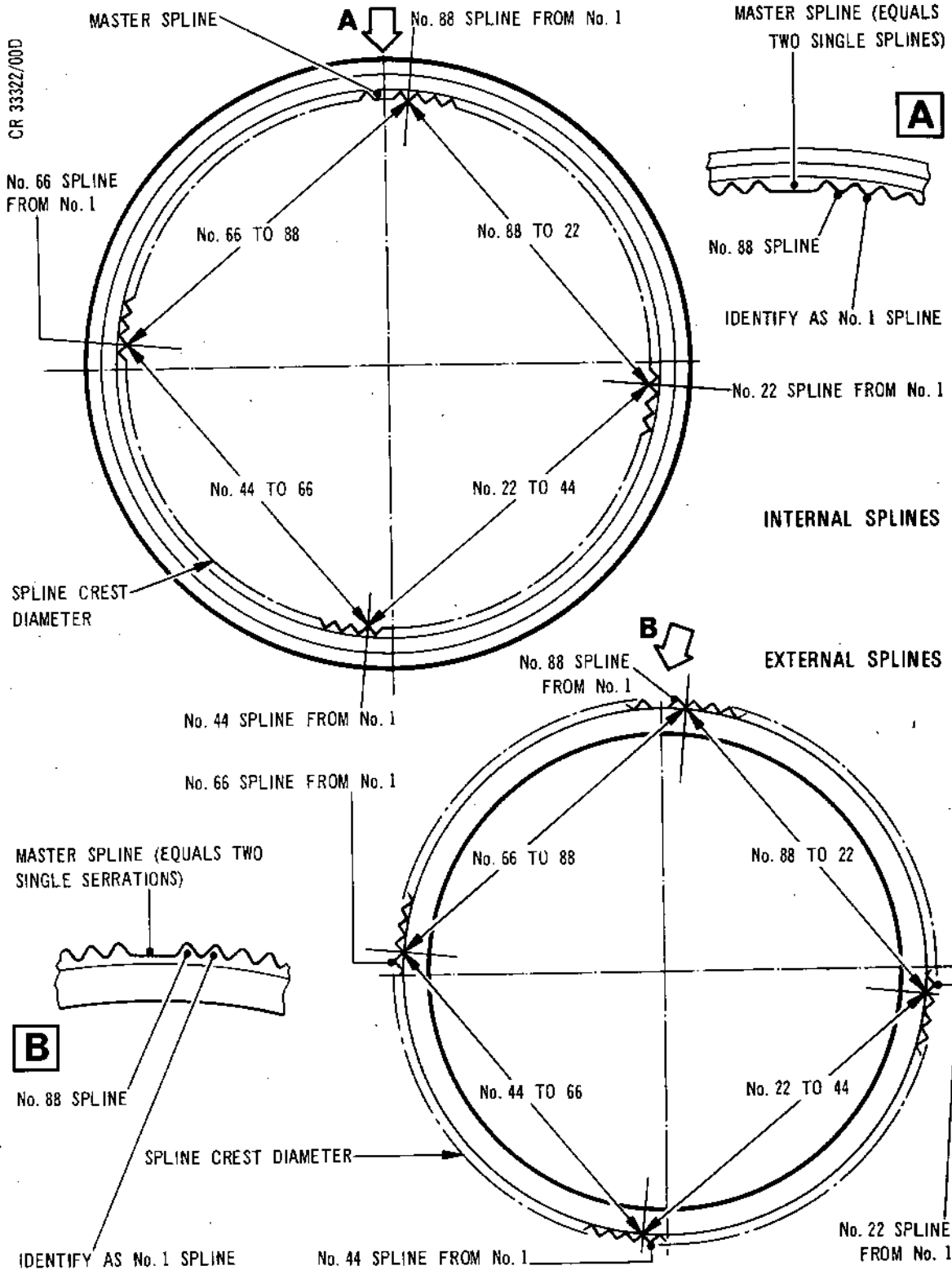
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Examples of Squareness Checks
Figure 305

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15. Identification of Components

A. General.

- (1) With the exception of small items, each component will be identified by series of alpha-numerics, the numbers off, position and form of markings will vary, depending on the components size, shape and material. The various alpha-numerics that may be found and what they represent are detailed as follows.


B. Material Batch/Code Number.

- (1) The batch/code number is the manufacturers identification of where and when the component was produced and is recorded on the data recording/retrieval inspection records. It is identified by a , followed by letters denoting the contractor, and numbers denoting when the batch was produced. The symbol may point towards, or be above the batch/code numbers as space dictates. A letter C preceding the symbol denotes the component is subject to Customs and Excise control.

Examples  BAA99  RAZ80 C  AZA66

- (2) The batch/code number will not exceed five digits, but an oblique stroke followed by additional code letters and/or numbers will refer to a heat treatment that has been carried out on the item. The heat treatment identification will not be recorded on the data recording/retrieval inspection records.

C. Locational Code/Serial Number.

- (1) The code/serial number is the manufacturers identification of where the component is produced and is recorded on the data recording/retrieval inspection records. Each single piece component or a fabricated component with two or more pieces of material that are permanently joined will be identified by a , while an assembly will be identified by an O. In each instance the symbol will be followed by a location serial number.

Examples  RBC23  BAB60  CE567  WB432

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D. Part Number.

- (1) The part number is the manufacturers identification of a component. Each component or a fabricated component that is permanently joined will be identified by a letter B followed by six numbers. The part number is the reference used in the Illustrated Parts Catalogue for ordering spares or replacing components. B numbered components with a PM suffix are supplied in the part machined form.
- (2) If the component is without a B identification, it will be a National Standards Part component and may be identified by A, SP, AGS, AS, AN, MS, NAS, FBS, FB, UBS or U.

E. Salvage Number.

- (1) The salvage number will only be found on components that have had a repair carried out and will be identified by a SAL. B. followed by six numbers.

Example SAL. B.476923

- (2) During manufacture minor defects, corrections, faults etc. may have been accepted by minor concessions, with possible minor salvage which will be identified by an MC or CON.

F. Miscellaneous Numbers.

- (1) Bevel gears will have a mounting distance MD number which is a dimension used in the manufacture of the gears and will be required during the setting up of the gears to their correct position during assembly. Other markings found on gears may be SET and TV.
- (2) Components may have a laboratory identification L followed by numbers, which will refer to a manufacture heat treatment, or some other process.
- (3) Depending on the component and whether it has had numerous forms of machining, or is fabricated, inspection checks denoted by a BA may have been applied. The BA and a number may be contained in a circle.

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16. Fluorosilicone Face Seals

A. General.

- (1) All fluorosilicone face seals are re-usable.
- (2) Any damaged seals and those not acceptable to the limits set out below are to be returned to the manufacturer for rebonding, a recommended minimum economical batch for repair will be 20.

B. Examine Fluorosilicone Face Seals.

- (1) Examine the fluorosilicone bonding to ensure positive attachment to the plate.
- (2) Check the stand up of the seal lip from the plate ensuring a minimum stand up of 0.005 in. (0,130 mm).
- (3) Examine the primary and secondary rubber sealing rims to ensure that they are completely intact around their circumference and are free of any cuts and nicks.
- (4) Reject the fluorosilicone seal for repair where any defects are found.
- (5) Examine fluorosilicone seal plate for nicks, burrs, wear, distortion and corrosion.
- (6) Reject the seal plate for renewal where any defects are found.

TERM AND ASSOCIATED TERMS	DEFINITION
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Battered (Damaged
by Impacts)

Damaged by repeated blows or impacts
(not humanly inflicted).

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TERM AND ASSOCIATED TERMS	DEFINITION
Bent (Creased, Folded, Kinked or Leaning)	Sharp deviation from original line or plane usually caused by lateral force. Examples are: kinked pipe, creased or folded sheet metal.
Binding (Sticking or Tight)	Restricted movement such as tightened or sticking condition resulting from high or low temperature, foreign object jammed in mechanism, etc.
Bowed	Curved or gradual deviation from original line or plane usually caused by lateral force and/or heat.
Brinelled	Surface indentations on bearing races usually caused by repeated shock loading of the bearing, i.e., ball or roller indentation.
Brittle (Perished)	Resilience of material not to specification.
Broken (Fractured)	Separated by force into two or more pieces.
Bulged (Ballooned or Swollen)	Localized outward or inward swelling usually caused by excessive local heating and/or differential pressure.
Burned (Charred)	Destructive oxidation usually caused by higher temperature than the parent material can withstand.
Burr	A rough edge or a sharp projection on the edge or surface of the parent material.

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Table 321 (Continued)

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TERM AND ASSOCIATED
TERMS

DEFINITION

Carboned (Carbon covered, Carbon tracked or Coked)	Accumulation of carbon deposits.
Chafed (Scraped or Scuffed)	Frictional wear damage usually caused by two parts rubbing together with limited motion.
Chipped	A breaking away of the edge, corner or surface of the parent material usually caused by heavy impact (not flaking).
Collapsed (Crushed)	Inward deformation of the original contour of a part usually due to high pressure differentials such as a collapsed bellows.
Corroded (Rusted, Oxidation, Etched or Sulphidation)	Gradual destruction of the material by chemical action. Often evidenced by oxide build-up on the surface.
Cracked	Visible (not requiring special fluorescent or magnetic penetrants) partial separation of material which may progress to a complete break.
Crossed	Material damage to parts (as in the case of crossed threads) or part rendered inoperative (as in the case of crossed wires) as a result of improper assembly.
Curled	A condition where the tip(s) of compressor blades or turbine buckets have been curled over due to rubbing action.

Inspection Terminology
Table 321 (Continued)

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TERM AND ASSOCIATED
TERMS

DEFINITION

Dented	An indentation usually caused by impact of a foreign object. Parent material is displaced, seldom separated.
Deposits (Metalized)	A build-up of material on a part either from foreign material or from another part not in direct contact.
Disengaged (Separated or Loose)	Applies only to a detail that is normally permanently affixed to another part.
Disintegrated (Shattered)	Separated or decomposed into fragments resulting in a complete loss of original form (e.g. disintegrated bearings).
Distorted (Buckled, Depressed, Twisted or Warped)	Extensive deformation of the original contour of a part usually due to impact of a foreign object, structural stresses, excessive localized heating or any combination of these.
Eccentric (Non-concentric)	Part(s) wherein the intended common center is displaced significantly.
Eroded	Carry away of material by flow of fluids or gases, accelerated by heat or grit.
Feathered (Edge) - Not Propeller	Thinning of material.
Flattened Out	Permanent deformation beyond tolerance limits usually caused by compression.

Inspection Terminology
Table 321 (Continued)

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TERM AND ASSOCIATED
TERMS

DEFINITION

Frayed	Worn into shreads by rubbing action.
Fused	Joining together of two materials usually caused by heat, friction, or current flow.
Galled (Fretted or Spiked)	Chafing or severe fretting caused by slight relative movement of two metal surfaces under high contact pressure.
Glazed	Undesirable development of a hard, glossy surface due to rubbing action, heat, varnish or non-uniform loading.
Gouged	Scooping out of material usually caused by a foreign object.
Grooved (Furrowed or Fluted)	Smooth, rounded furrow or furrows of wear, usually wider than scoring, with rounded corners and smooth on the groove bottom.
Indications	Cracks, inclusions, fractures, etc. not visible without fluorescent or magnetic penetrants.
Melted	Deformation from the original configuration due to heat, friction or pressure as with melted bearings or insulation.
Nicked	A sharp surface indentation caused by impact of a foreign object.
Out-of-Round (Elongated)	Diameters of part not constant.

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Table 321 (Continued)

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TERM AND ASSOCIATED
TERMS

DEFINITION

Out-of-Square	Deformation of right angle relationship of part surfaces.
Overheated (Heat discolored, Heated excessively or Hot spot)	Subjected to excessive temperature usually evidenced by change in color and appearance of part.
Peeled (Blistered, Flaked or Exfoliated)	A breaking away or flaking of surface finish such as coating, plating etc. A blistered condition usually precedes or accompanies flaking.
Peened	Closely and evenly distributed indentations caused by a multitude of impacts.
Pick-up	Transfer of metal from one surface to another. Usual cause is the rubbing of two surfaces without sufficient lubrication.
Pierced (Hole in part)	The puncturing of a material.
Pitted	Small irregular shaped cavities in the surface of the parent material usually caused by corrosion, chipping, or heavy electrical discharge.
Plugged (Clogged, Obstructed or Restricted passage)	Pipe, hoses, tubing, channeling, internal passage, etc., which are totally or partially blocked.

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TERM AND ASSOCIATED
TERMS

DEFINITION

Porous (Pock-marked or Perforation-weld)	Voids located internally, in the surface or completely through a material. Usually applied to cast material or to welds.
Rolled-over (Lipped or Turned metal)	Lipping or rounding of a metal edge.
Rubbed (Abraded)	To move with pressure or friction against another part - such as compressor rub.
Ruptured (Blown, Burst or Split)	Extensive breaking apart of material usually caused by high stresses, differential pressure, locally applied force or any combination of these. Examples: burst bellows, blown casing, etc.
Scored	Deep scratch or scratches made during part operation by sharp edges of foreign particles.
Scratched	Light narrow, shallow mark or marks caused by movement of a sharp object or particle across a surface. Material is displaced, not removed.
Seized (Frozen, Jammed or Stuck)	Parts bound together because of expansion or contraction due to high or low temperature, foreign object jammed in mechanism, etc.
Sheared (Cut)	Dividing a body by cutting action, i.e., division of a body so as to cause its parts to slide relative to each other in a direction parallel to their plane of contact.

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Table 321 (Continued)

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TERM AND ASSOCIATED
TERMS

DEFINITION

Skidding	Surface damage to ball, rollers, and races of bearings. Appearance: silvery frosted over intermittent areas of the surfaces caused by intermittent loading (as during windmilling).
Spalled (Plucked)	Sharply roughened area characterized by progressive chipping away of surface material (Not to be confused with flaking). Usual causes are surface cracks, inclusions or any similar surface injury causing a progressive breaking away of the surface under load.
Spinning	Excessive turning of bearing ring (race) causing damage.
Stretched (Growth)	Enlargement of a part as a result of exposure to operating conditions.
Stripped	A condition usually associated with threads or insulation. Involves removal of material (threads) by force.
Torn	Separation by pulling apart.
Worn	Material of part consumed as a result of exposure to operation or usage.

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17. Lapping Sealol Seals and Mating Rings

A. General.

- (1) Lapping of Sealol seals and mating rings must be carried out immediately before assembly to ensure the best possible seal. If more than one week elapses between lapping and assembly, seals and rings must be re-lapped.
- (2) Seals and mating rings must be within the dimensional limits specified in the appropriate section of Inspection/Check.
- (3) After lapping and leak testing, the seals and mating rings are to be kept together as a matched set.

B. Lapping Sealol Seals (Ref.Fig.306).

- (1) Clean the seal using a group 1 or 3 solvent (Ref.72-09-00 - Cleaning) or white spirit.
- (2) If only light lapping/polishing is required, continue with paragraph (3). If heavier lapping is required, machine lap using aluminium oxide powder (20 micro-inches (0,508 micro-metres)) suspended in Abra-lap 2E oil in the ratio of 4 oz/gallon (25 g/l). Ensure that all traces of lapping compound are removed with a group 1 or 3 solvent (Ref.72-09-00 - Cleaning) or white spirit before polishing.
- (3) Lap the carbon seal face to achieve an even, flat surface with flatness better than three helium light bands (Ref.72-09-00 Inspection/Check). For light lapping and polishing, use a ceramic lapping plate. No scores are permitted on the sealing face.
- (4) Clean the Sealol seal with a group 1 or 3 solvent (Ref.72-09-00 - Cleaning) or white spirit.

C. Lapping Mating Rings (Ref.Fig.307).

- (1) Clean the ring using a group 1 or 3 solvent (Ref.72-09-00 - Cleaning) or white spirit.

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- (2) If only light lapping/polishing is required, continue with paragraph (3). If heavier lapping is required, machine lap using Hyprez Liquid grade MM 142 (heavy removal) and M 133 (light removal) with type 990/140 lubricating fluid. Ensure that all traces of lapping compound are removed with a group 1 or 3 solvent (Ref.72-09-00 - Cleaning) or white spirit before polishing.
- (3) Hand lap and polish the mating face on a ceramic plate to obtain a flatness better than three helium light bands and a finish better than four micro-inches (0,1 micro-metres). No scores are permitted on the sealing face.
- (4) Clean the ring using a group 1 or 3 solvent (Ref.72-09-00 - Cleaning) or white spirit.

D. Vacuum Test.

- (1) Assemble the seal and the ring to the test fixture (Ref.Fig.308). Lightly lubricate the carbon face and the mating ring with engine oil, and place the seal on the ring concentrically.
- (2) Switch on the vacuum pump, open the inlet valve and close the vent valve. Evacuate to 933 millibars and close the inlet valve. Switch off the pump.
- (3) Test for two minutes. A pressure drop less than 8 millibars is acceptable. Seals and mating rings that fail this test must be re-lapped or sent for repair (Ref.72-63-05 Repair).

INSPECTION/CHECK

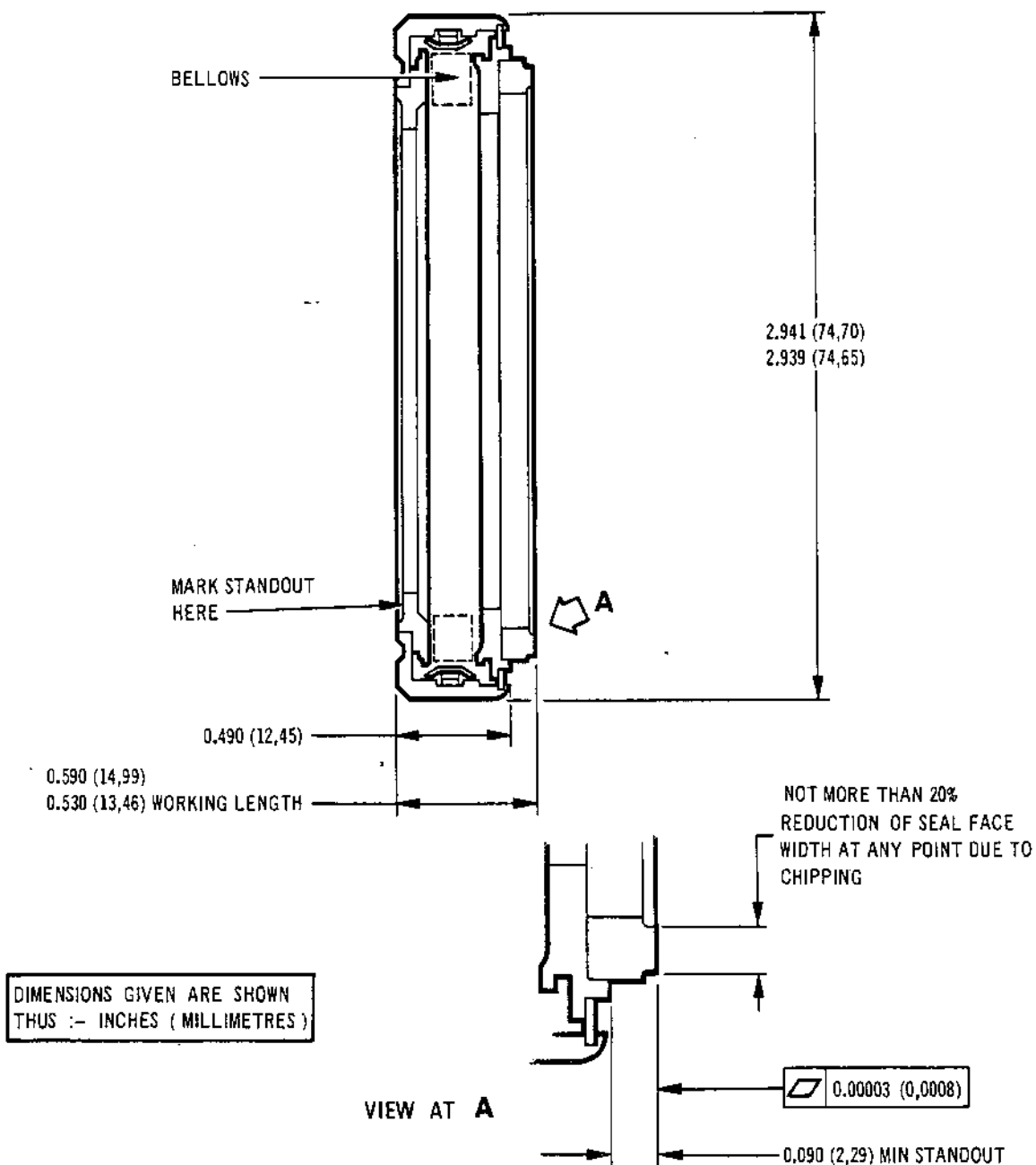
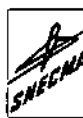
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Sealol Seal
Figure 306

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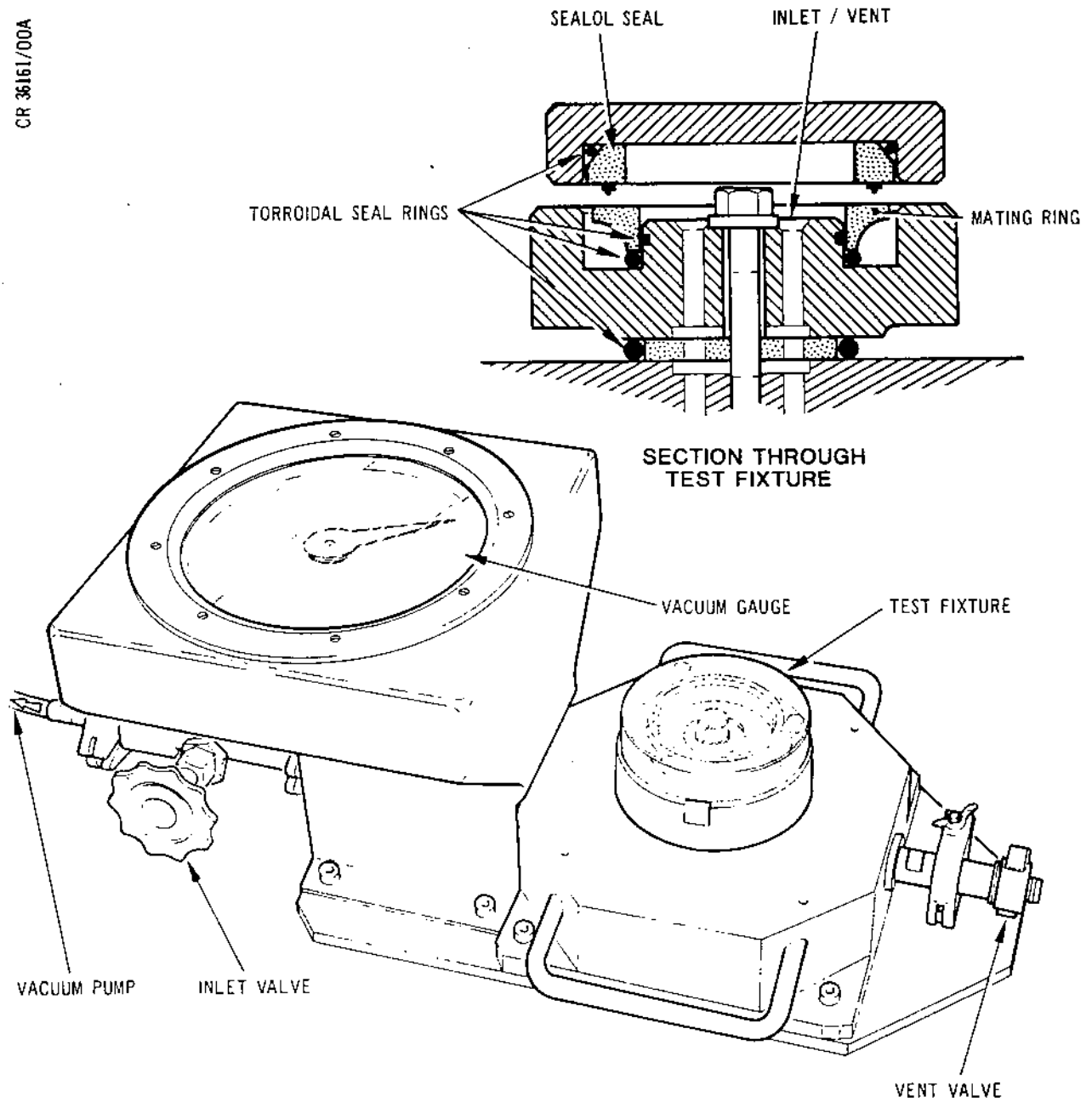
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Test Equipment
Figure 308

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18. Ultrasonic Inspection

A. General.

- (1) This procedure is an ultrasonic immersion technique for detection of defects in weld build up/substrate interface using 'C' scan presentation.
- (2) The appropriate safety regulations, relevant to the country in which the inspection is to be carried out, must be observed at all times.
- (3) Personnel involved in the preparation and application of these techniques must be fully trained and approved to the satisfaction of the Quality Assurance Authority.

B. Equipment Requirements.

- (1) High resolution ultrasonic flaw detector capable of operating between 10 and 20 MHz. The test unit must be of the pulse echo type employing the 'A' scan presentation.
- (2) Focused ultrasonic transducer (PVdF film type) with focal length between 1.57 in. and 2.75 in. (40 mm and 70 mm) and nominal frequency 10-20 MHz.
- (3) The flaw detector/transducer combination must be capable of detecting a -12 dB signal from a 0.050 in. (1,27 mm) diameter flat bottomed hole (fbh) at a depth of 0.039 in. (1 mm) below the surface and of positioning the gate to start at a depth of 0.035 in. (0,9 mm).

NOTE: The water path may be adjusted for optimum resolution.

- (4) Immersion scanning tank and recording system capable of incrementing the transducer in fine steps and recording the position of any indication detected. The equipment must be capable of varying and controlling the relative movement of the transducer and component to a scan plan, and be able to re-position the transducer over an indication site.

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- (5) The returned ultrasonic signals must be gated and the outputs monitored. The monitor gate must be capable of being interface triggered and have position and width controls. Minimum delay from front surface signal is 0.035 in. (0,9 mm) and minimum width 0.079 in. (2 mm).
- (6) The output from the monitor gate must be captured and automatically recorded so that the position of an indication can be identified for assessment later.
- (7) Calibration ring made from similar material to the component, built up with blanket weld to the correct thickness with surface finish 100 micro in. or better. An fbh 0.050 in. (1,27 mm) diameter is to be drilled to a depth corresponding to the weld/substrate interface from the inside diameter of the ring. Minimum depth of fbh is to be 0.039 in. (1 mm).

NOTE: A test ring of outside diameter 7.0 in. \pm 0.5 in. (177,8 mm \pm 12,7 mm) is suitable for inspecting shafts from 5.0 in. (127 mm) outside diameter and above. Smaller diameter shafts will require separate test rings of equal diameter to the shaft. For the LP Rotor Shaft Front (Titanium) which has an outside diameter of approximately 4.5 in. (114,3 mm), it is necessary to increase the sensitivity of the inspection by 3 dB to compensate for the smaller weld diameter.

C. Preparation.

- (1) The surface finish must be machined to 100 micro in. or better, using a round nosed tool to provide optimum near surface resolution.
- (2) Set scanning speed. The maximum scanning speed is dependent upon the test beam diameter, pulse repetition frequency and the number of signal pulses required to trigger the gate monitor alarm.

$$\text{Max scanning speed } V_{\text{max}} = \frac{dt \times P}{2 \times c}$$

where:

V_{max} = max linear in mm per second
 dt = test beam diameter
 P = pulse repetition frequency (Hz)
 c = monitor count function (normally 3 pulses)

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NOTE: The test beam diameter (dt) is defined as the diameter of the ultrasonic beam at its narrowest point within the inspection zone. It is measured between the points where the signal from an fbh, whose diameter is equal to the quality acceptance requirement, falls 6 dB in amplitude from its maximum.

- (3) Set scanning pitch. The maximum scanning pitch must not exceed half the test beam diameter.

D. Procedure.

- (1) Centralize the calibration ring on the turntable.
- (2) Normalize the transducer to the outside diameter of the calibration ring.
- (3) Rotate the calibration ring to locate the signal from the 0.050 in. (1,27 mm) fbh.
- (4) Maximise the fbh signal by adjusting the transducer position both axially and radially to ensure the ultrasonic beam is focused on the fbh.
- (5) Ensure the fbh signal is adequately resolved from the front surface echo. The minimum signal separation required is 12 dB. Optimum resolution may be achieved by adjusting the water path and calibrated pulse length/damping control.
- (6) Set the monitor gate to echo follow, using the front surface echo as the trigger. Adjust the start to begin immediately after the front surface echo and span the full width of the fbh signal to a depth of 0.079 in. (2 mm minimum).
- (7) Set the gate trigger level as follows:
 - (a) Ensure fbh signal is at maximum amplitude and adjust to 100% screen height.
 - (b) Reduce gain by 6 dB.
 - (c) Adjust gate trigger level to activate at this amplitude.
 - (d) Increase gain by 6 dB.
- (8) Scan the calibration ring to ensure the fbh signal is readily detected.

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- (9) Replace the calibration ring with the component and centralize it to the turntable.
- (10) Normalize the transducer over the areas to be scanned.
- (11) Position the transducer at the start of the scan ensuring same scan speed and increment as the calibration ring.
- (12) Scan the component for flaws at the weld/parent metal interface.

E. Completion.

- (1) Evaluate any indication found on the recording with respect to signal amplitude.
- (2) Signals at the weld/parent metal interface greater than the amplitude quoted in Quality Acceptance Standards for the particular material must be rejected.

MATERIAL	STANDARD
STEEL	0 dB
WASPALLOY	0 dB
TITANIUM	-6 dB

The 0 (zero) dB reading on the oscilloscope is equivalent to the 0.050 in. (1,27 mm) flat-bottom hole standard.

19. Measurement of Corrosion Depth

A. General.

- (1) The technique for replication and measurement of corrosion depth consists of producing a silicon rubber mould of the area to be inspected, and measuring the height of the bumps or nodules which correspond to the corrosion pits, using a calibrated microscope.
- (2) The accuracy of the pit depth measurement depends on the effectiveness of corrosion removal during the cleaning process. The cleanliness of the corrosion pits must be checked before the replication process using a binocular microscope.

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B. Corrosion Definitions.

(1) Superficial corrosion.

- (a) Light corrosion or rusting over the whole or part of the component surface. The corrosion is easily removed by light abrasion without loss of dimension of the component and, after removal, no pitting is visible to the naked eye.

(2) Light surface corrosion.

- (a) Corrosion slightly more extensive than superficial, where powdery surface deposits may sometimes be seen and where, after cleaning, the surface has become visibly roughened. The depth of the surface roughening will be less than 0.002 in. (0,05 mm). Discrete pits are not yet evident and the depth of degree of corrosion is not readily measured using the replica technique.

(3) Isolated pitting corrosion.

- (a) Small individual pits typically up to 0.005 in. (0,13 mm) depth and 0.005 in. (0,13 mm) diameter. The pits may be in groups but where necessary the minimum distance between the outer edges of the pits together with the maximum pit depth will be specified for individual areas under consideration.

(4) Coalesced pitting corrosion.

- (a) Pitting up to 0.005 in. (0,13 mm) depth and typically 0.005 in. (0,13 mm) diameter where individual pits have merged together in small areas. Acceptable pit depths together with the permissible extent of surface degradation and size of the area where the corrosion pits have merged will be specified for individual regions of the components under consideration.

C. Preparation.

- (1) Remove any protective coatings using the cleaning process specified in the appropriate section of the Overhaul Manual (Cleaning).
- (2) Remove all corrosion using the de-scaling process specified in the appropriate section of the Overhaul Manual (Cleaning).

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- (3) If examination does not follow immediately after de-scaling, protect the surface by using de-watering oil as specified in Chapter 72-09-20 Repair.

D. Inspection.

- (1) Degrease the area to be inspected by swab degreasing using a group 1 or 3 solvent (Ref.72-09-00 - Cleaning).
- (2) Inspect the corroded areas using a binocular microscope with 10 to 30 times magnification to ensure that all corrosion has been removed, and to select the worst affected areas for replication.

E. Replication.

- (1) Mask up the affected areas using masking tape or plasticene to form a reservoir for the silicon rubber mix (Ref.Fig.309).
- (2) Mix 10 parts of Silastic J silicon rubber base with one part Silastic J RTV curing agent and mix thoroughly. The resulting mixture should be a pale green in colour. Allow to stand for five minutes to eliminate air bubbles.

NOTE: The silicon rubber mix remains workable for up to one hour, after which it begins to cure. Therefore, it is recommended that only small quantities (approx. 100 g) are made up and worked with at any one time.

- (3) Work the silicon rubber mix into the surface of the affected area using a hard-bristled brush to ensure maximum penetration into the corrosion pits.
- (4) Pour the silicon rubber mix into the reservoir to form a thick layer over the affected area. When replicating disk blade root slots, the entire root slot should be filled (Ref.Fig.309).
- (5) Leave to cure for at least 12 hours at room temperature.

F. Remove Replica.

- (1) Remove the masking from the reservoir.

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- (2) Identify the silicon rubber cast by writing on it the disk slot number, or its position relative to some datum, as required.
- (3) Gently remove the replica from the surface, taking care not to touch the contact faces. Remove replicas from disks slots rearwards.
- (4) Trim excess material from the replica with a knife or scissors, ensuring that the contact surfaces are kept clean.
- (5) Place the replica in a clean plastic bag as soon as possible.

G. Protect Component.

- (1) Clean the replicated component and protect with de-watering oil as specified in Chapter 72-09-20 Repair.

H. Measure Pit Depth.

- (1) Examine the replica using a binocular microscope at 2 to 5 times magnification to identify the areas of bumps or nodules corresponding to the corrosion pits. Mark the areas with a pen.
- (2) Evaporate heavy metal (Au/Pd) onto the marked areas using a coating unit.
- (3) Examine the coated replica using a calibrated microscope with a dial gauge on the vertical focus control.
 - (a) Focus on the top of the chosen bump or nodule. Note the gauge reading.
 - (b) Focus on the base of the bump or nodule. Note the gauge reading.
 - (c) Obtain the height of the bump or nodule from the difference in gauge readings between paragraphs (a) and (b). This equals the depth of the corresponding corrosion pit.
- (4) Repeat the procedure in paragraph (3) as required for other corrosion pits.

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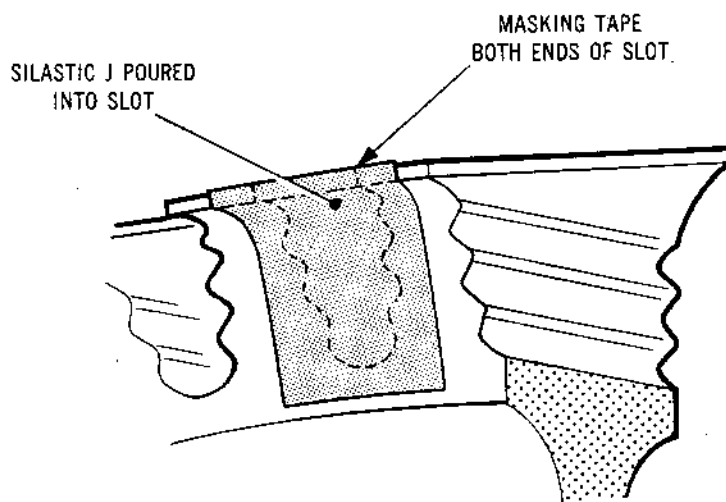
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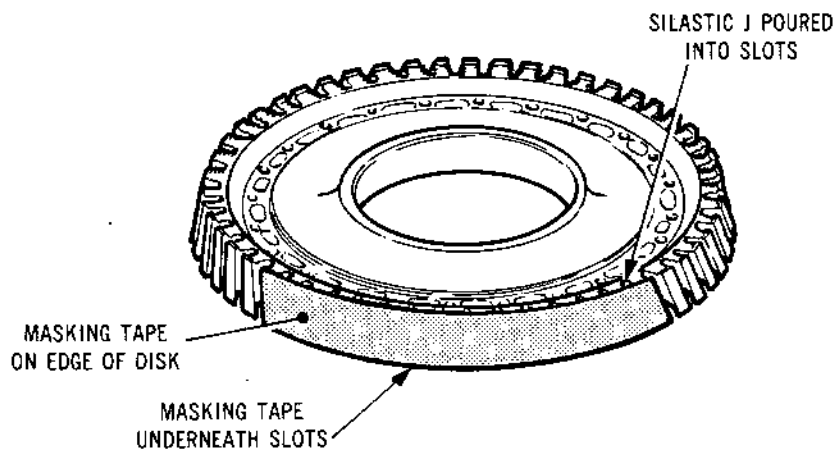


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MASKING OFF BLADE ROOT
SLOT WITH DISK UPRIGHT



MASKING OFF BLADE ROOT
SLOTS WITH DISK HORIZONTAL

Replication of Rotor Disk Root Slots
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ENGINE TURNING - INSPECTION/CHECK1. General

CAUTION: DO NOT TURN HP ROTOR ASSEMBLY UNLESS LUBRICATION HAS BEEN MADE EFFECTIVE BY ENGINE RUN. LABYRINTH RUB AND EXCESSIVE RESISTANCE TO ROTATION OCCURS WHEN BEARINGS HAVE NO OIL SQUEEZE FILM.

Provision is made for turning the HP and LP rotating assemblies using hand operated equipment. The HP assembly is turned through a drive in the right-hand gearbox, while the LP assembly is turned through a drive in the pulse probe drive and housing using the equipment installed as detailed in paragraph 3.

Two alternatives are listed, the adapter assembly allows rotation of the LP and HP rotors, whilst the adapter and immobiliser assembly allows rotation and locking of the LP and HP rotors when carrying out the in-situ blade blending operation (Ref.72-09-31 Repair).

2. Tools and Equipment

Adapter assembly	PE.20785
Universal joint	PE.22056
Preset torque wrench, for HP rotor	S3S12619000
Preset torque wrench, for LP rotor	S3S12620000
Torque adapter	T2.EP1594
Extension bar	T2.E3312
Adapter and immobiliser assembly	S3S20255000

3. General Hand Turning Equipment - Installation/Removal

A. Install LP Turning Equipment (Ref.Fig.301, Detail A).

- (1) Remove the bolts securing cover to the pulse probe drive and housing flange, withdraw cover.
- (2) Assemble the universal joint and the adapter to the cover flange.
 - (a) Engage universal joint drive with drive in the pulse probe drive and housing.
 - (b) Position adapter on cover flange and, with assembly pin and universal joint engaged, press adapter to abut the cover flange.

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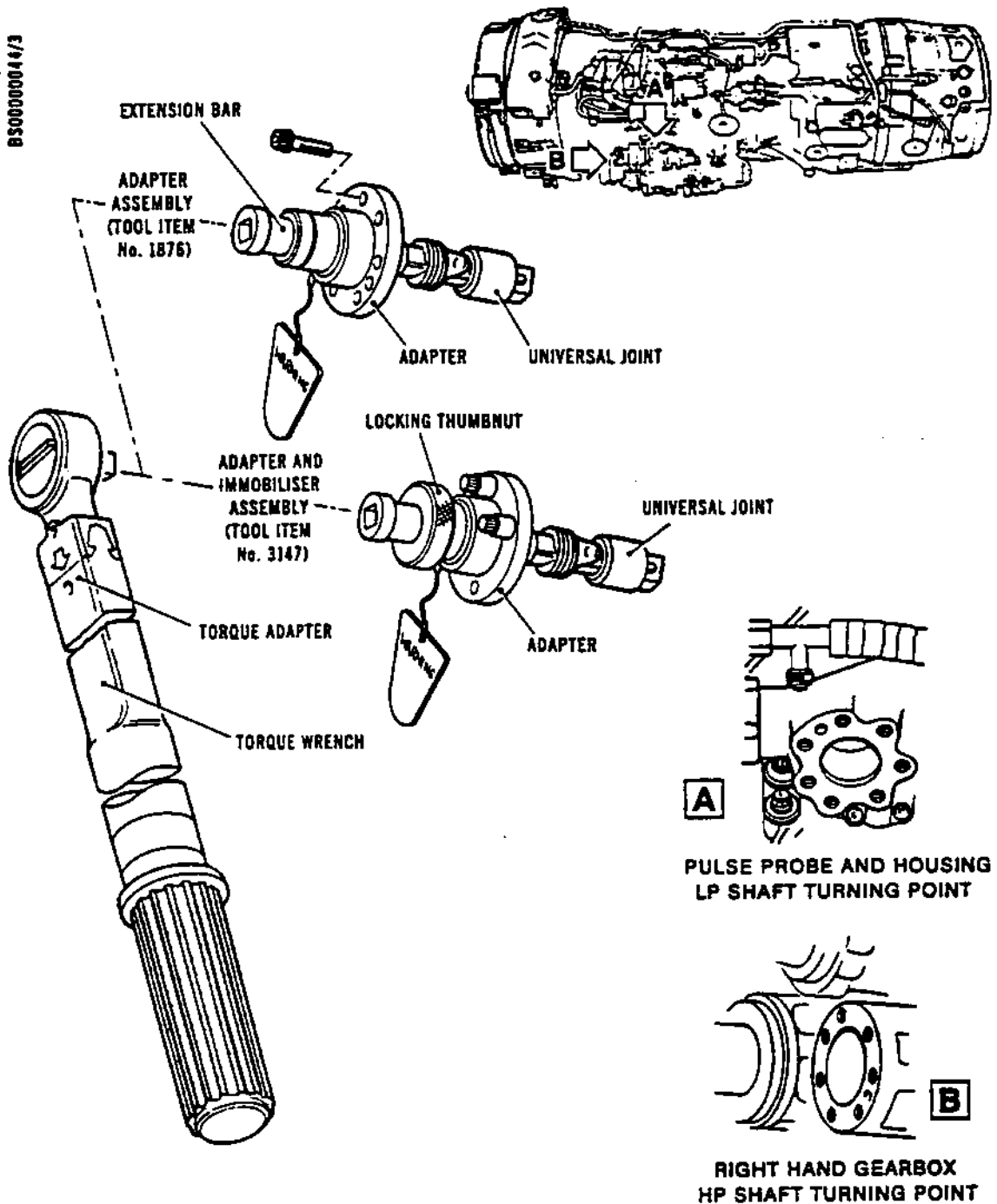
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General Hand Turning Equipment -
LP and HP Rotating Assemblies
Figure 301

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- (c) Secure the assembly with three equally spaced bolts torque-tightened to between 85 and 95 lbf in. (9,6 and 10,7 N.m) with lubricant A applied.
- (3) Engage the extension bar square drive in the universal joint and assemble the torque adapter to the extension bar.
- (4) Pre-set a torque wrench to between 150 and 180 lbf in. (16,9 and 20,3 N.m) and assemble to the torque adapter.
- (5) Apply a gradual force at the torque wrench to turn the LP rotating assembly.

NOTE: The torque wrench is pre-set to prevent excessive loading should a sudden force be applied.

- (6) If the adapter and immobiliser is being used, hand-tighten the thumbnut to lock the LP rotor in the required position.

B. Install HP Turning Equipment (Ref.Fig.301, Detail B).

- (1) Remove bolts and washers securing blank cover to engine right-hand gearbox cover flange. Withdraw cover.
- (2) Assemble the universal joint and the adapter to the cover flange.
 - (a) Engage universal joint drive with drive in the right-hand gearbox.
 - (b) Position adapter on cover flange and, with assembly pin and universal joint engaged, press adapter to abut the cover flange.
 - (c) Secure the assembly with three equally spaced bolts torque-tightened to between 90 and 100 lbf in. (10,2 and 11,3 N.m) with lubricant A applied.
- (3) Engage the extension bar square drive in the universal joint and assemble the torque adapter to the extension bar.
- (4) Pre-set a torque wrench to between 360 and 400 lbf in. (40 and 45 N.m) and assemble to the torque adapter.

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- (5) Apply a gradual force at the torque wrench to turn the HP rotating assembly.

NOTE: The torque wrench is pre-set to prevent excessive loading should a sudden force be applied.

- (6) If the adapter and immobiliser is being used, hand-tighten the thumbnut to lock the HP rotor in the required position.

C. Remove LP Turning Equipment.

- (1) Remove the torque wrench and torque adapter and withdraw extension bar.

NOTE: If the adapter and immobiliser is being used, the thumbnut must be loosened before the extension bar can be withdrawn.

- (2) Remove the bolts securing the adapter to the flange, remove the adapter and withdraw the universal joint.

CAUTION: FAILURE TO CORRECTLY RE-ASSEMBLE THE COVER, INCLUDING THE USE OF A NEW GASKET, WILL LEAD TO RAPID LOSS OF ENGINE OIL CONTENTS DURING FLIGHT.

- (3) Ensure that the cover and new gasket are to the same Service Bulletin standard (Ref. S.B.0L.593-72-41), then assemble gasket and cover to the pulse probe drive and housing flange and secure with seven bolts torque-tightened to between 85 and 95 lbf in. (9,6 and 10,8 N.m) with lubricant A applied.

D. Remove HP Turning Equipment.

- (1) Remove the torque wrench, withdraw the torque adapter and extension bar.

NOTE: If the adapter and immobiliser is being used, the thumbnut must be loosened before the extension bar can be withdrawn.

- (2) Remove the bolts securing the adapter to the gearbox cover flange, remove the adapter and withdraw the universal joint.

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CAUTION: FAILURE TO CORRECTLY RE-ASSEMBLE THE COVER, INCLUDING THE USE OF A NEW GASKET, WILL LEAD TO RAPID LOSS OF ENGINE OIL CONTENTS DURING FLIGHT.

- (3) Ensure that the blank cover and new gasket are to the same Service Bulletin standard (ref. S.B.OL.593-72-41), then assemble gasket and blank cover to gearbox cover flange and secure with seven bolts and washers torque-tightened to between 90 and 100 lbf in. (10,2 and 11,3 N.m) with lubricant A applied.

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ENGINE INTERNAL EXAMINATION - INSPECTION/CHECK**1. General**

- A. Internal examination of the engine can be carried out with the engines in the vertical or horizontal attitude, and without dismantling the modules. The examination of the LP and HP compressor blades, turbine blades and combustion chamber is effected by the use of illuminating optical probes of various sizes inserted into the engine through ports in the engine cases. To give full examination coverage, the engine rotating assemblies are turned during the examination (Ref.72-09-01 Engine Turning).
- B. Two types of optical inspection probes are used for internal examinations. Projected light probes which have a cold light output provided by a light source box and light transmitting cable are used to examine the LP and HP compressor rotor blades and the HP and LP turbine rotor blades. Distal light probes connected to a transformer provide a hot light output from a quartz iodine bulb housed at the end of the probe and are used to examine the combustion chamber and HP turbine nozzles.
- C. To obtain permanent records of engine internal damage, photographic equipment is used in conjunction with the internal inspection procedures using the optical inspection probes.
- D. Datum blades on engines of SB.0L.593-72-25 standard can be identified by slots cut in the seventh LP and third and seventh HP compressor rotor disk. On engines of pre SB.0L.72-25 standard, paint marking may be found to have been used in some instances for datum blade identification.
- E. For identification of lubricants and jointing compounds used in this topic refer to (72-09-00 Assembly).
- F. Refer to Para.3 for the inspection acceptance standard terminology used in this topic.
- G. Certain types of blade damage can be repaired in-situ, without dismantling the engine. For details of in-situ blade blending and acceptance limits refer to 72-09-31 LP and HP Compressor Rotor Blades - Repair by In-situ Blending.

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2. Tools and Equipment

Probe (Tool 1894))	(PE.15864
)	(
Sleeve (Tool 1895))	(PE.28892
(retained on probe))	(
)	(
Probe (Tool 3080))	(S3S11561000
)	(
Sleeve (Tool 3081))	(S3S11562000
(retained on probe))	(
)	(
Probe (Tool 1896))	(PE.15865
)	(
Sleeve (Tool 1897))	(PE.28888
(retained on probe))	(
)	(
Probe (Tool 1892))	(PE.24262
)	(
Sleeve (Tool 1893))	(S3S11209000
(retained on probe))	(
)	(
Light transmitting cable)	(PE.24099
(Tool 1891))	(
)	(
Probe eye piece (Tool 1889))	(PE.15969
)	(
Right angle eye piece	...)	(S3S10360000
)	(
Light source box (Tool 1888))	(PE.24304
)	(
Extractor (Tool 1887)	...)	(PE.17283
)	(
Probe (Tool 1902))	(PE.24004
)	(
Sleeve (Tool 3082))	(PE.24135
(retained on probe))	(
)	(
Probe (Tool 1899))	(PE.15862
)	(
Transformer (Tool 1900)	...)	(PE.24310

Part of kit
PE.35891

Part of kit
PE.24288

Part of kit
PE.15889

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Probe kit	Keymed Olympus 1F6D4-20
Tube (1L))			(S3S20081001
)			(
Tube (2L))			(S3S20081010
)			(
Tube (3L))			(S3S20081020
)			(
Tube (1R))			(S3S20081030
)			(
Tube (2R))			(S3S20081040
)			(
Tube (3R))			(S3S20081050
)			(
Container)	Part of kit S3S20081000		(S3S20081060
)			(
Tube fixture (1L))			(S3S20223000
)			(
Tube fixture (2L))			(S3S20233000
)			(
Tube fixture (3L))			(S3S20234000
)			(
Tube fixture (1R))			(S3S20235000
)			(
Tube fixture (2R))			(S3S20236000
)			(
Tube fixture (3R))			(S3S20237000

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3. Terminology for Damage

A. Apply the following definitions to the terms used to describe damage:

- | | |
|------------------------|--|
| (1) <u>Bend</u> | A sharp deviation from original line or plane (associated terms: crease, fold, kink, lean). |
| (2) <u>Break</u> | A separation by force into two or more pieces. |
| (3) <u>Burn</u> | Destructive oxidation usually caused by higher temperature than the parent material can withstand. |
| (4) <u>Chip</u> | A breaking away of the edge, corner or surface of the material. |
| (5) <u>Crack</u> | Visible partial separation of material which may progress to a complete break (Ref. para (2)). |
| (6) <u>Curl</u> | Tips of blades or vanes curled over due to rubbing. |
| (7) <u>Dent</u> | An indentation usually caused by impact of an object; parent metal is displaced, seldom separated. |
| (8) <u>Distortion</u> | Excessive deformation of the original contour of the part (associated terms: buckle, depression, twist, warp). |
| (9) <u>Nick</u> | A sharp surface indentation. |
| (10) <u>Overheated</u> | Subjected to excessive temperature, usually evidenced by change in colour and appearance of the part. |
| (11) <u>Pierced</u> | Puncture of the material. |
| (12) <u>Score</u> | Deep scratch. |

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- (13) Scratch Light, narrow, shallow mark; material is not removed.
- (14) Spalled Sharply roughened area characterised by progressive chipping away of the surface material.
- (15) Tear Separation by pulling apart.

4. Prepare Probe Equipment (Ref.Fig.301)

A. Prepare and Test the Projected Light Probe Equipment.

NOTE: A power supply of 2A at 100V a.c. or 240V a.c. incorporating an earth connection is required for the light source box.

- (1) Ensure that the protective sleeve on the probe is retained in position both during use and storage.
- (2) Ensure that the cable contacts are clean, then connect the cable (Tool 1891) to the socket of the light source box (Tool 1888).
- (3) Check that the light source box (Tool 1888) is switched OFF, then set the brightness control to minimum.

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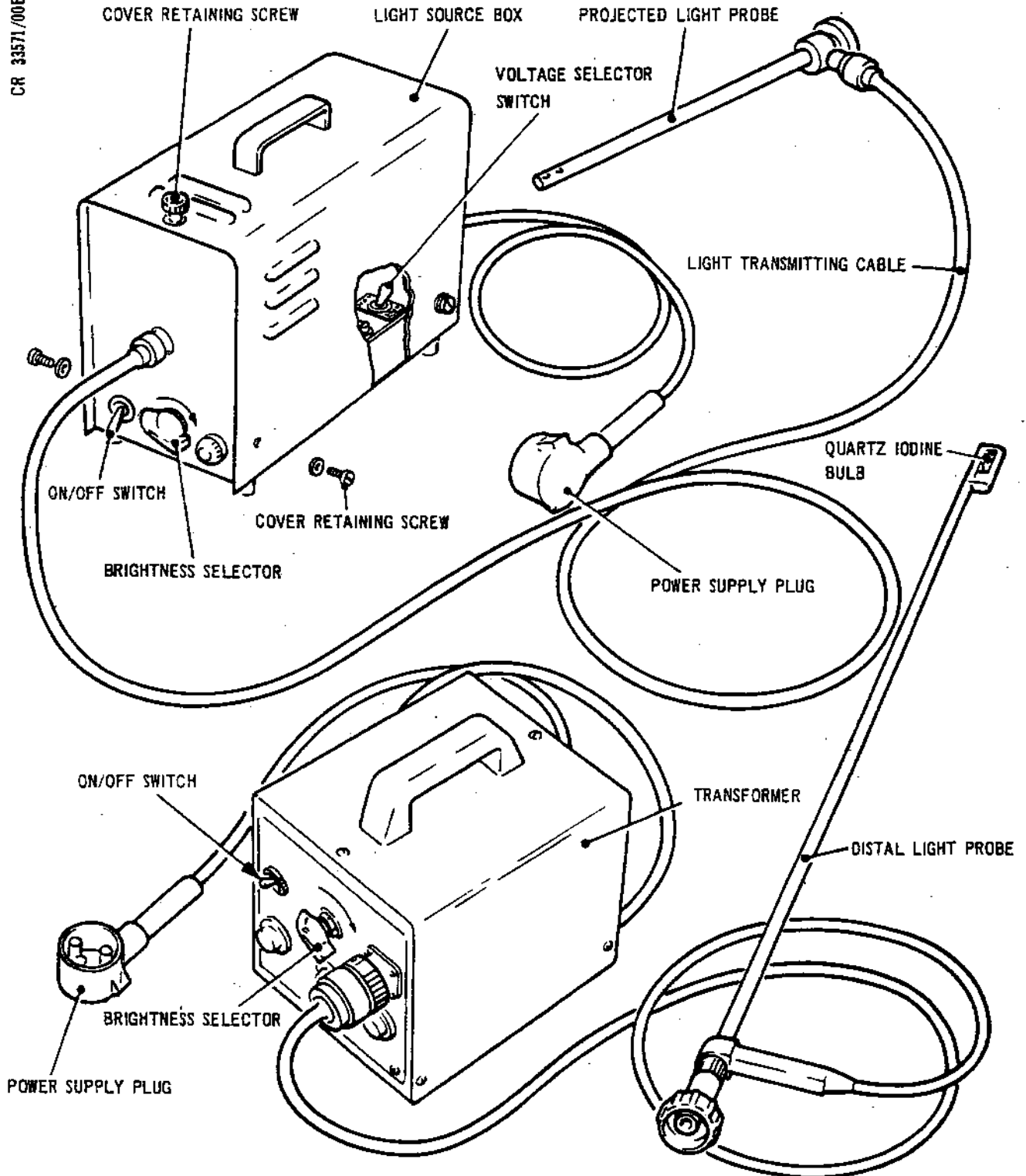
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Optical Inspection Probe Equipment
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- (4) Check the light source box voltage selector switch.
 - (a) Release the knurled screw at the top of the cover and remove the cover retaining slotted screws. Lift up the cover.
 - (b) Select either 110 V or 240 V as required.
 - (c) Assemble and secure the cover with the knurled screw and slotted screws.
- (5) Ensure that the power supply is turned OFF, then connect the light source box (Tool 1888) lead to the power supply.
- (6) Test the equipment light control.

CAUTION: DO NOT MOVE LIGHT SOURCE BOX WHILE SWITCHED ON OR WITHIN 30 SECONDS OF SWITCHING OFF. BULB FILAMENT IS NOT SHOCK RESISTANT WHEN HOT.

- (a) Switch ON the power supply.
- (b) Adjust the brightness control and check the response at the probe.
- (c) Return the control to the minimum setting, then switch OFF the light source box.

NOTE: The projected light probe is now ready for checking the LP and HP compressors and turbines.

B. Prepare and Test the Distal Light Probe Equipment.

WARNING: QUARTZ IODINE BULBS MUST NOT BE HANDLED IN SERVICE. HANDLING OF BULB WILL CAUSE SURFACE CONTAMINATION WHICH MAY CAUSE BULB TO SHATTER.

NOTE: A power supply of 2 A at 110 V a.c. incorporating an earth connection is required for the distal light probe transformer.

- (1) Ensure that the contacts are clean, then connect the distal probe (Tool 1899) to the transformer (Tool 1900).
- (2) Check that the transformer is switched OFF, then set the brightness control to minimum.

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- (3) Ensure that the power supply is turned OFF, then connect the transformer lead to the power supply.
- (4) Test the equipment light control.
 - (a) Switch ON the power supply.
 - (b) Adjust the brightness control and check the response.
 - (c) Return the control to minimum setting, then switch OFF the transformer.

NOTE: The distal probe is now ready for checking the combustion chamber (Ref. para.9.A) or HP turbine nozzles (Ref. para.10.C).

5. Dismantle Probe Equipment

NOTE: On completion of the inspection of the LP and HP compressors and turbines, and the combustion chamber, dismantle the appropriate probe equipment.

A. Dismantle the Projected Light Source Probe Equipment.

- (1) Ensure that the power supply is turned OFF, then disconnect the light source box (Tool 1888) lead from the power supply.
- (2) Disconnect the light transmitting cable (Tool 1891) from the probe and light source box.
- (3) Place the probes and the light transmitting cable in the appropriate storage container.

B. Dismantle the Distal Light Source Probe Equipment.

- (1) Ensure that the power supply is turned OFF, then disconnect the transformer lead (Tool 1900) from the power supply.
- (2) Disconnect the distal probe (Tool 1899) from the transformer.
- (3) Place the distal probe into the appropriate storage container.

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6. Examination of Stage 1 LP Compressor Rotor Blades and Stator Vanes

NOTE: The stage 1 LP compressor rotor blades and stator vanes are examined visually through the air inlet case.

A. Examine the Stage 1 Rotor Blades and Stator Vanes.

- (1) Carry out the examination of the stage 1 LP compressor rotor blades and stator vanes in conjunction with the engine inspection build records to establish the details of repaired rotor blades or stator vanes installed during assembly.
- (2) Examine the leading and trailing edges of the stage 1 rotor blades and stator vanes in accordance with the acceptance standards detailed in para.B.(1).
- (3) All acceptable damage on the stage 1 LP compressor rotor blades must be blended and polished in accordance with the in situ blending standard detailed in para.B.(2).
- (4) In-situ repair of damage outside of the acceptance standards detailed in para.B.(1) may be possible. (Refer to 72-09-31, Repair).

B. Acceptance Standards - Stage 1 LP Compressor Rotor Blades and Stator Vanes.

(1) Impact damage (Ref.Fig.303 and 305).

- | | | |
|-----|---|--|
| (a) | Any damage in zone 'A'. | Accept after repair
(Refer to 72-09-31,
Repair) |
| (b) | Damage in Zone 'A1' on stage 1 blade only not exceeding the limits in (i) to (iii). | Accept (subject to acceptance of damage in (c) and (d)). |
| (i) | Nicks or tears on one edge only and blended out to a depth (detail F) not exceeding 0.100 in. (2,5 mm). | |

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- (ii) Nicks or tears on both edges and blended out to a depth (detail F) not exceeding 0.050 in. (1,3 mm).
- (iii) Light scratches or scoring polished out.
- (c) Damage in Zone 'B' not exceeding the limits in (i) to (vi). Accept (subject to acceptance of damage in (b) and (d)).
- (i) Nicks or tears on one edge only (detail E) not exceeding in depth 0.200 in. (5,0 mm) at stage 1 blade, 0.100 in. (2,5 mm) at stage 1 vane.
- (ii) Nicks or tears on both edges (detail E) not exceeding in depth 0.100 in. (2,5 mm) at stage 1 blade, 0.050 in. (1,3 mm) at stage 1 vane.
- (iii) Dents on one surface (detail G), which do not protrude through and distort the other surface, not exceeding in diameter 0.200 in. (5,0 mm) at stage 1 blade, 0.100 in. (2,5 mm) at stage 1 vane.
- (iv) The least amount of undeformed material permissible between surface dents not less than 1.00 in. (25,0 mm) at stage 1 blade, 0.500 in. (13,0 mm) at stage 1 vane.

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- (v) Dents in one edge of blade or vane not exceeding a lateral displacement of 0.120 in. (3,0 mm).
- (vi) Light scratches or scoring.
- (d) Damage in Zone 'C' not exceeding the limits in (i) to (viii).
 - (i) Nicks and tears on one edge only (detail D) not exceeding in depth 0.500 in. (13,0 mm) at stage 1 blade, 0.200 in. (5,0 mm) at stage 1 vane.
 - (ii) Nicks and tears on both edges (detail D) not exceeding in depth 0.250 in. (6,0 mm) at stage 1 blade, 0.100 in. (2,5 mm) at stage 1 vane.
 - (iii) Dents on one surface (detail H), which do not protrude through and distort the other surface, not exceeding in diameter 0.400 in. (10,0 mm) at stage 1 blade, 0.200 in. (5,0 mm) at stage 1 vane.
 - (iv) The least amount of undeformed material permissible between surface dents not less than 1.00 in. (25,0 mm) at stage 1 blade, 0.500 in. (13,0 mm) at stage 1 vane.

Accept (subject to acceptance of damage in (b) and (c)).

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- (v) Dent in one edge not exceeding a lateral displacement of 0.500 in. (13,0 mm) at stage 1 blade, 0.250 in. (6,0 mm) at stage 1 vane.
- (vi) Tip rubbing with light curling and cracks running from the tip not exceeding in length 0.250 in. (6,0 mm) at stage 1 blade.
- (vii) The tip of the leading edge of the stage 1 blade bent at an angle of not more than 15 deg.
- (viii) Light scratches and scores.

- (2) Carry out in situ blending on all acceptable damage on the stage 1 LP compressor blades to the following standards and limitations (Ref.Fig.304).

CAUTION: DO NOT BLEND CRACKS.

- (a) Blends must be smoothly profiled into an aerodynamic shape and polished to produce a good surface finish. Where two acceptable blends interfere then metal must be removed to produce a coupled blend.
- (b) Scratching and or scoring must be polished out.
- (c) Dye penetrant inspection (Ref.72-09-00 Inspection/Check) must be carried out after all blending.
- (d) Blends occurring within 4.00 in. (100,0 mm) of the tip must be blended out towards the tip.
- (e) Blends carried out on one edge only (details D and E) must not exceed 0.600 in. (15,0 mm) and 0.250 in. (6,0 mm) in depth respectively.

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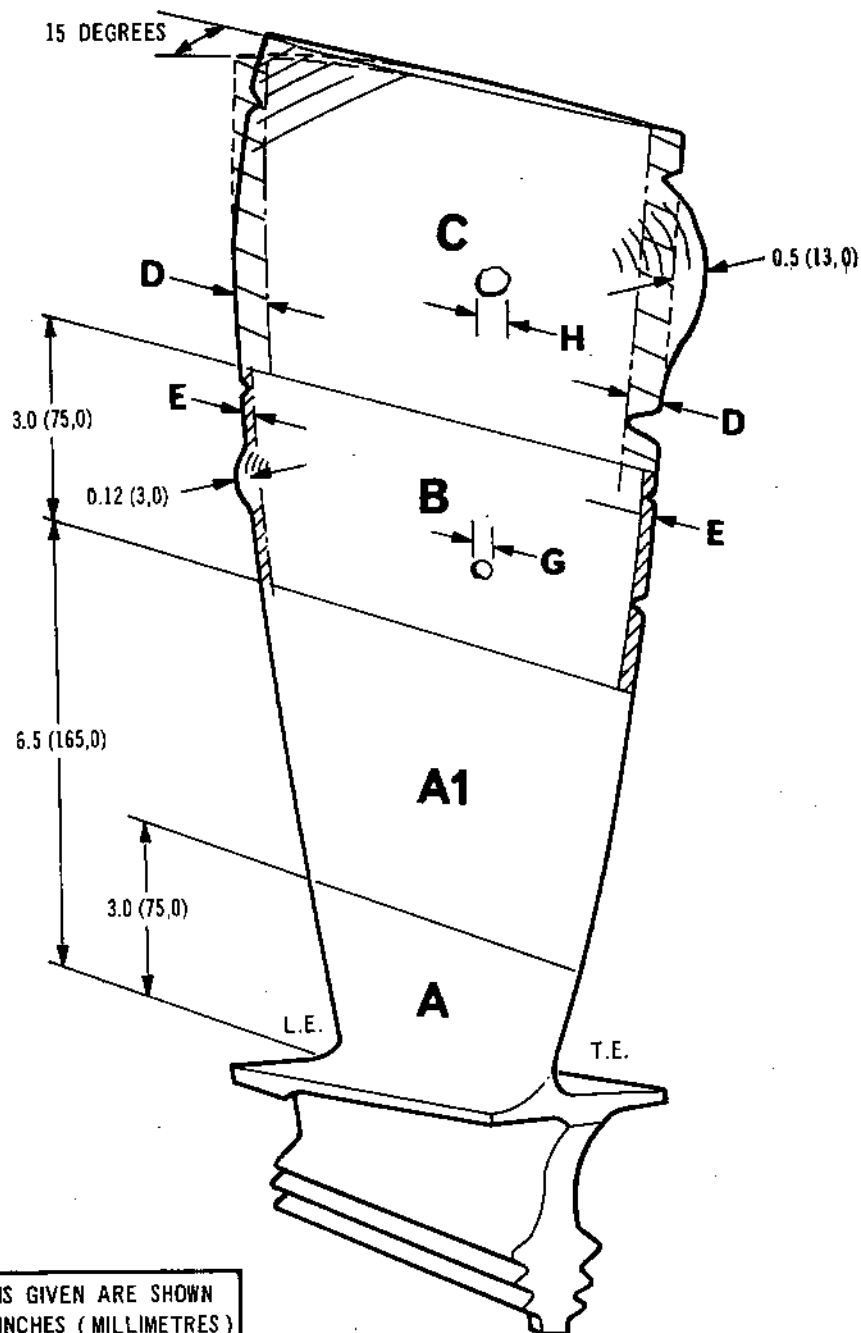


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Stage 1 LP Compressor Rotor Blade - Acceptance Standard
Figure 303

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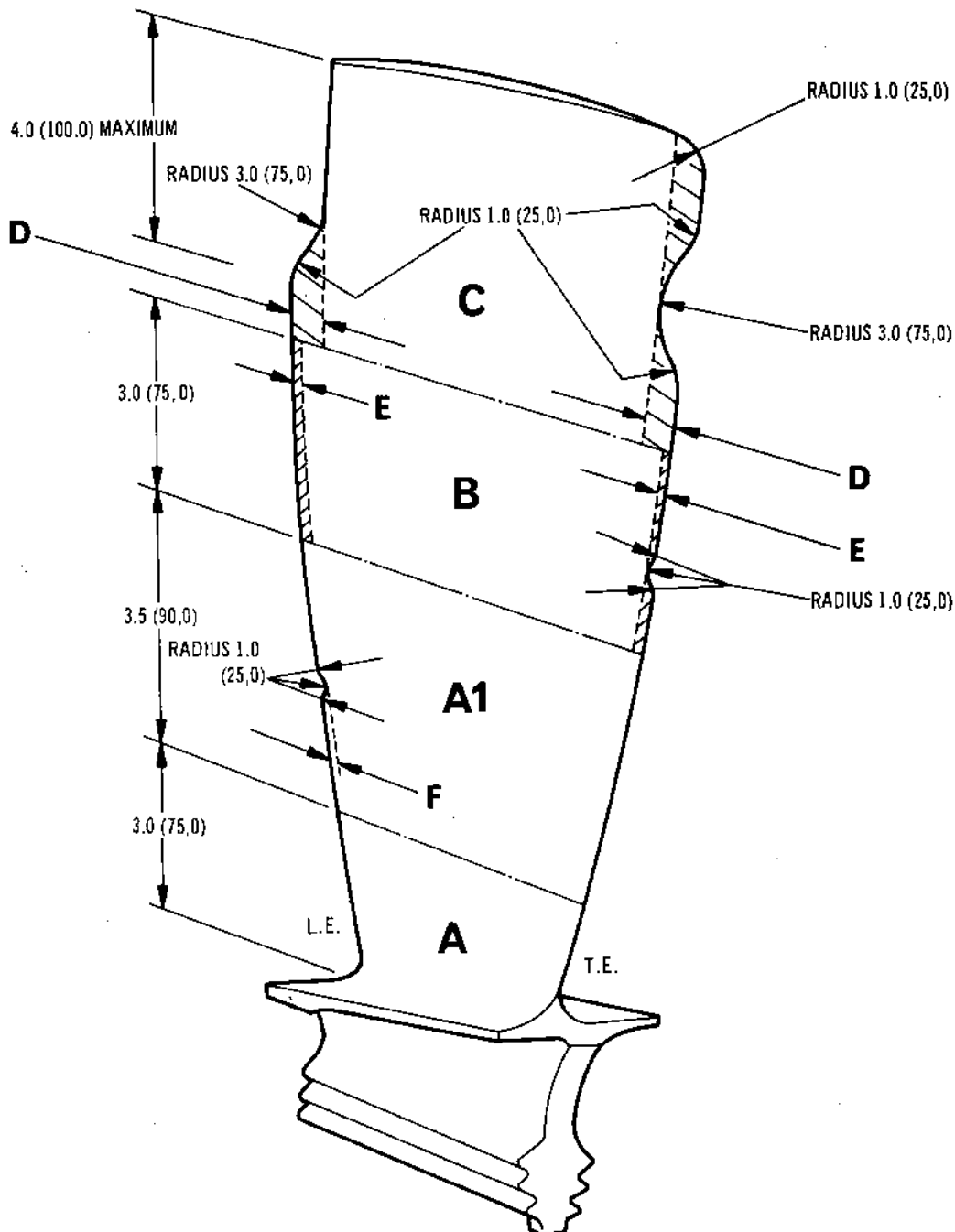
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



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Stage 1 LP Compressor Rotor Blade - In Situ Blending
Figure 304

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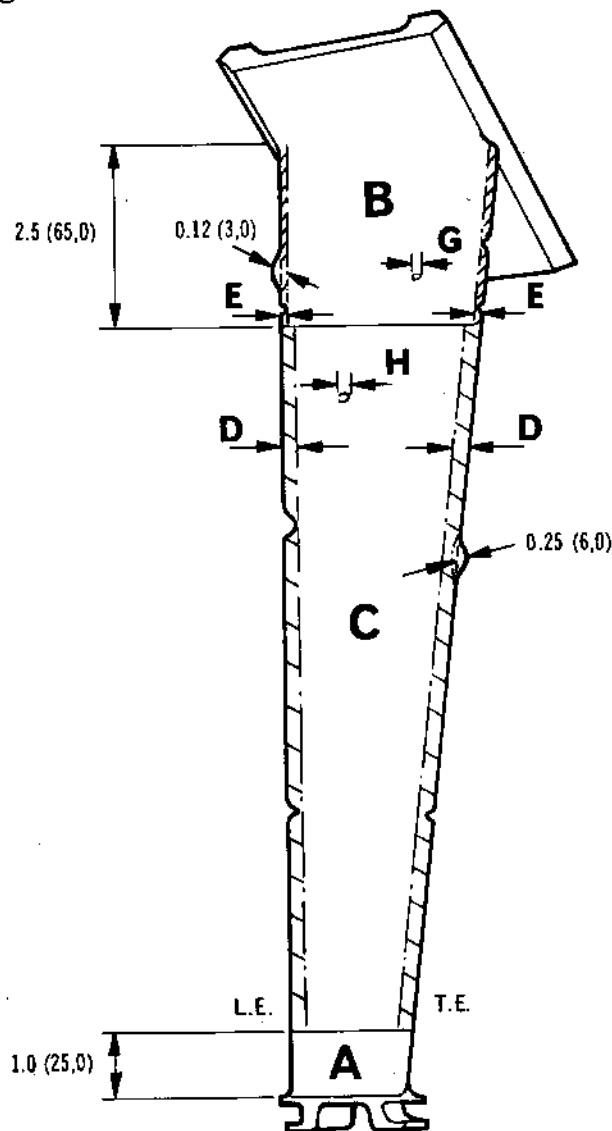
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

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Stage 1 LP Compressor Stator Vane - Acceptance Standard
Figure 305

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- (f) Blends carried out on both edges (details D and E) must not exceed 0.300 in. (8,0 mm) and 0.120 in. (3,0 mm) in depth respectively.
- (g) A maximum of two blends or one coupled blend is permitted in each zone.
- (h) Torn, rough or scored edges must be blended to a depth 20 per cent greater than the damaged depth.

7. Examination of the LP Compressor Rotor Blades

NOTE: The LP compressor rotor blades are examined by the use of optical inspection instruments inserted through inspection ports arranged in pairs at each stage of the LP compressor case, with the exception of stage 4 which has only a single port. The most convenient port of each pair to be used.

NOTE: The inspection ports for stages 1 to 6 are sealed with blanking plugs retained by bolts, and the stage 7 inspection ports are sealed with washers and screwed plugs.

A. Install the LP Compressor Turning Equipment (Ref.72-09-01 Engine Turning).

B. Prepare the LP Compressor Case for Examination (Ref.Fig.306 and 307).

- (1) Remove an accessible blanking plug from each port at stages 1 to 6.
 - (a) Remove the bolt securing the blanking plug to the plug support.
 - (b) Use the extractor (Tool 1887) and withdraw the blanking plug from the plug support.
- (2) Unscrew the blanking plug from stage 7 and remove together with the washer.

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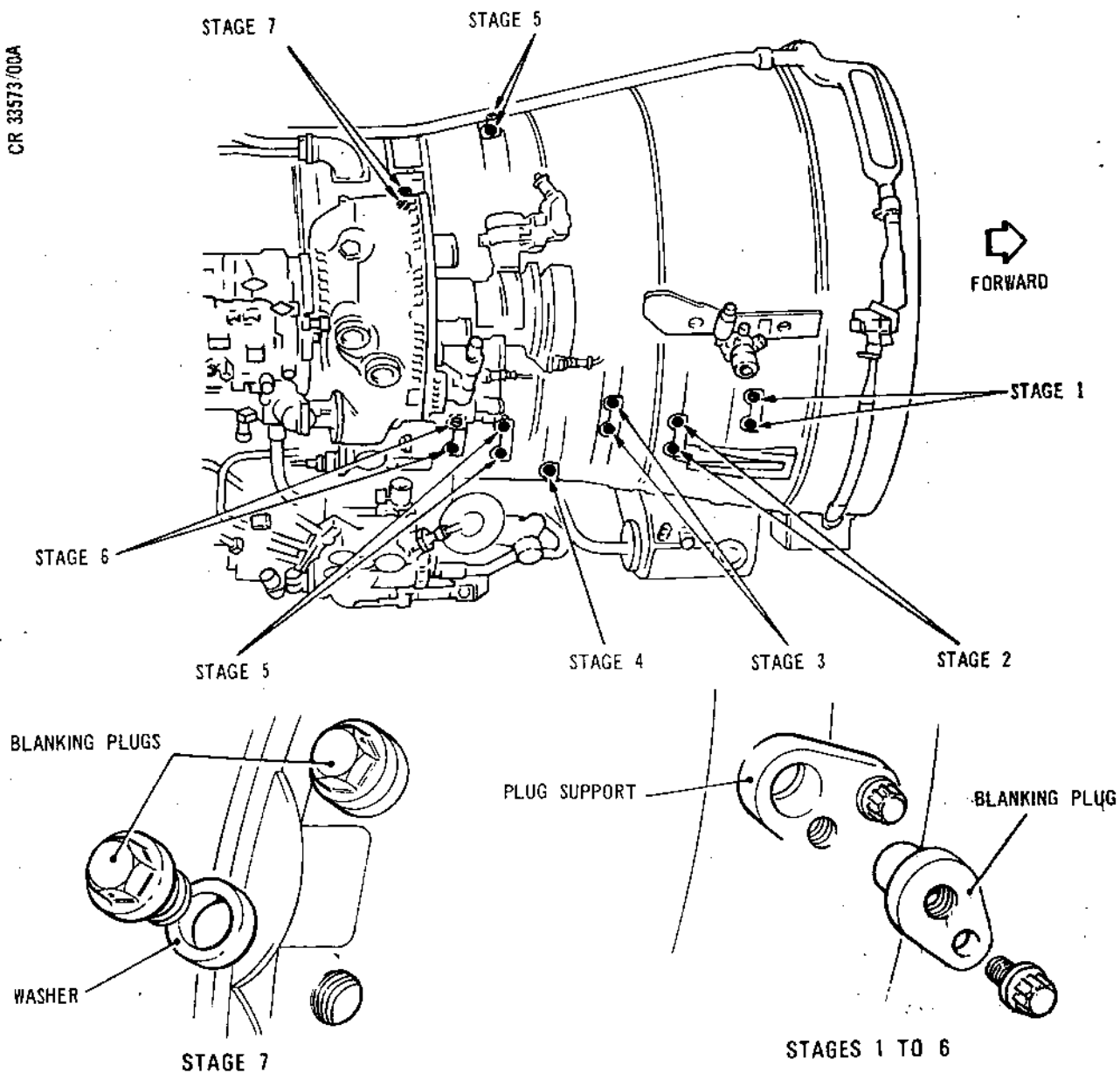
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LP Compressor Right-hand Side Inspection Ports
Figure 306

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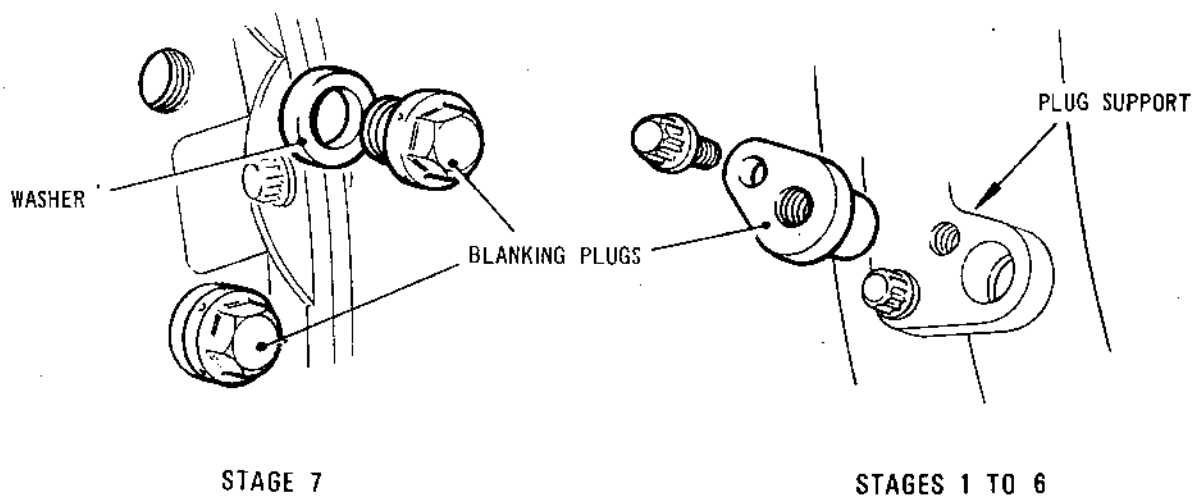
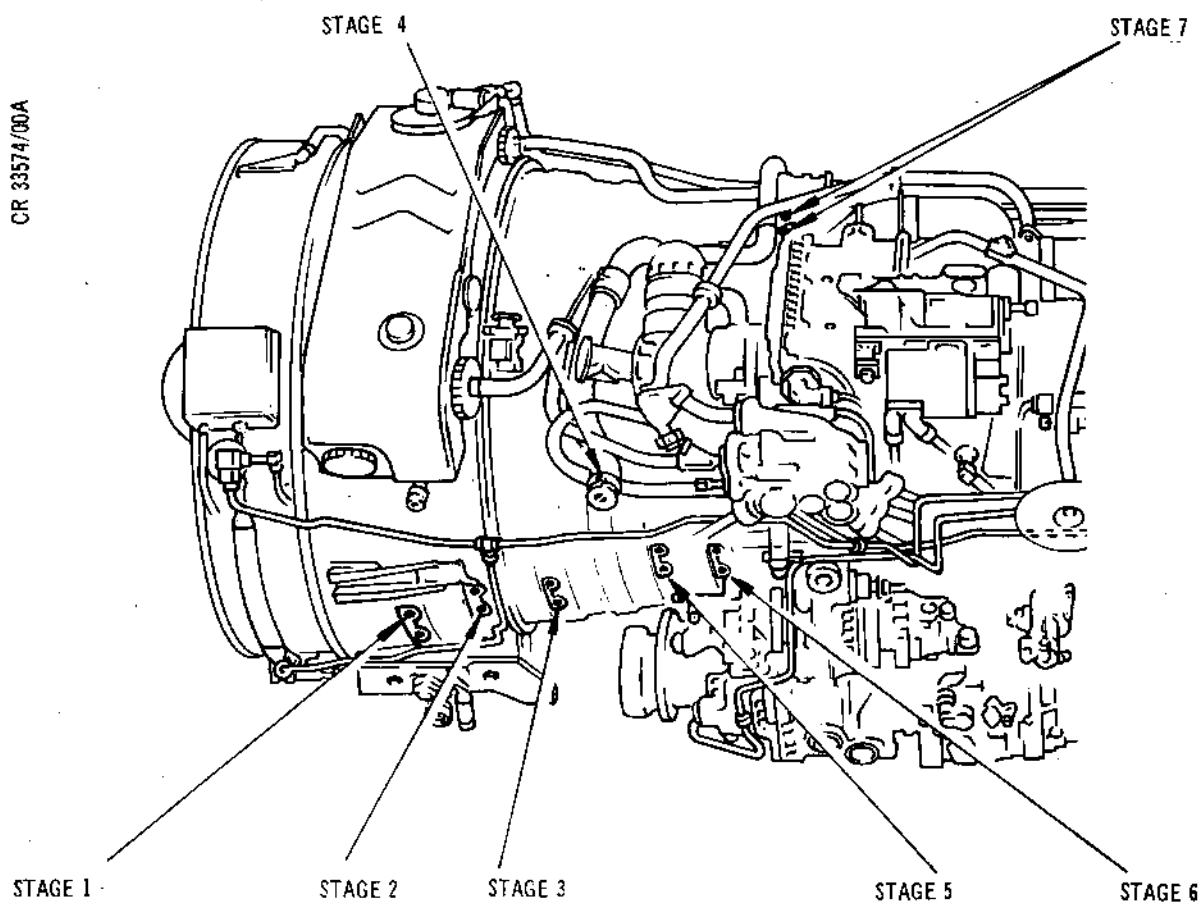


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LP Compressor Left-hand Side Inspection Ports
Figure 307

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- (3) Ensure that the optical inspection equipment (light source box (Tool 1888) and cable (Tool 1891)) have been prepared and tested (Ref. para. 4.A), then select the probes to be used at the specific locations as follows.

CAUTION: DO NOT MOVE LIGHT SOURCE BOX WHILE SWITCHED ON OR WITHIN 30 SECONDS OF SWITCHING OFF. HOT LIGHT FILAMENT IS NOT SHOCK RESISTANT.

- (a) Stages 1 to 6 probe 11 mm dia. x 19 in. (482 mm) long (Tool 1892).
- (b) Stage 7 probe 8 mm dia. x 19 in. (482 mm) long (Tool 1894).
- (c) All stages for blade roots 4,5 mm x 18.7 in. (475 mm) long (Tool 3080) or 5,5 mm x 19 in. (482 mm) long (Tool 1896).



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C. Examine the Rotor Blades.

(1) Examine each stage of the compressor blades through the locations as follows:

(a) Insert the probe and ensure free penetration.

NOTE: The protective sleeve (Tools 1893, 1895, 1897 and 3081) must be retained on the probe at all times except when removal is essential for insertion of the probe or its effective use when inserted.

(b) Switch on the probe illumination and commence examination.

NOTE: Refer to Table 301 for number of rotor blades per stage.

LP Compressor Stage	Quantity Per Stage
1	19
2	25
3	33
4	34
5	33
6	29
7	33

LP Compressor Blades
Table 301

(c) Carefully examine the blades for damage by changing the probe position or varying the depth of insertion. Turn the engine as necessary to ensure full coverage of all surfaces to be examined.

(d) Record the extent of any damage found and compare with the acceptance limits given in para.E. If a photographic record of the damage is required, use the equipment and procedures detailed in 72-09-04 Inspection/Check, or equivalent.

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- (2) On completion of the compressor examination, switch off the illumination and withdraw the probe.
 - (3) If no further examinations are required, dismantle the equipment (Ref. para.5.A).
 - (4) If no further examinations of the LP assemblies are required, remove the turning equipment (Ref.72-09-01 Engine Turning).
- D. Install the Blanking Plugs Removed for Internal Examination (Ref.Fig.306 and 307).
- (1) Apply lubricant 'B' to the bolts (72-31-01/1-30/220, 2-30/230, 3-30/230) and the stage 7 blanking plugs (72-31-02/1-130) and washers (72-31-02/1-140).
 - (2) Install each blanking plug (72-31-01/1-40/230, 2-40/240, 3-40/240) in its respective port at stages 1 to 6.
 - (a) Ensure that the blanking plug and plug support are clean and damage free.
 - (b) Carefully insert the blanking plug spigot fully into the plug support bore.
 - (c) Secure the blanking plug in position on the plug support with the retaining bolt. Torque-tighten the bolt between 85 and 95 lbf in. (9,6 and 10,7 N.m).
 - (3) Assemble the blanking plug to the port at stage 7.
 - (a) Assemble the washer to the plug and screw into the compressor case.
 - (b) Torque-tighten the plug between 160 and 180 lbf in. (18,1 and 20,3 N.m).
 - (c) Wire-lock the adjacent plugs together.
- E. Acceptance Standards - LP Compressor Rotor Blades Stages 2 to 7.

NOTE: The acceptance standards contained in this chapter are applicable to intrascope inspection only. Information on the stage 1 LP compressor rotor blades and stator vanes is contained in para.6.

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- (1) Carry out the internal examination of the LP compressor blades in conjunction with the engine inspection build records to establish details of repaired rotor blades installed during assembly.
- (2) Examine the leading and trailing edges of stage 2 to 7 rotor blades in accordance with the acceptance standards detailed in (4).
- (3) In-situ repair of damage outside of the acceptance standards detailed in para.(4) may be possible. (Refer to 72-09-31, Repair).
- (4) Impact damage (Ref.Fig.308 and 309).
 - (a) Any damage in zone 'A'. Accept after repair (Refer to 72-09-31, Repair)
 - (b) Damage in zone 'B' not exceeding the limits in (i) to (vi). Accept (subject to acceptance of damage in (c) and (d)).
 - (i) Nicks or tears on one edge only (detail E) not exceeding in depth
0.120 in. (3,0 mm)
at stage 2,
0.090 in. (2,3 mm)
at stage 3,
0.080 in. (2,0 mm)
at stages 4 to 7.
 - (ii) Nicks or tears on both edges (detail E) not exceeding in depth
0.060 in. (1,5 mm)
at stage 2,
0.050 in. (1,3 mm)
at stage 3,
0.040 in. (1,0 mm)
at stages 4 to 7.

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- (iii) Dents on one surface
(detail G), which do
not protrude through
and distort the other
surface, not exceeding
in diameter
0.200 in. (5,0 mm)
at stage 2,
0.120 in. (3,0 mm)
at stage 3,
0.100 in. (2,5 mm)
at stages 4 to 7.

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- (iv) The least amount of undeformed material permissible between surface dents not less than
1.00 in. (25,0 mm)
at stage 2,
0.500 in. (13,0 mm)
at stage 3 to 7.
- (v) Dents in one edge not exceeding a lateral displacement of
0.120 in. (3,0 mm)
at stages 2 to 7.
- (vi) Light scratches or scoring at stages 2 to 7.
- (c) Damage in zone 'C' not exceeding the limits in (i) to (vii).
 - (i) Nicks or tears on one edge only (detail D) not exceeding in depth
0.400 in. (10,0 mm)
at stage 2,
0.300 in. (8,0 mm)
at stages 3 to 5,
0.200 in. (2,00 mm)
at stages 6 and 7.
 - (ii) Nicks or tears on both edges (detail D) not exceeding in depth
0.200 in. (5,0 mm)
at stage 2,
0.150 in. (4,0 mm)
at stages 3 to 5,
0.100 in. (2,5 mm)
at stages 6 and 7.

Accept (subject to acceptance of damage in (b) and (d)).

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(iii) Dents on one surface (detail H), which do not protrude through and distort the other surface, not exceeding in diameter
0.400 in. (10,0 mm)
at stages 2 to 5,
0.200 in. (5,0 mm)
at stages 6 and 7.

(iv) The least amount of undeformed material permissible between surface dents not less than
1.00 in. (25,00 mm)
at stage 2,
0.500 in. (13,00 mm)
at stages 3 to 7.

(v) Dent in one edge not exceeding a lateral displacement of
0.250 in. (6,0 mm)
at stages 2 to 7.

(vi) Tip rubbing with light curling and cracks running from the tip not exceeding in length
0.250 in. (6,0 mm)
at stages 2 to 7.

(vii) Light scratches and scoring at stages 2 to 7.

(d) No more than 20 blades damaged throughout the LP compressor including the stage 1 rotor blades.

Accept (subject to acceptance of damage in (b) and (c)).

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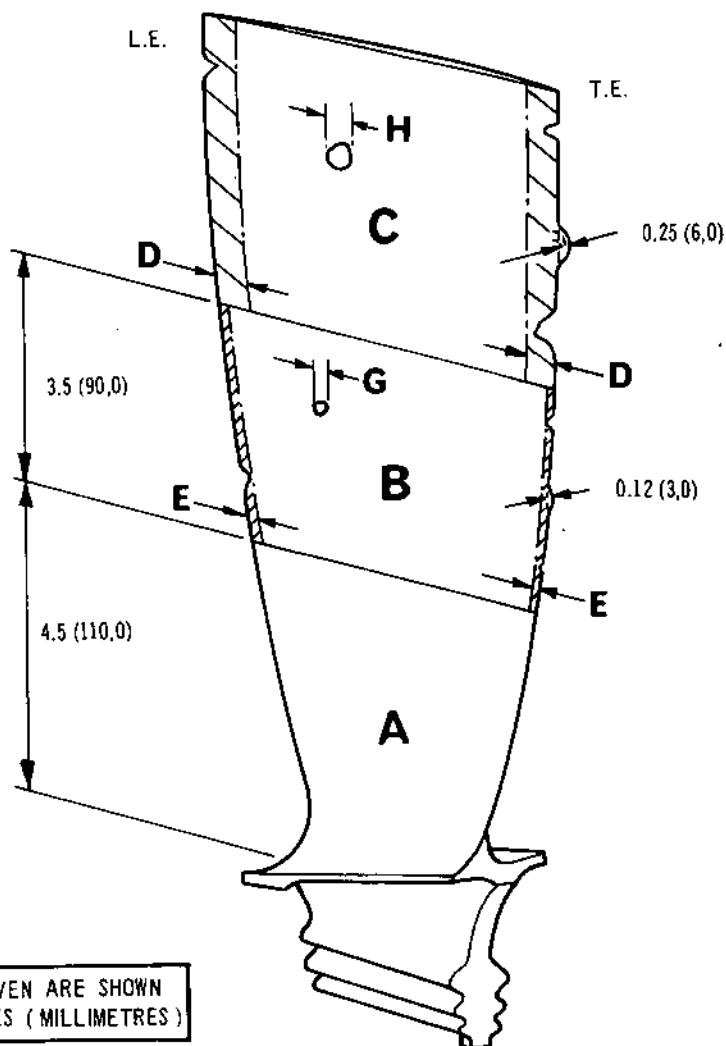


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Stage 2 LP Compressor Rotor Blade - Acceptance Standard
Figure 308

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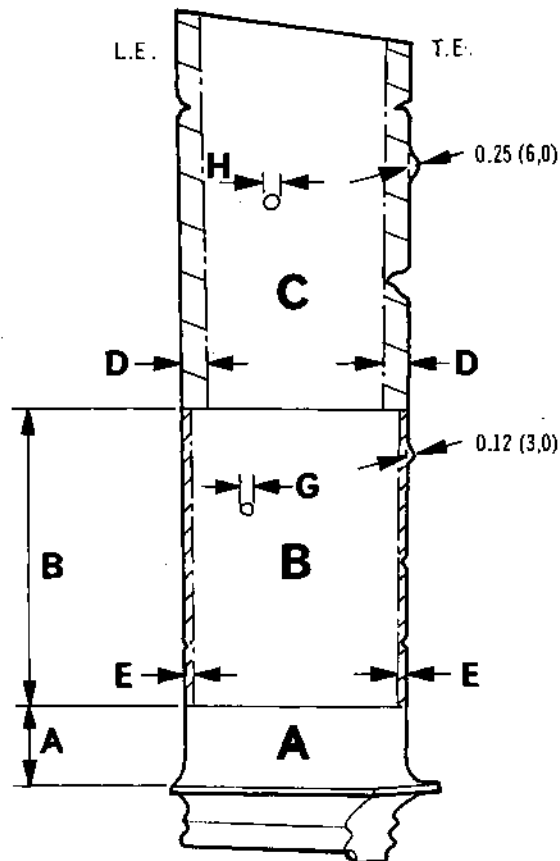
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

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STAGE	3	4	5	6	7
DIMENSION A	2.5 (60,0)	1.0 (25,0)	1.0 (25,0)	1.0 (25,0)	1.0 (25,0)
DIMENSION B	3.0 (75,0)	3.0 (75,0)	2.5 (60,0)	2.5 (60,0)	2.0 (50,0)

Stage 3 to 7 LP Compressor Rotor Blade - Acceptance Standard
Figure 309

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8. Examination of the HP Compressor Rotor Blades

NOTE: The HP compressor rotor blades are examined by the use of optical inspection instruments inserted through the most convenient of each pair of ports at each stator stage.

NOTE: The single paired inspection ports at stages 1 and 2 are sealed with blanking plugs, retaining plates and bolts and those at stages 5 and 6 with blanking plugs and washers. Twin ports at stages 3 and 4 are sealed with spherically seated blanking plugs and locknuts. Spherically seated blanking plugs are used at stage 7 ports.

- A. Install the HP Compressor Turning Equipment (Ref.72-09-01 Engine Turning).
- B. Prepare the HP Compressor Case for Examination (Ref.Fig.310 and 311).

(1) Remove an accessible blanking plug from the position at the stage to be inspected as follows.

- (a) Stages 1 and 2. Unscrew and withdraw the blanking plug. Do not remove the retaining bolts or the retaining plate.
- (b) Stages 3 and 4. Slacken the locknut, unscrew and withdraw the blanking plug complete with the locknut.

NOTE: Alternative Stage 4 blanking plug (Ref. Fig.310, Sheet 1 of 2) and Fig.311, Sheet 1 of 2). Unscrew and remove the blanking plug.

- (c) Stages 5 and 6. Unscrew and remove the blanking plug and washer.
- (d) Stage 7. Unscrew and withdraw the blanking plug.

NOTE: Alternative Stage 7 blanking plug (Ref. Fig.311, Sheet 1 of 2). Unscrew and remove the blanking plug.

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- (2) Ensure that the optical inspection equipment (light source box (Tool 1888) and cable (Tool 1891)) have been prepared and tested (Ref. para. 4.A), then select the probes to be used at specific locations as follows.

CAUTION: DO NOT MOVE LIGHT SOURCE BOX WHILE SWITCHED ON OR WITHIN 30 SECONDS OF SWITCHING OFF. BULB FILAMENT IS NOT SHOCK RESISTANT WHEN HOT.

- (a) Stages 1 to 4, probe 8 mm dia x 19 in. (482 mm) long, (Tool 1894).
- (b) Stages 5 to 7, probe 5,5 mm dia x 19 in. (482 mm) long, (Tool 1896).

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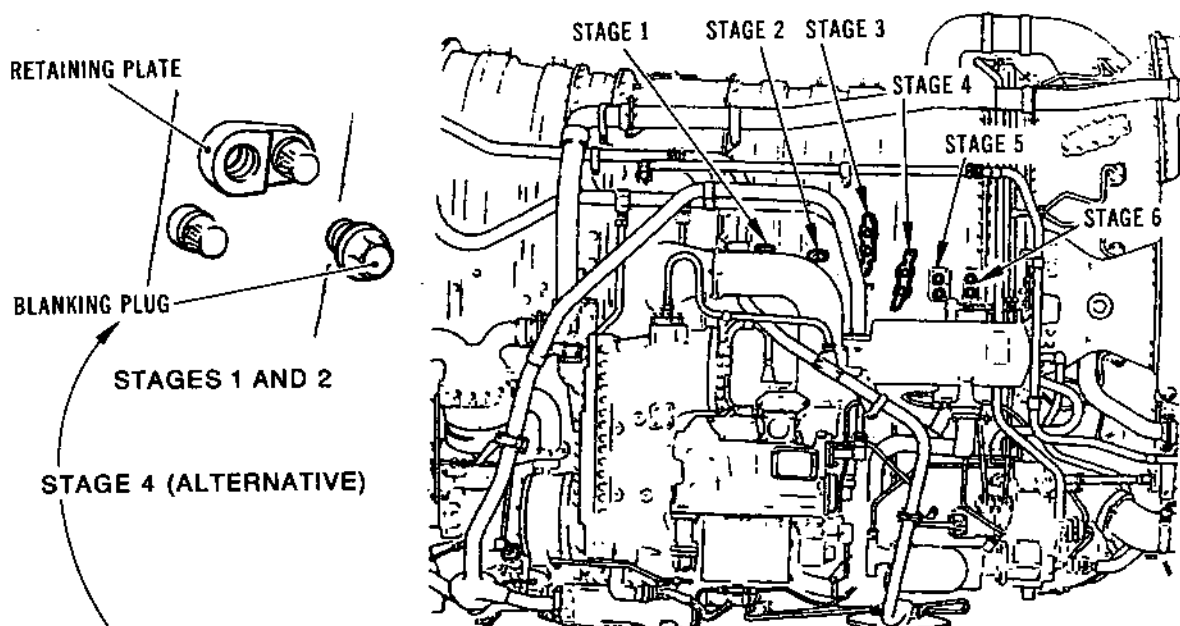
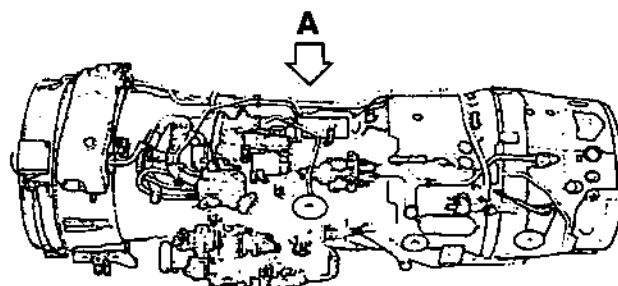


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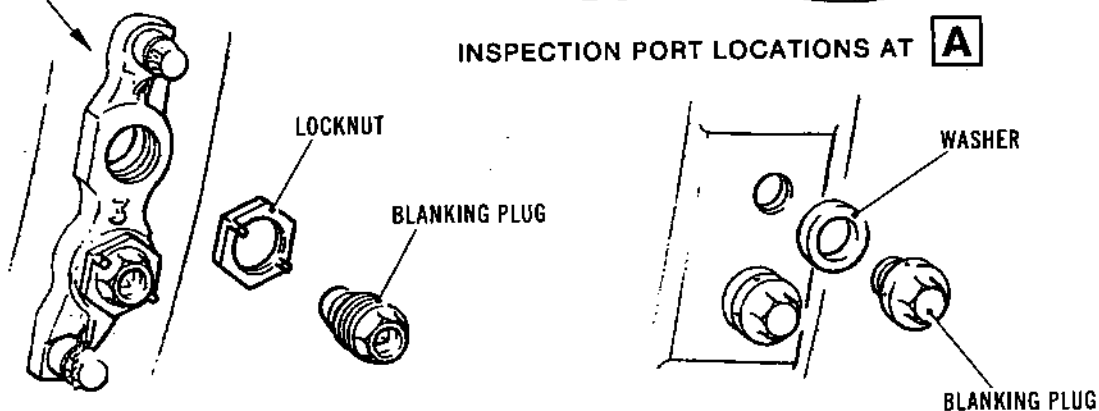
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INSPECTION PORT LOCATIONS AT **A**



STAGES 5 AND 6

HP Compressor Left-hand Side Inspection Ports
Figure 310 (Sheet 1 of 2)

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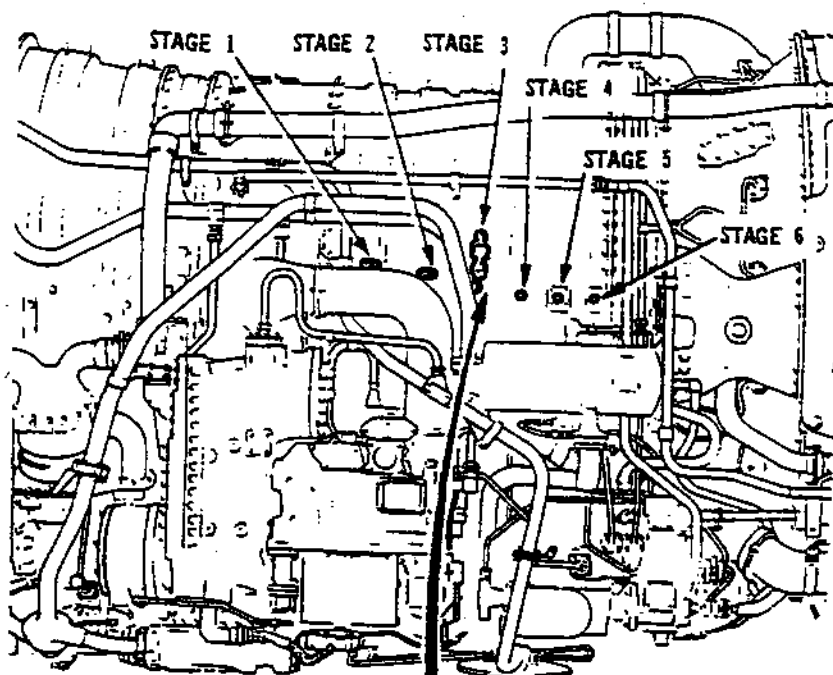
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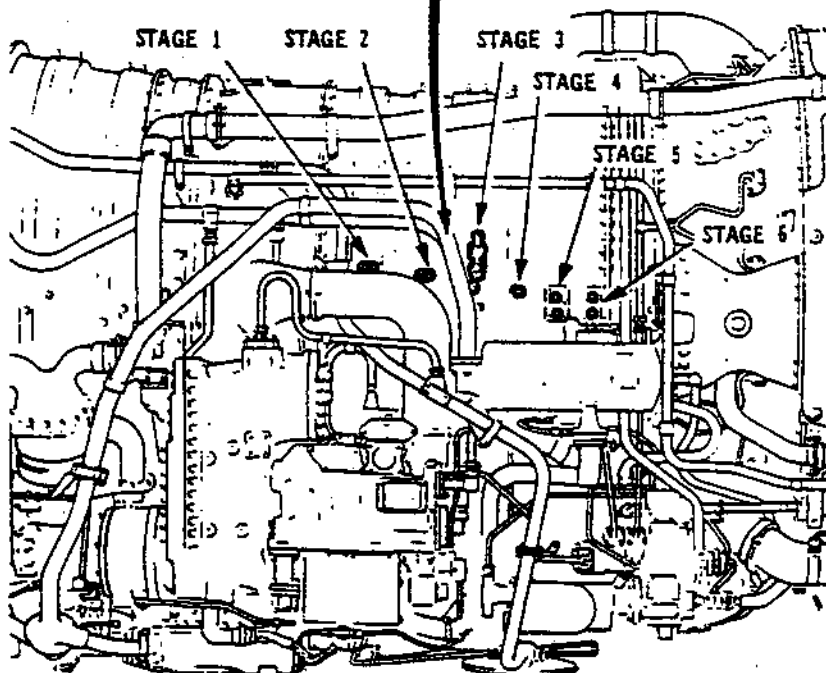


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ALTERNATIVE INSPECTION PORT LOCATIONS AT



HP Compressor Left-hand Side Inspection Ports
Figure 310 (Sheet 2 of 2)

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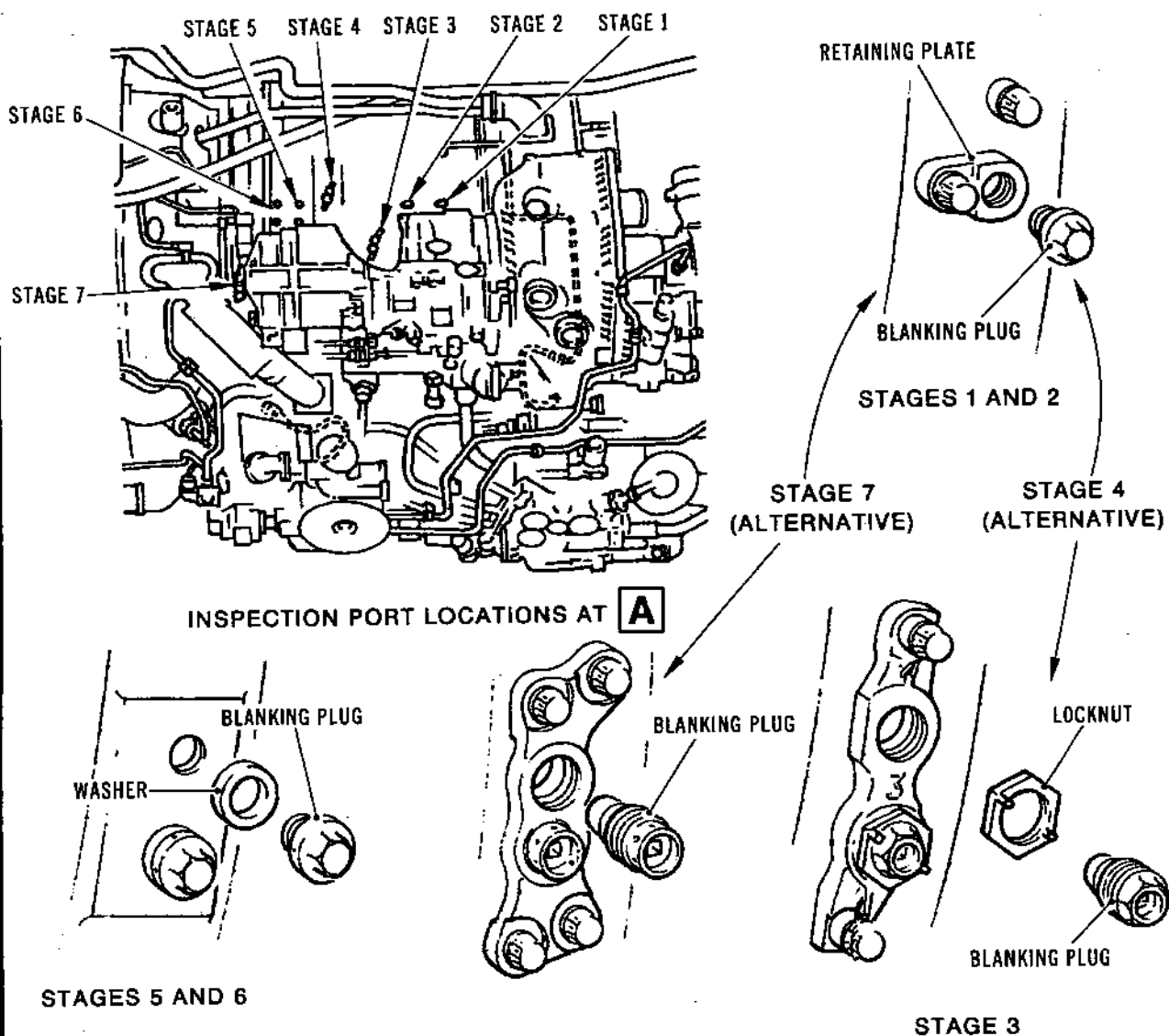
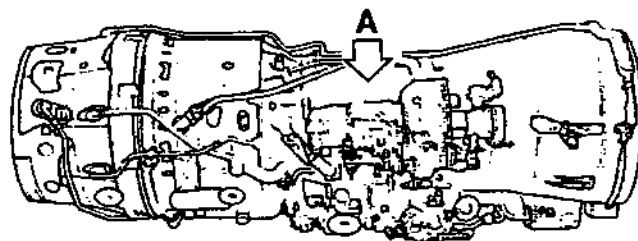
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HP Compressor Casing - Right-hand Side Inspection Ports Locations
Figure 311 (Sheet 1 of 2)

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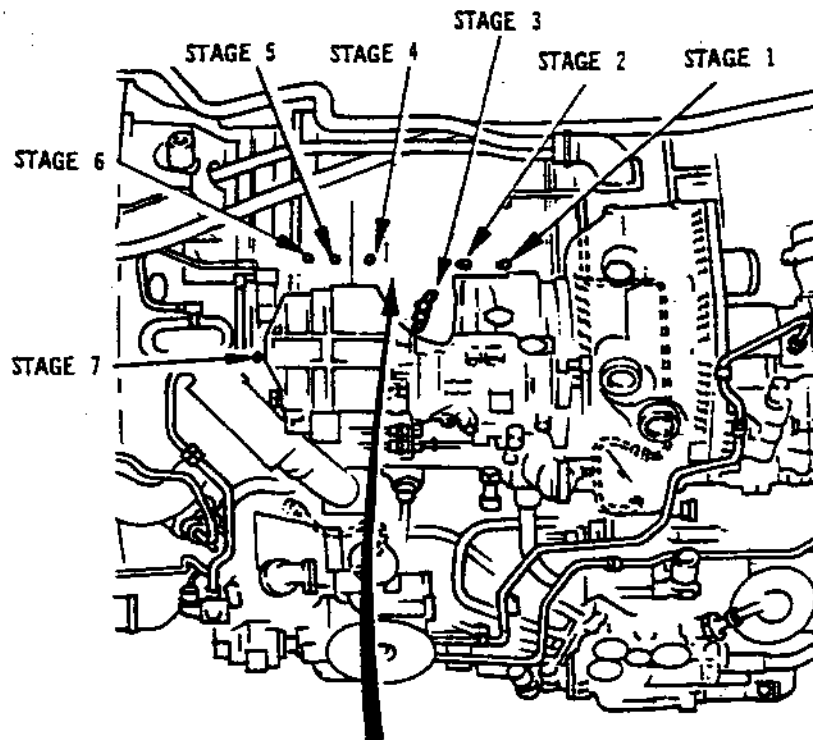
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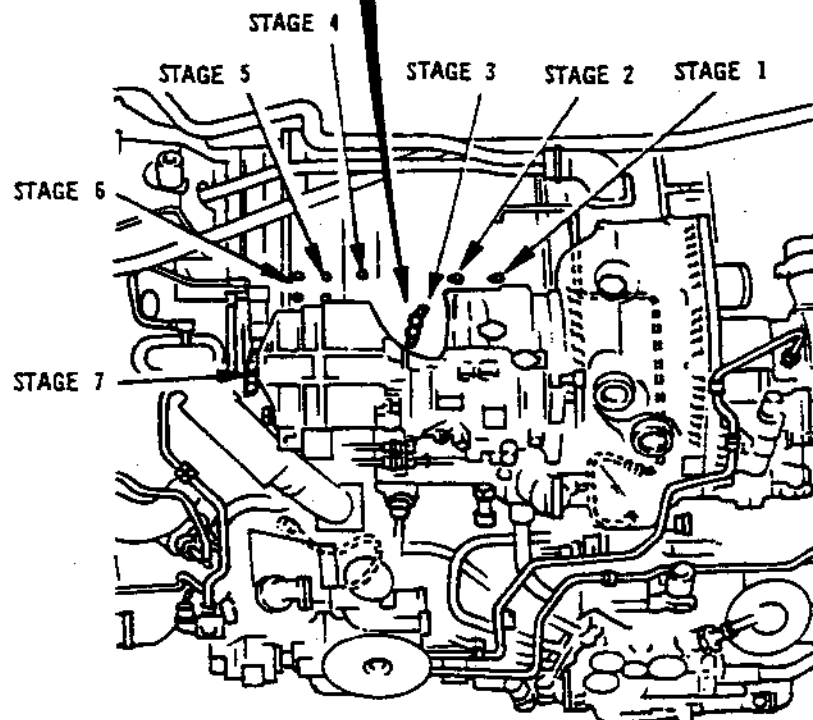
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ALTERNATIVE INSPECTION PORT LOCATIONS AT

A



HP Compressor Casing - Right-hand Side Inspection Ports Locations
Figure 311 (Sheet 2 of 2)

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C. Examine the Rotor Blades.

(1) Examine each stage of the compressor blades through the locations as follows.

(a) Insert the probe and ensure free penetration.

NOTE: The protective sleeve (Tools 1895 and 1897) must be retained on the probe at all times except when removal is essential for insertion of the probe or its effective use when inserted.

(b) Switch on the probe illumination and commence examination.

NOTE: Refer to Table 302 for number of rotor blades per stage.

(c) Carefully examine the blades for damage by changing the probe position or varying the depth of insertion. Turn the engine as necessary to ensure full coverage of all surfaces to be examined.

(d) Record the extent of any damage found and compare with the acceptance limits given in para.E. If a photographic record of the damage is required, use the equipment and procedures detailed in 72-09-04 Inspection/Check, or equivalent.

HP Compressor Stage	Quantity Per Stage
1	34
2	54
3	55
4	69
5	81
6	83
7	105

HP Compressor Blades
Table 302

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- (2) On completion of the compressor examination, switch off the illumination and withdraw the probe.

NOTE: If the inspection of the combustion chamber internal surfaces/fuel sprayers, or the HP turbine rotor/nozzles are to be carried out, phase them in at this stage.

- (3) If no further examinations are required, dismantle the equipment (Ref.para.5.A).
- (4) If no further examinations of the HP assemblies are required, remove the turning equipment (Ref.72-09-01 Engine Turning).

D. Install the Blanking Plugs Removed for Internal Examination (Ref.Fig.310 and 311).

- (1) Assemble blanking plugs to stages 1 and 2.
 - (a) Apply lubricant 'A' and screw the blanking plug (72-33-01/1-230/430) into its location.
 - (b) Torque-tighten the plug to 65 lbf in. (7,3 N.m). Wire-lock the plug and adjacent bolts together.
- (2) Assemble blanking plugs to stages 3 and 4.
 - (a) Ensure that the locknut (72-33-01/2-30/130) is screwed back under the head of the blanking plug (72-33-01/2-40/140).
 - (b) Apply lubricant 'A' and screw the blanking plug into its location, then torque-tighten the plug to 70 lbf in. (7,9 N.m).
 - (c) Hold the plug with a spanner to prevent turning, then screw in the locknut and torque-tighten to 370 lbf in. (41,8 mm). Wire-lock the locknut to the adjacent locknut.

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- (3) Procedure for ports at Stage 4 when flanged blanking plug is used.
 - (a) Apply lubricant A and screw blanking plug (72-33-01/2A-123) into its location.
 - (b) Torque-tighten plug to 65 lbf in. (7,3 Nm) and wire-lock plug to adjacent bolts.
- (4) Assemble blanking plugs to stages 5 and 6.
 - (a) Assemble the washer (72-33-01/4-310 and 5-420) to the blanking plug (72-33-01/4-300 and 5-410).
 - (b) Apply lubricant 'A' and screw the blanking plug into its location. Torque-tighten the plug to 65 lbf in. (7,3 mm), then wire-lock to the adjacent plug.
- (5) Assemble blanking plugs to stage 7.

Apply lubricant 'A' and screw the blanking plug (72-33-01/3-80) into its location. Torque-tighten the plug to 70 lbf in. (7,9 N.m), then wire-lock to the adjacent plug.
- (6) Procedure for ports at Stage 7 when flanged blanking plug is used.
 - (a) Apply lubricant A and screw blanking plug (72-33-01/3A-073) into its location.
 - (b) Torque-tighten plug to 65 lbf in. (7,3 Nm) and wire-lock plug to adjacent bolts.

E. Acceptance Standards - HP Compressor Rotor Blades Stages 1 to 7.

- (1) Carry out the internal examination of the HP compressor blades in conjunction with the engine inspection build records to establish details of repaired rotor blades installed during assembly.

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- (2) Examine the leading and trailing edges of stage 1 to 7 rotor blades in accordance with the acceptance standards detailed in (5).
- (3) No (unblended) HP2 Rotor Blade damage is acceptable.
- (4) In-situ repair of damage outside of the acceptance standards detailed in para.(5) may be possible. (Refer to 72-09-31, Repair).
- (5) Impact damage (Ref.Fig.312 and 313).
 - (a) Any damage in zone 'A'. Accept after repair (Refer to 72-09-31, Repair)
 - (b) Damage in zone 'B' not exceeding the limits in (i) to (vi). Accept (subject to acceptance of damage in (c) and (d)).
 - (i) Nicks or tears on one edge only (detail E) not exceeding in depth 0.060 in. (1,5 mm) at stages 1 to 5.
 - (ii) Nicks or tears on both edges (detail E) not exceeding in depth 0.030 in. (0,8 mm) at stages 1 to 5.

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- (iii) Dents on one surface (detail G), which do not protrude through and distort the other surface, not exceeding in diameter
0.150 in. (4,0 mm)
at stages 1 to 5.
- (iv) The least amount of undeformed material permissible between surface dents not less than
0.500 in. (13,0 mm)
at stages 1 and 2,
0.250 in. (6,0 mm)
at stages 3 to 5.



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- (v) Dents in one edge not exceeding a lateral displacement of 0.120 in. (3,0 mm) at stages 1 to 5.
- (vi) Light scratches or scoring at stages 1 to 5.
- (c) Damage in zone 'C' not exceeding the limits in (i) to (vi).
- (i) Nicks or tears on one edge only (detail D) not exceeding in depth 0.120 in. (3,0 mm) at stages 1 and 2, 0.100 in. (2,5 mm) at stages 3 to 7.
- (ii) Nicks or tears on both edges (detail D) not exceeding in depth 0.060 in. (1,5 mm) at stages 1 and 2, 0.050 in. (1,3 mm) at stages 3 to 7.
- (iii) Dents on one surface (detail H), which do not protrude through and distort the other surface, not exceeding in diameter 0.150 in. (4,0 mm) at stages 1 to 7.
- (iv) The least amount of undeformed material permissible between surface dents not less than 0.500 in. (13,0 mm) at stages 1 and 2, 0.250 in. (6,0 mm) at stages 3 to 7.

Accept (subject to acceptance of damage in (b) and (d)).

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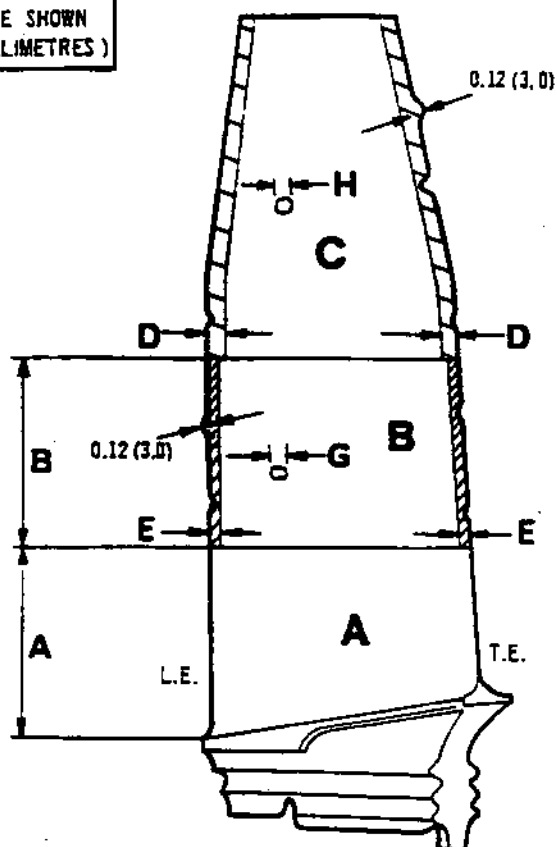
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



STAGE	1	2	3
DIMENSION A	2.0 (50.0)	1.5 (40.0)	1.5 (40.0)
DIMENSION B	2.0 (50.0)	1.5 (40.0)	1.0 (25.0)

Stage 1 and 3 HP Compressor Rotor Blade - Acceptance Standard
Figure 312

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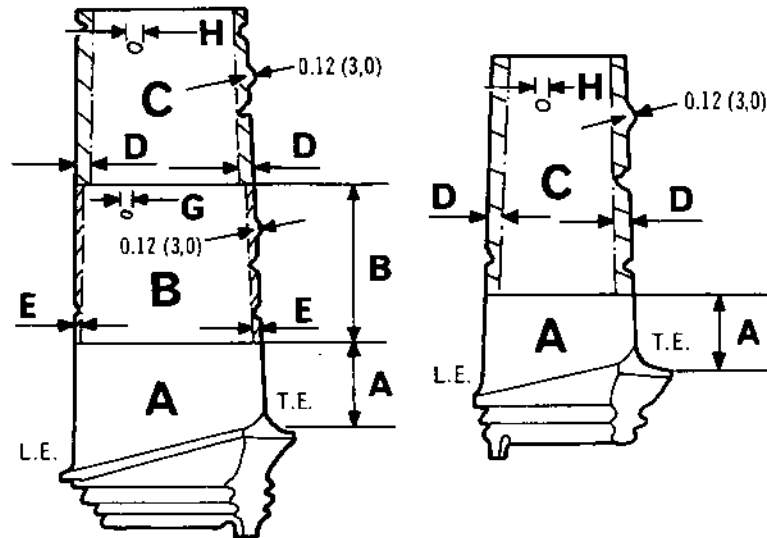
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



STAGE 4 AND 5

STAGE 6 AND 7

STAGE	4	5	6	7
DIMENSION A	0.75 (20,0)	0.75 (20,0)	0.75 (20,0)	0.75 (20,0)
DIMENSION B	1.0 (25,0)	1.0 (25,0)	N.A.	N.A.

Stage 4 to 7 HP Compressor Rotor Blade - Acceptance Standard
Figure 313

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(v) Dent in one edge not exceeding a lateral displacement of 0.120 in. (3,0 mm) at stages 1 to 7.

(vi) Tip rubbing with light curling and cracks running from the tip not exceeding in length 0.250 in. (6,0 mm) at stages 1 to 7.

(vii) Light scratches or scoring at stages 1 to 7.

(d) No more than 100 blades damaged throughout the HP compressor.

Accept (subject to acceptance of damage in (b) and (c)).

9. Examination of the Combustion Chamber

NOTE: The combustion chamber, fuel vaporizers and high pressure (HP) turbine nozzle vane leading edges are examined by use of an optical inspection instrument inserted through each of three inspection ports provided in the combustion chamber outer case (CCOC).

NOTE: Examination of the forward internal surfaces of the combustion chamber and the sixteen fuel sprayers is effected by use of an optical inspection instrument through three of the four inspection ports in the HP compressor diffuser case.

A. Prepare the Combustion Chamber for Examination (Ref. Fig.314).

- (1) Remove the attachment bolts and blanking cover from CCOC left-hand inspection port.
- (2) Remove attachment bolts and cover from right-hand inspection port together with spacer plate on engines to SB.72-8629-256 standard.

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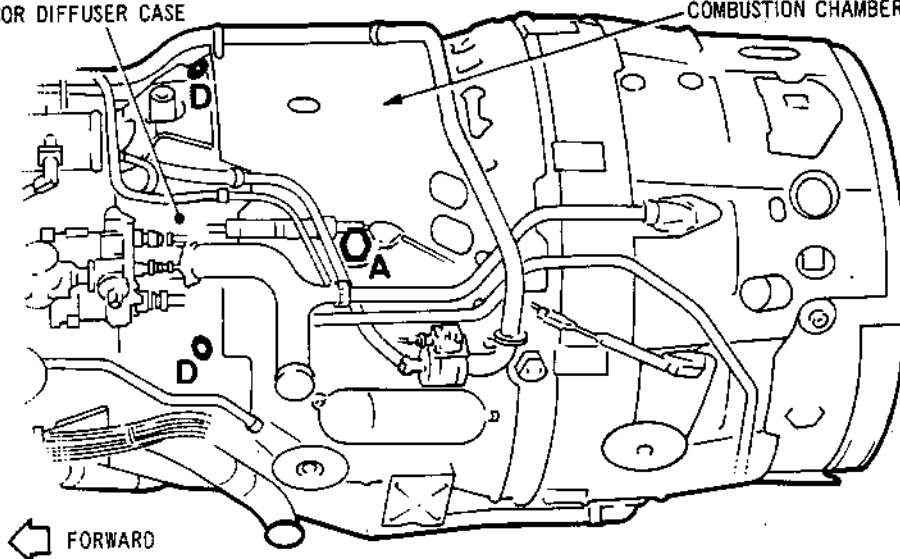
OVERHAUL



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HP COMPRESSOR DIFFUSER CASE

COMBUSTION CHAMBER OUTER CASE

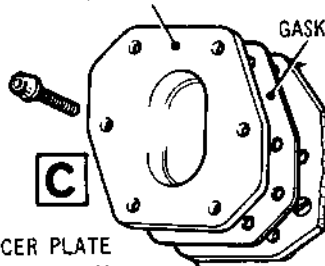
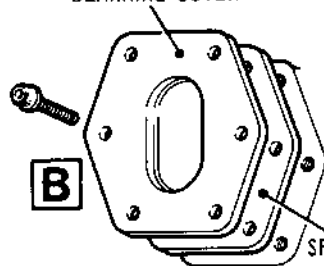
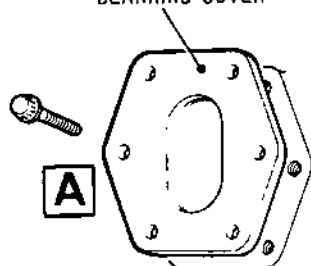


BLANKING COVER

BLANKING COVER

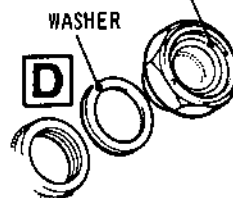
BLANKING COVER

BLANKING PLUG



GASKET

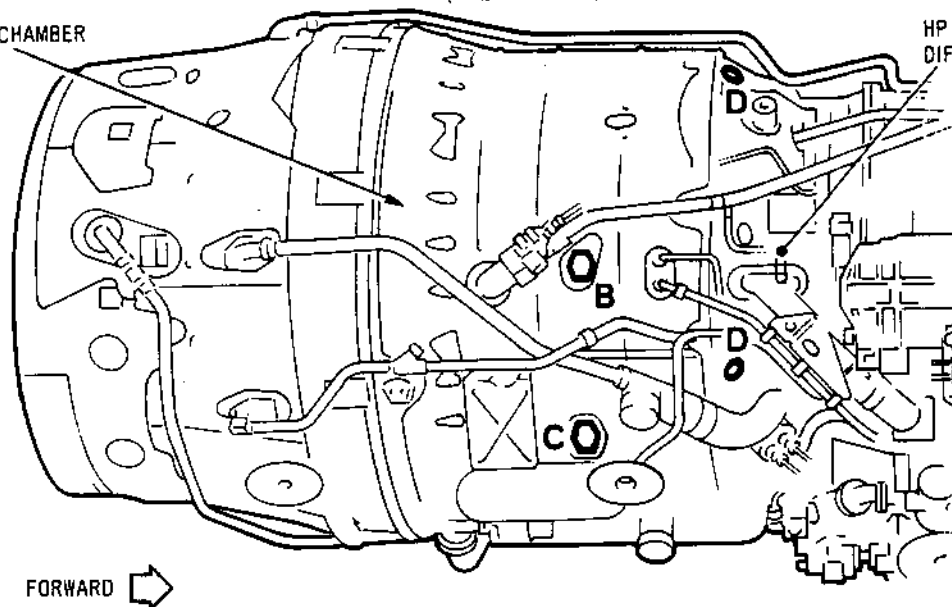
WASHER



SPACER PLATE
(PRE S.B. 72-62)

COMBUSTION CHAMBER
OUTER CASE

HP COMPRESSOR
DIFFUSER CASE



Combustion Chamber Inspection Ports
Figure 314

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- (3) Remove the blanking cover from the bottom inspection port.
 - (a) Position a container to catch any residual fuel.
 - (b) Remove the bolts securing the blanking cover to the CCOC.
 - (c) Withdraw the blanking cover and gasket (SB.0L.593-72-58) from the engine.
 - (d) Wipe any fuel deposits from the inspection port area.
- (4) Remove blanks from the HP compressor diffuser case.
 - (a) Use a crowfoot spanner and unscrew and remove blanking plugs and flat washers from the two lower ports and one upper port of the HP compressor diffuser case.
- (5) Ensure that the optical inspection equipment (transformer (Tool 1900)) has been prepared and tested (Ref.para.4.A).

B. Examine the Combustion Chamber.

- (1) Commence the examination using the probe (Tool 1899), used in conjunction with the transformer (Tool 1900), inserted through the CCOC ports.

WARNING: CHECK PERIODICALLY AND REMOVE RESIDUAL FUEL DRAINAGE AT LOWER PORT POSITION AND FROM PROBE. FUEL COULD ENTER EYES DURING EXAMINATION SEQUENCE.

WARNING: QUARTZ IODINE BULBS MUST NOT BE HANDLED IN SERVICE. HANDLING OF BULB WILL CAUSE SURFACE CONTAMINATION WHICH MAY CAUSE BULB TO SHATTER.

CAUTION: DO NOT USE FORCE TO EFFECT PROBE ENTRY AND PREVENT PROBE FROM BECOMING DENTED OR BENT. INVESTIGATE ANY OBSTRUCTION TO PROBE PENETRATION.

- (a) Insert probe through inspection port, switch on probe illumination and commence examination of:

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- (i) The vaporisers and internal surfaces of the combustion chamber including the HP turbine nozzles.
 - (ii) The annulus between the combustion chamber outer surface and the CCOC (Ref.Fig.315A).
- (b) Record details of damage found.
- (i) Record extent of any damage to sub-sections of combustion chamber (Ref.Figs.315 to 315B) and compare with acceptance limits given in para.D. If a photographic record of the damage is required, use the equipment and procedures detailed in 72-09-04 Inspection/Check, or equivalent.
- NOTE: If the HP turbine nozzle inspection is to be carried out, phase it in with this sequence.
- (ii) Record the approximate size and the position of any debris found in the annulus between the combustion chamber and the CCOC.
- (c) On completion of examination, switch off probe illumination and withdraw probe.
- (d) Stow optical inspection equipment (Ref.para.5B).
- (2) Examine No.2 Outer Cooling Ring Through CCOC Inspection Ports A and B (Ref.Fig.314) Using Guide Tubes.

CAUTION: WHEN REMOVING THE GUIDE TUBE FROM ITS FIXTURE, ENSURE IT IS INSTALLED CORRECTLY BEFORE REMOVAL AND THAT THE GUIDE TUBE PROFILE MATCHES EXACTLY THE PROFILE OF ITS FIXTURE.

- (a) Remove selected guide tube from its storage fixture.

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CAUTION: USE NO FORCE TO INSERT GUIDE TUBES. ENSURE GUIDE TUBES ENTER THE COMBUSTION CHAMBER THROUGH THE CCOC PORT AND THE CORRECT CHAMBER PLUNGING AND DO NOT ENTER THE SPACE BETWEEN CCOC AND CHAMBER.

- (b) Install selected guide tube to CCOC inspection port necessary to inspect the required cooling ring zone (Ref.Fig.315C), using two slave bolts. Care must be taken to ensure the bolts do not inadvertently enter the inspection port and are not overtightened.

CAUTION: ENSURE THE TIP OF THE PROBE IS STRAIGHT WHEN REMOVING THROUGH THE GUIDE TUBES TO AVOID DAMAGE.

- (c) Install probe to light source, insert through guide tube and locate in No.2 cooling ring slot. Switch on probe illumination and commence examination of cooling ring.

NOTE 1: It may be necessary for a second operative to be employed during the probe inspection to hold the probe eye-piece whilst the first operative keeps radial pressure on the probe to keep it in the cooling hole slot.

NOTE 2: The operative may find it easier to feed-in the full amount of necessary probe through the guide tube and inspect whilst engaging backward movement.

NOTE 3: It is possible when fitting the longer guide tubes, to bolt in position and find that the cooling ring end is slightly out of position. In this event, loosen the slave bolts and slightly re-adjust the guide tube until probe in the correct position, then re-tighten slave bolts, taking care not to overtighten.

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- (d) Record details of any damage found and compare with acceptance limits given in para.D.
- (e) On completion of the examination, remove the probe.
- (f) Switch off probe illumination and disconnect probe from light source.

CAUTION 1: ENSURE ALL GUIDE TUBES ARE REMOVED ON COMPLETION OF INSPECTION.

CAUTION 2: USE NO FORCE TO REMOVE GUIDE TUBES.

- (g) Remove guide tubes from inspection ports.

CAUTION: WHEN INSTALLING GUIDE TUBE TO ITS FIXTURE, ENSURE IT IS INSTALLED CORRECTLY WITH THE TUBE PROFILE MATCHING THE FIXTURE PROFILE EXACTLY.

- (h) Stow inspection equipment in its storage fixture.

C. Install the Blanking Covers Removed for Internal Examination.

- (1) Assemble the blanking cover to the left-hand inspection port (Ref.Fig.314, detail A).
 - (a) Apply lubricant 'A' to bolts (76-21-01/2-70).
 - (b) Secure the cover (76-21-01/2-80) with six bolts, torque-tighten to 100 lbf in. (11,4 N.m).
 - (c) Wire-lock bolts together.

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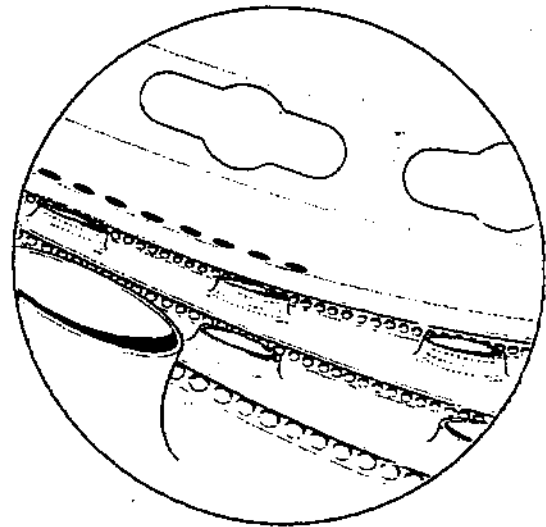
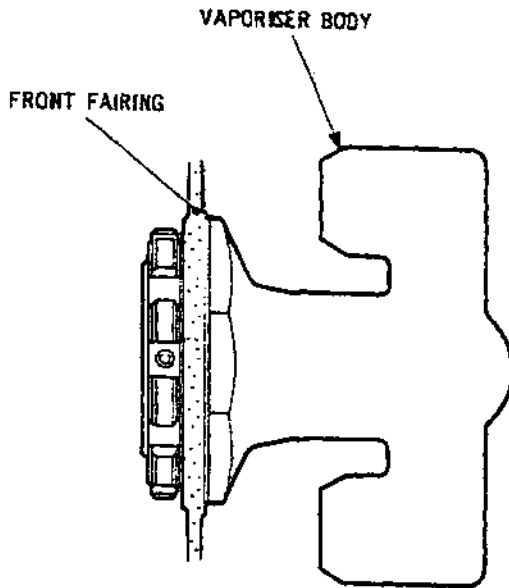
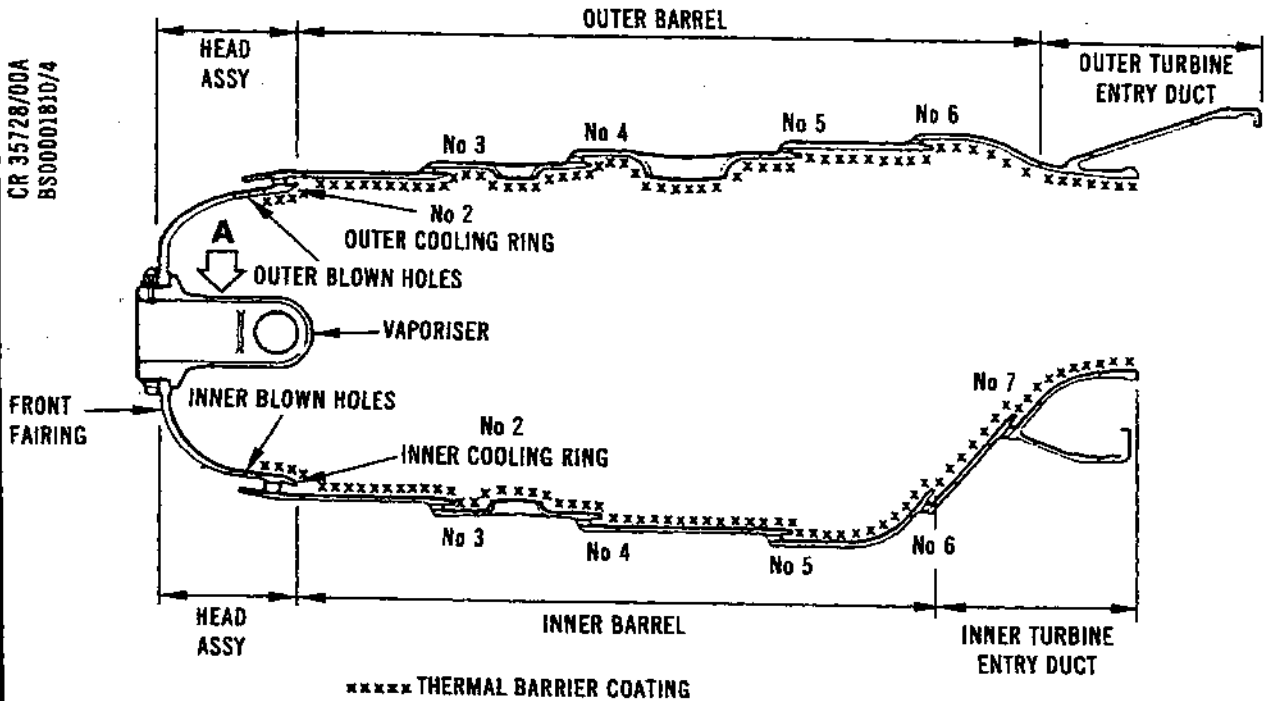
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TYPICAL VIEW OF OUTER BARREL
WHEN USING CONVENTIONAL PROBE

Combustion Chamber Identification
Figure 315

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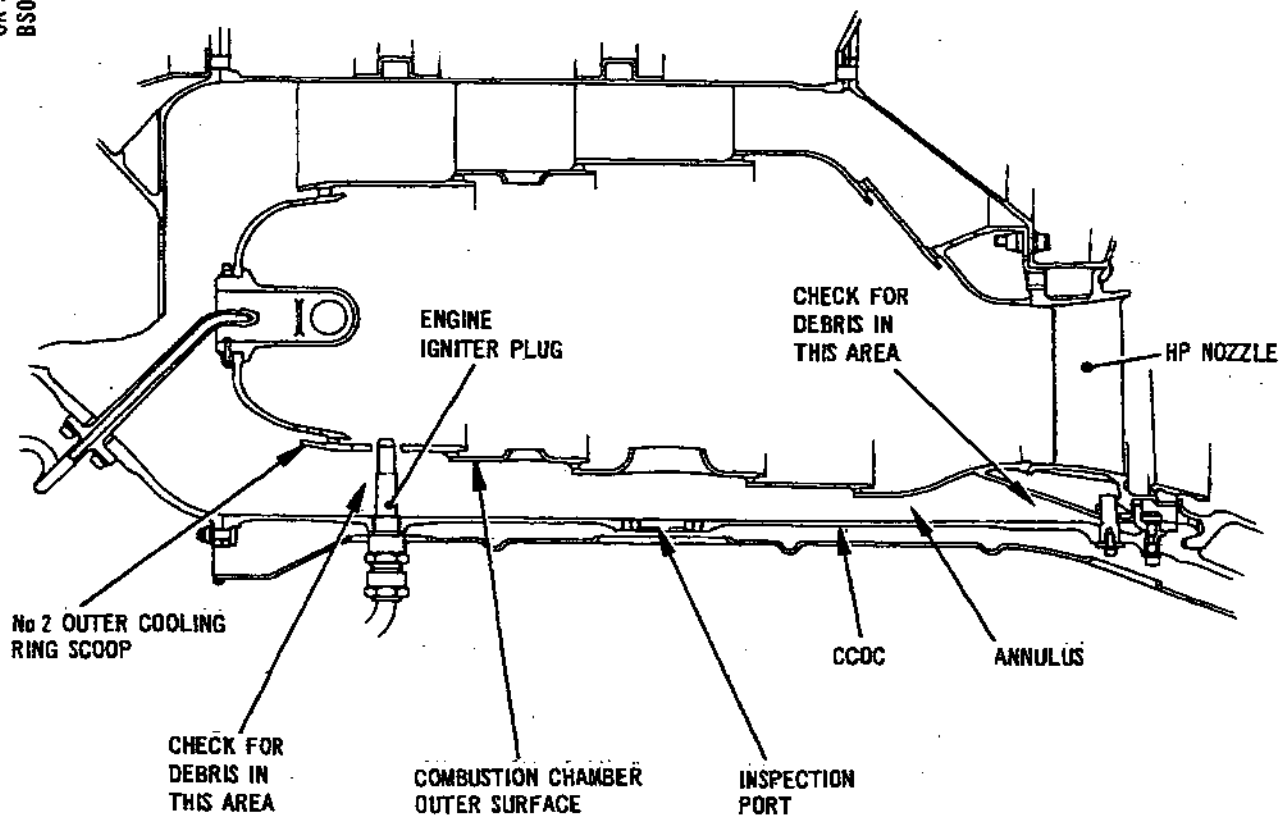
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Intrascopes Examination for Debris from No.2 Outer
Cooling Ring Scoop
Figure 315A

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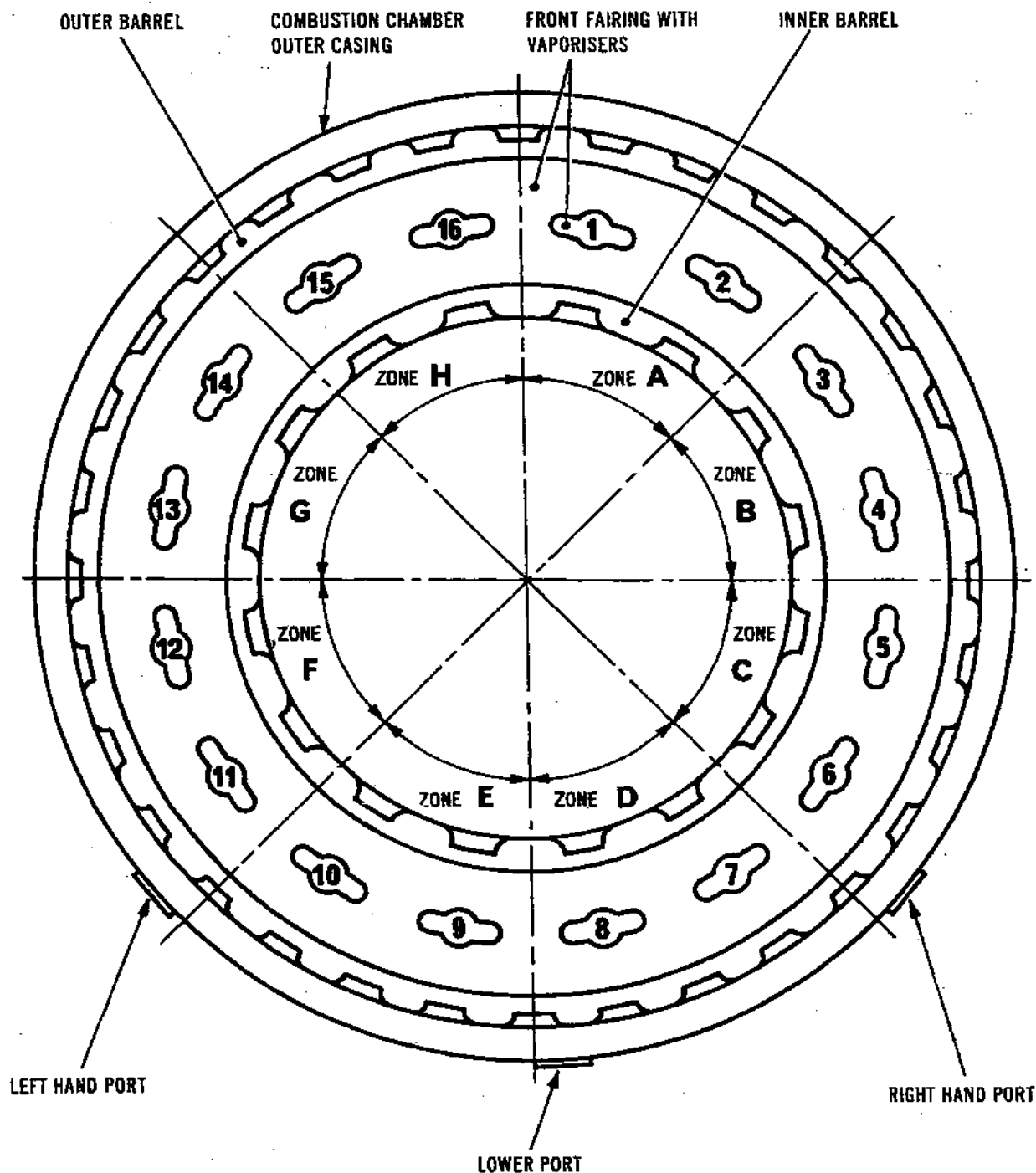


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DIAGRAMMATIC VIEW LOOKING FORWARD
DO NOT USE MARKING. IDENTIFY THE VAPORISERS BY THEIR RELATIVE LOCATIONS
ESTIMATE THE ZONE BOUNDARIES IN RESPECT OF THE VAPORISER

Theoretical Inspection Zones
Figure 315B

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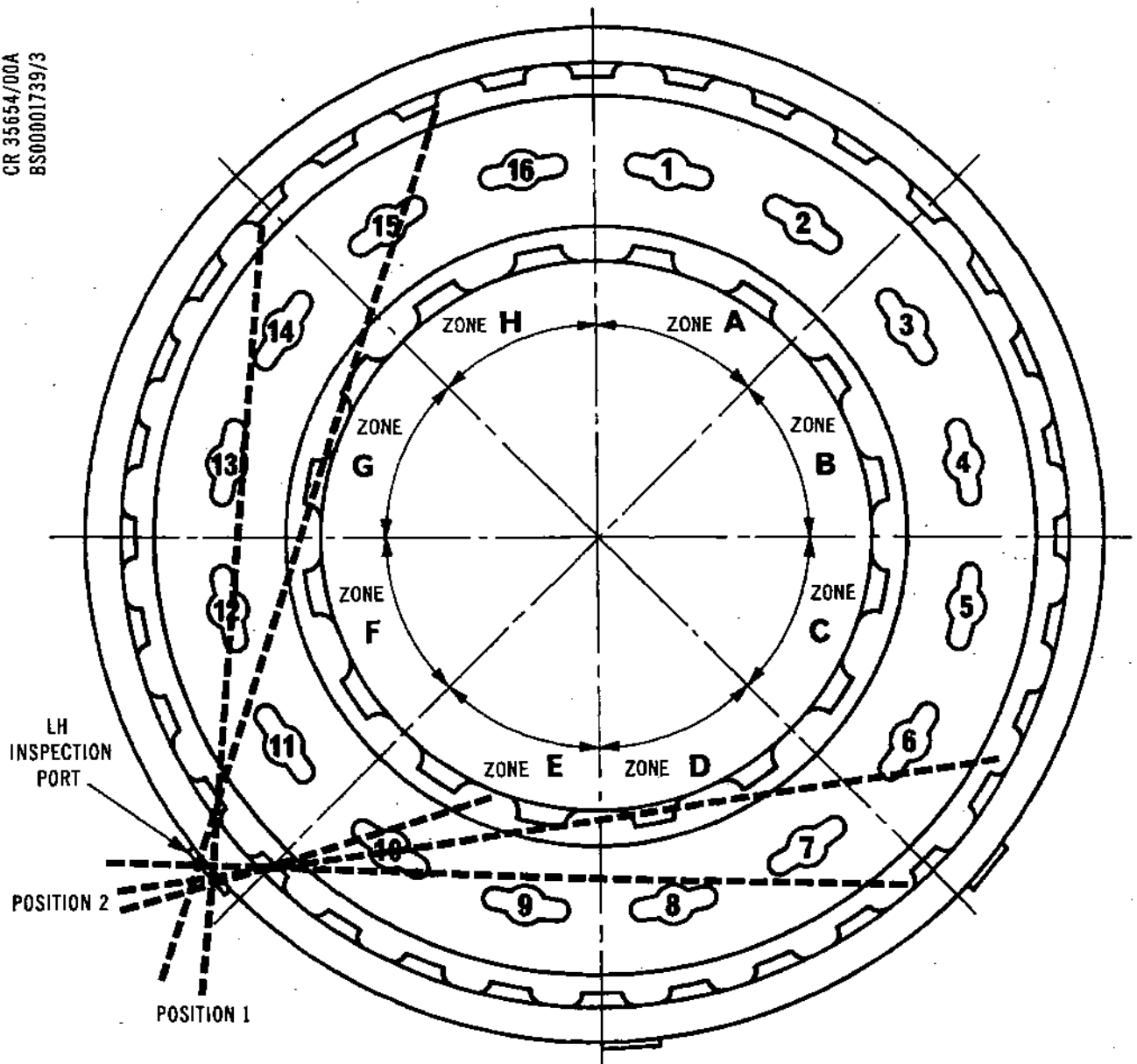
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PROBE POSITION	VAPORISER LOCATIONS VISIBLE	BARREL ZONES VISIBLE	
		INNER	OUTER
1	1,2,3,9,10,11,12,13,14,15,16.	F (PART),G,H.	F,G,H.
		INNER	C,D.
2	4,5,6,7,8,9,10,11,12,13.	C,D.	A,B,C (PART), D,E,F (PART).
		OUTER	

Probe Insertion Angles and Range of Inspection
Figure 315C (Sheet 1 of 3)

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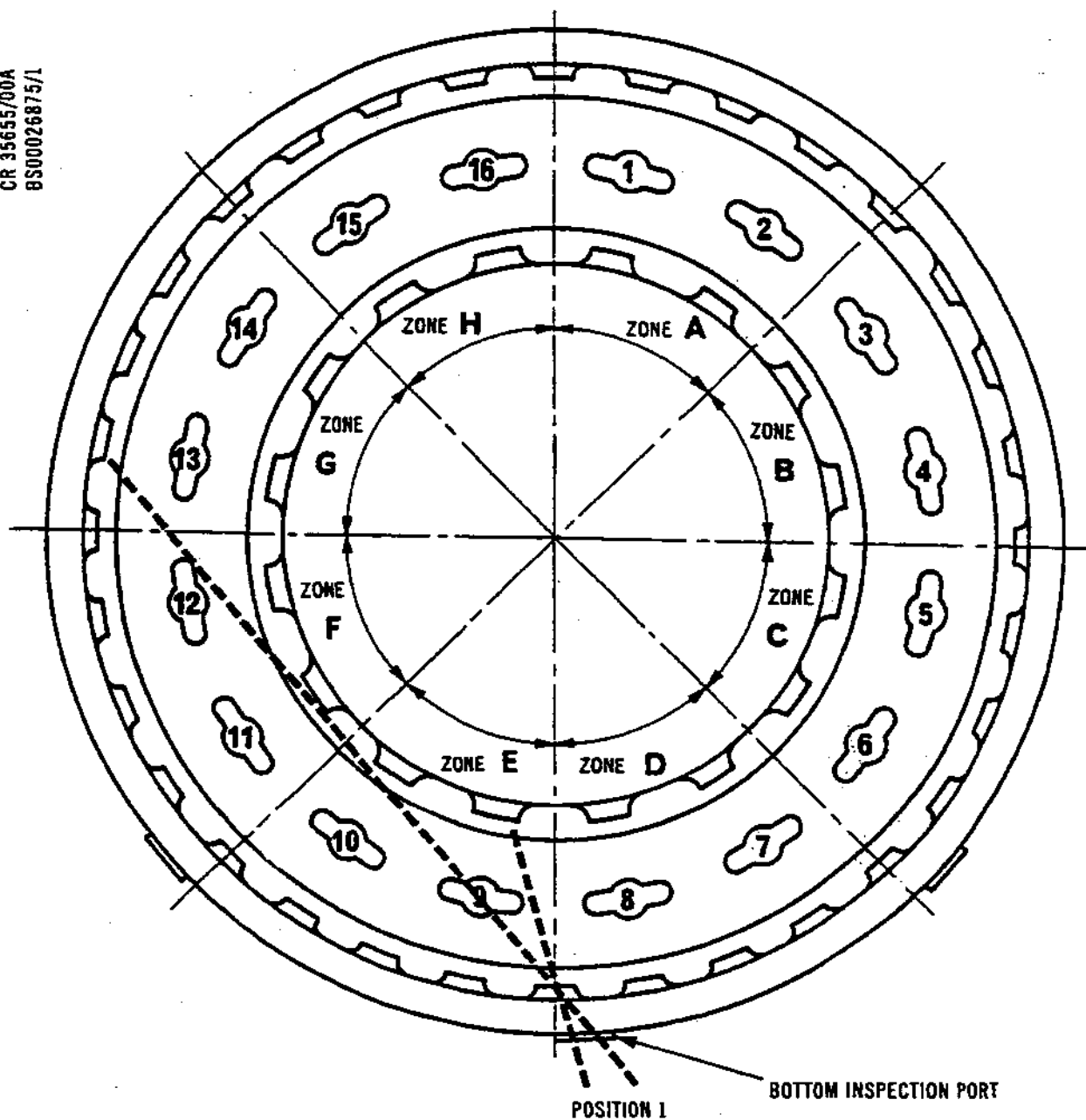


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PROBE POSITION	VAPORISER LOCATIONS VISIBLE	BARREL ZONES VISIBLE	
1	1,6,7,8,9,10,11,12,13,14,15,16.	INNER	D,E,G.
		OUTER	E,F,G,H.

Probe Insertion Angles and Range of Inspection
Figure 315C (Sheet 2 of 3)

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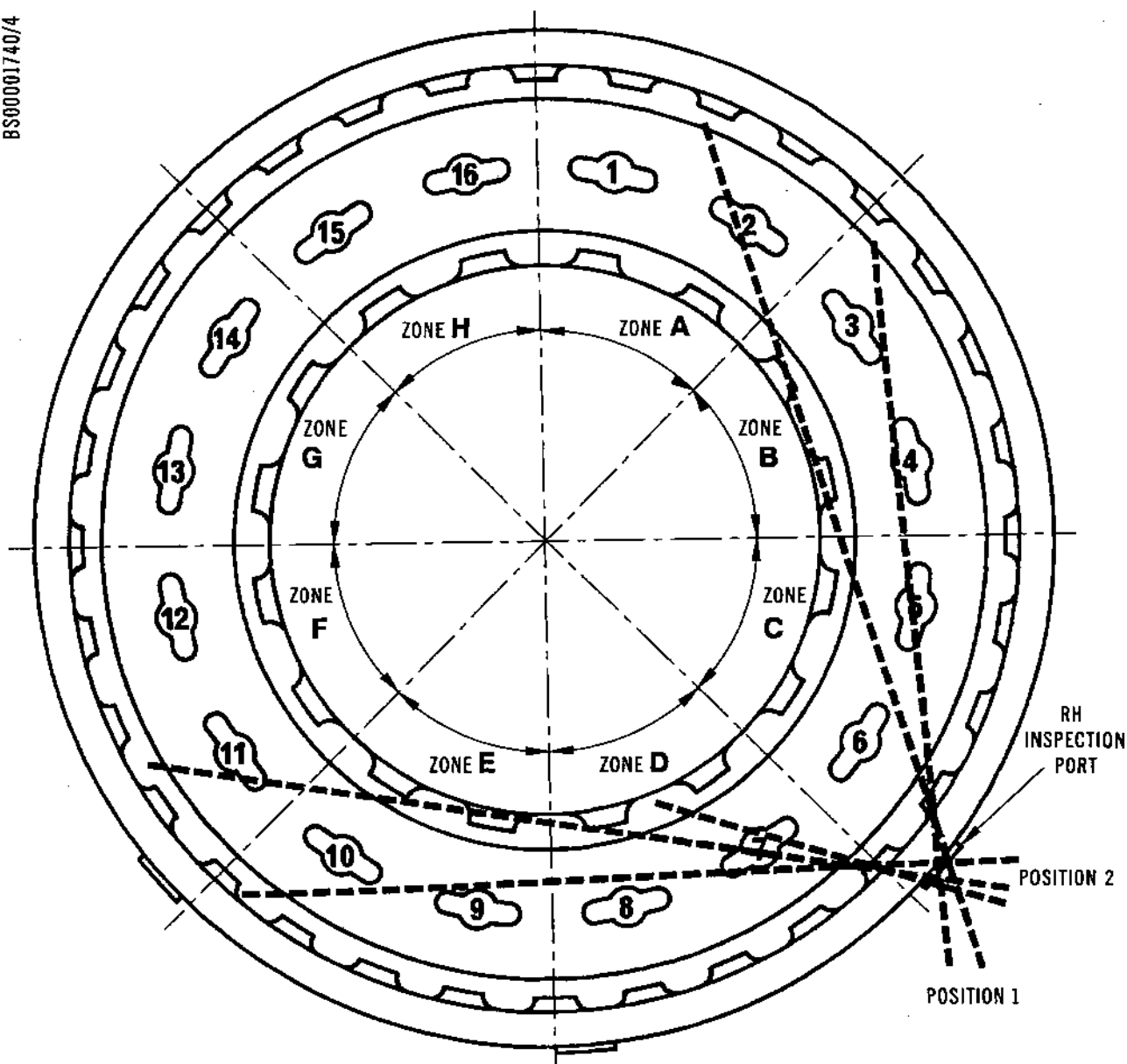
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PROBE POSITION	VAPORISER LOCATIONS VISIBLE	BARREL ZONES VISIBLE	
1	1,2,3,4,5,6,14,15,16.	INNER	A,B,C.
		OUTER	B (PART), C,H.
2	4,5,6,7,8,9,10,11,12,13.	INNER	E,F.
		OUTER	C (PART), D,E,F (PART), G,H.

Probe Insertion Angles and Range of Inspection
Figure 315C (Sheet 3 of 3)

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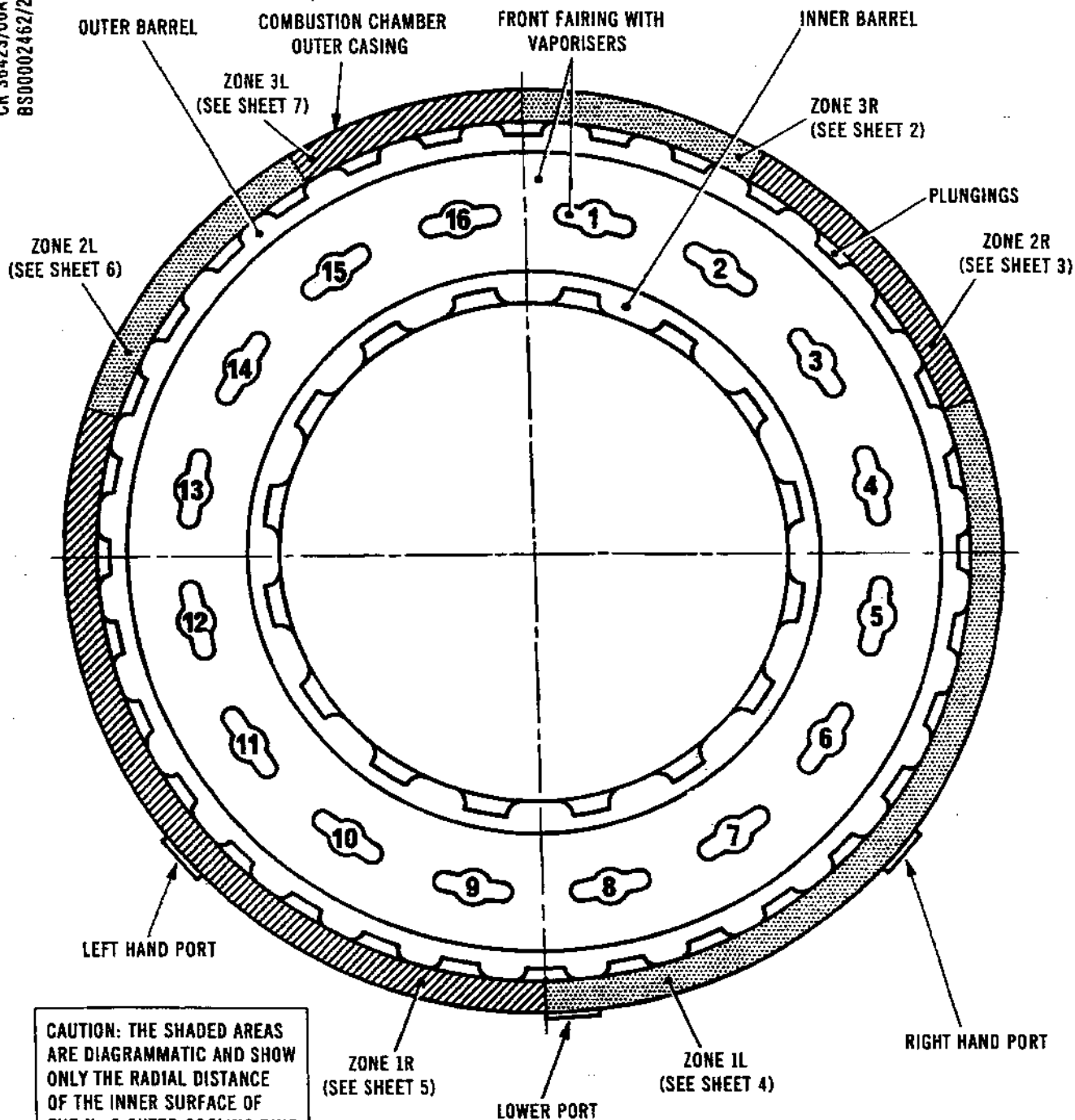
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DIAGRAMMATIC VIEW LOOKING FORWARD

ESTIMATE THE ZONE BOUNDARIES IN RESPECT OF THE PLUNGINGS
NO ZONE OVERLAP SHOWN

Probe Inspection of No.2 Outer Cooling Ring
using Guide Tubes

Figure 315D (Sheet 1 of 7)

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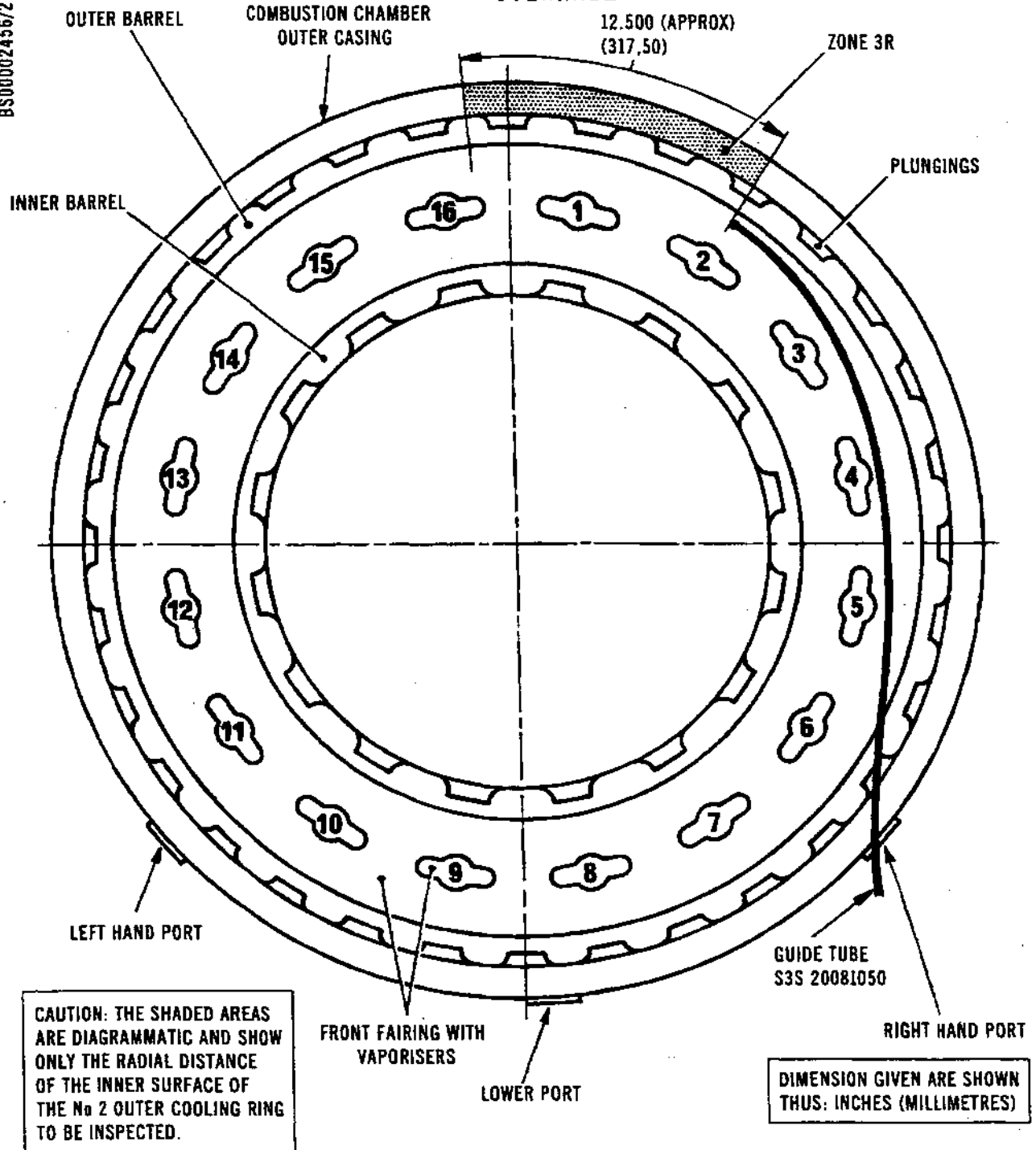
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DIAGRAMMATIC VIEW LOOKING FORWARD
ESTIMATE THE ZONE BOUNDARIES IN RESPECT OF THE PLUNGINGS
Probe Inspection of No.2 Outer Cooling Ring
using Guide Tubes
Figure 315D (Sheet 2 of 7)

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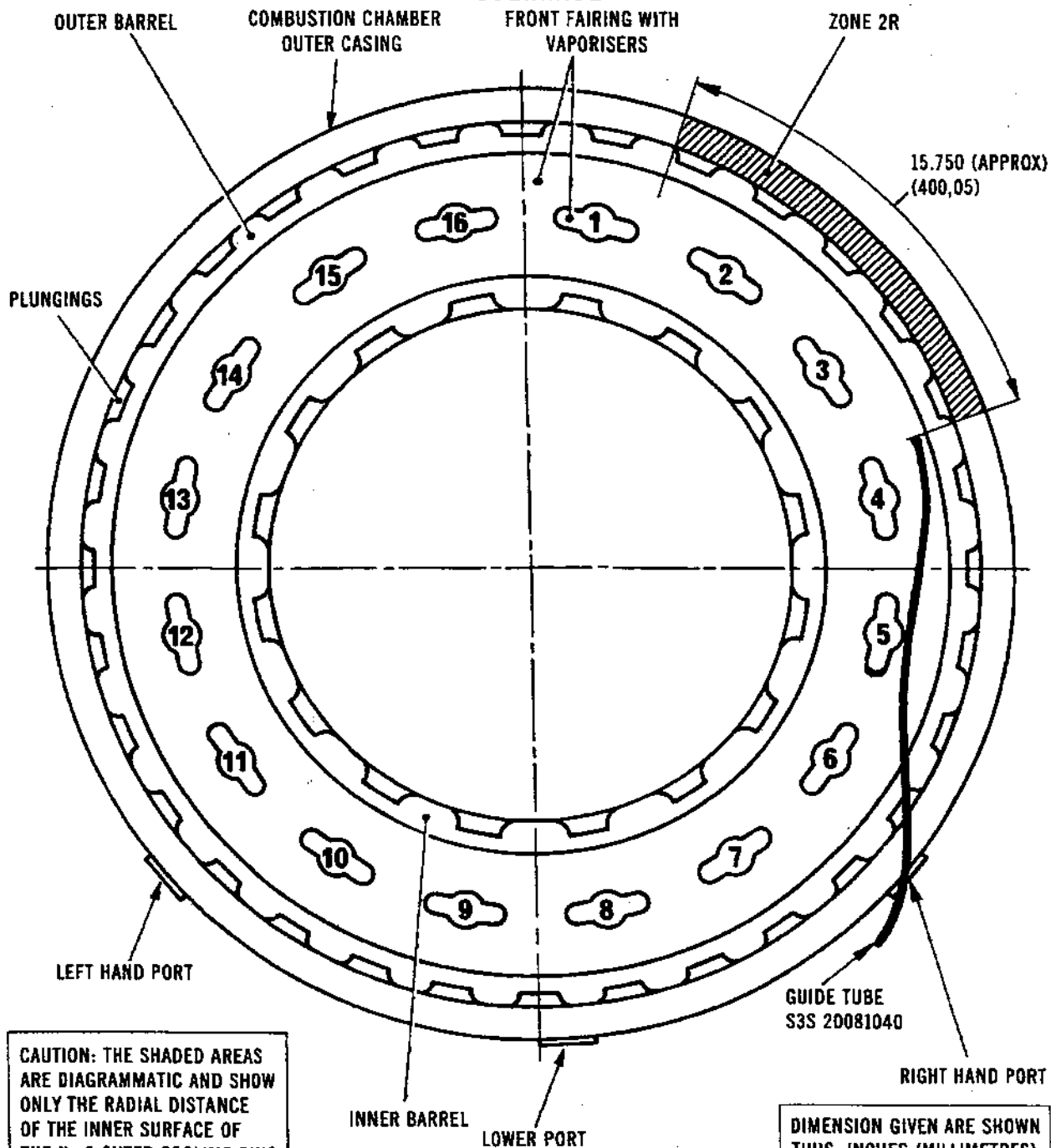
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DIAGRAMMATIC VIEW LOOKING FORWARD

ESTIMATE THE ZONE BOUNDARIES IN RESPECT OF THE PLUNGINGS

Probe Inspection of No.2 Outer Cooling Ring
using Guide Tubes

Figure 315D (Sheet 3 of 7)

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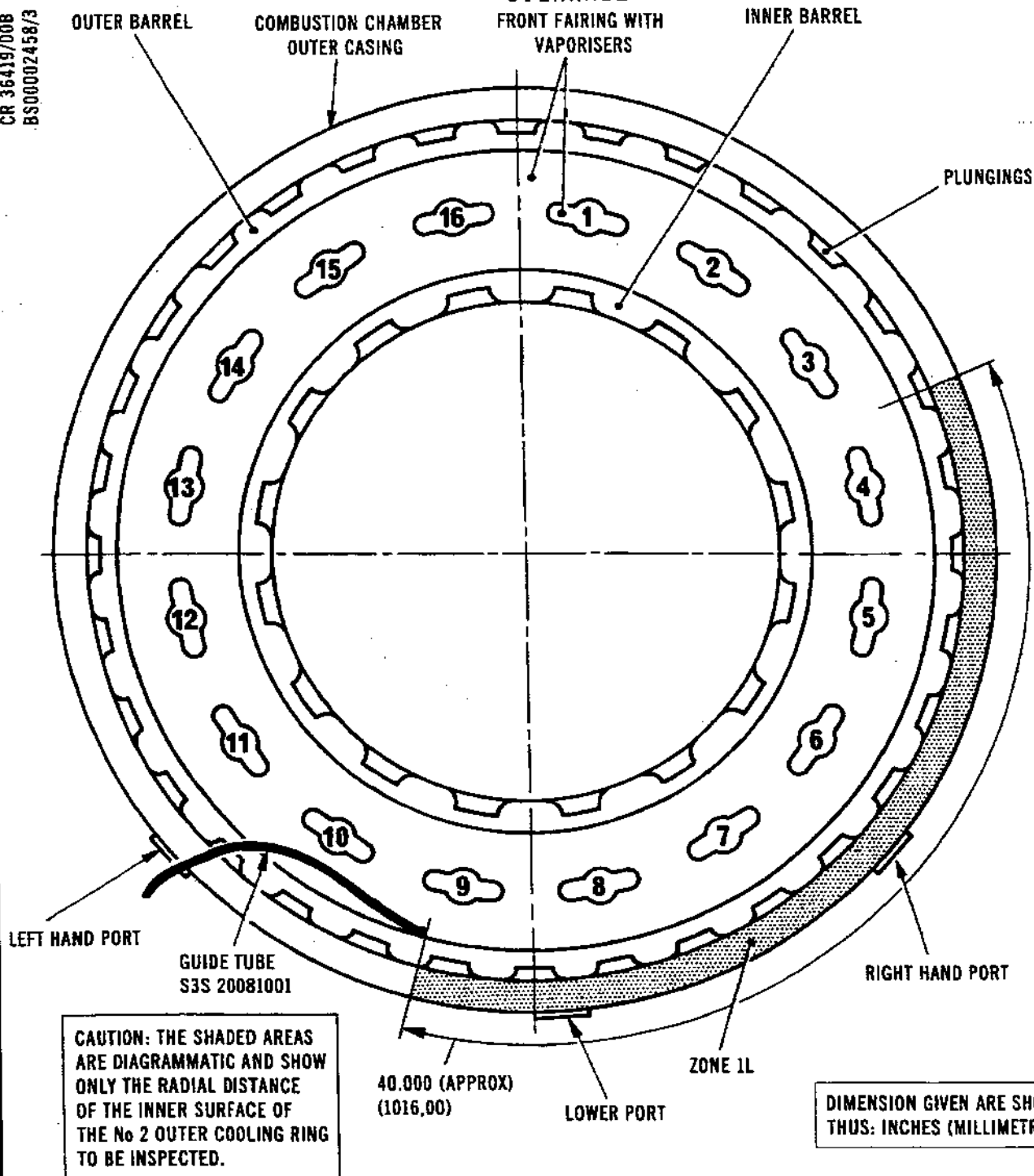
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BS00002458/3



DIAGRAMMATIC VIEW LOOKING FORWARD
ESTIMATE THE ZONE BOUNDARIES IN RESPECT OF THE PLUNGINGS
Probe Inspection of No.2 Outer Cooling Ring
using Guide Tubes
Figure 315D (Sheet 4 of 7)

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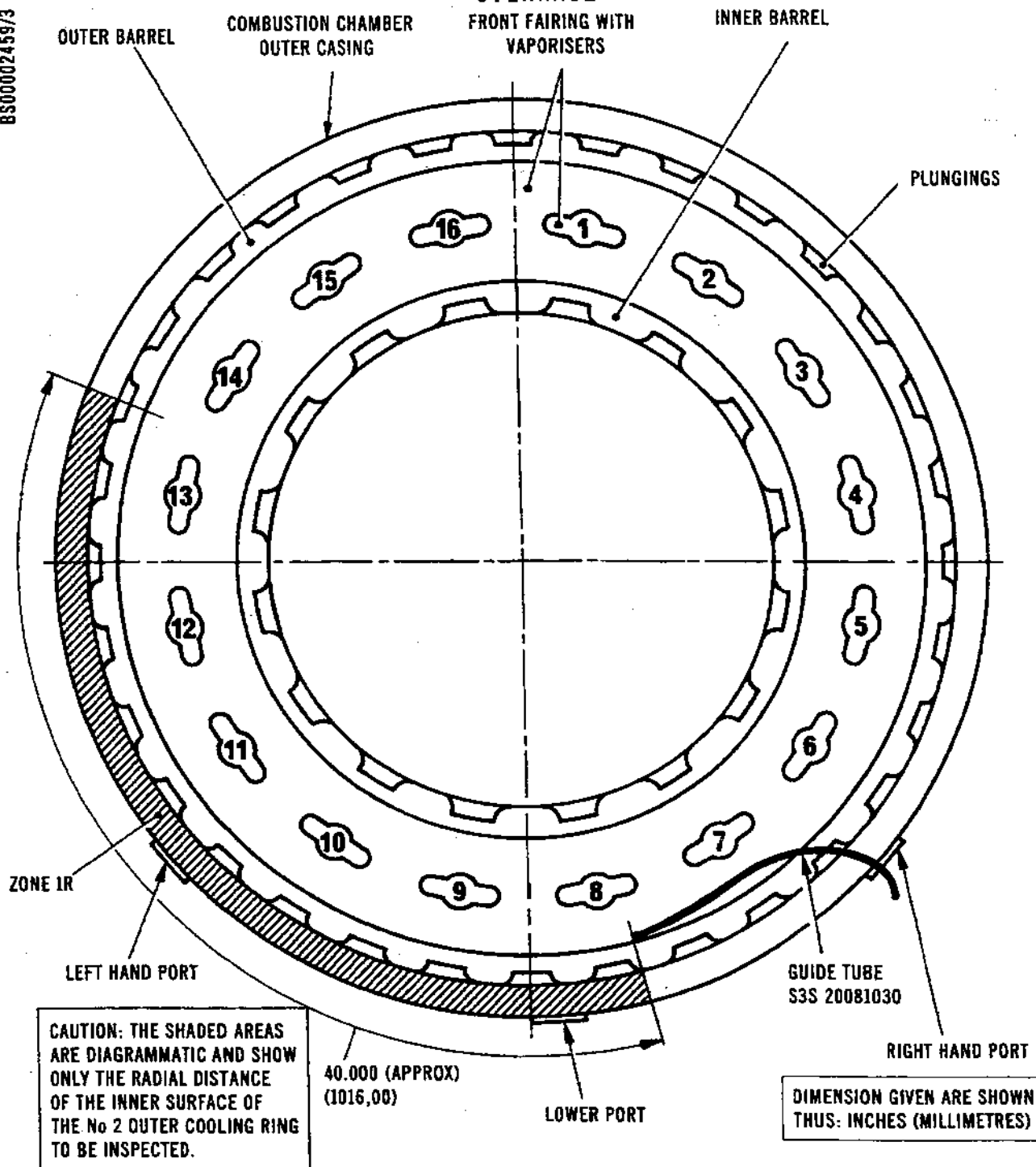


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DIAGRAMMATIC VIEW LOOKING FORWARD
ESTIMATE THE ZONE BOUNDARIES IN RESPECT OF THE PLUNGINGS
Probe Inspection of No.2 Outer Cooling Ring
using Guide Tubes
Figure 315D (Sheet 5 of 7)

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OVERHAUL
FRONT FAIRING WITH
VAPORISERS

COMBUSTION CHAMBER
OUTER CASING

INNER BARREL

OUTER BARREL

PLUNGINGS

RIGHT HAND PORT

LOWER PORT

LEFT HAND PORT

GUIDE TUBE
S3S 20081010

DIMENSION GIVEN ARE SHOWN
THUS: INCHES (MILLIMETRES)

CAUTION: THE SHADED AREAS
ARE DIAGRAMMATIC AND SHOW
ONLY THE RADIAL DISTANCE
OF THE INNER SURFACE OF
THE No 2 OUTER COOLING RING
TO BE INSPECTED.

DIAGRAMMATIC VIEW LOOKING FORWARD
ESTIMATE THE ZONE BOUNDARIES IN RESPECT OF THE PLUNGINGS
Probe Inspection of No.2 Outer Cooling Ring
using Guide Tubes
Figure 315D (Sheet 6 of 7)

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15.750 (APPROX)
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ZONE 2L



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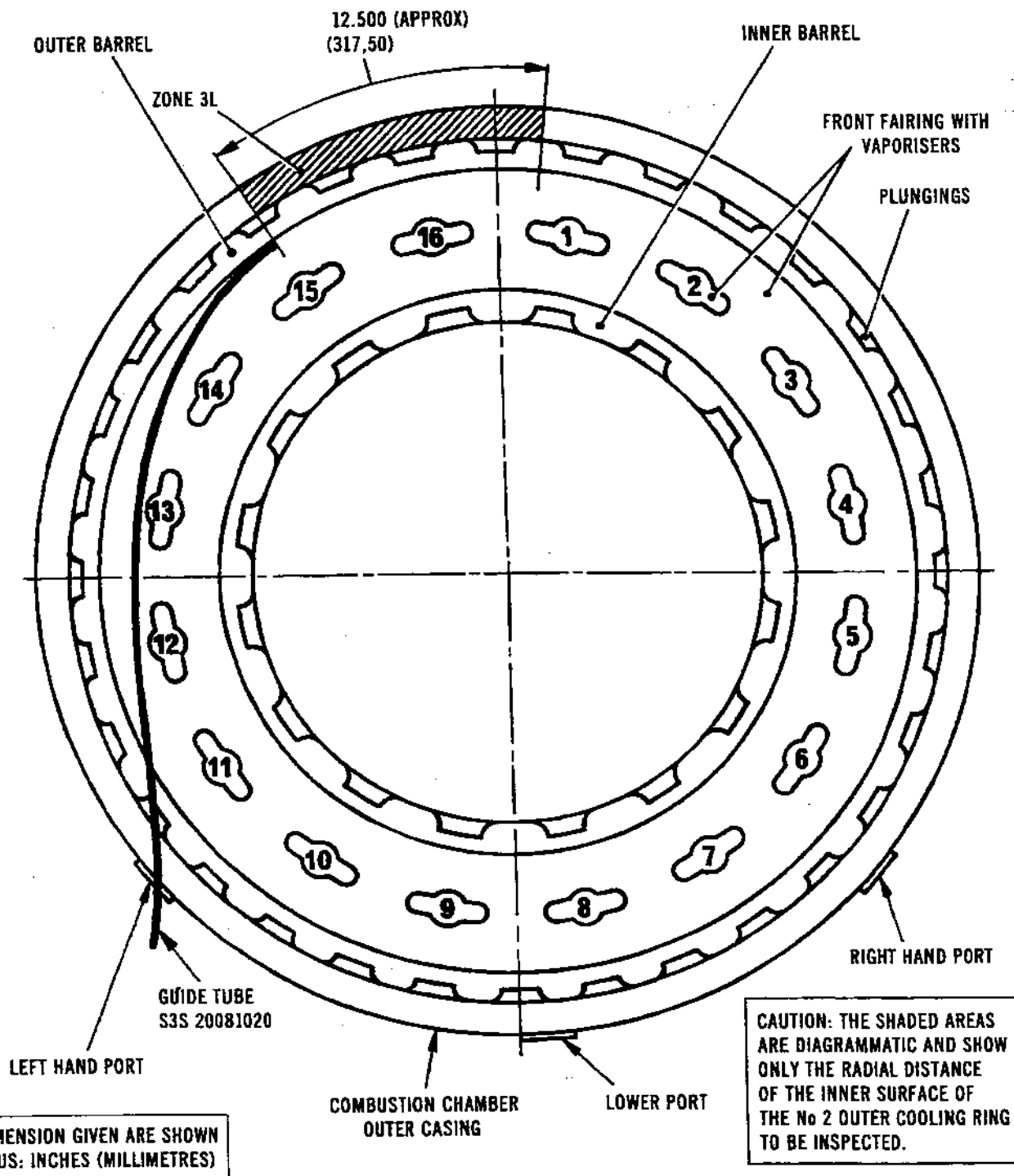


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DIAGRAMMATIC VIEW LOOKING FORWARD

ESTIMATE THE ZONE BOUNDARIES IN RESPECT OF THE PLUNGINGS
Probe Inspection of No.2 Outer Cooling Ring
using Guide Tubes
Figure 315D (Sheet 7 of 7)

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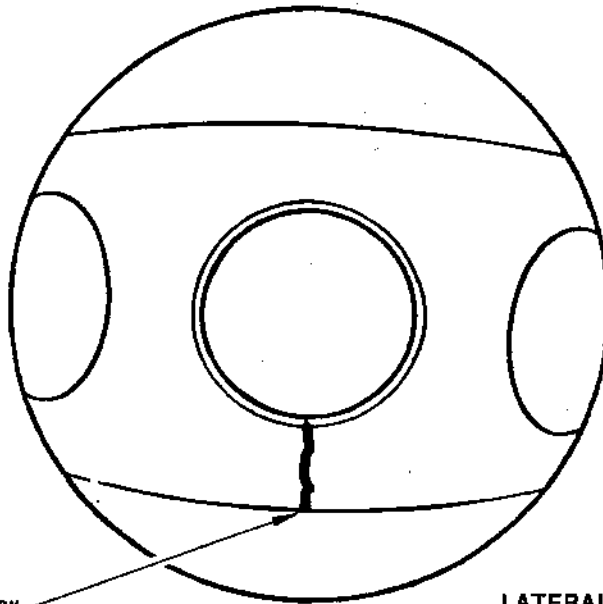
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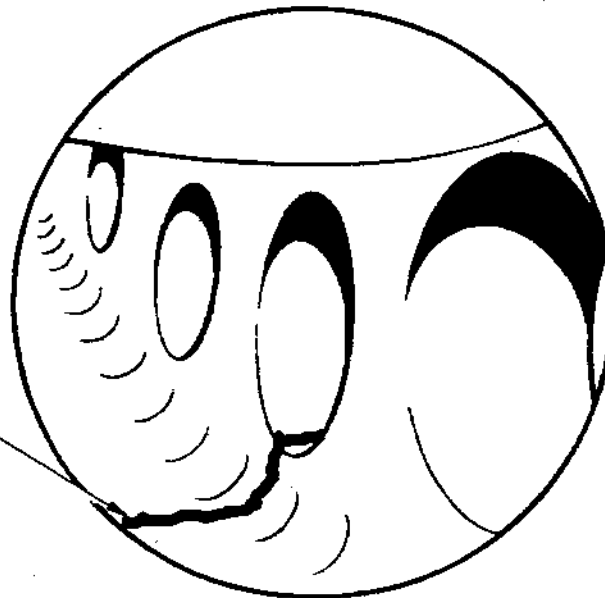
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TYPICAL AXIAL CRACK

LATERAL VIEW



TYPICAL AXIAL CRACK

END VIEW

No 2 OUTER COOLING RING CRACK INSPECTION USING
GUIDE TUBES AND FLEXIBLE PROBE (REF FIG 315D)

Typical Axial Cracks in the No.2 Outer Cooling Ring
Emanating from the No.2 Cooling Ring Scoop
Figure 315E

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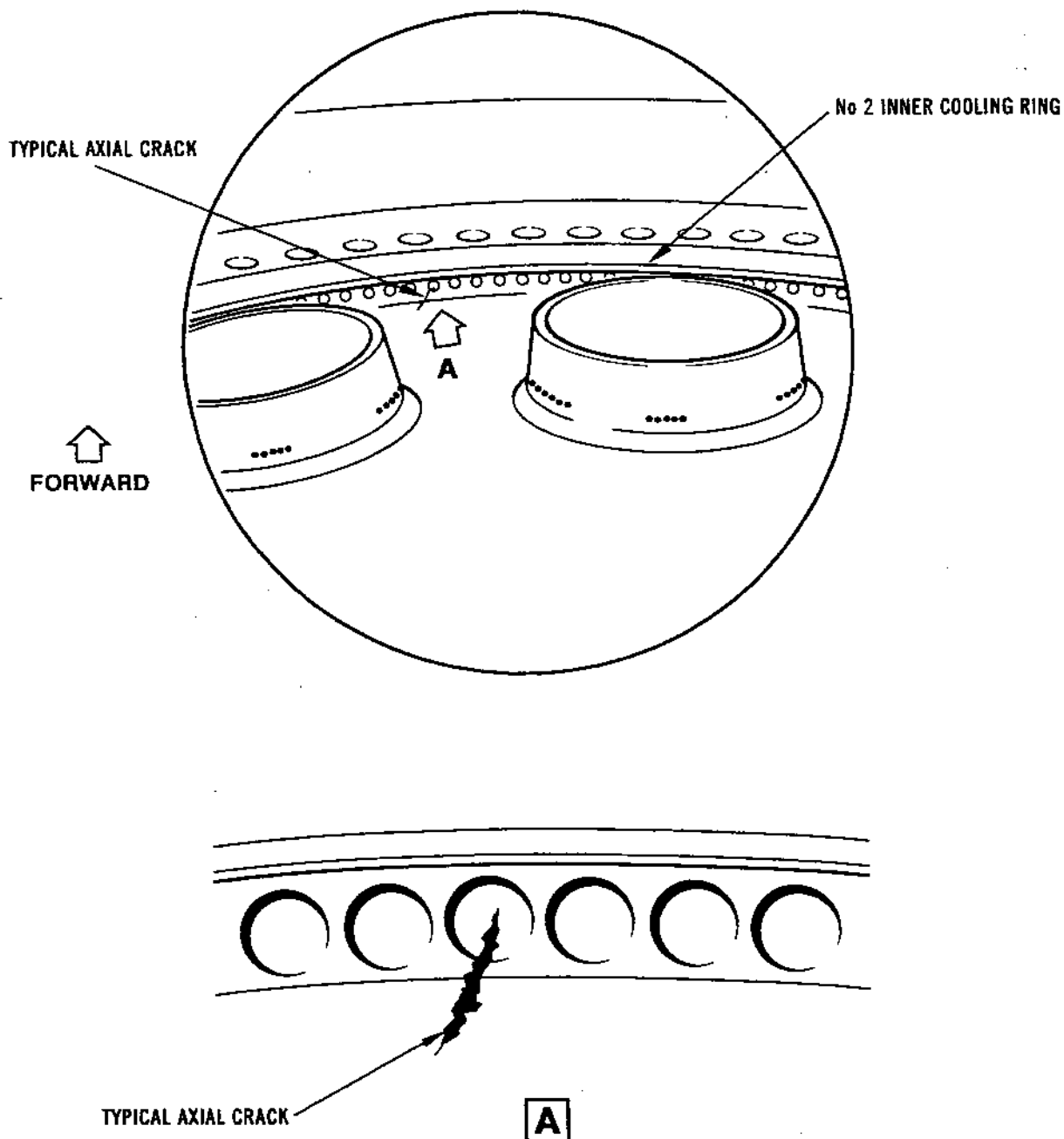


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**No 2 INNER COOLING RING AXIAL CRACK INSPECTION
USING CONVENTIONAL SCOPE**

Typical Axial Cracks in the No.2 Inner Cooling Ring
Emanating from the No.2 Cooling Ring Scoop
Figure 315F

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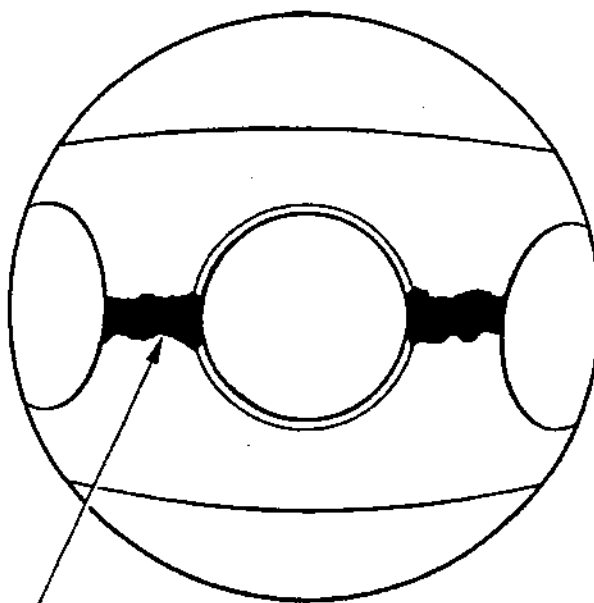
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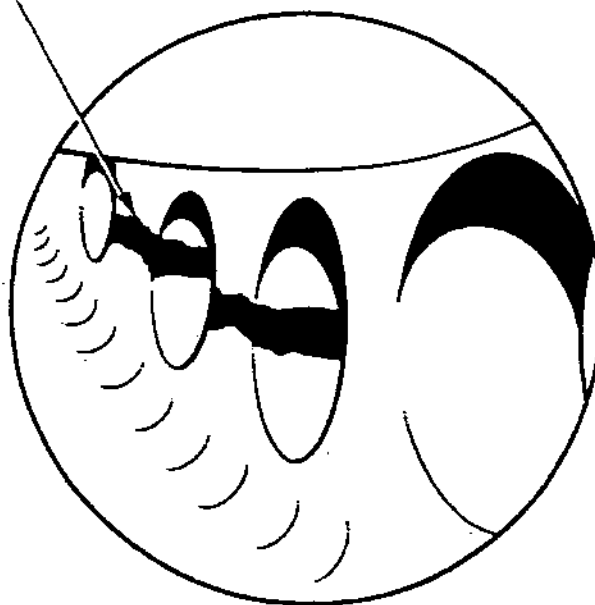
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BS00002464/4



LATERAL VIEW

TYPICAL ACCEPTABLE
COOLING HOLE CRACKS



END VIEW

No 2 OUTER COOLING RING CRACK INSPECTION USING
GUIDE TUBES AND FLEXIBLE PROBE (REF FIG 315D)

Typical Circumferential Cracks Between No.2 Outer
Cooling Ring Holes
Figure 315G

INSPECTION/CHECK

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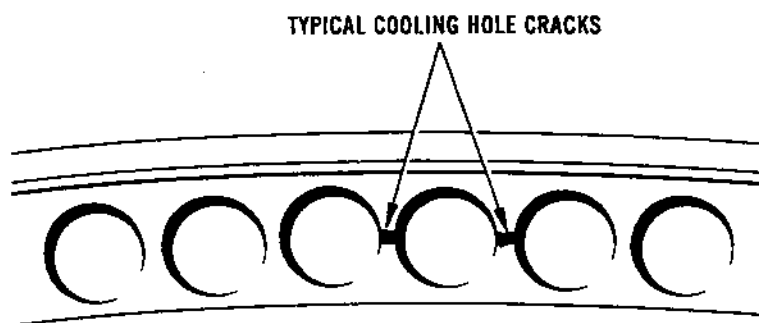
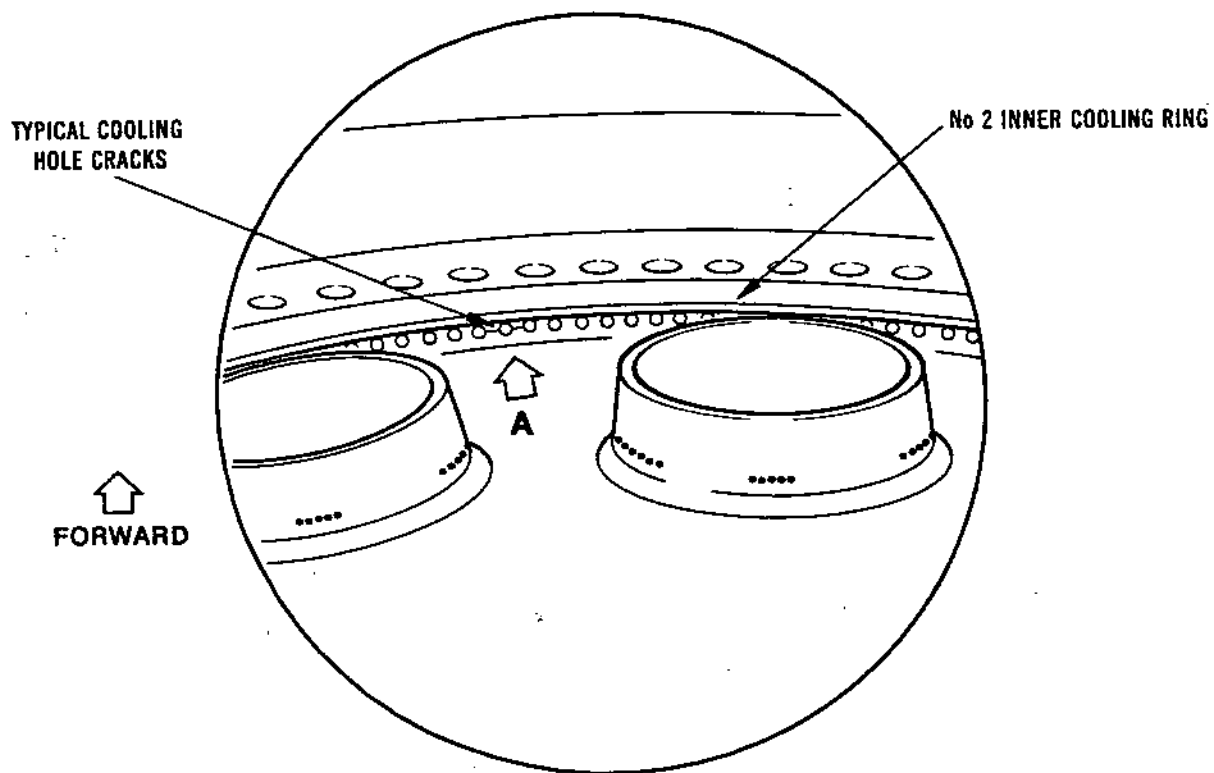
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A

No 2 INNER COOLING RING.CIRCUMFERENTIAL CRACK INSPECTION
USING CONVENTIONAL SCOPE

Typical Circumferential Cracks Between No.2 Inner
Cooling Ring Holes
Figure 315H

INSPECTION/CHECK

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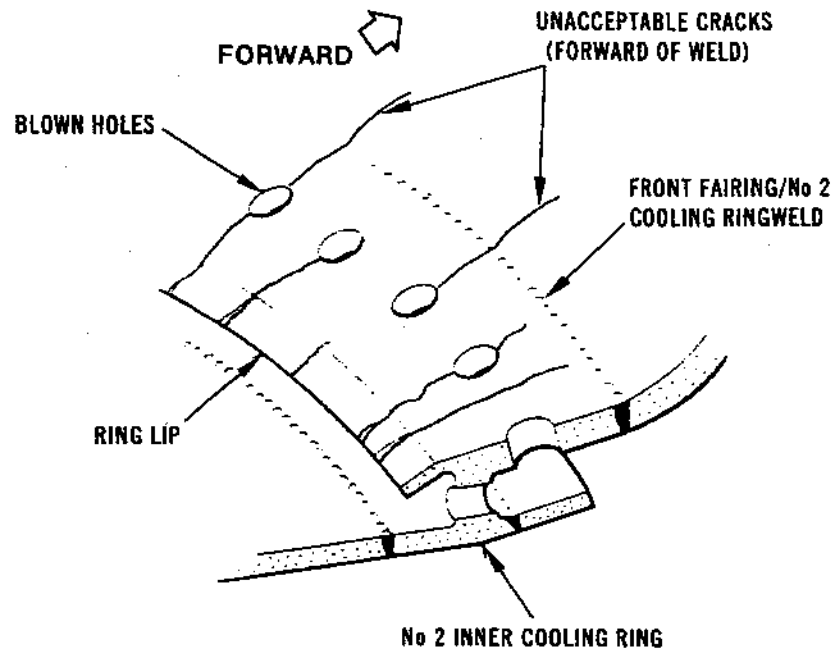
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CRACKS EXTENDING INTO, THROUGH
OR ORIGINATING FROM BLOWN HOLES

Typical Cracks in No.2 Cooling Ring Flameside Lips
Figure 315J

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- (2) Assemble the blanking cover to the right-hand inspection port (detail B).
 - (a) Apply lubricant 'A' to bolts (72-42-01/2-40).
 - (b) Locate the cover (72-42-01/2-50) on the port, together with the spacer plate (72-42-01/2-45) on engines to pre-SB.0L.593-72-62/SB.0L.593-72-8629-256 standard (detail B) and retain in position with six bolts (72-42-01/2-40B) lightly tightened.
 - (c) Torque-tighten the six bolts to 100 lbf in. (11,3 N.m).
 - (d) Wire-lock bolts together.
- (3) Assemble the blanking cover to the bottom inspection port (detail C).
 - (a) Apply lubricant 'A' to bolts (72-42-01/2-160).
 - (b) Secure the cover (72-42-01/2-170) on the engine with a gasket (72-42-01/2-175) SB.72-58 interposed, and secure with six bolts torque-tightened to 100 lbf in. (11,3 N.m).
 - (c) Wire-lock bolts together.
- (4) Assemble the HP compressor diffuser case blanks.
 - (a) Assemble a flat washer (72-34-00/3-270) to the blanking plug (72-34-00/3-260), then apply lubricant 'A' to the plug threads.
 - (b) Screw the blanking plug into its location and torque-tighten between 540 and 600 lbf in. (61 and 67,8 N.m). Wire-lock the blanking plug.

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D. Acceptance Standards - Combustion Chamber.

- (1) Carry out the internal examination of the combustion chamber in conjunction with the engine inspection build records to establish details of the build/repair standard of the combustion chamber.
- (2) Examine the combustion chamber in accordance with the acceptance standards detailed in (3).
- (3) Acceptance standards (Ref.Fig.315).
 - (a) Fuel Vaporisers.
 - (i) No defects are acceptable in the vaporisers.
 - (ii) Obvious signs of overheating or burning should be reported to the Olympus Project Office, Rolls-Royce plc., Filton, Bristol, England, BS34 7QE.
 - (b) Thermal Barrier Coating.
 - (i) Small areas of chipping and/or spalling of thermal barrier coating (TBC) are acceptable. Loss of TBC may, however, reduce the life potential of the combustion chamber.
 - (c) Head Assembly.
 - (i) Front fairing burns/blisters are not acceptable.
 - (ii) Circumferential cracking at the front fairing/No.2 cooling ring welds is not acceptable.
 - (iii) Axial cracking forward of the front fairing/No.2 cooling ring welds is not acceptable.

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- (iv) Axial cracks in the No.2 cooling rings originating from the No.2 cooling ring scoops are not acceptable (Ref.Figs. 315E and 315F). If found, report findings to the Olympus Project Office, Rolls-Royce plc., Filton, Bristol, England, BS34 7QE.
- (v) Loss of material from the No.2 outer cooling ring scoop is not acceptable (Ref.Fig.315A).

NOTE: Complete viewing of this location is not possible. However, any material missing from the scoop would be carried rearwards to become trapped in the annulus between the combustion chamber and CCOC or against the HE igniter and pilot nozzle. In most instances, the debris would tend to drop to the bottom of the annulus.

- (vi) Circumferential cracking between cooling holes in the No.2 outer cooling ring is not acceptable (Ref.Fig.315G).
- (vii) Circumferential cracking between cooling holes in the No.2 inner cooling ring is not acceptable (Ref.Fig.315H).
- (viii) Cracks in the No.2 inner and outer cooling ring flameside lips extending into, through, or originating from, blown holes are not acceptable. (Ref.Fig.315J).
- (d) Inner and Outer Barrels.
 - (i) Any number of cracks in any cooling ring flameside lip including No's.3, 4, 5, 6 inner and outer and No.7 inner cooling rings but excluding No.2 cooling rings, are acceptable provided they do not propagate through the cooling holes into the barrel section (Ref.Fig.315K).
- (e) Any other damage that fails to meet the limits detailed in (a), (b), (c) and (d), reject.

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10. Examination of the HP Turbine Rotor Blades and Nozzle Vanes

NOTE: The HP turbine rotor blades leading edges are examined by the use of an optical inspection probe inserted through a sealed port located in the combustion chamber outer case (CCOC) rearward of the thermocouple junction box. The trailing edges of the turbine rotor blades are accessible through sealed ports located in the CCOC rearward of the fuel drains tank.

NOTE: The leading edge regions of the HP turbine nozzle vanes are examined by the use of a probe inserted through three inspection ports provided in the CCOC.

- A. Install the HP Rotating Assembly Turning Equipment (Ref.72-09-01 Engine Turning).

NOTE: If examination of the HP compressor rotor blades has been carried out, the turning equipment will be assembled.

- B. Prepare the HP Turbine Rotor Blades and Nozzle Vanes for Examination (Ref.Fig.314, 316 and 317).

- (1) Remove the flanged sealing bar from the CCOC (Ref.Fig.316).
 - (a) Remove the bolts securing the cover plate and the flanged sealing bar and detach the cover plate.
 - (b) Withdraw the flanged sealing bar from the engine.
- (2) Remove the flanged sealing bar from the CCOC (Ref.Fig.317).
- (3) Remove the blanking covers from the CCOC inspection ports (Ref.Fig.314).
 - (a) Remove attachment bolts and blanking cover from the CCOC left-hand inspection port (detail A).

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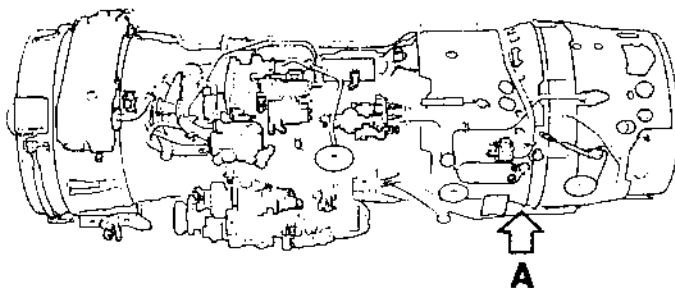
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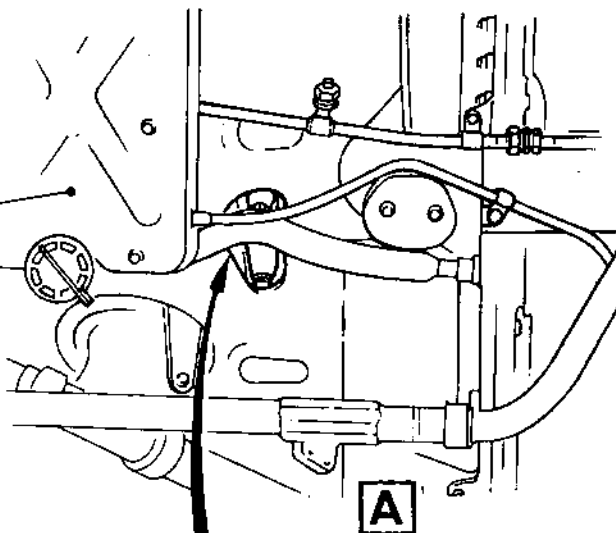


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THERMOCOUPLE TERMINATION
JUNCTION BOX

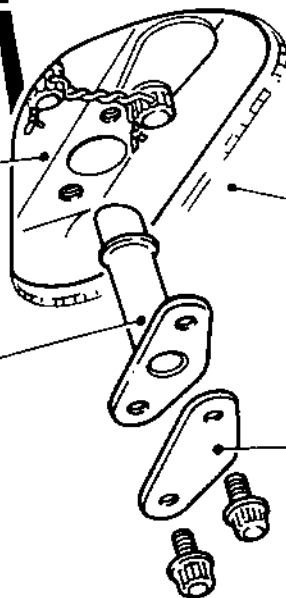


COMBUSTION CHAMBER
OUTER CASE

HEAT INSULATING SHIELD

FLANGED SEALING BAR

COVER PLATE



HP Rotor Blade Leading Edge Inspection Port
Figure 316

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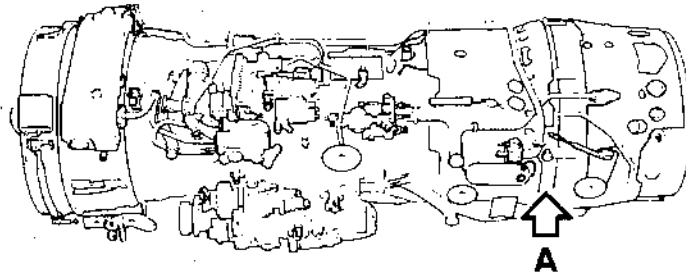


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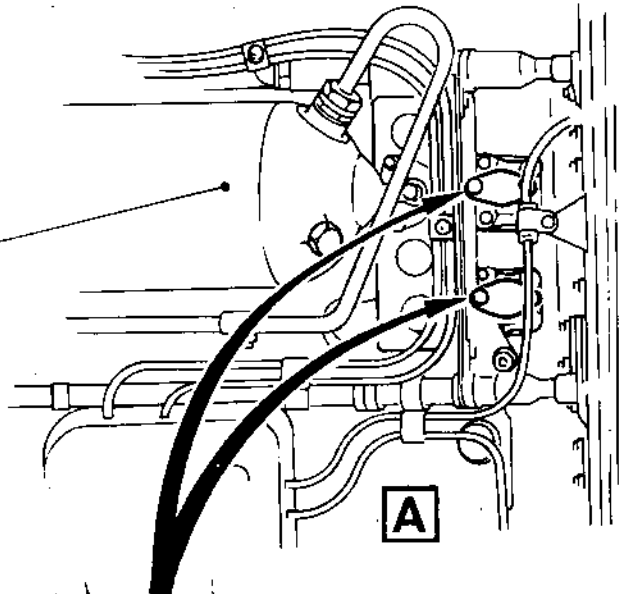
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OVERHAUL



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DRAINS TANK

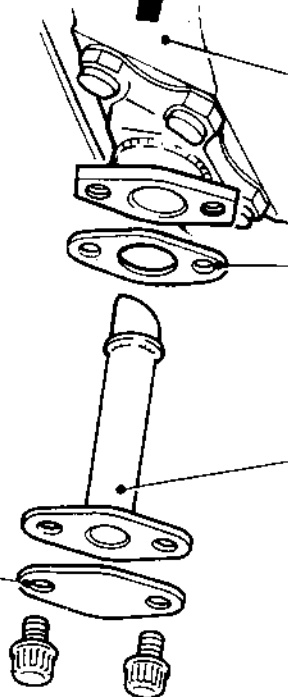


COMBUSTION CHAMBER
OUTER CASE

GASKET

FLANGED SEALING BAR

COVER PLATE



HP Rotor Blade Trailing Edge and LP Rotor Blade
and Nozzle Vane Inspection Ports
Figure 317

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- (b) Remove attachment bolts and cover from right-hand inspection port together with spacer plate on engines to SB.72-8629-256 standard (detail B).
- (c) Remove blanking cover from the bottom inspection port (detail C).
 - (i) Position a container to catch any residual fuel.
 - (ii) Remove the bolts securing the blanking cover to CC0C.
 - (iii) Withdraw blanking cover from the engine and gasket (SB.72-58).
 - (iv) Wipe any fuel deposits from the inspection port area.
- (4) Ensure that the optical inspection equipment (light source box (Tool 1888) and cable (Tool 1891)) have been prepared and tested (Ref. para.4.A).

C. Examine the Rotor Blades and the Nozzle Vanes.

CAUTION: DO NOT MOVE LIGHT SOURCE BOX WHILE SWITCHED ON OR WITHIN 30 SECONDS OF SWITCHING OFF. BULB FILAMENT IS NOT SHOCK RESISTANT WHEN HOT.

- (1) Commence the examination using the probe (Tool 1892), used in conjunction with the light source box (Tool 1888) and cable (Tool 1891), inserted through the ports in the CC0C (Ref. Fig. 316).

- (a) Insert the probe (Tool 1892) and ensure free penetration.

NOTE: The protective sleeve (Tool 1893) must be retained on the probe at all times except when removal is essential for insertion of the probe or its effective use when inserted.

- (b) Switch on the probe illumination and commence examination.

NOTE: There are 87 HP turbine rotor blades per set.

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sneema

- (c) Carefully examine the leading edge region of the turbine rotor blades for damage, signs of blockage or evidence of debris wrapped around the leading edges. Turn the engine changing the probe position and varying the depth of insertion as necessary to obtain coverage.
 - (d) Record the extent of any damage or debris found for comparison with the acceptance limits given in para.F. If a photographic record of the damage is required, use the equipment and procedures detailed in 72-09-04 Inspection/Check or equivalent.
- (2) Change the probe position (Ref.Fig.317) and carefully examine the trailing edge region of the turbine rotor blades using the same probe insertion procedure (Ref. para.(1)).
 - (3) On completion of examination switch off the illumination and withdraw the probe.
- NOTE: If the inspection of the LP turbine is to be carried out, phase it in with this sequence.
- (4) If no further examinations are required, dismantle the equipment (Ref.para.5.A).
 - (5) Continue with examination of the HP turbine nozzle vanes using probe (Tool 1899), used in conjunction with the transformer (Tool 1900), inserted through the CCOC ports (Ref.Fig.314).

WARNING: CHECK PERIODICALLY AND REMOVE RESIDUAL FUEL DRAINAGE AT LOWER PORT POSITION AND FROM PROBE. FUEL COULD ENTER EYES DURING EXAMINATION SEQUENCE.

WARNING: QUARTZ IODINE BULBS MUST NOT BE HANDLED IN SERVICE. HANDLING OF BULB WILL CAUSE SURFACE CONTAMINATION WHICH MAY CAUSE BULB TO SHATTER.

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CAUTION: DO NOT USE FORCE TO EFFECT PROBE ENTRY AND PREVENT PROBE FROM BECOMING DENTED OR BENT. INVESTIGATE ANY OBSTRUCTION TO PROBE PENETRATION.

- (a) Insert the probe through the inspection port, switch on the probe illumination and commence examination.
- (b) Record the extent of any damage found and compare with acceptance limits given in para.F. If a photographic record of the damage is required, use the equipment and procedures detailed in 72-09-04 Inspection/Check, or equivalent.
- (6) On completion of the examination, switch off the illumination and withdraw the probe.
- (7) Dismantle and stow the optical inspection equipment (Ref.para.5.B).
- (8) Remove the turning equipment (Ref.72-09-01 Engine Turning).
- D. Install the Flanged Sealing Bar Assemblies (Ref.Fig.316 and 317).
- (1) Install the flanged sealing bar at the thermocouple termination junction box position (Ref.Fig.316).
- (a) Apply lubricant 'A' to the bolts (72-42-01/2-120).
- (b) Insert the flanged sealing bar (72-42-01/2-140) into the engine, position the cover plate (72-42-01/2-130) and secure the assembly with two bolts (72-42-01/2-120).
- (c) Torque-tighten the bolts to 100 lbf in. (11,3 N.m). Wire-lock the bolts together.
- (2) Install the flanged sealing bar in position at rear of the drains tank (Ref.Fig.317).
- (a) Apply lubricant 'A' to the bolts (72-42-01/2-200).

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- (b) Position a gasket (72-42-01/2-225) on mounting boss and insert the flanged sealing bar (72-42-01/2-220) into engine.
- (c) Position cover plate (72-42-01/2-210) on sealing bar and secure with two bolts, torque-tighten to 100 lbf in. (11,3 N.m).
- (d) Wire-lock bolts together.

E. Install Blanking Covers.

- (1) Assemble the blanking cover to the left-hand inspection port (Ref.Fig.314, detail A).
 - (a) Apply lubricant 'A' to bolts (76-21-01/2-70).
 - (b) Secure the cover (76-21-01/2-80) with six bolts, torque-tighten to 100 lbf in. (11,3 N.m.).
 - (c) Wire-lock bolts together.
- (2) Assemble the blanking cover to the right-hand inspection port (detail B).
 - (a) Apply lubricant 'A' to bolts (72-42-01/2-40).
 - (b) Locate the cover (72-42-01/2-50) on the port with the spacer plate (72-42-01/2-45) on engines to pre-SB.72-62/SB.72-8629-256 standard (detail B) and retain in position with six bolts (72-42-01/2-40B) lightly tightened. Finally torque-tighten bolts to 100 lbf in. (11,3 N.m) to secure cover.
 - (c) Wire-lock bolts together.
- (3) Assemble the blanking cover to the bottom inspection port (detail C).
 - (a) Apply lubricant 'A' to bolts (72-42-01/2-160).

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(b) With a gasket (72-42-01/2-175) interposed, position the blanking cover (72-42-01/2-170) on the engine and secure with six bolts, torque-tighten to 100 lbf in. (11,3 N.m).

(c) Wire-lock bolts together.

F. Acceptance Standards - HP Turbine Rotor Blades.

- (1) Carry out the internal examination of the HP turbine blades in conjunction with the engine build records to establish details of the build standard of turbine blades installed during assembly.
- (2) Examine the turbine blades in accordance with the acceptance standards detailed in (3), (4), (5) and (6). All acceptable damage must be smooth contoured, crack free, and not penetrating into the cooling passages.
- (3) Impact damage (Ref.Fig.318).
 - (a) Any damage not contained within zones A, B and C. Reject.
 - (b) Any measurable damage in zone A. Reject.
 - (c) Damage in zone B not more than 0.070 in. (1,780 mm) in diameter and not more than 0.007 in. (0,180 mm) in depth. Accept (subject to acceptance of damage in (d)).
 - (d) Damage in zone C not more than 0.125 in. (3,170 mm) in diameter and not more than 0.010 in. (0,250 mm) in depth. Accept (subject to acceptance of damage in (c)).

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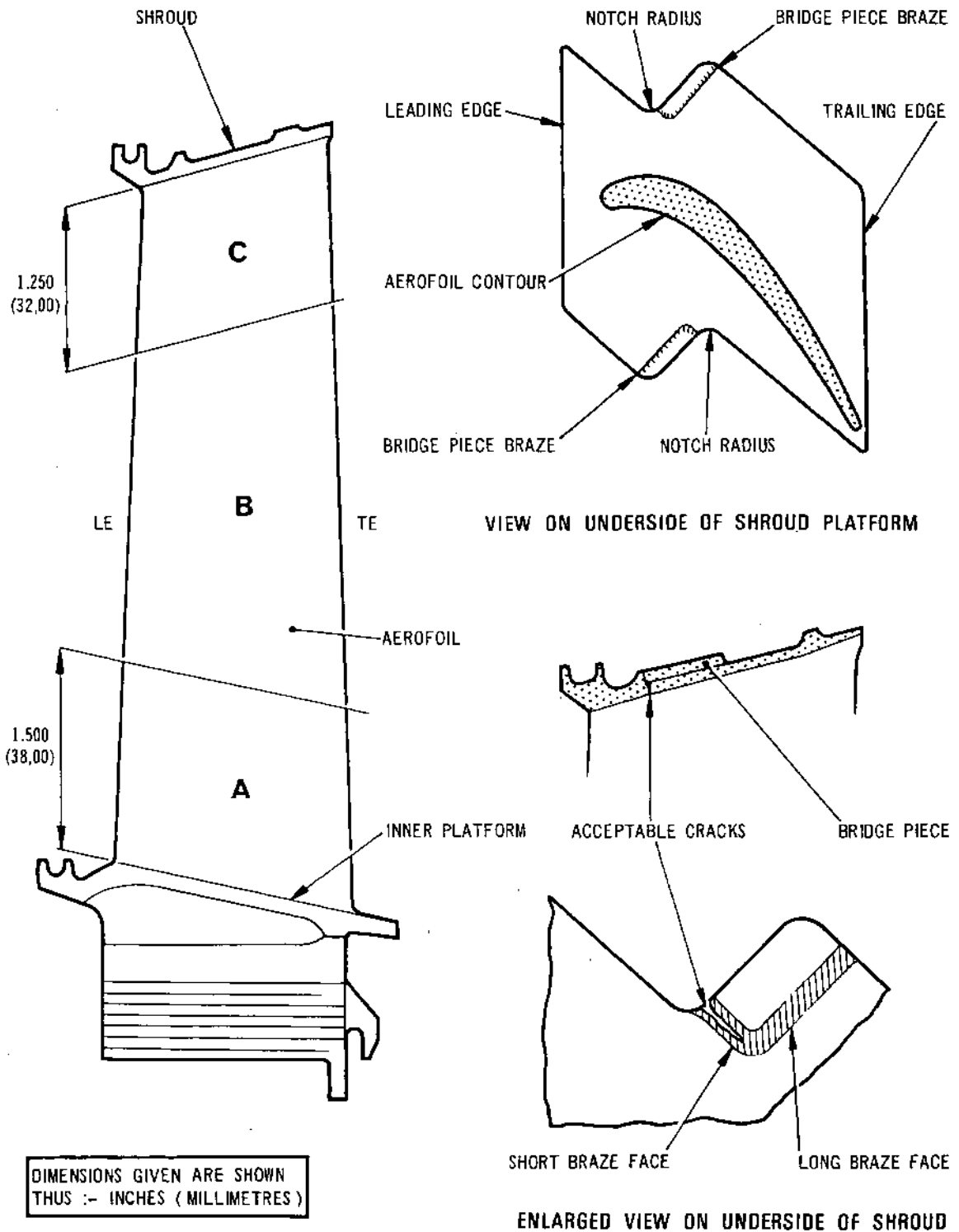
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HP Turbine Blades - Acceptance Standard
Figure 318

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(4) Deformation of leading and trailing edges.

- | | |
|---|--|
| (a) Any deformation in zone A. | Reject. |
| (b) Deformation in zone B not exceeding a lateral displacement of 0.010 in. (0,250 mm). | Accept (subject to acceptance of damage in (c)). |
| (c) Deformation in zone C not exceeding a lateral displacement of 0.020 in. (0,50 mm). | Accept (subject to acceptance of damage in (b)). |

(5) Cracks.

- | | |
|---|---------|
| (a) Any cracks other than in (b). | Reject. |
| (b) Cracks in the bridge piece (pad) braze on the underside of the shroud from notch radius but not extending into long face nor into blade parent metal. | Accept. |

(6) Overheating.

- | | |
|---|---------|
| (a) Obvious burning, erosion, deposition of material or damage to pack aluminising. | Reject. |
|---|---------|

G. Acceptance Standard - HP Nozzle Vanes.

To be issued later.

11. Examination of the LP Turbine Rotor Blades and Nozzle Vanes

NOTE: The LP turbine rotor blades leading edges are examined by the use of an optical inspection probe inserted through one of two sealed ports located in the CCOC rearward of the fuel drains tank. The trailing edges of the turbine rotor blades are accessible from the jet pipe.

NOTE: The LP turbine nozzle vanes are examined from the same access points as the rotor blades.

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- A. Install the LP Rotating Assembly Turning Equipment (Ref.72-09-01 Engine Turning).

NOTE: If examination of the LP compressor rotor blades has been carried out, the turning equipment will be assembled.

- B. Prepare the LP Turbine Rotor Blades and Nozzle Vanes for Examination (Ref.Fig.317).

- (1) Remove the flanged sealing bar from the CCOC.

(a) Remove the bolts securing the cover plate and the flanged sealing bar and detach the cover plate.

(b) Withdraw the flanged sealing bar from the engine.

(i) On pre SB.72-58 standard engines, remove any deposits of jointing compound from abutment surfaces.

(ii) On SB.72-58 standard engines, remove the gasket.

- (2) Ensure that the optical inspection equipment (light source box (Tool 1888) and cable (Tool 1891)) have been prepared and tested (Ref.para.4.A).

- C. Examine the Rotor Blades and the Nozzle Vanes.

CAUTION: DO NOT MOVE LIGHT SOURCE BOX WHILE SWITCHED ON OR WITHIN 30 SECONDS OF SWITCHING OFF.
BULB FILAMENT IS NOT SHOCK RESISTANT WHEN HOT.

- (1) Commence examination using the probe (Tool 1892) in conjunction with the light source box (Tool 1888) and cable (Tool 1891).

(a) Insert the probe and ensure free penetration.

NOTE: The protective sleeve (Tool 1893) must be retained on the probe at all times except when removal is essential for insertion of the probe or its effective use when inserted.

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- (b) Switch on the probe illumination and commence examination.

NOTE: There are 79 LP turbine rotor blades per set.

- (c) Carefully examine the leading edge region of the turbine rotor blades for damage, signs of blockage or evidence of debris wrapped around the leading edges. Turn the engine changing the probe position and varying the depth of insertion as necessary to obtain coverage.
 - (d) Record the extent of any damage or debris found for comparison with the acceptance limits given in para.E. If a photographic record of the damage is required, use the equipment and procedures detailed in 72-09-04 Inspection/check, or equivalent.
 - (e) Examine the LP nozzle vanes as far as possible for signs of damage.
- (2) On completion of examination switch off the illumination and withdraw the probe.
 - (3) Dismantle and stow the optical inspection equipment (Ref.para.5.A).
 - (4) Continue the examination by obtaining access through the exhaust diffuser. Turn the engine as necessary to ensure full coverage of the surfaces to be examined and record the extent of any damage found for comparison with the acceptance limits given in para.E.
 - (a) Carry out a visual and tactile examination of the trailing edge region of turbine rotor blades for signs of damage.
 - (b) Carry out a visual and tactile examination of the turbine nozzle vanes for signs of damage.
 - (5) Remove the hand turning equipment (Ref.72-09-01 Engine Turning).

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D. Install the Flanged Sealing Bar Assembly (Ref.Fig.317).

- (1) Apply lubricant 'A' to the bolts (72-42-01/2-200).
- (2) On pre SB.72-58 standard engines, apply jointing compound 'A' to abutment surfaces and insert flanged sealing bar (72-42-01/2-220) into the engine.
- (3) On SB.72-58 standard engines, position a gasket (72-42-01/2-225) on mounting boss and insert the flanged sealing bar (72-42-01/2-220) into engine.
- (4) Position cover plate (72-42-01/2-210) on sealing bar and secure with two bolts, torque-tighten to 100 lbf in. (11,3 N.m).
- (5) Wire-lock the bolts together.

E. Acceptance Standards - LP Turbine Rotor Blades.

- (1) Carry out the internal examination of the LP turbine blades in conjunction with the engine build records to establish details of the build standard of turbine blades installed during assembly.
- (2) Examine the turbine blades in accordance with the acceptance standards detailed in (3) to (9). All acceptable damage which affects not more than five blades must be smooth contoured, crack free, and not penetrating into the cooling passages.
- (3) Impact damage (Ref.Fig.319).
 - (a) Damage in zone A not more than 0.080 in. (2 mm) in diameter and not more than 0.010 in. (0,250 mm) in depth and not less than 0.750 in. (19 mm) between damage marks. Accept (subject to acceptance of damage in (b) and (c)).
 - (b) Damage in zone B not more than 0.125 in. (3,170 mm) in diameter and not more than 0.015 in. (0,380 mm) in depth and not less than 0.250 in. (6,35 mm) between damage marks. Accept (subject to acceptance of damage in (a) and (c)).

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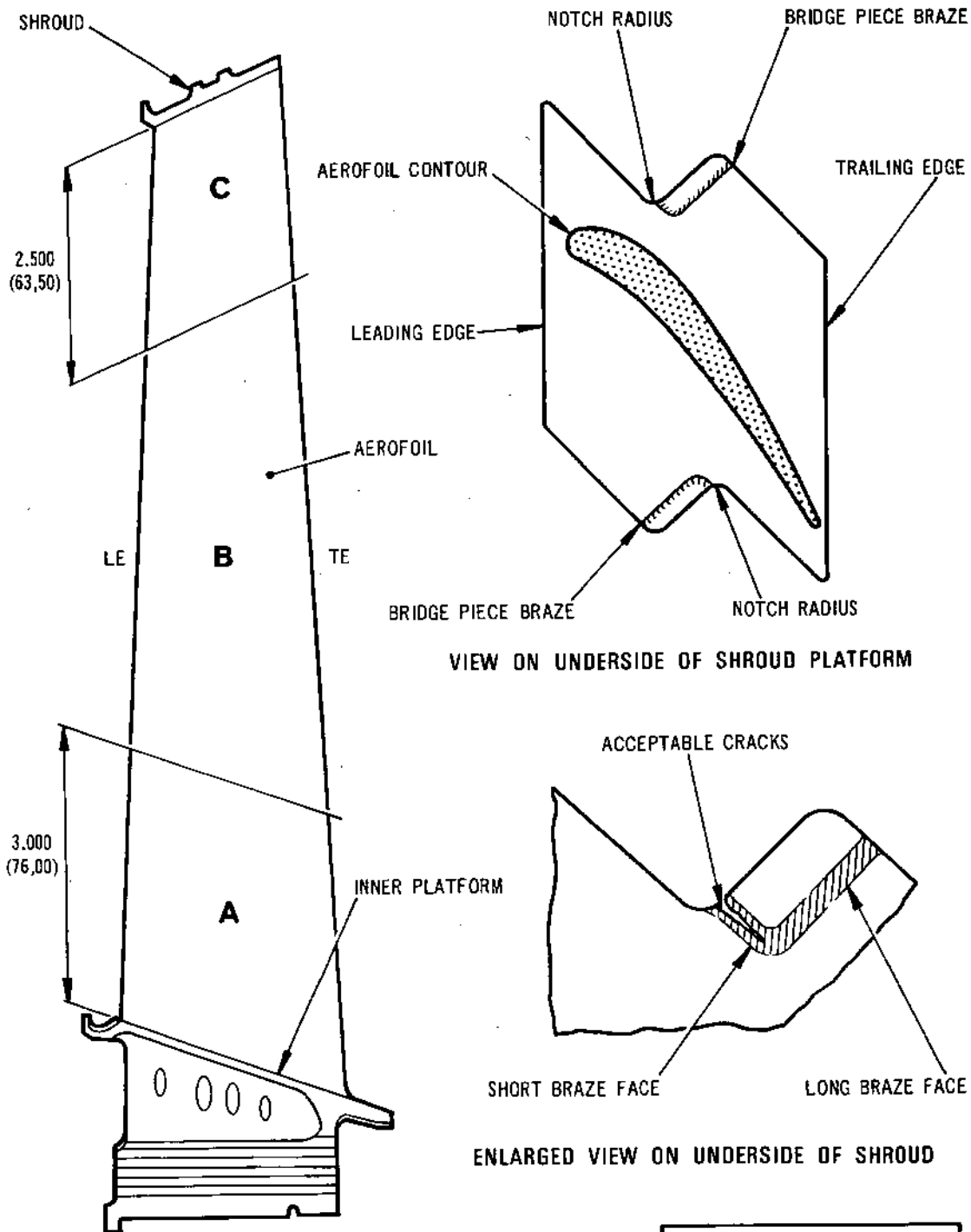
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DIMENSIONS GIVEN ARE SHOWN.
THUS :-- INCHES (MILLIMETRES)

LP Turbine Blades - Acceptance Standard
Figure 319

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- (c) Damage in zone C not more than 0.200 in. (5,08 mm) in diameter and not more than 0.020 in. (0,5 mm) in depth and not less than 0.750 in. (19 mm) between damage marks. Accept (subject to acceptance of damage in (a) and (b)).
- (4) Deformation of trailing edges.
- (a) Deformation in zone A not exceeding a lateral displacement of 0.020 in. (0,250 mm) and not less than 0.750 in. (19 mm) between damage marks. Accept (subject to acceptance of damage in (b) and (c)).
- (b) Deformation in zone B not exceeding a lateral displacement of 0.030 in. (0,760 mm) and not less than 0.750 in. (19 mm) between damage marks. Accept (subject to acceptance of damage in (a) and (c)).
- (c) Deformation in zone C not exceeding a lateral displacement of 0.040 in. (1,01 mm) and not less than 0.250 in. (6,35 mm) between damage marks. Accept (subject to acceptance of damage in (a) and (b)).
- (5) Blade shroud damage.
- (a) Damage marks not more than 0.200 in. (5,08 mm) in diameter and not more than 0.020 in. (0,5 mm) in depth. Accept.
- (b) Shroud side face or shroud trailing edge distortion not more than 0.040 in. (1 mm). Accept.
- (c) All bridge piece pads intact. Accept.

INSPECTION/CHECK

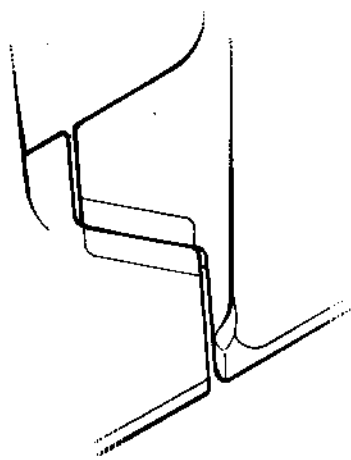
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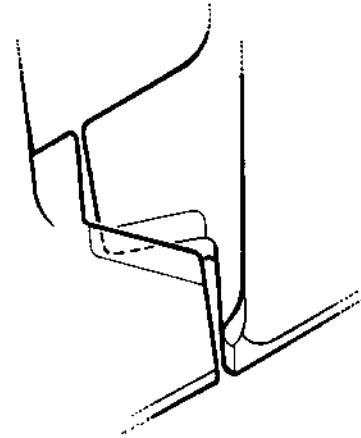
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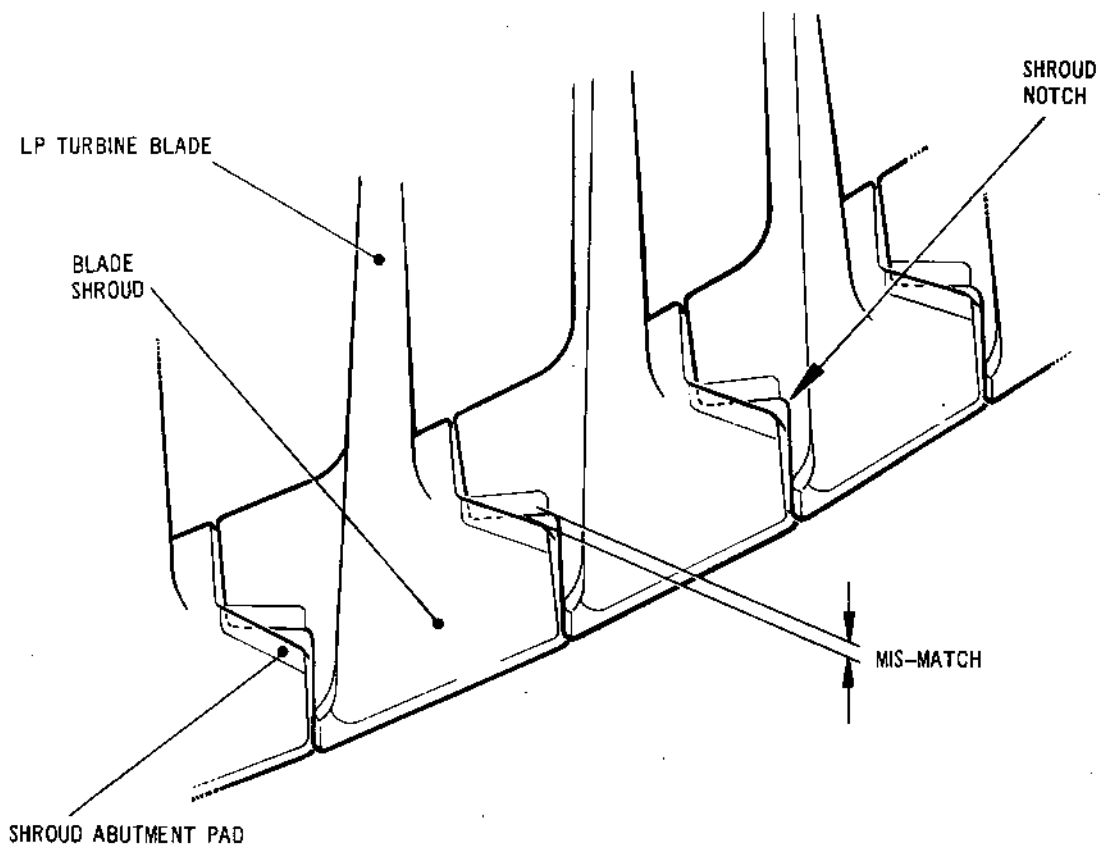
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BEFORE SHROUD DISTORTION



MIS-MATCH AFTER SHROUD DISTORTION



Blade Shroud Abutment Pad/Notch Mis-match
Figure 320

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(6) Separation of blade shrouds.

- (a) No separation or sliding of blade shroud abutment faces. Accept.

NOTE: Check (a) may be carried out by applying moderate hand pressure at the blade trailing edges to attempt to separate two adjacent blades.

(7) Outward distortion of shroud edges (Ref.Fig.320).

- (a) Obvious outward distortion of shroud edges causing a marked mis-match at the adjacent shroud corner paying particular attention to outer ends of the bridge piece or pads. Reject.

NOTE: When carrying out damage checks, access to the trailing edges of the blades can be gained through the exhaust diffuser.

(8) Cracks.

- (a) Any cracks other than (b) Reject.
(b) Cracks in bridge piece (pad) braze on underside of shroud from notch radius but not extending into long braze face nor into blade parent metal. Accept.

(9) Overheating.

- (a) Obvious burning, erosion, deposition of material. Reject.

F. Acceptance Standard - LP Nozzle Vanes.

To be issued later.

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ENGINE INTERNAL EXAMINATION - USE OF PHOTOGRAPHIC EQUIPMENT1. General

To obtain permanent records of engine internal damage, photographic equipment is used in conjunction with internal inspection procedures using the optical inspection probes (Ref.72-09-03 Inspection/Check).

NOTE: Functional details of the camera, film loading and unloading are contained in the camera manufacturers information provided with the camera.

2. Tools and Equipment

Adapter (Tool 1905) PE.15957

Camera assembly comprising:

Case (Tool 1904) PE.28892

Camera body (Tool 1903)... .. PE.15953

Screen, clear PE.15954

Lens (Tool 1906) PE.15956

Viewfinder (Tool 1908) PE.15958

Cable release (Tool 1909) PE.15979

Tripod stand (Tool 1907) PE.15960

Photographic film:

HP4 (Black and white) (or ASA 408-650, DIN.27-29 equivalent)

3. Prepare Photographic Equipment (Ref. Fig.301)

A. Prepare the Camera.

- (1) Remove the camera (Tool 1903) from its case (Tool 1904) and check that all attachments are securely assembled to the body.
- (2) Assemble the adapter (Tool 1905) to the camera by screwing adapter into the camera lens (Tool 1906) filter thread and lightly tighten by hand.

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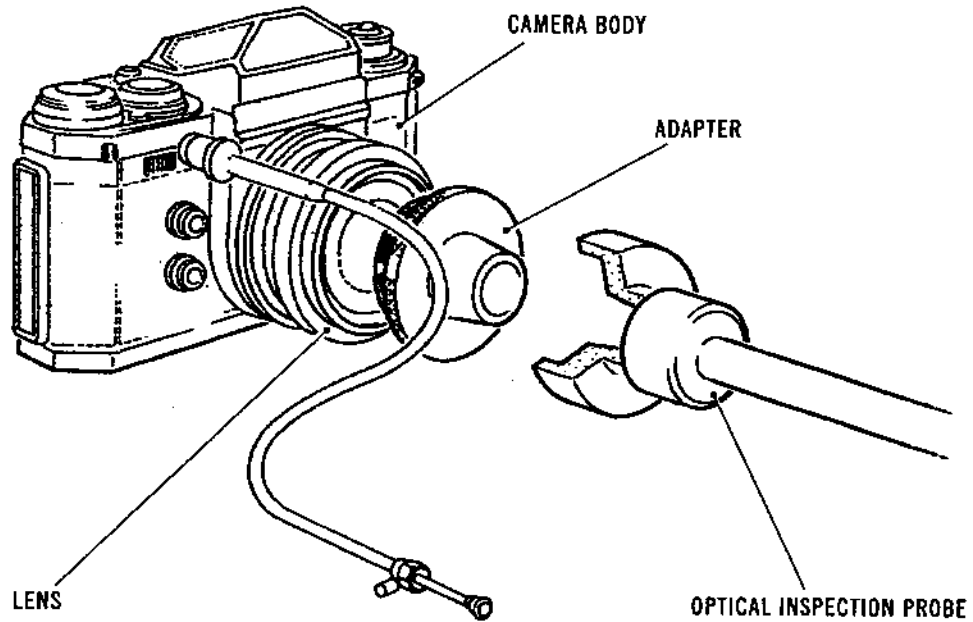
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Camera and Adapter
Figure 301

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sneema

- (3) Load the camera with film.
 - (4) Set the camera controls as follows:
 - (a) Set the aperture to max. (f2.8).
 - (b) Set the aperture to 'M' (manual).
 - (c) Set the focusing distance to 3.5 feet (1,067 m).
 - (d) Wind adhesive tape around the body of the lens, to lock the adjustments together and prevent accidental movement.
 - (e) Set the shutter speed control to obtain the following exposure times:

HP compressor blades	...	1 second
LP compressor blades	...	2 seconds
Turbine blades	...	2 seconds
Combustion chamber...	...	2 to 3 seconds
 - (5) Assemble and secure camera to the tripod stand (Tool 1907).
 - (6) Position the tripod near area of operation on a firm flat surface.
- B. Connect the Camera to the Intrascope Probe.
- (1) Hold the probe in position throughout the photographic procedure.
 - (2) Remove the probe eye-piece (Tool 1889) from the probe.
 - (3) Position the camera to effect alignment of the adapter (Tool 1905) with the probe. Adjust the pan and tilt head to ensure that the adapter axis is exactly in line with the intrascope axis.
 - (4) Secure the probe to the adapter with adhesive tape.
 - (5) Check through the camera viewfinder (Tool 1908), that the area to be photographed is in view, and if necessary, adjust the camera and/or probe.

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- (6) Set the probe illumination light source to the maximum setting.
- (7) Ensure that there is no movement of the engine or camera and operate the camera shutter release (Tool 1909).
- (8) Record the film frame numbers and identify each frame with the area photographed.
- (9) Take the second photograph of the damage area with one and a half to twice the specified exposure time to allow for variations in light intensity.

4. Dismantle the Photographic Equipment.

NOTE: On completion of recording engine internal damage, disconnect and dismantle the camera equipment.

A. Disconnect the Camera from the Intrascopes Probe.

- (1) Remove the adhesive tape and detach the camera from the probe ensuring that the probe does not fall free from the engine.
- (2) Remove the equipment from the vicinity of the engine or transfer to the next area to be photographed.

B. Dismantle the Camera.

- (1) Remove the camera from the tripod.
- (2) Remove the film from the camera.
- (3) Remove the adapter from the camera lens filter thread.
- (4) Remove the adhesive tape used to lock the adjustments and place the camera in the carrying case (Tool 1904).
- (5) Submit the film for development, together with a copy of the frame sequence/damage area identification record. Instruct that the negatives and prints are identified accordingly and printed 6 in. by 4 in. (150 mm by 100 mm).

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AIR INLET SECTION - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 302, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Table 301.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

There is no requirement for magnetic particle crack detection applicable to this Topic.

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**B. Fluorescent Dye Crack Detection.**

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	10	Air Intake Fairing	FlA/S3B
303	40	Flange	FlA
303	60	Baffle	FlA
303	110	Baffle	FlA
304	10	Flange Assembly	FlA
304	50	Tube	FlA
304	70	Seal Clamp	FlA
304	150	Tube	FlA/S3B
304	180	Tube	FlA
304	190	Tube	FlA/S3B
305	10	Air Intake Case	FlA
306	290	Mounting Bracket	FlA

Items to be Fluorescent Dye Crack Tested
Table 301

FIG.NO. ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-21-01	Fig.1
303	72-22-01	Fig.1
304	72-22-01	Fig.2
305	72-22-01	Fig.3
306	72-22-01	Fig.4
307	Not applicable	

Cross References to Illustrated Parts Catalogue
Table 302

4. Air Intake Fairing (302-10)

- A. Inspect Air Intake Fairing (Ref.Fig.307).

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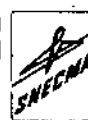
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(1) Dents.

- (a) Smooth dents not more than 0.200 in. (5,08 mm) deep and covering an area not exceeding 5 square inches (3225 square mm) and not less than 3.00 in. (76,2 mm) apart (Ref. detail A). Accept.
- (b) Smooth dents not more than 0.100 in. (2,54 mm) deep and covering an area not exceeding 5 square inches (3225 square mm) and not less than 1.00 in. (25,4 mm) apart (Ref. detail B). Accept.
- (c) Any smooth dents in the central area (Ref. detail C). Accept after repair (Ref.72-21-01 Repair No.1).
- (d) Sharp dents with a radius less than 0.050 in. (1,25 mm) (Ref. detail D). Reject.

(2) Scores.

- (a) Not more than 0.005 in. (0,125 mm) in depth. Accept after repair.

B. Inspect Air Intake Fairing Abutment Flange.

- (1) Nicks and burrs. Accept after repair.

C. Inspect Support Webs.

- (1) Cracking.
 - (a) Any signs of cracking. Reject.

D. Inspect Damping Spring Location.

- (1) Wear.
 - (a) Not more than 0.012 in. (0,30 mm) deep over the complete circumference. Accept.

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- (b) Local patches not more than 0.017 in. (0,43 mm) deep for not more than 10% of circumference.

Accept.

- (c) Wear greater than limits in (a) and (b).

Accept after repair
(Ref.72-21-01
Repair No.2).

E. Inspect Damping Spring.

- (1) Damage.

- (a) Any signs of cracking.

Reject.

F. Inspect Support Boss Locations
(Inner Surface of Outer Case).

- (1) Porosity pores.

- (a) Not more than 0.010 in.
(0,25 mm) diameter at
support boss weld
location.

Accept.

5. Flange (303-40)

A. Inspect Flange Abutment Faces.

- (1) Nicks, burrs and scores.

Accept after repair
providing sealing
capabilities are
unimpaired.

- (2) Wear.

- (a) Not more than 5 per
cent reduction in
flange thickness.

Accept if compat-
ibility is
preserved.

- (b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

- (c) Fretting at D-head bolt
traps not more than
0.001 in. (0,030 mm)
in depth.

Accept after
repair.

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6. Baffle Assembly (303-60)

A. Inspect Threaded Inserts and Shank Nuts (Ref.72-09-00 Inspection/Check).

B. Inspect Baffle and Flange Abutment Flanges.

(1) Nicks, burrs and scores.

Accept after repair
providing sealing
capabilities are
unimpaired.

(2) Wear.

(a) Not more than 5 per
cent reduction in
flange thickness.

Accept if compat-
ibility is
preserved.

(b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

C. Inspect Oil Feed and Oil Scavenge Tube Locations.

(1) Fretting.

(a) Not more than 0.001 in.
(0,030 mm) in depth is
acceptable.

Accept after repair
providing repair
maintains profile.

D. Inspect Weld Joints.

(1) Visual check for obvious cracking outside crack
detection checks.

(a) Any cracking.

Reject.

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E. Inspect Baffle Assembly.

(1) Dents.

- (a) Minor dents of smooth contour.

Accept after repair providing repair does not induce cracking.

7. Baffle (303-110)

A. Inspect Baffle Assembly and Front Bearing Support Abutment Flange.

(1) Nicks, burrs and scores.

Accept after repair providing sealing capabilities are unimpaired.

(2) Wear.

- (a) Not more than 5 per cent reduction in flange thickness.

Accept if compatibility is preserved.

- (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

(3) Dents.

- (a) Minor dents of smooth contour.

Accept.

8. Flange Assembly (304-10)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Oil Tube Abutment Face.

(1) Nicks and burrs.

Accept after repair providing sealing capabilities are unimpaired.

(2) Scores.

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- (a) Not more than 0.002 in.
(0,050 mm) in depth
and not extending across
the space between the
oil inlet holes and the
oil drain groove.

Accept after repair
providing the
sealing capabilities
are unimpaired.

(3) Wear.

- (a) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

C. Inspect Tube Sealing Lands.

(1) Wear.

- (a) Slight witness mark.

Accept after
repair.

D. Inspect Flange Assembly.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

- (a) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

9. Tube Assembly (304-50)

A. Inspect Tubes (Ref.72-09-00 Inspection/Check).

NOTE: The tube is constructed in such a way that the oil
feed tube is enclosed in the drain tube, any damage
to the outer tube must result in close inspection
of inner tube.

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Flange Assembly and Oil Tube Abutment Faces.

(1) Nicks and burrs.

Accept after repair
providing sealing
capabilities are
unimpaired.

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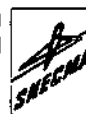
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(2) Scores.

- | | |
|---|---|
| (a) Not more than 0.002 in.
(0,050 mm) in depth and
not extending more than
half way across the face
and not extending between
the oil holes and the
drain holes on the flange
assembly faces. | Accept after repair
providing sealing
capabilities are
unimpaired. |
| (b) Not more than 0.002 in.
(0,050 mm) in depth and
not extending more than
half way across either
face and not extending
into the bolt-holes on
the oil tube abutment
faces. | Accept after repair
providing sealing
capabilities are
unimpaired. |

D. Inspect Braze Locations (Fig.301).

(1) Inspect braze location outer cover to outer sheath.

- | | |
|---|---------|
| (a) Lack of braze fillet
around the joint of one
only of the two 180° radii
positions and along the
flat areas amounting to
less than 10% of the
length. | Accept. |
| (b) Lack of braze fillet
around the joints of both
the 180° radii positions
and along the flat areas
amounting to more than 10%
of the length. Cracking
in the braze fillets. | Reject. |

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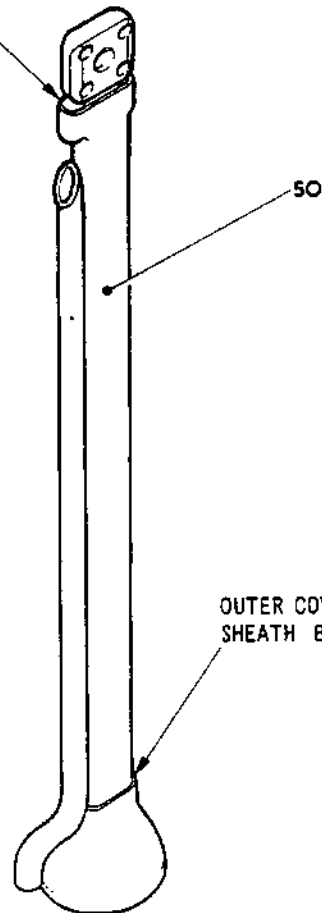
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INNER FLANGE TO
OUTER SHEATH BRAZE



OUTER COVER TO OUTER
SHEATH BRAZE

Tube Assembly - Braze Locations
Figure 301

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(2) Inspect braze location inner flange to outer sheath.

- (a) Lack of braze fillet Accept.
around the joints of both
the 180° radii positions
and along the flat areas
amounting to less than 10%
of the length.
- (b) Lack of braze fillet along Reject.
the flat areas amounting
to more than 10% of the
length. Cracking in the
braze fillets.

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E. Inspect Seal Clamp Location.

(1) Nicks and burrs.

Accept after
repair.

(2) Scores.

(a) Not more than 0.002 in.
(0,050 mm).

Accept after repair
providing sealing
capabilities are
unimpaired.

(3) Fretting.

(a) Not more than a witness
mark.

Accept.

F. Inspect Electrical Cable Tube (Ref.72-09-00 Inspection/
Check - Rigid Tubes).

10. Seal Clamp (304-70)

A. Inspect Seal Clamp.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

11. Backing Plate (304-130)

A. Inspect Backing Plate.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

12. Tube Assembly (304-150/180/190)

A. Inspect Tube (Ref.72-09-00 Inspection/Check).

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

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C. Inspect Connecting Nipple.

(1) Wear.

(a) Light witness mark. Accept.

D. Inspect Attachment Flange.

(1) Nicks and burrs.

Accept after repair.

(2) Wear.

(a) Not more than 5 per cent reduction in flange thickness.

Accept if compatibility is preserved.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

(3) Scores.

(a) Not more than 0.002 in. (0,050 mm) in depth and not extending right across the seal lip location.

Accept after repair providing sealing capabilities are unimpaired.

13. Air Intake Case Assembly (305-10)

A. Inspect Vanes.

(1) Distortion, cracks, tears, dents, gouges, nicks, scores, scratches and piercing.

(a) Acceptable providing within limits of Repair No.1 (Ref.72-22-01).

Accept after repair (Ref.72-22-01 Repair No.1).

B. Inspect all Threads and Shank Nuts (Ref.72-09-00 Inspection/Check).

C. Inspect Compressor Case Attachment Flange.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in. (0,130 mm) deep.

Accept after repair if compatibility is preserved.

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(2) Distortion.

Accept if compatibility is preserved.

D. Inspect Front Flange.

(1) Nicks, burrs and scores.

Accept after repair provided that 90 per cent of the clamp contact area is preserved.

E. Inspect Anti-icing Manifold Locations.

(1) Nicks and burrs.

Accept after repair providing sealing capabilities are unimpaired.

(2) Fretting and wear.

Accept after repair if compatibility is preserved.

(3) Scoring.

Accept after repair providing sealing capabilities are unimpaired.

F. Inspect Rear Face of Bearing Housing.

(1) Nicks and burrs.

Accept after repair.

(2) Scoring.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair.

G. Inspect Bearing Housing Inner and Outer, Front and Rear Abutment Flanges.

(1) Distortion.

Accept if compatibility is preserved.

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(2) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair providing
compatibility is
preserved.

H. Inspect Air Inlet for General Condition.

(1) Casing surfaces for cracks, tears,
dents, gouges, nicks, scores,
scratches and piercing.

(a) Acceptable providing within
limits of Repair No.1
(Ref.72-22-01).

Accept after
repair (Ref.72-22-01
Repair No.1).

14. Brackets (306-50/80/110/140/170/200/210/240/290)

A. Inspect Brackets.

(1) Wear and fretting.

(a) Attachment face thickness
not reduced by more than
5 per cent.

Accept.

(b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

(2) Scoring.

(a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing material
thickness is not
reduced by more
than 5 per cent.

(3) Nicks and burrs.

Accept after
repair.

(4) Distortion.

Accept if compat-
ibility is
preserved.

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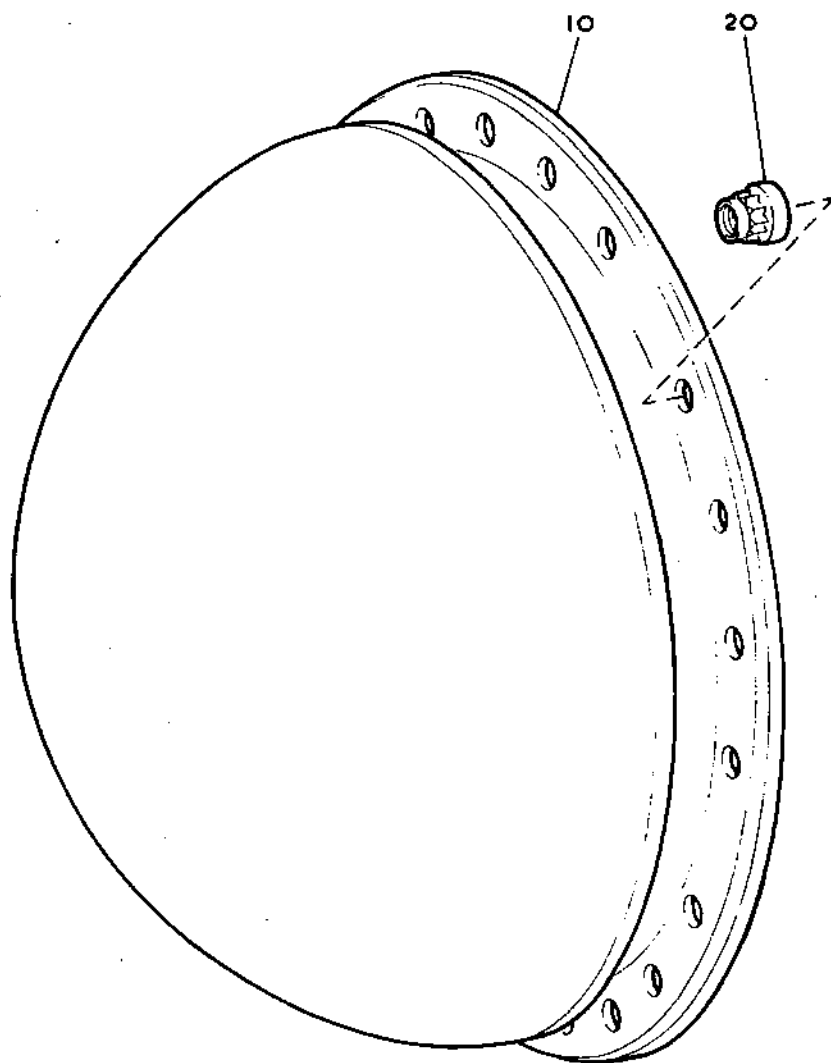
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Air Intake Fairing
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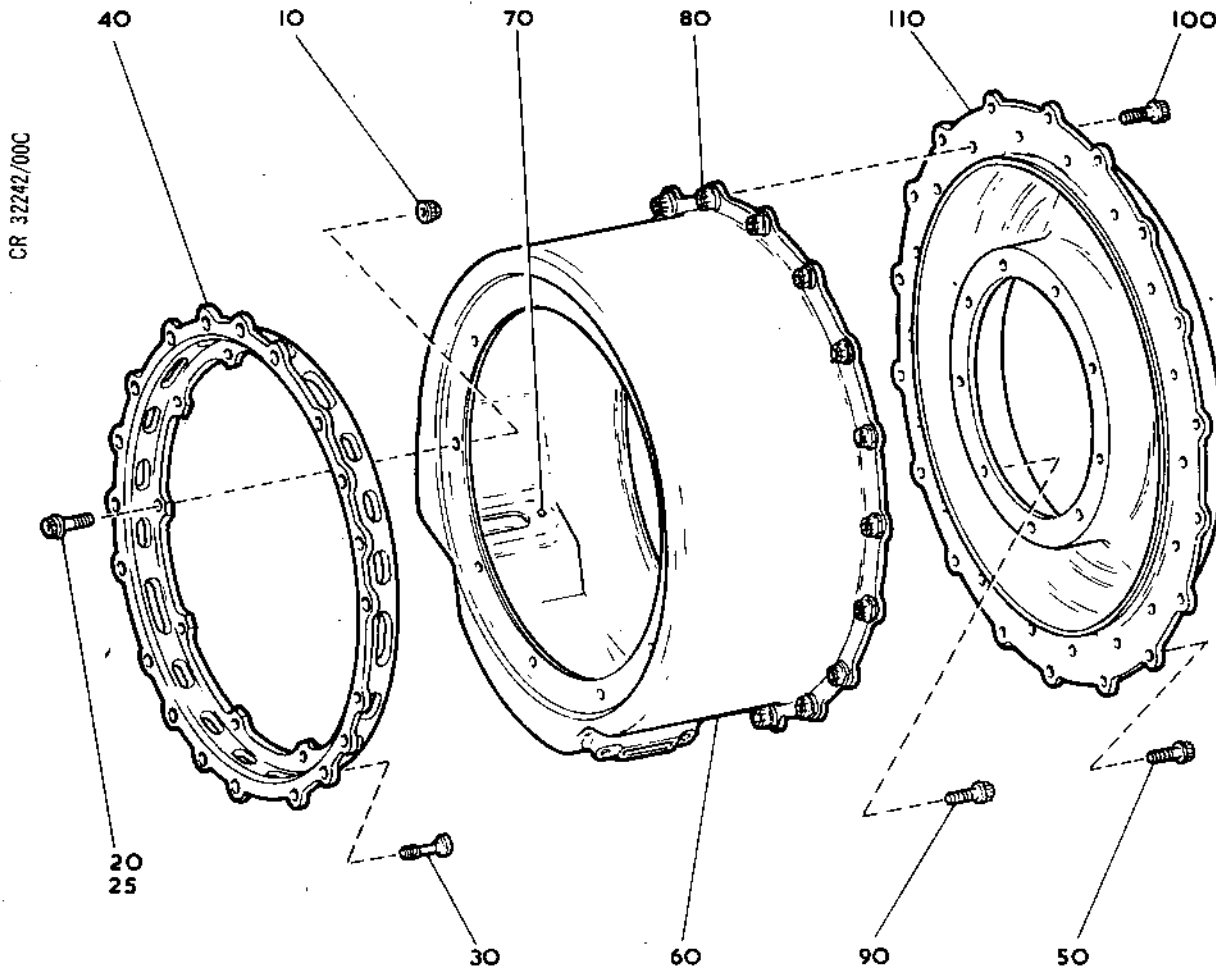
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Air Intake Case, Baffles and Flange
Figure 303

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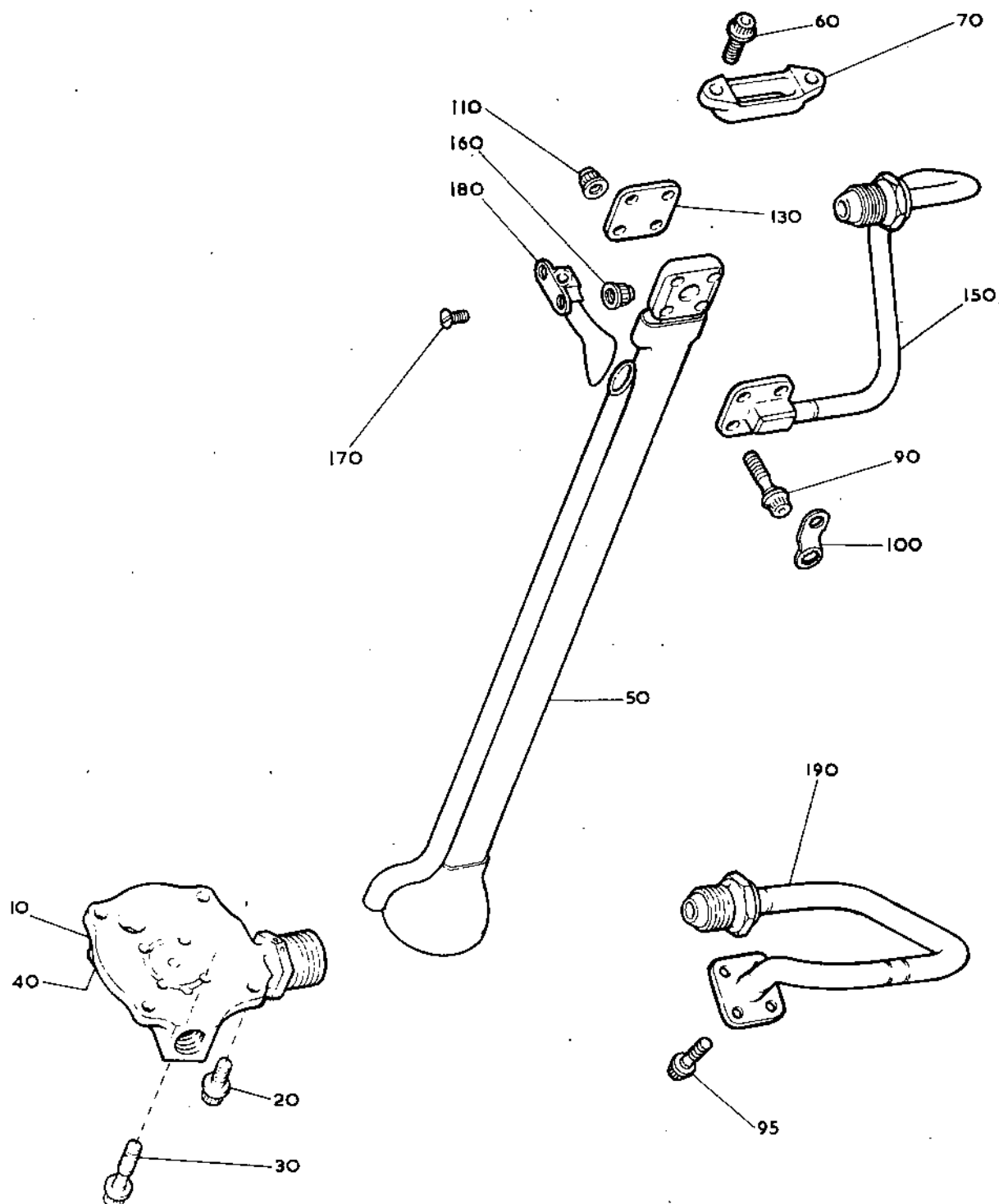
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Air Intake Case Oil Tubes
Figure 304

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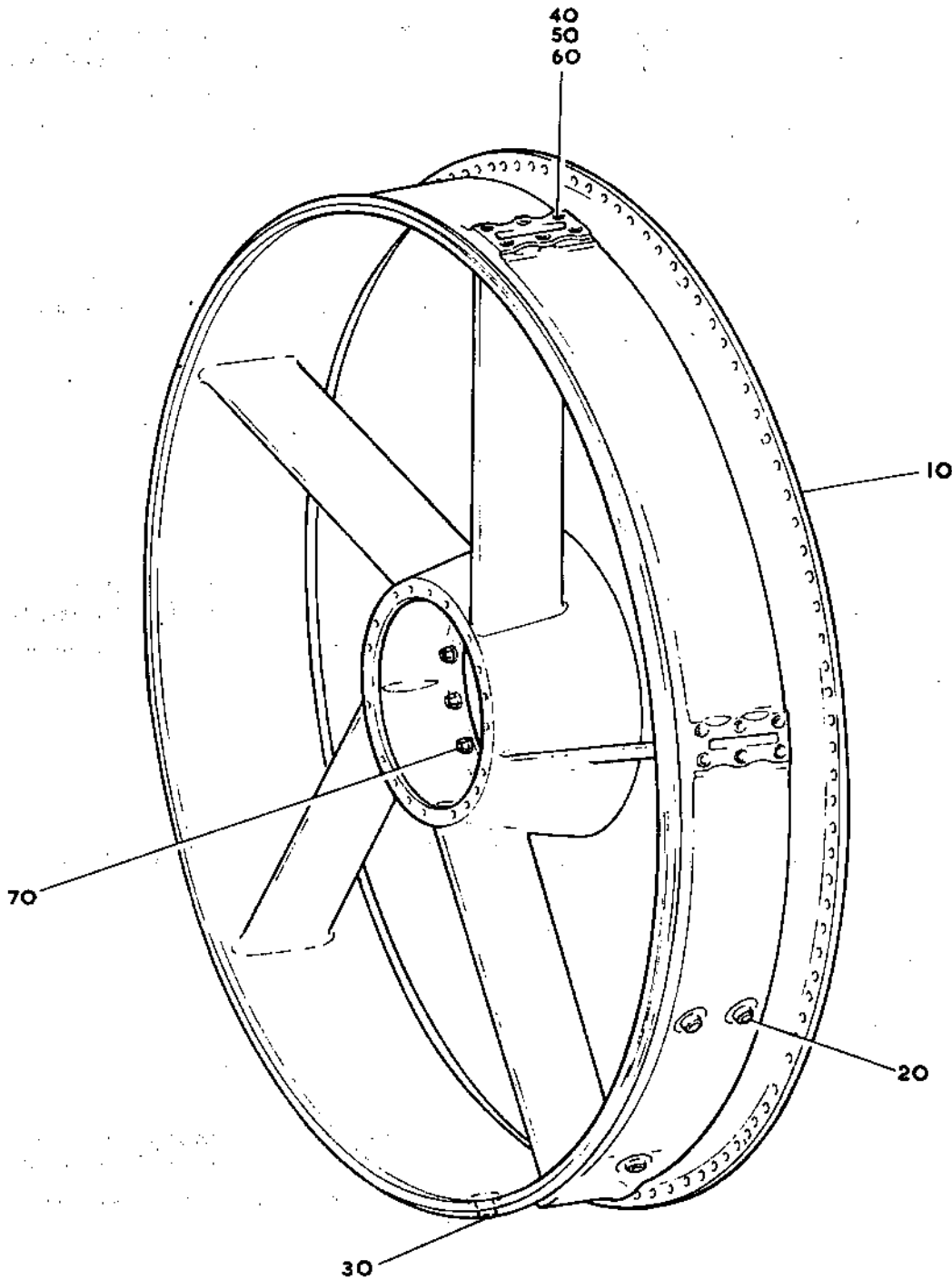


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Air Intake Case Assembly
Figure 305

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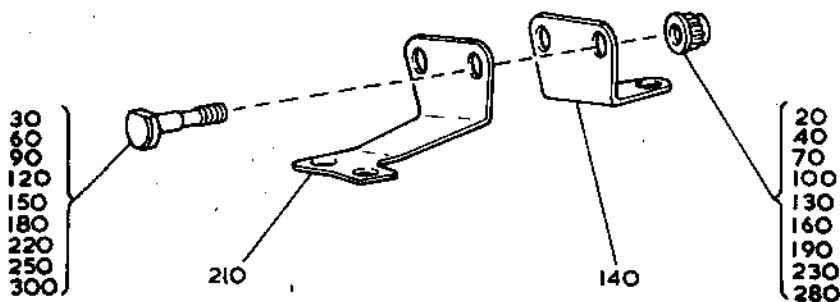
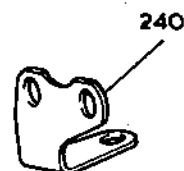
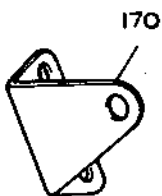
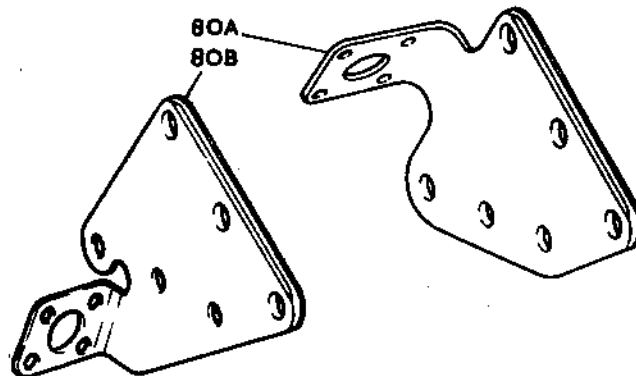
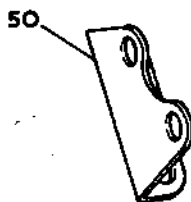
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Air Intake Case Attaching Parts
Figure 306

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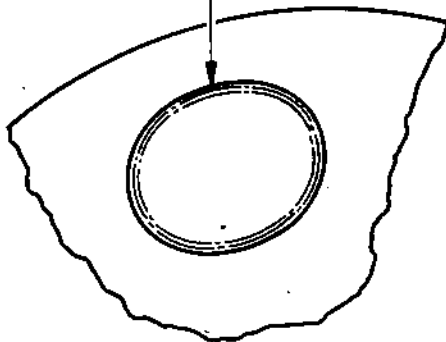
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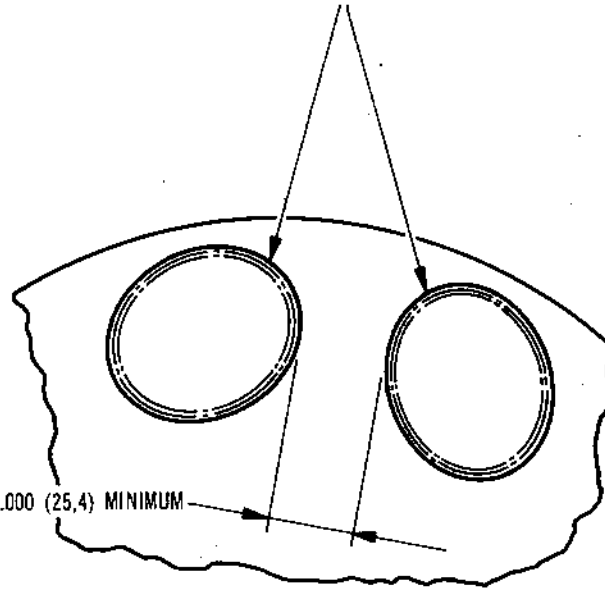
2.500 X 2.000
(63,5) (50,8)



A

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

2.500 X 2.000
(63,5) (50,8)

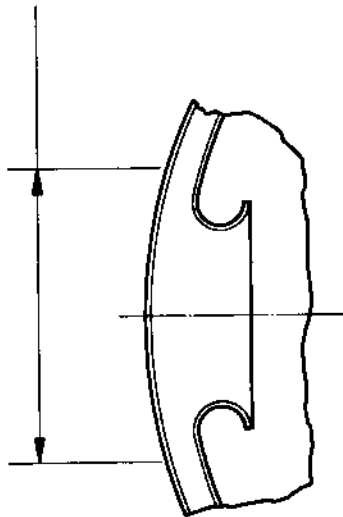


1.000 (25,4) MINIMUM

B

D 4.000 (101,600)

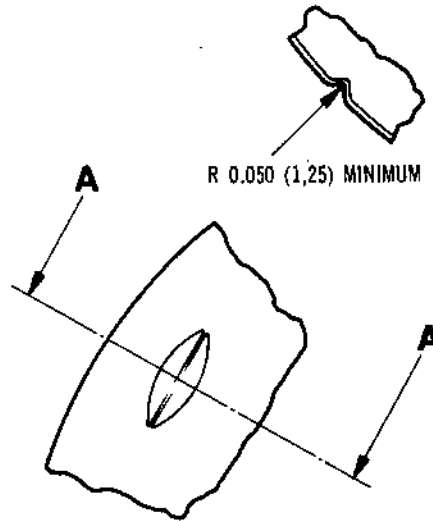
NO DENTS PERMISSIBLE IN THIS AREA



C

SECTION AA

R 0.050 (1,25) MINIMUM



D

Air Intake Fairing Damage Limitations
Figure 307

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AIR INTAKE FAIRING - INSPECTION/CHECK

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Fairing, refer to 72-20-00 Inspection/Check.

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AIR INTAKE CASE - INSPECTION/CHECK

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LP COMPRESSOR FRONT BEARING SUPPORT - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	80	LP Compressor Front Bearing - Outer Track	MP1
		- Cage	MP1
302	100	Retaining Plate	MP1
302	110	Bearing Housing Assembly	MP1
302	140	Labyrinth Housing	MP1

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	40	Bearing Housing Cover	FlA

Items to be Fluorescent Dye Crack Tested
Table 302

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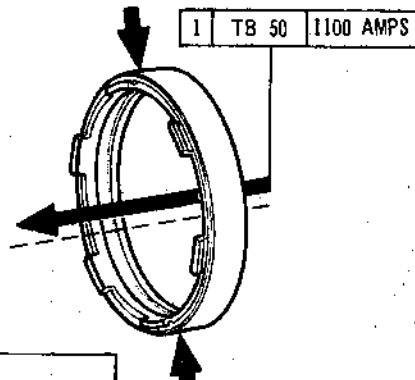


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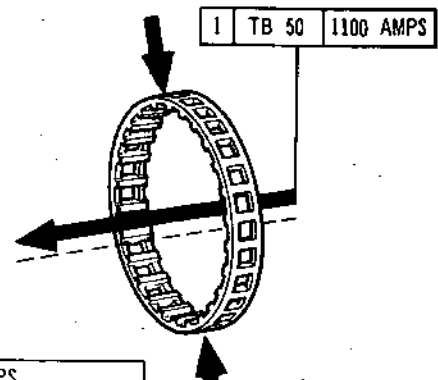
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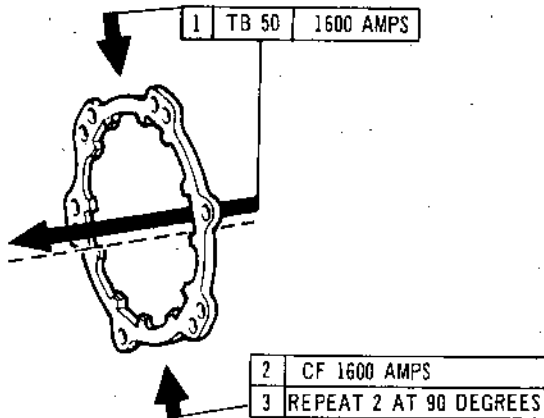
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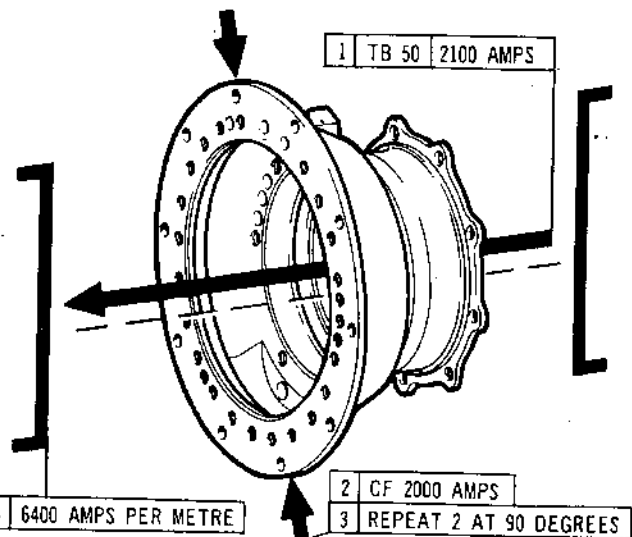
LP COMPRESSOR FRONT BEARING-OUTER TRACK (302-80)



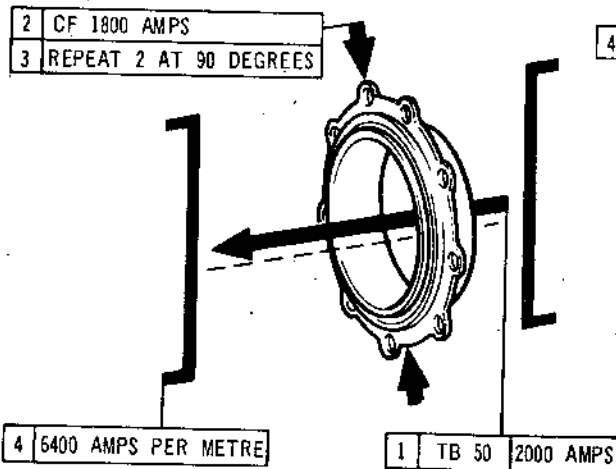
LP COMPRESSOR FRONT BEARING CAGE (302-80)



RETAINING PLATE (302-100)



BEARING HOUSING ASSEMBLY (302-110)



LABYRINTH HOUSING (302-140)

Crack Detection Test Diagram
Figure 301

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301
302

Not applicable
72-23-01

Fig.1

Cross References to Illustrated Parts Catalogue
Table 303

4. Bracket (302-20)

A. Inspect Bracket.

(1) Wear.

(a) Attachment face thickness reduced not more than 5 per cent. Accept.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

(2) Scoring.

(a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing material thickness is not reduced by more than 5 per cent.

(3) Distortion.

Accept after repair providing repair does not induce cracking and compatibility is preserved.

(4) Nicks and burrs.

Accept after repair.

5. Bearing Housing Cover (302-40)

A. Inspect Main Abutment Flange.

(1) Nicks and burrs.

Accept after repair.

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(2) Scoring.

- (a) Not more than 0.003 in.
(0,760 mm) deep.

Accept after
repair providing
sealing
capabilities are
unimpaired.

B. Inspect Transducer Platform.

- (1) Nicks and burrs.

Accept after
repair.

6. Headless Shoulder Pin (302-70)

A. Inspect for Damage.

- (1) Any damage to pins.

Reject.

7. LP Compressor Front Bearing Outer (302-80)

A. Inspect Bearing (Ref.72-09-00 Inspection/Check).

B. Carry Out Dimensional Checks (Ref.72-20-00 Fits and Clearances).

- (1) Check bearing track outer diameter (F.C.S.601-1).

NOTE: Make this check in conjunction with the
Bearing Housing Assembly (para.9).

- (a) Within F.C.S. limits. Accept.

- (2) Check roller bore and inner track diameter
(F.C.S.601-3).

NOTE: Make this check in conjunction with the LP
Compressor Rotor Front Bearing Inner Track
(Ref.72-31-03/302-30).

- (a) Within F.C.S. limits. Accept.

- (3) Check diametrical clearance of bearing (F.C.S.601-7).

NOTE: Make this check in conjunction with the LP
Compressor Rotor Front Bearing Inner Track
(Ref.72-31-03/302-30).

- (a) Within F.C.S. limits. Accept.

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8. Retaining Plate (302-100)

NOTE: The Retaining Plate and the Bearing Housing Assembly (302-110) are to be retained as a matched set and are not interchangeable in conjunction with SB.72-17.

A. Inspect Retaining Plate.

- | | |
|--|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Fretting and wear. | |
| (a) Not more than 0.005 in.
(0,130 mm) in depth. | Accept after repair. |
| (b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm). | Accept after repair. |

9. Bearing Housing Assembly (302-110)

NOTE: The Retaining Plate (302-100) and the Bearing Housing Assembly are to be retained as a matched set and are not interchangeable in conjunction with SB.72-17.

A. Carry Out Dimensional Checks (Ref.72-20-00 Fits and Clearances).

- (1) Check bearing outer track locating bore (F.C.S.601-1).

NOTE: Make this check in conjunction with the Front Bearing Outer (para.8).

- (a) Within F.C.S. limits. Accept.

- (2) Check labyrinth housing locating bore (F.C.S.601-2).

NOTE: Make this check in conjunction with the Labyrinth Housing (para.10).

- (a) Within F.C.S. limits. Accept.

- (3) Check bore of No.1 windback seal housing (F.C.S.601-8).

NOTE: Make this check in conjunction with the LP Compressor Front Rotor Shaft (Ref.72-31-03).

- (a) Within F.C.S. limits. Accept.

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B. Inspect Thread Inserts (Ref.72-09-00 Inspection/Check).

C. Inspect Main Abutment Flange.

(1) Nicks and burrs. Accept after repair.

(2) Scoring.

(a) Light scoring not more than 0.003 in. Accept after repair.
(0,080 mm) in depth.

(3) Fretting and wear.

(a) Not more than 0.005 in. Accept after repair.
(0,130 mm) in depth.

(b) Bolt-holes elongated not more than 0.030 in. Accept after repair.
(0,760 mm).

D. Inspect Bearing Location of Bearing Retaining Plate.

(1) Nicks and burrs. Accept after repair.

(2) Fretting and wear.

(a) Not more than 0.005 in. Accept after repair.
(0,130 mm) in depth.

(b) Bolt-holes elongated not more than 0.030 in. Accept after repair.
(0,760 mm).

E. Inspect Front Bearing Location.

(1) Nicks and burrs. Accept after repair.

(2) Scoring.

(a) Not more than 0.005 in. Accept after repair providing repair does not violate F.C.S. limits.
(0,130 mm) in depth.

(3) Damage.

(a) Any damage in oil groove. Reject.

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F. Inspect Rear Abutment Face.

- (1) Nicks and burrs.

Accept after
repair providing
repair does not
violate F.C.S.601-2
limits.

- (2) Scoring.

- (a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair providing
repair does not
violate F.C.S.
limits.

- (3) Wear.

- (a) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

G. Inspect Windback Thread Housing.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Any damage outside the limits
in para.(3) and (4).

Accept after
repair (Ref.
72-23-01 Repair
No.1 and No.3).

- (3) Grooving.

- (a) Rubbing extending over an
arc not greater than 90 deg.
and regardless of width
over face, provided that
maximum depth does not
exceed 0.005 in. (0,130 mm)
and that F.C.S. limits are
not violated.

Accept.

- (4) Distortion.

- (a) Provided that minimum local
clearance is not more than
0.006 in. (0,150 mm) below
the minimum permissible
dimension in the F.C.S.

Accept.

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H. Inspect Thread in Oil Tube Location (Ref.72-09-00 Inspection/Check).

J. Inspect Seating in Oil Tube Locations.

(1) Fretting.

(a) Not more than 0.002 in.
(0,050 mm) in depth.

Accept after
repair providing
sealing
capabilities are
unimpaired.

K. Inspect General Condition of Bearing Housing.

(1) Nicks and burrs.

Accept after
repair.

L. Inspect Shank Self-locking Nuts.

(1) Inspect nut (Ref.72-09-00 Inspection/Check).

10. Labyrinth Housing (302-140)

A. Carry Out Dimensional Checks (Ref.72-20-00 Fits and Clearances).

(1) Check bearing housing locating diameter (F.C.S.601-2).

NOTE: Make this check in conjunction with the
Bearing Housing Assembly (para.9).

(a) Within F.C.S. limits. Accept.

(2) Check No.2.A. and 2.B. labyrinth housing bores
(F.C.S.601-9).

NOTE: Make this check in conjunction with the
LP Compressor Front Rotor Shaft (Ref.
72-31-03).

(a) Within F.C.S. limits. Accept.

B. Inspect Labyrinth Housing.

(1) Nicks and burrs.

Accept after
repair.

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- (2) Any damage outside the limits
in para.(3) and (4).

Accept after
repair (Ref.
72-23-01 Repair
No.2).

- (3) Grooving.

- (a) Any number of grooves,
provided that they are all
contained within an arc not
greater than 60 deg. of bore
mean circumference, that
maximum depth is not greater
than 0.005 in. (0,130 mm)
and that F.C.S. limits are
not violated.

Accept.

- (4) Distortion.

- (a) Provided that minimum local
clearance is not more than
0.006 in. (0,150 mm) below
the minimum permissible
dimension in the F.C.S.

Accept.

C. Inspect Attachment Flange and Bearing Support Locating
Flange.

- (1) Nicks and burrs.

Accept after
repair providing
repair does not
violate F.C.S.
limits.

- (2) Wear and fretting.

- (a) Slight witness mark on
attachment flange.

Accept.

- (b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

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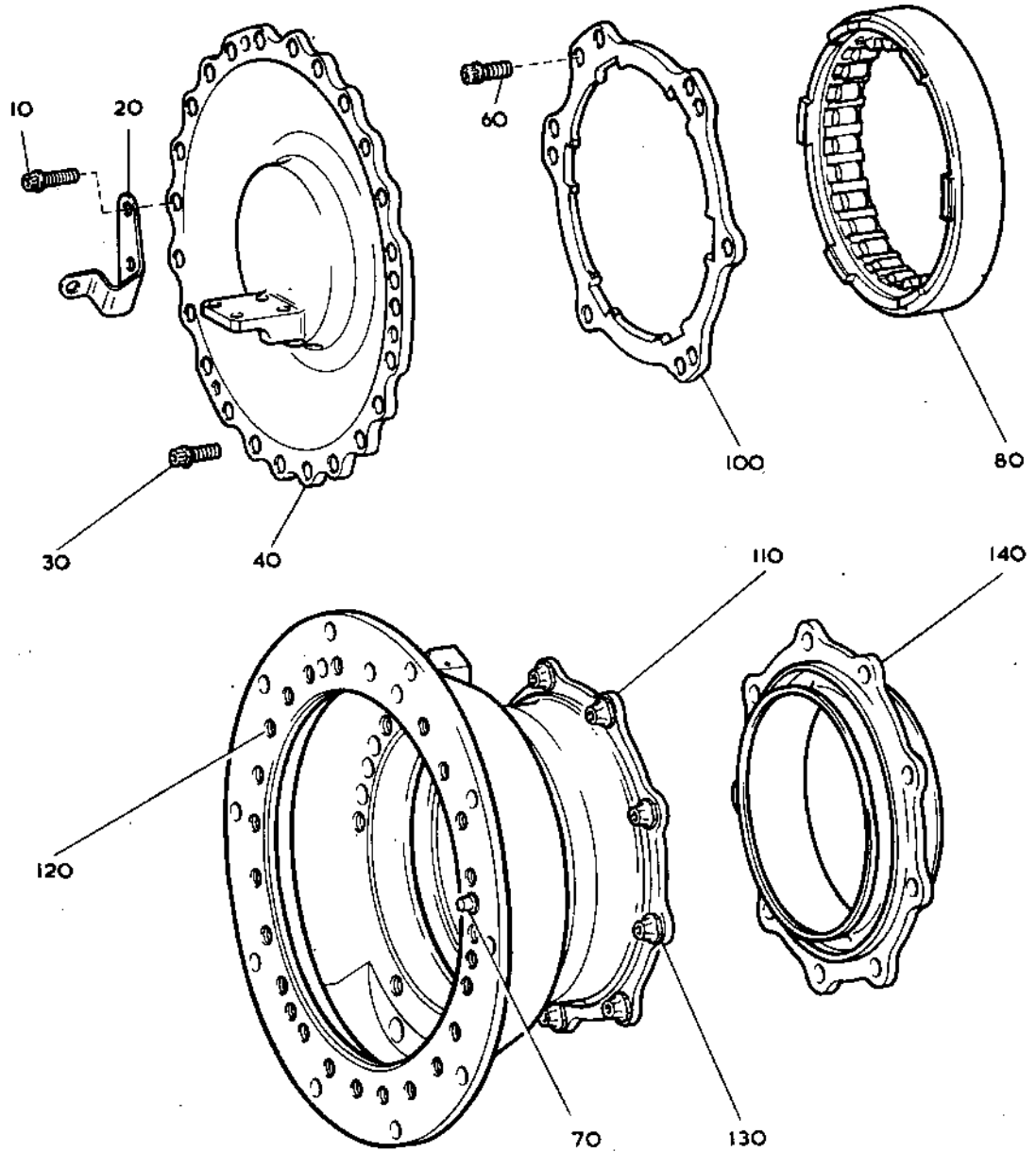
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LP Compressor Rotor Front Bearing Support
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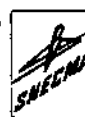
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LP COMPRESSOR CASE AND VANES - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
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3. Crack Detection

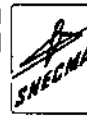
- A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

No current requirement

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

302	100	LP Compressor Vane	F2A
302	110	LP Compressor Vane	F2A
302	120	LP Compressor Vane	F2A
302	180	Vane Fixing Ring	F1A
302	190	Labyrinth Ring	F1A
302	194	Liner, front	F1A
302	196	Liner, rear	F1A
303	290	LP Compressor Vane	F2A
303	300	LP Compressor Vane	F2A
303	310	LP Compressor Vane	F2A
303	370	Vane Fixing Ring	F1A
303	380	Labyrinth Ring	F1A
303	390	Liner, front	F1A
303	400	Liner, rear	F1A
304	100	LP Compressor Vane	F2A
304	110	LP Compressor Vane	F2A
304	120	LP Compressor Vane	F2A

Items to be Fluorescent Dye Crack Tested
Table 302 (Continued)

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FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
304	130	LP Compressor Vane	F2A
304	190	Vane Fixing Ring	F1A
304	200	Labyrinth Ring	F1A
304	204	Liner, front	F1A
304	206	Liner, front	F1A
305	300	LP Compressor Vane	F2A
305	310	LP Compressor Vane	F2A
305	320	LP Compressor Vane	F2A
305	330	LP Compressor Vane	F2A
305	390	Vane Fixing Ring	F1A
305	400	Labyrinth Ring	F1A
305	410	Liner, front	F1A
305	420	Liner, rear	F1A
306	100	LP Compressor Vane	F2A
306	110	LP Compressor Vane	F2A
306	120	LP Compressor Vane	F2A
306	130	LP Compressor Vane	F2A
306	190	Vane Fixing Ring	F1A
306	200	Labyrinth Ring	F1A
306	204	Liner, front	F1A
306	206	Liner, rear	F1A
307	300	LP Compressor Vane	F2A
307	310	LP Compressor Vane	F2A
307	320	LP Compressor Vane	F2A
307	330	LP Compressor Vane	F2A
307	390	Vane Fixing Ring	F1A
307	400	Labyrinth Ring	F1A
307	410	Liner, front	F1A
307	420	Liner, rear	F1A
308	320	Flanged Connector	F1A
308	330	Support Strut	F1A
308	370	Support Bracket Lug	F1A
308	440	Support Lug	F1A
310	60	Spherical Bearing	F1A
310	100	LP Compressor Case	F1A

Items to be Fluorescent Dye Crack Tested
Table 302 (Concluded)

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FIG.NO. ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-31-01	Fig.1
303	72-31-01	Fig.1
304	72-31-01	Fig.2
305	72-31-01	Fig.2
306	72-31-01	Fig.3
307	72-31-01	Fig.3
308	72-31-01	Fig.4
309	72-31-01	Fig.5
310	72-31-01	Fig.6

Cross References to Illustrated Parts Catalogue Table 303

4. Blanking Plug (302-40,303-230,304-40,305-240,306-40,307-240)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Blanking Plug.

- | | |
|--|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Scores. | |
| (a) Not more than 0.010 in.
(0,250 mm). | Accept after repair. |
| (3) Wear. | |
| (a) Bolt-holes elongated not
more than 0.030 in.
(0,720 mm). | Accept after repair. |

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No Current Requirement

Crack Detection Test Diagram
Figure 301

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5. Plug Support Assembly (302-50, 303-240, 304-50, 305-250, 306-50, 307-250)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Support Assembly.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Bolt-holes elongated not more than 0.030 in. (0,720 mm). Accept after repair.

(3) Scoring.

(a) Less than 0.010 in. (0,250 mm) on the attachment face. Accept after repair.

6. LP Compressor Vanes (302-100/110/120, 303-290/300/310, 304-100/110/120/130, 305-300/310/320/330, 306-100/110/120/130, 307-300/310/320/330)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Vane Inner Fixing Abutment Faces.

(1) Wear.

(a) Stage 1 to 6 vanes (SB. 72-8441-235 standard) not more than 0.002 in. (0,050 mm) on any surface. Accept.

(b) Stage 1 vanes (SB.72-72 standard) not more than 0.0005 in. (0,013 mm) on any surface. Accept.

(c) Stage 2 vanes (SB.72-8218-217 standard) not more than 0.0005 in. (0,013 mm) on any surface. Accept.

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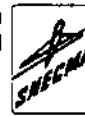
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- (d) On any surface of vanes to Pre SB.72-8841-235, 72-72 and 72-8218-217 standard not more than 0.015 in. (0,380 mm) on stage 1, 0.010 in. (0,250 mm) on stage 2 and 3, 0.005 in. (0,130 mm) on stage 4 and 5 and 0.002 in. (0,050 mm) on stage 6. Accept.
- (2) Nicks and burrs. Accept after repair.
- (3) Scores.
- (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair, subject to satisfactory crack detection.
- (4) Damage.
- (a) Abutment face and hook surface corners missing. Reject.
- C. Inspect Vane Inner Fixing Hook Surfaces. *
- (1) Wear.
- (a) Not more than 0.010 in. (0,250 mm) on the upper and lower hook surfaces. Accept after repair.
- (2) Nicks and burrs. Accept after repair.
- (3) Scores.
- (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair, subject to satisfactory crack detection.
- (4) Damage.
- (a) Hook surface corners missing. Reject.

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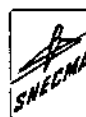
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(4) Damage.

(a) Hook surface corners missing. Reject.

D. Inspect Vane Aerofoil.

(1) Inspect to acceptance and blending standard (Ref. 72-31-01 Repair No.2).

E. Inspect Vane Outer Fixing Surfaces.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

To be issued later.

7. Retaining Piece (302-90,303-280,304-90,305-290,306-90,307-290)

A. Inspect Retaining Piece.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Blade location worn not more than 0.005 in. (0,130 mm). Accept after repair.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

8. Labyrinth Retaining Plate (302-170,303-360,304-180,305-380,306-180,307-380)

A. Inspect Retaining Plate.

(1) Nicks and burrs. Accept after repair.

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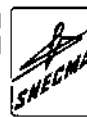
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- (2) Wear.
 - (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.
 - (b) Fretting on labyrinth flange not more than 0.005 in. (0,130 mm). Accept.

9. Vane Fixing Ring (302-180,303-370,304-190,305-390,306-190,307-390)

A. Inspect Vane Inner Fixing Locating Grooves.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Vane inner fixing inner and outer abutment faces.
 - (i) Not more than 0.010 in. (0,250 mm) in depth, on either face, at stage 1 (302-180). Accept.
 - (ii) Not more than 0.005 in. (0,130 mm) in depth, on either face, at all stages other than stage 1. Accept.
 - (b) Vane inner fixing front and rear abutment faces.
 - (i) Not more than 0.005 in. (0,130 mm) in depth, on either face, at any stage. Accept.

B. Inspect Labyrinth Location Flange.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

INSPECTION/CHECK

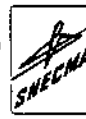
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10. Labyrinth Ring (302-190, 303-380, 304-200, 305-400, 306-200, 307-400)

A. Carry Out Dimensional Checks (Ref.72-31-00 Fits and Clearances).

- (1) Check bores of LP 1, 2, 3, 4, 5 and 6 stator labyrinths (F.C.S.601-13/17/21 and 602-32/36/41).

NOTE: Carry out these checks in conjunction with the LP Compressor Rotor Spacer Rings (Ref.72-31-00).

NOTE: Remove any burrs or metal build-up prior to carrying out these checks.

(a) Within F.C.S. limits. Accept.

B. Inspect Labyrinth Ring Housing.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Damage greater than (b). Accept after repair (Ref.72-31-01 Repair No.1).

(b) Any number of grooves provided that their cumulative length does not exceed 60 degrees of housing mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.

(3) Distortion.

(a) Provided that minimum local clearance is not less than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S. Accept.

C. Inspect Vane Fixing Ring Location.

(1) Nicks and burrs. Accept after repair.

INSPECTION/CHECK

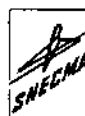
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(2) Wear.

- | | | |
|-----|--|----------------------|
| (a) | Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |
|-----|--|----------------------|

D. Inspect General Condition of Labyrinth Ring.

- | | | |
|-----|------------------|----------------------|
| (1) | Nicks and burrs. | Accept after repair. |
|-----|------------------|----------------------|

11. Identification Plates (308-40/190/220/250)

A. Inspect Plates for General Condition.

12. Mounting Bracket (308-70) Plate Mounting Bracket Assembly (305-130/260)

A. Inspect Attachment Faces.

(1) Wear.

- | | | |
|-----|---|----------------------|
| (a) | Reduction of material thickness of less than 10 per cent. | Accept. |
| (b) | Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |

(2) Scoring.

- | | | |
|-----|--|---|
| (a) | Not more than 0.010 in. (0,250 mm) in depth. | Accept after repair providing material thickness is not reduced by more than 10 per cent. |
|-----|--|---|

B. Inspect Bracket.

- | | | |
|-----|------------------|----------------------|
| (1) | Nicks and burrs. | Accept after repair. |
|-----|------------------|----------------------|

- | | | |
|-----|-------------|---|
| (2) | Distortion. | Accept after repair to restore profile provided repair does not induce cracking and compatibility is preserved. |
|-----|-------------|---|

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C. Inspect Captive Nuts (Ref.72-09-00 Inspection/Check).

13. Brackets (308-100/430/490, 309-30/60/110/140/180/190/200/230/270/300/320/360/410/420/460/500/530/560/590, 310-96/180/210/220/230/270/280/330/340/380/410)

A. Inspect Attachment Faces.

(1) Wear.

(a) Reduction of material thickness not more than 10 per cent.

Accept.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

(2) Scoring.

(a) Not more than 0.010 in. (0,250 mm) in depth.

Accept after repair providing material thickness is not reduced by more than 10 per cent.

B. Inspect Bracket.

(1) Nicks and burrs.

Accept after repair.

(2) Distortion.

Accept after repair to restore profile provided repair does not induce cracking and compatibility is preserved.

14. Flanged Connector (308-320)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Tube Sealing Locations.

(1) Nicks and burrs.

Accept after repair providing sealing capabilities are unimpaired.

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(2) Scores.

- | | | |
|-----|---|---|
| (a) | Not more than 0.005 in.
(0,130 mm) in depth. | Accept after repair
providing sealing
capabilities are
unimpaired. |
|-----|---|---|

C. Inspect Attachment Flange.

- | | | |
|-----|--|-------------------------|
| (1) | Nicks and burrs. | Accept after
repair. |
| (2) | Wear. | |
| (a) | Flange thickness reduced
not more than 10 per cent. | Accept. |
| (b) | Bolt-holes elongated not
more than 0.030 in.
(0,760 mm). | Accept after
repair. |

15. Support Strut (308-330)

A. Inspect Support Strut.

- | | | |
|-----|--|-------------------------|
| (1) | Distortion. | |
| (a) | Any distortion. | Reject. |
| (2) | Wear. | |
| (a) | Bolt-holes elongated not
more than 0.030 in.
(0,760 mm). | Accept after
repair. |
| (3) | Nicks and burrs. | Accept after
repair. |

16. Lug Support (308-370/440)

A. Inspect Support Strut Location.

- | | | |
|-----|---|-------------------------|
| (1) | Nicks and burrs. | Accept after
repair. |
| (2) | Wear. | |
| (a) | Not more than 0.010 in.
(0,250 mm) in depth. | Accept after
repair. |

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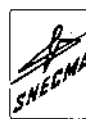
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(b) Bolt-holes elongated. Reject.

B. Inspect Attachment Face.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Attachment flange material thickness reduced by not more than 10 per cent. Accept.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

17. Lifting Bracket (309-490)

A. Inspect Bracket.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Attachment flange thickness reduced by not more than 10 per cent. Accept after repair.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

18. Engine Lifting Bracket (310-40)

A. Inspect Bracket.

(1) Distortion.

(a) Any distortion. Reject.

(2) Nicks and burrs. Accept after repair.

(3) Wear.

(a) Bolt-holes elongated. Reject.

(b) Lifting pin hole elongated. Reject.

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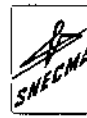
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19. Spherical Bearing (310-60)

NOTE: This item must be rejected at overhaul.

20. Spherical Bush (310-90)

NOTE: This item must be rejected at overhaul.

21. Blanking Plate (310-98)

A. Inspect Attachment Flange.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Not more than 5 per cent
reduction in flange
thickness.

Accept after repair
providing sealing
capabilities are
unimpaired.

(b) Bolt-hole elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

(3) Scores.

(a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing flange
thickness is not
reduced by more
than 5 per cent and
sealing capabilities
are unimpaired.

B. Inspect Blanking Plate.

(1) Nicks and burrs.

Accept after
repair.

(2) Distortion

Reject.

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22. LP Compressor Case Assembly (310-100)

NOTE: A radial tip clearance is required between case and blades. This will be carried out during assembly.

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Front and Rear Attachment Faces.

(1) Scoring.

(a) Not more than 0.005 in. (0,130 mm).	Accept after repair.
--	-------------------------

(2) Nicks and burrs.	Accept after repair.
----------------------	-------------------------

(3) Fretting and wear.

(a) Fretting not more than 0.005 in. (0,130 mm).	Accept after repair.
---	-------------------------

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm).	Accept after repair.
--	-------------------------

C. Inspect Vane Locations.

(1) Fretting.

(a) Not more than 0.002 in. (0,050 mm) in depth in vane grooves at all stages.	Accept after repair.
--	-------------------------

(2) Nicks and burrs.	Accept after repair.
----------------------	-------------------------

(3) Wear.

(a) Bolt-holes elongated not more than 0.030 in. (0,760 mm).	Accept after repair.
--	-------------------------

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(4) Corrosion pitting.

(a) Up to 0.005 in. (0,127 mm) provided; Accept after repair.

(i) Pitting does not affect the seating or location of any vane.

(ii) Casing shows no evidence of cracking when NDT inspecting using magnetic particle or penetrant.

(iii) Casing shall be re-inspected at each removal of the vanes.

D. Inspect Case Inner Lands.

(1) Nicks, burrs, gouges and indents.

(a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing F.C.S. limits are not violated.

(2) Rubbing and object damage.

(a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing F.C.S. limits are not violated.

(3) Surface damage greater than (1) and (2) (Stages 1 to 3).

(a) Not more than 0.025 in. (0,635 mm) in depth and in groups covering an area not greater than 2.00 in. (50,80 mm) in diameter and each group spaced not less than 60 degrees apart circumferentially. Accept after repair.

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(4) Surface damage greater than (1) and (2) (Stages 4 to 7).

(a) Not more than 0.015 in.
(0,380 mm) in depth and
in groups covering an area
not greater than 1.50 in.
(38,10 mm) in diameter and
each group spaced not less
than 60 degrees apart
circumferentially.

Accept after
repair.

(5) Metallic build-up.

Accept after repair
providing repair
restores circum-
ferential profile
of case inner lands.

E. Inspect Front and Rear Blow-off Flanges.

(1) Nicks and burrs.

Accept after
repair.

F. Inspect Mounting Brackets.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Any wear on the mounting
bracket sphericals.

Reject.

G. Inspect General Condition of Case.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

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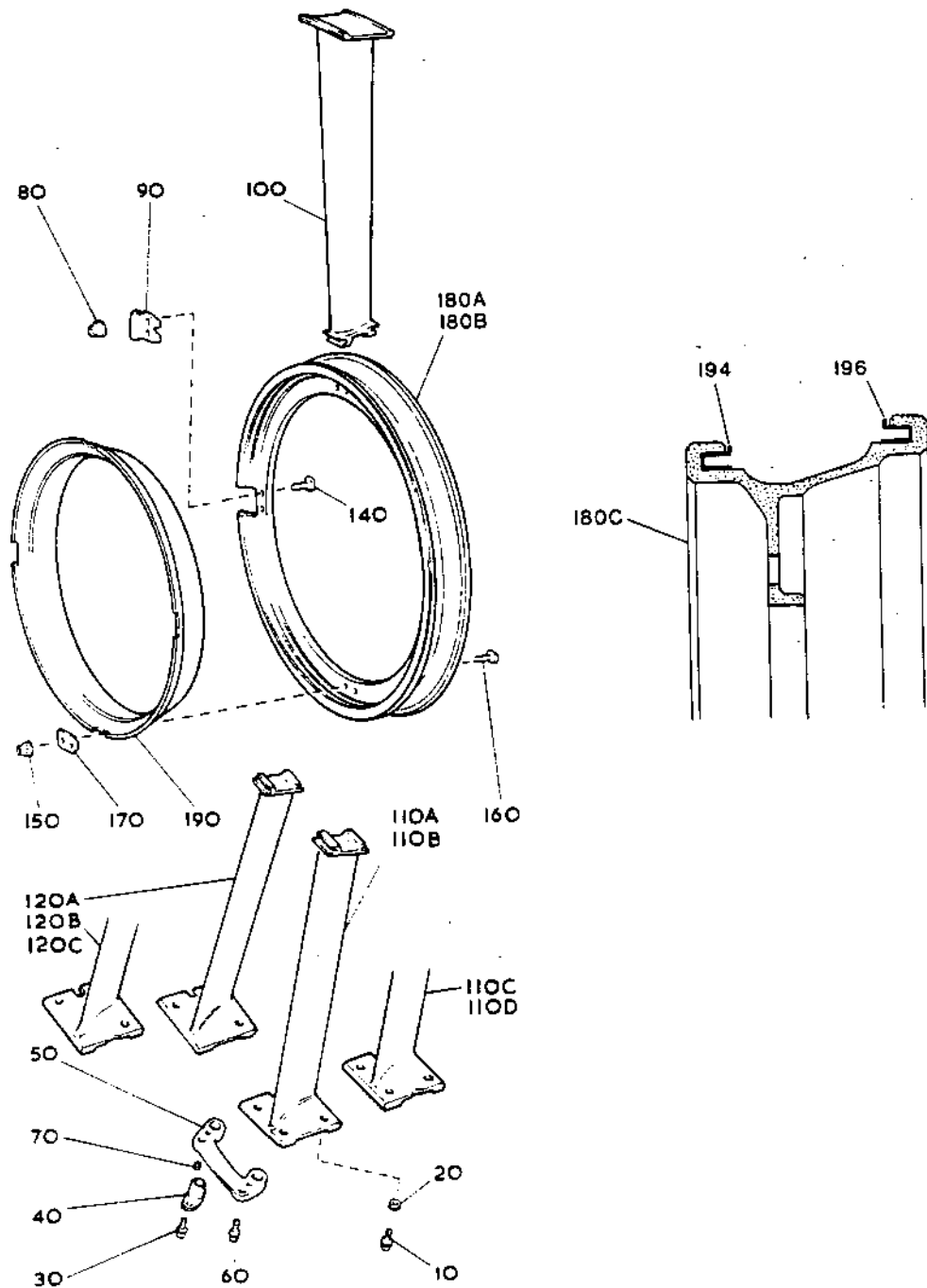
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CR 32241/000



LP Compressor Case and Vanes, Stage 1
Figure 302

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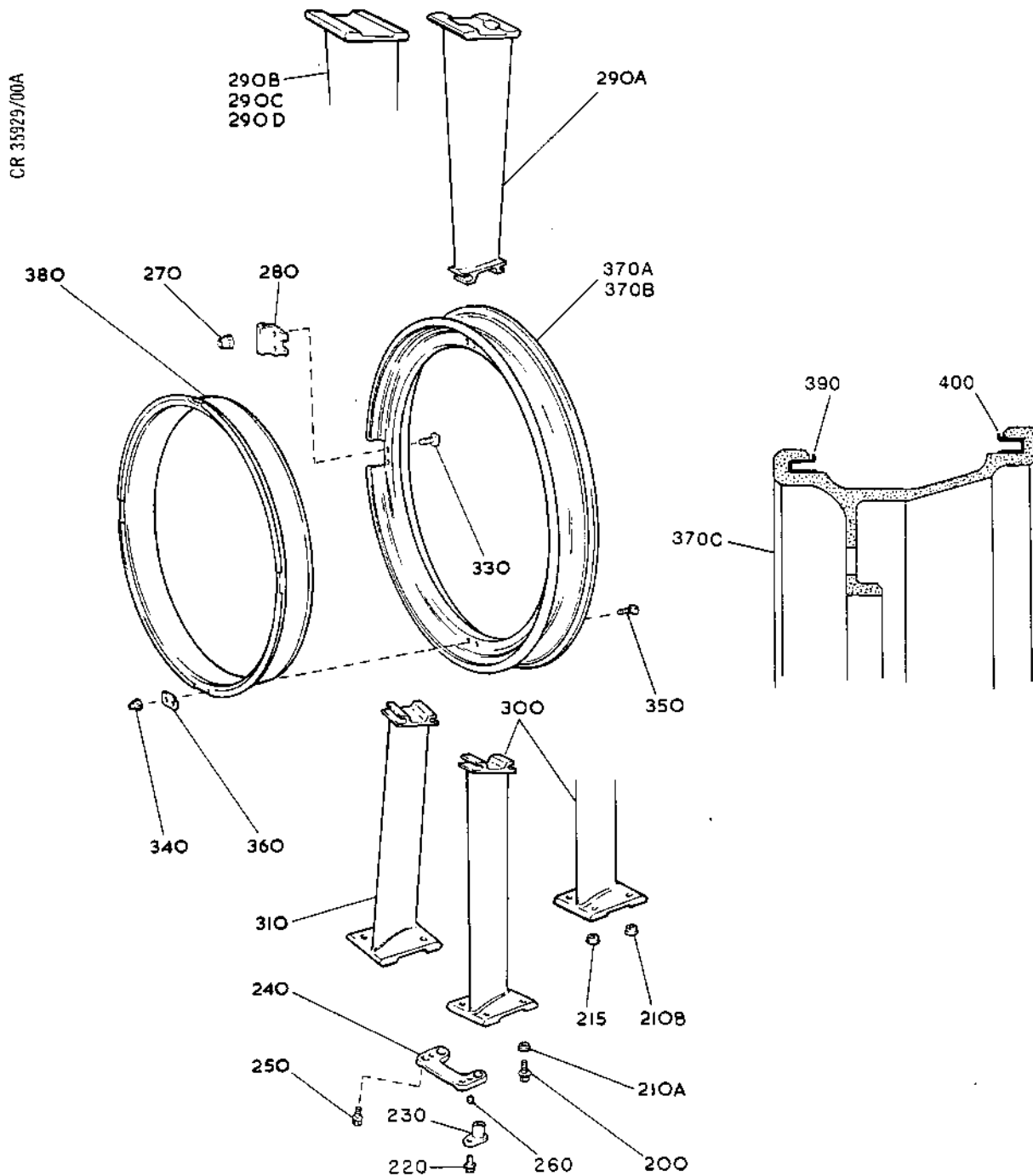
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LP Compressor Case and Vanes, Stage 2
Figure 303

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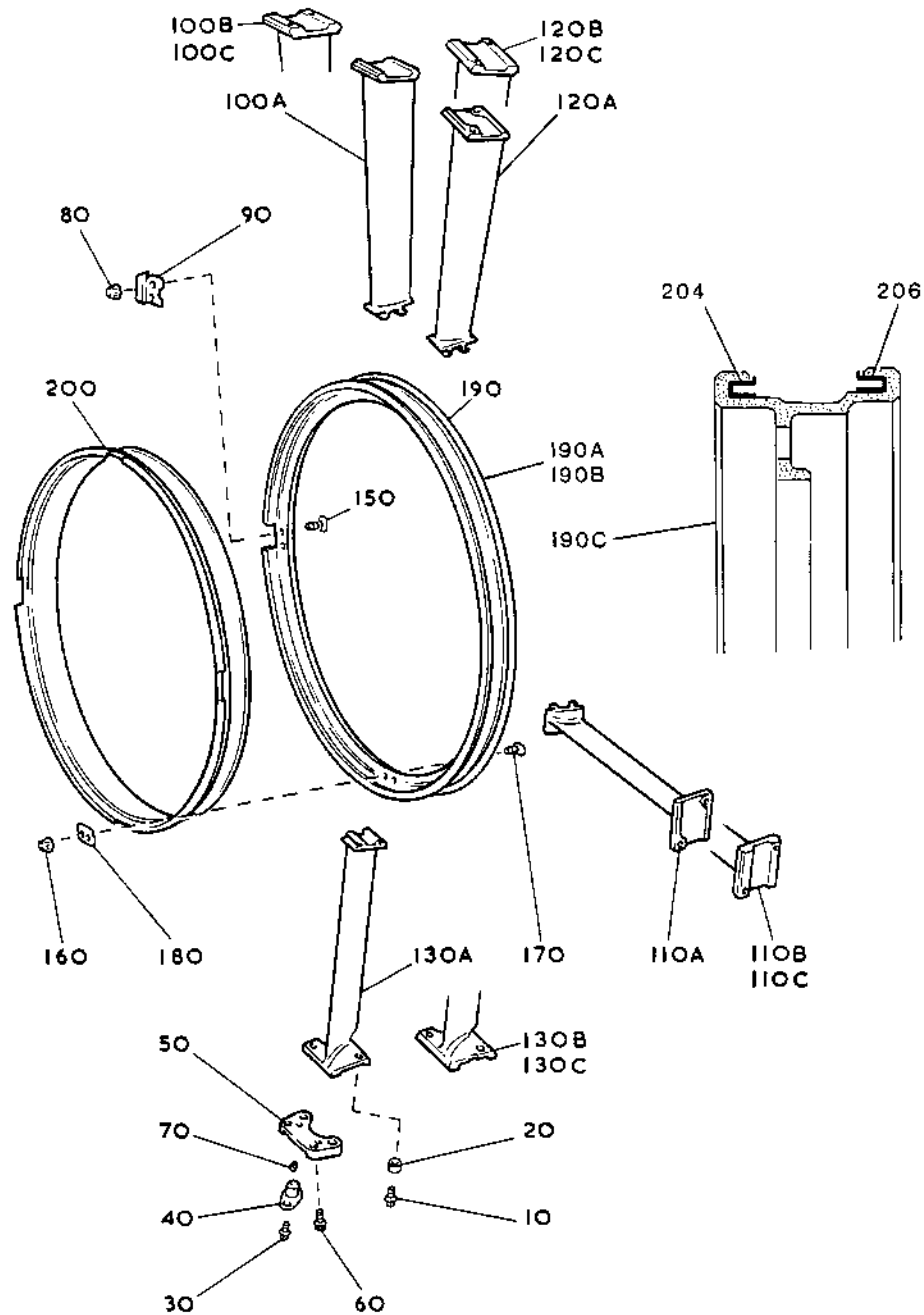
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LP Compressor Case and Vanes, Stage 3
Figure 304

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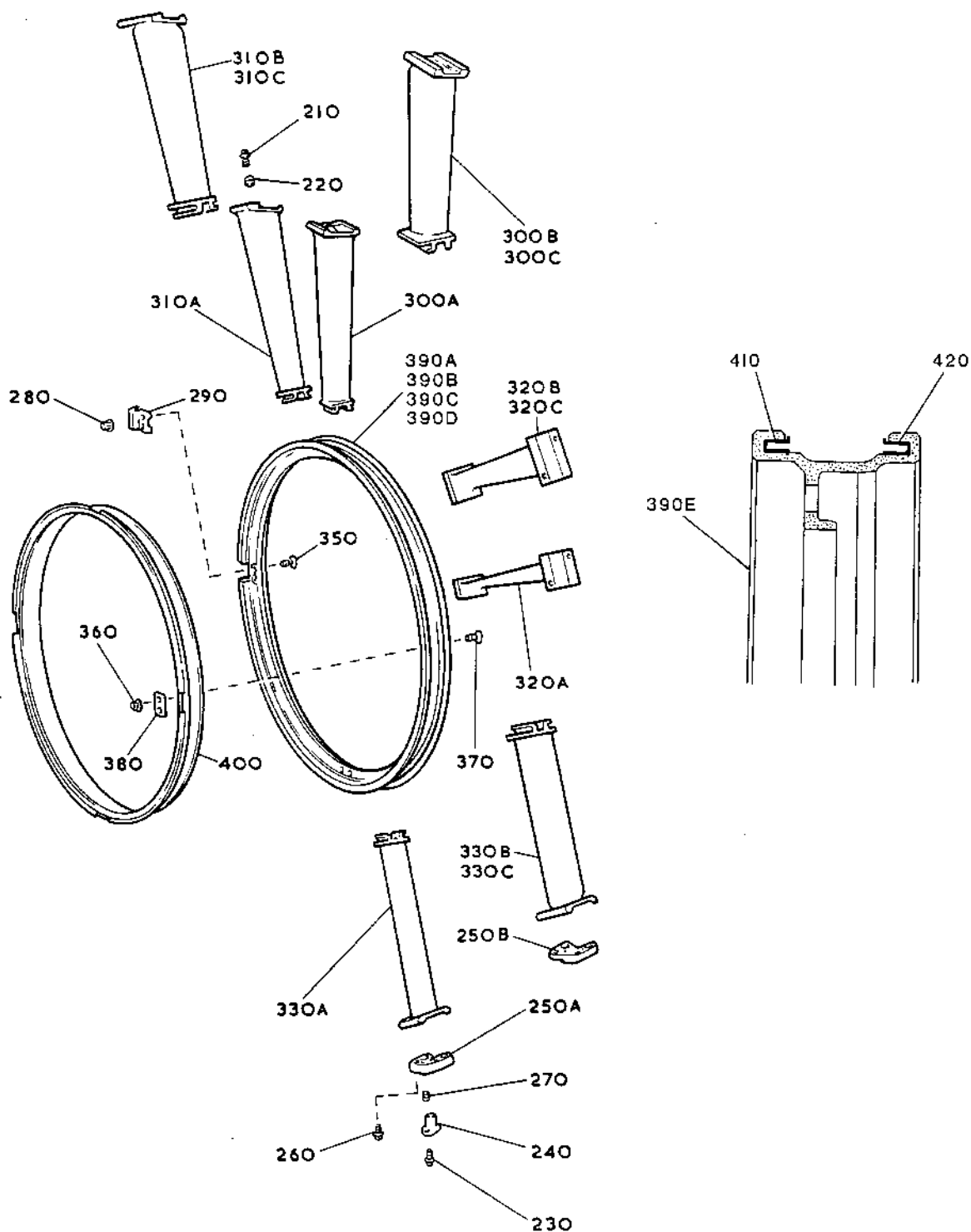
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LP Compressor Case and Vanes, Stage 4
Figure 305

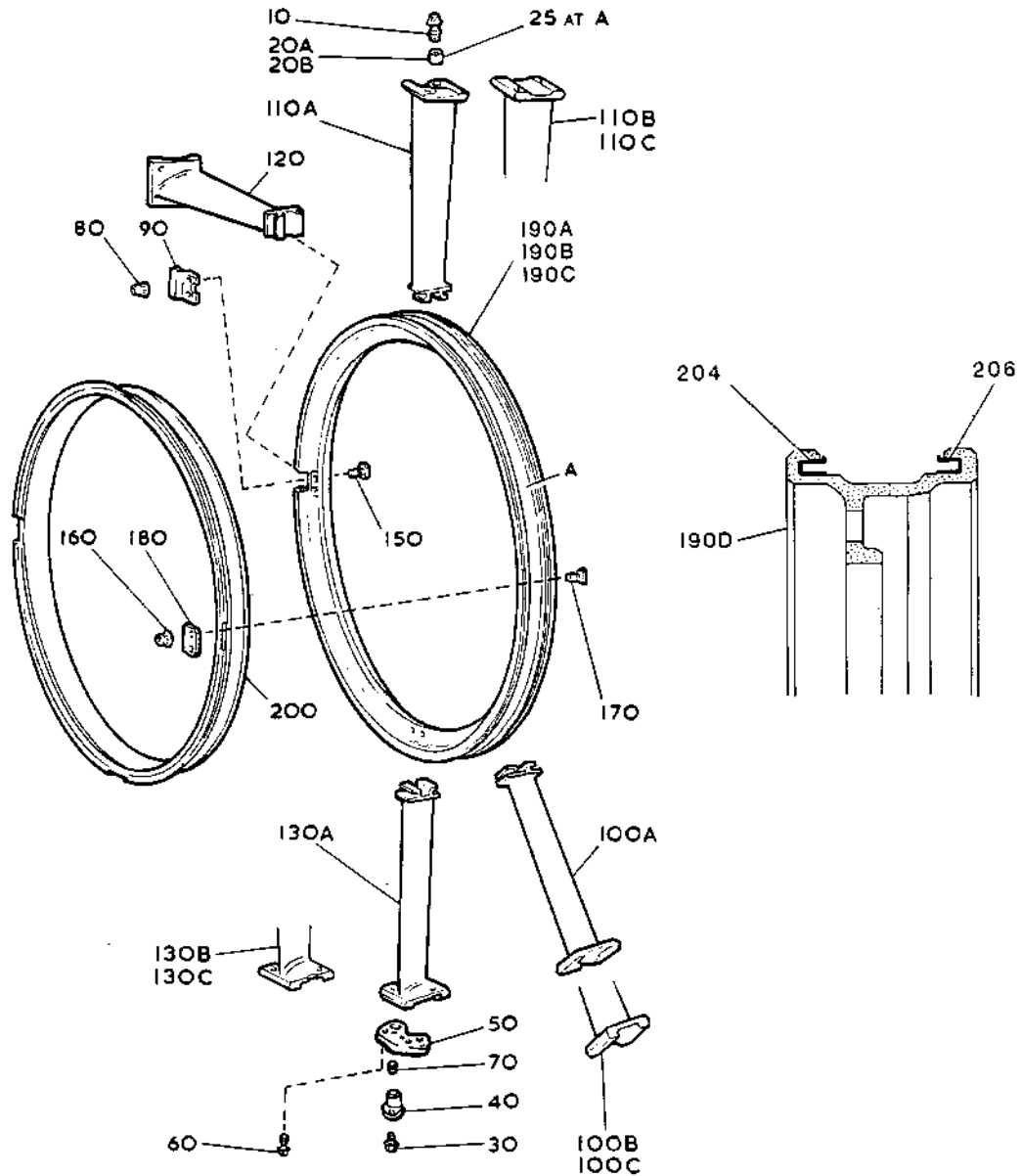
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LP Compressor Case and Vanes, Stage 5
Figure 306

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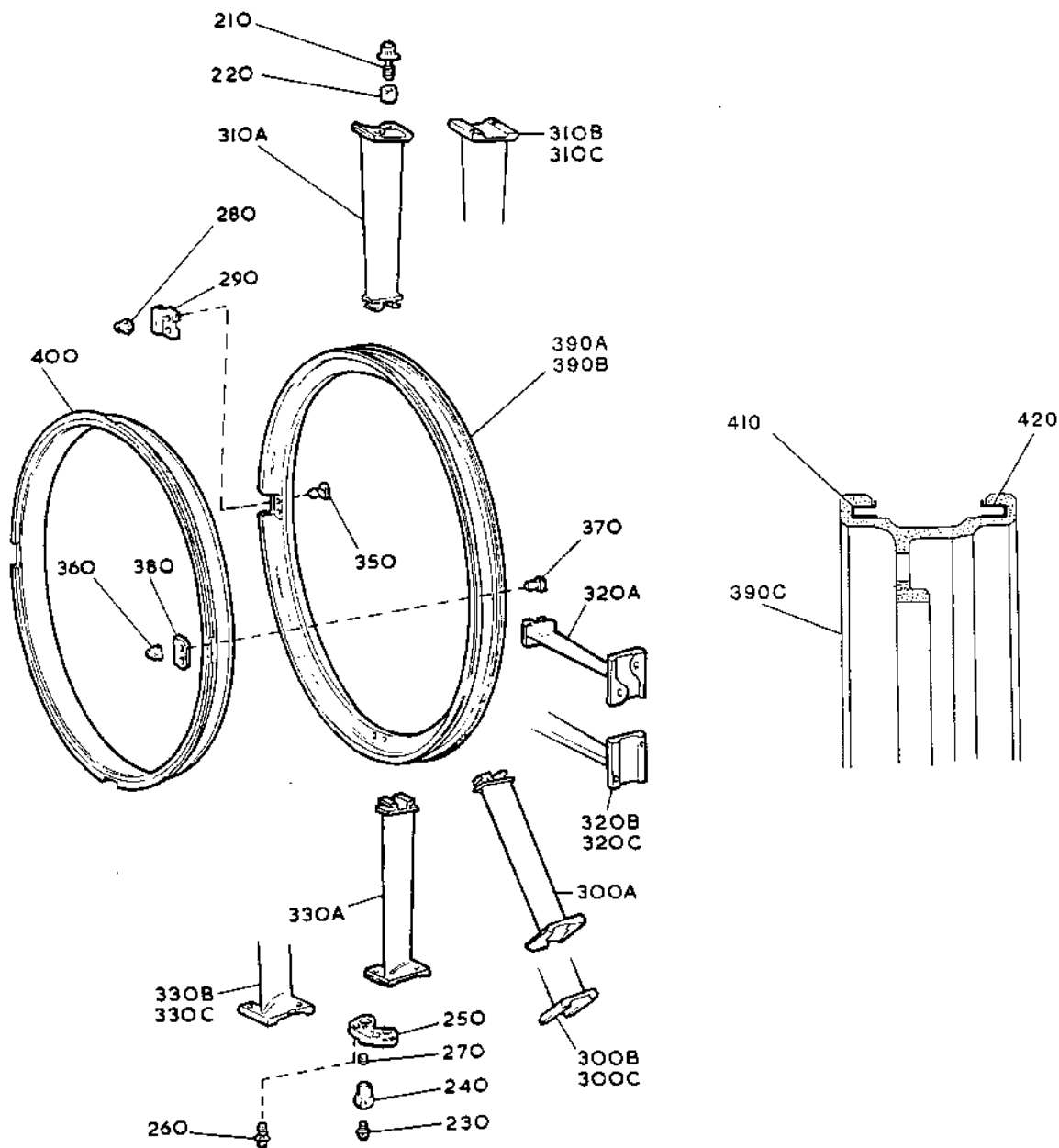
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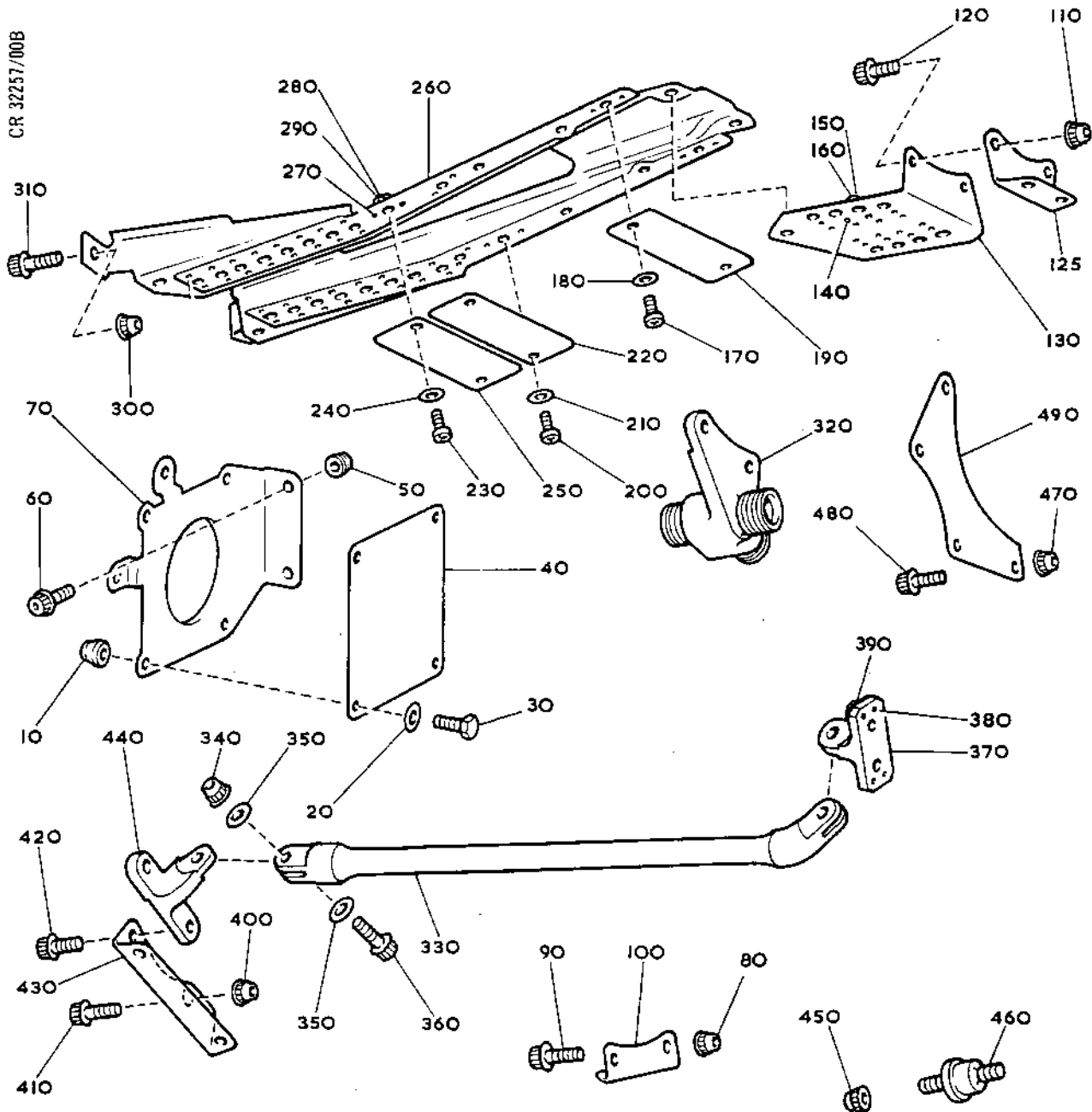
LP Compressor Case and Vanes, Stage 6
Figure 307

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LP Compressor Case and Vanes, Front Blow-off Flange Fittings
Figure 308

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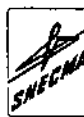
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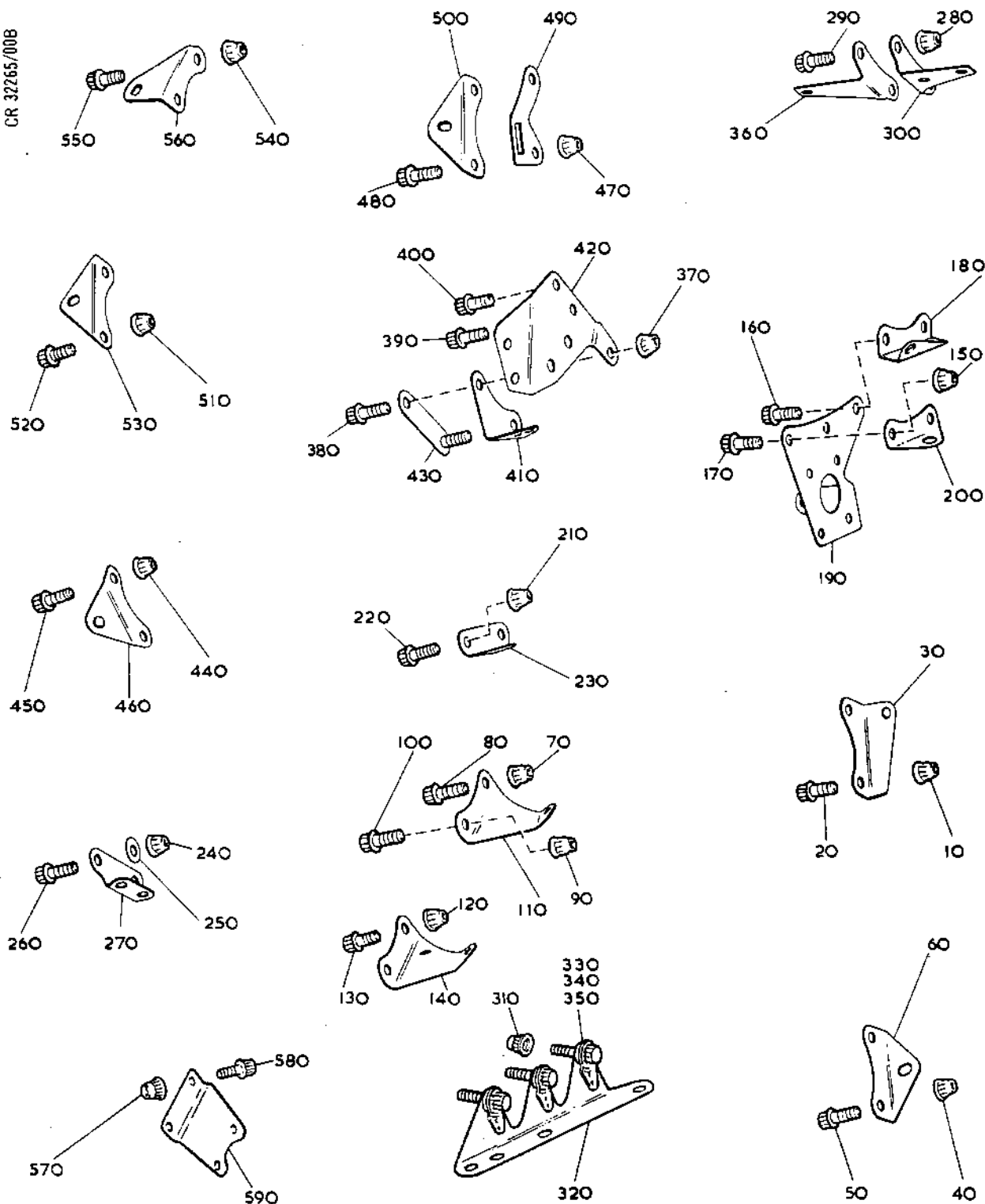
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LP Compressor Case and Vanes, Rear Blow-off Flange Fittings
Figure 309

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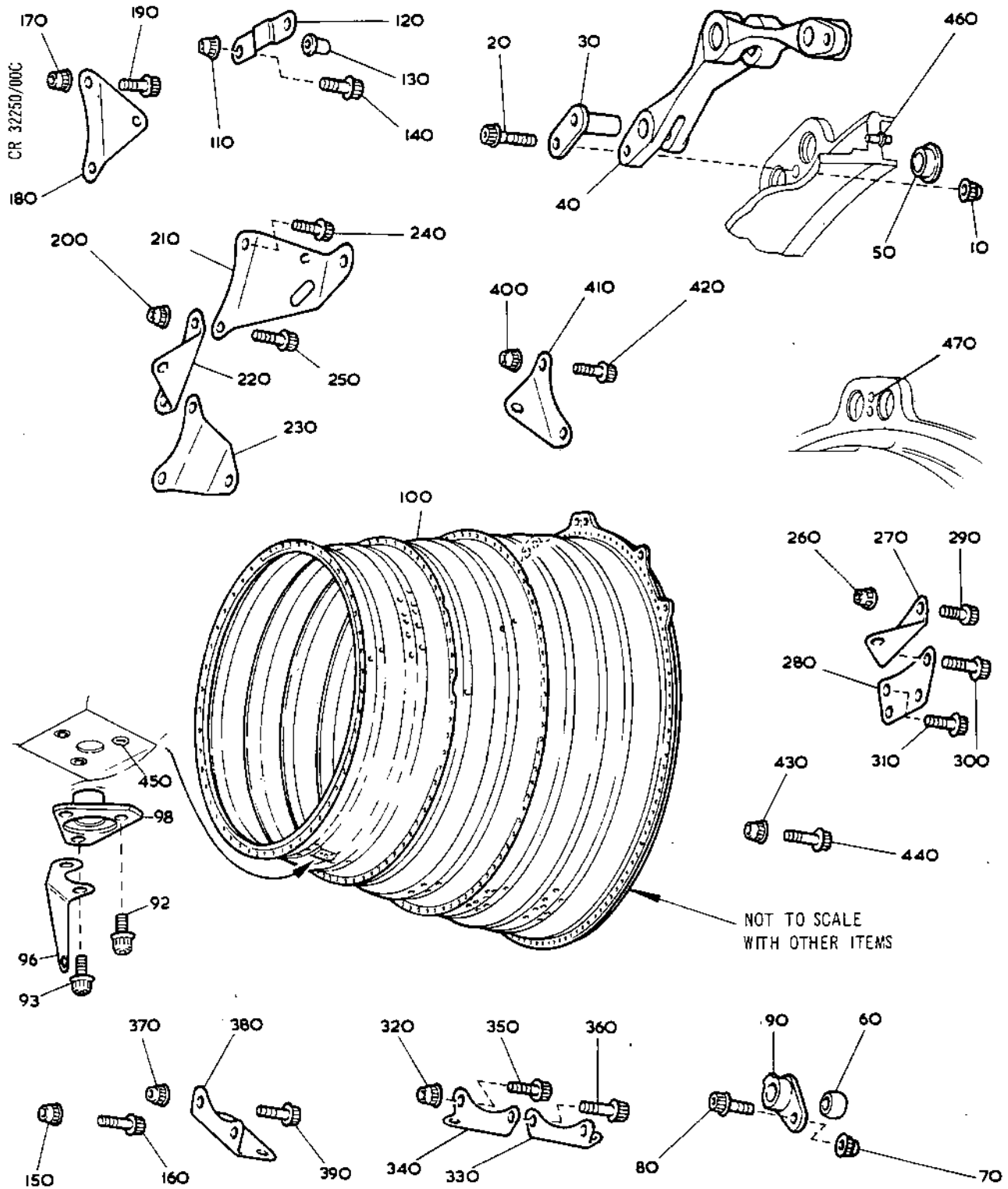
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LP Compressor Case and Vanes, LP Case Assembly
Figure 310

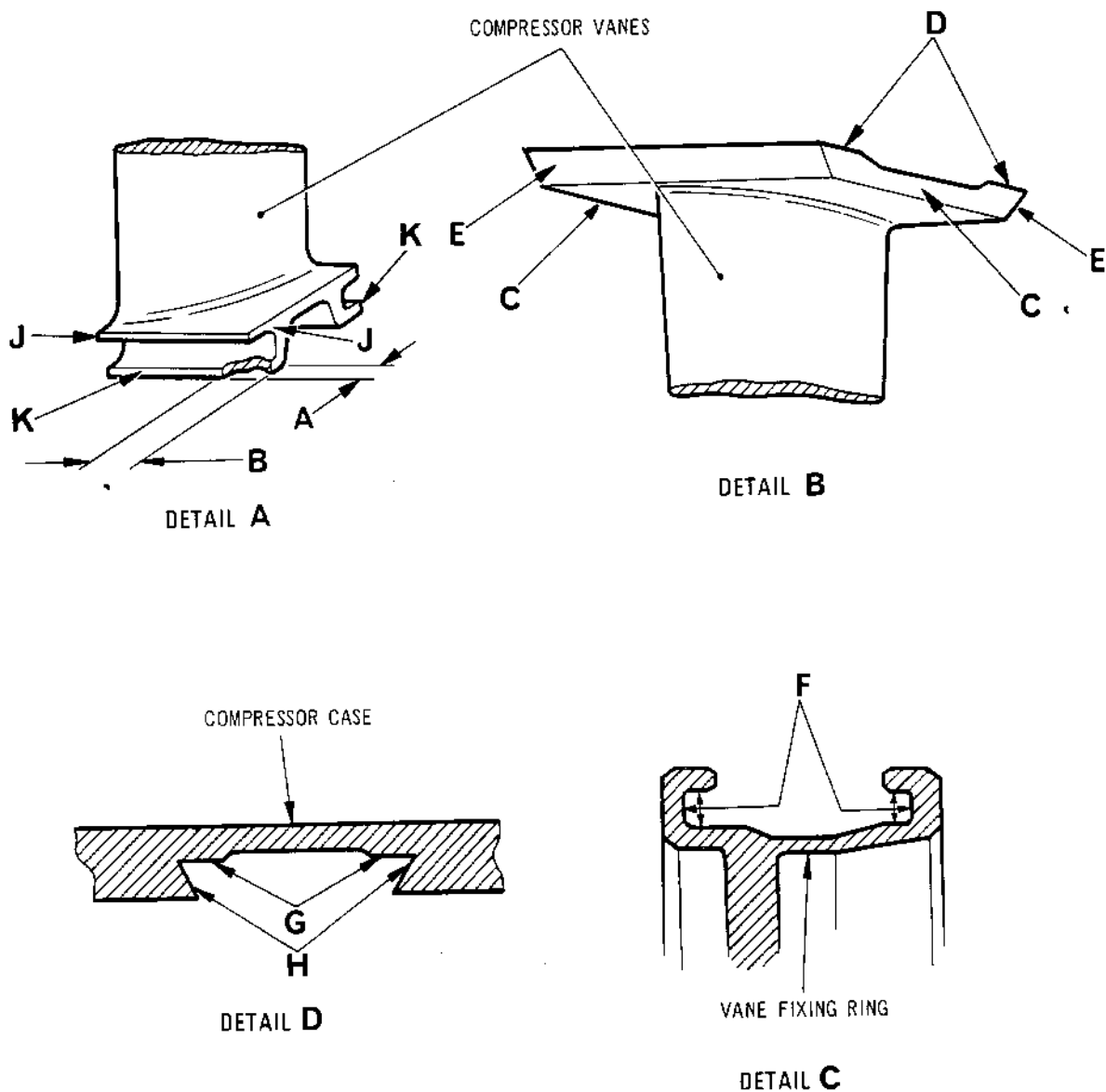
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LP Compressor Vane, Case and Fixing Ring Inspection Zones
Figure 311

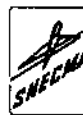
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LP COMPRESSOR EXIT GUIDE CASE AND VANES -
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LP COMPRESSOR EXIT GUIDE CASE AND VANES - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	150	Exit Guide Vane Case	MPI

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	60	Retaining Ring	F1A
302	90	Exit Guide Vanes	F2A
302	100	Exit Guide Vanes	F2A
302	110	Exit Guide Vanes	F2A
302	120	Exit Guide Vanes	F2A

Items to be Fluorescent Dye Crack Tested
Table 302

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**ATP
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This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

Dennis Howard

For Chief Technical and Industrial Services Engineer CAA Design Approval No.DAI/8566/78

TEMPORARY REVISION NO.72-565

Insert in 72-31-02 after page 302

REASON FOR ISSUE

To add a BEOL procedure following Table 301

ACTION

(3) BEOL PROCEDURE

The following process may be used in lieu of process MPL specified in Table 301.

Equipment and Materials

- (a) Magnaflux Model X2152 Pancake Coil and Knife Switch Unit.
- (b) Magnaflux TAQ 1205 three phase full wave rectified power supply connected to (a) by twin cables.
- (c) Ardrox Type 851-3 ink containing 0.3 to 0.3% fluorescent magnetic particle inspection powder.

Procedure.

Exit Guide Vane Case Fig. No. 302 Item No. 150 can be crack detected using the following method:-

- (a) Demagnetise
- (b) Magnetise using knife switch 3000A. Case must be rotated through coil.
- (c) Apply ink on residual techniques.
- (d) Inspect under U.V. light.
- (e) Demagnetise
- (f) Magnetise using pancake coil 2800 A.
- (g) Apply ink on residual techniques.
- (h) Inspect under U.V. light.
- (i) Demagnetise.

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British airways

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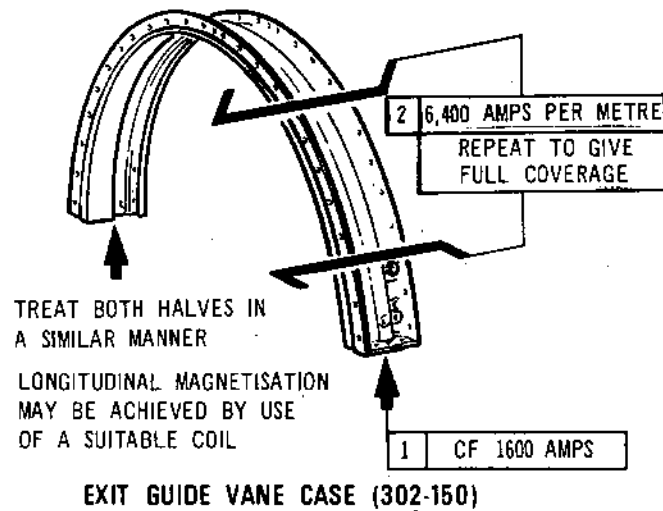
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Crack Detection Test Diagram
Figure 301

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-31-02	Fig.1
303	72-31-02	Fig.2

Cross References to Illustrated Parts Catalogue
Table 3034. Sealing Ring (302-30)

A. Inspect Sealing Ring Groove.

- | | |
|-----------------------------|---|
| (1) Local metal deposition. | Reject. |
| (2) Nicks and burrs. | Accept after repair. |
| (3) Dressable damage. | Accept after repair. |
| (4) Fretting. | Accept, providing F.C.S. limits are not violated. |

B. Carry Out Dimensional Checks (Ref.72-31-00 Fits and Clearances).

- (1) Check width of blade retaining ring locating groove (F.C.S.602-44).

NOTE: Carry out this check in conjunction with Retaining Ring 302-60.

- | | |
|---------------------------|--------------------------------|
| (a) Within F.C.S. limits. | Accept, subject to NOTE below. |
|---------------------------|--------------------------------|

NOTE: It is permissible to pair blade retaining rings of not less than minimum acceptable section with inner fixing sealing rings with not more than maximum acceptable slot width.

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C. Inspect Diaphragm Abutment Face.

- | | |
|---|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Scoring. | |
| (a) Less than 0.005 in.
(0,130 mm) deep. | Accept after repair. |
| (b) Elongation of bolt-
holes less than
0.030 in. (0,760 mm). | Accept after repair. |
| (3) Pitting. | Accept after repair. |

5. Retaining Ring (302-60)

A. Inspect Sealing Ring Groove Location.

- | | |
|-----------------------------|--|
| (1) Local metal deposition. | Reject. |
| (2) Nicks and burrs. | Accept after repair. |
| (3) Dressable damage. | Accept after repair subject to crack detection (Ref. Table 301). |
| (4) Fretting. | Accept, providing F.C.S. limits are not violated. |
| (5) Local fusion. | Reject. |

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B. Carry Out Dimensional Checks (Ref.72-31-00 Fits and Clearances).

- (1) Check width of ring at sealing ring groove location (F.C.S.602-44).

NOTE: Carry out this check in conjunction with Retaining Ring 302-30.

- (a) Within F.C.S. limits. Accept, subject to NOTE below.

NOTE: It is permissible to pair blade retaining half rings of not less than minimum acceptable section with inner fixing sealing rings with not more than maximum acceptable slot width.

C. Inspect Exit Guide Vane Attachment Flange.

- (1) Fretting and Wear.

- (a) Depth 0.010 in. Accept after repair.
(0,250 mm).
- (b) Bolt-holes elongated Accept after repair.
not more than 0.030 in.
(0,760 mm).

- (2) Nicks and burrs. Accept after repair.

- (3) Scoring.

- (a) Less than 0.005 in. Accept after repair.
(0,130 mm).

- (4) Pitting. Accept after repair.

6. LP Compressor Exit Guide Vanes (302-90/100/110/120)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Vanes.

- (1) Bowing. Accept providing no incipient cracks are detectable and there is no evidence of kinking.

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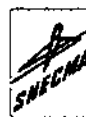
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(2) Impact damage.

(a) Inspect to acceptance and blending standard
(Ref.72-31-02 Repair No.1).

C. Inspect Vane Outer Fixing Surfaces (Ref. Fig.304 Detail A).

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Not more than 0.003 in. Accept.
(0,08 mm) in depth over
less than 67 per cent of
the surface area of each
surface 'B'.

(b) Not more than 0.001 in. Accept.
(0,03 mm) in depth on
surfaces 'B' not covered
in (a).

7. Exit Guide Vane Case Assembly (302-150)

NOTE : Acceptance of Exit Guide Vane Case is subject to
a satisfactory radial tip clearance, stage 7
rotor blade to case. This check will be made
during assembly.

A. Inspect Front and Rear Attachment Faces.

(1) Scoring.

(a) Not more than 0.005 in. Accept after
(0,130 mm). repair.

(2) Nicks and burrs. Accept after repair.

(3) Fretting and wear.

(a) Fretting not more than Accept after
0.005 in. (0,130 mm). repair.

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- (b) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

B. Inspect Horizontal Attachment Faces.

(1) Scoring.

- (a) Not more than 0.005 in.
(0,130 mm).

Accept after
repair.

(2) Nicks and burrs.

Accept after
repair.

(3) Fretting and wear.

- (a) Fretting not more than
0.005 in. (0,130 mm).

Accept after
repair.

- (b) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

C. Inspect Vane Locations.

(1) Fretting.

- (a) Not more than 0.010 in.
(0,250 mm) in the vane
groove.

Accept after
repair.

(2) Nicks and burrs.

Accept after
repair.

(3) Wear.

- (a) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

D. Inspect Case Inner Land.

(1) Rubbing.

- (a) Not more than 0.005 in.
(0,130 mm).

Accept after
repair.

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(2) Metallic build-up.

(a) Not more than 0.003 in.
(0,080 mm).

Accept after
repair.

E. Inspect General Condition of Case.

(1) Nicks and burrs.

Accept after
repair.

8. Mounting Bracket (303-70)

A. Inspect Bracket.

(1) Fretting and Wear.

(a) Attachment face material
thickness reduced by not
more than 5 per cent.

Accept after
repair.

(b) Bolt-holes elongated by
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

(2) Nicks and burrs.

Accept after
repair.

9. Brackets (303-180/210/240)

A. Inspect Brackets.

(1) Wear and fretting.

(a) Attachment face thickness
reduced not more than
5 per cent.

Accept after
repair.

(b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

(2) Scoring.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair
providing material
thickness is not
reduced by more
than 5 per cent.

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(3) Nicks and burrs.

Accept after
repair.

(4) Distortion.

(a) Distortion from true
form.

Accept if com-
patibility is
preserved.

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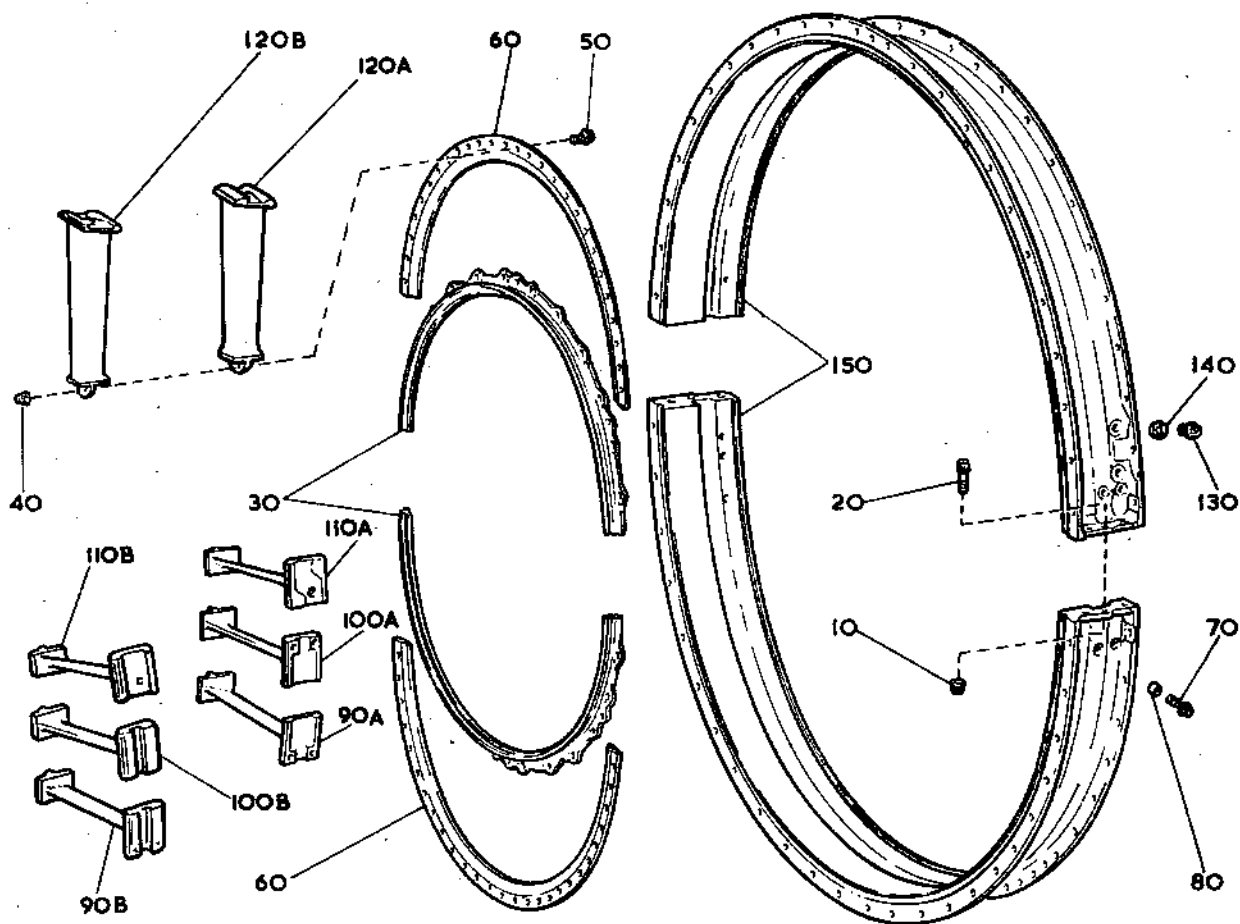
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LP Compressor, Exit Guide Case and Vanes
Figure 302

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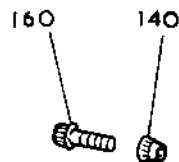
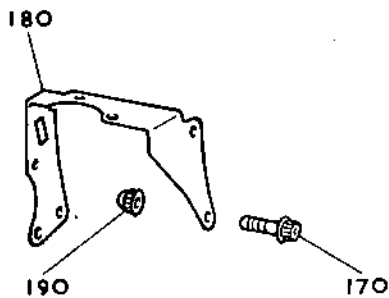
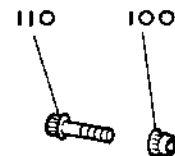
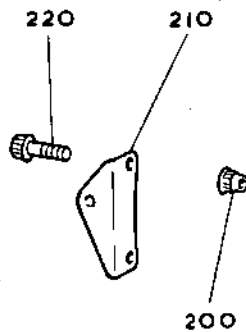
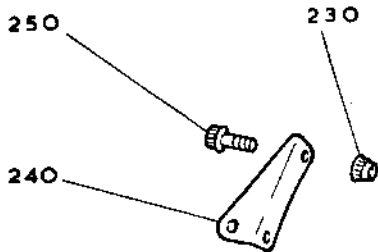
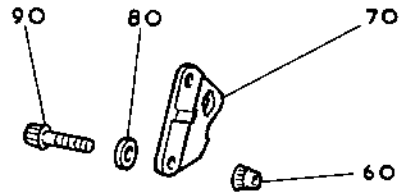
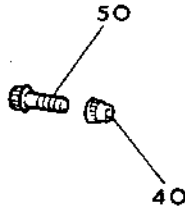
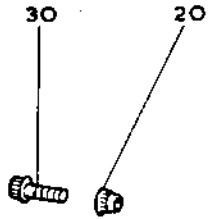


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LP Compressor Exit Guide Case, Rear Flange
Attaching Parts
Figure 303

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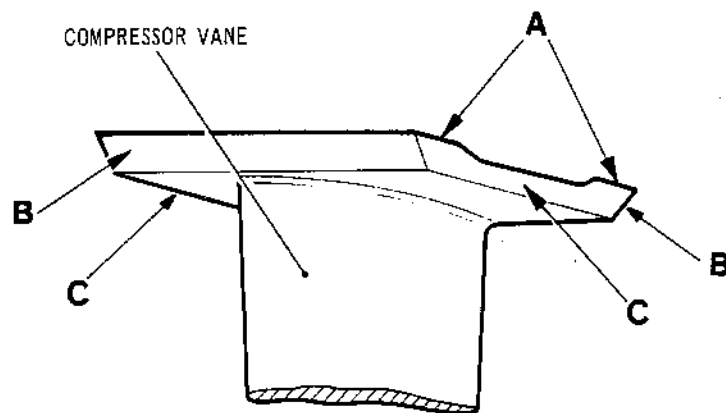
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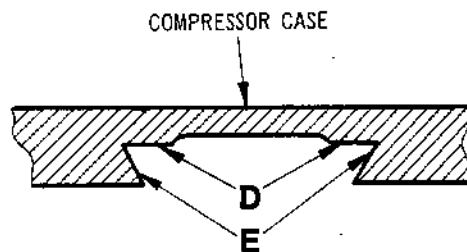


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DETAIL A



DETAIL B

LP Compressor Exit Guide Case and Vane Inspection Zones
Figure 304

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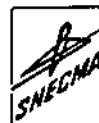
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1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.
- F. Certain types of blade damage can be repaired in-situ, without dismantling the engine. For details of in-situ blade blending and acceptance limits refer to 72-09-31 LP and HP Compressor Rotor Blades - Repair by In-situ Blending.

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2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards. Special attention must be paid to critical areas of certain specified items during inspection. An instruction to this effect is included in the inspection detailed for the specified item.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.
- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.
 - (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	30	Bearing Inner Track	MP1
302	170	Externally Relieved Bolt	MP1
302	260	Externally Relieved Bolt	MP1
303	10	Externally Relieved Bolt	MP1
303	70	Externally Relieved Bolt	MP1
303	130	Externally Relieved Bolt	MP1
304	10	Retaining Nut	MP1
304	40	Probe Operating Ring	MP1
304	50	Plain Round Nut	MP1
304	70	Adjusting Washer	MP1
304	190	Sleeve Housing	MP1
304	220	Centre Spherical Mounting	MP1
304	230	Rear Rotor Shaft Assembly	MP1
304	250	Externally Relieved Bolt	MP1

Items to be Magnetic Particle Crack Tested
Table 301

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B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

Items marked with an asterisk (*) in Table 302 feature defined critical areas. (Ref. Figs.307 and 308). In addition to the general overall crack detection examination, special attention must also be paid to those defined critical areas during the inspection.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	90	Front Rotor Shaft Assembly	F2A
302	150	LP Compressor Blade	F2A
302	160*	LP Compressor Rotor Disk	F2A
302	190*	Spacer Ring	F2A
302	240	LP Compressor Blade	F2A
302	250*	LP Compressor Rotor Disk	F2A
302	280*	Spacer Ring	F2A
302	330	LP Compressor Blade	F2A
302	360*	LP Compressor Rotor Disk	F2A
303	30*	Spacer Ring	F2A
303	40	LP Compressor Blade	F2A
303	60*	LP Compressor Rotor Disk	F2A
303	90*	Spacer Ring	F2A
303	100	LP Compressor Blade	F2A
303	120*	LP Compressor Rotor Disk	F2A
303	150*	Spacer Ring	F2A
303	160	LP Compressor Blade	F2A
303	180*	LP Compressor Rotor Disk	F2A
304	270*	Spacer Ring	F2A
304	320	LP Compressor Blade	F2A
304	340*	LP Compressor Rotor Disk	F2A

Items to be Fluorescent Dye Crack Tested
Table 302

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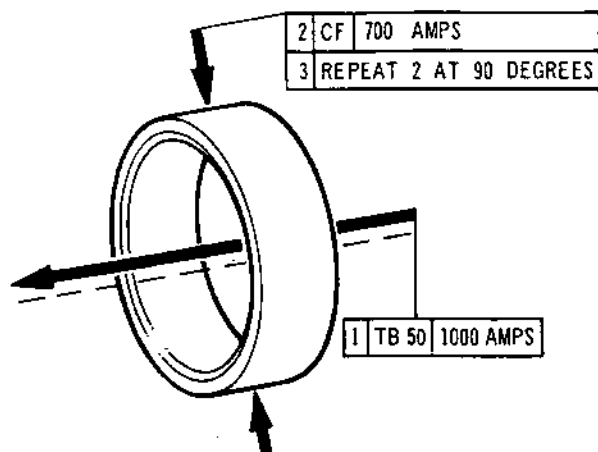


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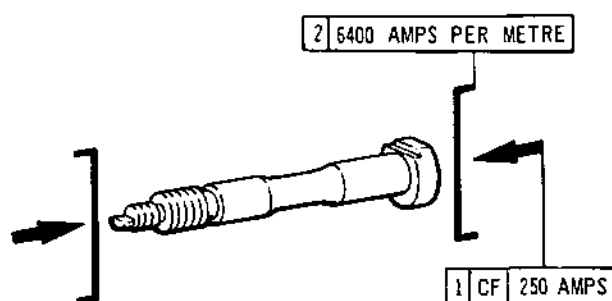
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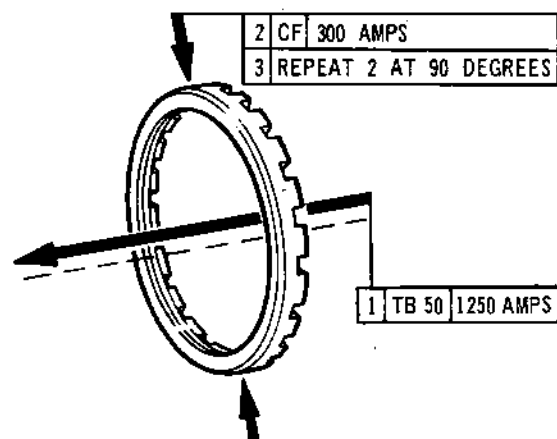
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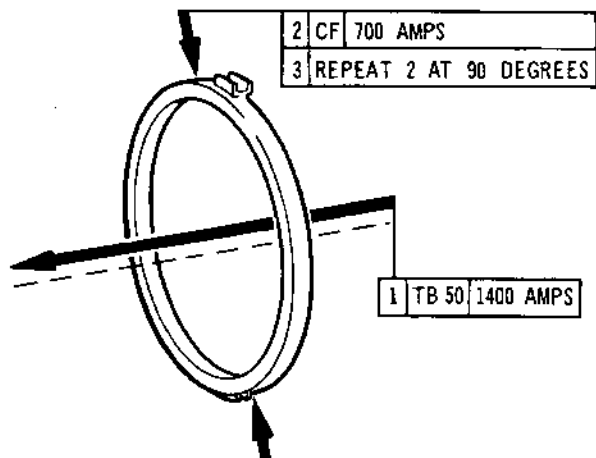
BEARING INNER TRACK (302-30)



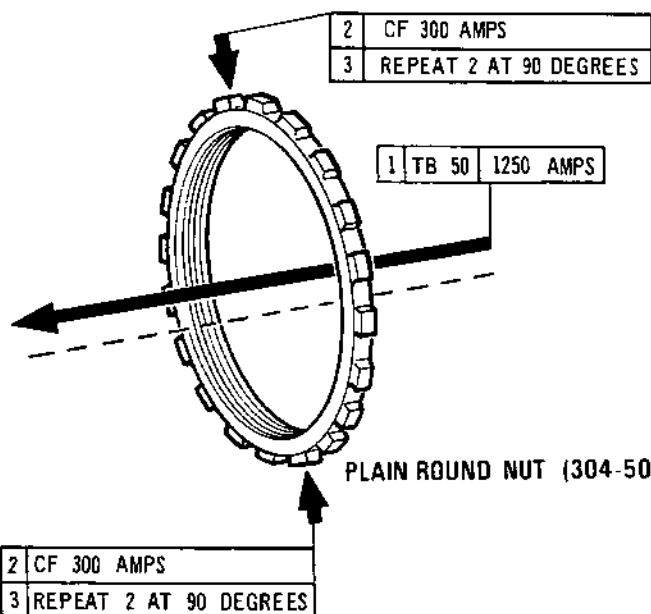
EXTERNALLY RELIEVED BOLT
(302-170/260, 303-10/70/130, 304-250)



RETAINING NUT (304-10)



PROBE OPERATING RING (304-40)



PLAIN ROUND NUT (304-50)

Crack Detection Test Diagram
Figure 301 (Sheet 1 of 2)

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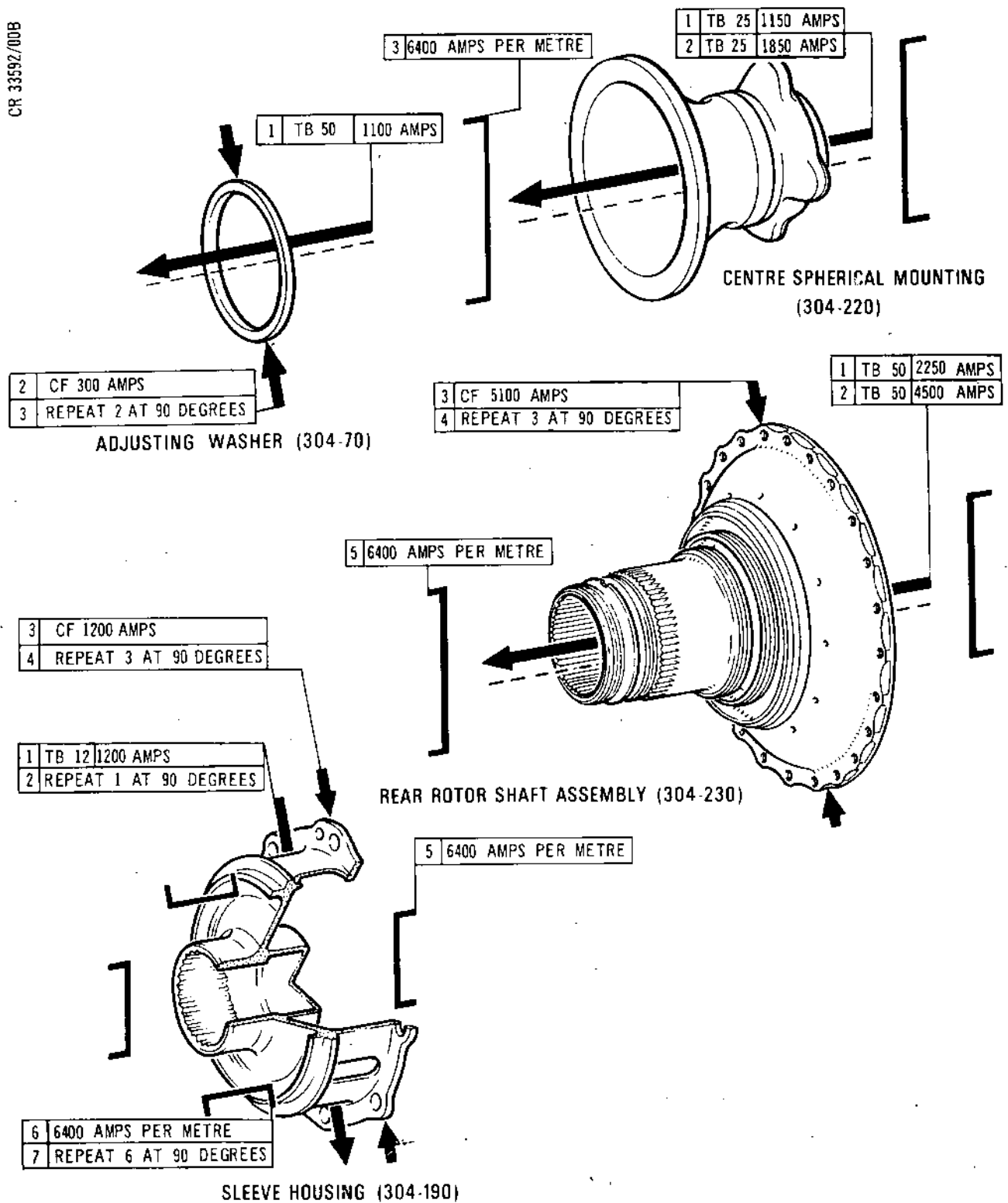
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Crack Detection Test Diagram
Figure 301 (Sheet 2 of 2)

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-31-03	Fig.1
303	72-31-03	Fig.2
304	72-31-03	Fig.3
305	Not applicable	

Cross References to Illustrated Parts Catalogue
Table 303

CAUTION: THIS IS A ROTATING ASSEMBLY. ENSURE THAT ANY FREE OR CAPTIVE SELF-LOCKING NUTS (REGARDLESS OF SIZE) HAVE BEEN REPLACED BEFORE THE ASSEMBLY IS RELEASED FOR SERVICE (REF.72-09-00 INSPECTION/CHECK). FAILURE TO DO SO MAY RESULT IN ENGINE DAMAGE.

NOTE: Inspect all balancing bolts (302-80/140/230/320, 303-310), balancing weights (302-60/120/210/300, 302-290) or washers for general condition. Reject any damaged items; any attempt at repair will render them suspect for balancing purposes. Retain any undamaged items for possible selection and use during assembly.

4. Shaft Cover (302-20)

A. Inspect Front Shaft Cover.

(1) Nicks and burrs. Accept after repair.

B. Inspect Abutment Face.

(1) Fretting.

(a) Not more than 0.002 in.
(0,050 mm) in depth. Accept after repair.

(2) Scoring.

(a) Not more than 0.005 in.
(0,130 mm) in depth. Accept after repair.

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5. LP Compressor Rotor Front Bearing Inner Track (302-30)

- A. Carry Out Dimensional Checks (Ref.72-31-00 Fits and Clearances).

NOTE: Carry out these checks in conjunction with the Front Rotor Shaft (302-90), the Front Bearing 72-23-01/302-80 and the Front Bearing Support 72-23-01/302-110.

- (1) Check inner track bore (F.C.S.601-6).

(a) Within F.C.S. limits Accept.

- (2) Check bearing diametrical clearance (F.C.S.601-7).

(a) Within F.C.S. limits. Accept.

- B. Inspect Bearing Track (Ref.72-09-00 Inspection/Check).

6. Front Rotor Shaft Assembly (302-90)

- A. Carry Out Dimensional Checks (Ref.72-31-00 Fits and Clearances).

- (1) Check bearing inner track locating diameter (F.C.S.601-6).

NOTE: Make this check in conjunction with the LP Compressor Rotor Front Bearing Inner Track (para.5).

(a) Within F.C.S. limits. Accept.

- (2) Check diameter of No.1 windback seal (F.C.S.601-8).

NOTE: Make this check in conjunction with the LP Compressor Rotor Front Bearing Housing (Ref.72-23-01).

(a) Within F.C.S. limits. Accept.

- (3) Check diameter of Nos.2A and 2B labyrinth seals (F.C.S.601-9).

NOTE: Make this check in conjunction with the LP Compressor Rotor Front Bearing Labyrinth Housing (Ref.72-23-01).

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- (4) Check bolt locating land bores (F.C.S.601-10).

NOTE: Make this check in conjunction with the
Externally Relieved Body Bolts (para.11).

B. Inspect Windback Thread.

- (1) Rubbing.

- (a) Slight rubbing within
F.C.S. limits.

Accept.

- (2) Nicks and burrs.

Accept after
repair.

- (3) Minor edge damage.

Accept after repair
providing that only
one blend is made
to each fin, that
finished blends
are not more than
one-half fin depth
deep or five times
fin depth long,
that all blends on
adjacent blades are
separated radially
by not less than
five times fin
depth at their
ends, and that
F.C.S. limits are
not violated.

NOTE: Greater damage will require repair
(Ref.72-31-03 Repair No.2).

C. Inspect Nos.2A and 2B Labyrinth Fins.

- (1) Rubbing.

- (a) Slight rubbing within
F.C.S. limits.

Accept.

- (2) Nicks and burrs.

Accept after
repair.

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(3) Minor edge damage.

Accept after repair providing that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that all blends on adjacent blades are separated radially by not less than five times fin depth at their ends, and that F.C.S. limits are not violated.

NOTE: Greater damage will require repair
(Ref.72-31-03 Repair No.2).

D. Inspect Bearing Inner Track Location.

(1) Nicks and burrs.

Accept after repair.

(2) Scoring.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair
(Ref.72-31-03
Repair No.3).

E. Inspect Main Abutment Face.

(1) Nicks and burrs.

Accept after repair.

(2) Scoring.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair.

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F. Inspect Shoulder Bolt Holes.

(1) Nicks.

- (a) Not more than 0.010 in.
(0,250 mm) deep.

Accept after repair
providing repair
does not violate
F.C.S. limits.

(2) Scoring.

- (a) Any scoring.

Reject.

7. Shanked Self-Locking Nuts (302-100)

A. Inspect Self-locking Nuts (Ref.72-09-00 Inspection/Check).

NOTE: Ensure that all self-locking shanked nuts have
been removed/renewed.

8. LP Compressor Blades (302-150/240/330, 303-40/100/160, 304-320)

A. Inspect Blade Fir-tree Form and Abutment Faces (Ref.
Fig.305).

(1) Fretting.

- (a) Any fretting on the
loaded flanks that just
produces a step between
the fretted and non-
fretted surfaces at the
ends of the inner surfaces.

Reject.

NOTE: Where there is visible fretting, the step
may be detected by traversing a 0.040 in.
(1,00 mm) scribe or similar instrument
over the fretted and non-fretted
surfaces.

- (b) Not more than 0.003 in.
(0,080 mm) in depth on
the abutment faces.

Accept after
repair.

- (c) Not more than 0.005 in.
(0,130 mm) in depth on
blade tang outer face on
stage 1 and 2.

Accept.

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(2) Nicks and burrs.

Accept after
repair.

B. Inspect Blade Aerofoil.

(1) Inspect to acceptance and blending standard (Ref. 72-31-03 Repair No.6).

C. Inspect Stages 1 to 4 for Excessive Blade Twist (302-150/240/330, 303-40) (Ref.Fig.306).

(1) Position Inspection Fixture (Ref.3142) base plate on surface table (refer to 72-31-03 Special Tools).

CAUTION: ENSURE PLUNGER SPRINGS ARE LOCATED ON PLUNGER SHAFTS.

(2) Locate 4 plungers in relevant stage location holes in fixture (2 at blade tip position and 2 at blade centre position).

(3) Position blade location block for required stage ensuring the block locators are positioned in the correct base plate slots. Secure using the 4 Allen screws.

(4) Position calibration block for required stage at blade tip position and secure using thumb screw.

(5) Position blade root in blade location block depressing the 4 plungers beneath aerofoil face as blade enters block. Clamp in position.

CAUTION: ENSURE ROOT HAS COMPLETELY ENTERED CLAMP AND ROOT LUG IS TIGHT AGAINST CLAMP TOP FACE.

(6) Starting at blade tip position and using suitable measuring equipment, measure the distance between plunger at trailing edge position and calibration block. Record dimension.

(7) Also at blade tip position, measure the distance between plunger at leading edge position and calibration block. Record dimension.

(8) Subtract the lower of the two dimensions recorded at paras.(6) and (7) from the higher. Using the Inspection Fixture data plate; if the difference between the dimensions equates to 2° or below continue to next step of inspection procedure, if difference equates to above 2° reject blade.

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- (9) At blade centre position and using suitable measuring equipment, measure the distance between plunger at trailing edge position and calibration pillar. Record dimension.
- (10) Also at blade centre position, measure the distance between plunger at leading edge position and calibration pillar. Record dimension.
- (11) Subtract the lower of the two dimensions recorded at paras.(9) and (10) from the higher. Using the Inspection Fixture data plate; if the difference between the dimensions equates to 20 or below accept the blade, if difference equates to above 20 reject blade.

CAUTION: TAKE CARE WHEN REMOVING BLADE THAT PLUNGERS
DO NOT SPRING OUT OF THEIR LOCATION HOLES.

- (12) Remove blade from fixture and dismantle fixture and return to protective box.

9. LP Compressor Disks (302-160/250/360, 303-60/120/180, 304-340)

CAUTION: THE BOTTOM OF THE DISC BLADE ROOT SLOT IS A CRITICAL AREA. (REF. FIG.307). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

A. Inspect Blade Fir-tree Form Location (Ref.Fig.305).

(1) Fretting.

- (a) Any fretting on the loaded flanks that just produces a step between the fretted and non-fretted surfaces at the ends of the inner surfaces. Reject.

NOTE: Where there is visible fretting, the step may be detected by traversing a 0.040 in. (1,00 mm) scriber or similar instrument over the fretted and non-fretted surfaces.

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(2) Nicks and burrs.

- (a) Small nicks and burrs on
fir-tree edges and radii.

Accept after repair
providing repair
maintains profile
of radii.

B. Carry Out Dimensional Check (Ref.72-31-00 Fits and Clearances).

- (1) Check bolt locating land bores in stages 1 to 7 disks inclusive (F.C.S.601-11/15/19/23 and 602-34/38/43).

NOTE: Make these checks in conjunction with the
Externally Relieved Body Bolts (para.11).

- (a) Within F.C.S. Limits.

Accept.

C. Inspect Retaining Bolt Bores.

CAUTION: THE DISC BOLT HOLE BORE IS A CRITICAL AREA.
(REF. FIG.307). SPECIAL ATTENTION MUST BE PAID
TO THIS AREA FOR SIGNS OF DAMAGE DURING THE
GENERAL OVERALL INSPECTION.

- (1) Scoring.

- (a) Any scores.

Reject.

- (2) Wear.

- (a) Slight wear within
F.C.S. limits.

Accept.

D. Inspect Abutment Faces.

- (1) Light witness marks.

Accept.

- (2) Nicks and burrs.

Accept after
repair.

- (3) Scoring.

- (a) Any scores.

Reject.

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10. Spacer Rings (302-190/280, 303-30/90/150, 304-270)

A. Carry Out Dimensional Checks (Ref.72-31-00 Fits and Clearances).

- (1) Check bolt locating land bores in all spacer rings (F.C.S.601-12/14/16/18/20/22/24 and 602-33/35/37/40/42).

NOTE: Make these checks in conjunction with the Externally Relieved Body Bolts (para.11).

(a) Within F.C.S. limits. Accept.

- (2) Check diameter of LP 1, 2, 3, 4, 5 and 6 Labyrinth seals (F.C.S.601-13/17/21 and 602-32/36/41).

NOTE: Make these checks in conjunction with the LP Compressor Case Labyrinth Rings (Ref. 72-31-01).

(a) Within F.C.S. limits. Accept.

B. Inspect Labyrinth Seal Fins.

- (1) Rubbing.

(a) Slight rubbing within F.C.S. limits. Accept.

- (2) Nicks and burrs. Accept after repair.

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(3) Minor edge damage.

Accept after repair providing that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that all blends on adjacent fins are separated radially by not less than five times fin depth at their ends, and that F.C.S. limits are not violated.

NOTE: Greater damage will require repair (Ref.72-31-03 Repair No.4 and No.5).

C. Inspect Bolt Hole Locations.

CAUTION: THE SPACER RING BOLT HOLE BORE IS A CRITICAL AREA. (REF. FIG.308). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

(1) Scoring.

- | | |
|---------------------------------------|---------|
| (a) Any scores. | Reject. |
| (b) Slight wear within F.C.S. limits. | Accept. |

D. Inspect Abutment Faces.

(1) Wear.

- | | |
|--------------------------|---------|
| (a) Light witness marks. | Accept. |
|--------------------------|---------|

(2) Nicks and burrs.	Accept after repair.
----------------------	----------------------

(3) Scoring.

- | | |
|---|----------------------|
| (a) Not more than 0.005 in. (0,130 mm). | Accept after repair. |
|---|----------------------|

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- E. Inspect Rotor Blade Retaining Flanges, Stages 1 to 2 and Stages 2 to 3.

(1) Fretting.

- (a) Not more than 0.005 in. Accept.
(0,130 mm) in depth at
the rotor blade tang
location.

- (2) Nicks and burrs. Accept after
repair.

11. Bolts, Externally Relieved Body (302-170/260, 303-10/70/130,
304-250/310)

- A. Carry Out Dimensional Checks (Ref.72-31-00 Fits and Clearances).

- (1) Check location land diameters of all bolts as follows:

Bolt Identity	F.C.S. Ref.
302-170	601-10/11/12
302-260	601-14/15/16
303-10	601-18/19/20
303-70	601-22/23/24
303-130	602-33/34/35
304-250	602-37/38/39/40
304-310	602-42/43

NOTE: Carry out these checks in conjunction with the Front Rotor Shaft (para.6), Compressor Disks (para.9), Spacer Rings (para.10) and Rear Rotor Shaft (para.20).

- (a) Within F.C.S. limits. Accept.

- B. Inspect Bolt.

- (1) Nicks and burrs. Accept after repair
providing repair
does not violate
F.C.S. limits.

- C. Inspect Threads (Ref.72-09-00 Inspection/Check).

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12. Retaining Nut (304-10) and Plain Round Nut (304-50)
- A. Inspect Threads (Ref.72-09-00 Inspection/Check).
 - B. Inspect Retaining Nut.
 - (1) Nicks and burrs. Accept after repair.
 - C. Inspect Spanner Locations.
 - (1) Damage.
 - (a) Any damage that may affect tool operation or safety. Reject.
 - (b) Any other minor damage. Accept.
 - D. Inspect Silver Plating.
 - (1) Damage or wear. Reject for re-plating (Ref. 72-09-08, Repair).
13. Cupwasher Locking (304-20)
- A. Inspect Cupwasher (Ref.72-09-00 Inspection/Check).
14. Operating Probe Ring (304-40)
- A. Inspect Probe Ring.
 - (1) Nicks and burrs. Accept after repair.
 - (2) Wear.
 - (a) Not more than 0.005 in. (0,130 mm) of wear in the knocker groove. Accept after repair.

NOTE: The manufactured width of the knocker groove is between 0.220 and 0.230 in. (5,588 and 5,842 mm).
 - B. Check Headless Pins.
 - (1) Nicks and burrs. Reject.
 - (2) Security.
 - (a) Pins firm in location. Accept.

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15. Pinned Locking Washer (304-60)

A. Check Locking Washer (Ref.72-09-00 Inspection/Check).

16. Adjusting Washer (304-70 to 165 selective range)

NOTE: This item may require selection during assembly.

A. Inspect Abutment Faces.

(1) Nicks, burrs and scores.

Accept, provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

(2) Fretting and wear.

Reject.

17. Sleeve Housing (304-190)

A. Carry Out Dimensional Checks (Ref.72-31-00 Fits and Clearances).

(1) Check square dimensions of splines (Ref.72-09-00 Inspection/Check) (F.C.S.602-53).

NOTE: Make this check in conjunction with the LP Signal Shaft Serrated Sleeve (Ref.72-31-04).

NOTE: This item contains 35 splines pitched as for 36, with one uncut at master spline.

(a) Any side of square outside F.C.S. limits.

Reject.

(b) Within F.C.S. limits.

Accept.

B. Inspect Spline (Ref.72-09-00 Inspection/Check).

(1) Nicks and burrs.

Accept after repair.

(2) Light chatter not more than 0.002 in. (0,050 mm) in depth.

Accept after repair

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C. Inspect Sleeve Housing.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Slight witness marks on abutment face. Accept.
 - (b) Bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

D. Inspect Metaflex Seal Location.

- (1) Nicks and burrs.
 - (a) Small peripheral nicks and burrs. Accept after repair.
- (2) Scores.
 - (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair.

E. Inspect External Finish (Ref.72-09-04 Repair for Areas with External Finish and the Procedure for Application of Finish).

NOTE: To enable the crack detection (magnetic particle) to be carried out, the high heat resisting aluminium enamel finish will have been removed during cleaning.

18. Metaflex Seal (304-210)

A. Inspect Metaflex Seal (Ref.72-09-00 Inspection/Check).

19. Spherical Centre Mounting (304-220)

A. Carry Out Dimensional Check (Ref.72-31-00 Fits and Clearances).

- (1) Check square dimensions of splines (Ref.72-09-00 Inspection/Check) (F.C.S.602-55).

NOTE: Make this check in conjunction with the LP Signal Shaft Locking Sleeve (Ref.72-31-04).

NOTE: This item contains 35 splines pitched as for 36, with one uncut at master spline.

- (a) Any side of square outside F.C.S. limits. Reject.
- (b) Within F.C.S. limits. Accept.

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B. Inspect Spline (Ref.72-09-00 Inspection/Check).

- | | |
|--|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Light chatter not more than 0.002 in. (0,050 mm) in depth. | Accept after repair. |

C. Inspect LP Shaft Bearing Surface.

- | | |
|--|----------------------|
| (1) Wear. | |
| (a) Not more than 0.002 in. (0,050 mm) in depth. | Accept after repair. |
| (2) Nicks and burrs. | Accept after repair. |

D. Inspect Rear Rotor Shaft Abutment Face.

- | | |
|--|----------------------|
| (1) Wear. | |
| (a) Not more than 0.002 in. (0,050 mm) in depth. | Accept after repair. |
| (2) Nicks and burrs. | Accept after repair. |

20. Rear Rotor Shaft Assembly (304-230)

A. Carry Out Dimensional Checks (Ref.72-31-00 Fits and Clearances).

- (1) Check bolt location bores (F.C.S.602-39).

NOTE: Make this check in conjunction with the Externally Relieved Body Bolts (para.11).

- | | |
|---------------------------|---------|
| (a) Within F.C.S. limits. | Accept. |
|---------------------------|---------|

- (2) Check the following seal fins diameters:

No.3 labyrinth (F.C.S.602-45/46/47)

No.4 labyrinth (F.C.S.602-48)

No.5 windback (F.C.S.602-49/50)

NOTE: Make these checks in conjunction with the Intermediate Casing Labyrinth Housings (Ref.72-32-00).

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(a) Within F.C.S. Limits. Accept.

- (3) Check the LP thrust bearing inner track locating diameter (F.C.S.602-51).

NOTE: Make this check in conjunction with the LP Compressor Rotor Front Bearing Inner Track (para.5).

(a) Within F.C.S. Limits. Accept.

- (4) Carry out "square" check (Ref.72-09-00 Inspection/Check) on LP compressor drive shaft locating serrations (F.C.S.602-64).

NOTE: Make this check in conjunction with the LP Compressor Drive Shaft (Ref.72-31-04).

NOTE: This item has 47 splines pitched as for 48, with one uncut at master spline.

(a) Any side of square outside F.C.S. limits. Reject.

(b) Within F.C.S. Limits. Accept.

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Splines (Ref.72-09-00 Inspection/Check).

CAUTION: THE REAR ROTOR SHAFT DRIVE SPLINE IS A CRITICAL AREA. (REF. FIG.309). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION. REFER TO PARAGRAPH 20.N.(3) FOR CORROSION ACCEPTANCE LIMITS.

(1) Nicks and burrs. Accept after repair.

(2) Slight chatter not more than 0.001 in. (0,030 mm) in depth. Accept after repair.

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D. Inspect Bearing Journal.

(1) Wear.

(a) Fretting within F.C.S. limits.	Accept after repair.
------------------------------------	----------------------

(2) Scores.

(a) Light localised scratches not more than 0.001 in. (0,030 mm) in depth.	Accept after repair.
--	----------------------

(3) Nicks and burrs.

(a) Nicks and burrs on unmachined surfaces.	Accept after repair.
---	----------------------

E. Inspect Windback Threads and Labyrinths Fins.

(1) Rubbing.

(a) Slight rubbing within F.C.S. limits.	Accept.
--	---------

(2) Nicks and burrs.

Accept after repair.

(3) Minor edge damage.

Accept after repair providing that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that all blends on adjacent blades are separated radially by not less than five times fin depth at their ends, and that F.C.S. limits are not violated.

NOTE: Greater damage will require repair (Ref.72-31-03 Repair No.1).

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F. Inspect Attachment Faces.

- (1) Nicks and burrs. Accept after repair.
- (2) Scoring.
 - (a) Light localised scratches not more than 0.002 in. (0,050 mm) in depth. Accept after repair.
- (3) Wear.
 - (a) Light witness mark. Accept.

G. Inspect Bolt Location Holes.

CAUTION: THE REAR ROTOR SHAFT BOLT HOLE BORE IS A CRITICAL AREA. (REF. FIG.309). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION. REFER TO PARAGRAPH 20.N.(2) FOR CORROSION ACCEPTANCE LIMITS.

- (1) Within F.C.S. limits. Accept.

H. Inspect Headless Pins.

- (1) Pins firm in location and free of damage. Accept.

J. Inspect Shank Self-locking Nuts (Ref.72-09-00 Inspection/Check).

NOTE: Ensure that all self-locking shanked nuts have been removed/renewed.

K. Check Metaflex Seal Location.

- (1) Nicks and burrs.
 - (a) Small peripheral nicks and burrs. Accept after repair.
- (2) Scoring.
 - (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair.

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L. Inspect Spherical Centre Mounting Abutment Face.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Not more than 0.002 in. Accept after
(0,050 mm) in depth. repair.

M. Inspect External Finish (Ref.72-09-04 Repair for areas with external finish and the procedure for application of finish).

NOTE: To enable the crack detection (magnetic particle) to be carried out, the high heat resisting aluminium enamel finish will have been removed during cleaning.

N. Inspect for Corrosion.

NOTE 1: For measurement of corrosion pit depth by replication, refer to 72-09-00 para.19; check that the mixture is free of air bubbles.

NOTE 2: In all cases where corrosion damage is accepted, it is essential that before re-applying any protective coating, all corrosion must be neutralised in accordance with Cleaning, 72-09-00, Process H.

(1) Corrosion terms.

- (a) Superficial - light corrosion or rusting over the whole or part of the component surface. The corrosion is easily removed by light abrasion without loss of dimension, and after removal no pitting is visible to the naked eye.
- (b) Light surface - corrosion slightly more extensive than superficial, where powdery deposits may be seen and after cleaning the surface has become visibly roughened; the depth of roughening will generally be less than 0.002 in. (0,05 mm). Discrete pits are not evident and the depth or degree of corrosion is not readily measureable using the replication technique.

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(c) Pitting corrosion.

- (i) Small individual pits typically up to 0.005 in. (0,127 mm) in depth and approx. 0.005 in. (0,127 mm) in diameter. The pits may be in groups, but where necessary, the minimum distance between the outer edges of the pits together with the maximum pit size will be specified for individual areas under consideration.
- (ii) Pitting up to 0.005 in. (0,127 mm) in depth and typically 0.005 in. (0,127 mm) in diameter where individual pits have merged together in small areas/clusters. Acceptable pit depths together with permissible extent of the surface degradation and size of the area where corrosion pits have merged will be specified for individual areas under consideration.

(2) Bolt holes including chamfers.

- (a) Isolated pits or clusters as detailed in (1)(c)(ii), but up to 0.004 in. (0,10 mm) deep-measured depth and covering up to 50% of the surface area. Accept.
- (b) Corrosion greater than that quoted in (a). Reject.

(3) Splines.

- (a) Superficial and light corrosion as detailed in (1)(a) and (b). Accept.
- (b) Corrosion greater than that quoted. Quarantine and seek advice from Rolls-Royce.

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(4) Attachment faces (both sides).

- | | | |
|-----|---|--------------------|
| (a) | Chains of pits around the disk and spacer profiles up to 0.005 in. (0,127 mm) deep-measured depth. | Accept. |
| (b) | All other areas, clusters as detailed in (1)(c)(ii) but up to 0.005 in. (0,127 mm) deep-measured depth. | Accept. |
| (c) | Corrosion greater than that quoted in (a) and (b). | Reject for Repair. |
| (d) | After Repair, corrosion witness up to the limits quoted in (a) and (b). | Accept. |
| (e) | Corrosion greater than that quoted in (a) and (b). | Reject. |

(5) Air holes.

- | | | |
|-----|---|--|
| (a) | Pitting as detailed in (1)(c)(ii) but up to 0.003 in. (0,08 mm) deep. | Accept. |
| (b) | Corrosion greater than that quoted in (a). | Quarantine and seek advice from Rolls-Royce. |

(6) Bearing journal.

- | | | |
|-----|--|---|
| (a) | Pitting as detailed in (1)(c)(ii). | Accept after light blending. |
| (b) | Pitting greater than that quoted in (a). | Reject for Repair (Repair 72-31-03, Repair No.9). |

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(7) Areas not covered by sub-para.(2) to (6).

(a) Pitting as detailed in (1) Accept.
(c)(ii) but up to 0.003 in.
(0,08 mm) deep.

(b) Pitting greater than that Quarantine and seek
quoted in (a). advice from Rolls-
Royce.

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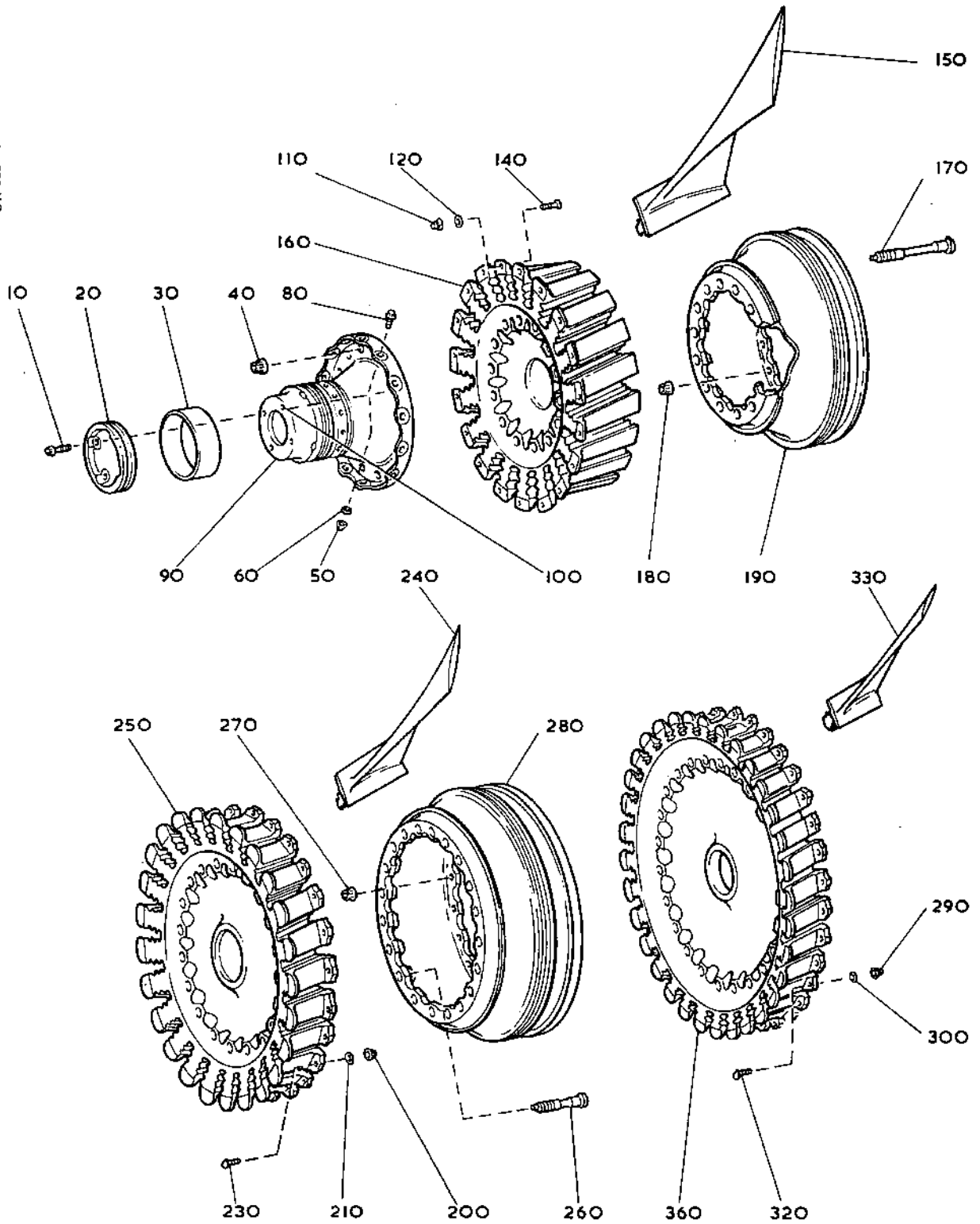


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CR 32249/00B



LP Compressor Rotor Front Shaft, Blades and
Disks Stages 1, 2 and 3
Figure 302

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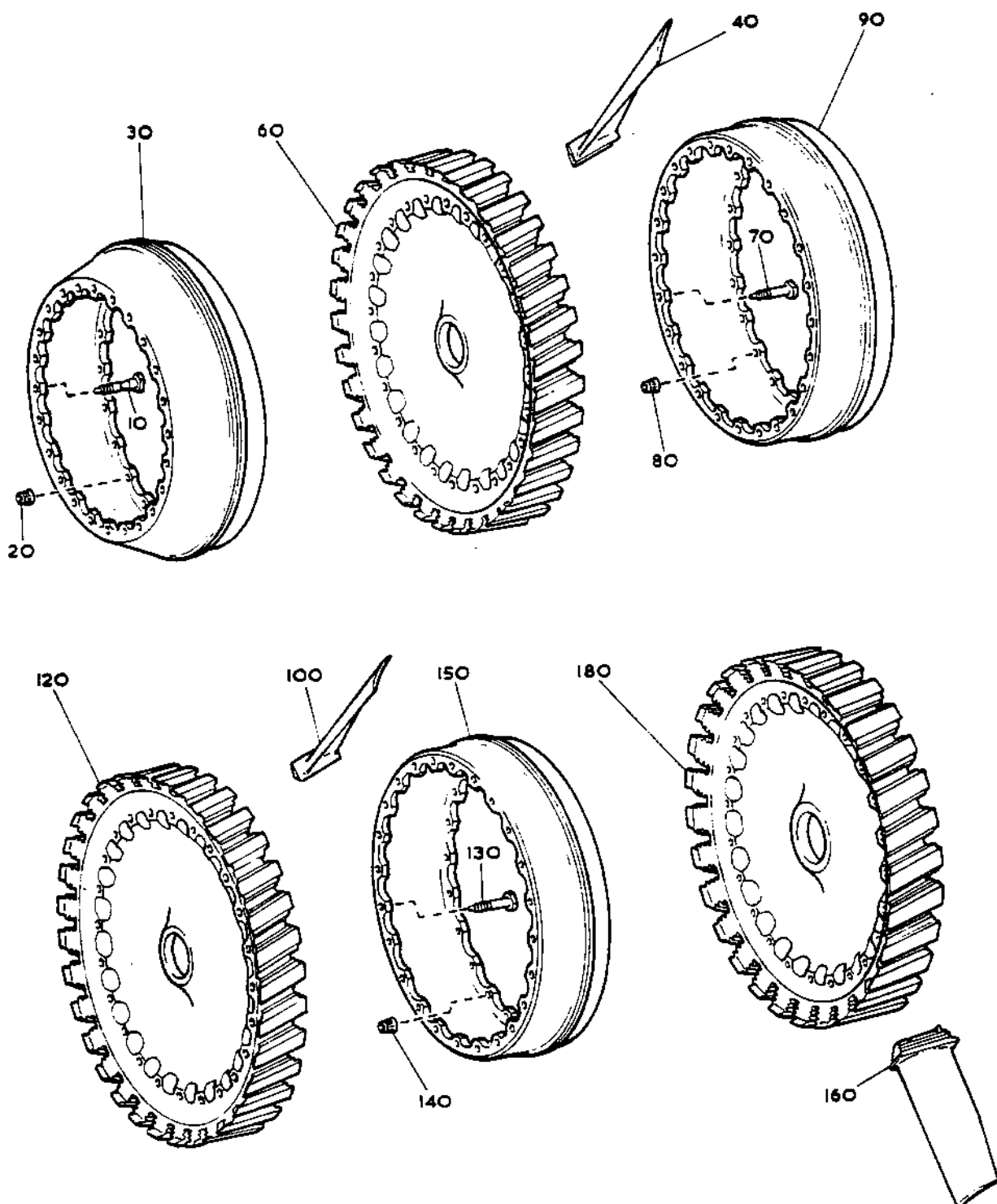


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LP Compressor Rotor Blades and Disks
Stages 4, 5 and 6
Figure 303

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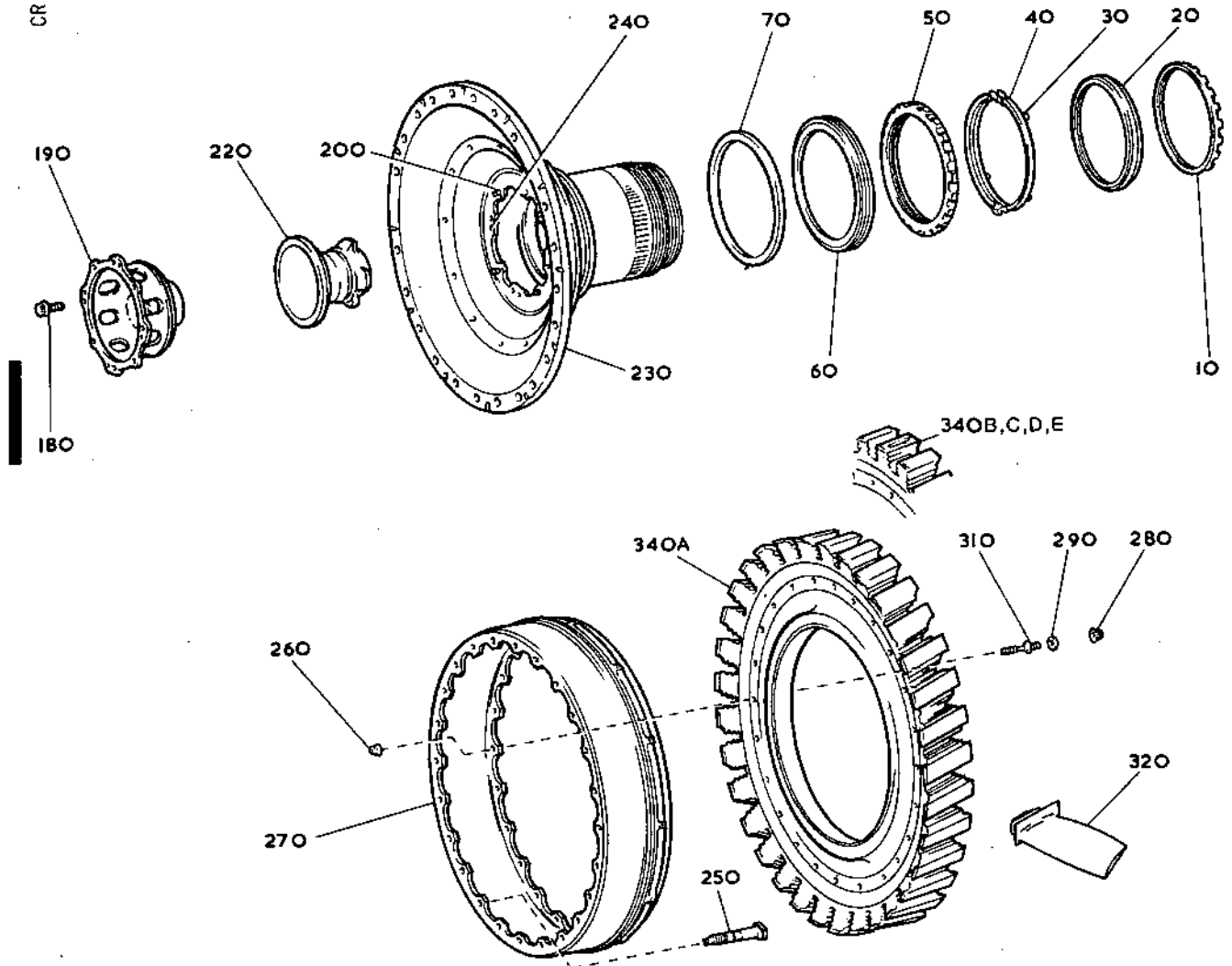


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CR 32246/00C



LP Compressor Rotor, Blades and Disk Stage 7
and Rear Rotor Shaft
Figure 304

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CR 33907/00A

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

MAXIMUM WEAR ON ABUTMENT FACE 0.003 (0,08)

STEPPING NOT
ACCEPTABLE BETWEEN
FRETTED AND NON-FRETTED
SURFACES ON ABUTMENT
FACES OF DISK AND BLADE

MAXIMUM WEAR ON BLADE TANG 0.005 (0,13)

AREAS WHERE FRETTING WILL
OCCUR INDICATED THUS



Rotor Blade and Disk Inspection Zones
Figure 305

INSPECTION/CHECK

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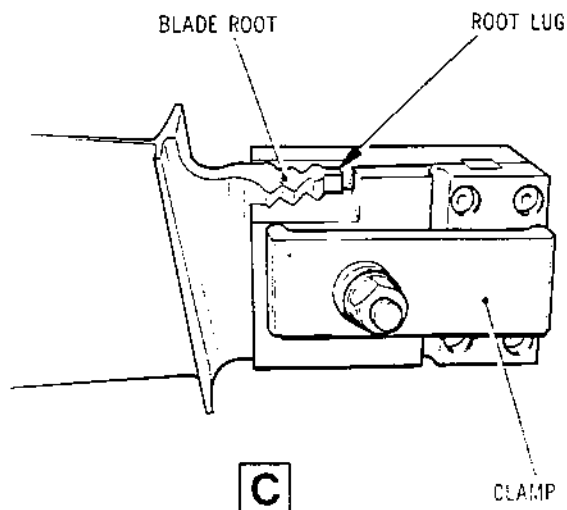
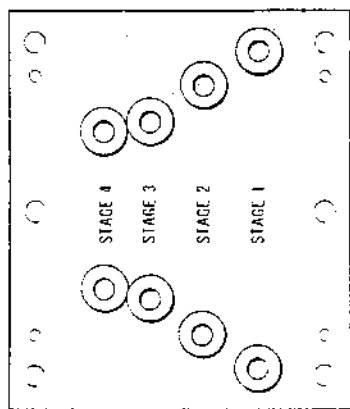
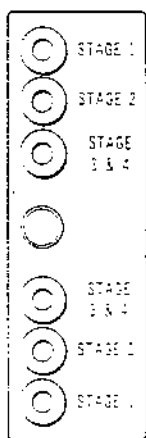
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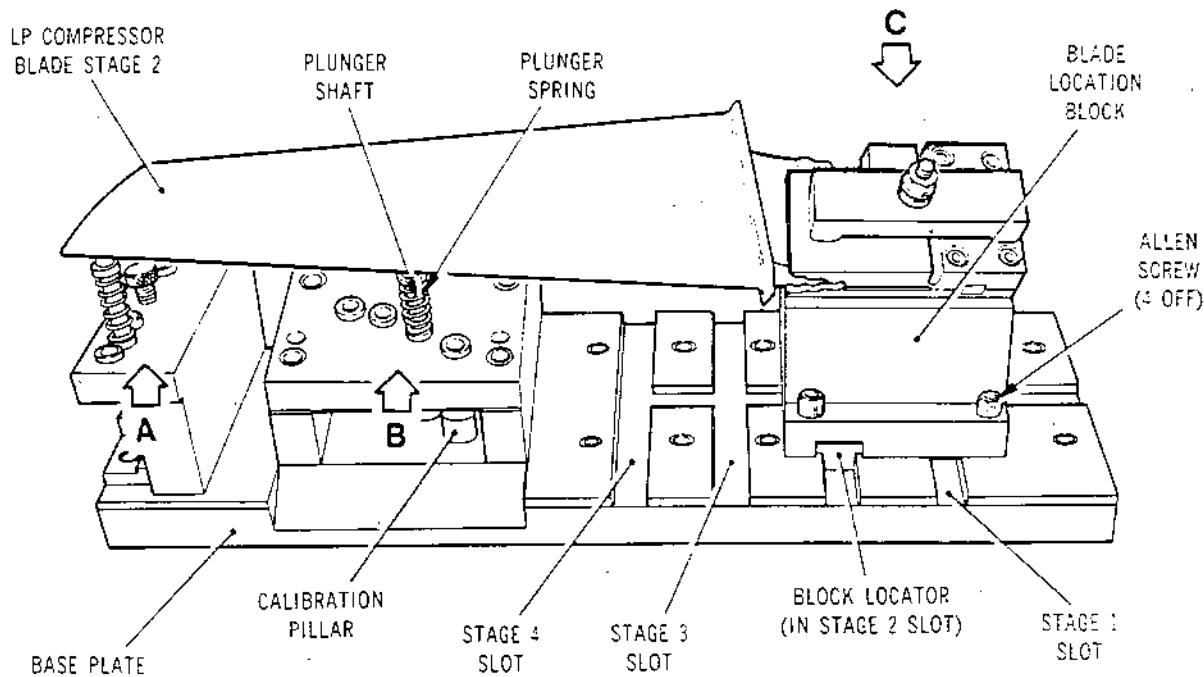
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A

STAGE LOCATION HOLES

B



Inspection of LP Compressor Blades (Stages 1-4) for
Excessive Twist (Sheet 1 of 2)
Figure 306

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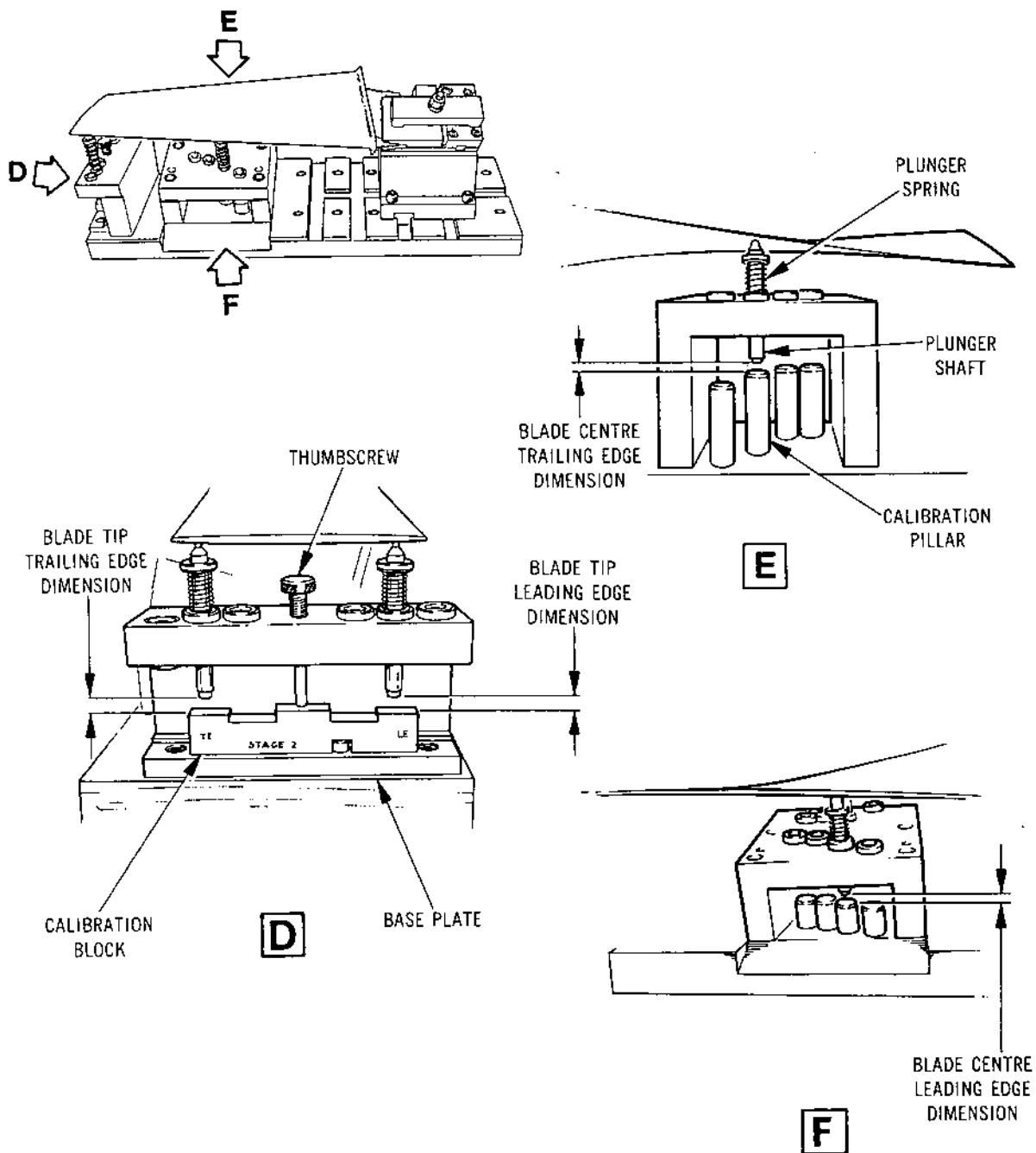
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Inspection of LP Compressor Blades (Stages 1-4) for
Excessive Twist (Sheet 2 of 2)
Figure 306

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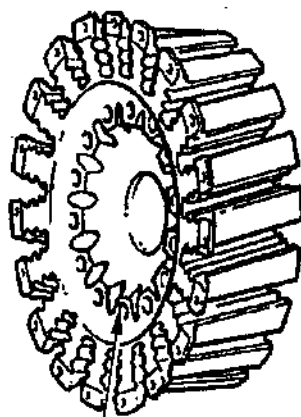


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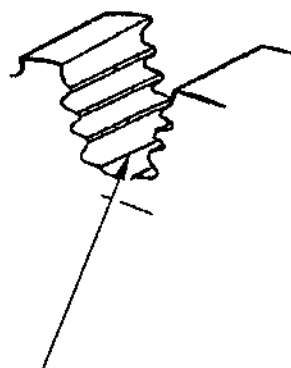
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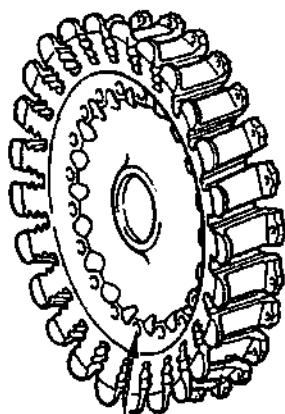


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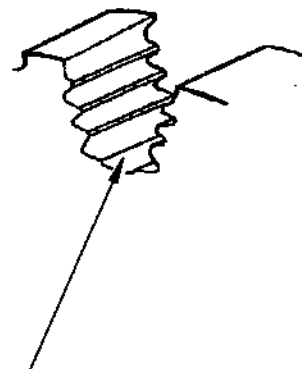


STAGE 1

RIM SLOT BOTTOM

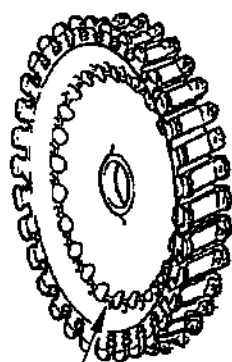


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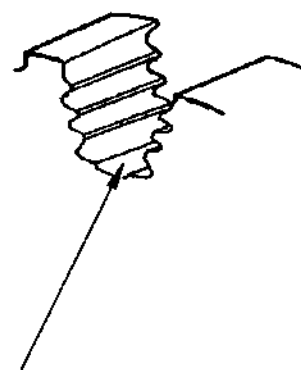


STAGE 2

RIM SLOT BOTTOM



MAIN BOLT HOLES



STAGE 3

RIM SLOT BOTTOM

LP Compressor Discs - Inspection Critical Areas
(Sheet 1 of 3)
Figure 307

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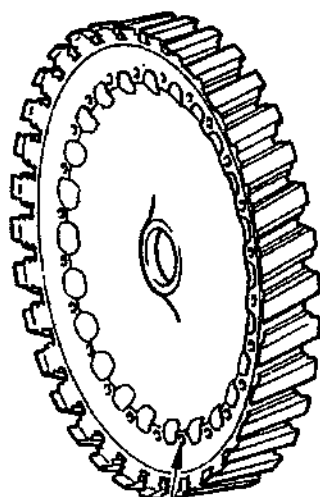


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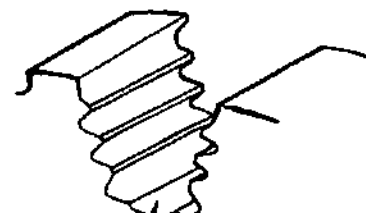


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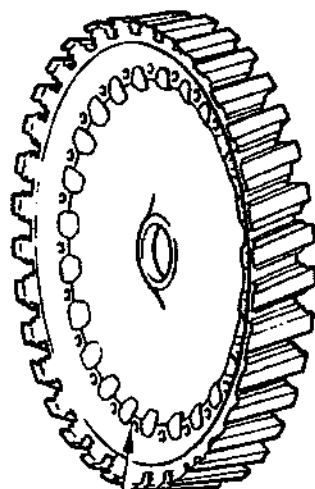


MAIN BOLT HOLES

STAGE 4

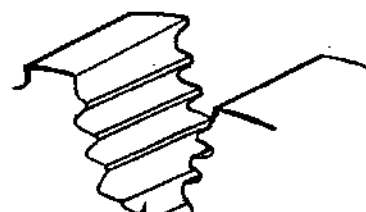


RIM SLOT BOTTOM



MAIN BOLT HOLES

STAGE 5



RIM SLOT BOTTOM

LP Compressor Discs - Inspection Critical Areas
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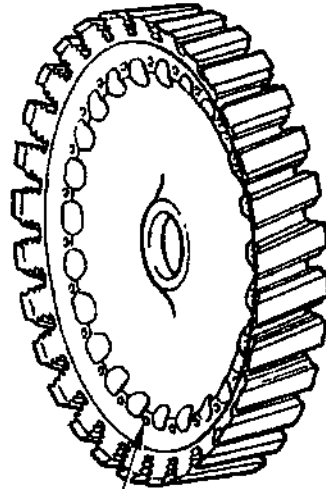


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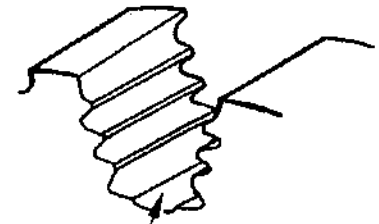
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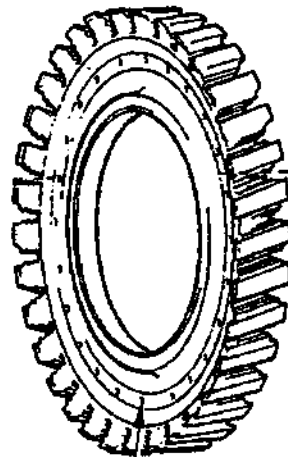


MAIN BOLT HOLES

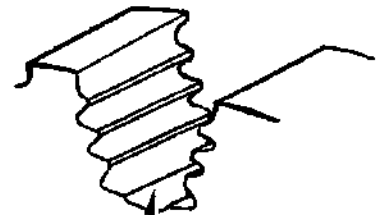


STAGE 6

RIM SLOT BOTTOM



MAIN BOLT HOLES



STAGE 7

RIM SLOT BOTTOM

LP Compressor Discs - Inspection Critical Areas
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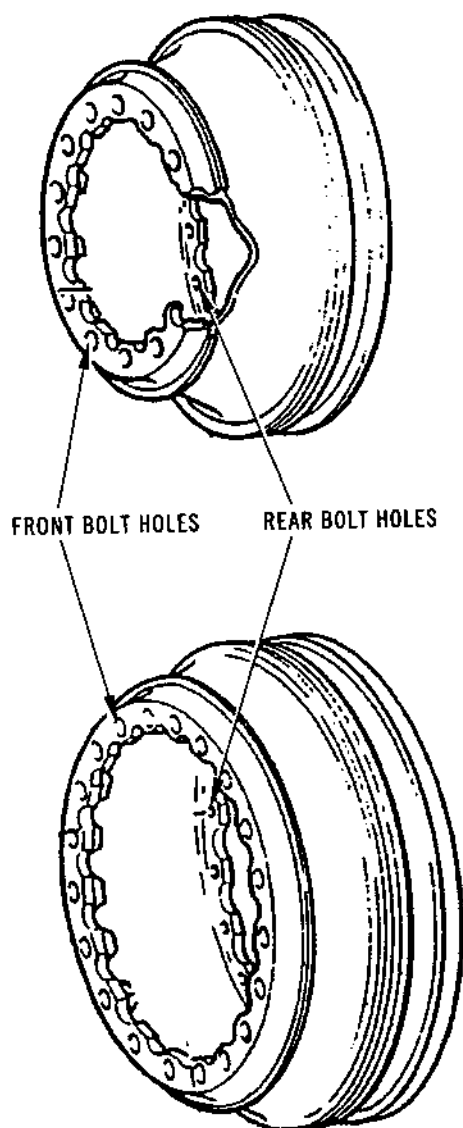


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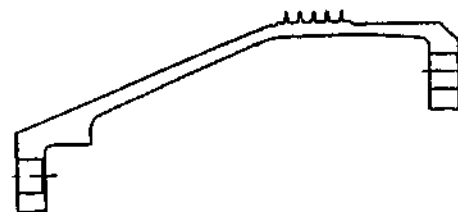
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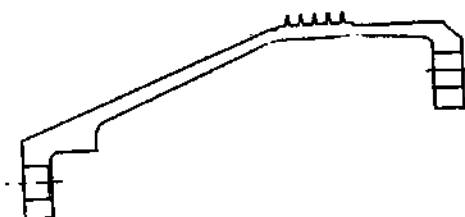
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STAGE 1-2



STAGE 2-3



LP Compressor Spacers - Inspection Critical Areas
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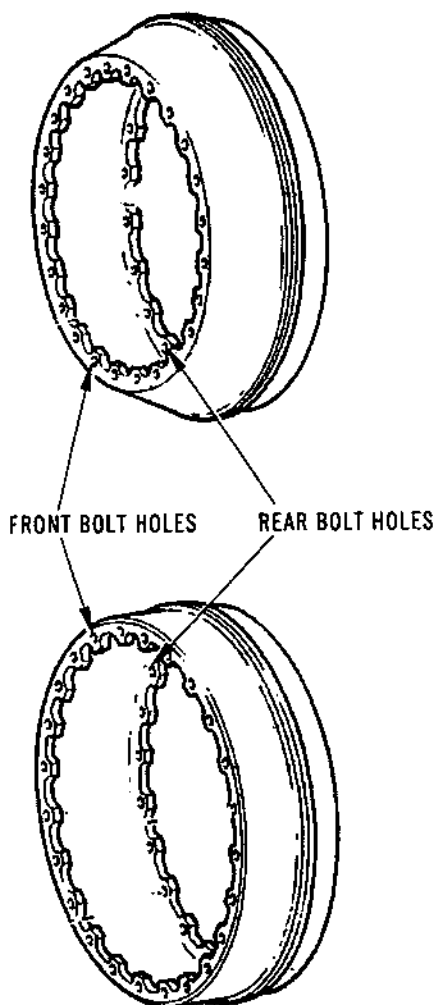


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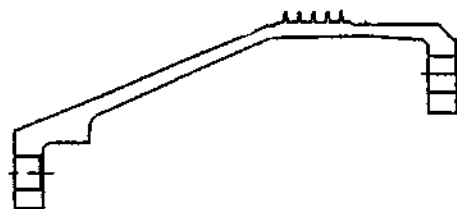
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STAGE 3-4



STAGE 4-5



LP Compressor Spacers - Inspection Critical Areas
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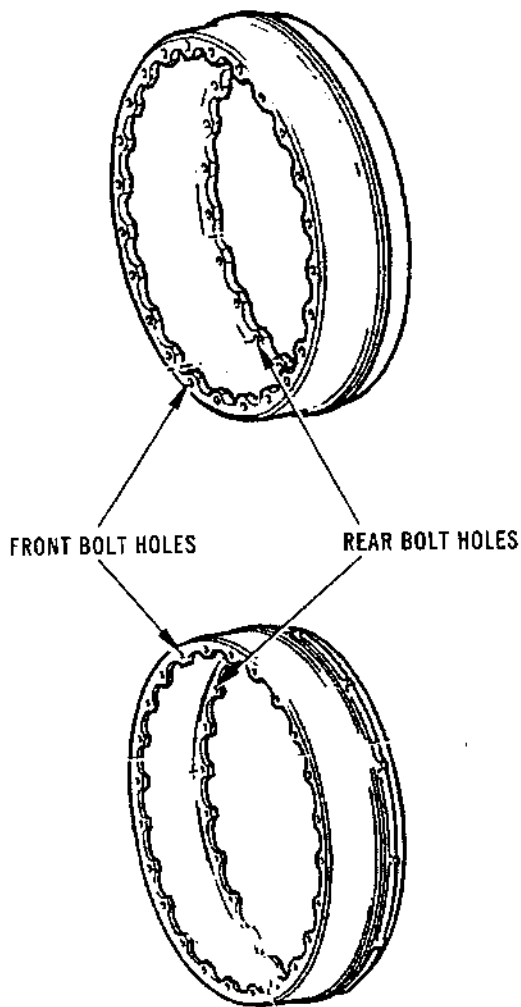


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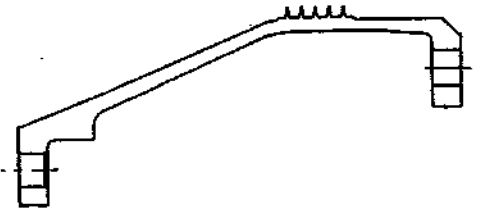
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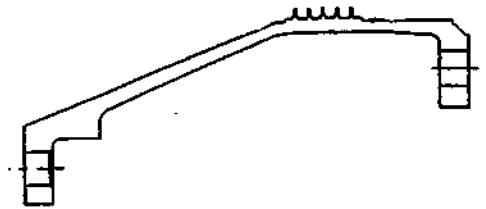
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STAGE 5-6



STAGE 6-7



LP Compressor Spacers - Inspection Critical Areas
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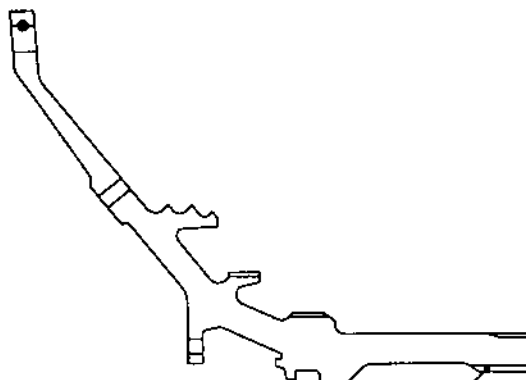
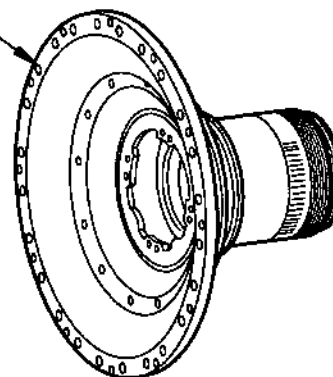
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FLANGE BOLT HOLES



SPLINES

LP Compressor Rear Rotor Shaft - Inspection Critical Areas
Figure 309

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LP COMPRESSOR DRIVE SHAFT - INSPECTION/CHECK

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**OLYMPUS 593**MK.610-14-28
OVERHAULLP COMPRESSOR DRIVE SHAFT - INSPECTION/CHECK1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards. Special attention must be paid to critical areas of certain specified items during inspection. An instruction to this effect is included in the inspection detailed for the specified item.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

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3. Crack Detection

A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.
- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

Items marked with an asterisk (*) in Table 301 feature defined critical areas. (Ref. Figs.304 and 305). In addition to the general overall crack detection examination, special attention must also be paid to those defined critical areas during the inspection.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	70	Outer Sealing Ring	MP1
302	210*	LP Compressor Drive Shaft (Front)	MP1
303	10	Adjusting Washer	MP1
303	120*	LP Compressor Drive Shaft (Rear)	MP1
303	150	Serrated Sleeve	MP1
303	160	Locking Sleeve	MP1

Items to be Magnetic Particle Crack Tested
Table 301

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sneema

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	190	Stiffening Disk	F2A
303	190	Signal Tube	F2A/S3

Items to be Fluorescent Dye Crack Tested
Table 302

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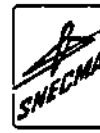
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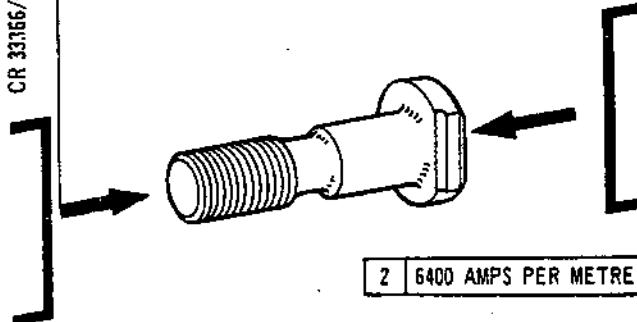
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1	CF 250 AMPS
---	-------------

CR 33166/00B

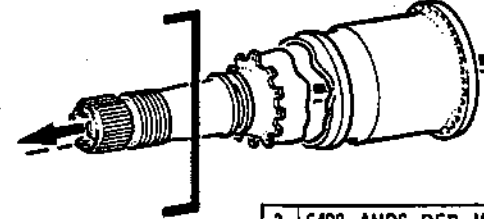


2	6400 AMPS PER METRE
---	---------------------

DEE HEAD BOLT (302-150)

LONGITUDINAL MAGNETISATION
MAY BE ACHIEVED BY USE OF
A COIL AS AN ALTERNATIVE
TO STEP 3

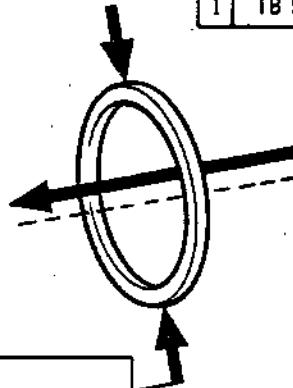
1	TB 38	1800 AMPS
2	TB 38	4500 AMPS



3	6400 AMPS PER METRE
4	REPEAT 3 TO GIVE FULL COVERAGE

LP COMPRESSOR DRIVE SHAFT (FRONT) (302-210)

1	TB 50	1000 AMPS
---	-------	-----------

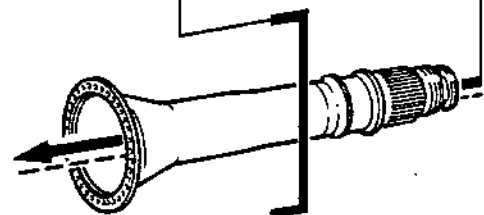


2	CF 350 AMPS
3	REPEAT 2 AT 90 DEGREES

ADJUSTING WASHER (303-10)

3	6400 AMPS PER METRE
4	REPEAT 3 TO GIVE FULL COVERAGE

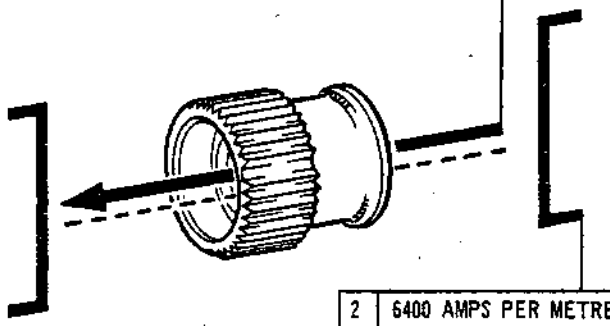
1	TB 38	1800 AMPS
2	TB 38	4500 AMPS



LONGITUDINAL MAGNETISATION MAY BE
ACHIEVED BY USE OF A SUITABLE COIL.
AS AN ALTERNATIVE TO STEP 3

LP COMPRESSOR DRIVE SHAFT (REAR) (303-120)

1	TB 19	900 AMPS
---	-------	----------

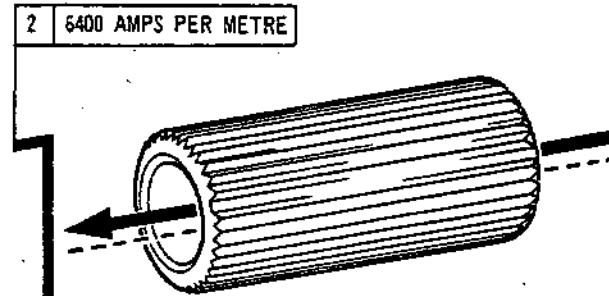


2	6400 AMPS PER METRE
---	---------------------

SERRATED SLEEVE (303-150)

2	6400 AMPS PER METRE
---	---------------------

1	TB 25	700 AMPS
---	-------	----------



LOCKING SLEEVE (303-160)

Crack Detection Test Diagram
Figure 301

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-31-04	Fig.1
303	72-31-04	Fig.2

Cross References to Illustrated Parts Catalogue
Table 303

CAUTION: THIS IS A ROTATING ASSEMBLY. ENSURE THAT ANY FREE OR CAPTIVE SELF-LOCKING NUTS (REGARDLESS OF SIZE) HAVE BEEN REPLACED BEFORE THE ASSEMBLY IS RELEASED FOR SERVICE (REF.72-09-00 INSPECTION/CHECK). FAILURE TO DO SO MAY RESULT IN ENGINE DAMAGE.

NOTE: Inspect all balancing bolts (302-50), balancing weights (302-20) or washers for general condition. Reject any damaged items; any attempt at repair will render them suspect for balancing purposes. Retain any undamaged items for possible selection and use during assembly.

4. Outer Sealing Ring (302-70)

- A. Carry Out Dimensional Check (Ref.72-31-04 Fits and Clearances F.C.S.602-161).

NOTE: Carry out this check in conjunction with the Inner Sealing Ring (Ref.72-33-02).

- B. Inspect Outer Sealing Ring.

- | | |
|---|----------------------|
| (1) Nicks, burrs and scores. | Accept after repair. |
| (2) Rubbing. | |
| (a) Not more than 0.005 in. (0,130 mm) over an arc not greater than 90 degrees. | Accept after repair. |
| (3) Wear. | |
| (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |

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5. Retaining Plate (302-100/180)

A. Inspect Retaining Plate.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.
- (3) Distortion.
 - (a) Any distortion. Reject.

6. Stiffening Disk Sub-assembly (302-190)

A. Carry Out Dimensional Checks (Ref 72-31-04 Fits and Clearances F.C.S. 601-75).

B. Inspect Stiffening Disks.

- (1) Nicks and burrs.
 - (a) Not more than 0.002 in. (0,050 mm) deep on the locating diameter faces. Accept after repair.
- (2) Distortion.
 - (a) Any distortion. Reject.
- (3) Wear.
 - (a) Not more than 0.005 in. (0,130 mm) of wear on the locating diameter faces. Accept.

C. Inspect Stiffening Disk Tube (Ref.72-09-00 Inspection/Check).

- (1) Wear.
 - (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

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- D. Inspect External Finish (Ref.72-09-04 Repair for Areas with External Finish and the Procedure for Application of Finish).

NOTE: To enable the crack detection (fluorescent dye) to be carried out, the high heat resisting aluminium enamel finish will have been removed during cleaning.

7. Carbon Bearings (302-200)

NOTE: These bearings are to be inspected in situ, carbon bearings that have been disassembled must be discarded.

A. Inspect Carbon Bearings.

(1) Cracks.

(a) Any sign of cracks. Reject.

(2) Scores.

(a) Not more than 0.010 in.
(0,250 mm) in depth. Accept providing 75 per cent of bearing surface is preserved.

(3) Dimension check.

(a) Within F.C.S. limits Accept.

NOTE: Make this check in conjunction with the LP Shaft signal tube assembly (303-190).

8. LP Compressor Drive Shaft Front (302-210)

A. Carry Out Dimensional Checks (Ref.72-31-04 Fits and Clearances).

- (1) Carry out "square" check (Ref.72-09-00 Inspection/Check) on locking sleeve locating serrations (F.C.S. 601-57) and rotor shaft rear locating serrations (F.C.S.601-64).

NOTE: Make these checks in conjunction with the Locking Sleeve (303-160) and LP Compressor Rotor Shaft Rear (Ref.72-31-03).

NOTE: This item contains 35 internal splines pitched as for 36, with one uncut at master spline and 47 external splines, pitched as for 48, with one removed at master slot.

(a) Any side of square out-side F.C.S. limits. Reject.



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(b) Within F.C.S. limits. Accept.

- (2) Check diameter of No.9A and 9B labyrinth seal fins (F.C.S.601-58/59).

NOTE: Make this check in conjunction with the Intermediate Case Static Seal Housing Ring (Ref.72-32-00).

(a) Within F.C.S. limits. Accept.

B. Inspect External Splines (Ref.72-09-00 Inspection/Check).

- (1) Nicks and burrs.

(a) Any nicks and burrs not more than 0.003 in. (0,080 mm) in depth and which are located in the lower 50 per cent of any spline. Accept.

(b) Nicks and burrs not more than 0.010 in. (0,250 mm) in depth which are not located in the lower 50 per cent of any spline. Accept after repair providing F.C.S. limits are preserved.

- (2) Wear.

(a) Light witness marks. Accept.

(b) Not more than 0.002 in. (0,050 mm) difference in the width of the spline crests between the front or rear ends of the spline and the mid-point of the spline. Accept.

C. Inspect Internal Splines (Ref.72-09-00 Inspection/Check).

- (1) Nicks and burrs.

(a) Not more than 0.005 in. (0,130 mm) in depth. Accept after repair providing F.C.S. limits are preserved.

D. Inspect Centre Spherical Mounting Locating Lugs.

- (1) Nicks and burrs.

(a) Not more than 0.005 in. (0,130 mm) in depth. Accept after repair.

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(2) Wear.

- (a) Not more than 0.002 in.
(0,050 mm) in depth on
the Spherical Centre
Mounting bearing surfaces.

Accept after
repair.

E. Inspect No.9a and 9b Labyrinth Seal.

(1) Rubbing.

- (a) Slight rubbing within
F.C.S. limits.

Accept.

(2) Nicks and burrs.

Accept after
repair.

(3) Minor edge damage.

Accept after repair
providing that only
one blend is made
to each fin, that
finished blends are
not more than one-
half fin depth deep
or five times fin
depth long, that
all blends on
adjacent blades are
separated radially
by not less than
five times fin
depth at their
ends, and that
F.C.S. limits are
not violated.

NOTE: Greater damage will require repair (Ref.
72-31-04 Repair No.1).

F. Inspect Outer Sealing Ring Locating Dogs.

(1) Nicks and burrs.

- (a) Not more than 0.010 in.
(0,250 mm) deep.

Accept after
repair.

(2) Bending.

Accept after repair
providing repair
does not induce
cracking.

G. Inspect Rear Abutment Flange.

(1) Nicks and burrs.

Accept after
repair.

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(2) Scores.

- | | | |
|-----|---|-------------------------|
| (a) | Not more than 0.005 in.
(0,130 mm) in depth. | Accept after
repair. |
|-----|---|-------------------------|

(3) Wear.

- | | | |
|-----|-----------------------------------|---------|
| (a) | Minor witness of even
wear. | Accept. |
| (b) | Any elongation of bolt-
holes. | Reject. |

(4) Corrosion.

NOTE: For corrosion definitions refer to
Chapter 72-09-00.

- | | | |
|-----|--|---|
| (a) | Superficial. | Accept. |
| (b) | Light surface. | Accept. |
| (c) | Isolated pitting
up to 0.005 in.
(0,130 mm) in depth. | Accept. |
| (d) | Coalesced pitting
up to 0.005 in.
(0,130 mm) in depth. | Accept up to 20%
of surface affected
(surface to be
refurbished with
Scotchbrite.
Corrosion to be
neutralised using
Process H,
ref.72-09-00
cleaning). |

H. Inspect Flange Bolt Holes.

(1) Corrosion.

NOTE: For corrosion definitions refer to
Chapter 72-09-00.

- | | | |
|-----|----------------|---------|
| (a) | Superficial. | Accept. |
| (b) | Light surface. | Accept. |

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- (c) Isolated pitting
up to 0.005 in.
(0,130 mm) in depth.

Accept.

- (d) Coalesced pitting
up to 0.005 in.
(0,130 mm) in depth.

Accept up to 50%
of surface affected
(surface to be
refurbished with
Scotchbrite.
Corrosion to be
neutralised using
Process H,
ref.72-09-00
Cleaning).

(2) Scoring.

- (1) Scoring up to
0.005 in. (0,130 mm)
in depth.

Accept. (Raised
material to be
removed using fine
emery. No dimen-
sional change
permitted).

J. Inspect Assembly Support Flange.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Any wear on assembly
support flange spigot.

Reject.

K. Inspect LP Shaft General Areas.

- (1) Corrosion.

NOTE: For corrosion definitions refer to
Chapter 72-09-00.

- (a) Superficial.

Accept.

- (b) Light surface.

Accept.

- (c) Isolated pitting
up to 0.005 in.
(0,130 mm) in depth.

Refer to Rolls-
Royce.

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sneema

- (d) Coalesced pitting
up to 0.005 in.
(0,130 mm) in depth.

Refer to Rolls-
Royce.

L. Inspect LP shaft D - Trap Locations.

(1) Indentation.

- (a) Indentation up to
0.010 in. (0,25 mm)
in depth.

Accept. (Raised
material and sharp
edges to be
removed).

M. Inspect LP Shaft Signal Tube Seal Location.

NOTE: The Sleeve (302-220), an integral part of the
LP Compressor Drive Shaft, is assembled on
manufacture and originally provides a sealing for
the seals on the LP Shaft Signal Tube (303-190).
A seal at this location is now redundant.

(1) Security of sleeve (302-220).

- (a) Sleeve secure in LP
Drive Shaft.

Accept.

N. Inspect External Finish (Ref.72-09-04 Repair for Areas
with External Finish and the Procedure for Application
of Finish).

NOTE: To enable the crack detection (magnetic particle)
to be carried out, the high heat resisting
aluminium enamel finish will have been removed
during cleaning.

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sneema

10. Adjusting Washer (303-10 to 105)

NOTE: This item may require selection during assembly.

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores.

Accept provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

- (2) Fretting and wear.

Reject.

11. LP Compressor Drive Shaft Rear (303-120)

A. Carry Out Dimensional Checks (Ref.72-31-04 Fits and Clearances).

- (1) Check sleeve locating bore (F.C.S.601-148) and outer guide locating bore (F.C.S.601-157).

NOTE: Make these checks in conjunction with the Sleeve (303-170) and the LP Shaft Signal Generating Outer Guide (Ref.72-31-05).

- (a) Within F.C.S. limits.

Accept.

- (2) Check the LP turbine hub and centering ring location diameters (F.C.S.601-216/214).

NOTE: Make these checks in conjunction with the LP Turbine Hub and Centering Ring (Ref.72-52-02).

- (a) Within F.C.S. limits.

Accept.

- (3) Carry out "square" checks (Ref.72-09-00 Inspection/Check) on LP signal mechanism outer sleeve and LP hub unit locating serrations (F.C.S.601-155/220).

NOTE: Make these checks in conjunction with the LP Shaft Signal Outer Guide (Ref.72-31-05) and the LP Turbine Rotor Hub (Ref.72-52-02).

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NOTE: Hub location has 59 external splines, pitched as for 60, with one uncut at master spline. Guide location has 40 external serrations, equi-spaced.

- (a) Any side of square outside F.C.S. limits. Reject
- (b) Within F.C.S. limits. Accept.

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect External Splines (Ref.72-09-00 Inspection/Check).

(1) Nicks and burrs.

- (a) Not more than 0.002 in. (0,050 mm) in depth. Accept after repair providing F.C.S. limits are not violated.

(2) Wear.

- (a) Not more than 0.002 in. (0,050 mm) above or below the machined witness face. Accept after repair providing F.C.S. limits are not violated.

D. Inspect Internal Splines (Ref.72-09-00 Inspection/Check).

(1) Nicks and burrs.

- (a) Not more than 0.002 in. (0,050 mm) in depth. Accept after repair providing F.C.S. limits are not violated.

(2) Wear.

- (a) Not more than 0.002 in. (0,050 mm) above or below the machined witness face. Accept after repair providing F.C.S. limits are not violated.

E. Inspect Abutment Face.

(1) Peripheral nicks and burrs.

Accept after repair.

(2) Scores.

- (a) Not more than 0.005 in. (0,130 mm) deep.

Accept after repair.

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(3) Wear.

- | | |
|-----------------------------------|---------|
| (a) Minor witness of even wear. | Accept. |
| (b) Any elongation of bolt-holes. | Reject. |

(4) Corrosion.

NOTE: For corrosion definitions refer to Chapter 72-09-00.

- | | |
|--|--|
| (a) Superficial. | Accept. |
| (b) Light surface. | Accept. |
| (c) Isolated pitting up to 0.005 in. (0,130 mm) in depth. | Accept. |
| (d) Coalesced pitting up to 0.005 in. (0,130 mm) in depth. | Accept up to 20% of surface affected (surface to be refurbished with Scotchbrite. Corrosion to be neutralised using Process H, ref.72-09-00 Cleaning). |

F. Inspect Flange Bolt Holes.

(1) Corrosion.

NOTE: For corrosion definitions refer to Chapter 72-09-00.

- | | |
|---|---------|
| (a) Superficial. | Accept. |
| (b) Light surface. | Accept. |
| (c) Isolated pitting up to 0.005 in. (0,130 mm) in depth. | Accept. |

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- (d) Coalesced pitting
up to 0.005 in.
(0,130 mm) in depth.

Accept up to 50%
of surface affected
(surface to be
refurbished with
Scotchbrite.
Corrosion to be
neutralised using
Process H,
ref.72-09-00
Cleaning).

(2) Scoring.

- (1) Scoring up to
0.005 in. (0,130 mm)
in depth.

Accept. (Raised
material to be
removed using fine
emery. No dimen-
sional change
permitted).

G. Inspect Turbine Adjusting Washer Flange.

(1) Nicks and burrs.

- (a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair.

(2) Wear.

- (a) Any signs of wear.

Investigate causes
of wear.

H. Inspect LP Shaft General Areas.

(1) Corrosion.

NOTE: For corrosion definitions refer to
Chapter 72-09-00.

- (a) Superficial.
(b) Light surface.
(c) Isolated pitting
up to 0.005 in.
(0,130 mm) in depth.
(d) Coalesced pitting
up to 0.005 in.
(0,130 mm) in depth.

Accept.
Accept.
Refer to Rolls-
Royce.
Refer to Rolls-
Royce.

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- J. Inspect External Finish (Ref.72-09-04 Repair for Areas with External Finish and the Procedure for Application of Finish).

NOTE: To enable the crack detection (magnetic particle) to be carried out, the high heat resisting aluminium enamel finish will have been removed during cleaning.

12. Screwed Plug (303-130)

- A. Inspect Threads (Ref.72-09-00 Inspection/Check).

- B. Inspect Plug.

(1) Nicks and burrs.

(a) Not more than 0.010 in.
(0,250 mm) deep.

Accept after
repair.

13. Locking Washer (303-140)

- A. Inspect Locking Washer (Ref.72-09-00 Inspection/Check).

14. Serrated Sleeve (303-150)

- A. Carry Out Dimensional Checks (Ref.72-31-04 Fits and Clearances).

(1) Carry out "square" check (Ref.72-09-00 Inspection/Check) on sleeve housing location serrations (F.C.S. 601-53).

NOTE: Make this check in conjunction with the Sleeve Housing (Ref.72-31-03).

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sneema

(b) Within F.C.S. limits. Accept.

(2) Check diameter of No.9A and 9B labyrinth seal fins (F.C.S.601-58/59).

NOTE: Make this check in conjunction with the Intermediate Case Static Seal Housing Ring (Ref.72-32-00).

(a) Within F.C.S. limits. Accept.

B. Inspect External Splines (Ref.72-09-00 Inspection/Check).

CAUTION: THE DRIVESHAFT EXTERNAL SPLINE IS A CRITICAL AREA. (REF. FIG.304). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

(1) Nicks and burrs.

(a) Any nicks and burrs not more than 0.003 in. (0,080 mm) in depth and which are located in the lower 50 per cent of any spline. Accept.

(b) Nicks and burrs not more than 0.010 in. (0,250 mm) in depth which are not located in the lower 50 per cent of any spline. Accept after repair providing F.C.S. limits are preserved.

(2) Wear.

(a) Light witness marks. Accept.

(b) Not more than 0.002 in. (0,050 mm) difference in the width of the spline crests between the front or rear ends of the spline and the mid-point of the spline. Accept.

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C. Inspect Internal Splines (Ref.72-09-00 Inspection/Check).

(1) Nicks and burrs.

- (a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair
providing F.C.S.
limits are
preserved.

D. Inspect Centre Spherical Mounting Locating Lugs.

(1) Nicks and burrs.

- (a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair.

(2) Wear.

- (a) Not more than 0.002 in.
(0,050 mm) in depth on
the Spherical Centre
Mounting bearing surfaces.

Accept after
repair.

E. Inspect No.9a and 9b Labyrinth Seal.

(1) Rubbing.

- (a) Slight rubbing within
F.C.S. limits.

Accept.

(2) Nicks and burrs.

Accept after
repair.

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(3) Minor edge damage.

Accept after repair providing that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that all blends on adjacent blades are separated radially by not less than five times fin depth at their ends, and that F.C.S. limits are not violated.

NOTE: Greater damage will require repair (Ref. 72-31-04 Repair No.1).

F. Inspect Outer Sealing Ring Locating Dogs.

(1) Nicks and burrs.

(a) Not more than 0.010 in.
(0,250 mm) deep.

Accept after repair.

(2) Bending.

Accept after repair providing repair does not induce cracking.

G. Inspect Rear Abutment Flange.

CAUTION: THE DRIVESHAFT REAR FLANGE FILLET RADIUS IS A CRITICAL AREA. (REF. FIG.304). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION. REFER TO PARAGRAPH 8.L.(1) FOR DEE HEAD BOLT LOCATION DAMAGE ACCEPTANCE LIMIT.

(1) Nicks and burrs.

Accept after repair.

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(2) Scores.

- | | |
|---|-------------------------|
| (a) Not more than 0.005 in.
(0,130 mm) in depth. | Accept after
repair. |
|---|-------------------------|

(3) Wear.

- | | |
|------------------------------------|---------|
| (a) Minor witness of even
wear. | Accept. |
| (b) Any elongation of boltholes. | Reject. |

(4) Corrosion.

NOTE: For corrosion definitions refer to
Chapter 72-09-00.

- | | |
|--|---|
| (a) Superficial. | Accept. |
| (b) Light surface. | Accept. |
| (c) Isolated pitting
up to 0.005 in.
(0,130 mm) in depth. | Accept. |
| (d) Coalesced pitting
up to 0.005 in.
(0,130 mm) in depth. | Accept up to 20%
of surface affected
(surface to be
refurbished with
Scotchbrite.
Corrosion to be
neutralised using
Process H,
ref.72-09-00
cleaning). |

H. Inspect Flange Bolt Holes.

CAUTION: THE DRIVESHAFT REAR FLANGE BOLT HOLE BORE IS A
CRITICAL AREA. (REF. FIG.304). SPECIAL
ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS
OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

(1) Corrosion.

NOTE: For corrosion definitions refer to
Chapter 72-09-00.

- | | |
|--------------------|---------|
| (a) Superficial. | Accept. |
| (b) Light surface. | Accept. |

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- (c) Isolated pitting up to 0.005 in. (0,130 mm) in depth. Accept.
- (d) Coalesced pitting up to 0.005 in. (0,130 mm) in depth. Accept up to 50% of surface affected (surface to be refurbished with Scotchbrite. Corrosion to be neutralised using Process H, ref.72-09-00 Cleaning).

(2) Scoring.

- (1) Scoring up to 0.005 in. (0,130 mm) in depth. Accept. (Raised material to be removed using fine emery. No dimensional change permitted).

J. Inspect Assembly Support Flange.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Any wear on assembly support flange spigot. Reject.

K. Inspect LP Shaft General Areas.

(1) Corrosion.

NOTE: For corrosion definitions refer to Chapter 72-09-00.

- (a) Superficial. Accept.
- (b) Light surface. Accept.
- (c) Isolated pitting up to 0.005 in. (0,130 mm) in depth. Refer to Rolls-Royce.

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NOTE: Hub location has 59 external splines, pitched as for 60, with one uncut at master spline. Guide location has 40 external serrations, equi-spaced.

- | | |
|--|---------|
| (a) Any side of square out-side F.C.S. limits. | Reject |
| (b) Within F.C.S. limits. | Accept. |

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect External Splines (Ref.72-09-00 Inspection/Check).

CAUTION: THE DRIVESHAFT EXTERNAL SPLINE IS A CRITICAL AREA. (REF. FIG.305). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

(1) Nicks and burrs.

- | | |
|--|---|
| (a) Not more than 0.002 in. (0,050 mm) in depth. | Accept after repair providing F.C.S. limits are not violated. |
|--|---|

(2) Wear.

- | | |
|--|---|
| (a) Not more than 0.002 in. (0,050 mm) above or below the machined witness face. | Accept after repair providing F.C.S. limits are not violated. |
|--|---|

D. Inspect Internal Splines (Ref.72-09-00 Inspection/Check).

(1) Nicks and burrs.

- | | |
|--|---|
| (a) Not more than 0.002 in. (0,050 mm) in depth. | Accept after repair providing F.C.S. limits are not violated. |
|--|---|

(2) Wear.

- | | |
|--|---|
| (a) Not more than 0.002 in. (0,050 mm) above or below the machined witness face. | Accept after repair providing F.C.S. limits are not violated. |
|--|---|

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E. Inspect Abutment Face.

- | | | |
|-----|---|----------------------|
| (1) | Peripheral nicks and burrs. | Accept after repair. |
| (2) | Scores. | |
| | (a) Not more than 0.005 in.
(0,130 mm) deep. | Accept after repair. |
| (3) | Wear. | |
| | (a) Minor witness of even wear. | Accept. |
| | (b) Any elongation of bolt-holes. | Reject. |
| (4) | Corrosion. | |

NOTE: For corrosion definitions refer to Chapter 72-09-00.

- | | | |
|-----|--|---|
| (a) | Superficial. | Accept. |
| (b) | Light surface. | Accept. |
| (c) | Isolated pitting
up to 0.005 in.
(0,130 mm) in depth. | Accept. |
| (d) | Coalesced pitting
up to 0.005 in.
(0,130 mm) in depth. | Accept up to 20%
of surface affected
(surface to be
refurbished with
Scotchbrite.
Corrosion to be
neutralised using
Process H,
ref.72-09-00
Cleaning). |

F. Inspect Flange Bolt Holes.

CAUTION: THE DRIVESHAFT BOLT HOLE BORE IS A CRITICAL AREA. (REF. FIG.305). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

- (1) Corrosion.

NOTE: For corrosion definitions refer to Chapter 72-09-00.

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- | | |
|--|---|
| (a) Superficial. | Accept. |
| (b) Light surface. | Accept. |
| (c) Isolated pitting
up to 0.005 in.
(0,130 mm) in depth. | Accept. |
| (d) Coalesced pitting
up to 0.005 in.
(0,130 mm) in depth. | Accept up to 50%
of surface affected
(surface to be
refurbished with
Scotchbrite.
Corrosion to be
neutralised using
Process H,
ref.72-09-00
Cleaning). |

(2) Scoring.

- | | |
|--|---|
| (1) Scoring up to
0.005 in. (0,130 mm)
in depth. | Accept. (Raised
material to be
removed using fine
emery. No dimen-
sional change
permitted). |
|--|---|

G. Inspect Turbine Adjusting Washer Flange.

(1) Nicks and burrs.

- | | |
|---|-------------------------|
| (a) Not more than 0.005 in.
(0,130 mm) in depth. | Accept after
repair. |
|---|-------------------------|

(2) Wear.

- | | |
|------------------------|--------------------------------|
| (a) Any signs of wear. | Investigate causes
of wear. |
|------------------------|--------------------------------|

H. Inspect LP Shaft General Areas.

(1) Corrosion.

NOTE: For corrosion definitions refer to
Chapter 72-09-00.

- | | |
|------------------|---------|
| (a) Superficial. | Accept. |
|------------------|---------|

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- (b) Light surface. Accept.
 - (c) Isolated pitting up to 0.005 in. Refer to Rolls-Royce.
(0,130 mm) in depth.
 - (d) Coalesced pitting up to 0.005 in. Refer to Rolls-Royce.
(0,130 mm) in depth.
- J. Inspect External Finish (Ref.72-09-04 Repair for Areas with External Finish and the Procedure for Application of Finish).

NOTE: To enable the crack detection (magnetic particle) to be carried out, the high heat resisting aluminium enamel finish will have been removed during cleaning.

12. Screwed Plug (303-130)

- A. Inspect Threads (Ref.72-09-00 Inspection/Check).
- B. Inspect Plug.
 - (1) Nicks and burrs.

- (a) Not more than 0.010 in. Accept after
(0,250 mm) deep. repair.

13. Locking Washer (303-140)

- A. Inspect Locking Washer (Ref.72-09-00 Inspection/Check).

14. Serrated Sleeve (303-150)

- A. Carry Out Dimensional Checks (Ref.72-31-04 Fits and Clearances).
 - (1) Carry out "square" check (Ref.72-09-00 Inspection/Check) on sleeve housing location serrations (F.C.S. 601-53).

NOTE: Make this check in conjunction with the Sleeve Housing (Ref.72-31-03).

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NOTE: This item has 35 external splines pitched as for 36, with one removed at master slot.

(a) Any side of square outside F.C.S. limits. Reject.

(b) Within F.C.S. limits. Accept.

(2) Check backlash of internal serrations with LP shaft signal tube (F.C.S.601-54).

NOTE: Make this check in conjunction with the LP Shaft Signal Tube (para.17).

NOTE: This a compatibility check. Do not reject sleeve unless backlash check is unsuccessful on a series of shafts.

(a) Within F.C.S. limits. Accept.

B. Inspect Splines (Ref.72-09-00 Inspection/Check).

(1) Nicks and burrs.

(a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.

(2) Fretting.

(a) Not more than 0.002 in. (0,050 mm) above and below the machine witness face. Accept after repair providing F.C.S. limits are not violated.

C. Inspect Locking Washer Bore.

(1) Nicks and burrs.

(a) Not more than 0.002 in. (0,050 mm) deep. Accept after repair.

D. Inspect Locking Sleeve Abutment Face.

(1) Nicks and burrs.

(a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.

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15. Locking Sleeve (303-160)

A. Carry Out Dimensional Checks (Ref.72-31-04 Fits and Clearances).

- (1) Check bore dimensions at LP signal tube locations (F.C.S.601-56).

NOTE: Make this check in conjunction with the LP Shaft Signal Tube (para.17).

(a) Within F.C.S. limits. Accept.

- (2) Carry out "square" check (Ref.72-09-00 Inspection/Check) on splines at spherical mounting and LP drive shaft locations (F.C.S.601-55/57).

NOTE: Make these checks in conjunction with the Centre Spherical Mounting (Ref.72-31-03) and the LP Compressor Drive Shaft Front (para.8).

NOTE: This item has 35 external splines pitched as for 36, with one removed at master slot.

(a) Any side of square outside F.C.S. limits. Reject.

(b) Within F.C.S. limits. Accept.

B. Inspect Splines (Ref.72-09-00 Inspection/Check).

- (1) Nicks and burrs.

(a) Not more than 0.005 in. (0,130 mm) in depth. Accept after repair providing F.C.S. limits are not violated.

- (2) Fretting.

(a) Not more than 0.002 in. (0,050 mm) above and below the machine witness face. Accept after repair providing F.C.S. limits are not violated.

C. Inspect Abutment Faces.

- (1) Scores.

(a) Not more than 0.005 in. (0,130 mm) in depth. Accept after repair.

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D. Inspect Locking Sleeve Bore.

(1) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

16. Sleeve (303-170)

A. Carry out Dimensional Checks (Ref.72-31-04 Fits and Clearances).

- (1) Check drive shaft location diameter (F.C.S.601-148).

NOTE: Make this check in conjunction with the LP
Compressor Drive Shaft Rear (para.11).

- (a) Within F.C.S. limits. Accept.

B. Inspect Sleeve.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Not more than 0.002 in.
(0,050 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

17. LP Shaft Signal Tube Assembly (303-190)

A. Carry Out Dimensional Checks (Ref.72-31-04 Fits and Clearances).

- (1) Check serrated sleeve backlash at location serrations
(F.C.S.601-54).

NOTE: Make this check in conjunction with the
Serrated Sleeve (303-150).

NOTE: This is a compatibility check. Do not reject
unless backlash check is unsuccessful with a
series of serrated sleeves.

- (a) Within F.C.S. limits. Accept.

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- (2) Check seal ring groove width (F.C.S.601-147) and seal ring installed gap (F.C.S.601-160).

NOTE: Make these checks with a new or F.C.S. checked seal ring (303-180).

- (a) Within F.C.S. limits. Accept.

- (3) Check the following location diameters and bore:

Location	F.C.S. Ref.
Locking sleeve dia (para.15)	601-56
Inner guide dia (72-31-05)	601-149/151
Locking piece bore (72-31-05)	601-154
Adjusting washer dia (72-31-05)	601-159
Carbon bearings location dia (para.7)	601-75

NOTE: Make these checks in conjunction with the relevant items.

- (a) Within F.C.S. limits. Accept.

- (4) Carry out "square" check (Ref.72-09-00 Inspection/Check) on inner guide locating splines (F.C.S.601-150).

NOTE: Make this check in conjunction with the LP Signal Mechanism Inner Guide (Ref.72-31-05).

NOTE: This item has 24 equi-spaced external splines. Take dimensions at centre line of spline crests.

B. Inspect Splines (Ref.72-00-00 Inspection/Check).

- (1) Nicks and burrs.

- (a) Not more than 0.005 in.
(0,130 mm) in depth. Accept after repair providing F.C.S. limits are not violated.

- (2) Fretting.

- (a) Not more than 0.002 in.
(0,050 mm) above and below the machine witness face. Accept after repair providing F.C.S. limits are not violated.

C. Inspect Threads (Ref.72-09-00 Inspection/Check).

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D. Inspect Sealing Ring Grooves.

- (1) Nicks and burrs.

Accept after
repair.

E. Inspect Signal Tube.

- (1) Distortion.

- (a) Any longitudinal
distortion.

Reject.

- (2) Nicks and burrs.

- (a) Small nicks and burrs.

Accept after
repair.

F. Inspect Locking Sleeve Location.

- (1) Wear.

- (a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair.

- (2) Nicks and burrs.

Accept after
repair.

G. Inspect Collar at Rear End of Signal Tube.

- (1) Nicks and burrs.

Accept after
repair.

18. Seal Ring (303-180 - not illustrated)

NOTE: This item is replaceable at overhaul. If engine is removed prematurely, seal may be re-used provided normal overhaul life will not be exceeded and Inspection and F.C.S. checks are satisfactory.

A. Carry out Dimensional Checks (Ref.72-31-04 Fits and Clearances).

- (1) Check seal ring width and gap in position (F.C.S. 601-147/160).

NOTE: Make these checks in conjunction with the LP Signal Shaft (para.17) and the Sleeve (para.16).

- (a) Within F.C.S. limits.

Accept.

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B. Check Seal Ring Free Gap.

- (1) Check free gap approximately
0.100 in. (2,540 mm).

Accept, subject
to A.

C. Inspect Seal Ring.

- (1) Surface finish.

- (a) Four outer diameters
and three inner bores,
smooth and light-tight.

Accept.

- (b) End faces smooth, with
no stepped wear.

Accept.

- (2) Overheating, burning or
distortion.

Reject.

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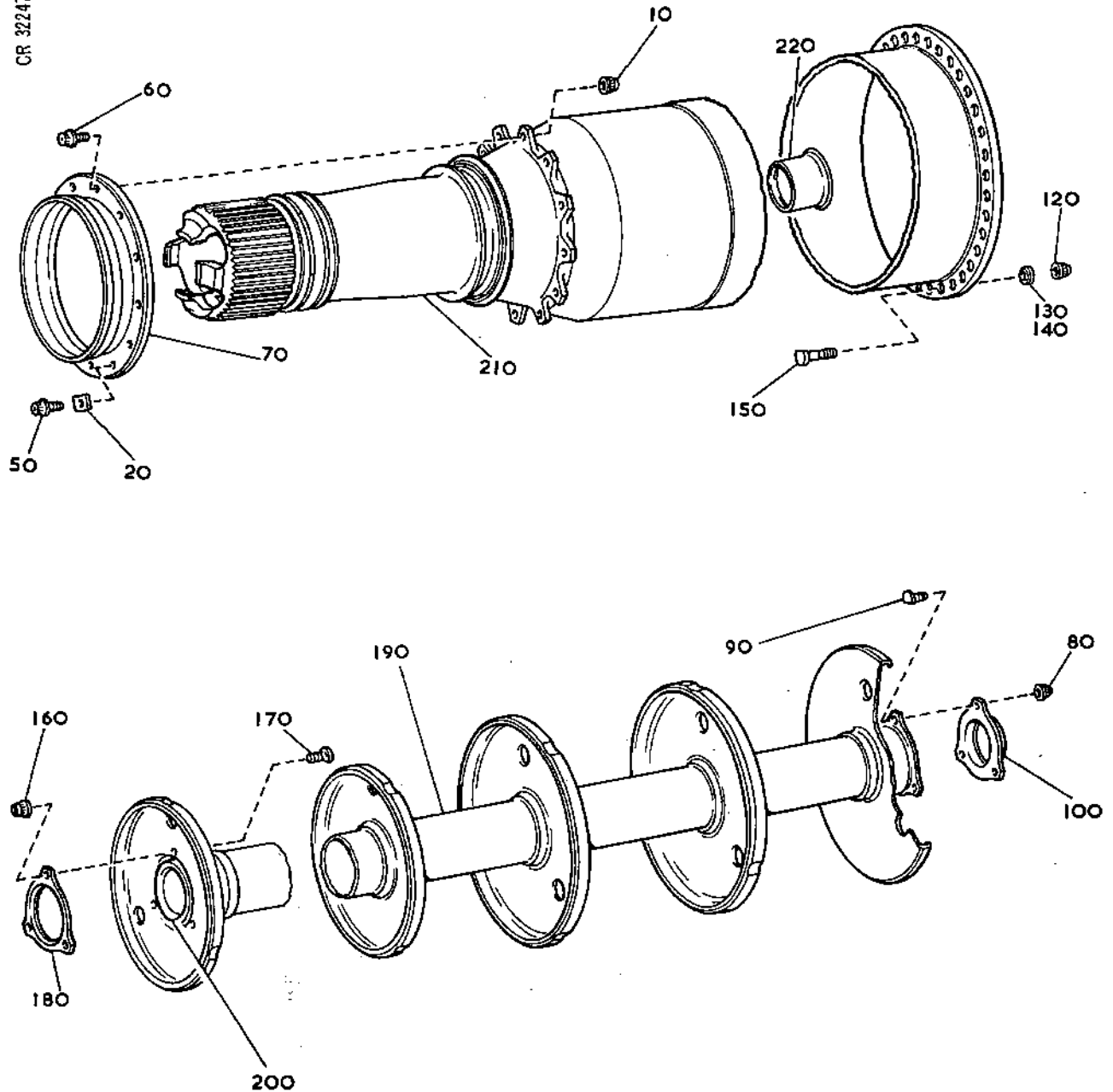


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LP Compressor Driving Shaft, Front
Figure 302

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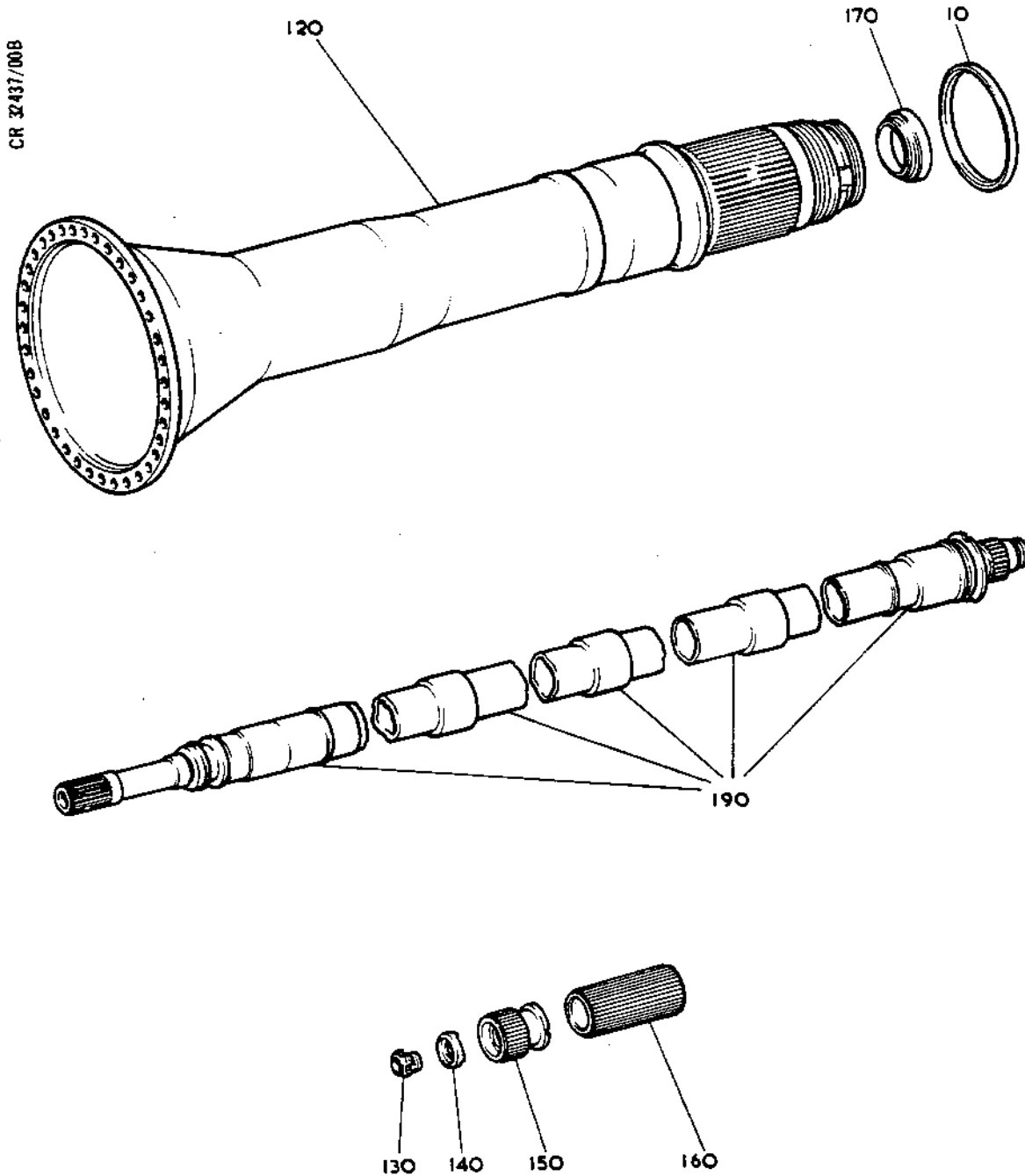
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LP Compressor Driving Shaft, Rear
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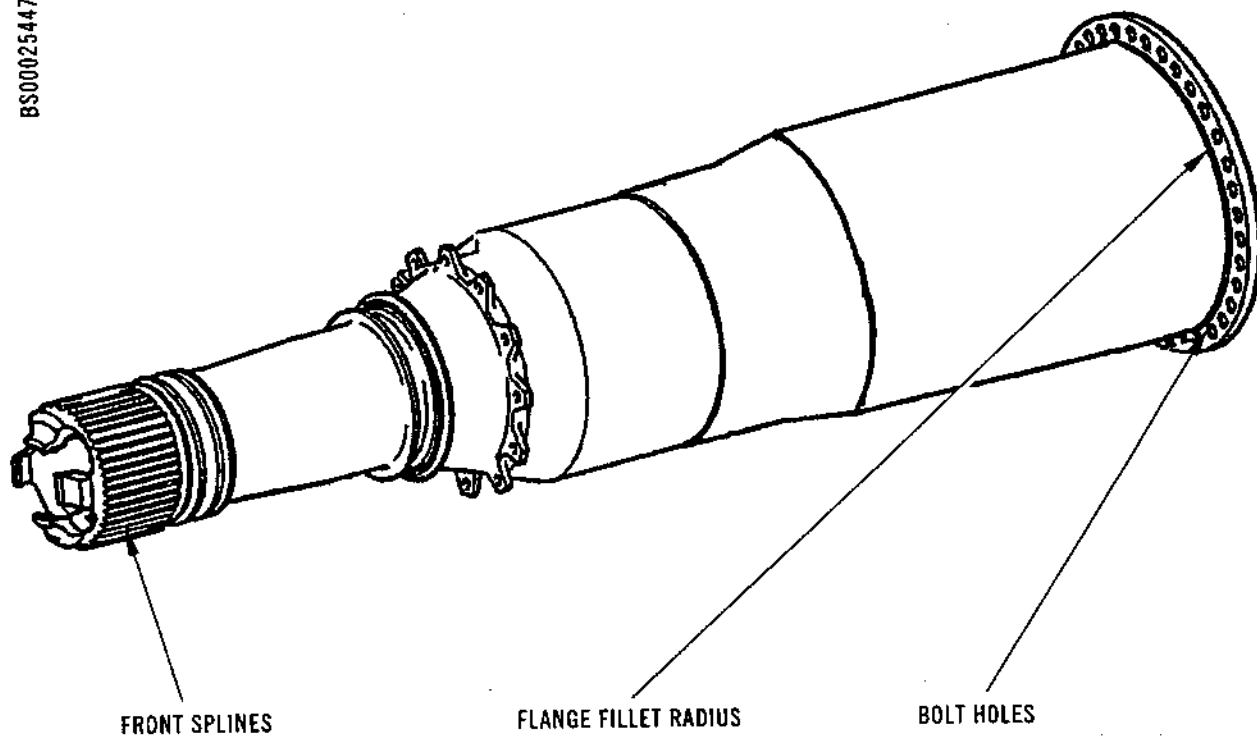
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LP Compressor Driving Shaft, Front -
Inspection Critical Areas
Figure 304

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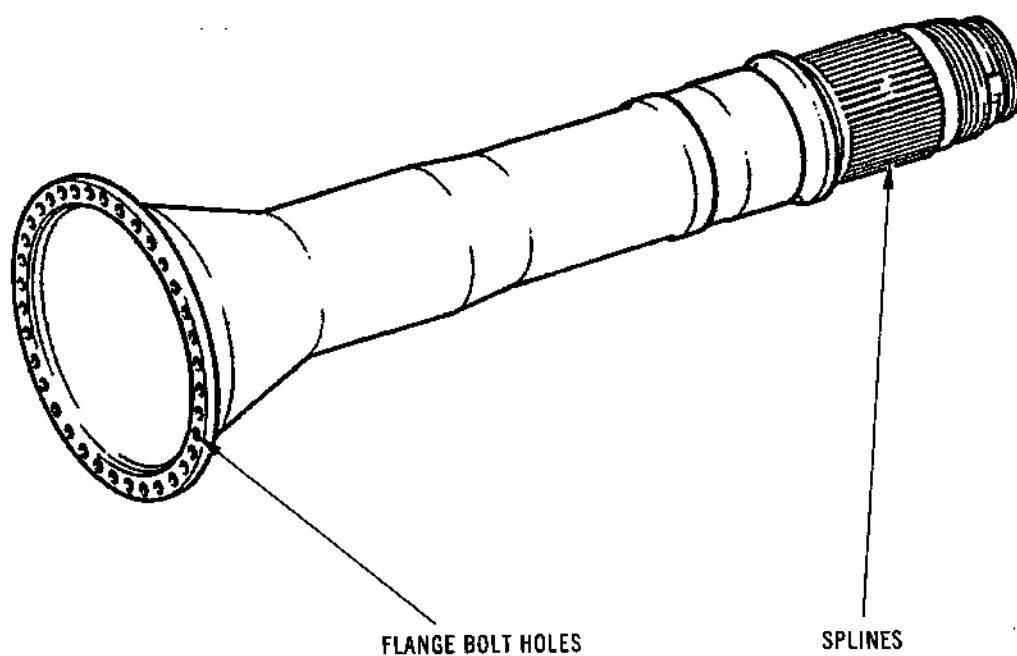
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LP Compressor Driving Shaft, Rear -
Inspection Critical Areas
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LP SHAFT SIGNAL GENERATING MECHANISM -
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LP SHAFT SIGNAL SYSTEM GENERATING MECHANISM - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	50	Helical Splined Nut	MP1
302	60	Inner Guide	MP1
302	70	Retaining Nut	MP1
302	90	Outer Guide	MP1
302	100	Adjusting Washer	MP1

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	10	Retaining Nut	FlA
302	30	Locking Piece	FlA
302	40	Round Plain Nut	FlA
302	80	Keywasher	FlA

Items to be Fluorescent Dye Crack Tested
Table 302

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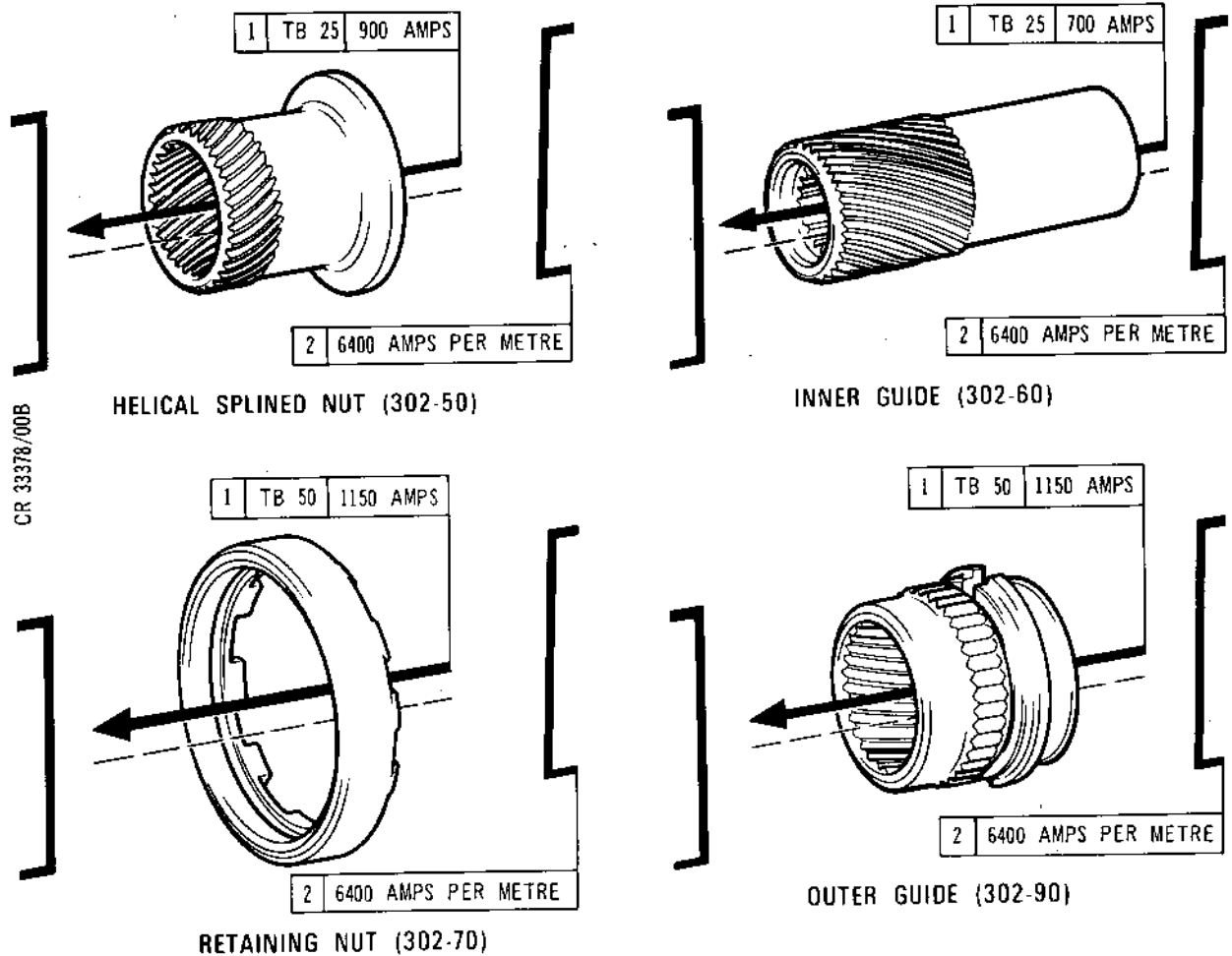
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Crack Detection Test Diagram
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FIG.NO. ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-31-05	Fig.1

Cross References to Illustrated Parts Catalogue
Table 303

4. Retaining Nut (302-10)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Keywasher Locking Slots.

(1) Damage.

Accept after repair
if slot profile is
restored.

C. Inspect Silver Plating.

(1) Damage or wear.

Reject for re-
plating (Ref.
72-09-08, Repair).

5. Keywasher (302-20) - Not Illustrated

A. Inspect Washer (Ref.72-09-00 Inspection/Check - Cupwashers).

B. Inspect Locating Keys.

NOTE: Make this check in conjunction with the Locking
Piece (302-30).

(1) Damage.

Accept after repair
if still compatible
with locations in
locking piece.

6. Locking Piece (302-30)

A. Inspect Splines.

(1) Nicks and burrs.

Accept, if repair
does not violate
F.C.S. limits.

(2) Wear and fretting.

(a) Smooth, even wear
and fretting.

Accept after repair
if F.C.S. limits
are not violated.

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B. Inspect Signal Tube Location Diameter.

NOTE: Make this check in conjunction with the LP Shaft Signal Tube (Ref.72-31-04).

- (1) Nicks, burrs and scores.

Accept, if repair preserves compatibility with tube and F.C.S. limits are not violated.

C. Inspect Locating Dogs.

NOTE: Make this check in conjunction with the Plain Round Nut (302-40).

- (1) Damage.

Accept, if repair preserves compatibility with nut.

D. Inspect Keywasher Locating Slots.

NOTE: Make this check in conjunction with the Keywasher (302-20).

- (1) Damage.

Accept after repair if still compatible with keywasher.

E. Carry Out Dimensional Checks (Ref.72-31-05 Fits and Clearances).

- (1) Check signal tube locating diameter (F.C.S.601-154).

NOTE: Make this check in conjunction with LP Shaft Signal Tube (Ref.72-31-05).

- (a) Within F.C.S. limits.

Accept.

- (2) Check backlash of splines in Inner Guide (F.C.S.601-153).

NOTE: Make this check in conjunction with the Inner Guide (302-60).

- (a) Within F.C.S. limits.

Accept.

7. Plain Round Nut (302-40)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

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B. Inspect Locking Piece Location Dogs.

NOTE: Make this check in conjunction with the
Locking Piece (302-30).

(1) Damage.

Accept, if repair
preserves compat-
ibility with
locking piece.

C. Inspect Silver Plating.

(1) Damage or wear.

Reject for re-
plating (Ref.
72-09-08, Repair).

8. Helical Splined Nut (302-50)

A. Inspect Helical and External Splines (Ref.72-09-00
Standard Practices).

(1) Nicks and burrs.

Accept, if repair
does not violate
F.C.S. limits.

(2) Wear and fretting.

(a) Smooth, even wear
and fretting.

Accept after repair
if F.C.S. limits
are not violated.

B. Inspect Inner Guide Location Bore.

(1) Damage.

Accept after repair
if F.C.S. limits
are not violated.

C. Inspect Actuating Arm Abutment Face.

(1) Wear and fretting.

(a) Any witness of contact
by actuating arm.

Reject and
investigate cause.

D. Carry Out Dimensional Checks (Ref.72-31-05 Fits and
Clearances).

(1) Check locating bore (F.C.S.601-152).

NOTE: Make this check in conjunction with the Inner
Guide (302-60).

(a) Within F.C.S. limits.

Accept.

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- (2) Check backlash of splines with inner and outer guides (F.C.S.601-156 and 158).

NOTE: Make this check in conjunction with the Inner and Outer Guides (302-60/90).

- (a) Within F.C.S. limits. Accept after repair.

9. Inner Guide (302-60)

A. Inspect Helical and Internal Splines (Ref.72-09-00 Inspection/Check).

- (1) Nicks and burrs. Accept, if repair does not violate F.C.S. limits.

(2) Wear and fretting.

- (a) Smooth, even wear and fretting. Accept after repair if F.C.S. limits are not violated.

B. Inspect Helical Splined Nut Location.

- (1) Nicks and burrs. Accept, if repair does not violate F.C.S. limits.

(2) Wear and fretting.

- (a) Any stepped wear or fretting. Reject.

- (b) Light witness mark, within F.C.S. limits. Accept.

C. Inspect Threads (Ref.72-09-00 Inspection/Check).

D. Inspect Signal Tube Location Bores.

- (1) Damage. Accept after repair if F.C.S. limits are not violated.

E. Inspect Adjusting Washer Abutment Face.

- (1) Nicks, burrs and scores.

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- (a) Not more than 0.005 in.
(0,130 mm).

Accept after repair
if surface flatness
and squareness are
preserved.

F. Carry Out Dimensional Checks (Ref.72-31-05 Fits and Clearances).

- (1) Check both signal tube location bores (F.C.S.601-149/151).

NOTE: Make this check in conjunction with the LP
Shaft Signal Tube (Ref.72-31-05).

- (a) Within F.C.S. limits. Accept.

- (2) Check helical splined nut location diameter
(F.C.S.601-152).

NOTE: Make this check in conjunction with the Helical
Splined Nut (302-50).

- (a) Within F.C.S. limits. Accept.

- (3) Check backlash of short internal splines and of
helical splines (F.C.S.601-153/156).

NOTE: Make this check in conjunction with the Locking
Piece (302-30) and the Helical Splined Nut
(302-50).

- (4) Carry out "square" check (Ref.72-09-00) of LP signal
shaft location splines (F.C.S.601-150).

NOTE: Make this check in conjunction with the LP
Signal Shaft (Ref.72-31-04).

NOTE: This item has 24 internal splines equi-spaced.

- (a) Any side of square out-
side F.C.S. limits. Reject.

- (b) Within F.C.S. limits. Accept.

10. Retaining Nut (302-70)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

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B. Inspect Keywasher Locating Face.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair
if 90 per cent
contact is retained.

C. Inspect Keywasher Locking Slots.

(1) Damage.

Accept after repair
if slot profile is
restored.

D. Inspect Silver Plating.

(1) Damage or wear.

Reject for re-
plating (Ref.
72-09-08, Repair).

11. Keywasher (302-80)

A. Inspect Washer (Ref.72-09-00 Inspection/Check - Cupwashers).

B. Inspect Locating Keys.

NOTE: Make this check in conjunction with the Outer
Guide (302-90).

(1) Damage.

Accept after repair
if still compatible
with locations in
outer guide.

12. Outer Guide (302-90)

A. Inspect Internal and External Splines (Ref.72-09-00
Inspection/Check).

(1) Nicks and burrs.

Accept, if repair
does not violate
F.C.S. limits.

(2) Wear and fretting.

(a) Smooth, even wear

Accept after repair
if F.C.S. limits
are not violated.

B. Inspect LP Drive Shaft Location Diameters.

(1) Nicks, burrs and scores.

Accept, if repair
does not violate
F.C.S. limits.

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C. Inspect Keywasher Locating Slots.

NOTE: Make this check in conjunction with the Keywasher (302-80).

- (1) Damage.

Accept after repair
if still compatible
with keywasher.

D. Carry Out Dimensional Checks (Ref.72-31-05 Fits and Clearances).

- (1) Carry out "square" check (Ref.72-09-00 Inspection/Check) on LP drive shaft location serrations (F.C.S. 601-155).

NOTE: Make this check in conjunction with the LP Compressor Rear Drive Shaft (Ref.72-31-04).

NOTE: This item has 40 equi-spaced external serrations.

- (a) Any side of square outside F.C.S. limits. Reject.

- (b) Within F.C.S. limits. Accept.

- (2) Check backlash of internal splines (F.C.S.601-158).

NOTE: Make this check in conjunction with the Helical Splined Nut (302-50).

- (a) Within F.C.S. limits. Accept.

- (3) Check diameter at LP shaft location (F.C.S.601-157).

NOTE: Make this check in conjunction with the LP Compressor Rear Drive Shaft (Ref.72-31-04).

- (a) Within F.C.S. limits. Accept.

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13. Adjusting Washer (302-100)

NOTE: This item may require selection during assembly.

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores.

Accept, provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

- (2) Fretting and wear.

Reject.

B. Carry Out Dimensional Checks (Ref.72-31-05 Fits and Clearances).

- (1) Check washer bore (F.C.S.601-159).

NOTE: Make this check in conjunction with the LP Shaft Signal Tube (Ref.72-31-04).

- (a) Within F.C.S. limits.

Accept.

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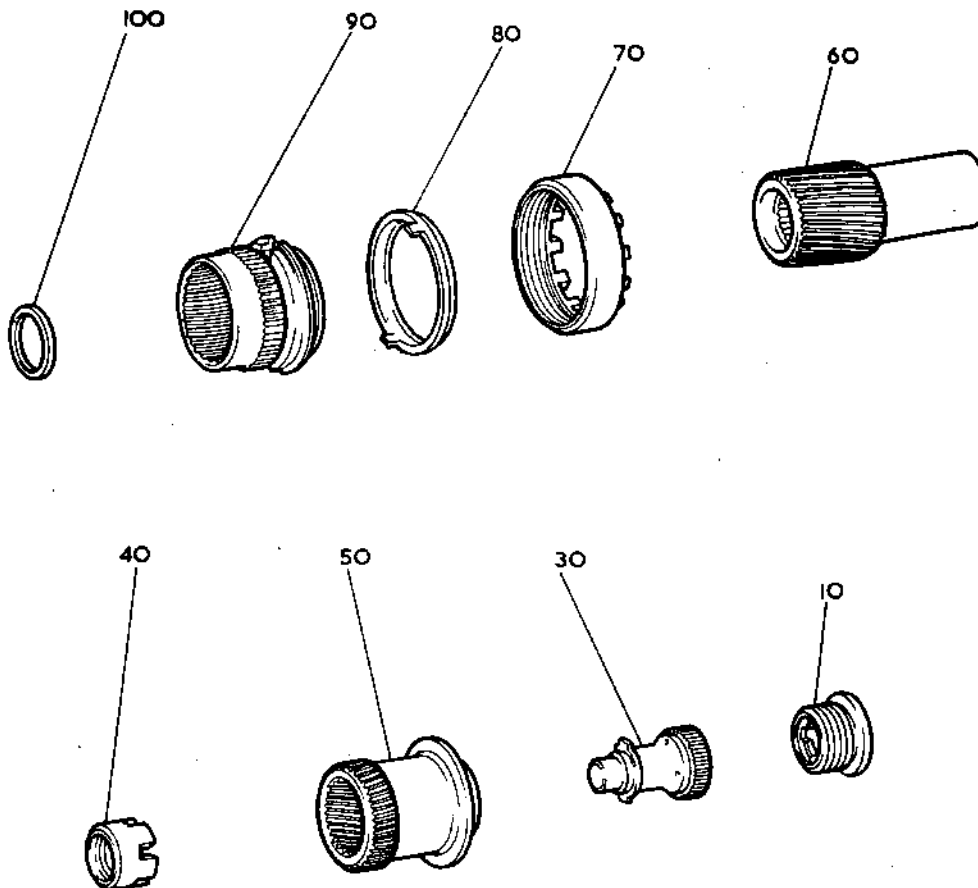


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LP Shaft Signal Generating Mechanism
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COMPRESSOR INTERMEDIATE CASE - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.
- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	40	Bevel Zerol Driver Gear	MP1
302	50	Adjusting Washer	MP1
302	170	Retaining Ring	MP1
302	190	LP Compressor Thrust	
		Bearing -	
		Outer Track	MP1
		- Inner Half Track	MP1
		- Inner Quarter Track	MP1
		- Cage	MP1
302	200	Oil Thrower, Adjusting	MP1
302	300	Thrust Washer	MP1
302	330	Inner Labyrinth Housing	MP1
303	60	Labyrinth Housing	MP1
303	100	Oil Baffle	MP1
303	110	Bearing Housing Retainer	MP1
303	120	Oil Thrower, Adjusting	MP1
303	210	HP Compressor Thrust	
		Bearing -	
		Outer Track	MP1
		- Inner Half Track	MP1
		- Inner Quarter Track	MP1
		- Cage	MP1
306	30	Static Labyrinth Ring	MP1
309	40	Adjusting Plate	MP1
309	150	Adjusting Plate	MP1

Items to be Magnetic Particle Crack Tested
Table 301

Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

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FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	270	LP Compressor Thrust Bearing Housing	FlA
302	300	Thrust Washer	FlA
302	340	Front Inner Air Baffle	FlA
302	350	Labyrinth Outer Housing	FlA
303	20	Air Baffle Assembly	FlA
303	30	Rear Outer Air Baffle	FlA
303	40	Rear Inner Air Baffle	FlA
303	80	HP Compressor Thrust Bearing Housing	FlA
303	240	Air Baffle Assembly	FlA
304	30	Oil Jet	FlA
304	70	Oil Distributor	FlA
304	110	Oil Transfer Tube	FlA
304	140	Oil Jet	FlA
304	160	Probe Retainer	FlA
304	170	Probe Assembly	FlA
304	340	Transfer Tube	FlA
304	370	Transfer Tube	FlA
304	400	Oil Feed and Jet Tube	FlA
304	410	Oil Distributor Assembly	FlA
304	440	Sleeve	FlA
305	20	Locating Plate Assembly	FlA
305	30	Fire Cover	FlA
305	50	Lubricating Oil Nozzle	FlA
305	100	Tube Assembly	FlA
305	200	Adapter Assembly	FlA
305	260	Drain Tube Assembly	FlA
305	360	Oil Sump Assembly	FlA
305	410	Locating Plate Assembly	FlA
305	420	Fire Cover	FlA
305	440	Vent Tube Assembly	FlA
306	40	Static Housing Seal Ring Assembly	FlA
306	270	Tube	FlA
306	330	Inner Case Sub-assembly	FlA
306	420	Outer Case Sub-assembly	FlA
307	60	Plug	FlA
307	100	Intermediate Outer Case	FlA
308	270	Adapter Plate Assembly	FlA
308	310	Mounting Bracket Assembly	FlA
309	30	Diaphragm	FlA
309	220	Gearbox Mounting	FlA

Items to be Fluorescent Dye Crack Tested
Table 302.

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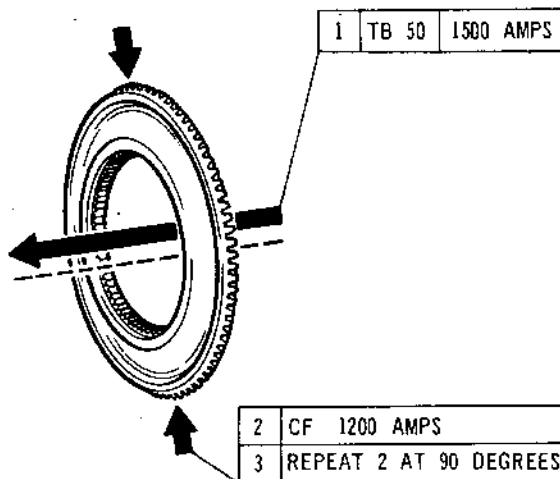
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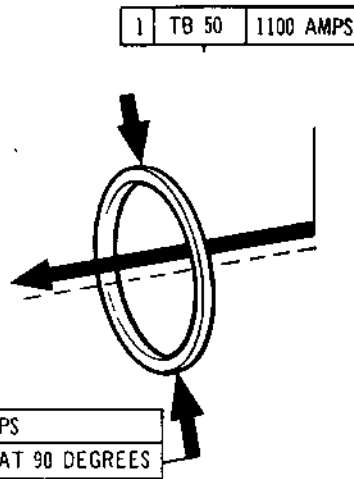
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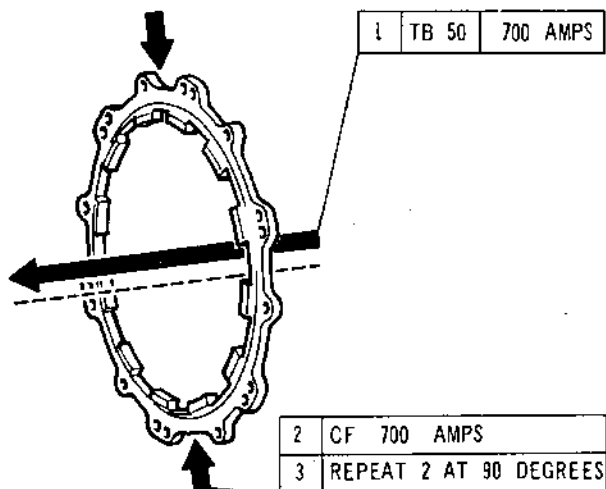
CR 33728/00B



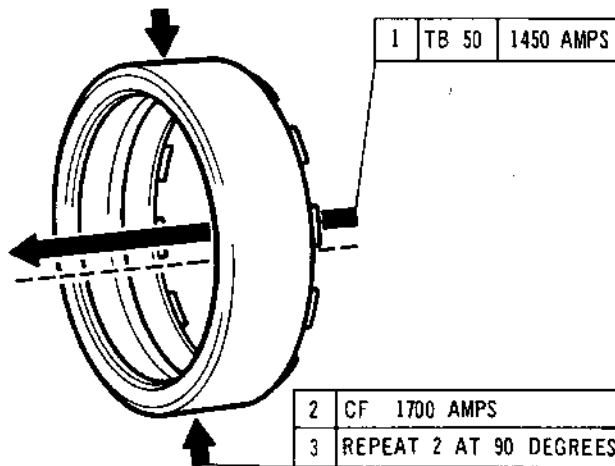
BEVEL ZEROL DRIVER GEAR (302-40)



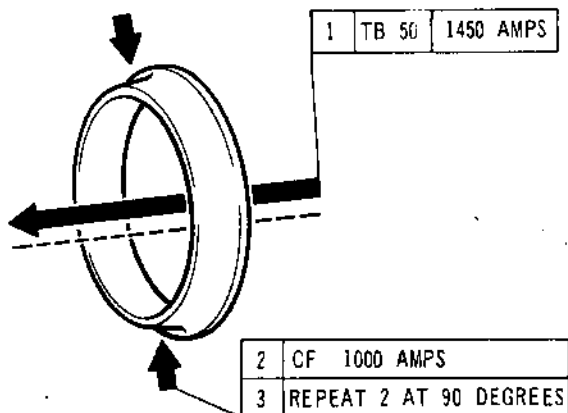
ADJUSTING WASHER (302-50)



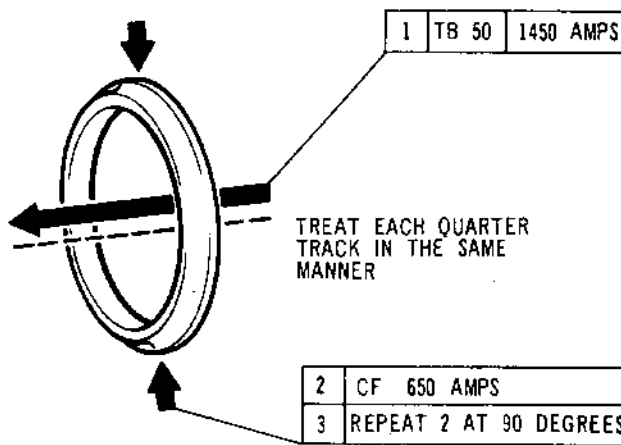
RETAINING RING (302-170)



LP THRUST BEARING - OUTER TRACK (302-190)



LP THRUST BEARING - INNER HALFTRACK (302-190)



LP THRUST BEARING - INNER QUARTER TRACK (302-190)

Crack Detection Test Diagram
Figure 301 (Sheet 1 of 4)

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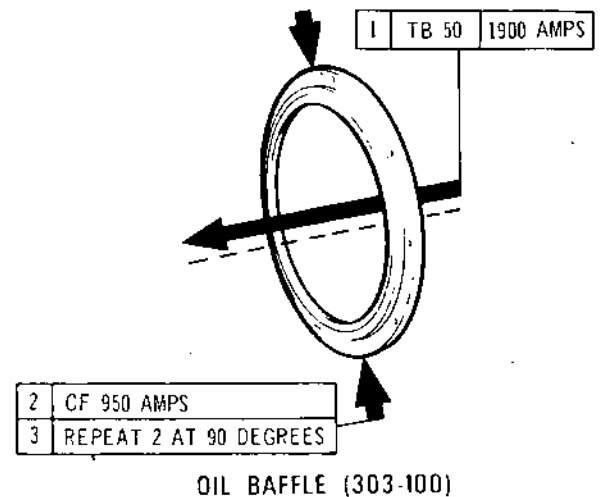
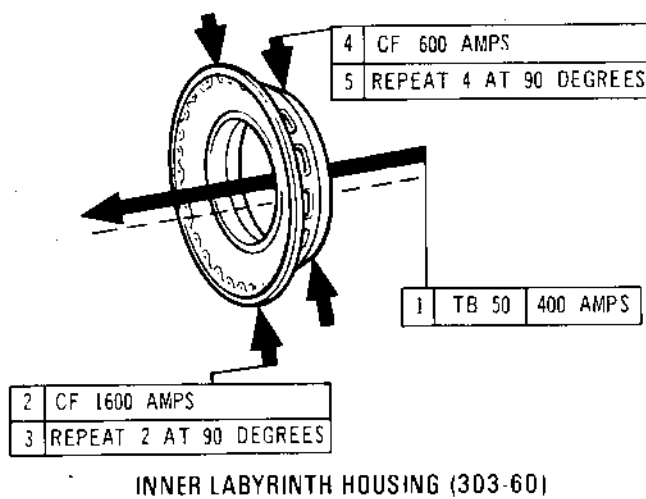
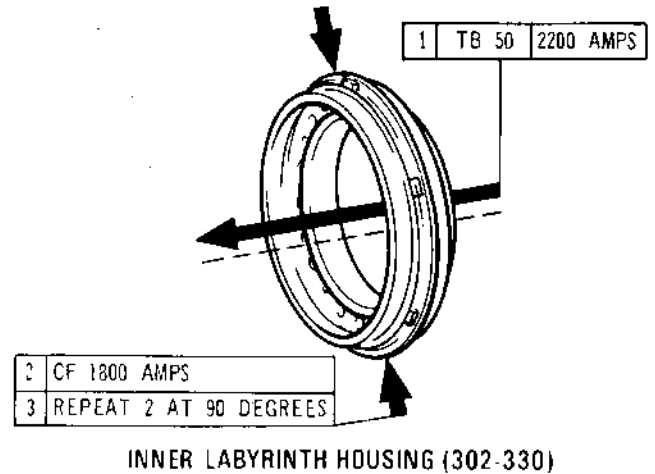
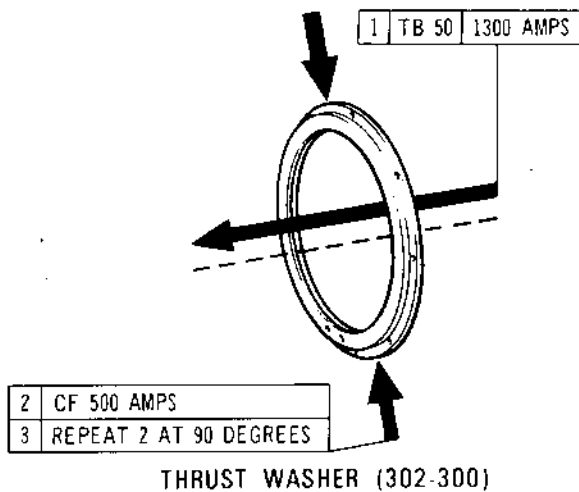
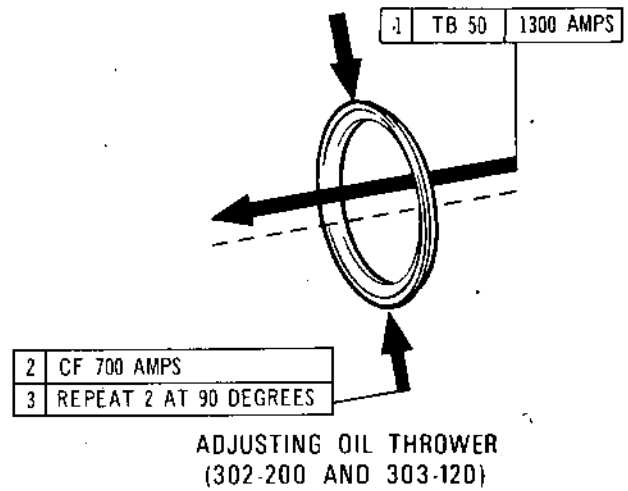
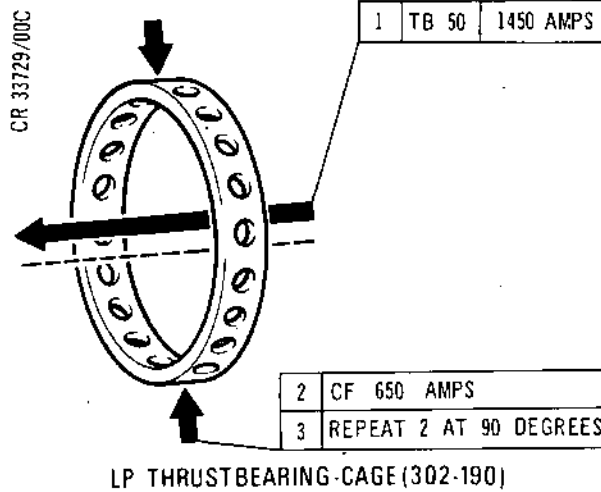
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Crack Detection Test Diagram
Figure 301 (Sheet 2 of 4)

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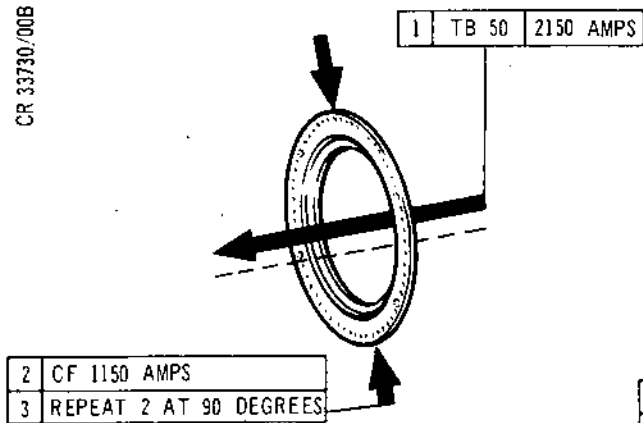


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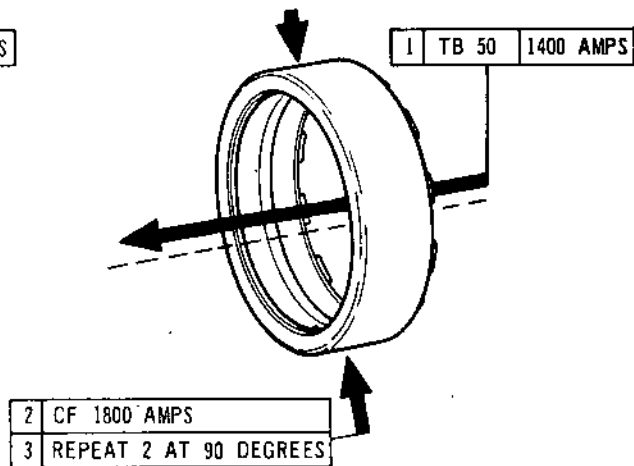
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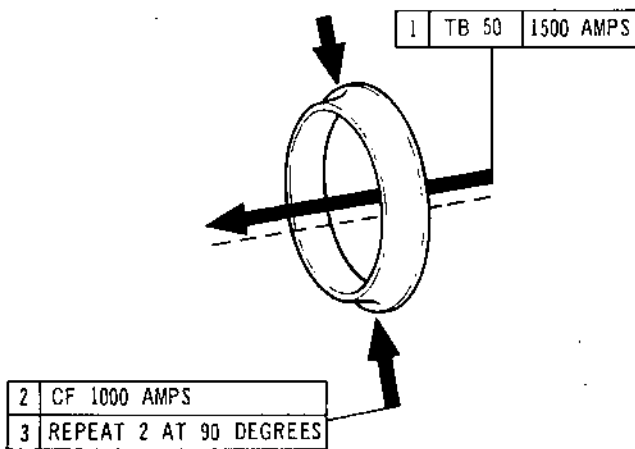
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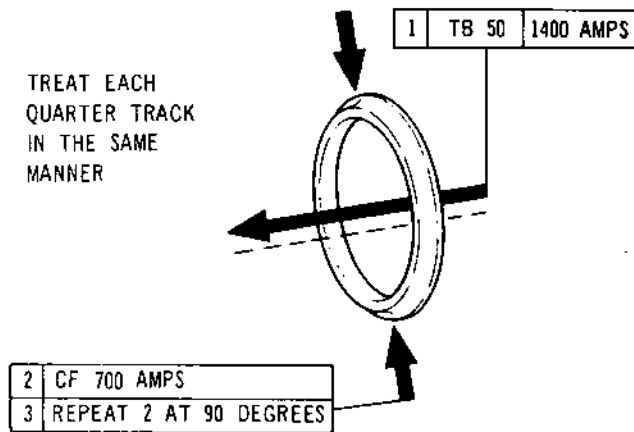
BEARING HOUSING RETAINER (303-110)



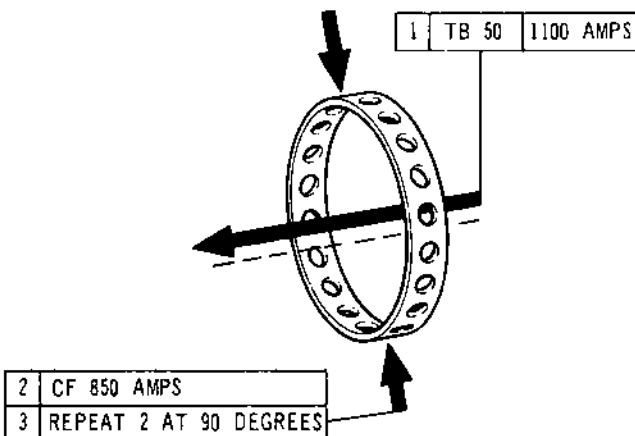
HP COMPRESSOR THRUST BEARING
-OUTER TRACK (303-210A)



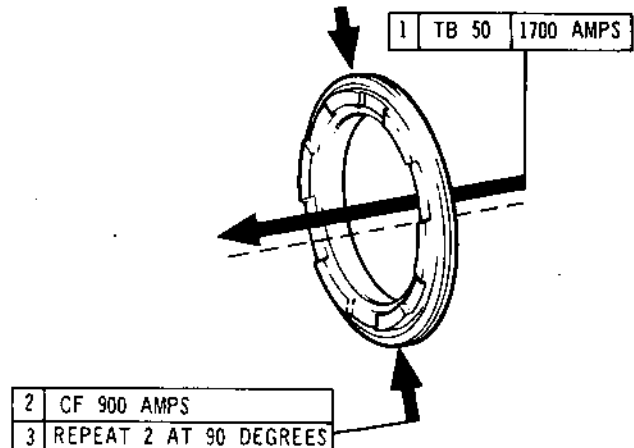
HP COMPRESSOR THRUST BEARING
INNER HALF TRACK (303-210A)



HP COMPRESSOR THRUST BEARING
INNER QUARTER TRACK (303-210A)



HP COMPRESSOR THRUST BEARING
CAGE (303-210A)



STATIC LABYRINTH RING (306-30)

TREAT EACH
QUARTER TRACK
IN THE SAME
MANNER

Crack Detection Test Diagram
Figure 301 (Sheet 3 of 4)

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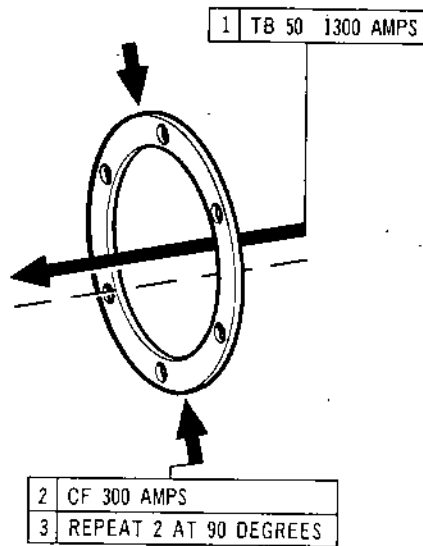
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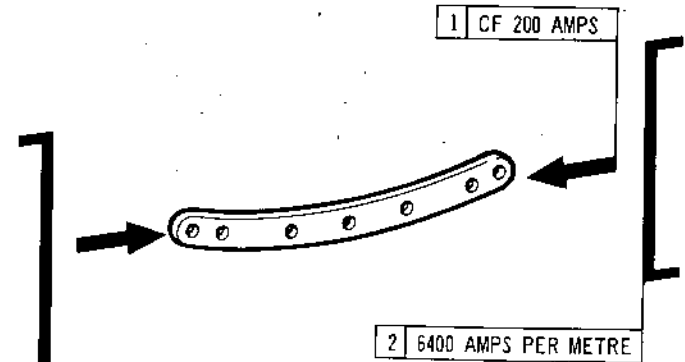


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ADJUSTING PLATE (309-40)



ADJUSTING PLATE (309-150)

Crack Detection Test Diagram
Figure 301 (Sheet 4 of 4)

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-32-00	Fig.1
303	72-32-00	Fig.2
304	72-32-00	Fig.3
305	72-32-00	Fig.4
306	72-32-00	Fig.5
307	72-32-00	Fig.6
308	72-32-00	Fig.7
309	72-32-00	Fig.8

Cross References to Illustrated Parts Catalogue
Table 3034. Bevel Zerol Driver Gear (302-40)

A. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

(1) Nicks and burrs.

Accept, if repair
does not violate
F.C.S. limits
during assembly
(Ref.72-32-00
Assembly).

(2) Fretting.

(a) Not more than 0.001 in.
(0,0254 mm) in depth.Accept if repair
does not violate
F.C.S. limits
during assembly
(Ref.72-32-00
Assembly).

B. Inspect Splines (Ref.72-09-00 Inspection/Check).

(1) Nicks and burrs.

Accept, if repair
does not violate
F.C.S. limits
during assembly
(Ref.72-32-00
Assembly).

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(2) Fretting and wear.

- (a) Not more than 0.001 in.
(0,030 mm) below machin-
ing witness mark.

Accept, if repair
does not violate
F.C.S. limits
during assembly
(Ref.72-32-00
Assembly).

C. Inspect Adjusting Washer Location Face.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Scores.

- (a) Not more than 0.003 in.
(0,080 mm) deep.

Accept after
repair.

D. Inspect Headed Pin Locations.

NOTE: Carry out this inspection in conjunction with the
headed pins (para.5).

- (1) Damage.

- (a) Any damage other than
slight edge burrs.

Reject.

- (b) Slight edge burrs only.

Accept after
repair.

- (2) Compatibility.

- (a) Pin compatible with bore.

Accept.

5. Headed Pins - 6 Off (302-30)

A. Inspect Pins.

- (1) Any damage.

Reject.

- (2) Check compatibility with
bevel gear (para.4).

Accept if compat-
ible.

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6. Adjusting Washers (302-50)

NOTE: This item may require selection during assembly.

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores.

Accept, provided that repair preserves surface flatness and that designed effective thickness, is maintained over 90 per cent of contact face area.

- (2) Fretting and wear.

Reject.

7. Bearing Retaining Ring (302-170)

A. Inspect Abutment Face.

- (1) Nicks and burrs.

Accept after repair.

B. Inspect Locating Dogs.

- (1) Nicks and burrs.

Accept after repair.

- (2) Wear.

- (a) Not more than 0.001 in.
(0,030 mm) on flanks.

Accept.

- (3) Distortion.

Reject.

C. Inspect Bolt Locations.

- (1) Fretting and wear.

- (a) Not elongated more than
0.010 in. (0,250 mm);
flange thickness not
reduced more than
5 per cent.

Accept.

- (2) Nicks and burrs.

Accept after repair.

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8. LP Compressor Thrust Bearing (302-190) (Ref.SB.72-17 Part 6 and 72-79 Part 3)

A. Inspect Bearing (Ref.72-09-00 Inspection/Check).

B. Carry Out Dimensional Checks.

(1) Check bore and diameter (F.C.S.601-51/69).

NOTE: Make this check in conjunction with the bearing housing (para.10) and the LP rotor rear shaft (Ref.72-31-03).

(a) Within F.C.S. limits. Accept.

(2) Check bearing end-float and diametral clearance (F.C.S.601-66).

(a) Within F.C.S. limits. Accept.

9. Oil Throwers (302-200 and 303-120)

NOTE: These two items are standard components on engines that do not incorporate SB.72-21 and SB.72-29 respectively. Engines on which these modifications have been made employ a range of adjusting Oil Throwers that may require selection during assembly (Ref.72-32-00 Assembly and the Illustrated Parts Catalogue).

A. Inspect Abutment Faces (Standard Items).

(1) Nicks, burrs and scores. Accept after repair.

B. Inspect Abutment Faces (Adjusting Oil Throwers).

(1) Nicks, burrs and scores. Accept provided repair preserves surface flatness and designed effective thickness is maintained over 90 per cent of face area.

(2) Fretting and wear. Reject.

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10. LP Compressor Thrust Bearing Housing (302-270)

NOTE: If SB.72-17 Part 2 is embodied, the thrust washer (302-300) and housing must be retained as a matched set.

A. Inspect Bearing Location Bores.

(1) Nicks and burrs.

Accept after
repair, if F.C.S.
limits are not
violated.

(2) Scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair, if F.C.S.
limits are not
violated.

B. Inspect Thread Insert (Ref.72-09-00 Inspection/Check).

C. Inspect Abutment and Location Faces.

(1) Nicks, burrs and scores.

Accept, if
repair does not
violate F.C.S.
limits.

D. Inspect Bolt Locations.

(1) Wear and fretting.

(a) Holes not elongated
more than 0.010 in.
(0,250 mm); flange
thickness not reduced
more than 5 per cent.

Accept.

E. Inspect Locating Pin Bores.

NOTE: Carry out this inspection in conjunction with the pins (para.12).

(1) Damage.

(a) Any damage other than
slight edge burrs.

Reject.

(b) Slight edge burrs only.

Accept after
repair.

(2) Compatibility.

(a) Pin compatible with bore.

Accept.

F. Inspect Metaflex Seal and Inner Case Location Bores.

(1) Nicks, burrs and scores.

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- (a) Not more than 0.005 in.
(0,130 mm) deep.

Accept, if repair
does not violate
F.C.S. limits.

G. Inspect Oil Transfer Tube Location.

- (1) Nicks, burrs and scores.

- (a) Not more than 0.001 in.
(0,030 mm) deep.

Accept, if repair
preserves sealing
capability.

- (2) Fretting and wear.

- (a) Even, unstepped, not more
than 0.001 in. (0,030 mm)
deep.

Accept.

H. Carry Out Dimensional Checks.

- (1) Check bearing location bore (F.C.S.601-69).

NOTE: Carry out this check in conjunction with the
LP compressor thrust bearing (para.8).

- (a) Within F.C.S. limits. Accept.

- (2) Check location bores for inner and outer cases
(F.C.S.601-67 and 68).

NOTE: Carry out this check in conjunction with the
inner and outer cases (paras.61 and 62).

- (a) Within F.C.S. limits. Accept.

11. Thrust Washer (302-300)

NOTE: If SB.72-17 Part 2 is embodied the thrust bearing
housing (302-270) and thrust washer must be retained
as a matched set.

A. Inspect Abutment Faces and Diameters.

- (1) Nicks, burrs and scores.

Accept after
repair.

B. Inspect Pin Locations.

NOTE: Carry out this inspection in conjunction with the
pins (para.12).

- (1) Damage.

- (a) Any damage other than
slight edge burrs. Reject.

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(b) Slight edge burrs only.

Accept after
repair.

(2) Compatibility.

(a) Pins compatible with ring.

Accept.

12. Pins - 8 Off (302-310)

A. Inspect Pins.

(1) Any damage.

Reject.

(2) Check compatibility with
thrust ring and housing
(para.10 and 11).

Accept if
compatible.

13. Metaflex Seals (302-320, 303-70/230, 305-80/390 and
306-105 (2 Off)) (Not Illustrated)

A. Inspect Seals.

WARNING: METAFLEX SEALS CONTAIN CHRYSOTILE (WHITE
ASBESTOS). THERE IS NO HEALTH HAZARD PROVIDING
THE PRECAUTIONS DETAILED IN THE ASSEMBLY
PROCEDURES ARE OBSERVED (REF.72-32-00 ASSEMBLY).

(1) Damage.

(a) Spot weld failure,
nicks or scores.

Reject.

(b) Laminations parted.

Accept providing
sealing capabilities
are unimpaired.

(2) Distortion.

Accept providing
sealing capabilities
are unimpaired and
compatibility is
maintained.

B. Carry Out Dimensional Checks.

NOTE: The Metaflex seal width must be between 0.003 and
0.008 in. (0,075 and 0,200 mm) greater than the
depth of its groove location.

(1) Seal within limits.

Accept.

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14. Inner Labyrinth Housing (302-330)

A. Inspect No.4 Labyrinth Seal Housing Bore.

NOTE: This housing is designed to accept some settlement of the rotor shaft, due to the absence of the squeeze-film at the thrust bearings when the engine is static. For this reason there is a change in seal bore radius from slightly below the horizontal centreline; this provides an additional 0.006-0.007 in. (0,150-0,180 mm) clearance at the bottom vertical centreline. This designed additional clearance must be accounted for during any seal bore inspection or check.

- | | |
|--|---|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Grooving. | |
| (a) Any damage greater than (b). | Accept after repair (Ref.72-32-00 Repair No.4). |
| (b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. | Accept. |
| (3) Distortion. | |
| (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S. | Accept. |

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B. Inspect No.5 Windback Seal Housing Bore.

NOTE: This housing is designed to accept some settlement of the rotor shaft, due to the absence of the squeeze-film at the thrust bearings when the engine is static. For this reason there is a change in seal bore radius from slightly below the horizontal centreline; this provides an additional 0.006-0.007 in. (0,150-0,180 mm) clearance at the bottom vertical centreline. This designed additional clearance must be accounted for during any seal bore inspection or check.

- (1) Nicks and burrs. Accept after repair.
- (2) Grooving.
 - (a) Any damage greater than (b). Accept after repair (Ref.72-32-00 Repair No.4).
 - (b) Rubbing extending over an arc not greater than 90 degrees and regardless of width over face, provided that maximum depth does not exceed 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.
- (3) Distortion.
 - (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below minimum permissible dimension in F.C.S. Accept.

C. Inspect All Abutment and Location Faces.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores.
 - (a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.

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D. Inspect Outer Labyrinth Housing Location Dogs.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores.
 - (a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.
- (3) Wear and fretting.
 - (a) Light witness only. Accept.
- (4) Compatibility.
 - (a) Dogs compatible with locations in labyrinth outer housing (para.16). Accept.

E. Inspect Bolt Locations.

- (1) Wear and fretting.
 - (a) Bolt holes elongated not more than 0.010 in. (0,250 mm); flange thickness not reduced more than 5 per cent. Accept.

F. Carry Out Dimensional Checks.

- (1) Check bore of Nos.4 and 5 labyrinth seal housings (F.C.S.601-48 and 49/50).

NOTE: Make these checks in conjunction with the LP compressor rotor (Ref.72-31-03).

- (a) Within F.C.S. limits. Accept.

15. Front Inner Air Baffle (302-340)

A. Inspect Abutment and Location Faces.

- (1) Nicks and burrs. Accept after repair.

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(2) Scores.

- (a) Not more than 0.005 in. Accept after
(0,130 mm) deep. repair.

B. Inspect Bolt Locations.

(1) Wear and fretting.

- (a) Bolt holes elongated Accept.
not more than 0.010 in.
(0,250 mm); flange
thickness not reduced
more than 5 per cent.

16. Outer Labyrinth Housing (302-350)

A. Inspect No.3 Labyrinth Seal Housing Bores.

NOTE: This housing is designed to accept some settlement of the rotor shaft, due to the absence of the squeeze-film at the thrust bearings when the engine is static. For this reason there is a change in seal bore radius at a point slightly below the horizontal centreline; this provides an additional 0.006-0.007 in. (0,150-0,180 mm) clearance at the bottom vertical centreline. This designed additional clearance must be accounted for during any seal bore inspection or check.

- (1) Nicks and burrs. Accept after
repair.
- (2) Grooving.
- (a) Damage greater than (b). Accept after repair
(Ref.72-32-00
Repair No.1 and
No.9).
- (b) Any number of grooves, Accept.
provided that they are all
contained within an arc not
greater than 60 degrees of
bore mean circumference,
that maximum depth is not
greater than 0.005 in.
(0,130 mm) and F.C.S.
limits are not violated.

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(3) Distortion.

- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below minimum permissible dimension in F.C.S. Accept.

B. Inspect Abutment and Location Faces.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores.
- (a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.

C. Inspect Bolt Locations.

- (1) Wear and fretting.
- (a) Bolt holes elongated not more than 0.010 in. (0,250 mm); flange thickness not reduced more than 5 per cent. Accept.

D. Inspect Inner Housing Dog Location Slots.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores.
- (a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.
- (3) Wear and fretting.
- (a) Light witness only. Accept.
- (4) Compatibility.
- (a) Slots compatible with dogs in inner labyrinth housing (para.14). Accept.

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E. Carry Out Dimensional Checks.

- (1) Check bores of No.3 labyrinth seal housing
(F.C.S.601-45/46/47).

NOTE: Make this check in conjunction with
the LP compressor rotor (Ref.72-31-03).

- (a) Within F.C.S. limits. Accept.

17. Air Baffle (303-20)

A. Inspect Abutment Faces.

- (1) Nicks and burrs. Accept after
repair.

- (2) Scores.

- (a) Not more than 0.005 in. Accept after
(0,130 mm) deep. repair.

B. Inspect Bolt Locations.

- (1) Wear and fretting.

- (a) Bolt holes elongated not Accept.
more than 0.010 in.
(0,250 mm); flange
thickness not reduced
more than 5 per cent.

C. Inspect Shouldered Pin Locations.

NOTE: Carry out this inspection in conjunction with the
shouldered pins (para.70).

- (1) Damage.

- (a) Any damage other than Reject.
slight edge burrs.

- (b) Slight edge burrs only. Accept after
repair.

- (2) Compatibility.

- (a) Pins compatible with Accept.
baffle.

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18. Rear Outer Air Baffle (303-30) (Ref.SB.72-91)

A. Inspect No.8 Labyrinth Seal Housing Bore.

NOTE: This housing is designed to accept some settlement of the rotor shafts, due to the absence of the squeeze-film at the thrust bearings when the engine is static. For this reason, there is a change in seal bore radius at a point slightly below the horizontal centreline; this provides an additional 0.006-0.007 in. (0,150-0,180 mm) clearance at the bottom vertical centreline. This designed additional clearance must be accounted for during any seal bore inspection or check.

- | | |
|--|--|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Grooving. | |
| (a) Damage greater than (b). | Accept after repair (Ref.72-32-00 Repair No.2 and No.8). |
| (b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. | Accept. |
| (3) Distortion. | |
| (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below minimum permissible dimension in F.C.S. | Accept. |

B. Inspect Abutment and Location Faces.

- | | |
|----------------------|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
|----------------------|----------------------|

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(2) Scores.

- (a) Not more than 0.005 in. Accept after
(0,130 mm) deep. repair.

C. Inspect Bolt Locations.

(1) Wear and fretting.

- (a) Bolt holes not elongated Accept.
more than 0.010 in.
(0,250 mm); flange thick-
ness not reduced more than
5 per cent.

D. Inspect Shouldered Pin Locations.

NOTE: Carry out this inspection in conjunction with the
shouldered pins (para.70).

(1) Damage.

- (a) Any damage other than Reject.
slight edge burrs.
(b) Slight edge burrs only. Accept after
repair.

(2) Compatibility.

- (a) Pins compatible with baffle. Accept.

E. Carry Out Dimensional Checks.

- (1) Check inner labyrinth housing location bore
(F.C.S.601-81).

NOTE: Make this check in conjunction with the
inner labyrinth housing (para.19).

- (a) Within F.C.S. limits. Accept.

- (2) Check No.8 labyrinth seal fin diameter
(F.C.S. 601-83/84/85).

NOTE: Make these checks in conjunction with the
HP compressor rotor (Ref.72-33-02).

- (a) Within F.C.S. limits. Accept.

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19. Rear Inner Air Baffle (303-40)

A. Inspect Abutment and Location Faces.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores.

- (a) Not more than 0.005 in. Accept after repair.
(0,130 mm) deep.

B. Inspect Bolt Locations.

- (1) Wear and fretting.
 - (a) Bolt holes not elongated Accept.
more than 0.010 in.
(0,250 mm); flange
thickness not reduced
more than 5 per cent.

20. Inner Labyrinth Housing (303-60) (Ref.SB.72-91)

A. Inspect No.6 Windback Seal Housing Bore.

NOTE: This housing is designed to accept some settlement of the rotor shafts, due to the absence of the squeeze-film at the thrust bearings when the engine is static. For this reason, there is a change in seal bore radius at a point slightly below the horizontal centreline; this provides an additional 0.006-0.007 in. (0,150-0,180 mm) clearance at the bottom vertical centreline. This designed additional clearance must be accounted for during any seal bore inspection or check.

- (1) Nicks and burrs. Accept after repair.
- (2) Grooving.
 - (a) Any damage greater than Accept after repair
(b) . (Ref.72-32-00
Repair No.5).

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- (b) Rubbing extending over an arc not greater than 90 degrees and regardless of width over face, provided that maximum depth does not exceed 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.

(3) Distortion.

- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below minimum permissible dimension in F.C.S. Accept.

B. Inspect No.7 Labyrinth Seal Housing Bore.

NOTE: This housing is designed to accept some settlement of the rotor shafts, due to the absence of the squeeze-film at the thrust bearings when the engine is static. For this reason, there is a change in seal bore radius slightly below the horizontal centreline; this provides an additional 0.006-0.007 in. (0,150-0,180 mm) clearance at the bottom vertical centreline. This designed additional clearance must be accounted for during any seal bore inspection or check.

- (1) Nicks and burrs. Accept after repair.
- (2) Grooving.
- (a) Damage greater than (b). Accept after repair (Ref.72-32-00 Repair No.5).
- (b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.

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(3) Distortion.

- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below minimum permissible dimension in F.C.S.

Accept.

C. Inspect Abutment and Location Faces.

- (1) Nicks and burrs.

Accept after repair.

- (2) Scores.

- (a) Not more than 0.005 in. (0,130 mm) deep.

Accept after repair.

D. Inspect Bolt Locations.

- (1) Wear and fretting.

- (a) Bolt holes not elongated more than 0.010 in. (0,250 mm); flange thickness not reduced more than 5 per cent.

Accept.

E. Inspect Headless Pin Locations.

NOTE: Carry out this inspection in conjunction with the headless pins (para.58).

- (1) Damage.

- (a) Any damage other than slight edge burrs.

Reject.

- (b) Slight edge burrs only.

Accept after repair.

- (2) Compatibility.

- (a) Pins compatible with housing.

Accept.

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F. Carry Out Dimensional Checks.

- (1) Check HP bearing housing and rear outer air baffle location diameters (F.C.S. 601-71 and 81).

NOTE: Make this check in conjunction with the HP thrust bearing housing (para.21), and rear outer air baffle (para.18).

(a) Within F.C.S. limits. Accept.

- (2) Check Nos.6 and 7 labyrinth seal bores (F.C.S.601-79/80 and 82).

NOTE: Make this check in conjunction with the HP compressor rotor (Ref.72-33-02).

(a) Within F.C.S. limits. Accept.

21. HP Compressor Thrust Bearing Housing (303-80)

NOTE: If SB.72-17 Part 3 is embodied, the bearing retainer (303-110), oil baffle (303-100) and bearing housing are to be retained as a matched set.

A. Inspect Bearing Location Bores.

- (1) Nicks and burrs. Accept after repair if F.C.S. limits are not violated.

- (2) Scores.

(a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair, if F.C.S. limits are not violated.

B. Inspect Abutment and Location Faces.

- (1) Nicks, burrs and scores. Accept, if repair does not violate F.C.S. limits.

C. Inspect Bolt Locations.

- (1) Wear and fretting.

(a) Bolt holes not elongated more than 0.010 in. (0,250 mm); flange thickness not reduced more than 5 per cent. Accept.

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D. Inspect Shouldered Pin Locations.

NOTE: Carry out this inspection in conjunction with the shouldered pins (para.57).

(1) Damage.

- | | |
|--|----------------------|
| (a) Any damage other than slight edge burrs. | Reject. |
| (b) Slight edge burrs only. | Accept after repair. |

(2) Compatibility.

- | | |
|--|---------|
| (a) Shouldered pins compatible with housing. | Accept. |
|--|---------|

E. Inspect Headless Pin Locations.

NOTE: Carry out this inspection in conjunction with the headless pins (para.58).

(1) Damage.

- | | |
|--|----------------------|
| (a) Any damage other than slight edge burrs. | Reject. |
| (b) Slight edge burrs only. | Accept after repair. |

(2) Compatibility.

- | | |
|-----------------------------------|---------|
| (a) Pins compatible with housing. | Accept. |
|-----------------------------------|---------|

F. Carry Out Dimensional Checks.

- (1) Check inner labyrinth housing locating bore and inner case locating diameter (F.C.S.601-71 and 72).

NOTE: Carry out this check in conjunction with the inner labyrinth housing (para.14).

- | | |
|---------------------------|---------|
| (a) Within F.C.S. limits. | Accept. |
|---------------------------|---------|

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- (2) Check bearing locating bore (F.C.S.601-73).

NOTE: Carry out this check in conjunction with the
HP compressor thrust bearing (para.25).

- (a) Within F.C.S. limits. Accept.

22. Headless Pins - 8 Off (303-90)

A. Inspect Pins.

- (1) Damage. Reject.
- (2) Check compatibility with bearing housing (para.21) and bearing retainer (para.24). Accept if compatible.

23. Oil Baffle (303-100)

NOTE: If SB.72-17 Part 3 is embodied, the bearing housing (303-80), bearing retainer (303-110) and oil baffle are to be retained as a matched set.

A. Inspect Abutment and Location Faces.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores.
- (a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.

B. Inspect Pin Locations.

- (1) Damage.
- (a) Any damage other than slight edge burrs. Reject.
- (b) Slight edge burrs only. Accept after repair.

C. Carry Out Dimensional Checks.

- (1) Check bevel gear bore (F.C.S.601-77).

NOTE: Make this check in conjunction with the internal accessory drives (Ref.72-61-00).

- (a) Within F.C.S. limits. Accept.

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24. Bearing Retainer (303-110)

NOTE: If SB.72-17 Part 3 is embodied, the bearing housing (303-80), oil baffle (303-100) and bearing retainer are to be retained as a matched set.

A. Inspect Abutment Faces.

(1) Nicks and burrs. Accept after repair.

(2) Scores.

(a) Not more than 0.005 in. Accept after
(0,130 mm) deep. repair.

B. Inspect Bearing Track Locating Dogs.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Not more than 0.001 in. Accept.
(0,030 mm) on flanks.

(3) Distortion. Reject.

C. Inspect Bolt Locations.

(1) Wear and fretting.

(a) Bolt holes elongated not Accept.
more than 0.010 in.
(0,250 mm); flange
thickness not reduced
more than 5 per cent.

25. HP Compressor Thrust Bearing (303-210) (Ref.SB.72-14 and 72-79 Part 4)

A. Inspect Bearing (Ref.72-09-00 Inspection/Check).

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B. Carry Out Dimensional Checks.

- (1) Check diameter and bore (F.C.S.601-73/78).

NOTE: Make this check in conjunction with the bearing housing (para.21) and the HP rotor shaft (ref.72-33-02).

(a) Within F.C.S. limits. Accept.

- (2) Check bearing end-float and diametral clearance (F.C.S.601-74).

(a) Within F.C.S. limits. Accept.

C. Inspect Bearing Outer Track.

- (1) Fretting.

(a) Not more than 0.001 in. Accept.
(0,030 mm) in depth on
squeeze film lands
location over an arc
not greater than
90 degrees at bottom
dead centre.

NOTE: If the bearing is rejected for excessive fretting of the front face, the associated Oil Baffle (2-100) must also be rejected.

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26. Air Baffle (303-240)

A. Inspect Self-Locking Shank Nuts (Ref.72-09-00 Inspection/Check).

B. Inspect Abutment Faces and Location Diameter.

(1) Nicks and burrs. Accept after repair.

(2) Scores.

(a) Not more than 0.005 in. Accept after
(0,130 mm) deep. repair.

C. Carry Out Dimensional Check.

(1) Check locating diameter (F.C.S.601-70).

NOTE: Make this check in conjunction with the
outer case (para.62).

(a) Within F.C.S. limits. Accept.

27. Bevel Oil Jets (304-30 and 140)

A. Inspect Jet Nozzles.

(1) Damage and obstruction.

(a) Jet bore clear and free of Accept.
any damage.

CAUTION: JET BORE MUST NOT BE PROBED WITH HARD
OBJECTS OR FLOW RATE MAY BE ALTERED.



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B. Inspect Stem.

- (1) Nicks and burrs. Accept after repair.

C. Inspect Connecting Flange and Spigot.

- (1) Wear and fretting.
(a) Even, unstepped wear not more than 0.001 in. (0,030 mm) in depth. Accept.
(2) Nicks and burrs. Accept after repair.

28. Oil Distributor (304-70)

A. Inspect Oil Transfer Tube and Oil Jet Location Bores.

- (1) Nicks and burrs. Accept after repair.
(2) Wear and fretting.
(a) Even, unstepped wear not more than 0.001 in. (0,030 mm) in depth. Accept.

B. Inspect Abutment Face.

- (1) Nicks, burrs and scores. Accept after repair.

29. Retaining Plates (304-100/330/360/390)

A. Inspect Plates.

- (1) Nicks and burrs. Accept after repair.
(2) Wear and fretting.
(a) Not more than 0.005 in. (0,130 mm) at tube retaining faces. Accept.
(b) Bolt holes not elongated more than 0.030 in. (0,760 mm). Accept.

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30. Oil Transfer Tubes (304-110/340/370)

A. Inspect Tubes (Ref.72-09-00 Inspection/Check).

B. Inspect Silver Plating.

(1) Wear.

(a) Any witness of parent metal.

Reject for
re-plating
(Ref.72-09-00
Repair).

C. Inspect Oil Ports (304-340).

(1) Damage and obstruction.

(a) Any bore damage.

Reject.

(b) Any obstruction.

Reject for re-
cleaning (Ref.
72-32-00 Cleaning).

31. Probe Retainers - 2 Off (304-160) and Probe Assemblies -
2 Off (304-170)

A. Inspect Retainers.

(1) Distortion.

Reject.

(2) Wear and fretting.

(a) Bolt holes elongated
not more than 0.010 in.
(0,250 mm).

Accept.

(b) Smooth, unstepped wear
not greater than a total
depth of 0.010 in.
(0,250 mm) at probe
location cut-out.

Accept.

(c) Any wear or fretting
of probe guide slot.

Reject for
investigation.

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B. Inspect Retainer and Probe Abutment Faces.

- | | |
|------------------------------|--|
| (1) Nicks, burrs and scores. | Accept after repair provided surface flatness and parallelism is retained. |
|------------------------------|--|

C. Inspect Probe Assemblies.

- | | |
|--|---------------------------|
| (1) Distortion. | Reject. |
| (2) Wear and fretting. | |
| (a) Bolt holes not elongated more than 0.010 in. (0,250 mm). | Accept. |
| (b) Smooth, unstepped wear not greater than a total depth of 0.010 in. (0,250 mm) on flanks of locating lug. | Accept. |
| (c) Any wear or fretting of probe in guide. | Reject for investigation. |

32. Adjusting Washers - 4 Off (304-180)

NOTE: These items may require selection during assembly.

A. Inspect Abutment Faces.

- | | |
|------------------------------|--|
| (1) Nicks, burrs and scores. | Accept, provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area. |
| (2) Fretting and wear. | Reject. |

33. Oil Feed and Jet Tube (304-400)

A. Inspect Tube (Ref.72-09-00 Inspection/Check).

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B. Inspect Silver Plating.

(1) Wear.

- (a) Any witness of parent metal.

Reject for repair.

C. Inspect Oil Jet Bores.

(1) Damage and obstruction.

- (a) Any bore damage.

Reject.

- (b) Any obstruction.

Reject for re-cleaning (Ref. 72-32-00 Cleaning).

34. Oil Distributor Assembly (304-410)

A. Inspect Thread Inserts (Ref. 72-09-00 Inspection/Check).

B. Inspect Locating Abutment Face.

- (1) Nicks, burrs and scores, not more than 0.005 in. (0,130 mm) deep.

Accept, if repair preserves sealing capability.

C. Inspect Oil Passages.

(1) Obstruction.

- (a) Any obstruction.

Reject for re-cleaning (Ref. 72-32-00 Cleaning).

D. Inspect All Location Bores.

- (1) Nicks and burrs.

Accept, if repair preserves sealing capability.

(2) Scores.

- (a) Not more than 0.001 in. (0,030 mm) in depth.

Accept, if repair preserves sealing capabilities.

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(3) Fretting.

- | | |
|---|--------------------------------------|
| (a) Not more than 0.001 in.
(0,030 mm) in depth. | Accept, if sealing
is unimpaired. |
|---|--------------------------------------|

E. Inspect Retaining Plate, Probe Assembly and Bevel Oil Jet Abutment Faces.

- | | |
|------------------------------|-------------------------|
| (1) Nicks, burrs and scores. | Accept after
repair. |
|------------------------------|-------------------------|

F. Inspect Bolt Locations.

- | | |
|---|---------|
| (1) Wear and fretting. | |
| (a) Bolt holes not elongated
more than 0.010 in.
(0,250 mm); flange
thickness not reduced
more than 5 per cent. | Accept. |

35. Sleeve (304-440)

A. Inspect Sleeve (Ref.72-09-00 Inspection/Check - Rigid Tubes).

36. Locating Plate/Cover Assemblies (305-20B/30 and 410B/420)

A. Inspect Serrations.

- | | |
|--|-------------------------|
| (1) Nicks, burrs and fretting. | |
| (a) Not more than 0.001 in.
(0,030 mm) deep on flank. | Accept after
repair. |

B. Inspect Plate.

- | | |
|------------------------------------|--|
| (1) Distortion. | Accept if repair-
able without
cracking. |
| (2) Security. | |
| (a) No loose or damaged
rivets. | Accept. |

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C. Inspect Abutment Faces.

- (1) Nicks and burrs.

Accept after
repair.

D. Inspect Bolt and Pin Locations.

- (1) Wear and fretting.

- (a) Bolt holes not elongated
more than 0.010 in.
(0,250 mm); flange
thickness not reduced
more than 5 per cent.

Accept.

- (b) Pin holes not damaged,
except for minor edge
burrs; pins compatible
with holes (para.37).

Accept.

37. Hollow Headed Pins (305-40)

A. Inspect Pins.

- (1) Damage.
- (2) Check compatibility with
locating plates (para.36)
and outer case (para.62).

Reject.

Accept if
compatible.

38. Lubricating Oil Nozzle (305-50)

A. Inspect Jet Bore.

- (1) Damage and obstruction.

- (a) Any bore damage.

Reject.

- (b) Any obstruction.

Reject for re-
cleaning (Ref.
72-32-00
Cleaning).

B. Inspect Body and Locating Faces.

- (1) Nicks and burrs.

Accept if repair
preserves sealing
capability.

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39. Oil Feed Housing (305-60)

A. Inspect Tube and Casing (Ref.72-09-00 Inspection/Check).

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Tube Connection Seatings.

(1) Fretting.

(a) Not more than 0.001 in.
(0,030 mm) in depth.

Accept if repair
preserves sealing
capability.

(2) Scores.

(a) Not more than 0.001 in.
(0,030 mm) in depth and
not extending more than
half-way across face.

Accept if repair
preserves sealing
capability.

D. Inspect Locating Flange and Metaflex Seal Location.

(1) Nicks, burrs and scores.

Accept after
repair.

(2) Wear and fretting.

(a) Bolt holes elongated
not more than 0.030 in.
(0,760 mm); flange
thickness not reduced
more than 5 per cent.

Accept.

(3) Distortion.

Reject.

E. Inspect Sealing Ring Pack Location.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear and fretting.

(a) Not more than 0.001 in.
(0,030 mm) deep on
flanks and diameter.

Accept.

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F. Inspect Serrations.

(1) Nicks, burrs and fretting.

(a) Not more than 0.001 in. Accept after
(0,030 mm) deep on flanks. repair.

G. Inspect Lubricating Oil Nozzle Location.

(1) Nicks and burrs. Accept, if
repair preserves
sealing capability.

40. Tubes (305-100/440)

A. Inspect Tubes (Ref.72-09-00 Inspection/Check).

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Anchor Nuts on 305-440 (Ref.72-09-00 Inspection/Check).

(1) Security.

(a) Cage secure; rivets Accept.
undamaged.

D. Inspect Serrations.

(1) Nicks, burrs and fretting.

(a) Not more than 0.001 in. Accept after
(0,030 mm) deep on flanks. repair.

E. Inspect Connection Seatings.

(1) Fretting.

(a) Not more than 0.001 in. Accept if repair
(0,030 mm) deep. preserves sealing
capability.

(2) Scores.

(a) Not more than 0.001 in. Accept if repair
(0,030 mm) deep and not preserves sealing
extending more than half- capability.
way across face.

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F. Inspect Sealing Ring Pack Location on 305-100.

- (1) Nicks, burrs and scores. Accept after repair.
- (2) Wear and fretting.
 - (a) Not more than 0.001 in. (0,030 mm) deep on flanks and diameter. Accept after repair.

G. Inspect Locating Face on 305-440.

- (1) Nicks, burrs and scores. Accept after repair.

41. Gland Nuts - 2 Off (305-150)

A. Inspect Nuts (Ref.72-09-00 Inspection/Check).

42. Air Sealing Rings - 2 Off (305-170)

A. Inspect Air Holes.

- (1) Damage and obstruction.
 - (a) Any damage. Reject.
 - (b) Any obstruction. Reject for re-cleaning (Ref. 72-32-00 Cleaning).

B. Inspect Locating Lands.

- (1) Wear and fretting.
 - (a) Light witness mark only. Accept.
- (2) Nicks and burrs.
 - (a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.
- (3) Scores. Reject.

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C. Inspect Packing Ring Location Faces.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair.

43. Spacers - 2 Off (305-160)

A. Inspect Locating Land.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair.

44. Adapter (305-200)

A. Inspect Self-locking Shank Nuts (Ref.72-09-00 Inspection/Check).

B. Inspect Thread Inserts (Ref.72-09-00 Inspection/Check).

C. Inspect Gland Nut Threads (72-09-00 Inspection/Check).

D. Inspect Air Sealing Ring and Packing Ring Location Bores.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept, if repair
preserves sealing
capability.

E. Inspect Abutment Faces.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair.

F. Inspect Pin Location Bores.

NOTE: Carry out this inspection in conjunction with the
straight and hollow headed pins (paras.45 and 46).

(1) Damage.

(a) Any damage other than
slight edge burrs.

Reject.

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(b) Slight edge burrs only.

Accept after
repair.

(2) Compatibility.

(a) Pins compatible with
adapter.

Accept.

45. Straight Headed Pins - 2 Off (305-190)

A. Inspect Pins.

NOTE: Carry out this check in conjunction with the
adapter (para.44).

(1) Damage.

Reject.

(2) Compatibility.

(a) Pins compatible with
adapter.

Accept.

46. Hollow Headed Pins - 2 Off (305-250)

A. Inspect Pins.

NOTE: Carry out this check in conjunction with the
adapter (para.44).

(1) Damage.

Reject.

(2) Compatibility.

(a) Pins compatible with
adapter.

Accept.

47. Drain Tube (305-260)

A. Inspect Tube (Ref.72-09-00 Inspection/Check).

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Tube Seating.

(1) Nicks, burrs and scores.

(a) Not more than 0.001 in.
(0,030 mm) in depth;
scores not extending more
than half-way across face.

Accept, if repair
preserves sealing
capability.

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(2) Wear and fretting.

(a) Not more than 0.001 in.
(0,030 mm) in depth.

Accept, if repair
preserves sealing
capability.

D. Inspect Mounting Ring Abutment Face.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair.

E. Inspect Tube Locating Bracket.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair.

(2) Wear and fretting.

(a) Bolt hole elongated not
more than 0.030 in.
(0,760 mm); flange
thickness not reduced
more than 5 per cent.

Accept.

F. Inspect Bolt Locations.

(1) Wear and fretting.

(a) Bolt holes elongated not
more than 0.010 in.
(0,250 mm); flange
thickness not reduced
more than 5 per cent.

Accept.

48. Shouldered Pins - 2 Off Each (305-340/350)

A. Inspect Pins.

NOTE: Carry out this inspection in conjunction with the
oil sump (para.49) and the inner case (para.61).

(1) Damage.

Reject.

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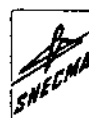
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(2) Compatibility.

(a) Pins compatible with
sump and inner case.

Accept.

49. Oil Sump (305-360)

A. Inspect Tubes and Sump Walls (Ref.72-09-00 Inspection/
Check - Rigid Tubes).

B. Inspect Self-Locking Shank Nuts (Ref.72-09-00
Inspection/Check).

C. Inspect Shouldered Pin Locations.

NOTE: Carry out this inspection in conjunction with the
shouldered pins (para.48) and inner case (para.61).

(1) Damage.

(a) Any damage other than
slight edge burrs.

Reject.

(b) Slight edge burrs only.

Accept after
repair.

(2) Compatibility.

(a) Pins compatible with sump.

Accept.

D. Inspect Sealing Ring Locations on Tubes.

(1) Damage.

Reject.

E. Inspect Drain Tube Assembly Location Face.

(1) Nicks and burrs.

(a) Not more than 0.001 in.
(0.030 mm) deep on
matt chrome surface.

Accept after
repair.

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(a) Any witness of parent metal at matt chrome surface. Reject.

F. Inspect Metaflex Seal Location Faces.

(1) Damage. Reject.

G. Inspect Inner Case Abutment Face.

(1) Nicks and burrs. Accept after repair.

(2) Scores.

(a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.

(3) Wear and fretting.

(a) Bolt holes not elongated more than 0.010 in. (0,250 mm); flange thickness not reduced more than 5 per cent at bolt location face. Accept.

50. Vent Tube (305-440)

A. Inspect Tube (Ref.72-09-00 Inspection/Check).

B. Inspect Captive Self-Locking Nuts (Ref.72-09-00 Inspection/Check) and Retainers.

(1) Security.

(a) Any loose or damaged rivets. Reject.

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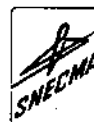
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C. Inspect Locating Serrations.

(1) Nicks, burrs and fretting.

- (a) Not more than 0.001 in.
(0,030 mm) on flanks.

Accept after
repair.

D. Inspect Locating Diameter.

(1) Nicks, burrs, scores and fretting.

- (a) Not more than 0.001 in.
(0,030 mm) deep.

Accept after
repair.

NOTE: Dry graphite coating must be renewed
if parent metal shows.

E. Inspect Attachment Flange Face.

(1) Nicks, burrs and scores.

- (a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair.

F. Inspect Tube Connection Seating.

(1) Nicks, burrs and scores.

- (a) Not more than 0.001 in.
(0,030 mm) deep; scores
not extending more than
half-way across face.

Accept, if repair
preserves sealing
capability.

(2) Wear and fretting.

- (a) Not more than 0.001 in.
(0,030 mm) in depth.

Accept, if repair
preserves sealing
capability.

51. Static Labyrinth Ring (306-30)

A. Inspect No.9B Labyrinth Seal Housing Bore.

(1) Nicks and burrs.

Accept after
repair.

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(2) Grooving.

- (a) Any damage greater than (b).

Accept after repair
(Ref.72-32-00
Repair No.3).

- (b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated.

Accept.

(3) Distortion.

- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S.

Accept.

B. Inspect No.10A Labyrinth Fins.

(1) Rubbing.

- (a) Slight rubbing within F.C.S. limits.

Accept.

(2) Nicks and burrs.

Accept after repair.

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(3) Damage to fins.

Accept after repair providing that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that all blends on adjacent fins are separated radially by not less than five times fin depth at their ends, and that F.C.S. limits are not violated.

NOTE: Greater damage will require repair (reforming) or possible rejection.

C. Inspect Abutment Faces.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair.

D. Inspect Bolt Locations.

(1) Wear and fretting.

(a) Bolt holes elongated not more than 0.010 in.
(0,250 mm); flange thickness not reduced more than 5 per cent.

Accept.

E. Carry Out Dimensional Checks.

NOTE: Make these checks in conjunction with the LP compressor rotor (Ref.72-32-03) and the probe operating labyrinth (Ref.72-61-00).

(1) Check No.9B labyrinth seal bore (F.C.S.601-59).

(a) Within F.C.S. limits.

Accept.

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- (2) Check No.10A labyrinth seal fin diameter (F.C.S.601-63).

(a) Within F.C.S. limits. Accept.

52. Static Seal Housing Ring (306-40)

A. Inspect Nos. 9A and 10B Labyrinth Seal Housing Bores.

(1) Nicks and burrs. Accept after repair.

(2) Grooving.

(a) Any damage greater than (b). Accept after repair (Ref.72-32-00 Repair No.6).

(b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.

(3) Distortion.

(a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S. Accept.

B. Inspect Air Tubes (Ref.72-09-00 Inspection/Check - Rigid Tubes).

C. Inspect Locating Lugs.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.

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(2) Security.

(a) Brazed pads secure.

Accept.

D. Inspect Bolt Locations.

(1) Wear and fretting.

(a) Bolt holes not elongated
more than 0.010 in.
(0,250 mm); flange
thickness not reduced
more than 5 per cent.

Accept.

E. Carry Out Dimensional Checks.

NOTE: Carry out these checks in conjunction
with the LP compressor rotor (Ref.
72-31-00), the static housing seal
ring (para.52) and the probe operating
labyrinth (Ref.72-61-00).

(1) Check No.9A and 10B labyrinth seal bores
(F.C.S.601-58 and 62).

(a) Within F.C.S. limits.

Accept.

53. Hollow Locating Pins - 12 Off (306-70)

A. Inspect Pins.

(1) Damage.

Reject.

(2) Compatibility.

NOTE: Make this check in conjunction with the
static housing seal ring (para.52) and
the inner casing (para.61).

(a) Pins compatible with ring
and casing.

Accept.

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54. Housings - 2 Off (306-100) and 1 Off Each (306-380/410)

A. Inspect Housing Walls.

- (1) Punctures. Reject.
- (2) Dents.
 - (a) Smooth contoured, free of impact marks. Accept.

B. Inspect Abutment Faces.

- (1) Nicks, burrs and scores.
 - (a) Not more than 0.005 in. (0,130 mm) in depth. Accept after repair.

C. Inspect Bolt Locations.

- (1) Wear and fretting.
 - (a) Bolt holes elongated not more than 0.030 in. (0,760 mm); flange thickness not reduced more than 5 per cent. Accept.

D. Inspect Dry Graphite Coated Areas.

- (1) Nicks, burrs and fretting.
 - (a) Not more than 0.001 in. (0,030 mm) deep. Accept after repair.

NOTE: Dry graphite coating must be renewed if parent metal shows.

E. Inspect Hard Chrome Plated Areas.

- (1) Nicks, burrs and fretting.
 - (a) Not more than 0.001 in. (0,030 mm) deep. Accept after repair.

NOTE: Chrome coating must be renewed if parent metal shows.

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55. Adjusting Washers - 2 Off (306-110)

NOTE: This item may require selection during assembly.

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores.

Accept, provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

- (2) Fretting and wear.

- (a) Any signs of wear.

Reject.

56. Headless Shouldered Pins - 2 Off (306-190)

A. Inspect Pins.

- (1) Damage.

Reject.

- (2) Compatibility.

NOTE: Make this check in conjunction with the housings 306-100 (para.54), the HP drive housing (Ref.72-61-00) and the inner casing (para.61).

- (a) Pins compatible with housings and casing.

Accept.

57. Shouldered Pins - 6 Off (306-200)

A. Inspect Pins.

- (1) Damage.

Reject.

- (2) Compatibility.

NOTE: Make this check in conjunction with the HP thrust bearing housing (para.21) and the outer casing (para.62).

- (a) Pins compatible with housing and casing.

Accept.

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58. Headless Pins - 4 Off (306-210)

A. Inspect Pins.

- (1) Damage. Reject.
- (2) Compatibility.

NOTE: Make this check in conjunction with the inner case (para.61), the HP thrust bearing housing (para.21), the bearing retainer (para.24) and the inner labyrinth housing (para.20).

- (a) Pins compatible with all components. Accept.

59. Blanking Plate (306-220)

A. Inspect Captive Self-locking Nuts and Retainers (Ref. 72-09-00 Inspection/Check).

B. Inspect Plate.

- (1) Nicks, burrs and scores.
 - (a) Not more than 0.005 in. (0,130 mm) deep. Accept, if repair gives satisfactory seal.
- (2) Wear and fretting.
 - (a) Bolt holes elongated not more than 0.030 in. (0,760 mm); flange thickness not reduced more than 5 per cent. Accept.
- (3) Distortion. Accept, if repairable without cracking.

60. Tubes - 2 Off (306-270)

A. Inspect Tube Bore.

- (1) Nicks, burrs and scores.
 - (a) Not more than 0.001 in. (0,030 mm) deep. Accept after repair.

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(2) Fretting.

- (a) Not more than 0.001 in. Accept after
(0,030 mm) deep. repair.

NOTE: Dry graphite coating must be renewed
if parent metal shows.

61. Inner Case (306-330)

NOTE: The inner case is not disassembled from the outer case
(306-420) during normal engine overhaul except where
damage necessitates disassembly for repair action.
These inspection procedures must be carried out, where
practicable, on the assembly. Carry out the full
inspection procedures if disassembly is effected.

A. Inspect Self-locking Shank Nuts (Ref.72-09-00 Inspection/
Check) (Ref.72-32-00 Repair No.15).

B. Inspect Wire Thread Inserts (Ref.72-09-00 Inspection/
Check).

C. Inspect All Abutment Faces and Locating Bores.

(1) Nicks, burrs and scores.

- (a) Not more than 0.005 in. Accept, if
(0,130 mm) deep. repair does not
violate F.C.S.
limits.

D. Inspect Static Seal Housing Ring Locations.

(1) Nicks, burrs and scores.

- (a) Not more than 0.005 in. Accept after
(0,130 mm) deep. repair.

(2) Damage.

- (a) Damage to air holes. Reject.

E. Inspect Casing.

(1) Dents.

- (a) Smooth contoured, with Accept, if casing
no impact marks. is not distorted.

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F. Inspect Stepped Pin Locations.

(1) Damage.

(a) Small edge burrs only.

Accept after repair
(Ref.72-32-00
Repair No.10).

G. Inspect Vent Tube Location Bore.

(1) Nicks, burrs and scores.

(a) Not more than 0.001 in.
(0,030 mm) deep.

Accept after
repair.

H. Carry Out Dimensional Checks.

(1) Check forward locating bore and diameter
(F.C.S.601-67 and 68).

NOTE: Make this check in conjunction with the
outer case (para.62) and the LP thrust
bearing housing (para.10).

(a) Within F.C.S. limits.

Accept.

(2) Check rear locating bore (F.C.S.601-72).

NOTE: Make this check in conjunction with the
HP thrust bearing housing (para.21).

62. Outer Case (306-420)

NOTE: The inner case (306-330) is not disassembled from the
outer case during normal engine overhaul except where
damage necessitates disassembly for repair action.
These inspection procedures must be carried out, where
practicable, on the assembly. Carry out the full
inspection procedures if disassembly is effected.

A. Inspect Self-locking Shank Nuts (Ref.72-09-00 Inspection/
Check) (Ref.72-32-00 Repair No.14).

B. Inspect All Abutment Faces.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair.

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C. Inspect All Location Bores.

(1) Nicks, burrs and scores.

- (a) Not more than 0.001 in. Accept after
(0,030 mm) deep. repair.

NOTE: Dry graphite coating must be renewed if
parent metal shows.

D. Inspect Casing.

(1) Dents.

- (a) Smooth contoured, with Accept if casing
no impact marks. is not distorted.

E. Inspect Shouldered Pin Locations.

(1) Damage.

- (a) Small edge burrs only. Accept after
repair.

F. Carry Out Dimensional Checks.

- (1) Check inner casing and air baffle locating
bores (F.C.S.601-68 and 70).

NOTE: Make this check in conjunction with the
inner casing (para.61) and air baffle
(para.26).

- (a) Within F.C.S. limits. Accept.

63. Stepped Pin (306-350)

A. Inspect Pin.

- (1) Damage. Reject.
(2) Compatibility.

NOTE: Make this check in conjunction with the
inner case (para.61), the LP thrust
bearing housing (para.10) and the outer
labyrinth housing (para.16).

- (a) Pin compatible with Accept.
case and housings.

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64. Retaining Plate (307-10)

A. Inspect Plate.

- (1) Nicks, burrs and scores. Accept after repair.
- (2) Wear and fretting.
 - (a) Bolt holes elongated not more than 0.030 in. (0,760 mm); flange thickness not reduced more than 5 per cent. Accept.
- (3) Distortion. Accept, if repairable without cracking.

65. Shouldered Pin (307-20)

A. Inspect Pin.

- (1) Damage. Reject.
- (2) Compatibility.

NOTE: Make this check in conjunction with the intermediate outer case (para.71) and the LP exit guide vane case (Ref.72-31-02).

- (a) Pin compatible with cases. Accept.

66. Shouldered Pins - 6 Off (307-30)

A. Inspect Pins.

- (1) Damage. Reject.
- (2) Compatibility.

NOTE: Make this check in conjunction with the intermediate outer case (para.71), the LP compressor thrust bearing housing (para.10), the outer labyrinth housing (para.16) and the LP exit guide vane case (Ref.72-31-02).

- (a) Pins compatible with housings and case. Accept.

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67. Headless Shoulder Pin (307-40)

A. Inspect Pin.

- (1) Damage. Reject.
- (2) Compatibility.

NOTE: Make this check in conjunction with the intermediate outer case (para.71), the LP compressor thrust bearing housing (para.10) and the outer labyrinth housing (para.16).

- (a) Pins compatible with case and housings. Accept.

68. Bracket (307-55)

A. Inspect Bracket.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear and fretting.
 - (a) Attachment face thickness reduced by not more than 5 per cent. Accept.
 - (b) Bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.
- (3) Scoring.
 - (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing material thickness is not reduced by more than 5 per cent.
- (4) Distortion. Accept if compatibility is preserved.

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69. Plugs - 6 Off (307-60)

A. Inspect Abutment Face and Locating Diameter.

(1) Nicks, burrs and scores.

- (a) Not more than 0.005 in. Accept after
(0,130 mm) deep. repair.

B. Inspect Bolt Locations.

(1) Wear and fretting.

- (a) Bolt holes elongated Accept.
not more than 0.030 in.
(0,760 mm); flange
thickness not reduced
more than 5 per cent.

70. Locating Peg (307-80) and Locating Shoulder Pins - 6 Off (307-90)

A. Inspect Peg and Pins.

- (1) Damage. Reject.
(2) Compatibility.

NOTE: Make this check in conjunction with the intermediate outer case (para.71), the outer case (para.62) and the air baffle (para.26).

- (a) Peg and pins compatible Accept.
with cases and baffle.

71. Intermediate Outer Case (307-100)

A. Inspect Self-locking Shank Nuts (Ref.72-09-00 Inspection/Check).

B. Inspect Thread Inserts (Ref.72-09-00 Inspection/Check).

- (1) Damage. Reject for repair.
(2) Security.
(a) Locking pins damaged, Reject for repair.
loose or missing.

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(3) Silver plating.

(a) Bolt seized in insert. Reject for repair.

C. Inspect All Abutment Faces and Locating Bosses.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) deep. Accept after repair.

(2) Wear and fretting.

(a) Bolt holes elongated
not more than 0.010 in.
(0,250 mm); flange
thickness not reduced
more than 5 per cent. Accept.

D. Inspect All Pin Locations.

(1) Damage.

(a) Small edge burrs only. Accept after repair.

(2) Compatibility.

NOTE: Make this check in conjunction with the
pins (paras.65-67 and 70).

(a) Pins compatible with case. Accept.

E. Inspect Vanes.

(1) Dents.

(a) Smooth contoured, with
no impact marks and not
fouling tubes or drives. Accept.

F. Inspect T₃ Probe Plug Location Bores.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) deep. Accept after repair.

G. Inspect Air Elbows.

(1) Nicks and burrs.

(a) Not more than 0.005 in.
(0,130 mm) deep at
abutment faces. Accept after repair.

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(2) Dents.

- (a) Smooth contoured, with no impact marks. Accept.

H. Inspect Rokide Coating (Ref. 72-09-10 Repair for the Procedure for Application of Coating).

NOTE: Before assessing amounts of damage, examine any chipped areas for faulty adhesion at edges; remove suspect coating and dress edges.

- (1) Any chipped area greater than 2 sq. in. (1290,32 sq. mm). Reject for repair.
- (2) No area greater than 2 sq. in. (1290,32 sq. mm):-
- (a) More than one area of chipping on one vane. Reject for repair.
- (b) More than three areas of chipping on any outer case inter vane segment. Reject for repair.
- (c) Damage less than (a) and (b). Accept after dressing.

72. Adjusting Shim (308-180 to 235), Adjusting Plate (309-40 to 85/150 to 170)

NOTE: These items will require selection during assembly.

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores. Accept provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

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(2) Fretting and wear.

Reject.

73. Gearbox Mounting Bracket Assemblies (308-310)

A. Inspect Shank Self-locking Nuts (Ref.72-09-00 Inspection/Check).

B. Inspect Attachment Faces.

(1) Wear.

(a) Not more than 10 per cent reduction of flange thickness.

Accept after repair providing surface flatness is maintained.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

(c) Hollow pin holes elongated.

Reject.

(2) Scores.

(a) Not more than 0.010 in. (0,250 mm) in depth on contact faces.

Accept after repair providing flange thickness is not reduced by more than 10 per cent.

C. Inspect General Condition of Mounting Bracket.

(1) Nicks and burrs.

Accept after repair.

74. Air Seal Retainer (308-60)

A. Inspect Attachment Faces.

(1) Wear.

(a) Not more than 10 per cent reduction in flange thickness.

Accept after repair.

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- (b) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

(2) Scores.

- (a) Not more than 0.010 in.
(0,250 mm) in depth
at bolthead locations.

Accept after
repair.

(3) Nick and burrs.

Accept after
repair.

B. Inspect Adjusting Ring Abutment Face.

(1) Wear.

- (a) Fretting not more than
0.005 in. (0,130 mm) in
depth.

Accept after repair
providing 90 per
cent of the
effective abutment
face is maintained.

(2) Nicks, burrs and scores.

Accept after
repair.

75. Adjusting Ring (308-70)

NOTE: This item requires selection during assembly.

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores,
repair pressures.

Accept, provided
that repair pre-
serves surface
flatness and that
designed effective
thickness is main-
tained over 90 per
cent of contact
face area.

(2) Fretting and wear.

Reject.

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76. Air Seal Ring (308-110)

A. Inspect Adjusting Ring Abutment Face.

(1) Wear.

- (a) Fretting not more than
0.005 in. (0,130 mm) in
depth.

Accept after repair
providing 90 per
cent of the
effective abutment
face is maintained.

(2) Nicks, burrs and scores.

Accept after
repair.

B. Inspect Outside Diameters and Air Holes.

(1) Nicks and burrs.

Accept after
repair.

(2) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair.

C. Inspect Air Seal Ring Bore.

(1) Wear.

- (a) Light witness mark.

Accept.

(2) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair.

D. Inspect Packing Gland Location.

(1) Wear.

- (a) Light witness mark.

Accept.

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(2) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair
providing sealing
capabilities are
unimpaired.

77. Adapter Plate (308-270)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Attachment Faces.

- (1) Nicks burrs and wear.

Accept after repair
providing sealing
capabilities are
unimpaired.

- (2) Wear at bolthead locations.

- (a) Not more than 10 per cent
reduction in flange
thickness.

Accept after
repair.

- (b) Bolt-holes elongated not
more than 0.010 in.
(0,250 mm).

Accept after
repair.

- (3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after repair
providing sealing
capabilities are
unimpaired.

C. Inspect Lands Adjacent Air Seal Ring.

- (1) Wear.

- (a) Light witness mark.

Accept.

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D. Inspect Air Inlet Orifice.

- (1) Obstruction.

CAUTION: DO NOT USE HARD OBJECTS TO CLEAR
OBSTRUCTIONS.

- (a) Orifice obstructed.

Reject for clean-
ing investigation.

E. Inspect Air Seal Ring and Packing Gland Locations.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Light witness mark.

Accept.

- (3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair
providing sealing
capabilities are
unimpaired.

F. Inspect Hollow Pin.

- (1) Security.

- (a) Pin loose in location.

Reject.

- (2) Nicks and burrs.

Accept after
repair.

78. Gearbox Mounting Assembly (309-220)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Intermediate Case Attachment Flange.

- (1) Nicks and burrs.

Accept after
repair.

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(2) Wear.

- | | |
|--|----------------------|
| (a) Any wear or reduction in flange thickness. | Reject. |
| (b) Bolt-holes elongated not more than 0.010 in. (0,250 mm) along the lateral axis only. | Accept after repair. |

(3) Scores.

- | | |
|--|----------------------|
| (a) Not more than 0.005 in. (0,130 mm) in depth. | Accept after repair. |
|--|----------------------|

C. Inspect Coupling Ring Location Interrupted Threads (Pre SB.72-8689-272).

NOTE: Using a new standard Coupling Ring Assembly (311-4) check the compatibility of the interrupted thread to ensure adequate torque clearance between the spherical nut and mounting bracket.

- | | |
|----------------------|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
|----------------------|----------------------|

(2) Wear.

- | | |
|---|--|
| (a) Fretting not more than 0.001 in. (0,030 mm) in depth. | Accept providing compatibility is preserved. |
|---|--|

D. Inspect Cover Blank Abutment Face (Pre SB.72-8689-272).

- | | |
|----------------------|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
|----------------------|----------------------|

(2) Scores.

- | | |
|--|--|
| (a) Not more than 0.010 in. (0,250 mm) in depth. | Accept after repair providing repair does not impair sealing capabilities. |
|--|--|

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E. Inspect Air Tube Seating.

(1) Wear.

(a) Light witness mark.

Accept after
repair.

(2) Scores.

(a) Not more than 0.003 in.
(0,080 mm) in depth.

Accept after repair
providing sealing
capabilities are
unimpaired.

F. Inspect Air Orifice.

NOTE: Do not use hard objects to clear obstructions.

(1) Obstruction.

(a) Any obstruction.

Reject for
cleaning
investigation.

G. Inspect Corruplus Seal Groove (Pre SB.72-8689-272).

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Light witness marks
provided that surface
roughness in grooves
is not more than
50 micro inches (1,25
micrometres).

Accept after repair
provided that
sealing capabil-
ities are
unimpaired.

79. Corruplus Seal (309-10, Pre SB.72-8689-272)

A. Inspect Corruplus Seal (Ref.72-09-00 Standard Practices).

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80. Diaphragm (309-30)

A. Inspect Attachment Flange.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Not more than 5 per
cent reduction in
flange thickness.

Accept after repair
providing 90 per
cent of designed
effective thickness
is maintained.

(b) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

(3) Scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth
and not extending right
across the face.

Accept after
repair.

B. Inspect Air Seal Groove.

(1) Nicks and burrs.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair.

(2) Dents.

(a) Any dents.

Reject.

C. Inspect Seal Groove Adjacent Lands.

(1) Scores.

(a) Any scores.

Reject.

(2) Wear.

(a) Light witness mark.

Accept.

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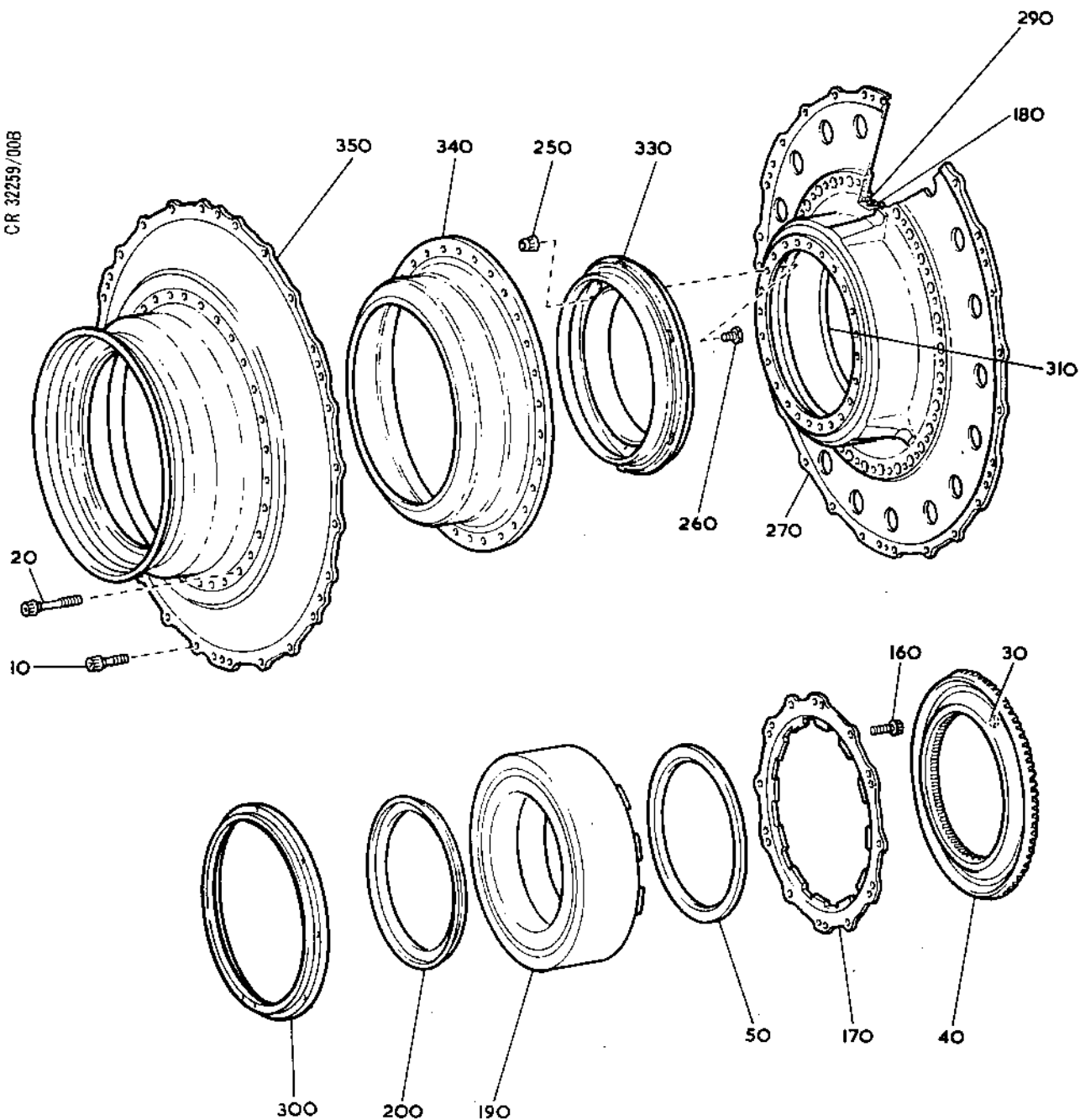
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LP Compressor Thrust Bearing and Housing
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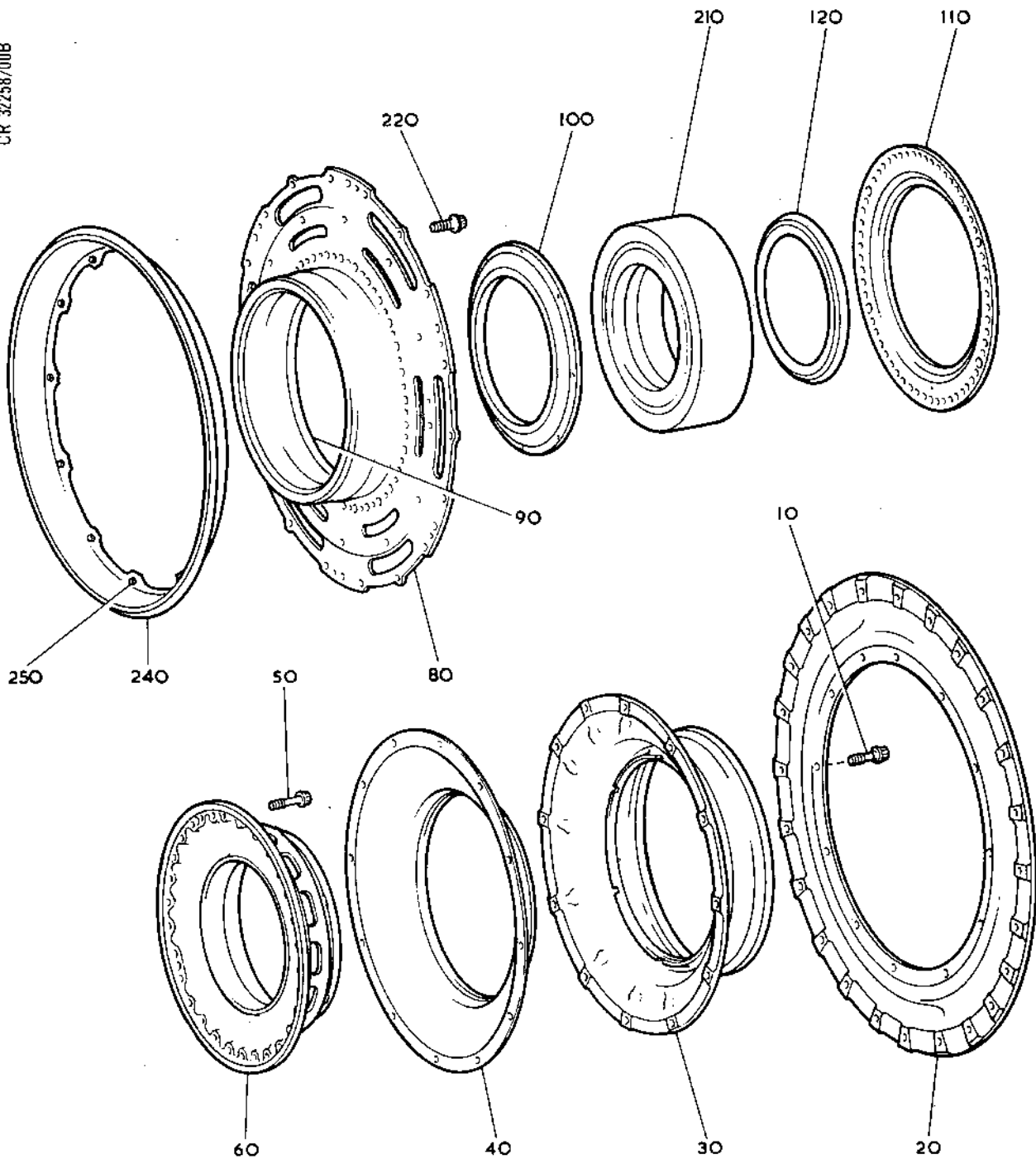


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TN34817

HP Compressor Thrust Bearing and Housing
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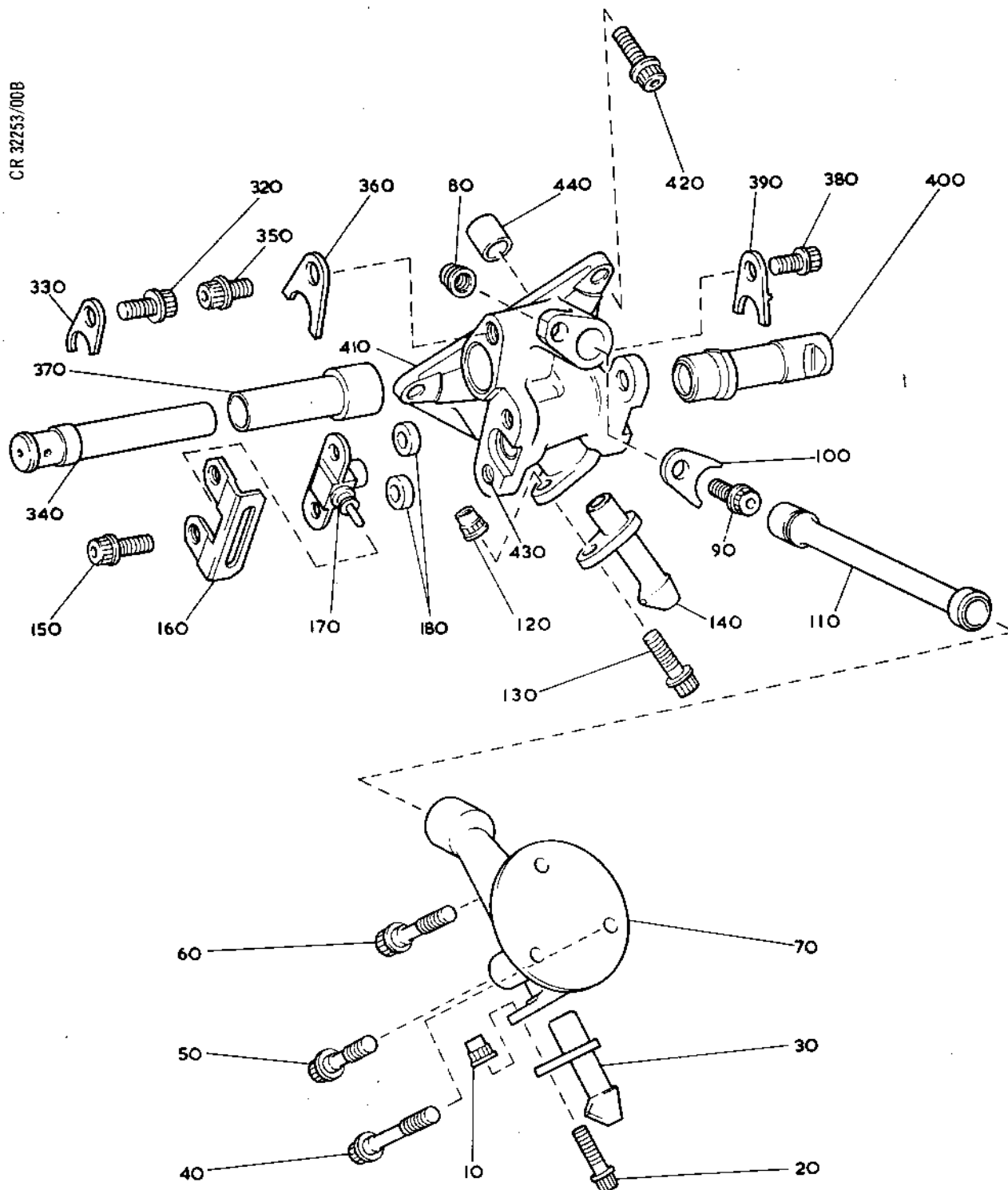
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Oil Distributors, Transfer Tubes and Jets
Figure 304

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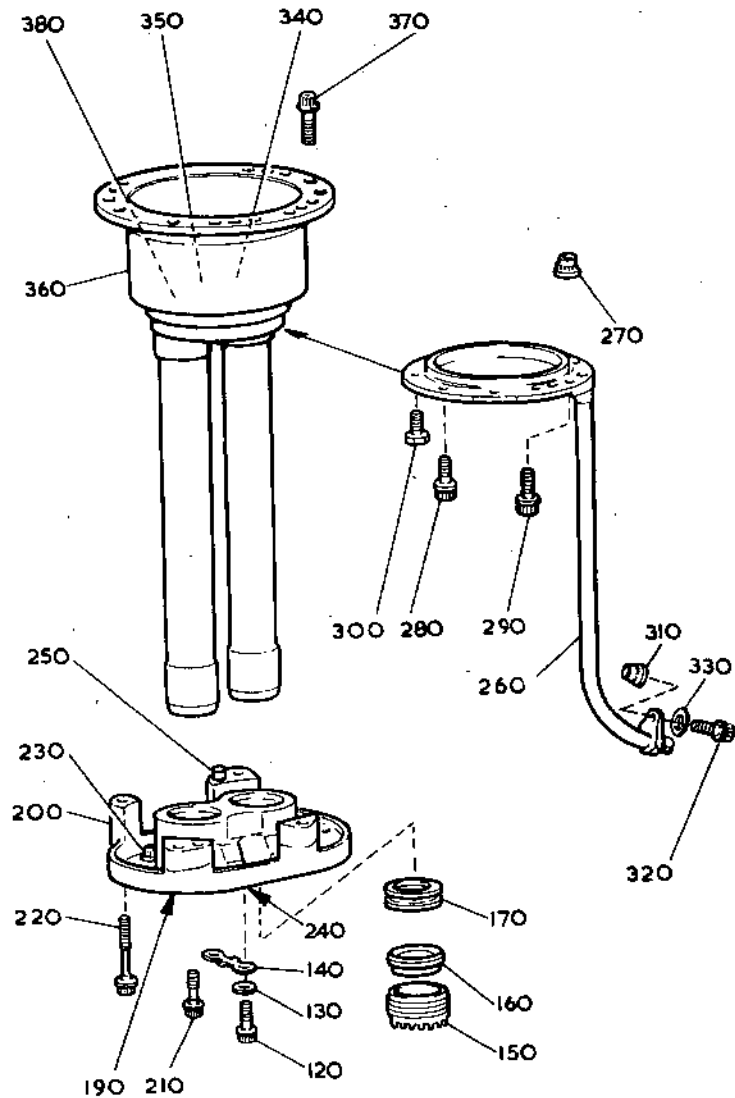
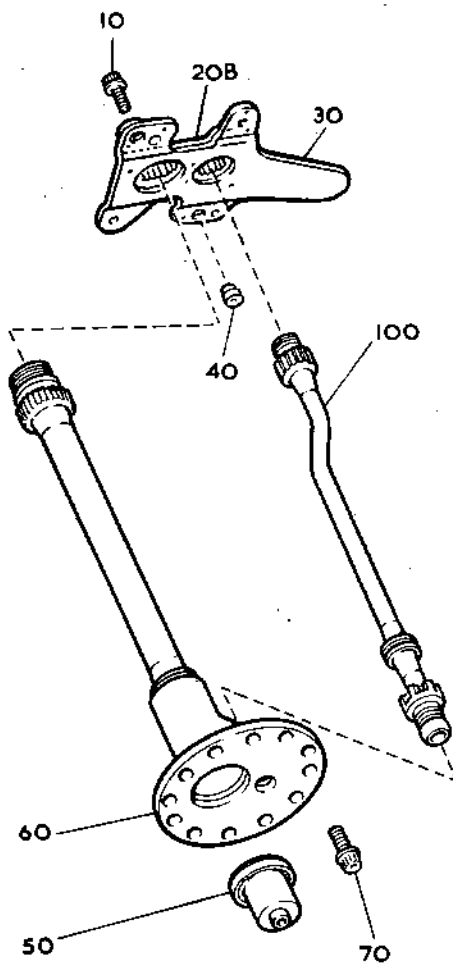
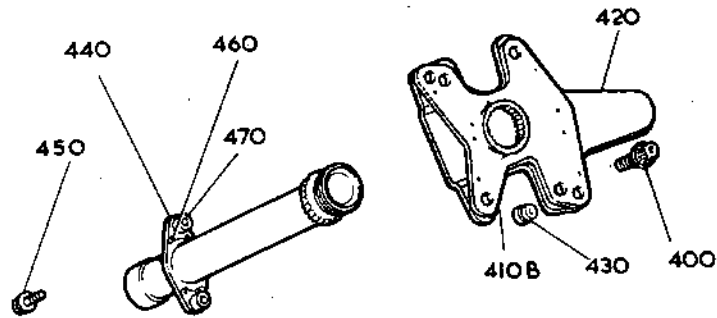


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Vanes 2, 4 and 6 Tube Details
Figure 305

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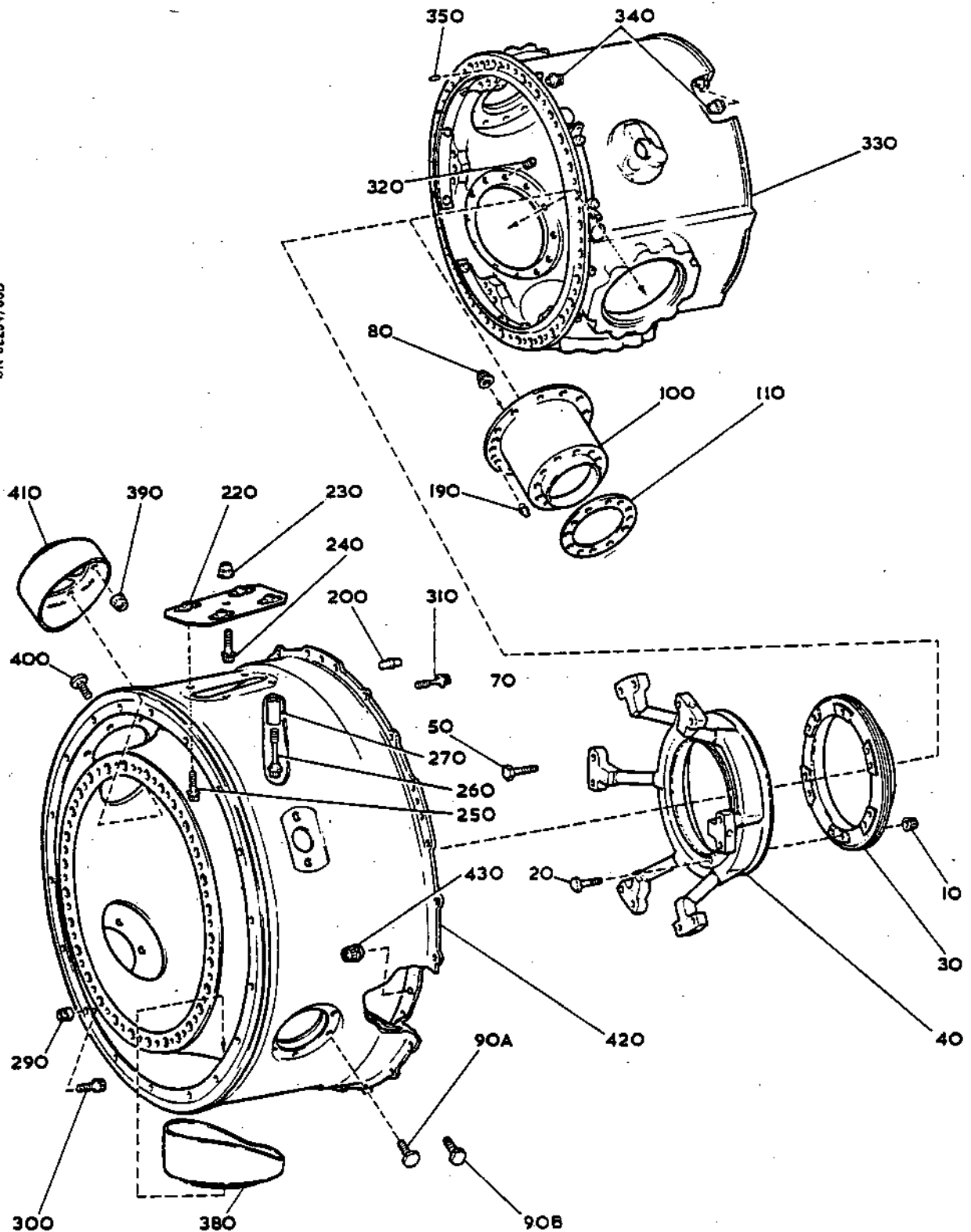


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CR 32254/00D



Inner Case and Fittings
Figure 306

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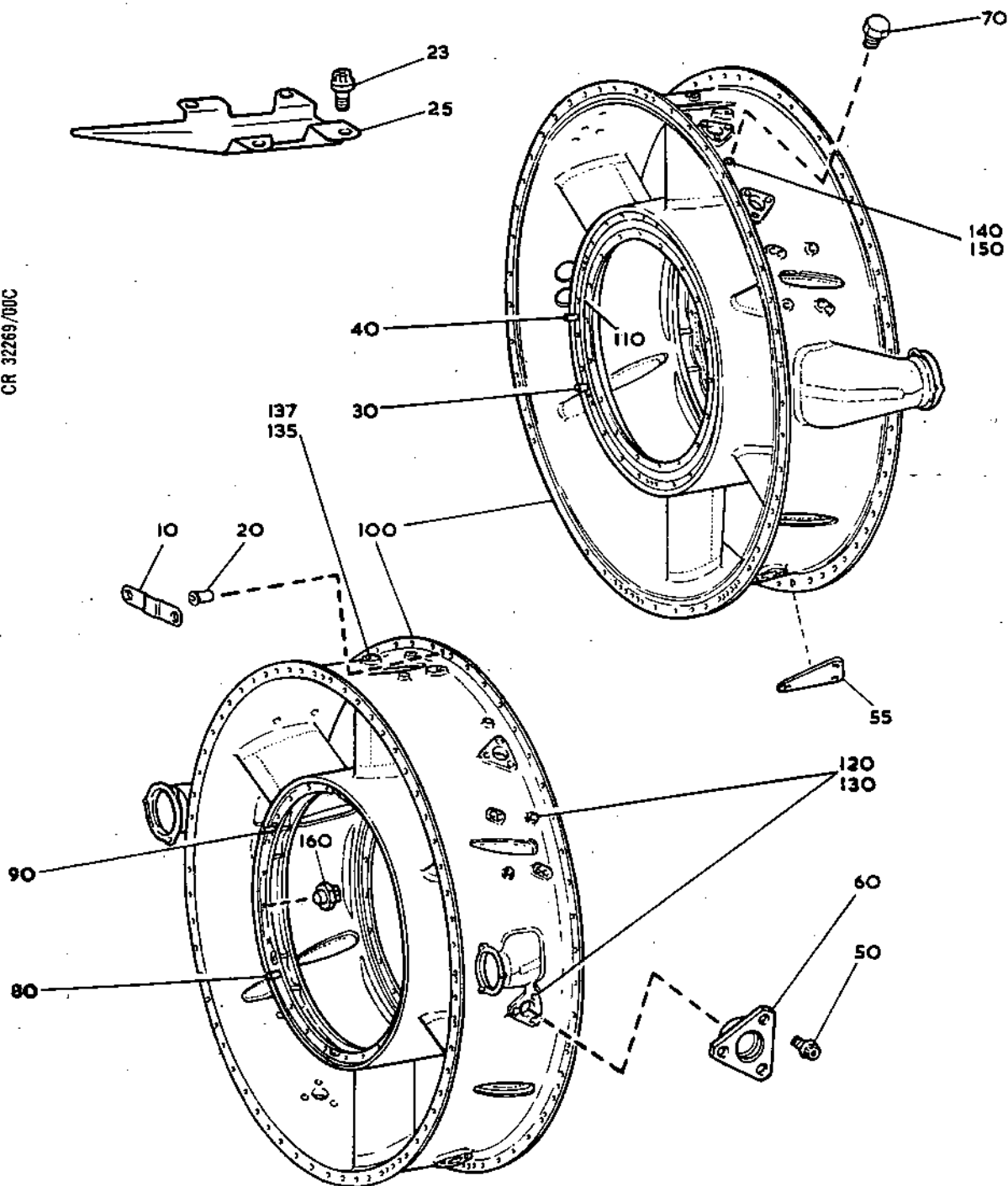
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CR 32269/00C



Outer Case and Fittings
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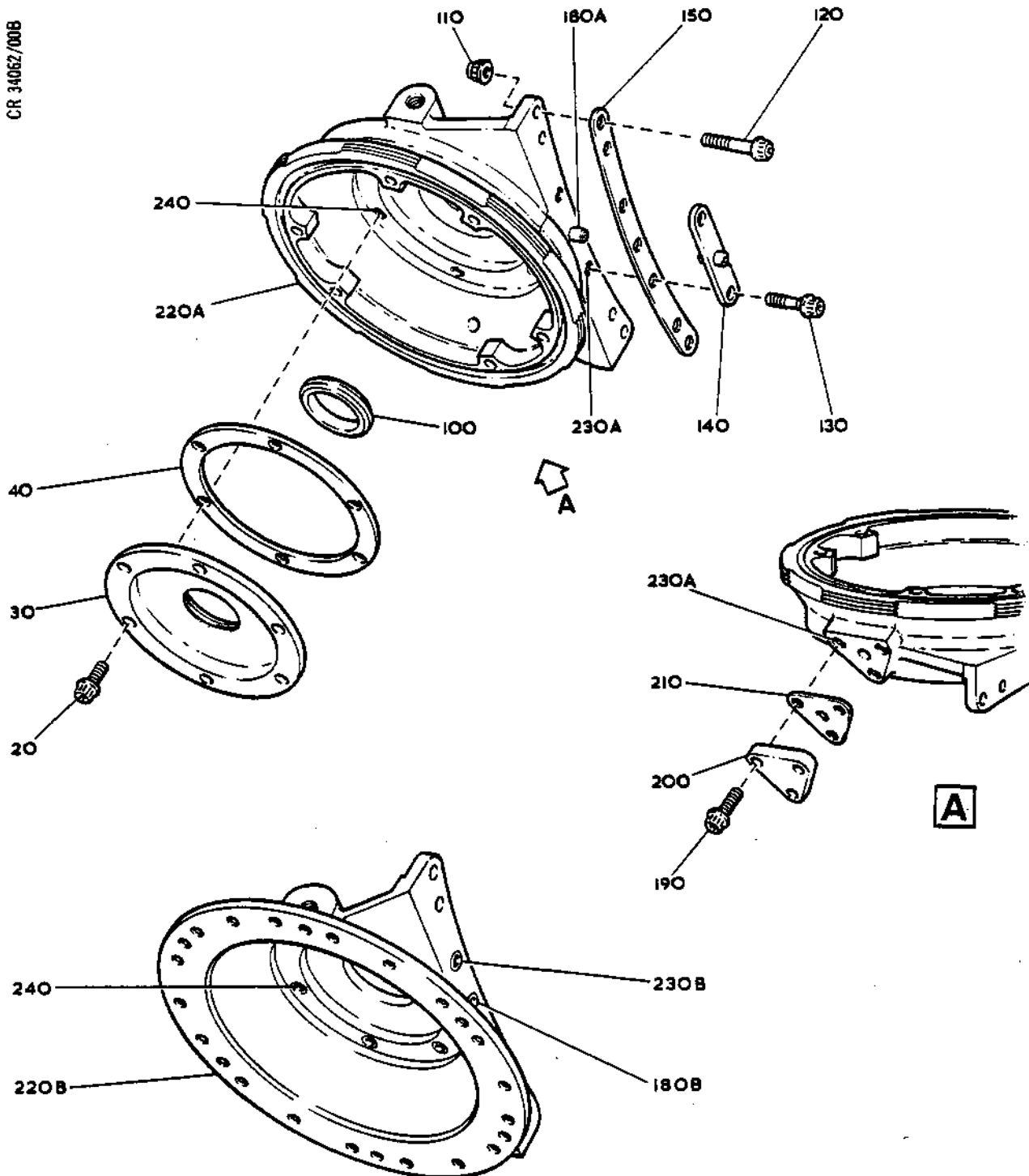
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RH Gearbox Mounting - Intermediate Compressor Case
Figure 309

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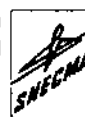
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HP COMPRESSOR CASE AND VANES - INSPECTION CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
306	440	HP Compressor Case Front	MP1
309	120	HP Compressor Case Rear	MP1

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

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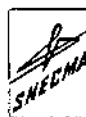


FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	80	Inner Vane Fixing Ring	F1A
302	90	Labyrinth Ring Stage 1	F1A
302	94	Liner, front	F1A
302	96	Liner, rear	F1A
302	250	HP Compressor Vane Stage 1	F2A
302	260	HP Compressor Vane Stage 1	F2A
302	270	HP Compressor Vane Stage 1	F2A
302	280	HP Compressor Vane Stage 1	F2A
302	360	Inner Vane Fixing Ring	F1A
302	370	Labyrinth Ring Stage 2	F1A
302	374	Liner, front	F1A
302	376	Liner, rear	F1A
302	460	HP Compressor Vane Stage 2	F2A
302	470	HP Compressor Vane Stage 2	F2A
302	480	HP Compressor Vane Stage 2	F2A
302	490	HP Compressor Vane Stage 2	F2A
303	80	HP Compressor Vane Stage 3	F2A
303	90	HP Compressor Vane Stage 3	F2A
303	100	HP Compressor Vane Stage 3	F2A
303	170	HP Compressor Vane Stage 4	F2A
303	180	HP Compressor Vane Stage 4	F2A
303	190	HP Compressor Vane Stage 4	F2A
303	220	HP Compressor Vane Stage 5	F2A
303	230	HP Compressor Vane Stage 5	F2A

Items to be Fluorescent Dye Crack Tested
Table 302 (Continued)

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FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
303	240	HP Compressor Vane Stage 5	F2A
304	30	HP Compressor Vane Stage 6	F2A
304	40	HP Compressor Vane Stage 6	F2A
304	50	HP Compressor Vane Stage 6	F2A
304	110	HP Compressor Exit Guide Vane	F2A
304	120	HP Compressor Exit Guide Vane	F2A
304	130	HP Compressor Exit Guide Vane	F2A

Items to be Fluorescent Dye Crack Tested
Table 302 (Concluded)

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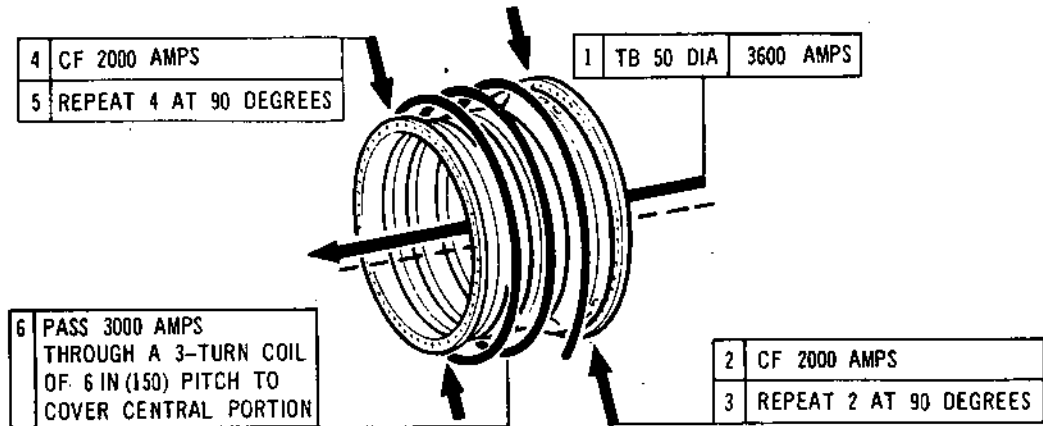
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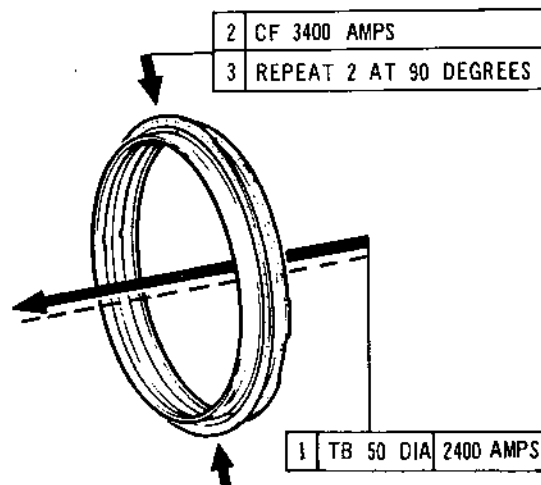


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H.P. COMPRESSOR CASE FRONT (306-440)



H.P. COMPRESSOR CASE REAR (309-120)

Crack Detection Test Diagram
(Figure 301 (Sheet 1 of 3))

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No current requirement

TN10238

Crack Detection Test Diagram
(Figure 301 (Sheet 2 of 3))

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No current requirement

Crack Detection Test Diagram
(Figure 301 (Sheet 3 of 3))

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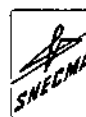


FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-33-01	Fig.1
303	72-33-01	Fig.2
304	72-33-01	Fig.3
305	72-33-01	Fig.4
306	72-33-01	Fig.5
307	72-33-01	Fig.6
308	72-33-01	Fig.7
309	72-33-01	Fig.8

Cross References to Illustrated Parts Catalogue
Table 303

4. Vane Retainer (302-30/310)

A. Inspect Vane Retainer.

- | | |
|--|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Not more than 5 per cent reduction in attachment flange thickness. | Accept after repair. |
| (b) Bolt holes elongated not more than 0.030 in. (0,760 mm) | Accept after repair. |
| (c) Vane location groove worn not more than 0.005 in. (0,130 mm). | Accept after repair. |

5. Labyrinth Retainer Plate (302-60/340)

A. Inspect Labyrinth Retainer Plate.

- | | |
|----------------------|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
|----------------------|----------------------|

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(2) Wear.

- | | | |
|-----|--|-------------------------|
| (a) | Bolt holes elongated
not more than 0.030 in.
(0,760 mm). | Accept after
repair. |
| (b) | Fretting on Labyrinth
flange not more than
0.005 in. (0,130 mm). | Accept. |

6. Inner Vane Fixing Ring (302-80/360) (Ref.SB.72-104)

- A. Carry Out Dimensional Checks (Ref.72-33-00 Fits and Clearances F.C.S. 601-90/97).

NOTE: Carry out these checks in conjunction with the Labyrinth Ring (302-90/370).

- B. Inspect Inner Vane Locations.

- | | | |
|-----|------------------|-------------------------|
| (1) | Nicks and burrs. | Accept after
repair. |
|-----|------------------|-------------------------|

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sneema

(2) Wear.

(a) Vane location groove.

(i) Pre SB.0L.593-72-8694-297 standard vane inner fixing ring, wear not more than 0.008 in. (0,20 mm) in depth on the upper and lower hook surfaces or on the base of the groove. Accept after repair.

(ii) SB.0L.593-72-8694-297 standard vane inner fixing ring (anti-fret liners). Service run vane inner fixing rings which have subsequently been modified to this standard and which show witness of "ratchet" type wear in the faces of the groove. Accept subject to the limits detailed in SB.0L.593-72-8694-297.

(b) Bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

C. Inspect Labyrinth Location Flange.

(1) Nicks and burrs. Accept after repair providing F.C.S. limits are not violated.

(2) Wear.

(a) Bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

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- (b) Light fretting not more than 0.002 in. (0,050 mm) on labyrinth flange.

Accept providing F.C.S. limits are not violated.

7. Labyrinth Ring (302-90/370)

- A. Carry Out Dimensional Checks (Ref.72-33-00 Fits and Clearances F.C.S. 601-89/90/96/97).

NOTE: Carry out these checks in conjunction with the Inner Vane Fixing Ring (302-80/360), the Front Rotor Shaft (72-33-02) and the Spacer Ring Stages 2 and 3 (72-33-02).

NOTE: Remove any burrs or metal build-up prior to carrying out these checks.

- B. Labyrinth Ring Seal Housing Bore.

- (1) Nicks and burrs.

Accept after repair.

- (2) Wear.

- (a) Damage greater than (b).

Accept after repair (Ref. 72-33-01 Repair No.1).

- (b) Any number of grooves, provided that they are all contained within an arc not greater than 90 degrees of bore mean circumference, that maximum depth is not greater than 0.010 in. (0,250 mm) and that F.C.S. limits are not violated.

Accept.

- (3) Distortion.

- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S.

Accept.

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C. Inspect Vane Fixing Ring Location.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.
 - (b) Light fretting not more than 0.002 in. (0,050 mm) on vane fixing ring flange. Accept providing F.C.S. limits are not violated.

8. Sleeve (302-110/120/140/210/390/400/420, 303-20/70/120/210, 304-20/70)

A. Inspect Sleeve.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Not more than 0.010 in. (0,250 mm) at sleeve ends. Accept providing sleeve ends are parallel.

9. Retaining Plate (302-170/240/450)

A. Inspect Retaining Plate.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

10. Air Supply Block (302-190)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

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B. Inspect Air Supply Block.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Bolt holes elongated not more than 0.010 in. (0,250 mm). Accept after repair.
- (3) Scores.
 - (a) Not more than 0.002 in. (0,050 mm) in depth and not extending right across the sealing face. Accept after repair providing sealing capabilities are unimpaired.

C. Inspect Tube Nipple Seating.

- (1) Wear.
 - (a) Light witness mark. Accept after repair.

11. HP Compressor Vane (302-250/260/270/280/460/470/480/490
(Ref.SB.72-104) 303-80/90/100/170/180/190/220/240, 304-30/40/
50/110/120/130)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Vane Inner Fixing Abutment Faces Stages 1 and 2.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Not more than 0.001 in. (0,025 mm) in depth on vanes to pre or SB.72-104 and Mod.7198 standard. Accept.
 - (b) Not more than 0.003 in. (0,076 mm) in depth on vanes to Mod.8453 standard. Accept.
- (3) Scores.
 - (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair, subject to satisfactory crack detection.

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(4) Chipping.

(a) Not more than 10 per cent of hard coating chipped. Accept.

(b) 10 per cent or more of hard coating removed. Accept after repair (i.e. recoating).

C. Inspect Vane Inner Fixing Hook Surfaces Stages 1 and 2.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Not more than 0.010 in. (0,250 mm) on upper and lower hook surfaces. Accept after repair.

(3) Scores.

(a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair, subject to satisfactory crack detection.

(4) Damage to corners (Ref. Fig.310 Detail A).

NOTE: Damage is acceptable on one corner of each hook.

(a) Dimension 'A' not more than 0.25 in. (6,350 mm) and dimension 'B' not more than 0.15 in. (3,810 mm). Accept after repair.

D. Inspect Vane Outer Fixing Surfaces Stages 1 and 2 (Ref. Fig.310 Detail B).

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Not more than 0.002 in. (0,05 mm) in depth on 'C' and 'D' surfaces. Accept.

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(b) Not more than 0.003 in. Accept.
(0,08 mm) in depth over
less than 67 per cent of
the surface area of each
surface 'E'.

(c) Not more than 0.001 in. Accept.
(0,025 mm) in depth on
surfaces 'E' not covered
in (b).

E. Inspect Vane Outer Fixing Surfaces Stages 3 to 6 and Exit
Guide (Ref. Fig.310 Detail B).

(1) Nicks and burrs. Accept after
repair.

(2) Wear.

(a) Not more than 0.001 in. Accept.
(0,025 mm) in depth on
'E' surface, or 0.002 in.
(0,050 mm) in depth on
'C' and 'D' surfaces.

F. Inspect Vane Aerofoil.

(1) Inspect to acceptance and blending standard
(Ref.72-33-01, Repair No.2).

G. Inspect Probe Locations.

(1) Nicks and burrs. Accept after
repair.

12. Probe Mounting Block (303-60/160, 304-100)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Probe Mounting Block.

(1) Nicks and burrs. Accept after
repair.

(2) Wear.

(a) Bolt holes elongated Accept after
not more than 0.030 in. repair.
(0,760 mm).

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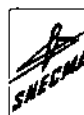
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(3) Scores.

(a) Not more than 0.010 in.
(0,250 mm) in depth
on abutment face.

Accept after
repair.

13. Brackets (305-30/110/150/160/190/200/230/240/280/290,
306-90/100/130/310/320/360/370/400, 307-110/160/170/215/220/
230/270/300/350/380/410/440/470, 308-50/80/110/140/170/200/
230/260/290/320, 309-170/200/250/280/320/350/380/410) and
Mounting Plate (307-80)

A. Inspect Attachment Faces.

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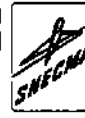
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(1) Nicks and burrs. Accept after repair.

(2) Wear and fretting.

(a) Attachment face thickness reduced by not more than 10 per cent. Accept.

(b) Bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

(3) Scores.

(a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing material thickness is not reduced by more than 10 per cent.

(4) Distortion.

Accept if compatibility is preserved.

14. Mounting Brackets (305-60, 306-170) Mounting Plate (309-30) and Brackets (305-350, 309-70/100/275)

A. Inspect Attachment Faces.

(1) Nicks and burrs. Accept after repair.

(2) Wear and fretting.

(a) Not more than 5 per cent reduction in flange thickness. Accept.

(b) Bolt holes elongated not more than 0.015 in. (0,380 mm). Accept after repair.

(3) Scores.

(a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing material thickness is not reduced by more than 5 per cent.

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B. Inspect Bracket.

- | | |
|--|--|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Item 306-170, any elongation of bush (306-180). | Reject. |
| (b) Mounting holes elongated not more than 0.010 in. (0,250 mm). | Accept after repair. |
| (3) Scores. | |
| (a) Not more than 0.010 in. (0,250 mm) in depth. | Accept after repair subject to satisfactory crack detection. |

15. Blanking Plate (305-380)

A. Inspect Blanking Plate.

- | | |
|--|--|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Not more than 5 per cent reduction in flange thickness. | Accept after repair providing sealing capabilities are unimpaired. |
| (b) Bolt holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |
| (3) Scores. | |
| (a) Not more than 0.010 in. (0,250 mm) in depth. | Accept after repair providing flange thickness is not reduced by more than 5 per cent and sealing capabilities are unimpaired. |

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(4) Distortion.

(a) Any distortion.

Reject.

16. Bracket Assembly (306-270)

A. Inspect Tube (Ref.72-09-00 Inspection/Check).

B. Inspect Attachment Flange.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear and fretting.

(a) Not more than 5 per cent
reduction in flange
thickness.

Accept.

(b) Bolt holes elongated
not more than 0.010 in.
(0,250 mm).

Accept after
repair.

(3) Scores.

(a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing material
thickness is not
reduced by more
than 5 per cent.

(b) Any distortion on
attachment bracket.

Accept providing
HP compressor case
contour and com-
patibility is
preserved.

C. Inspect Assembly.

(1) Distortion.

(a) Any distortion on
lifting tube.

Reject.

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17. Bush (306-180)

A. Inspect Bush.

- | | |
|---|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Scores. | |
| (a) Not more than 0.005 in.
(0,130 mm) in depth. | Accept after repair. |
| (3) Wear. | |
| (a) Any elongation. | Reject. |

18. Front HP Compressor Case Assembly (306-440)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Carry Out Dimensional Checks.

NOTE: Acceptance of HP Compressor Case Front is subject to F.C.S. 601-140/141/142/143/144 being acceptable on assembly, i.e. radial tip clearances, blade to case.

C. Inspect Front and Rear Attachment Faces.

- | | |
|--|----------------------|
| (1) Scores. | |
| (a) Not more than 0.005 in.
(0,130 mm). | Accept after repair. |
| (2) Nicks and burrs. | Accept after repair. |
| (3) Fretting and wear. | |
| (a) Fretting not more than
0.005 in. (0,130 mm). | Accept after repair. |
| (b) Bolt holes elongated
not more than 0.030 in.
(0,760 mm). | Accept after repair. |

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sneema

- D. Inspect Vane Locations (Ref. Fig.310 Detail D Surface 'H').
- (1) Nicks and burrs. Accept after repair
 - (2) Wear
 - (a) Bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.
 - (b) Not more than 0.005 in. (0,130 mm). Accept after repair
- E. Inspect Case Inner Lands (Ref. Fig.310 Detail D Surface 'G').
- (1) Nicks and burrs.
 - (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing F.C.S. limits are not violated.
 - (2) Wear.
 - (a) Not more than 0.009 in. (0,230 mm) in depth. Accept after repair providing F.C.S. limits are not violated.
 - (3) Scores.
 - (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing F.C.S. limits are not violated.
 - (4) Surface damage greater than (1) to (3).
 - (a) Not more than 0.012 in. (0,305 mm) in depth and in groups covering an area not greater than 1.00 in. (25,4 mm) in diameter on Stages 1 and 2, and not greater than 0.75 in. (19,05 mm) in diameter on Stages 3 to 5 and each group spaced not less than 60 degrees apart circumferentially. Accept after repair.

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(5) Metallic build-up.

Accept after repair providing repair restores circumferential profile of case inner lands.

F. Inspect General Condition of Case.

(1) Nicks and burrs.

Accept after repair.

(2) Wear.

(a) Bolt holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

G. Inspect Air Delivery Vents.

(1) Nicks and burrs.

Accept after repair.

19. Engine Lifting Bracket (307-50/480)

A. Inspect Brackets.

(1) Nicks and burrs.

Accept after repair.

(2) Distortion.

(a) Any distortion.

Reject.

(3) Wear.

a) Any wear.

Reject.

20. Rear HP Compressor Case Assembly (309-120)

A. Carry Out Dimensional Checks.

NOTE: Acceptance of HP Compressor Case Rear is subject to F.C.S. 601-145/146 being acceptable on assembly, i.e. radial tip clearances, blade to case.

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B. Inspect Front and Rear Attachment Faces.

(1) Scores.

(a) Not more than 0.005 in.
(0,130 mm). Accept after
repair.

(2) Nicks and burrs. Accept after
repair.

(3) Fretting and wear.

(a) Not more than 0.005 in.
(0,130 mm). Accept after
repair.

(b) Bolt holes elongated
not more than 0.030 in.
(0,760 mm). Accept after
repair.

C. Inspect Vane Locations (Ref. Fig.310 Detail D Surface 'H').

(1) Nicks and burrs. Accept after
repair.

(2) Wear.

(a) Bolt holes elongated
not more than 0.030 in.
(0,760 mm). Accept after
repair.

(b) Not more than 0.005 in.
(0,125 mm). Accept after
repair.

D. Inspect Case Inner Lands (Ref. Fig.310 Detail D Surface 'G').

(1) Nicks and burrs.

(a) Not more than 0.010 in.
(0,250 mm) in depth. Accept after repair
providing F.C.S.
limits are not
violated.

(2) Wear.

(a) Not more than 0.007 in.
(0,180 mm) in depth. Accept after repair
providing F.C.S.
limits are not
violated.

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(3) Scores.

- | | |
|---|--|
| (a) Not more than 0.010 in.
(0,250 mm) in depth. | Accept after repair
providing F.C.S.
limits are not
violated. |
|---|--|

(4) Surface damage greater than (1) to (3).

- | | |
|---|-------------------------|
| (a) Not more than 0.012 in.
(0,305 mm) in depth and
is greater than 0.75 in.
(19,05 mm) in diameter
and each group spaced
not less than 60 degrees
apart circumferentially. | Accept after
repair. |
|---|-------------------------|

(5) Metallic build-up.

Accept after
repair providing
repair restores
circumferential
profile of case
inner lands.

E. Inspect General Condition of Case.

- | | |
|--|-------------------------|
| (1) Nicks and burrs. | Accept after
repair. |
| (2) Wear. | |
| (a) Bolt holes elongated
not more than 0.030 in.
(0,760 mm). | Accept after
repair. |

F. Inspect Rokide Coating.

NOTE: Prior to applying the following standard, check the Rokide coating around the edge of the chipped area for faulty adhesion. Remove any suspect areas. Finally dress edges of Rokide around chipped area.

(1) Chipping.

- | | |
|---|---------|
| (a) Chipping over the full
width of each land. | Accept. |
|---|---------|

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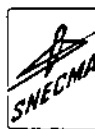
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- | | | |
|-----|--|--------------------|
| (b) | For full width loss greater than 5 in.
(127 mm) peripheral length over the top 180 degrees of the case. | Reject for repair. |
| (c) | For full width loss greater than 10 in.
(254 mm) peripheral length over the bottom 180 degrees of the case. | Reject for repair. |
| (d) | Any number of areas of chipping not exceeding 10 per cent of the total coated area. | Accept. |

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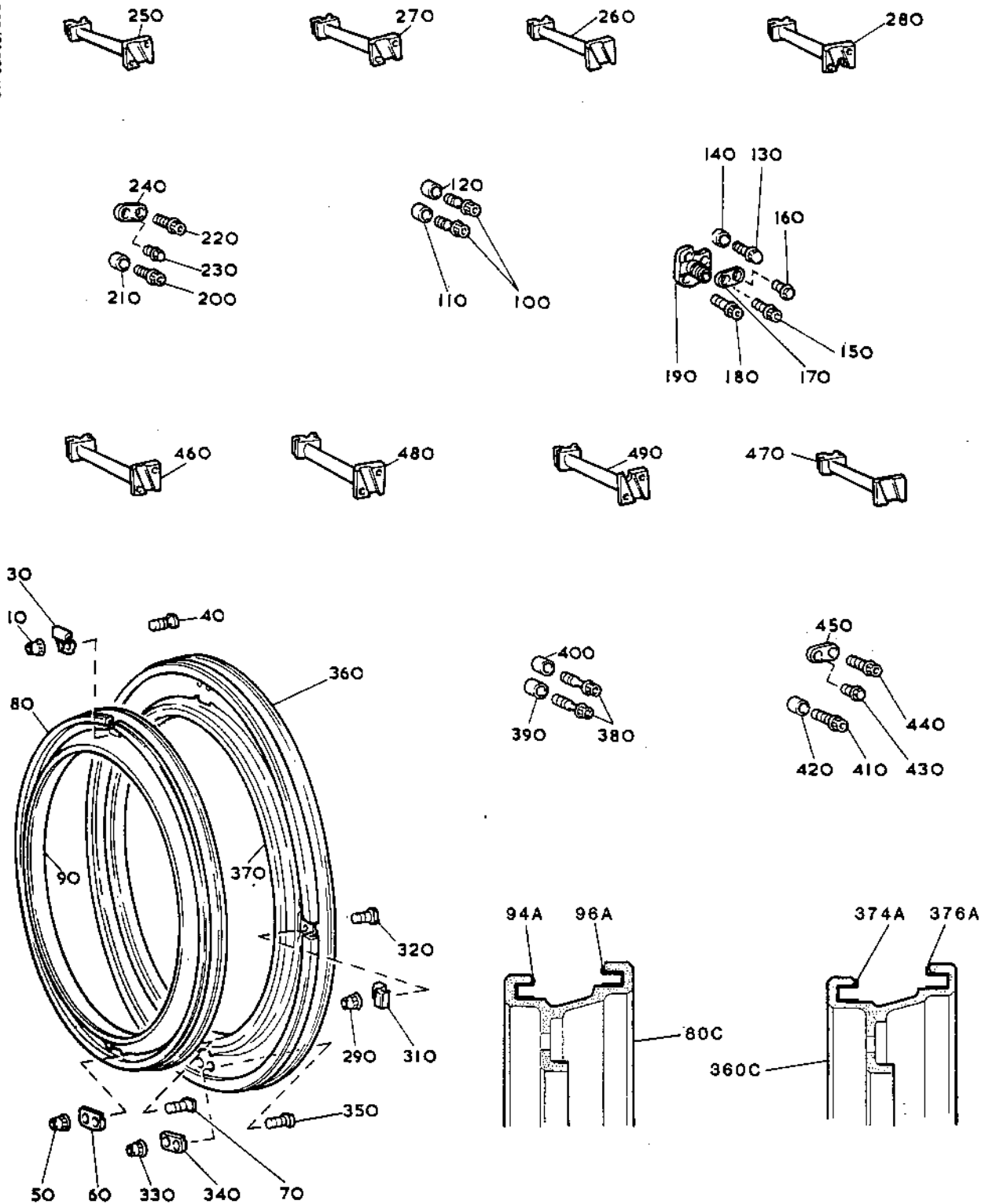
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HP Compressor Case and Vanes - Vanes Stages 1 and 2
Figure 302

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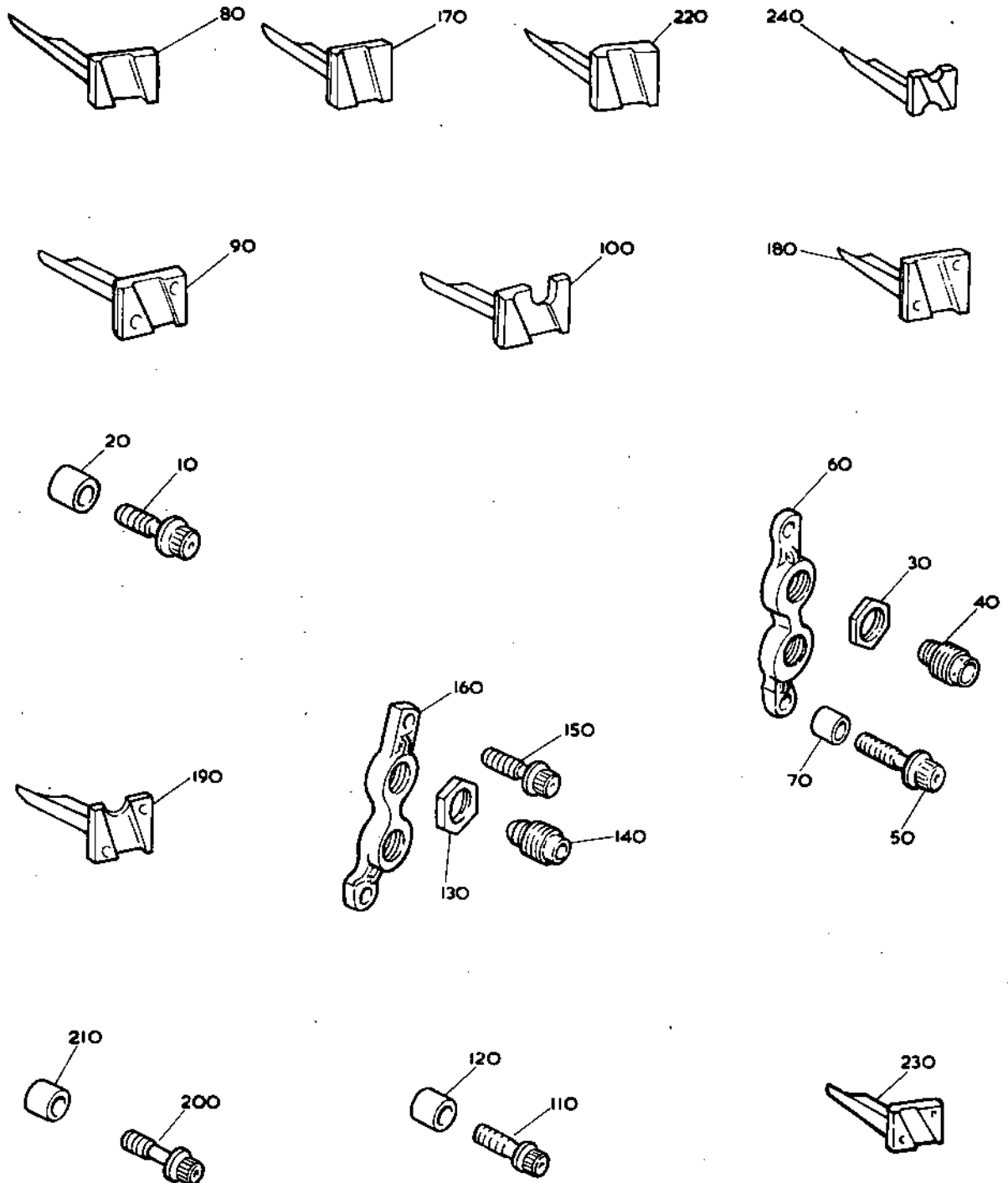


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HP Compressor Case and Vanes - Vanes Stages 3, 4 and 5
Figure 303

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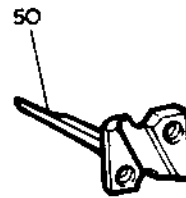
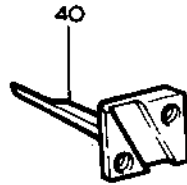
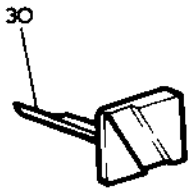


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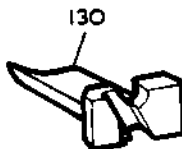
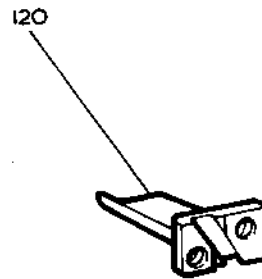
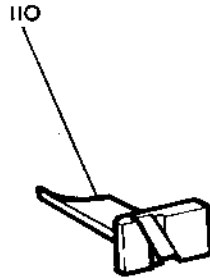
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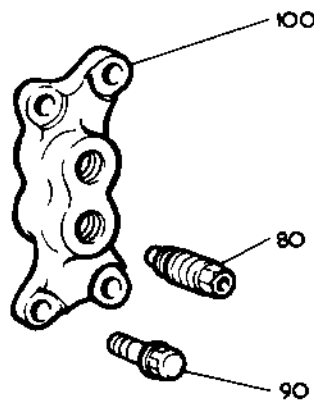
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20 10



70 60



80 90

TN485

HP Compressor Case and Vanes -
Vanes Stage 6 and Exit Guide
Figure 304

INSPECTION/CHECK

72-33-01

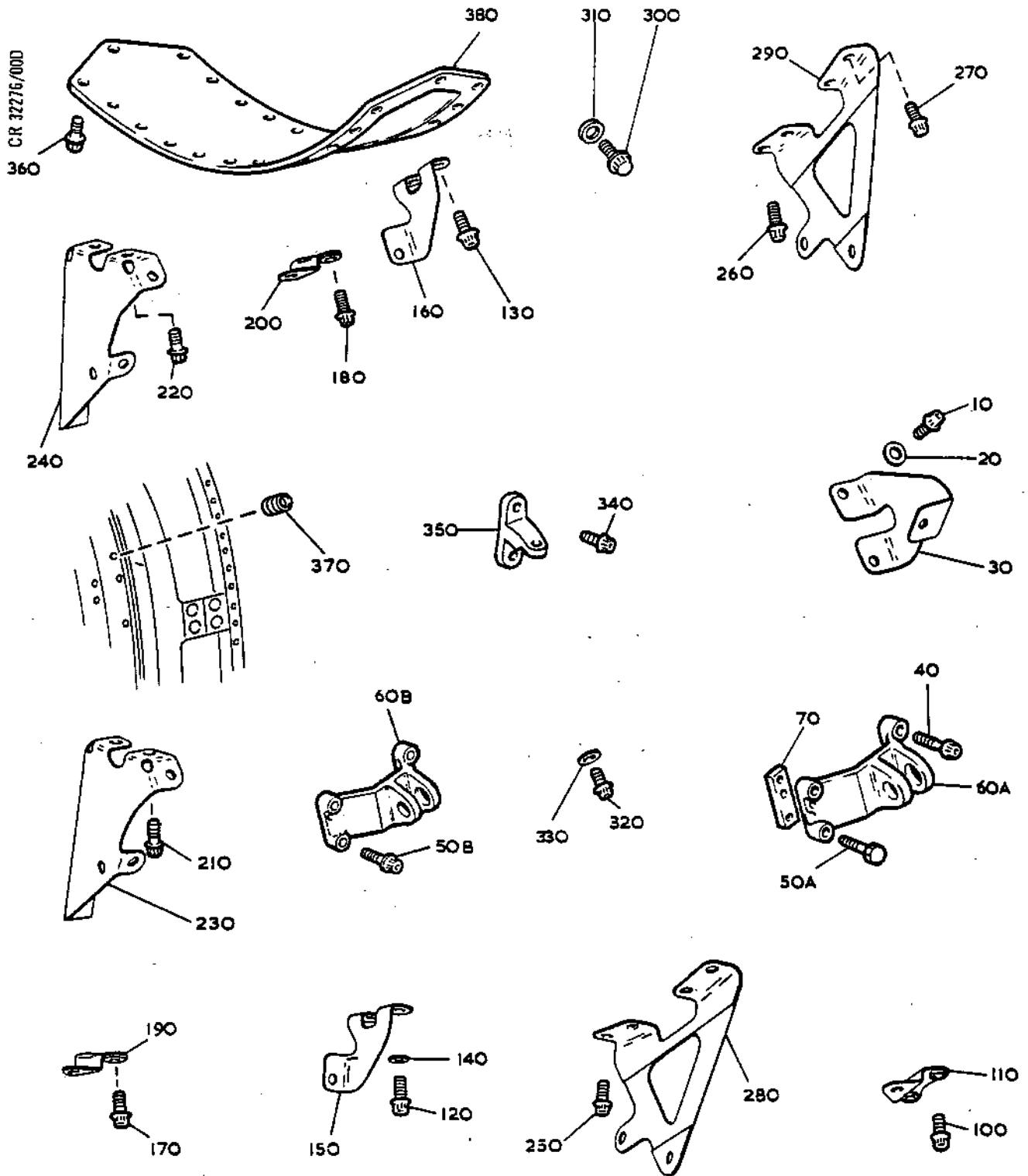
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Front HP Compressor Case and External Fittings (LH)
Figure 305

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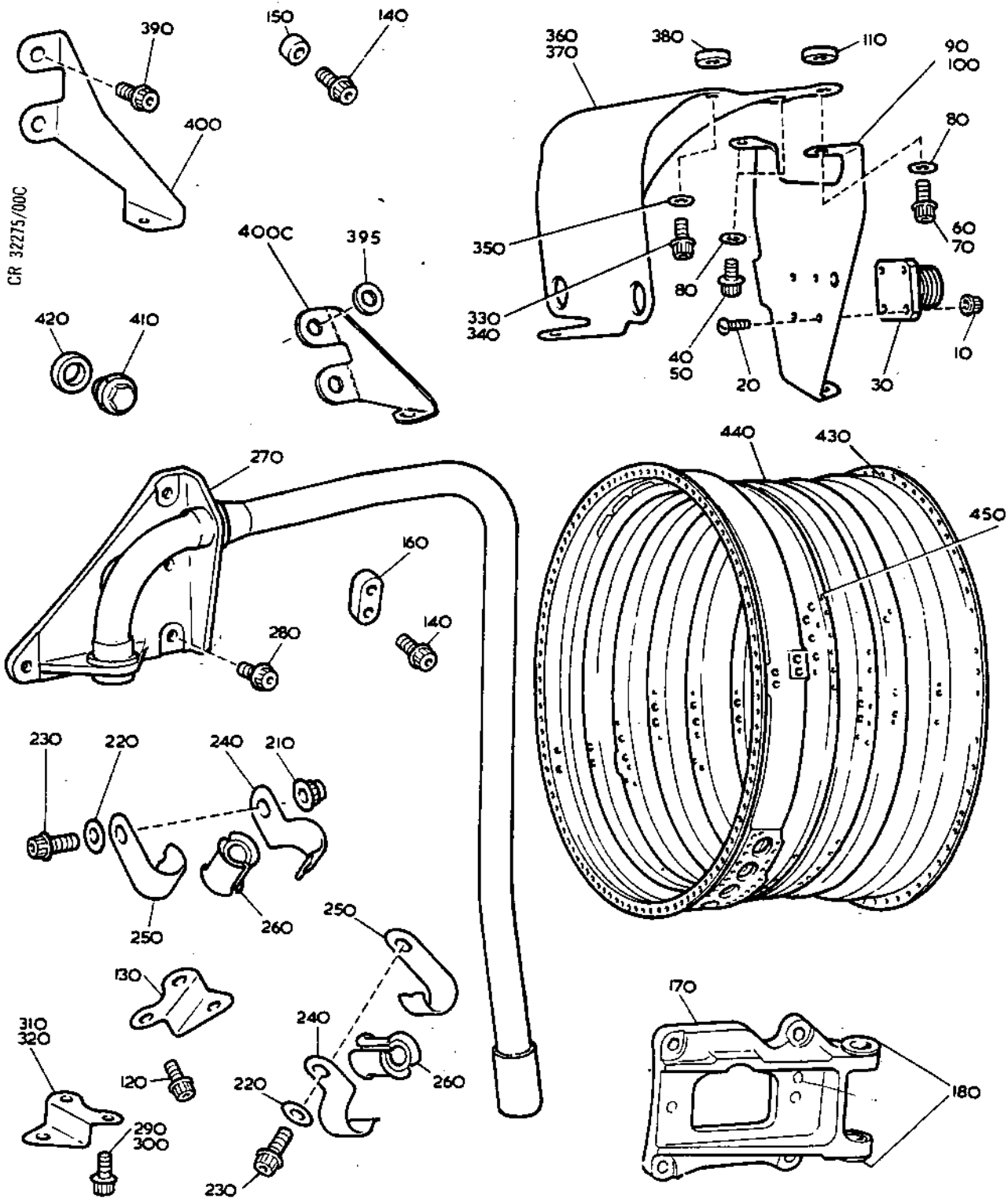
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Front HP Compressor Case and External Fittings (RH)
Figure 306

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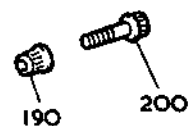
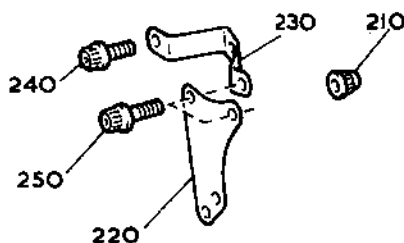
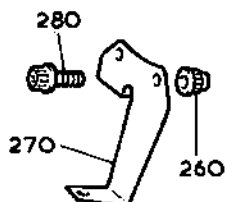
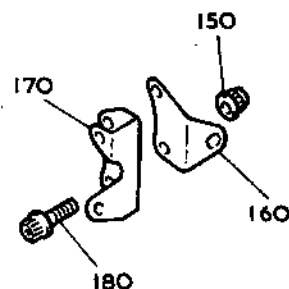
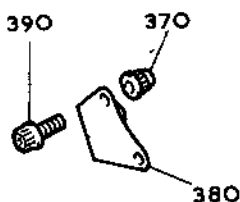
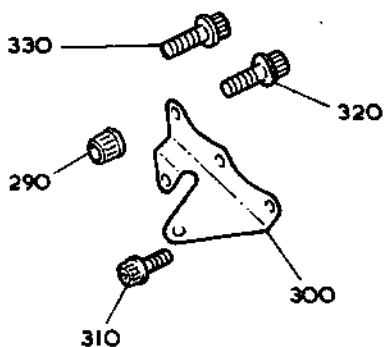
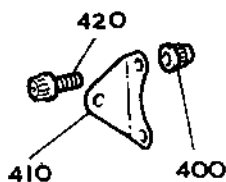
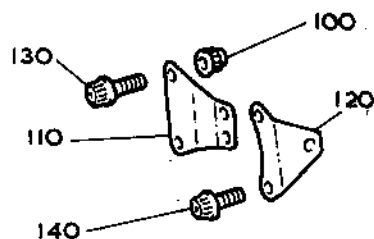
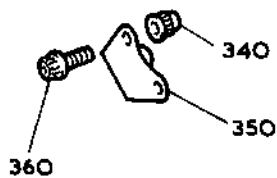
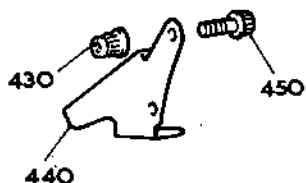
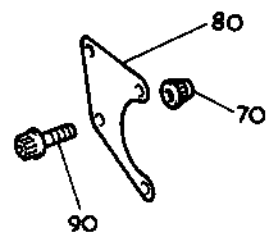
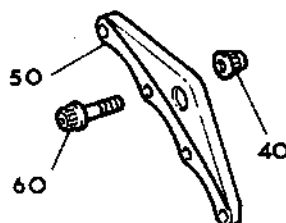
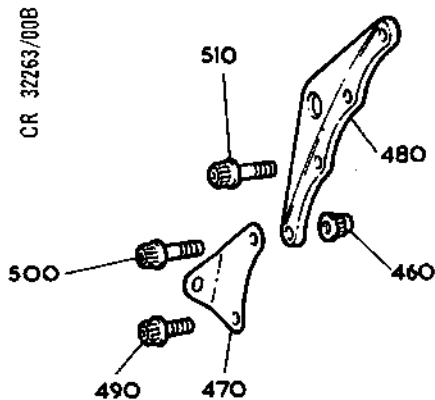


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CR 32263/008



Front HP Compressor Case Front Flange Attaching Parts
Figure 307

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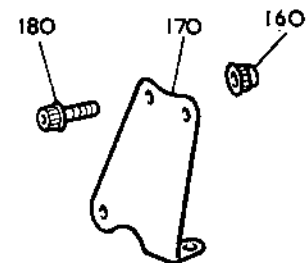
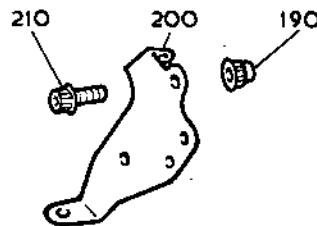
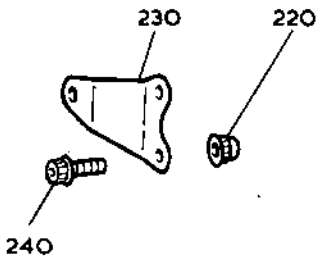
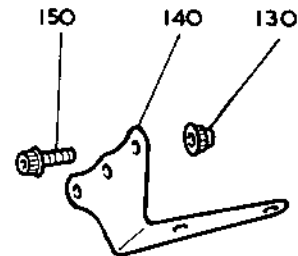
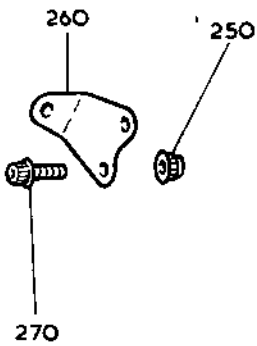
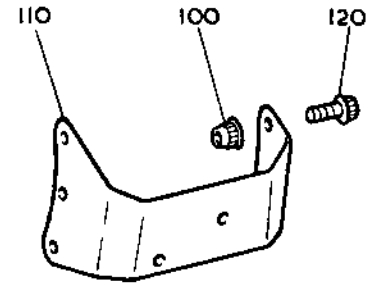
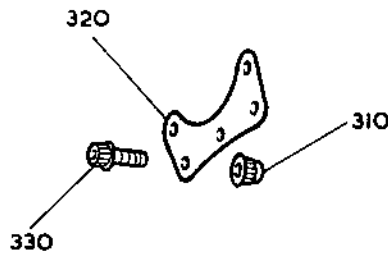
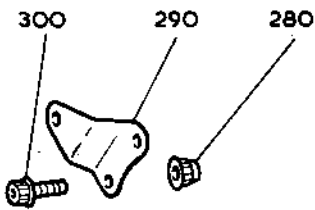
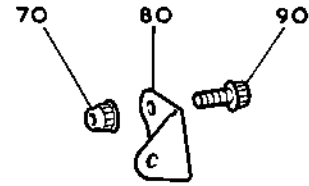
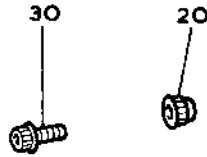
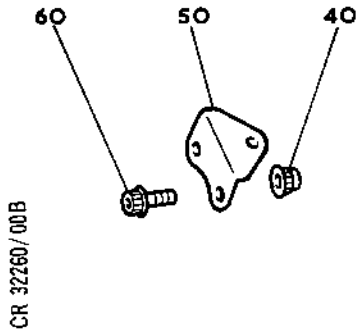
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Front HP Compressor Case Rear Flange Attaching Parts
Figure 308

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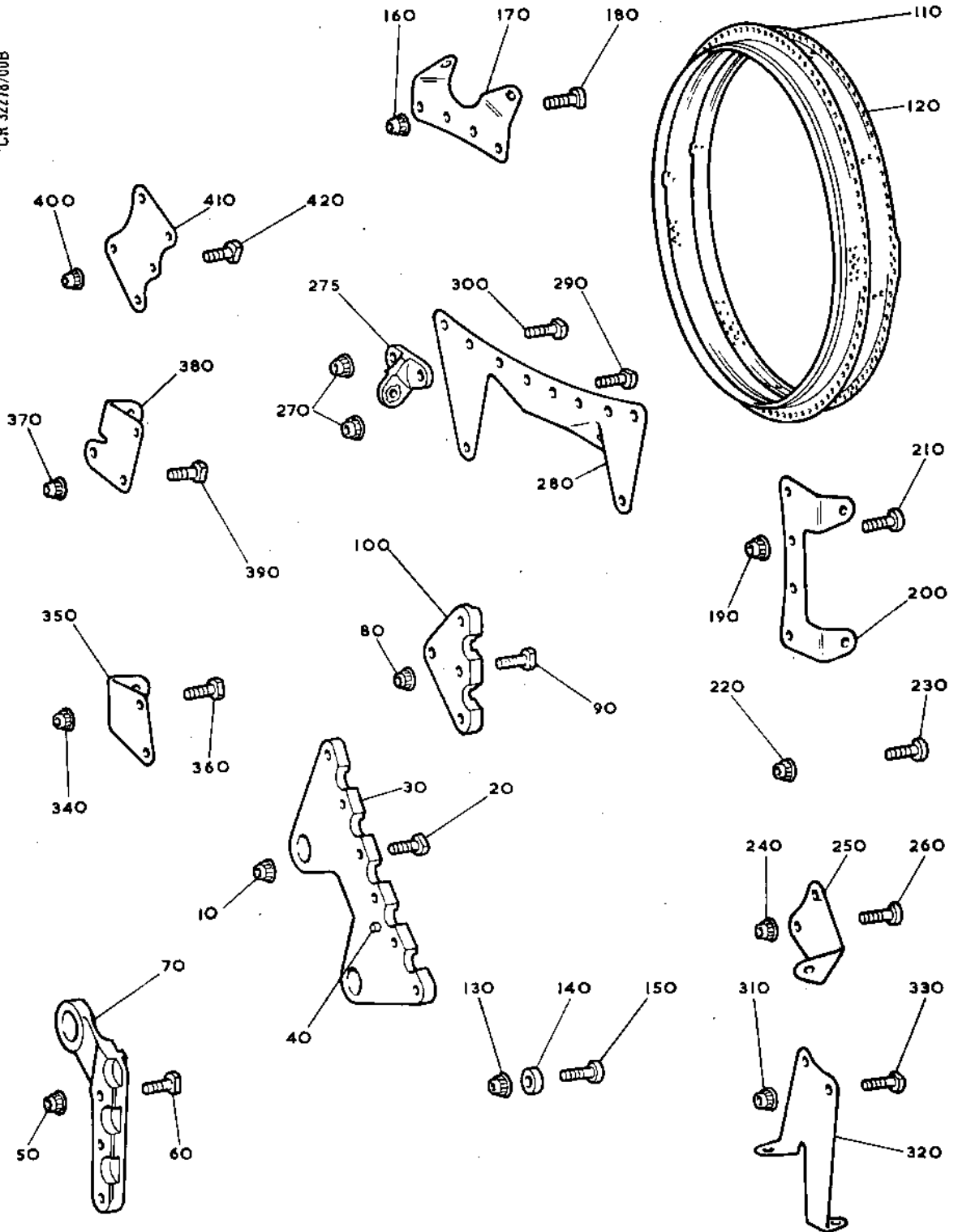
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CR 32278/00B



Rear HP Compressor Case
Figure 309

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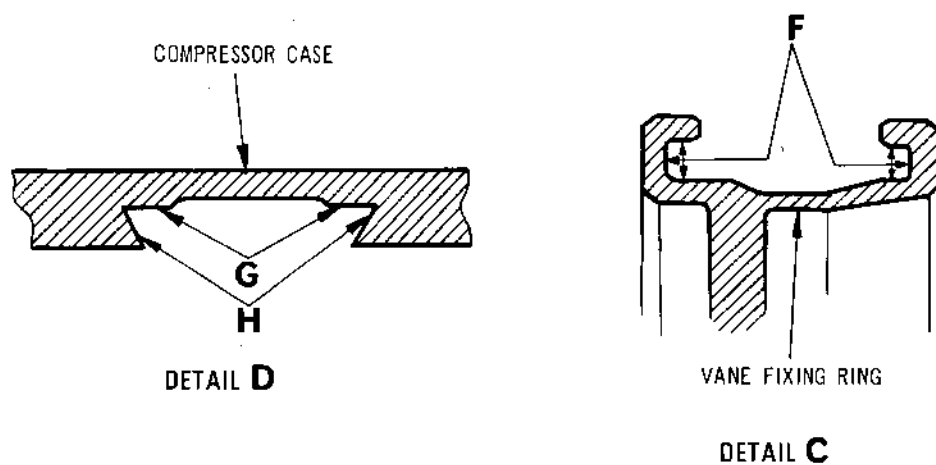
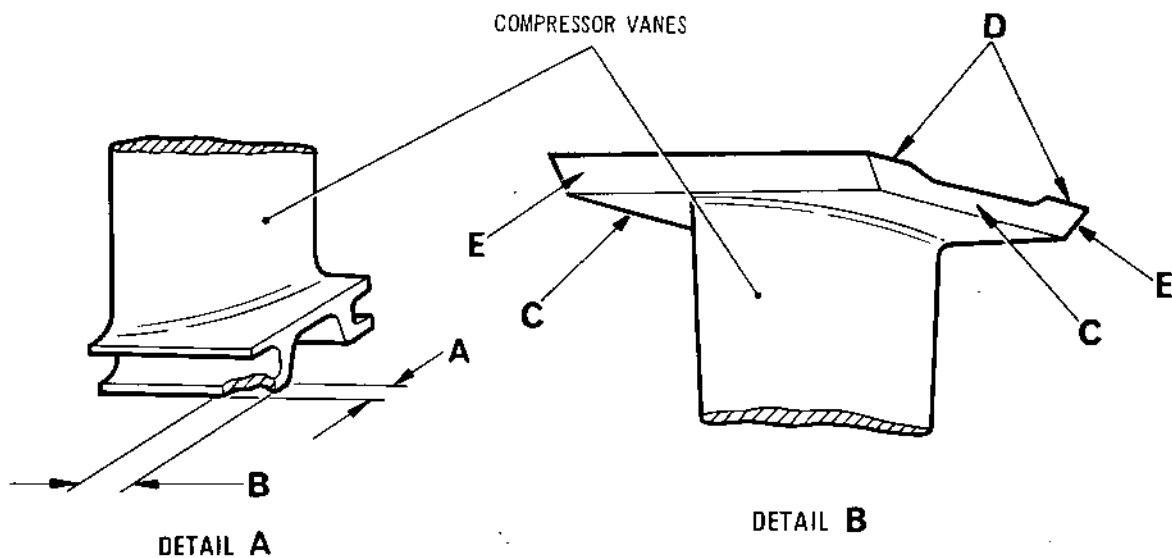


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HP Compressor Vane, Case and Fixing
Ring Inspection Zones
Figure 310

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HP COMPRESSOR ROTOR - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.
- F. Certain types of blade damage can be repaired in-situ, without dismantling the engine. For details of in-situ blade blending and acceptance limits refer to 72-09-31 LP and HP Compressor Rotor Blades - Repair by In-situ Blending.

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2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards. Special attention must be paid to the critical areas of certain specified items during inspection. An instruction to this effect is included in the inspection detailed for the specified item.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.
- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

Items marked with an asterisk (*) in Table 301 feature defined critical areas. (Ref.Figs.308 and 309). In addition to the general overall crack detection examination, special attention must also be paid to these defined critical areas during the inspection.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	10	Adjusting Washer	MP1
302	200	Shouldered Bolts	MP1
302	300*	Stage 2 Disk	MP1
302	310/360	Shouldered Bolts	MP1
302	330*	Stage 2-3 Spacer Ring	MP1
302	350*	Stage 3 Disk	MP1
304	120	HP Turbine Bearing - Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
304	400	Air Transfer Tube	MP1

Items to be Magnetic Particle Crack Tested
Table 301

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**ATP
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OLYMPUS 593 OVERHAUL MANUAL

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

Dennis Horsfield

For Chief Technical and Industrial Services Engineer CAA Design Approval No.DAI/8566/78

TEMPORARY REVISION NO.72-566

Insert in 72-33-02 after page 302

REASON FOR ISSUE

To add a BEOL procedure following Table 301

ACTION

(3) BEOL PROCEDURE

The following process may be used in lieu of process MP1 specified in Table 301.

Equipment and Materials

- (a) Magnaflux Model X2152 Pancake Coil and Knife Switch Unit.
- (b) Magnaflux TAQ 1205 three phase full wave rectified power supply connected to (a) by twin cables.
- (c) Ardrex type 851-3 ink containing 0.2 to 0.3% fluorescent magnetic particle inspection powder.

Procedure

The items tabulated below can be crack detected using the following method:-

Fig. No.	Item No.	Description
302	300	Stage 2 Disc
302	330	Stage 2 - 3 Spacer Ring
302	350	Stage 3 Disc

- (1) Demagnetise
- (2) Magnetise using Knife Switch 3000A. Item being magnetised must be rotated through coil.
- (3) Apply ink on residual techniques.
- (4) Inspect under U.V. light.
- (5) Demagnetise.
- (6) Magnetise using pancake Coil 2800A.
- (7) Apply ink on residual techniques.
- (8) Inspect under U.V. light.
- (9) Demagnetise.

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B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

Items marked with an asterisk (*) in Table 302 feature defined critical areas. (Ref.Figs.308, 309, 310 and 311). In addition to the general overall crack detection examination, special attention must also be paid to these defined critical areas during the inspection.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	210	Stage 1 Blades	F2A
302	230*	Stage 1 Disk	F2A
302	260*	Front Rotor Shaft	F2A
302	280	Stage 2 Blades	F2A
302	340	Stage 3 Blades	F2A
302	380*	Stage 3-4 Spacer Ring	F2A
303	10	Stage 4 Blades	F2A
303	20*	Stage 4 Disk	F2A
303	30/80	Shouldered Bolts	F2A
303	50*	Stage 4-5 Spacer Ring	F2A
303	60	Stage 5 Blades	F2A
303	70*	Stage 5 Disk	F2A
303	100*	Stage 5-6 Spacer Ring	F2A
303	110	Stage 6 Blades	F2A
303	120*	Stage 6 Disk	Refer to SB. 72-8880-337 for process
304	170	Machine Bolts	F1A
304	220/240	Bolt, Externally Relieved Body	F1A
304	300	No.12 Labyrinth	F2A
304	320	Shouldered Bolts	F2A
304	330*	Drive Shaft	F2A
304	350	Dee-head Bolts	F1A
304	360	Stage 7 Blades	F2A
304	370*	Stage 7 Disk	F2A
304	380	Shouldered Bolts	F2A
304	390*	Stage 6-7 Spacer Ring	F2A

Items to be Fluorescent Dye Crack Tested
Table 302 (Concluded)

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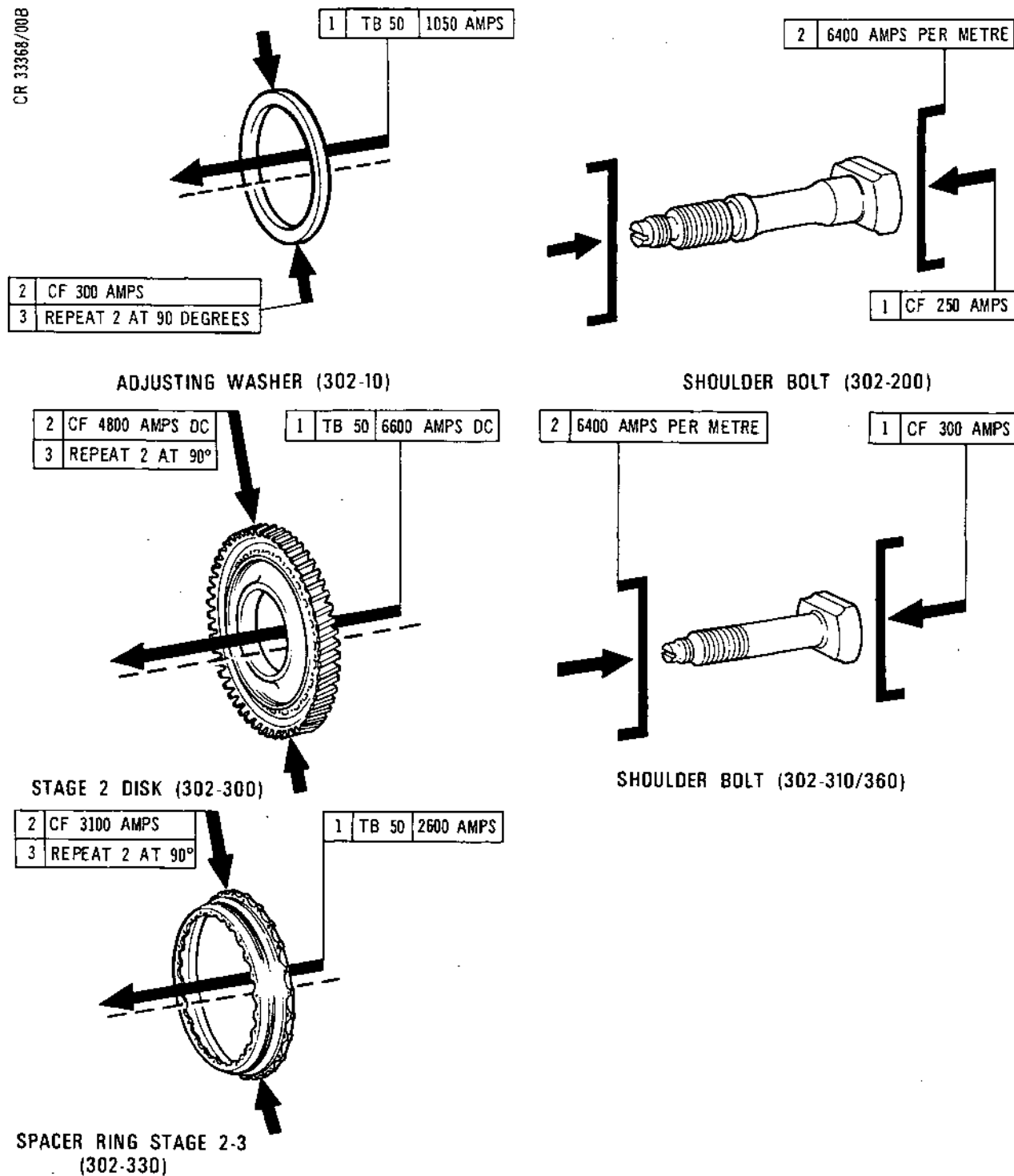
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Crack Detection Test Diagram
Figure 301 (Sheet 1 of 2)

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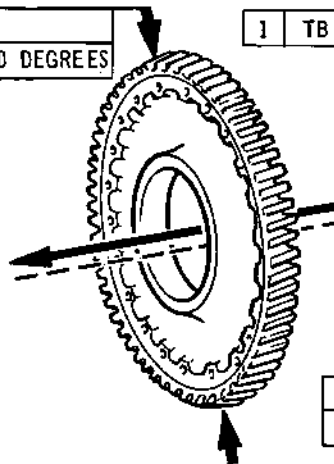
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2	CF 4250 AMPS
3	REPEAT 2 AT 90 DEGREES

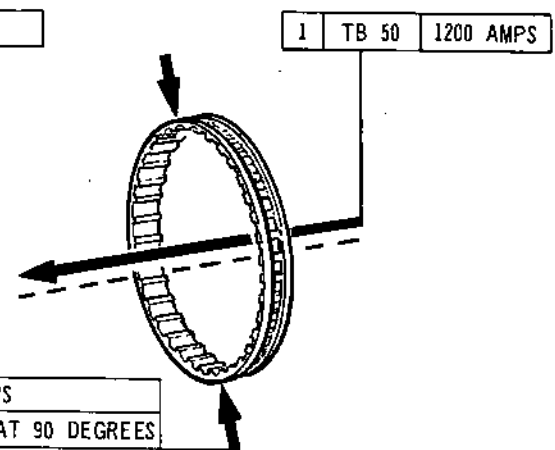
CR 33367/00B



STAGE 3 DISK (302-350)

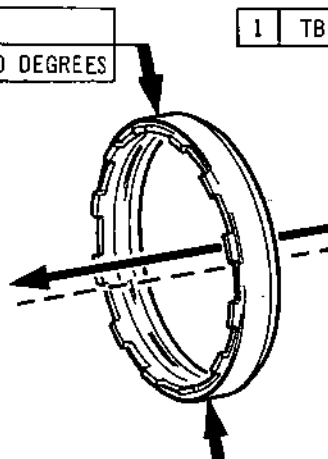
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2	CF 700 AMPS
3	REPEAT 2 AT 90 DEGREES



HP TURBINE BEARING CAGE (304-120)

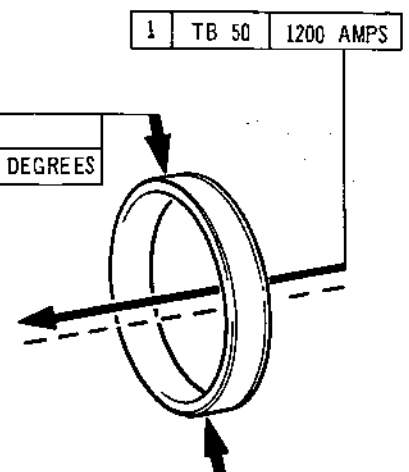
2	CF 950 AMPS
3	REPEAT 2 AT 90 DEGREES



HP TURBINE BEARING - OUTER TRACK (304-120)

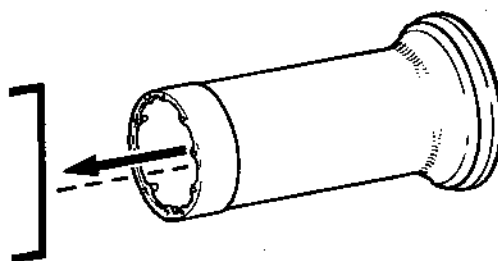
1	TB 50	1200 AMPS
---	-------	-----------

2	CF 950 AMPS
3	REPEAT 2 AT 90 DEGREES



HP TURBINE BEARING - INNER TRACK (304-120)

1	TB 50	1000 AMPS
2	TB 50	2600 AMPS



AIR TRANSFER TUBE (304-400)

3	6400 AMPS PER METRE
4	REPEAT AS REQUIRED TO GIVE FULL COVERAGE.
AS ALTERNATIVE TO 3 A 5 TURN COIL MAY BE USED.	

Crack Detection Test Diagram
Figure 301 (Sheet 2 of 2)

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 FIG.NO. ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-33-02	Fig.1
303	72-33-02	Fig.2
304	72-33-02	Fig.3
305	Not applicable	

 Cross References to Illustrated Parts Catalogue
Table 303

CAUTION: THIS IS A ROTATING ASSEMBLY. ENSURE THAT ANY FREE OR CAPTIVE SELF-LOCKING NUTS (REGARDLESS OF SIZE) HAVE BEEN REPLACED BEFORE THE ASSEMBLY IS RELEASED FOR SERVICE (REF.72-09-00 INSPECTION/CHECK). FAILURE TO DO SO MAY RESULT IN ENGINE DAMAGE.

NOTE: Inspect balancing weights (302-180, 304-140) or washers for general condition. Reject any damaged items; any attempt at repair will render them suspect for balancing purposes. Retain any undamaged items for possible selection and use during assembly.

4. Adjusting Washer (302-10 to 105 SB.72-29 or 302-30 to 150 Pre SB.72-29)

NOTE: These items require selection during assembly.

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores.

Accept provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

- (2) Fretting and wear.

Reject.

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5. Shouldered Bolts (302-200/310/360, 303-30/80 and 304-320/380)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Locating Diameters.

(1) Wear, nicks and burrs.

Accept after
repair, if F.C.S.
limits are not
violated.

C. Carry Out Dimensional Checks.

NOTE: Carry out these checks in conjunction with the Rotor Disks (para.9), Spacer Rings (paras. 12 and 13), the Front Rotor Shaft (para.10) and the HP Compressor Drive Shaft (para.16).

(1) Check locating diameters (Ref.72-33-00 Fits and Clearances) as follows:

Bolt	F.C.S. Ref.
302-200	601-87/88
302-310	601-91/93/95
302-360	601-99/100/101
303-30	601-104/105/106
303-80	601-109/110/111
304-320	601-122/123/125
304-380	601-114/115/116

(a) Within F.C.S. limits.

Accept.

6. Externally Relieved Body Bolts (302-250)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Locating Diameters.

(1) Nicks and burrs.

Accept after
repair.7. Dee-headed Bolts (304-350) (Pre SB.72-7913-99)

NOTE: SB.72-7913-99 standard bolts are lifed at one build only and must be discarded at each dis-assembly.

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

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B. Inspect Locating Diameters.

- (1) Wear, nicks and burrs.

Accept after
repair, if F.C.S.
limits are not
violated.

C. Carry Out Dimensional Checks.

- (1) Check locating diameter (F.C.S. 601-119).

(a) Within F.C.S. limits. Accept.

8. Compressor Blades (302-210/280/340, 303-10/60/110 and 304-360)

NOTE: Where there has been a Stage 1 HP Compressor rotor blade failure, or one or more similar blades are found cracked, the complete set of Stage 1 blades must be rejected.

A. Inspect Blade Fir-tree Form (Ref.Fig.305).

- (1) Fretting.

(a) Any fretting on the loaded flanks that just produces a step between the fretted and non-fretted surfaces at the ends of the inner surfaces. Reject.

NOTE: Where there is visible fretting, the step may be detected by traversing a 0.040 in. (1,00 mm) scribe or similar instrument over the fretted and non-fretted surfaces.

(2) Nicks and burrs. Accept after repair.

B. Inspect Blade Aerofoil.

- (1) Inspect to acceptance and blending standard (Ref.72-33-02 Repair No.6).

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9. Rotor Disks, Stage 1 (302-230), Stage 2 (302-300), Stage 3 (302-350), Stage 4 (303-20), Stage 5 (303-70), Stage 6 (303-120) and Stage 7 (304-370)

CAUTION: THE RIM SLOT BOTTOM IS A CRITICAL AREA. (Ref.Fig.308). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

A. Inspect Blade Fir-tree Form Locations (Ref.Fig.305).

(1) Fretting.

- | | |
|--|---------|
| (a) Any fretting on the loaded flanks that just produces a step between the fretting and non-fretted surfaces at the ends of the inner surfaces. | Reject. |
|--|---------|

NOTE: Where there is visible fretting, the step may be detected by traversing a 0.040 in. (1,00 mm) scriber or similar instrument over the fretted and non-fretted surfaces.

- | | |
|----------------------|--------------------------------------|
| (2) Nicks and burrs. | Accept, if repair preserves profile. |
|----------------------|--------------------------------------|

B. Inspect Bolt Location Bores.

CAUTION: THE MAIN BOLT HOLE BORE INCLUDING STAGE 7 DISC RIM BOLT HOLE BORE, IS A CRITICAL AREA. (Ref.Fig.308). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

(1) Wear.

- | | |
|-----------------------------|--|
| (a) Smooth, unstepped wear. | Accept, if F.C.S. limits are met. |
| (2) Scores. | Reject. |
| (3) Nicks and burrs. | Accept after repair if F.C.S. limits are not violated. |

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- C. Inspect Abutment Location Surfaces of Front Rotor Shaft (Stage 2), HP Turbine Shaft (Stage 7) and Spacer Rings (All Stages).

CAUTION: THE STAGE 7 ROTOR DISK SPIGOT RADIUS IS A CRITICAL AREA (Ref.Fig.308). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

- (1) Nicks and burrs. Accept after repair providing F.C.S. limits are not violated.

- D. Carry Out Dimensional Checks.

NOTE: Carry out these checks in conjunction with the Shouldered Bolts (para.5), the Front Rotor Shaft (para.10), the Spacer Rings (para.12 and 13) and the HP Compressor Drive Shaft (para.16).

- (1) Check the shouldered bolt bores (Ref.72-33-00 Fits and Clearances) as follows:

Location	F.C.S.
Stage 1 disk	601-87
Stage 2 disk	601-93
Stage 3 disk	601-100
Stage 4 disk	601-105
Stage 5 disk	601-110
Stage 6 disk	601-115
Stage 7 disk	601-123

- (a) Within F.C.S. limits. Accept.

- (2) Check the following spacer ring location diameters and bores:

Location	F.C.S.
Stage 2 disk (dia.)	601-92/94
Stage 3 disk (bores)	601-98/102
Stage 4 disk (bores)	601-103/107
Stage 5 disk (bores)	601-108/112
Stage 6 disk (bores)	601-113/117
Stage 7 disk (bores)	601-118/121/124

- (a) Within F.C.S. limits. Accept

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CAUTION: THE INSPECTION DETAILED IN PARA.E IS TO BE APPLIED ONLY TO DISKS THAT ARE COATED WITH EITHER PL101 ENAMEL OR SERMETEL W. FOR DISKS THAT HAVE HAD THESE COATINGS REMOVED REFER TO PARA.F.

E. Stage 2 and 3 Disks All Surfaces.

- | | | |
|-----|--|----------------------|
| (1) | Damage, scratching, pitting, blistering or general surface degradation to coating. | Accept after repair. |
| (2) | Loss of coating due to fretting in blade root slots. | Accept. |

CAUTION: THE INSPECTION DETAILED IN PARA.F IS TO BE APPLIED ONLY TO DISKS THAT HAVE HAD THEIR PL101 ENAMEL OR SERMETEL W PROTECTIVE COATING REMOVED. THE INSPECTION DETAILED IN PARA.E IS FOR DISKS STILL COATED WITH EITHER PL101 OR SERMETEL W.

F. Inspect Stages 2 and 3 Rotor Disks for Corrosion.

NOTE: For measurement of corrosion pit depth by replication and corrosion definitions, refer to 72-09-00.

- | | | |
|-----|--|--------|
| (1) | Zones A and D, excluding areas within 0.080 in. (2,0 mm) of blade root slots (zones Z and Y), and zones B, E and F (Ref.Figs.306 and 307). | |
| (a) | Superficial and light surface corrosion with surface roughening less than 0.002 in. (0,05 mm) deep. | Accept |
| (b) | Isolated pitting less than 0.005 in. (0,13 mm) deep. | Accept |

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- (c) Coalesced pitting affecting less than 20% of any zone area. Patches less than 0.5 sq in. (3,2 sq cm) in area with less than 50% of patch affected by pits. Pits less than 0.005 in. (0,13 mm) deep. Accept

NOTE: Acceptance is conditional on surfaces being refurbished using Scotchbrite or fine emery, and corrosion neutralised using cleaning process H (Ref.72-09-00 Cleaning).

(2) Zone G (Ref.Fig.306).

- (a) Superficial corrosion easily removed by light abrasion without loss of dimension. No visible pits. Accept
- (b) Light surface and isolated pitting. Submit details to Rolls-Royce plc for individual assessment
- (c) Coalesced pitting. Reject.

(3) Zones Y and Z (Blade Root Slots and front and rear faces) (Ref.Figs.306 and 307).

- (a) Superficial and light surface corrosion with surface roughening less than 0.002 in. (0,05 mm) deep. No pits visible. Accept

NOTE: Acceptance is conditional on surfaces being refurbished using Scotchbright or fine emery, and corrosion neutralised using cleaning process H (Ref.72-09-00 Cleaning).

- (b) Isolated and coalesced corrosion pits on root serrations and zone Z (front and rear face). Submit details to Rolls-Royce plc for individual assessment

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(c) Isolated or coalesced corrosion pits in zone Y (front and rear faces and bottom of root slot). Reject

(4) Zone C.

(a) Superficial and light surface corrosion with surface roughening less than 0.002 in. (0,05 mm) deep. Accept

NOTE: Acceptance is conditional on surfaces being refurbished using Scotchbrite or fine emery, and corrosion neutralised using cleaning process H (Ref.72-09-00 Cleaning).

(b) Isolated and coalesced corrosion pits more than 0.002 in. (0,5 mm) deep. Accept after repair (Ref.72-33-02 Repairs No.10 and 11)

G. Inspect Stage 4, 5, 6 and 7 Rotor Disks for Corrosion.

(1) Carry out visual and binocular inspections. Identify any areas of corrosion pitting or areas of adherent oxide. Submit details to Rolls-Royce plc for individual assessment

10. Front Rotor Shaft (302-260)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Splines.

(1) Fretting.

(a) Not more than 0.001 in. (0,030 mm) above or below machining witness mark. Accept

(2) Nicks and burrs. Accept after repair

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C. Inspect Bearing Journal Diameter.

(1) Nicks and burrs.

Accept after
repair

(2) Scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair, providing
F.C.S. limits are
not violated

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D. Inspect Drain Slot.

CAUTION: THE DRAIN SLOT IS A CRITICAL AREA.
(Ref. Fig.310). SPECIAL ATTENTION MUST
BE PAID TO THIS AREA FOR SIGNS OF DAMAGE
DURING THE GENERAL OVERALL INSPECTION.

(1) Cracks. Reject.

E. Inspect Abutment Faces for First and Second Stage
Rotor Disks.

(1) Nicks, burrs and scores.

(a) Not more than 0.003 in. Accept after
(0,080 mm) deep. repair.

F. Inspect Second Stage Disk and Air Transfer Tube Locating
Bores.

(1) Nicks and burrs. Accept after
repair, providing
F.C.S. limits are
not violated.

G. Inspect Bolt Location Bores.

CAUTION: THE FRONT AND REAR BOLT HOLE BORES ARE A
CRITICAL AREA. (Ref.Fig.310). SPECIAL
ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS
OF DAMAGE DURING THE GENERAL OVERALL
INSPECTION

(1) Wear.

(a) Smooth, unstepped wear. Accept, if F.C.S.
limits are met.

(2) Scores. Reject.

(3) Nicks and burrs. Accept after
repair, providing
F.C.S. limits are
not violated.

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H. Inspect Inner Sealing Ring Location Face and Bore.

(1) Nicks, burrs and scores.

Accept after
repair, providing
F.C.S. limits are
not violated.

J. Inspect No.6 Windback and Nos.7, 8 and HP1 Labyrinth Fins
(Ref.SB.72-91).

(1) Rubbing.

(a) Slight rubbing, within
F.C.S. limits.

Accept.

(2) Nicks and burrs.

Accept after
repair.

(3) Damage to fin edges.

Accept after
repair, providing
that only one
blend is made to
each fin, that
finished blends are
not more than one-
half fin depth deep
or five times fin
depth long, that
all blends on adja-
cent fins are
separated radially
by not less than
five times fin
depth at their
ends, and that
F.C.S. limits are
not violated.

NOTE: Greater damage will require repair
(Ref.72-33-02 Repair No.1, No.4, No.7,
No.8 and No.9).

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K. Carry Out Dimensional Checks.

NOTE: Carry out these checks in conjunction with the Shouldered Bolts (para.5), the Air Transfer Tube (para.17) and the Rotor Disks (para.9).

- (1) Check the shaft diameters (Ref.72-33-00 Fits and Clearances) as follows:

Location	F.C.S.
Probe operating labyrinth	601-60
Thrust bearing	601-78
No.6 windback seal	601-79/80
No.7 labyrinth seal	601-82
No.8 labyrinth seal	601-83/84/85
HPL labyrinth seal	601-89

(a) Within F.C.S. limits. Accept.

- (2) Check the following shaft bores:

Location	F.C.S.
Air transfer tube	601-86
No.1 disk retaining bolts	601-88
No.2 disk retaining bolts	601-91
No.2 disk spigot	601-92

(a) Within F.C.S. limits. Accept.

- (3) Check No.8 Labyrinth seal fin diameter (F.C.S.601-83/84/85).

NOTE: Make these checks in conjunction with the Compressor Intermediate Case (Ref.72-32-00).

(a) Within F.C.S. limits. Accept.

- (4) Check No.6 and 7 labyrinth seal diameters (F.C.S.601-79/80/82).

NOTE: Make these checks in conjunction with the Compressor Intermediate Case (Ref.72-32-00).

(a) Within F.C.S. limits. Accept.

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- (5) Check HP compressor thrust bearing diameter (F.C.S. 601-78).

NOTE: Make this check in conjunction with the Compressor Intermediate Case (Ref.72-32-00).

- (a) Within F.C.S. limits. Accept.

11. Inner Sealing Ring (302-270)

A. Inspect Ring.

- (1) Nicks, burrs and scores. Accept after repair.

(2) Wear.

- (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept.

(3) Rubbing.

- (a) Not more than 0.005 in. (0,130 mm) over not more than 90 degrees. Accept if F.C.S. limits are met.

B. Carry Out Dimensional Check.

- (1) Check fin diameter (F.C.S.601-161).

NOTE: Carry out this check in conjunction with the LP Drive Shaft Outer Sealing Ring (Ref. 72-31-04).

- (a) Within F.C.S. limits. Accept.

- (2) Check air tube diameter (F.C.S.601-163).

NOTE: Carry out this check in conjunction with the Air Transfer Tube (para.17).

- (a) Within F.C.S. limits. Accept.

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12. Spacer Ring, Stages 2 to 3 (302-330)

A. Inspect HP2 Labyrinth Fins.

(1) Rubbing.

(a) Slight rubbing, within
F.C.S. limits.

Accept.

(2) Nicks and burrs.

Accept after repair.

(3) Damage to fin edges.

Accept after
repair, providing
that only one blend
is made to each fin,
that finished
blends are not more
than one-half fin
depth deep or five
times fin depth
long, that all
blends on adjacent
fins are separated
radially by not
less than five times
fin depth at their
ends, and that
F.C.S. limits are
not violated.

NOTE: Damage greater than this will require repair
(Ref.72-33-02 Repair No.5).

B. Inspect Stages 2 and 3 Rotor Disc Abutment Faces.

(1) Nicks, burrs and scores.

Accept, if repair
does not violate
F.C.S. limits.

C. Inspect Shouldered Bolt Locating Bores.

CAUTION: THE BOLT HOLE BORE IS A CRITICAL AREA.
(Ref.Fig.309). SPECIAL ATTENTION MUST
BE PAID TO THIS AREA FOR SIGNS OF DAMAGE
DURING THE GENERAL OVERALL INSPECTION.

(1) Wear.

(a) Smooth, unstepped wear,
within F.C.S. limits.

Accept.

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- | | |
|------------------------------|---|
| (2) Scores. | Reject. |
| (3) Nicks, burrs and scores. | Accept, if repair does not violate F.C.S. limits. |

D. Inspect Front Face of Rear Flange.

- | | |
|--|---|
| (1) Scoring and pitting. | Accept. |
| (a) Not more than 0.005 in. (0,13 mm) in a band 0.500 in. to 0.600 in. (12,70 mm to 15,24 mm) diameter concentric with each bolt hole. | Accept. Raised material must be removed by light stoning. |

E. Carry Out Dimensional Checks.

NOTE: Carry out these checks in conjunction with the Stage 2 and 3 Rotor disks (para.9) and Shouldered Bolts (para.5).

- | | |
|---|---------|
| (1) Check No.2 disk location bore and No.3 disk location diameter (F.C.S. 601-94 and 98). | |
| (a) Within F.C.S. limits. | Accept. |
| (2) Check front and rear shouldered bolt location bores (F.C.S. 601-95 and 99). | |
| (a) Within F.C.S. limits. | Accept. |
| (3) Check HP2 labyrinth ring bore (F.C.S. 601-96). | |
| (a) Within F.C.S. limits. | Accept. |
| (4) Check labyrinth ring fins (F.C.S. 601-96). | |

NOTE: Carry out this check in conjunction with the HP Compressor Case and vanes (Ref.72-33-01).

- | | |
|---------------------------|---------|
| (a) Within F.C.S. limits. | Accept. |
|---------------------------|---------|

CAUTION: THE INSPECTION DETAILED IN PARA.E IS TO BE APPLIED ONLY TO SPACERS THAT ARE COATED WITH EITHER PL101 ENAMEL OR SERMETEL W. FOR SPACERS THAT HAVE HAD THESE COATINGS REMOVED REFER TO PARA.F.

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F. Stage 2-3 Spacers All Surfaces.

- (1) Damage, scratching, pitting, blistering or general surface degradation to coating. Accept after repair.

CAUTION: THE INSPECTION DETAILED IN PARA.F IS TO BE APPLIED ONLY TO SPACERS THAT HAVE HAD THEIR PL101 ENAMEL OR SERMETEL W PROTECTIVE COATING REMOVED. THE INSPECTION DETAILED IN PARA.E IS FOR SPACERS STILL COATED WITH EITHER PL101 OR SERMETEL W.

G. Inspect Stages 2-3 Spacer Ring for Corrosion (Ref.Fig.306).

NOTE: For measurement of corrosion pit depth by replication, refer to 72-09-00.

(1) Zone A.

- (a) Light corrosion with surface roughening less than 0.002 in. (0,05 mm) deep. Accept
- (b) Isolated pits less than 0.005 in. (0,13 mm) deep. Accept
- (c) Discrete patches of corrosion more than 0.250 in. (6,35 mm) from bolt holes. Patches less than 0.5 sq in. (3,2 sq cm) in area with less than 50% of patch affected by pits. Pits less than 0.005 in. (0,13 mm) deep. Accept

(2) Zones D, E, and F.

- (a) Light corrosion with surface roughening less than 0.002 in. (0,05 mm) deep. Accept

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- (b) Isolated pits more than 0.250 in. (6,35 mm) apart and less than 0.005 in. (0,13 mm) deep. Accept

(3) Zone B.

- (a) Light corrosion with surface roughening less than 0.002 in. (0,05 mm) deep. Accept

NOTE: Acceptance is conditional on surfaces being refurbished using Scotchbrite or fine emery, and corrosion neutralised using cleaning process H (Ref.72-09-00 Cleaning).

- (b) Corrosion pits more than 0.002 in. (0,05 mm) deep. Quarantine pending issue of Repair Scheme

(4) Zone G.

CAUTION: THE FLANGE FILLET RADII ARE A CRITICAL AREA (Ref.Fig.309). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

- (a) Light corrosion with surface roughening less than 0.002 in. (0,05 mm) deep. Accept

NOTE: Acceptance is conditional on surfaces being refurbished using Scotchbrite or fine emery, and corrosion neutralised using cleaning process H (Ref.72-09-00 Cleaning).

- (b) Corrosion pits. Reject

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(5) Zone C.

- (a) Light corrosion with surface roughening less than 0.002 in. (0,05 mm) deep. Accept

NOTE: Acceptance is conditional on surfaces being refurbished using Scotchbrite or fine emery, and corrosion neutralised using cleaning process H (Ref.72-09-00 Cleaning).

- (b) Isolated pits more than 0.050 in. (1,27 mm) apart and less than 0.005 in. (0,13 mm) deep. Accept.

13. Spacer Rings, Stages 3 to 4 (302-380), Stages 4 to 5 (303-50), Stages 5 to 6 (303-100) and Stages 6 to 7 (304-390)

A. Inspect Abutment and Location Faces for Rotor Disks.

CAUTION: THE FILLET RADII ON THE REAR OF THE ABUTMENT AND LOCATION FACES ARE A CRITICAL AREA. (Ref. Fig.309). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

- (1) Nicks, burrs and scores. Accept, if repair does not violate F.C.S. limits

B. Inspect Shouldered Bolt Location Bores (All Disk Locations) and Dee-headed Bolt Location Bores (Stage 7 Disk Location Only).

CAUTION: THE BOLT HOLE BORE IS A CRITICAL AREA. (Ref.Fig.309). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

(1) Wear.

- (a) Smooth, unstepped wear within F.C.S. limits. Accept

- (2) Scores. Reject

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(3) Nicks and burrs.

Accept, if repair
does not violate
F.C.S. limits

C. Inspect Flange Fillet Radii.

CAUTION: THE FLANGE FILLET RADII ARE A CRITICAL AREA. (Ref. Fig.309). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

- (1) There are no acceptance limits for corrosion in these areas. Details of any corrosion found in these areas should be reported to Rolls-Royce plc., Filton, Bristol.

D. Carry Out Dimensional Checks.

NOTE: Carry out these checks in conjunction with the Shoulder Bolts (para.5) and the Rotor Disks (para.9).

- (1) Check the shoulder bolt bores (Ref.72-33-00 Fits and Clearances) as follows:

Location	F.C.S.
Stage 3 to 4	601-101/104
Stage 4 to 5	601-106/109
Stage 5 to 6	601-111/114
Stage 6 to 7	601-116/119/122

(a) Within F.C.S. limits. Accept

- (2) Check the following disk location diameters.

Location	F.C.S.
Stage 3 to 4	601-102/103
Stage 4 to 5	601-107/108
Stage 5 to 6	601-112/113
Stage 6 to 7	601-117/118/121

(a) Within F.C.S. limits. Accept

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E. Inspect Rokide Coating on Spacer Outer Diameter.

NOTE: Before commencing this inspection, examine edges of any chipping for adhesion of Rokide coating. Ensure that any suspect coating is removed before assessing damage.

(1) Measure and assess chip damage.

NOTE: In this paragraph, peripheral dimensions are measured round the circumference of the disk surface; axial dimensions are measured across the width of the spacer surface.

- | | | |
|-----|---|---------|
| (a) | Any chip more than 5 peripheral in. (127 peripheral mm) in length, regardless of width. | Reject. |
| (b) | Any chipping less than one third of spacer axial width and up to 10 in. (254 mm) peripheral length. | Accept. |
| (c) | Any areas of chipping acceptable under (a) and (b) and separated by not less than 10 in. (254 mm). | Accept. |
| (d) | Any number of chips not exceeding 10 per cent of the total coated area. | Accept. |

F. Inspect Front and Rear Rotor Disk Abutment Faces.

(1) Fretting.

- | | | |
|-----|---|--|
| (a) | Not deeper than 0.005 in. (0,130 mm) on either side; i.e. total acceptable rim loss is 0.010 in. (0,250 mm), provided fretting on either side does not exceed 0.005 in. (0,130 mm). | Accept, if repair does not violate these limits. |
|-----|---|--|

- | | | |
|-----|--------------------------|----------------------|
| (2) | Nicks, burrs and scores. | Accept after repair. |
|-----|--------------------------|----------------------|

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G. Inspect Dee-head Bolt Traps.

(1) Wear and fretting.

- (a) Slight bolt-head impressions.

Accept, if effectiveness of trap is preserved after repair.

H. Inspect for Corrosion.

- (1) Carry out visual and binocular inspections. Identify any areas of corrosion pitting or areas of adherent oxide.

Submit details to Rolls-Royce plc for individual assessment

14. HP Turbine (Main) Bearing (304-120)

A. Inspect Bearing (Ref.72-09-00 Inspection/Check).

B. Carry Out Dimensional Checks.

NOTE: On Engines to SB.0L.593-72-9066-439 the bearing outer race cage and the bearing inner race are separate spareable items. Therefore rejection of one item does not imply rejection of the complete HP turbine main bearing assembly.

- (1) Check bearing diametrical clearance (Ref. F.C.S. 602-196).

- (a) Within F.C.S. limits. Accept.

- (2) Check bearing bore (Ref. F.C.S. 602-197).

NOTE: Carry out this check in conjunction with the HP Compressor Drive Shaft (para.16).

- (a) Within F.C.S. limits. Accept.

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15. HP Compressor Rear (No.12) Labyrinth (304-300)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect No.12 Labyrinth Fins.

(1) Overheating discolouration. Reject.

(2) Rubbing.

(a) Slight rubbing within F.C.S. limits. Accept.

(3) Nicks and burrs. Accept after repair.

(4) Damage to fin edges. Accept after repair, providing that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that all blends on adjacent fins are separated radially by not less than five times fin depth at their ends, and that F.C.S. limits are not violated.

NOTE: Damage greater than this will require repair (Ref.72-33-02 Repair No.2).

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C. Inspect HP Compressor Drive Shaft Abutment Locations.

- (1) Nicks and burrs. Accept, if repair preserves F.C.S. limits.
- (2) Wear and fretting.
 - (a) Smooth, unstepped wear, within F.C.S. limits. Accept.

D. Inspect Bolt Locations.

- (1) Wear.
 - (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

E. Carry Out Dimensional Checks.

- (1) Check Labyrinth/HP Compressor Drive Shaft Locating Diameter and Bore (Ref. F.C.S. 601-126 and 133).

NOTE: Carry out this check in conjunction with the HP Compressor Drive Shaft (para.17. 304-330).

 - (a) Within F.C.S. limits. Accept.
- (2) Check Labyrinth Fin Diameters (Ref. F.C.S. 601-127 to 132 inclusive).

NOTE: Carry out this check in conjunction with the No.12 Labyrinth Seal (Ref.72-34-00).

 - (a) Within F.C.S. limits. Accept.

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16. HP Compressor Drive Shaft (304-330)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Stage 7 Rotor Disk Abutment Face and Location Bore.

(1) Nicks, burrs and scores.

(a) Not more than 0.003 in.
(0,080 mm) deep.Accept, if repair
preserves F.C.S.
limits.

C. Inspect Air Transfer Tube Location Diameter.

(1) Nicks, burrs and scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.Accept, if repair
preserves F.C.S.
limits.

D. Inspect Shouldered Bolt Location Bores.

CAUTION: THE BOLT HOLE BORES ARE A CRITICAL AREA.
(Ref.Fig.311). SPECIAL ATTENTION MUST
BE PAID TO THIS AREA FOR SIGNS OF DAMAGE
DURING THE GENERAL OVERALL INSPECTION.

(1) Wear.

(a) Smooth, unstepped wear,
within F.C.S. limits.

Accept.

(2) Scores.

Reject.

(3) Nicks and burrs.

Accept after
repair, provided
F.C.S. limits are
not violated.

E. Inspect No.12 Labyrinth Abutment Faces, Location Bore and Diameter and Bolt Holes.

CAUTION: THE BOLT HOLE BORES ARE A CRITICAL AREA.
(Ref.Fig.311). SPECIAL ATTENTION MUST
BE PAID TO THIS AREA FOR SIGNS OF DAMAGE
DURING THE GENERAL OVERALL INSPECTION.

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- | | |
|---|--|
| <p>(1) Nicks, burrs and scores.</p> | <p>Accept, if repair preserves F.C.S. limits. (See para.E.(4) for bolt holes scoring limit)</p> |
| <p>(2) Pitting either isolated or coalesced in the front No.12 labyrinth flange bolt holes and flange faces within 0.040 in. (1,016 mm) band around the bolt holes.</p> <p>(a) Up to a maximum measured depth of 0.002 in. (0,051 mm).</p> | <p>Accept.
Reject beyond this limit. Shafts may be recovered by embodying Service Bulletin 0L.593-72-8923-363.</p> |
| <p>(3) Pitting either isolated or coalesced on the rear No.12 labyrinth flange faces and bolt holes and front flange areas outside of the 0.040 in. (1,016 mm) band around the bolt holes.</p> <p>(a) Up to a maximum measured depth of 0.003 in. (0,076 mm).</p> | <p>Accept.
Reject beyond this limit. Shafts may be recovered by embodying Service Bulletin 0L.593-72-8923-363.</p> |
| <p>(4) Pitting/scoring in main bolt holes.</p> <p>(a) Up to a maximum measured depth of 0.003 in. (0,076 mm).</p> | <p>Accept.
Reject for repair beyond this limit.</p> |
| <p>F. Inspect Splines (Ref.72-09-00 Inspection/Check).</p> | |
| <p>(1) Nicks and burrs.</p> | <p>Accept after repair.</p> |

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(2) Fretting.

- | | | |
|-----|--|--|
| (a) | Not more than 0.001 in.
(0,030 mm) above or
below machining witness
face. | Accept, provided
F.C.S. limits are
not violated. |
|-----|--|--|

G. Inspect Turbine Bearing Journal Diameter.

(1) Scoring.

- | | | |
|-----|---|---|
| (a) | Not more than 0.003 in.
(0,080 mm) deep. | Accept, if repair
does not violate
F.C.S. limits. |
| (b) | Nicks and burrs. | Accept, if repair
does not violate
F.C.S. limits. |

H. Inspect Shaft Bore Location for Nos.24 and 26 Labyrinth Carrier.

(1) Scoring.

- | | | |
|-----|---|--|
| (a) | Not more than 0.005 in.
(0,130 mm) deep. | Accept, if repair
preserves F.C.S.
limits. |
|-----|---|--|

- | | | |
|-----|------------------|--|
| (2) | Nicks and burrs. | Accept, if repair
preserves F.C.S.
limits. |
|-----|------------------|--|

J. Inspect Locating Diameters for HP Turbine Rotor Hub and Centering Ring.

- | | | |
|-----|------------------|--|
| (1) | Nicks and burrs. | Accept, if repair
preserves F.C.S.
limits. |
|-----|------------------|--|

K. Inspect Nos.13 and 14 Labyrinth and No.15 Windback Seal Fins.

(1) Rubbing.

- | | | |
|-----|---|---------|
| (a) | Slight rubbing within
F.C.S. limits. | Accept. |
|-----|---|---------|

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- (2) Nicks and burrs. Accept after repair.
- (3) Damage to fin edges. Accept after repair, providing that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that all bleeds on adjacent fins are separated radially by not less than five times fin depth at their ends, and that F.C.S. limits are not violated.

NOTE: Damage greater than this will require repair (Ref.72-33-02 Repair No.3).

L. Carry Out Dimensional Checks.

- (1) Check the following shaft diameters and bores.

NOTE: Make these checks in conjunction with the appropriate mating items.

Location	F.C.S.
Stage 7 disk (dia.)	601-124
Shouldered bolts (bore)	601-125
No.12 labyrinth (both)	601-123/133
Air transfer tube (dia.)	601-134
No.4 bearing (dia.)	602-197
HP turbine hub (dia.)	602-198
Centering ring (dia.)	602-206
Nos.24 and 26 labyrinth (bore)	602-207

- (a) Within F.C.S. limits. Accept.

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- (2) Check No.13, 14 and 15 seal fin diameters (Ref. F.C.S. 602-192/193/194).

NOTE: Make this check in conjunction with the HP Turbine Bearing Support (Ref.72-51-01).

(a) Within F.C.S. limits. Accept.

- (3) Check square dimensions of splines (Ref.72-09-00 Inspection/Check) (F.C.S. 601-202).

NOTE: Make this check in conjunction with the HP Turbine Hub (Ref.72-51-03).

NOTE: This item contains 87 splines pitched as for 88; with one spline removed at the master slot. Take dimensions from the centre line of spline roots.

(a) Any side of square outside F.C.S. limits. Reject.

(b) Within F.C.S. limits. Accept.

17. Air Transfer Tube (304-400)

A. Inspect HP Drive Shaft Location Bore.

- (1) Nicks, burrs and scores.

(a) Not more than 0.005 in. (0,130 mm) deep. Accept, if repair preserves F.C.S. limits.

B. Inspect Rotor Shaft Front Abutment Face and Location Diameter.

(1) Nicks and burrs. Accept after repair, provided F.C.S. limits are met.

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C. Carry Out Dimensional Checks.

- (1) Check HP drive shaft bore (F.C.S. 601-134).

NOTE: Carry out this check in conjunction with the HP Compressor Drive Shaft (para.16).

(a) Within F.C.S. limits. Accept.

- (2) Check inner sealing ring bore (F.C.S. 601-163).

NOTE: Carry out this check in conjunction with the Inner Sealing Ring (para.11).

(a) Within F.C.S. limits. Accept.

- (3) Check outside diameter at HP drive shaft location.

(a) Not more than 12.235 in. Accept.
(310,77 mm).

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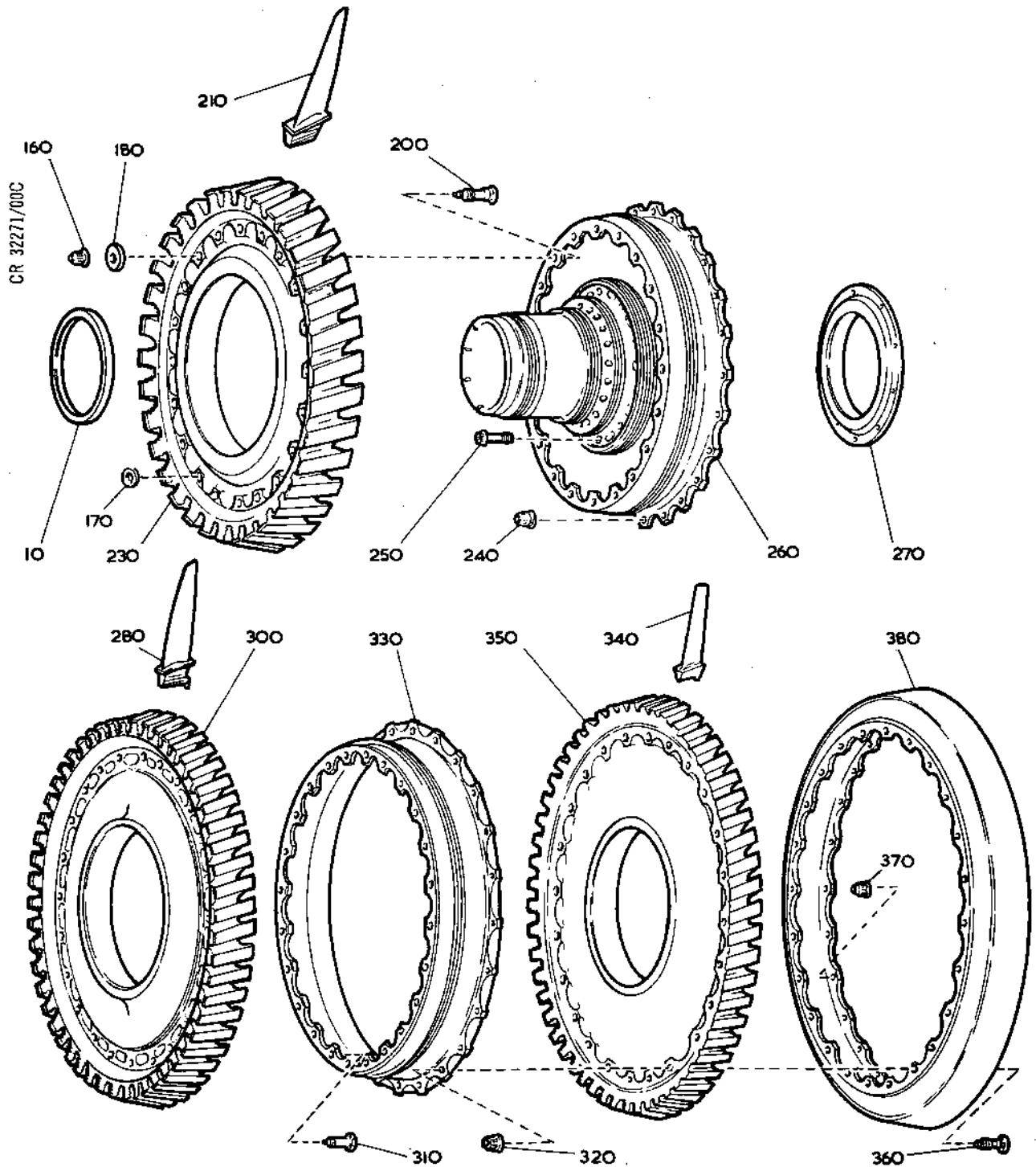
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Front Rotor Shaft, Stages 1, 2 and 3 Disks and Blades
Figure 302

INSPECTION/CHECK

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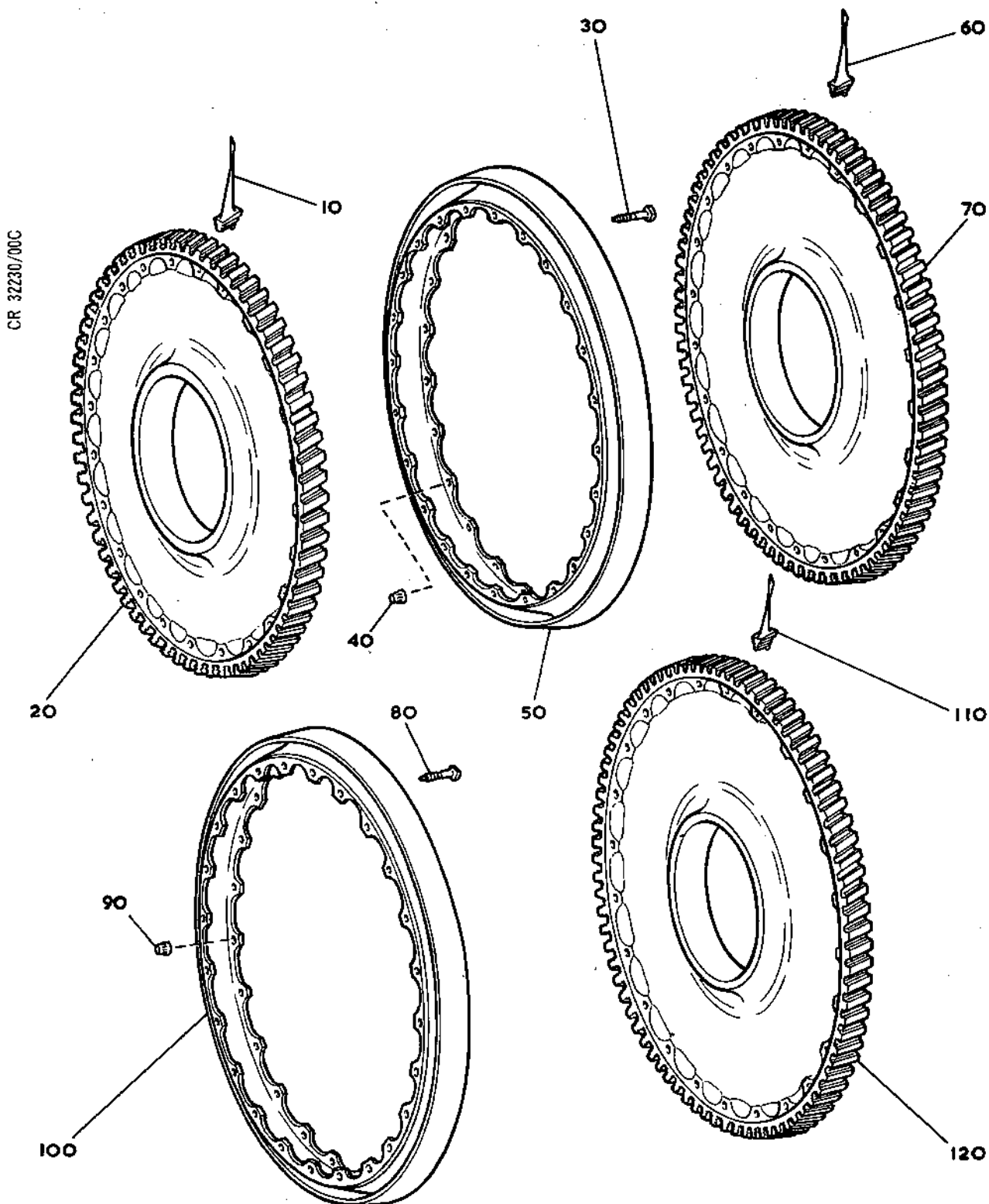
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Stages 4, 5 and 6 Disks and Blades
Figure 303

INSPECTION/CHECK

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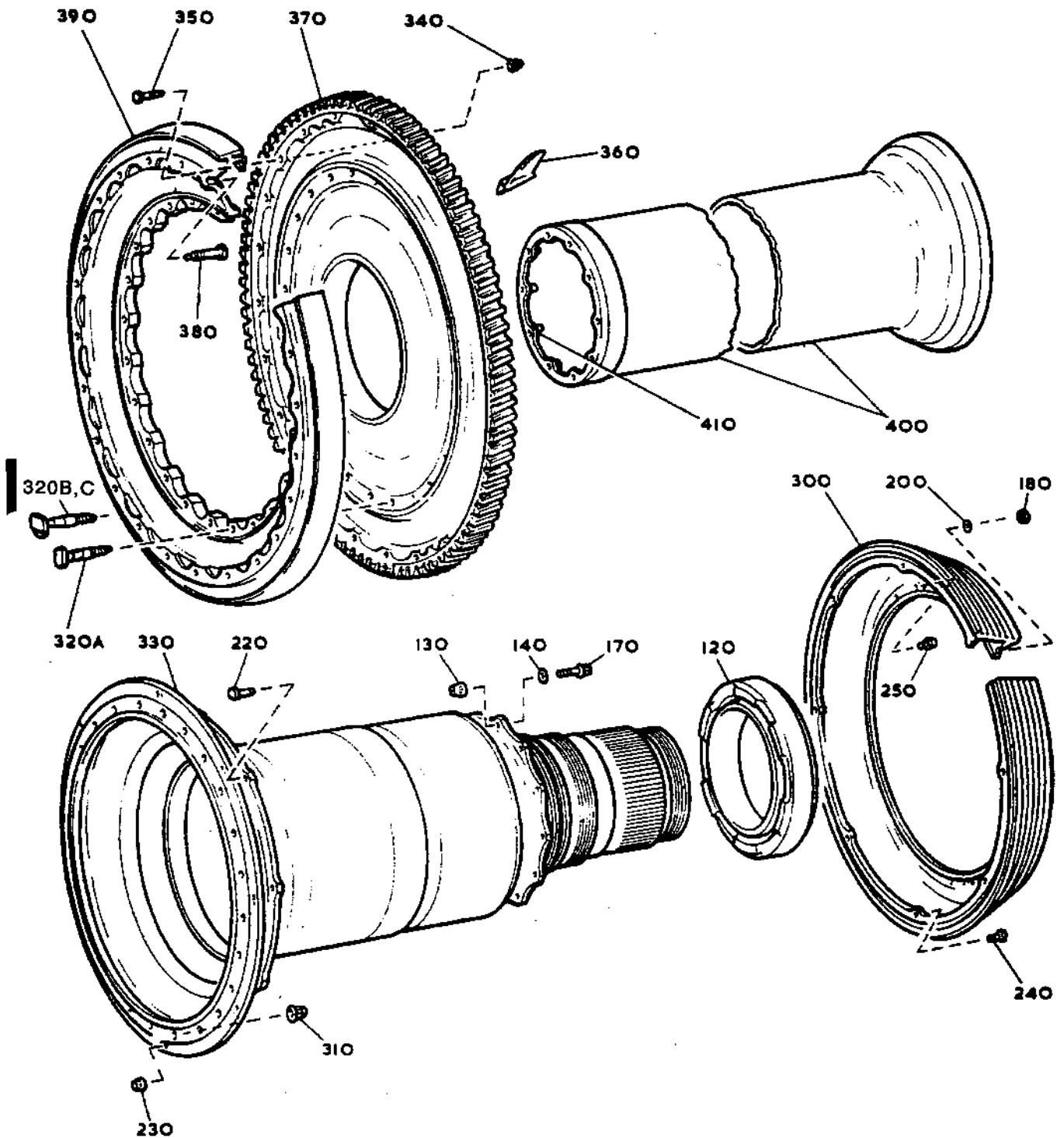
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CR 32274/000
BS00026920/1



Stage 7 Disk and Blades and Drive Shaft
Figure 304

INSPECTION/CHECK

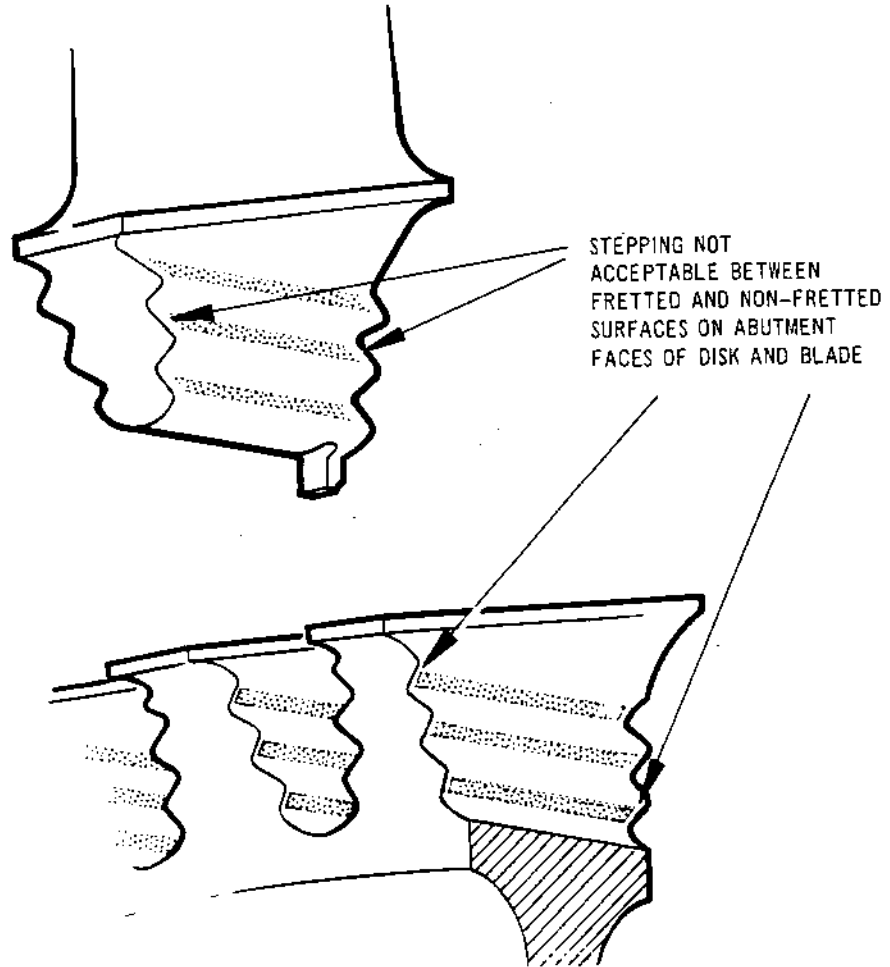
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AREAS WHERE FRETTING WILL
OCCUR INDICATED THUS



Rotor Blade and Disk Inspection Zones
Figure 305

INSPECTION/CHECK

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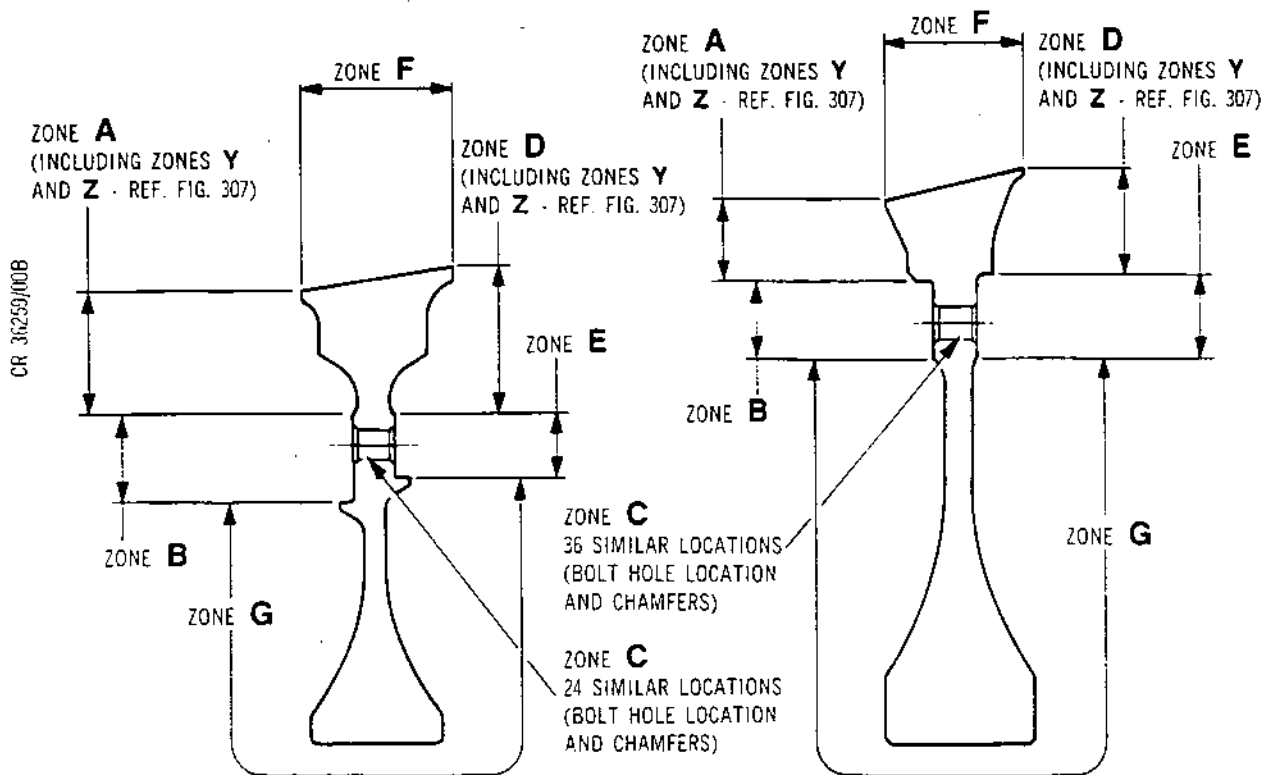
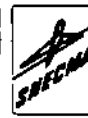
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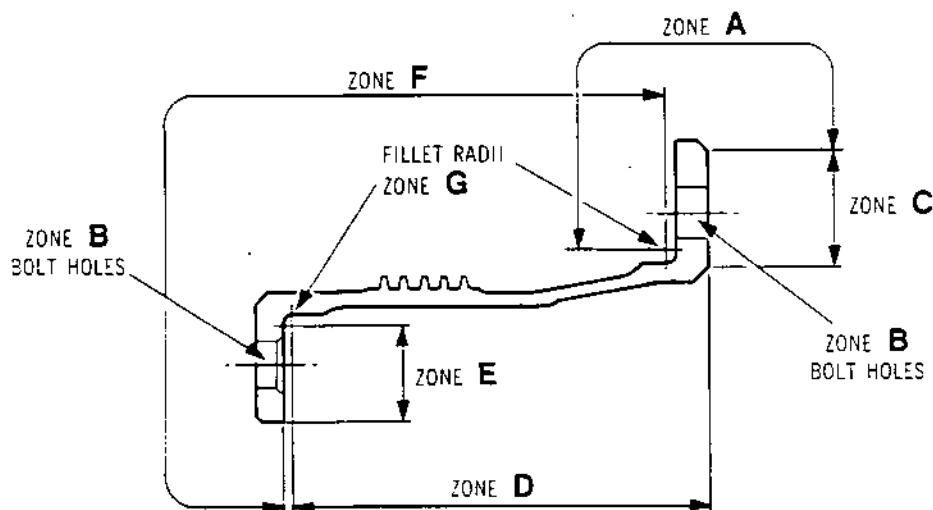
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TYPICAL SECTION THROUGH DISK

TYPICAL SECTION THROUGH DISK



TYPICAL SECTION THROUGH SPACER

Stages 2 and 3 Rotor Disks and Stages 2-3 Spacer
Corrosion Acceptance Standard Zones
Figure 306

INSPECTION/CHECK

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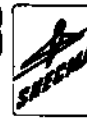
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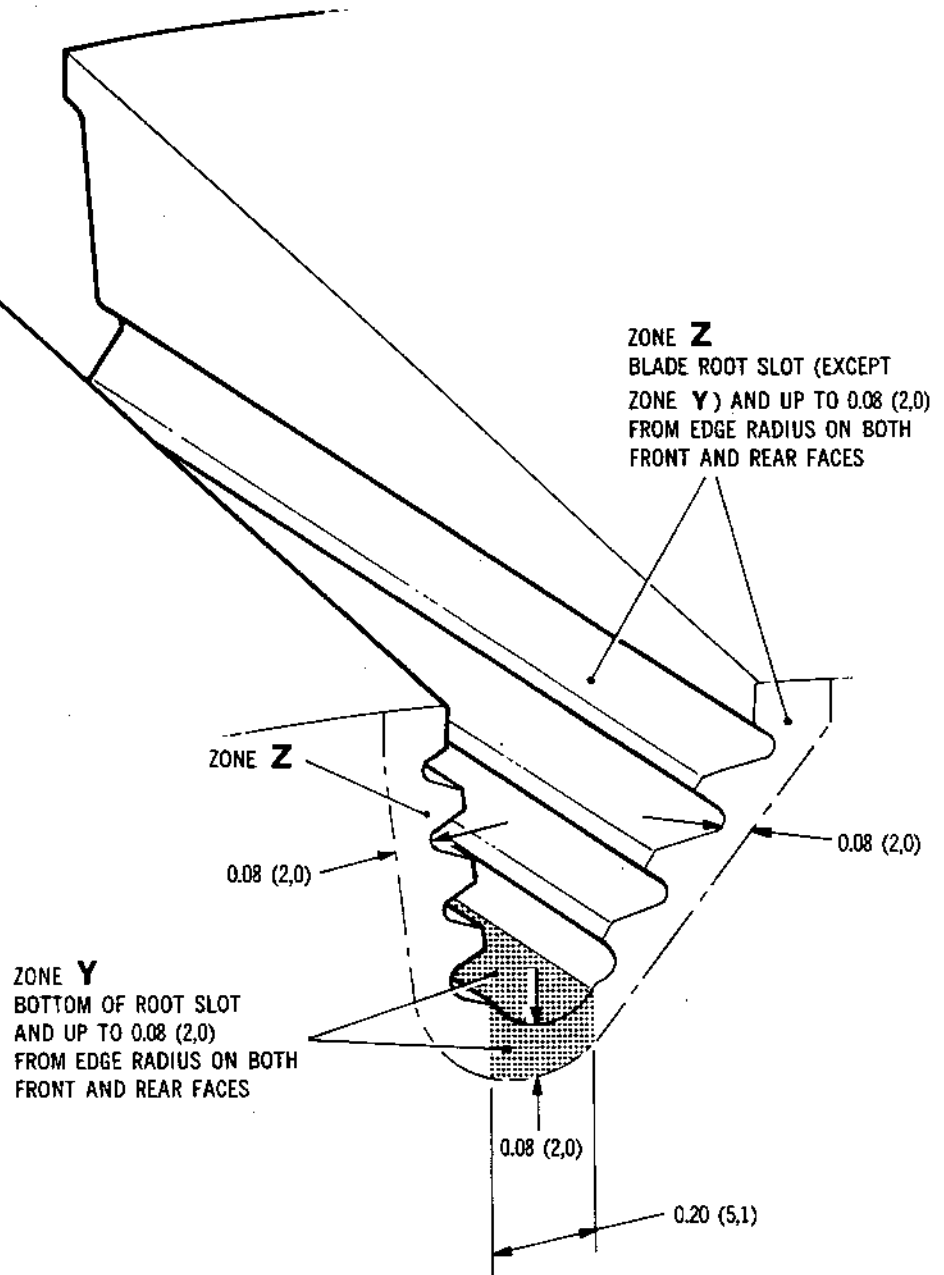
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Stages 2 and 3 Rotor Disk Fir Tree Root Slots
Corrosion Acceptance Standards
Figure 307

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BS00026260/1

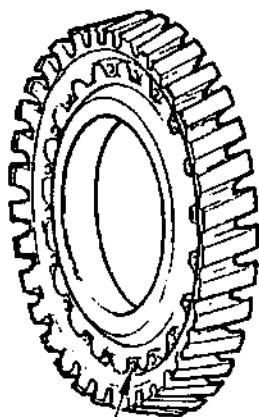


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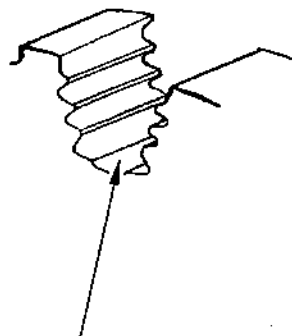
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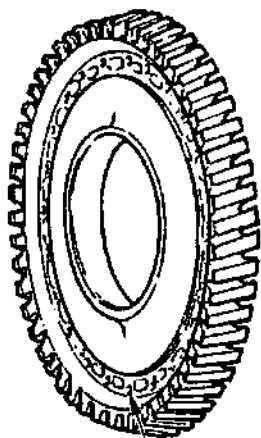


MAIN BOLT HOLES

STAGE 1

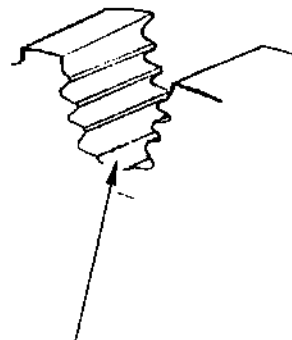


RIM SLOT BOTTOM

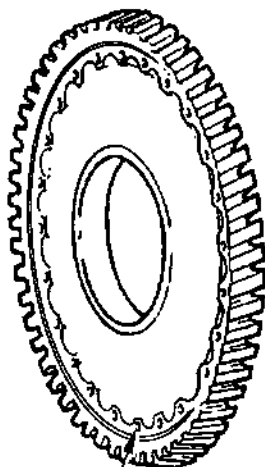


MAIN BOLT HOLES

STAGE 2

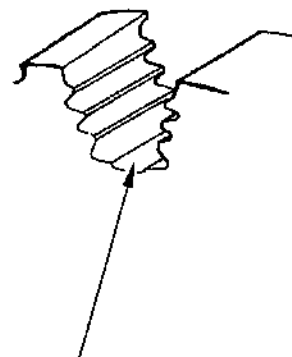


RIM SLOT BOTTOM



MAIN BOLT HOLES

STAGE 3



RIM SLOT BOTTOM

HP Compressor Discs - Inspection Critical Areas
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Figure 308

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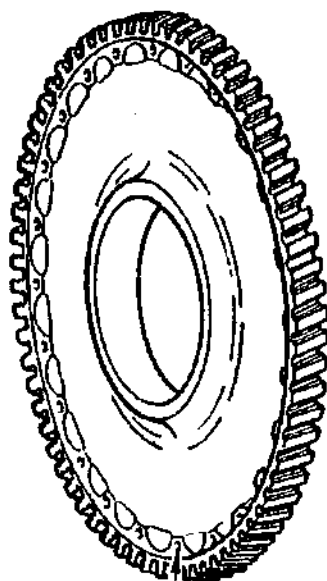


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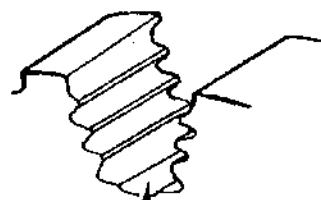
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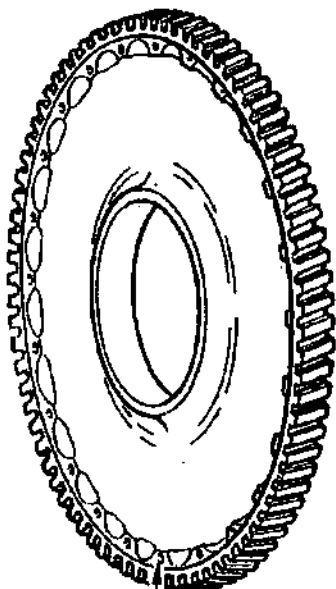


MAIN BOLT HOLES

STAGE 4

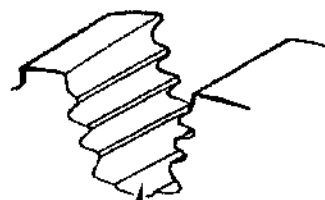


RIM SLOT BOTTOM



MAIN BOLT HOLES

STAGE 5



RIM SLOT BOTTOM

HP Compressor Discs - Inspection Critical Areas
(Sheet 2 of 3)
Figure 308

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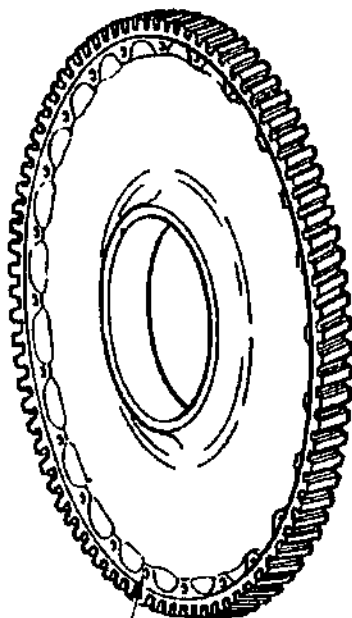


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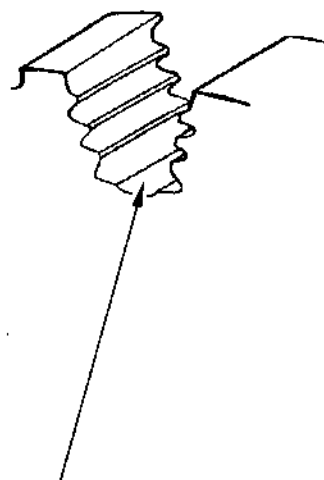


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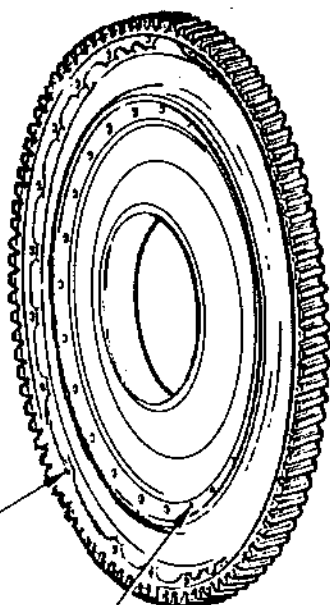


MAIN BOLT HOLES

STAGE 6



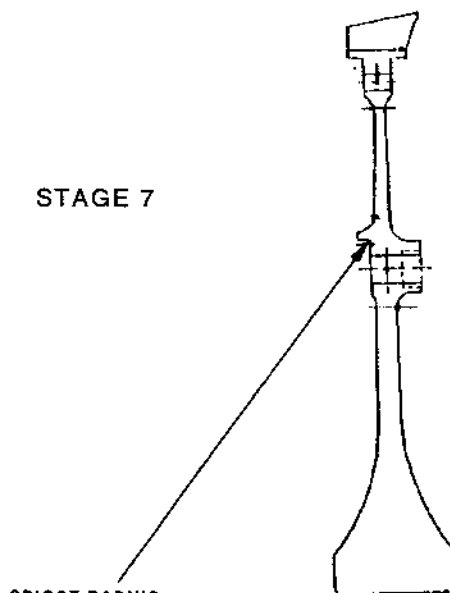
RIM SLOT BOTTOM



RIM
BOLT
HOLES

MAIN BOLT HOLES

STAGE 7



SPIGOT RADIUS

HP Compressor Discs - Inspection Critical Areas
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Figure 308

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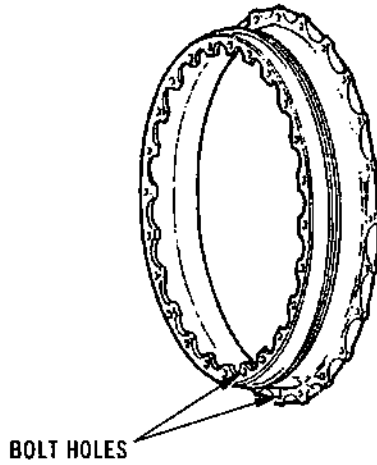
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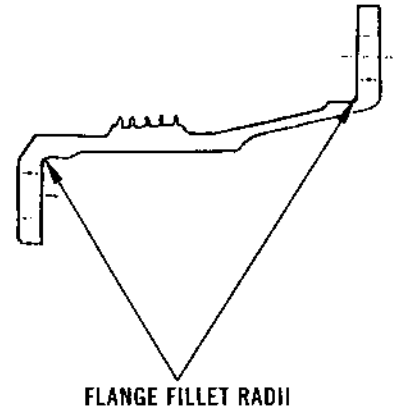
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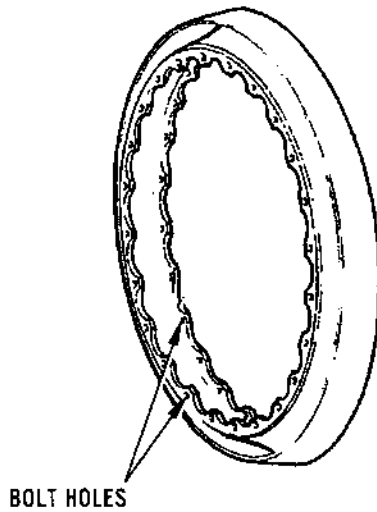


BOLT HOLES

STAGE 2-3

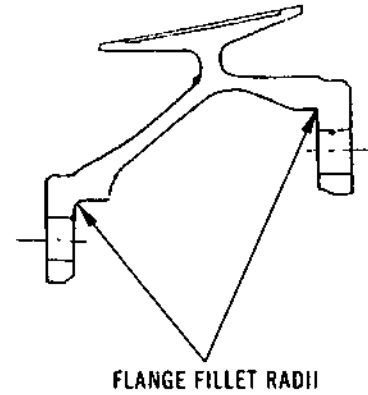


FLANGE FILLET RADII

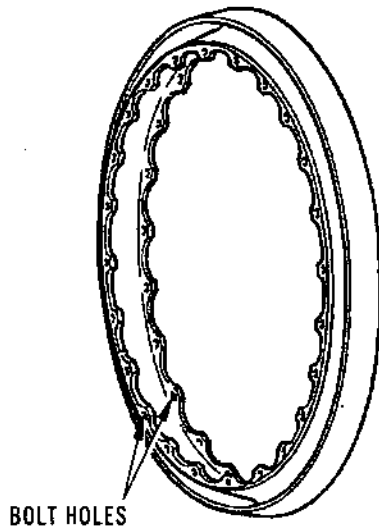


BOLT HOLES

STAGE 3-4

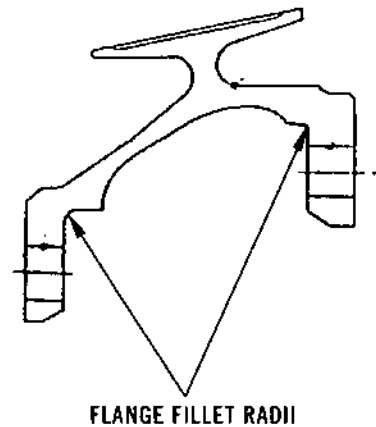


FLANGE FILLET RADII



BOLT HOLES

STAGE 4-5



FLANGE FILLET RADII

HP Compressor Spacers - Inspection Critical Areas
(Sheet 1 of 2)
Figure 309

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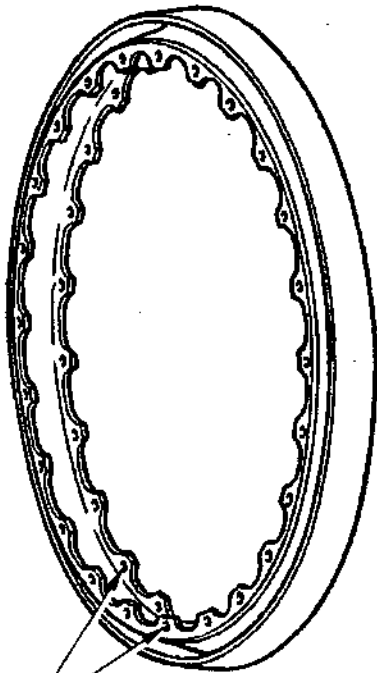


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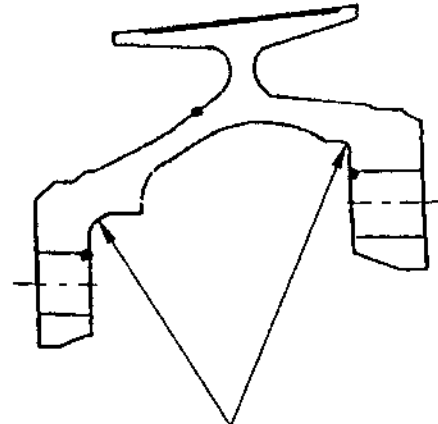
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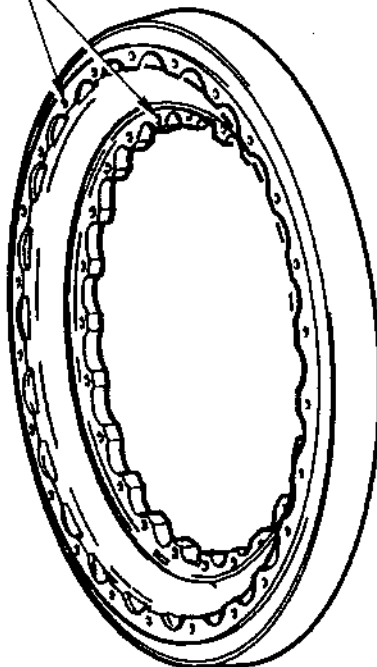


STAGE 5-6

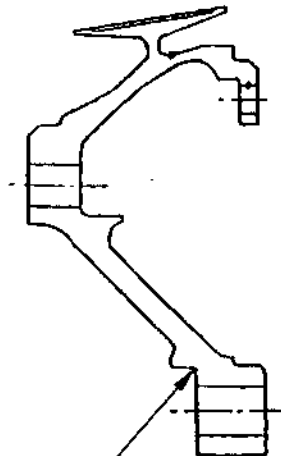


FLANGE FILLET RADIUS

BOLT HOLES



STAGE 6-7



FLANGE FILLET RADIUS

HP Compressor Spacers - Inspection Critical Areas
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Figure 309

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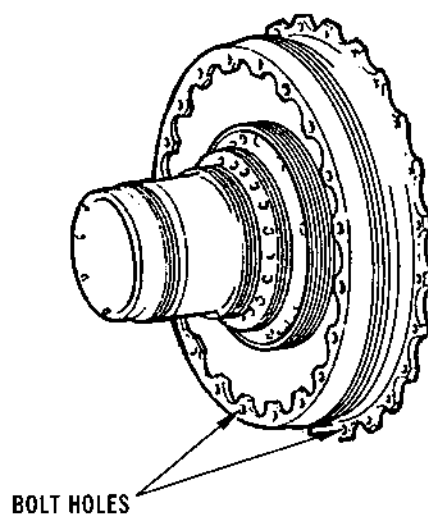
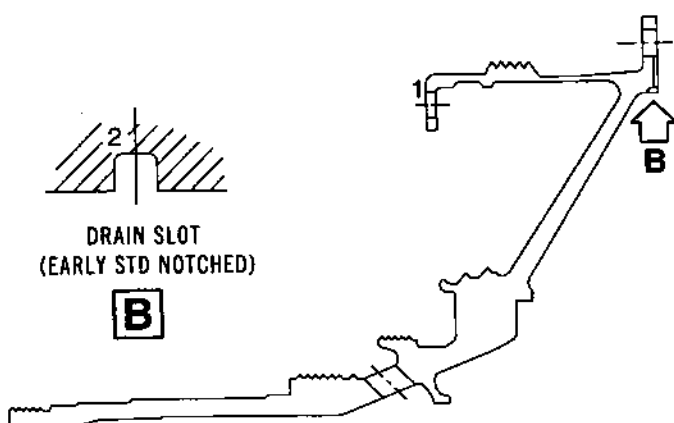


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HP Compressor Front Rotor Shaft
-Inspection Critical Areas
Figure 310

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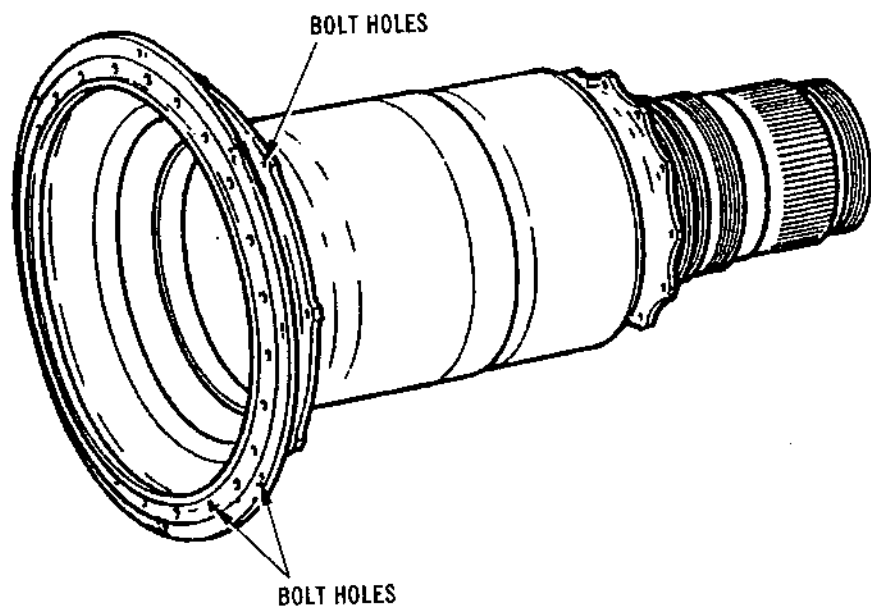


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HP Compressor Drive Shaft
- Inspection Critical Areas
Figure 311

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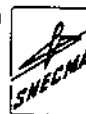
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HP COMPRESSOR DIFFUSER CASE ASSEMBLY - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.
 - (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

No current requirement

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

302	80	Tube	FlA
302	210	Tube	FlA
302	340	Tube	FlA
302	420	Tube	FlA
303	110	No.12 Labyrinth Seal	FlA
303	120	Adjusting Ring	FlA
303	220	Adjusting Ring	FlA
304	90	Blanking Cover	FlA
304	100	Blanking Cover	FlA
304	150	Blank	FlA
304	220	Blanking Cover	FlA
304	250	Cover	FlA
304	300	Elbow	FlA
304	340	Diffuser Case Assembly	FlA

Items to be Fluorescent Dye Crack Tested
Table 302

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Crack Detection Test Diagram
Figure 301

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FIG. NO.

ILLUSTRATED PART CATALOGUE EQUIVALENT

301	Not applicable	
302	72-34-00	Fig.1
303	72-34-00	Fig.2
304	72-34-00	Fig.3

Cross References to Illustrated Parts Catalogue
Table 303

4. Tubes (302-80/210/340/420) (Ref.SB.72-84 and 72-137)

A. Inspect Tubes (Ref.72-09-00 Inspection/Check).

B. Inspect Tube Bores.

(1) Inspect tube bore for contamination using a flexible intrascope.

(a) Bore entirely free of contamination. Accept.

(b) Contamination present in bore. Reject for cleaning.

C. Inspect All Threads (Ref.72-09-00 Inspection/Check).

D. Inspect Tube End Nipples and Seatings.

(1) Inspect tube end seating faces.

(a) Scored or pitted. Reject.

(b) Sealing capability unimpaired. Accept.

E. Inspect Angled Adapter Block (302-340).

(1) Nicks and burrs. Accept after repair.

(2) Scores.

(a) Not more than 0.005 in. (0,130 mm) deep on sealing face. Accept after repair providing sealing capabilities are unimpaired.

5. Insulating Blanket (302-100/110/120/130/230/240/250/260/360/370/380/390/440/450)

A. Inspect Spot Weld.

(1) Damage.

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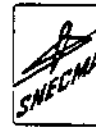
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- (a) Broken spot welded joints. Reject.

B. Inspect Blanket.

(1) Damage.

- (a) Tears and punctures. Reject.
(b) Small dents of smooth contour. Accept.
(c) Powdering and collapse of filler. Reject.

NOTE: Press blanket with finger tips and note any lack of "cushion" effect.

6. Union (302-400) (Ref.SB.72-82)

NOTE: Carry out this check in conjunction with the tube (302-340).

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Hexagon.

- (1) Nicks and burrs. Accept after repair.
(2) Scores.
(a) Not more than 0.005 in. (0,130 mm) deep on sealing face. Accept after repair providing sealing capabilities are unimpaired.

7. Flat Washer (303-20)

A. Inspect Washer.

- (1) Wear and fretting.
(a) Not more than 0.005 in. (0,130 mm) deep on the locking sleeve contact face. Accept after repair providing 100 per cent contact area is maintained.

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(2) Nicks and burrs.

Accept after
repair.

8. Locking Sleeve Spacer (303-30) Outer Sleeve (303-40) and Inner Sleeve (303-60)

A. Inspect Splines (Ref.72-09-00 Inspection/Check).

(1) Wear.

(a) Not more than 0.005 in.
(0,130 mm) on splines.

Accept after
repair.

(b) Backlash not exceeding
0.010 in. (0,250 mm) on
spline engagement.

Accept after
repair.

(2) Nicks and burrs.

Accept after
repair.

9. Labyrinth Seal No.12 (303-110)

A. Carry Out Dimensional Checks (Ref.72-34-00 Fits and Clearances F.C.S. 601-127/128/129/130/131/132).

NOTE: Worn dimensions quoted in Fits and Clearances in respect of seals to SB.72-8574-278 standard, apply across the full width of the seal but do not include local grooving.

(1) Carry out these checks in conjunction with the HP Compressor Rear Labyrinth (Ref.72-32-02).

(2) Remove any burrs or metal build-up prior to carrying out these checks.

B. Inspect Labyrinth Seal Housing Bore.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear (pre SB.72-8574-278 standard).

(a) Damage greater than (b).

Accept after
repair (Ref.
72-34-00
Repair No.1).

(b) Any number of grooves,
provided that they are
all contained within an
arc not greater than
60 degrees of bore mean
circumference, that max-
imum depth is not greater

Accept.

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than 0.005 in. (0,130 mm)
and that F.C.S. limits are
not violated.

(3) Abradable coating (SB.72-8574-278 standard)

- | | | |
|-----|---|--|
| (a) | No signs of break-up
or excessive erosion. | Accept. |
| (b) | Clean cut grooves not
wider than 0.100 in.
(2,54 mm). | Accept. |
| (c) | Areas of chipping extending
across less than 25% of the
coating width and circumfer-
entially not exceeding 0.500
in. (12,70 mm) in collective
length. | Accept
provided that
base metal is
not exposed. |

(4) Distortion.

- | | | |
|-----|---|---------|
| (a) | Provided that minimum
local clearance is not
less than 0.006 in.
(0,150 mm) below the
minimum permissible
dimension in the F.C.S.
over an arc not greater
than 90 degrees. | Accept. |
|-----|---|---------|

10. Adjusting Ring (303-120 to 210 and 220 to 330)

NOTE: These items may require selection during assembly.

A. Inspect Abutment Faces.

- | | | |
|-----|--------------------------|---|
| (1) | Nicks, burrs and scores. | Accept, provided
that repair preserves
surface flatness and
that designed
effective thickness
is maintained over
90 per cent of
contact face area. |
| (2) | Fretting and wear. | Reject. |

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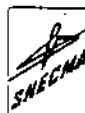
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11. Stepped Pin (304-10)

NOTE: Carry out this check in conjunction with the Diffuser Case 304-340 (Ref.para.16).

A. Inspect Pin.

(1) Security.

(a) Pin loose in diffuser case location. Reject.

(2) Damage.

(a) Bent. Reject.

(b) Nicks and burrs and slight dressable damage. Accept after repair.

12. Brackets (304-40/85)

A. Inspect Attachment Faces.

(1) Wear and fretting.

(a) Reduction of material thickness not more than 10 per cent. Accept.

(b) Bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

(2) Scoring.

(a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing material thickness is not reduced by more than 10 per cent.

B. Inspect Brackets.

(1) Nicks and burrs. Accept after repair.

(2) Distortion. Accept if compatibility is preserved.

13. Blanking Cover (304-90), Blank Cover and Thermocouple Housing (304-100) and Cover (304-250)

A. Inspect Covers.

(1) Distortion.

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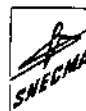
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- (a) Any signs of distortion. Reject.
- (2) Nicks and burrs. Accept after repair.
- (3) Wear.
 - (a) Bolt holes elongated not more than 0.005 in. (0,130 mm). Accept.
- (4) Scores.
 - (a) Not more than 0.005 in. (0,130 mm) in depth and not extending across the sealing washer sealing lip location. Accept after repair.

B. Inspect Thermocouple Housing Thread (Ref.72-09-00 Inspection/Check).

NOTE: Carry out this check in conjunction with the Union Nut (304-190).

14. Blank (304-150/220)

A. Inspect Blanks.

- (1) Scores.
 - (a) Not more than 0.005 in. (0,130 mm) in depth on the abutment face. Accept after repair.
- (2) Nicks and burrs. Accept after repair.
- (3) Wear.
 - (a) Bolt holes elongated not more than 0.005 in. (0,130 mm). Accept after repair.

15. Union Nut (304-190)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

NOTE: Carry out this check in conjunction with cover (304-100).

16. Blank Ferrule (304-200)

A. Inspect Seating.

- (1) Wear.
 - (a) Light dressable wear. Accept providing sealing capabilities are preserved.

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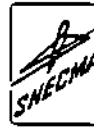
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(2) Scores.

- (a) Not more than 0.003 in.
(0,080 mm) deep.

Accept after repair
providing sealing
capabilities are
unimpaired.

17. Elbow (304-300)

A. Inspect Elbow.

- (1) Distortion.

Accept if compati-
bility is
maintained.

- (2) Nicks and burrs.

Accept after
repair.

- (3) Scoring.

- (a) Scoring at bolt head
locations not more than
0.005 in. (0,130 mm) deep.

Accept after
repair.

B. Inspect Seal Housing.

- (1) Nicks, burrs and scoring.

- (a) Of any description on
sealing lands.

Reject.

- (2) Fretting.

- (a) Light fretting not more
than 0.002 in. (0,050 mm)
in depth.

Accept after repair
providing sealing
capabilities are
preserved.

C. Inspect Flange Face.

- (1) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth and
not extending right
across the sealing face.

Accept after repair
providing sealing
capabilities are
unimpaired.

- (2) Nicks and burrs.

Accept after
repair.

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(3) Wear.

- (a) Bolt holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

18. HP Compressor Diffuser Case (304-340)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Rokide Protective Finish.

NOTE: Check the Rokide coating around the edge of the chipped area for faulty adhesion. Remove any suspect areas and finally dress edges of Rokide around chipped areas before carrying out the following checks.

(1) Chipping.

- (a) Any area of chipping greater than 10 square inches (6450 square mm).

Reject for repair.

- (b) Any number of areas of chipping not exceeding a total of 20 square inches (12900 square mm) per coated region.

Accept.

C. Inspect Vane Ends Inner Seal Housings.

(1) Fretting.

- (a) Not more than 0.002 in. (0,050 mm) in depth.

Accept.

D. Inspect Stepped Pins in Fuel Sprayer Mountings.

NOTE: Carry out this check in conjunction with stepped pins 304-10 (Ref.para.9).

(1) Security.

- (a) Pin loose in case.

Reject case for salvage.

E. Inspect All Joint Faces.

(1) Nicks and burrs.

Accept after repair.

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(2) Scoring.

- | | |
|---|-------------------------|
| (a) Not more than 0.005 in.
(0,130 mm) deep and not
extending right across
the sealing face. | Accept after
repair. |
|---|-------------------------|

(3) Fretting and wear.

- | | |
|-------------------------------|---------|
| (a) Any bolt holes elongated. | Reject. |
|-------------------------------|---------|

(4) Distortion.

- | | |
|---|---------|
| (a) Any distortion of the whole
or part of the case. | Reject. |
|---|---------|

F. Inspect Damper Ring.

- | | |
|---|---|
| (1) Damper ring in correct
axial position. | Accept. |
| (2) Damper ring under interference
with inner case. | Accept. |
| (3) Check for evidence of any
relative movement of the inner
case forward lip i.e. fretting,
burrs or overheating. | |
| (a) Any evidence of movement
or lack of interference | Accept, after
repair; refer to
SB.72-8728-287
(increased inter-
ference fit). |

G. Inspect Delivery Case Vanes.

(1) Dents.

- | | |
|--|---------|
| (a) Large irregular dents and
dents with impact marks. | Reject. |
| (b) Dents of smooth contour
not more than 2 per cent
of "normal" section
thickness. | Accept. |

- | | |
|----------------------|-------------------------|
| (2) Nicks and burrs. | Accept after
repair. |
|----------------------|-------------------------|

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British airways

CONCORDE

OLYMPUS 593 ENGINE OVERHAUL MANUAL

Temporary Revision 72-551

Insert in 72-34-00 before page 313

Reason for issue:

Check on countersunk screws - No 12 labyrinth seating flange.

Read the following NOTE after paragraph H (3).

BEOL NOTE:

Check when the area is accessible, that the 8 countersunk screws (item 340) in the No 12 labyrinth seating flange, are not loose.

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SEE TR

(3) Metallic splatter.

- (a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept providing
surface is no
rougher than the
unsplattered parent
surface.

H. Inspect Inner Case Outer Surface and Outer Case Inner Surface.

(1) Dents.

- (a) Large irregular dents
and dents with impact marks.

Reject.

- (b) Dents of smooth contour
not more than 2 per cent
of "normal" section
thickness.

Accept.

(2) Nicks and burrs.

Accept after
repair.

(3) Metallic splatter.

- (a) Not more than 0.010 in.
(0,250 mm) in depth.

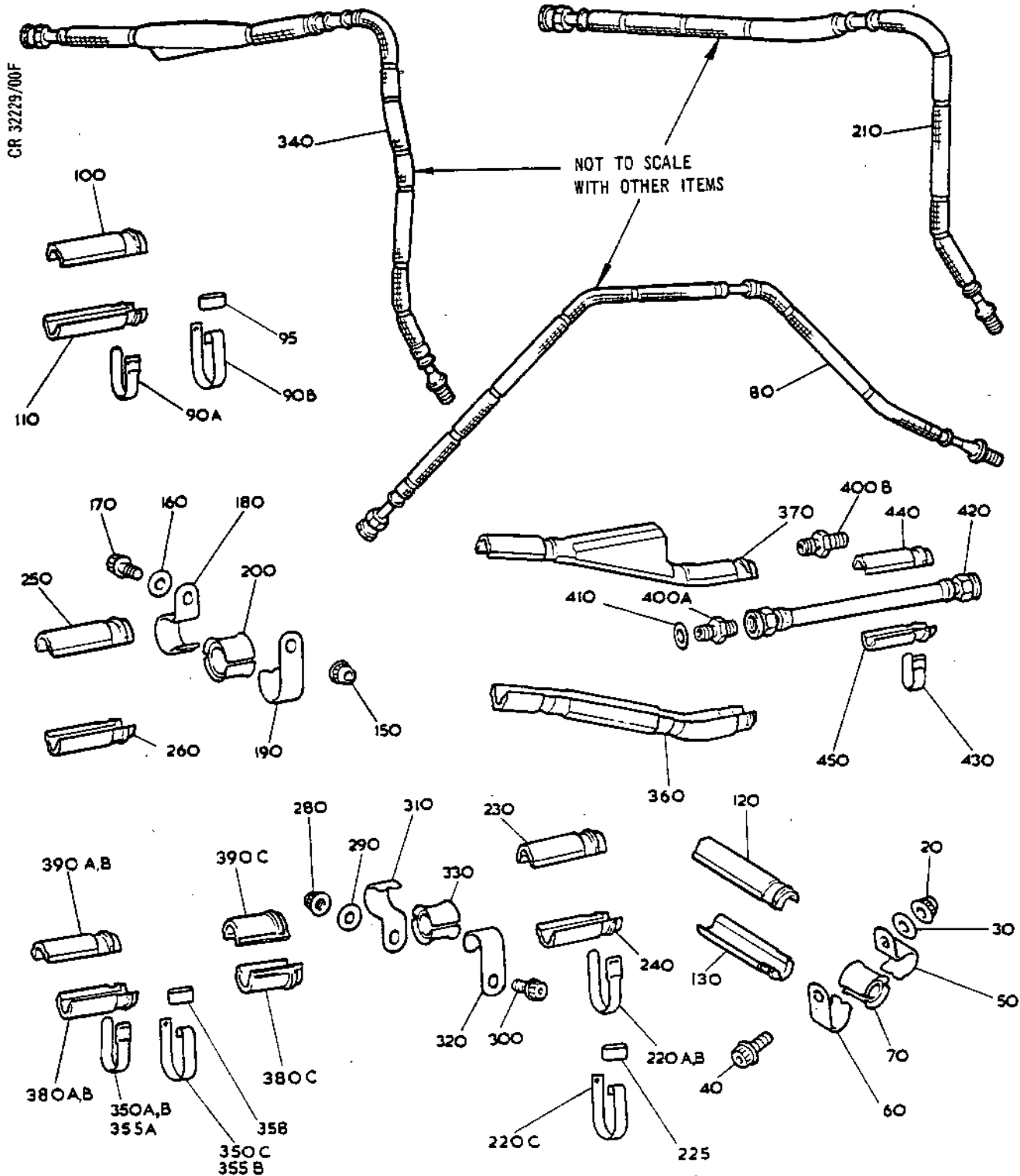
Accept providing
surface is no
rougher than the
unsplattered parent
surface.



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HP Compressor Diffuser Case, Oil and Air Tubes
Figure 302

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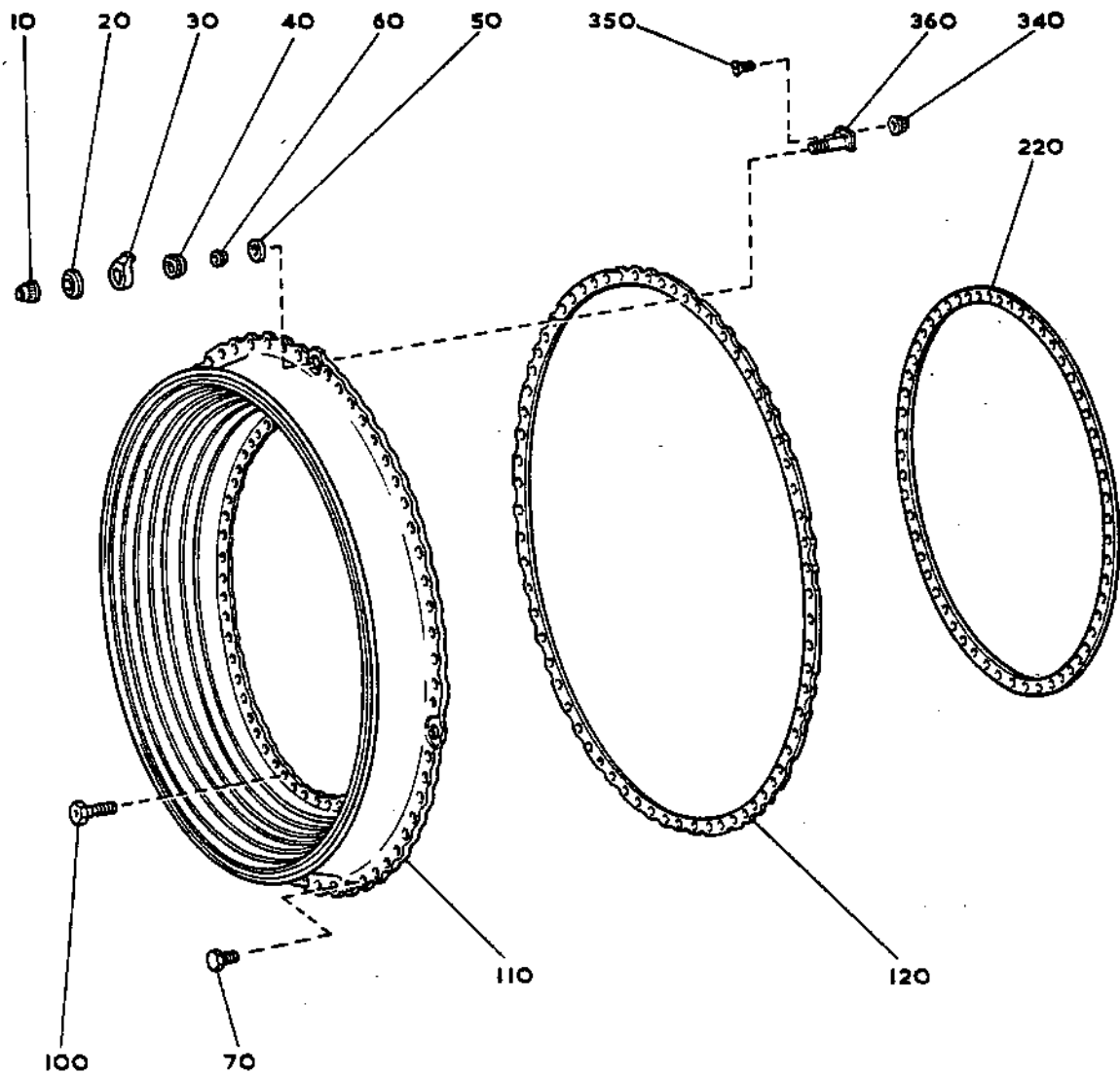
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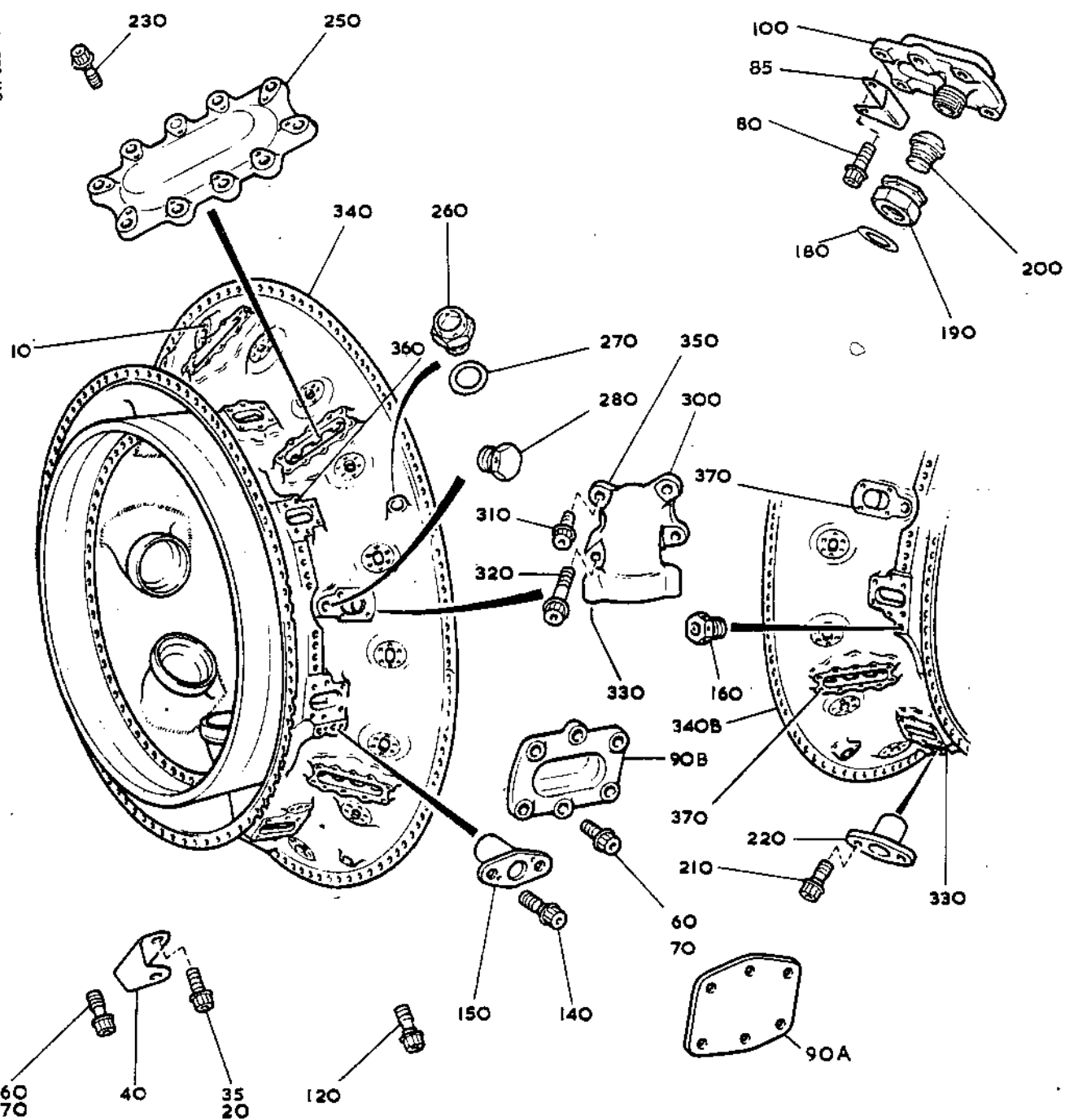


HP Compressor Diffuser Case, Labyrinth Seal
Figure 303

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HP Compressor Diffuser Case Assembly
Figure 304

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COMBUSTION CHAMBER - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.
- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

No Current Requirement

Items to be Magnetic Particle Crack Tested
Table 301

B. Dye Penetrant Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	10	Combustion Chamber	F1 or S3B

Items to be Dye Penetrant Crack Tested
Table 302

FIG.NO.	ILLUSTRATED PARTS CATALOGUE EQUIVALENT
301	Not applicable
302	72-41-01 Fig.1 or Fig.2
303	Not applicable
304	72-41-01 Fig.2

Cross References to Illustrated Parts Catalogue
Table 303

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No Current Requirement

Crack Detection Test Diagram
Figure 301

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4. Annular Combustion Chamber Assembly

A. Inspect Shanked Self-locking Nuts (Ref.72-09-00 Inspection/Check.

B. Inspect Outer Turbine Entry Duct Nozzle Location (Ref.Fig.303).

(1) Fretting and wear.

(a) Less than 0.020 in. Accept.
(0,500 mm) deep at
NGV locations.

C. Inspect Inner Turbine Entry Duct Nozzle Location (Ref.Fig.303).

(1) Fretting and wear.

(a) Light dressable amounts. Accept.

D. Inspect Front Fairing (Head Outer Surface) and Combustion Chamber Outer Surface.

(1) Metallic splatter.

(a) Less than 0.010 in. Dress locally to
(0,250 mm) deep. ensure that
surface is no
rougher than the
unsplattered
parent surface.

(b) Reduction in cooling Accept after repair
hole area or cooling (Ref.72-41-01,
holes blocked. Repair No.1 onwards).

E. Visual Check.

(1) Carry out complete visual Accept after repair
inspection in accordance (Ref.72-41-01,
with 72-09-00 Inspection/ Repair No.1 onwards).
Check.

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F. Vaporizers (SB.72-8709-259 or SB.72-8706-264 or SB.72-8679-282 Standard).

(1) Running hours identification.

Mark the threaded flange end face of the vaporizers in accordance with procedure ref: 72-09-00 Standard Practices Assembly para.15.

G. Inspect No.2 Outer Cooling Ring and Front Fairing Inner Surfaces (Ref. Fig.304).

(1) Corrosion.

(a) Less than 0.020 in.
(0,51 mm) deep.

Accept after repair
(Ref.72-41-01,
Repair No.12).

(b) More than 0.020 in.
(0,51 mm) deep.

Accept after repair
(Ref.72-41-01,
Repair No.7.

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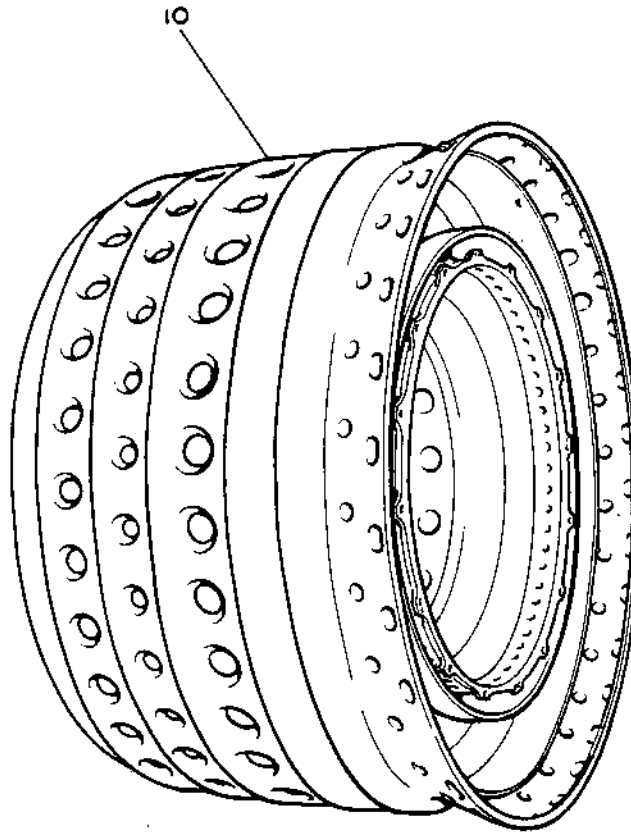
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CR 32146/00B



Combustion Chamber
Figure 302

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BS00015110/1

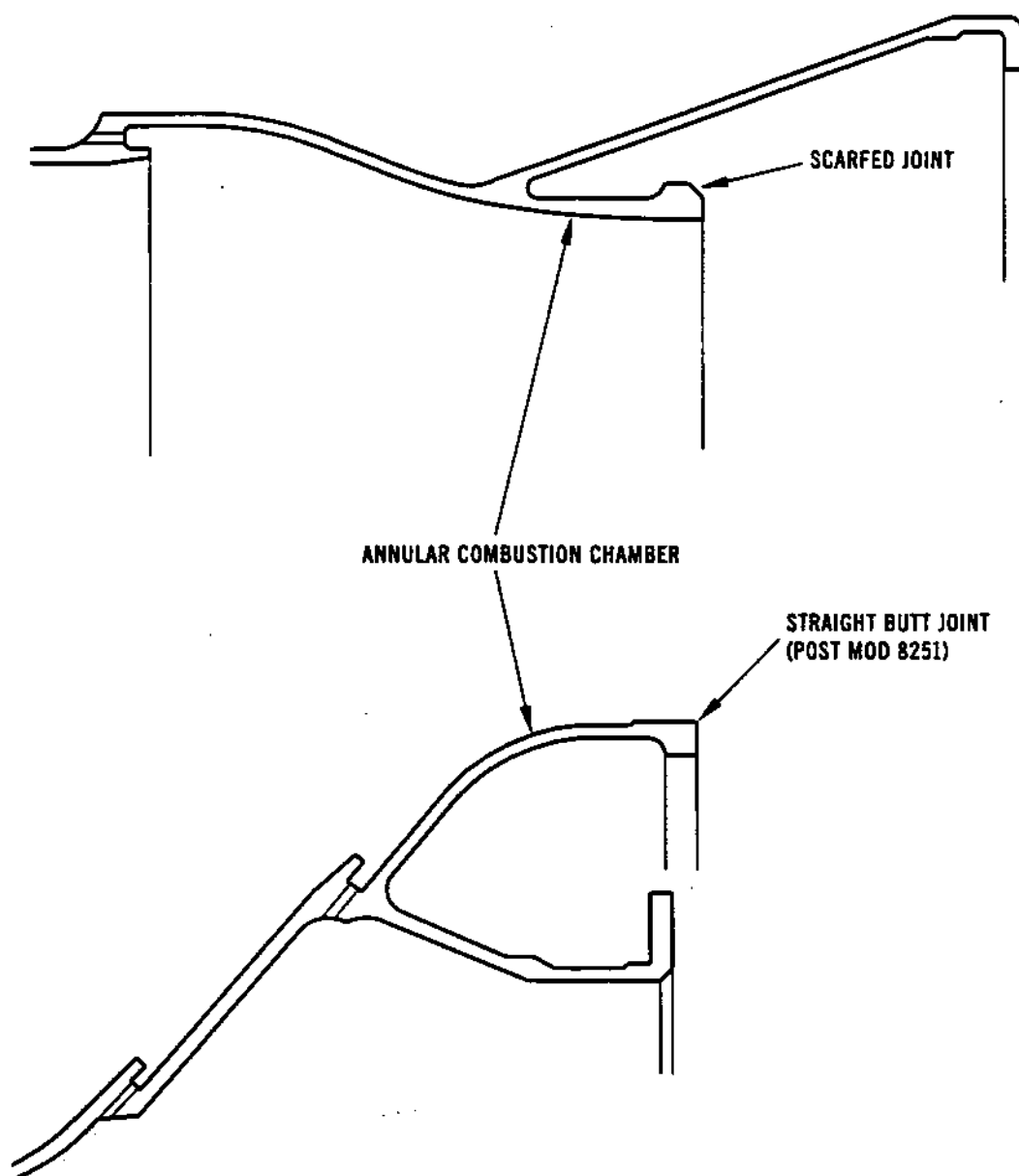


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Turbine Entry Duct Abutment Faces
Figure 303

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FRONT FAIRING

No 2 COOLING
RING OUTER

B

SECTION THROUGH COMBUSTION CHAMBER

FRONT
FAIRING

No 2 COOLING RING OUTER

EXISTING COATING

TYPICAL AREA OF
CORROSION

158 HOLES EQUI-SPACED
AS FOR 180

B

No.2 Outer Cooling Ring and Front Fairing Corrosion
Figure 304

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COMBUSTION CHAMBER OUTER CASE - INSPECTION/CHECK1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards. Special attention must be paid to critical areas of certain specified items during inspection. An instruction to this effect is included in the inspection detailed for the specified item.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

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3. Crack Detection

A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.
- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
304	170	Rear Lifting Bracket	MP1
305	70	Bracket	MP1
306	230	Rear Lifting Bracket	MP1

Items to be Magnetic Particle Crack Tested
Table 301

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B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

Items marked with an asterisk (*) in Table 302 feature defined critical areas. (Ref.Fig.308). In addition to the general overall crack detection examination, special attention must also be paid to these defined critical areas during the inspection.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	230	Tube Support Assembly	F1A
302	270	Tube Support Assembly	F1A
302	290	Tube Support Assembly	F1A
303	30	Mounting Block	F1A
303	50	Blanking Cover	F1A
303	70	Blanking Cover	F1A
303	140	Flanged Sealing Bar	F1A
303	170	Blanking Cover	F1A
303	190	Bracket	F1A
303	220	Flanged Sealing Bar	F1A
303	250	Mounting Boss	F1A
303	410*	Combustion Chamber Outer Case Assembly	F1A
304	340	Bracket	F1A
305	360	Bracket	F1A
305	370	Bracket	F1A
307	20	Vane Locking Pin	F1A
307	40	Pin	F1A
307	80	Extended Head Pin	F1A
307	130	Extended Head Pin	F1A
307	160	Vane Nozzle Abutment Segment	F1A
307	190	Vane Nozzle Abutment Segment	F1A

Items to be Fluorescent Dye Crack Tested
Table 302

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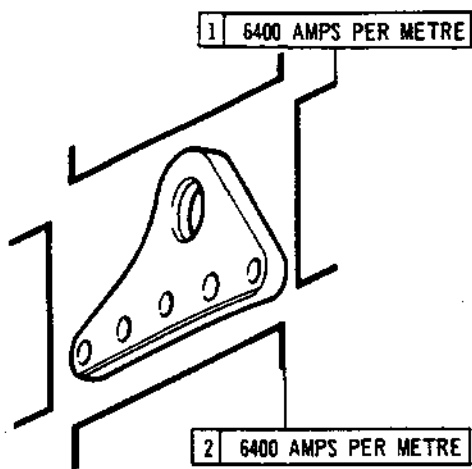
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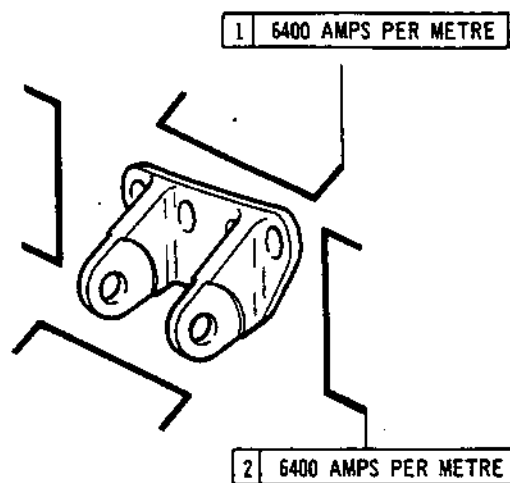


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REAR LIFTING BRACKET (304-170, 306-230)



BRACKET (305-70)

Crack Detection Test Diagram
Figure 301

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-42-01	Fig.1
303	72-42-01	Fig.2
304	72-42-01	Fig.3
305	72-42-01	Fig.4 and 4A
306	72-42-01	Fig.5
307	72-42-01	Fig.6, 6A and 6B

Cross References to Illustrated Parts Catalogue
Table 303

4. Support Brackets (302-10/60/110/160) and Brackets (302-260, 303-280/300, 304-50/140/230/280/350/360/400/470/500/530, 305-30/120/210/220/280/310, 306-30/110/200/300, 307-220/225/230/235)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Attachment Faces.

(1) Wear and fretting.

(a) Not more than 10 per cent reduction in flange thickness.

Accept.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

(2) Scoring.

(a) Not more than 0.010 in. (0,250 mm) in depth.

Accept after repair providing material thickness is not reduced by more than 10 per cent.

C. Inspect Bracket.

(1) Nicks and burrs.

Accept after repair.

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(2) Distortion.

Accept after repair
providing repair
restores compati-
bility and does
not induce cracking.

(3) Security.

(a) Captive nut rivets
secure.

Accept.

5. Tube Support Assembly (302-230/270/290)

A. Inspect Tube (Ref.72-09-00 Inspection/Check).

B. Inspect Bracket and Tube Support Flanges.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear and fretting.

(a) Not more than 10 per cent
reduction in flange
thickness.

Accept.

(b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

(3) Scoring.

(a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing material
thickness is not
reduced by more
than 10 per cent.

(4) Distortion.

Accept after repair
providing repair
restores compati-
bility and does not
induce cracking.

C. Inspect Tube Support Spigot.

(1) Nicks and burrs.

Accept after
repair.

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(2) Wear.

- (a) Not more than 0.010 in. Accept after
(0,250 mm) in depth. repair.

NOTE: Check compatibility of support spigot with Mounting Plates (Ref.72-53-00/307-260/440 and 309-80).

(3) Scores.

- (a) Not more than 0.010 in. Accept after repair
(0,250 mm) in depth. providing crack
detection investi-
gation is
satisfactory.

6. Mounting Block (303-30) and Mounting Boss (303-250)

A. Inspect Attachment Flanges.

- (1) Nicks, burrs, wear and Accept after repair
scoring. providing material
thickness is not
reduced by more
than 10 per cent
and sealing capa-
bilities are
unimpaired.

(2) Wear.

- (a) Bolt-holes elongated not Accept after
more than 0.030 in. repair.
(0,760 mm).

(3) Distortion.

Accept after repair
providing repair
restores compat-
ibility and does
not induce cracking.

B. Inspect Bore.

- (1) Nicks and burrs. Accept after
repair.

(2) Obstruction.

- (a) Bore free from Accept.
obstruction.

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7. Blanking Cover (303-50/70/170), Blanking Plate (303-110/150/340/400 (Ref.SB.72-75 and 72-85)) and Cover Plate (303-130/210)

A. Inspect Attachment Flange.

- (1) Nicks, burrs, wear and scoring.

Accept after repair providing material thickness is not reduced by more than 10 per cent and sealing capabilities are unimpaired.

- (2) Wear.

- (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

- (3) Scoring.

- (a) Not more than 0.010 in. (0,250 mm) in depth at bolthead locations.

Accept after repair.

8. Flanged Sealing Bar (303-140/220)

A. Inspect Attachment Flange.

- (1) Nicks and burrs.

Accept after repair.

- (2) Wear.

- (a) Not more than 5 per cent reduction in flange thickness.

Accept.

- (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

- (3) Scores.

- (a) Not more than 0.005 in. (0,130 mm) in depth and not extending right across the contact face.

Accept after repair.

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B. Inspect Tubes (Ref.72-09-00 Inspection/Check).

9. Bracket (303-190, 304-340, 305-70/360/370)

A. Inspect Attachment Flange.

- | | |
|--|--|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Not more than 5 per cent reduction in flange thickness. | Accept. |
| (b) Bolt-holes elongated not more than 0.010 in. (0,250 mm). | Accept after repair. |
| (3) Scores. | |
| (a) Not more than 0.010 in. (0,250 mm) in depth. | Accept after repair subject to satisfactory crack detection. |

B. Inspect Support Flange and Support Spigot.

- | | |
|---|---------------------------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Not more than 5 per cent reduction in material thickness. | Accept. |
| (b) Bolt-holes elongated not more than 0.010 in. (0,250 mm). | Accept after repair. |
| (3) Distortion. | Accept if compatibility is preserved. |

10. Combustion Chamber Outer Case (303-410)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

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B. Inspect Front and Rear Abutment Flanges.

(1) Nicks and burrs. Accept after repair.

(2) Scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth and
not extending right across
the mating face. Accept.

(3) Distortion. Reject.

C. Inspect Bolt Locations.

(1) Nicks and burrs. Accept after repair.

(2) Wear and fretting.

(a) Any bolt-holes elongated. Reject.

D. Inspect All External Abutment Faces.

(1) Nicks and burrs. Accept after repair.

(2) Scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth and
not extending right across
the sealing face. Accept after repair
providing sealing
capabilities are
unimpaired.

E. Inspect LP Turbine Nozzle Vane Locating Groove (FRONT).

(1) Nicks and burrs. Accept after repair.

(2) Wear (Pre.SB.0L.593-72-9012-410 CCOC's only).

(a) Not more than 0.010 in.
(0,250 mm) in depth on
any part of the inner or
outer surface of the
groove. Accept.

(3) Plug security.

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- (a) Any plugs insecure or missing. Reject.

NOTE: The forward LP Nozzle Vane Locating Flange cooling air holes are plugged, these plugs must maintain an interference fit.

F. Inspect LP Turbine Nozzle Vane Locating Groove (REAR).

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
- (a) Not more than 0.002 in. (0,050 mm) in depth on any part of the tapered flange. Accept.

G. Inspect HP Turbine Nozzle Abutment Segment Location.

- (1) Wear and fretting.
- (a) Light witness mark. Accept.
- (b) Bolt-holes elongated. Reject.
- (2) Scores.
- (a) Not more than 0.002 in. (0,050 mm) in depth. Accept after repair.

H. Inspect Headless Pin.

- (1) Nicks and burrs. Accept after repair.
- (2) Damage.
- (a) Pin bent. Reject.
- (3) Security.
- (a) Pin secure in location. Accept.

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J. Inspect area adjacent the cooling air holes feeding the forward location groove.

(1) Erosion.

(a) Less than 0.040 in. Accept.
(1,02 mm) in depth.

(b) Between 0.040 in. Accept after
(1,02 mm) and 0.045 in. repair.
(1,14 mm) in depth.

(c) More than 0.045 in. Reject.
(1,14 mm) in depth.

K. Inspect Combustion Chamber Outer Case Overall.

(1) Nicks and burrs. Accept after
repair.

(2) Dents. Reject.

(3) Metallic splatter.

(a) Less than 0.010 in. Accept providing
(0,250 mm) in depth. surface is no
rougher than
unsplattered
parent surface.

(4) Distortion. Reject.

11. Rear Lifting Bracket (304-170, 306-230)

A. Inspect Attachment Flange.

(1) Nicks and burrs. Accept after
repair.

(2) Wear and fretting.

(a) Bolt-holes elongated. Reject.

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B. Inspect Bracket.

(1) Distortion.

Reject.

(2) Wear.

(a) Lifting pin location
elongated not more than
0.001 in. (0,030 mm).

Accept

12. Vane Locking Pin (307-20), Pin (307-40), and Extended Head
Pin (307-80/130)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Attachment Flange.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Not more than 5 per cent
reduction in flange
thickness.

Accept.

(b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

(3) Scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair
subject to satis-
factory crack
detection.

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B. Inspect Tubes (Ref.72-09-00 Inspection/Check).

9. Bracket (303-190, 304-340, 305-70/360/370)

A. Inspect Attachment Flange.

- | | |
|--|--|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Not more than 5 per cent reduction in flange thickness. | Accept. |
| (b) Bolt-holes elongated not more than 0.010 in. (0,250 mm). | Accept after repair. |
| (3) Scores. | |
| (a) Not more than 0.010 in. (0,250 mm) in depth. | Accept after repair subject to satisfactory crack detection. |

B. Inspect Support Flange and Support Spigot.

- | | |
|---|---------------------------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Not more than 5 per cent reduction in material thickness. | Accept. |
| (b) Bolt-holes elongated not more than 0.010 in. (0,250 mm). | Accept after repair. |
| (3) Distortion. | Accept if compatibility is preserved. |

10. Combustion Chamber Outer Case (303-410)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

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B. Inspect Front and Rear Abutment Flanges.

CAUTION: THE FILLET RADII ON THE REAR OF THE FRONT AND REAR ABUTMENT FLANGES ARE A DEFINED CRITICAL AREA. (Ref. Fig.308). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

- | | |
|--|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Scores. | |
| (a) Not more than 0.005 in.
(0,130 mm) in depth and
not extending right across
the mating face. | Accept. |
| (3) Distortion. | Reject. |

C. Inspect Bolt Locations.

CAUTION: THE FRONT AND REAR FLANGE BOLT HOLE BORES ARE A DEFINED CRITICAL AREA. (Ref.Fig.308). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

- | | |
|-------------------------------|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear and fretting. | |
| (a) Any bolt-holes elongated. | Reject. |

D. Inspect All External Abutment Faces.

- | | |
|---|--|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Scores. | |
| (a) Not more than 0.005 in.
(0,130 mm) in depth and
not extending right across
the sealing face. | Accept after repair providing sealing capabilities are unimpaired. |

E. Inspect LP Turbine Nozzle Vane Locating Groove (FRONT).

- | | |
|----------------------|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
|----------------------|----------------------|

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(2) Wear (Pre.SB.0L.593-72-9012-410 CCOC's only).

(a) Not more than 0.010 in. Accept.
(0,250 mm) in depth on
any part of the inner or
outer surface of the
groove.

(3) Plug security.

(a) Any plugs insecure or Reject.
missing.

NOTE: The forward LP Nozzle Vane Locating
Flange cooling air holes are plugged,
these plugs must maintain an
interference fit.

F. Inspect LP Turbine Nozzle Vane Locating Groove (REAR).

(1) Nicks and burrs. Accept after
repair.

(2) Wear.

(a) Not more than 0.002 in. Accept.
(0,050 mm) in depth on
any part of the tapered
flange.

G. Inspect HP Turbine Nozzle Abutment Segment Location.

(1) Wear and fretting.

(a) Light witness mark. Accept.

(b) Bolt-holes elongated. Reject.

(2) Scores.

(a) Not more than 0.002 in. Accept after
(0,050 mm) in depth. repair.

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H. Inspect Headless Pin.

- (1) Nicks and burrs. Accept after repair.
- (2) Damage.
 - (a) Pin bent. Reject.
- (3) Security.
 - (a) Pin secure in location. Accept.

J. Inspect area adjacent the cooling air holes feeding the forward location groove.

- (1) Erosion.
 - (a) Less than 0.040 in. (1,02 mm) in depth. Accept.
 - (b) Between 0.040 in. (1,02 mm) and 0.045 in. (1,14 mm) in depth. Accept after repair.
 - (c) More than 0.045 in. (1,14 mm) in depth. Reject.

K. Inspect Combustion Chamber Outer Case Overall.

CAUTION: THE WELDS (BOSS AND AXIAL) ARE A CRITICAL AREA. SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

- (1) Nicks and burrs. Accept after repair.
- (2) Dents. Reject.
- (3) Metallic splatter.
 - (a) Less than 0.010 in. (0,250 mm) in depth. Accept providing surface is no rougher than unsplattered parent surface.
- (4) Distortion. Reject.

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11. Rear Lifting Bracket (304-170, 306-230)

A. Inspect Attachment Flange.

(1) Nicks and burrs. Accept after repair.

(2) Wear and fretting.

(a) Bolt-holes elongated. Reject.

B. Inspect Bracket.

(1) Distortion. Reject.

(2) Wear.

(a) Lifting pin location elongated not more than 0.001 in. (0,030 mm). Accept

12. Vane Locking Pin (307-20), Pin (307-40), and Extended Head Pin (307-80/130)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Attachment Flange.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Not more than 5 per cent reduction in flange thickness. Accept.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

(3) Scores.

(a) Not more than 0.005 in. (0,130 mm) in depth. Accept after repair subject to satisfactory crack detection.

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C. Inspect Locking Spigot.

- | | |
|--|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Wear to be smooth, unstepped. Width of spigot to be not less than 0.312 in. (7,925 mm) in the circumferential direction. | Accept. |
| (3) Distortion. | Reject. |

13. Vane Nozzle Abutment Half Segment (307-160/165 and Vane Nozzle Abutment Segment (307-190/195)

A. Inspect Segments.

- | | |
|--|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Not more than 0.010 in. (0,250 mm) in depth on nozzle abutment face. | Accept. |
| (b) Not more than 0.010 in. (0,250 mm) in depth on outer case abutment face. | Accept. |
| (c) Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |
| (3) Distortion. | |
| (a) Any distortion. | Reject. |
| (4) Scoring. | |
| (a) Not more than 1.010 in. (0,250 mm) in depth. | Accept after repair. |

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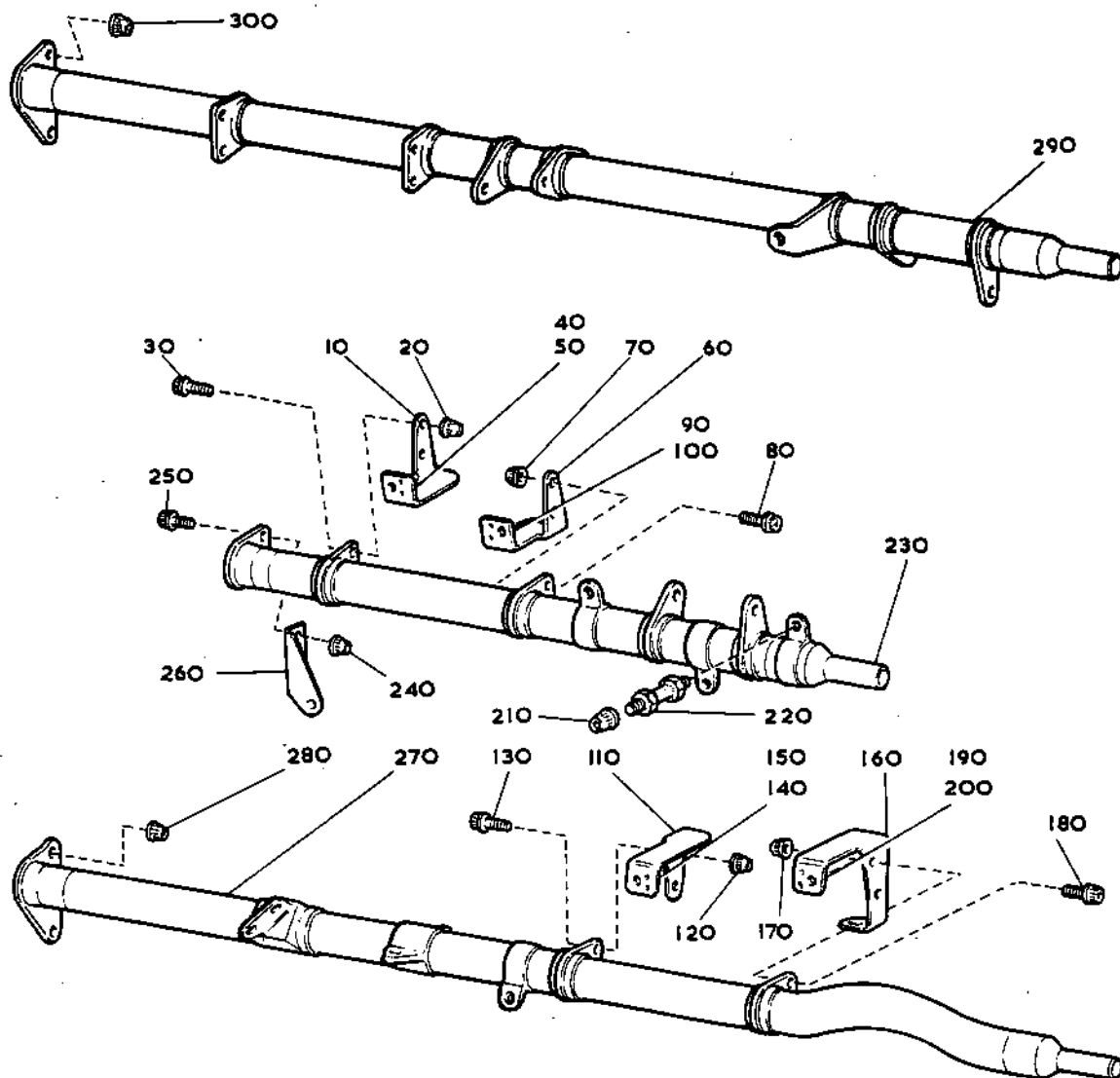
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Combustion Chamber Outer Case, Support Tubes
and Fittings
Figure 302

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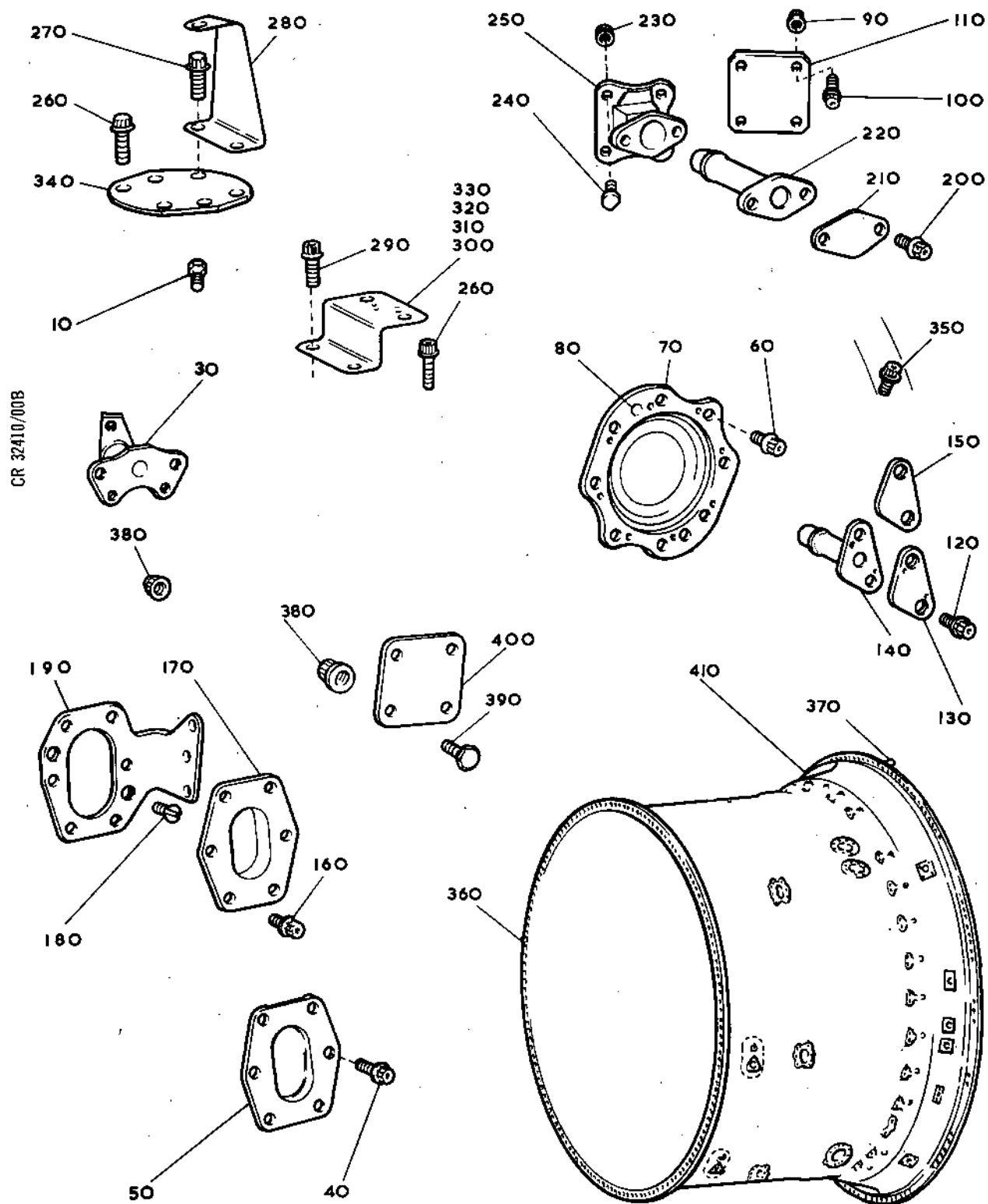
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Combustion Chamber Outer Case, Case Assembly
and External Fittings
Figure 303

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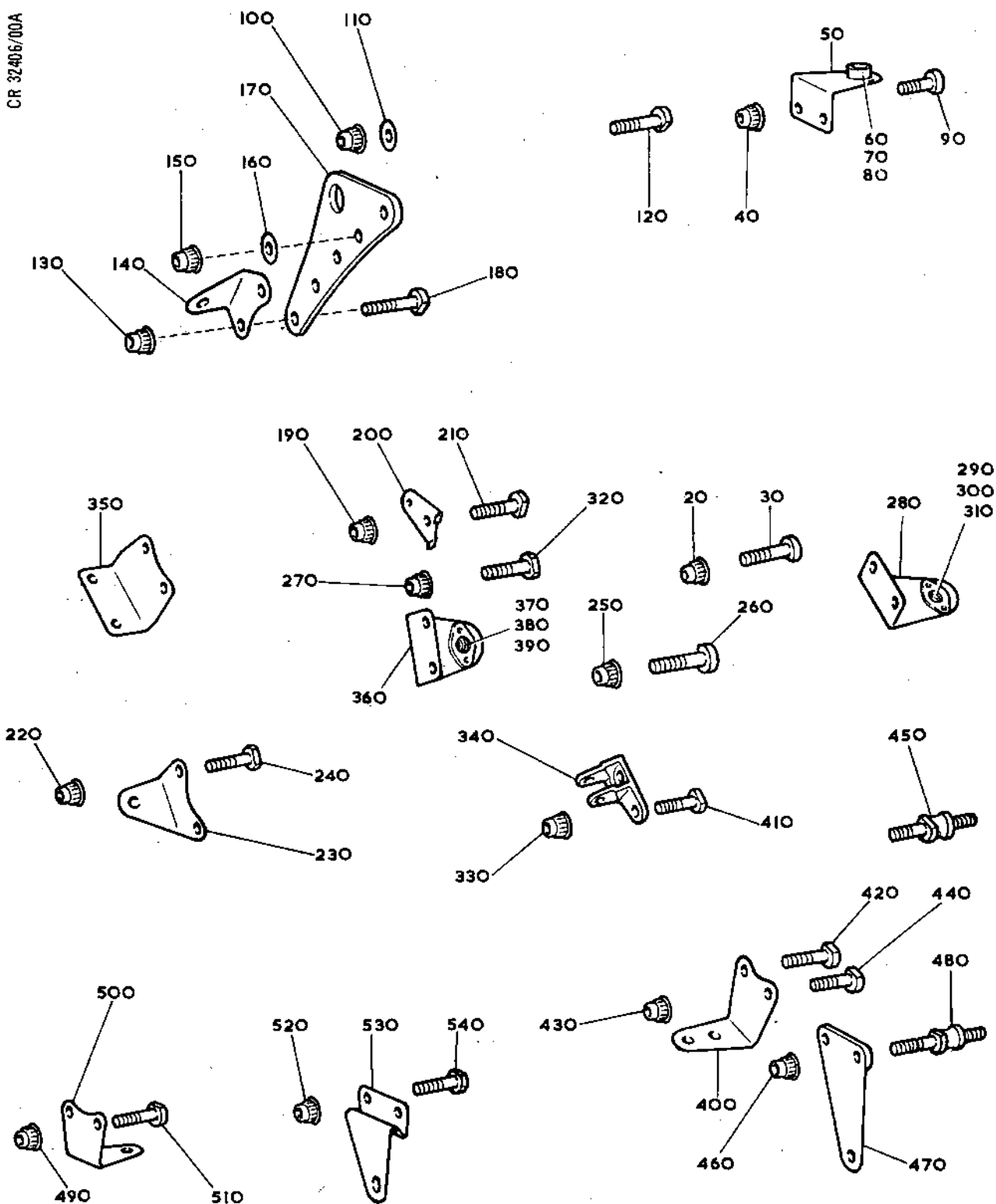


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Combustion Chamber Outer Case, Attaching Parts
Figure 304

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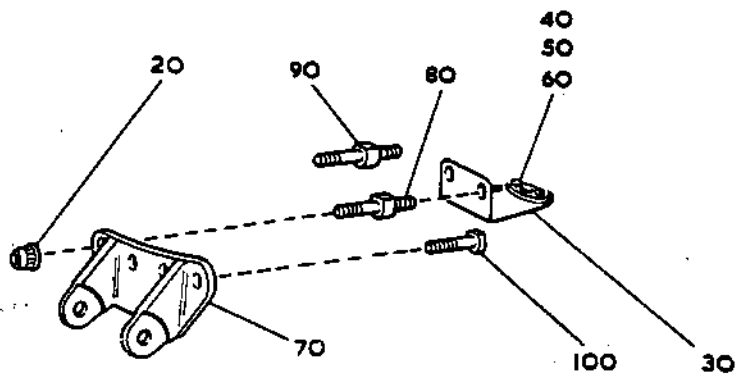
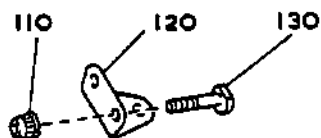
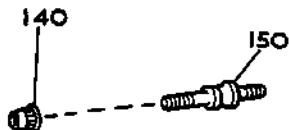
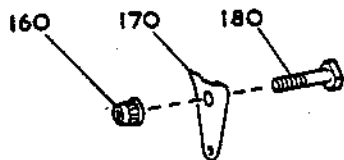
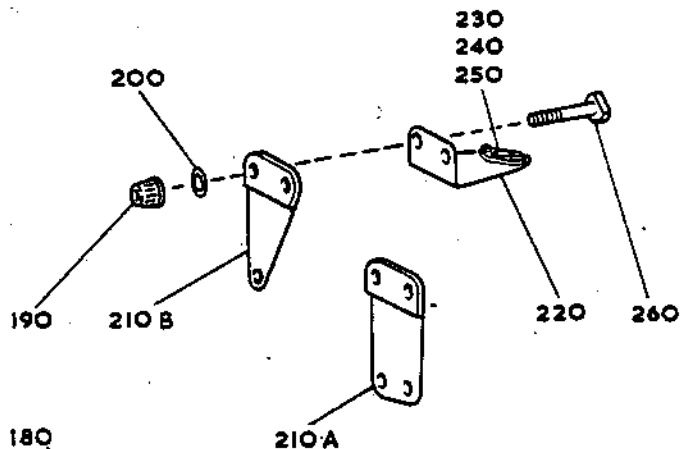
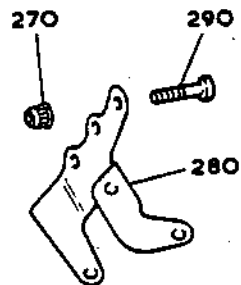
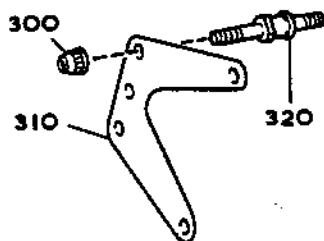
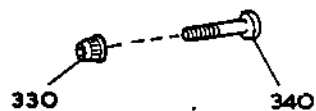
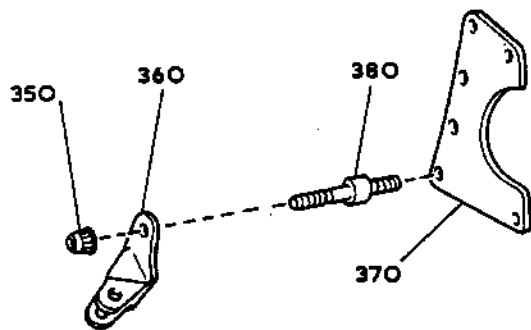
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Combustion Chamber Outer Case, Attaching Parts
Figure 305

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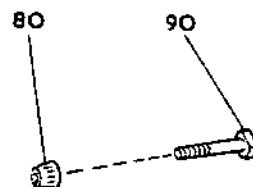
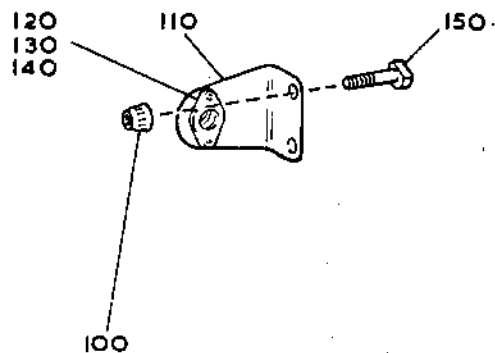
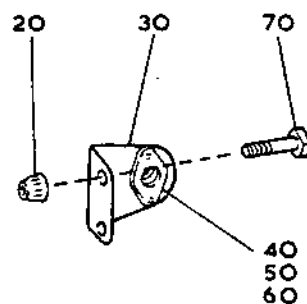
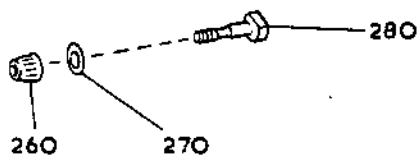
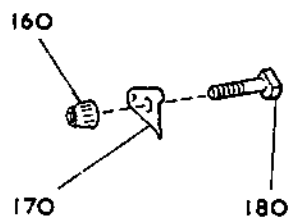
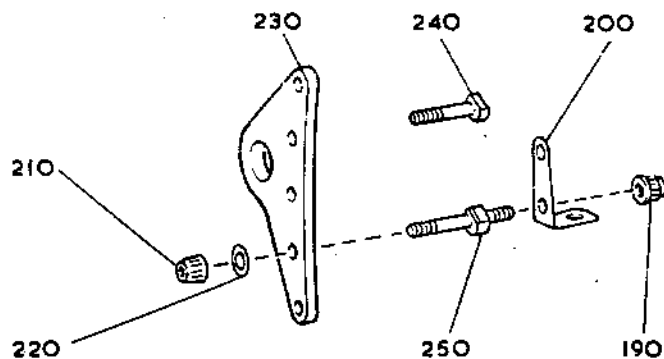
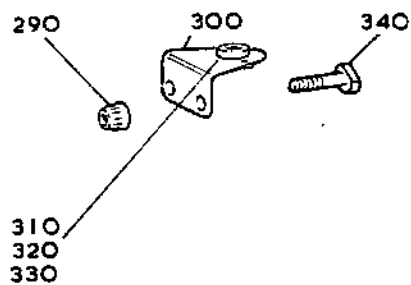


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Combustion Chamber Outer Case, Attaching Parts
Figure 306

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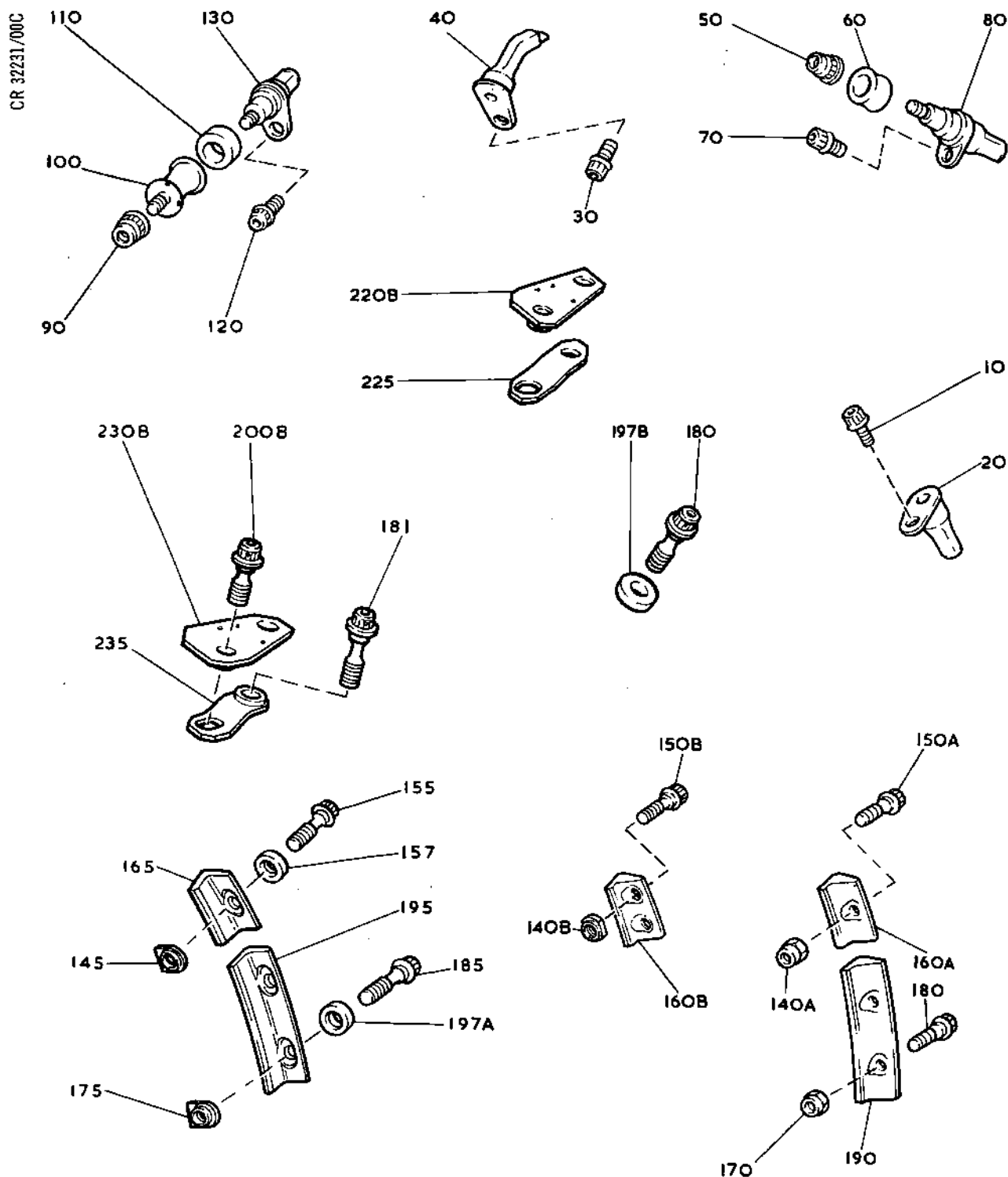
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Combustion Chamber Outer Case, Vane Nozzle
Abutment Segments and Fittings
Figure 307

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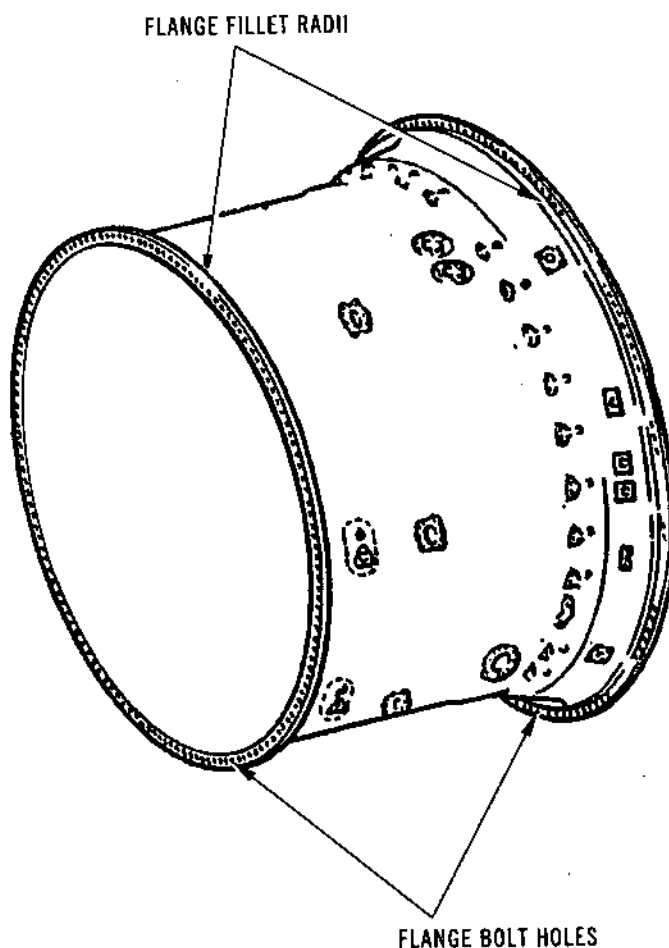


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Combustion Chamber Outer Case
- Inspection Critical Areas
Figure 308

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HP TURBINE BEARING SUPPORT - INSPECTION/CHECK

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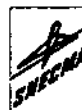
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1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

(1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
305	340 to 370	Retaining Ring	MP1

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	50	Coupling Assembly	FlA
302	130	Coupling Assembly	FlA
302	220	Coupling Assembly	FlA
302	270	Outer Air Duct	FlA
303	50	Coupling	FlA
303	60	Air Duct	FlA
304	30	Tube	FlA
304	70	Tube	FlA
304	140	Tube Elbow	FlA
304	170	Spherical Seal	FlA
304	190	Spherical Housing	FlA
304	210	Tube End	FlA
304	240	Tube Adapter	FlA
304	260	Tube End	FlA
305	180	Cover	FlA
305	300 to 330	Labyrinth Ring	FlA
305	339	(Bearing Housing and Retaining Ring	FlA
306	20	Shroud Assembly	FlA
306	40	Bearing Support	FlA

Items to be Fluorescent Dye Crack Tested
Table 302

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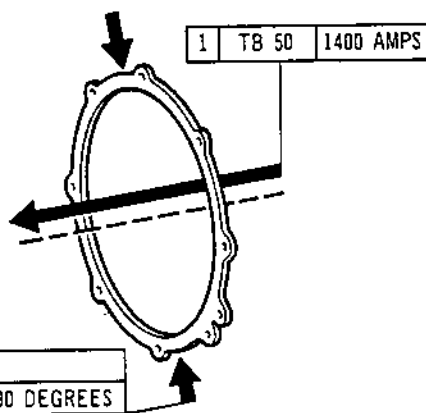
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2	CF 550 AMPS
3	REPEAT 2 AT 90 DEGREES



RETAINING RING (305-331)

Crack Detection Test Diagram
Figure 301

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FIG.NO.	ILLUSTRATED PARTS CATALOGUE	EQUIVALENT
301	Not applicable	
302	72-51-01	Fig.1 & 1A
303	72-51-01	Fig.2
304	72-51-01	Fig.3
305	72-51-01	Fig.4
306	72-51-01	Fig.5

Cross References to Illustrated Parts Catalogue
Table 303

4. Outer Air Duct (302-270)

A. Inspect Cover Unit Locating Bore.

NOTE: Carry out these checks in conjunction with the
Cover Unit (Ref.para.6).

(1) Check dimension of air duct inner bore (F.C.S.
602-234).

(a) Diameter within Accept.
F.C.S. limits.

(2) Fretting. Accept, if repair does
not violate F.C.S.
limits in (1).

(3) Nicks and burrs. Accept, if repair does
not violate F.C.S.
limits in (1).

B. Inspect Outer Air Duct Abutment Flange.

(1) Distortion.

(a) Square to centre line Accept.
with no distortion.

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5. Coupling Assemblies (302-50/130/220 and 303-50)

A. Inspect Seal Ring Grooves.

NOTE: Carry out these checks in conjunction with new Seal Rings.

- (1) Check dimension of seal ring grooves (F.C.S. 601-182/184 for 305-20/220; F.C.S. 601-186/188 for 302-130; F.C.S. 601-180 for 303-50).

(a) Groove width within F.C.S. limits. Accept.

- (2) Nicks and burrs. Accept, if repair does not violate F.C.S. limits in (1).

B. Inspect Captive Self-locking Nuts and Retainers (Ref.72-09-00 Inspection/Check).

6. Cover Assembly (305-180)

A. Check No.13 Labyrinth Bore Dimensions.

- (1) Check bore (F.C.S. 602-192).

NOTE: Carry out this check in conjunction with the HP Rotor Shaft (Ref.72-33-02 Inspection/Check).

(a) Diameter within F.C.S. limits. Accept.

- (2) Nicks and burrs. Accept, if repair does not violate F.C.S. limits in (1).

B. Inspect Captive Nuts and Retainers (Ref.72-09-00 Inspection/Check).

C. Inspect No.13 Labyrinth Seal Housing Bore.

- (1) Overheating discolouration. Accept.

- (2) Nicks and burrs. Accept after repair.

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(3) Grooving.

- (a) Damage greater than (b). Accept after repair (Ref. 72-51-01 Repair No.1 and No.5).
- (b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.

(4) Distortion.

- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S. Accept.

D. Carry out Dimensional Checks.

- (1) Check bore of air tube locations and duct/bore clearance (F.C.S. 601-243).

NOTE: Carry out this check in conjunction with the Tube Assemblies (para.9).

- (a) Within F.C.S. limits. Accept.

- (2) Check Outer Air Duct location diameter (F.C.S. 602-234) and Bearing Housing location bore (F.C.S. 602-190).

NOTE: Carry out these checks in conjunction with the Outer Air Duct (para.4) and the Bearing Housing (para.15).

(3) Scoring.

- (a) Less than 0.005 in. (0,130 mm) deep. Accept after repair.

- (4) Pick-up. Accept after repair.

E. Inspect Cover Assembly Bores.

- (1) Inspect cover assembly bores for contamination

- (a) Bores entirely free of Contamination. Accept.

- (b) Contamination present in bores. Reject for cleaning.

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7. Seal Ring Assemblies (302-30/100/200, 302-40/110/210 and 303-10)

NOTE: Replacement items, checked during assembly.

8. Air Duct (303-60)

A. Inspect Captive Shank Nuts (Ref.72-09-00 Inspection/Check).

B. Inspect Seal Ring Assembly Locations.

NOTE: Carry out this check in conjunction with new Seal Ring Assemblies.

(1) Nicks, burrs and scores.

(a) Less than 0.005 in. Accept, if repair
(0,130 mm) deep. preserves sealing capability.

C. Inspect Case Abutment Flange and Coupling Abutment Faces.

(1) Nicks and burrs. Accept, if repair preserves surface flatness.

D. Inspect Bolt Locations.

(1) Fretting and wear.

(a) Any bolt-holes Reject.
elongated.

9. Tube Assemblies (304-30/70) and Elbow (304-140)

A. Inspect Tubes (Ref.72-09-00 Inspection/Check).

B. Inspect Spherical Ends.

(1) Check diameter (F.C.S. 601-243).

NOTE: Carry out this check in conjunction with the Cover Assembly (para.6).

(a) Within F.C.S. limits. Accept.

(2) Fretting.

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- (a) Less than 0.001 in.
(0,030 mm) deep.

Accept, if repair
does not violate
F.C.S. limits in (1).

C. Inspect Tube Locations in Elbow.

(1) Fretting.

- (a) Less than 0.002 in.
(0,050 mm) deep.

Accept after
repair.

(2) Nicks and burrs.

Accept after
repair.

D. Inspect Spherical Housing Abutment Face.

(1) Nicks, burrs and scores.

Accept, if repair
preserves surface
flatness.

(2) Wear and fretting.

- (a) Bolt-holes elongated
not more than 0.010
in. (0,250 mm).

Accept.

10. Spherical Seal (304-170) and Housing (304-190)

A. Inspect Spherical Contact Faces.

(1) Nicks, burrs and scores.

- (a) Less than 0.002 in.
(0,050 mm) deep.

Accept after
repair.

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Tube Elbow and Coupling Assembly Abutment
Faces.

(1) Nicks and burrs.

Accept, if repair
preserves surface
flatness.

(2) Wear and fretting.

- (a) Bolt-holes elongated
less than 0.030 in.
(0,760 mm).

Accept after repair.

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11. Tube Ends (304-210/260) and Adapter (304-240)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Tube Bores.

(1) Inspect tube bores for contamination.

(a) Bore entirely free of contamination. Accept.

(b) Contamination present in bore. Reject for cleaning.

C. Inspect Spherical Ends.

(1) Scores.

(a) Less than 0.005 in. (0,130 mm) deep. Accept, if repair preserves sealing capability.

(2) Fretting.

(a) Less than 0.001 in. (0,030 mm) deep. Accept, if repair preserves sealing capability.

(3) Nicks and burrs. Accept, if repair preserves sealing capability.

D. Carry Out Dimensional Checks on Tube Ends.

(1) Check seal gap in position (F.C.S. 601-244), seal ring and groove width and clearance (F.C.S. 601-245).

NOTE: Carry out this check in conjunction with the Cover Assembly (para.6) and identify acceptable ring for matching with compatible tube ends and cover.

(a) Within F.C.S. limits. Accept.

E. Inspect Tube Adapter Bore.

(1) Inspect tube adapter bore for contamination.

(a) Bore entirely free of contamination. Accept.

(b) Contamination present in bore. Reject for cleaning.

F. Carry Out Dimensional Check on Tube Adapter.

(1) Check diameter of tube end and clearance in Cover Assembly bore (F.C.S. 601-246).

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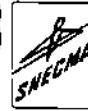
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NOTE: Carry out this check in conjunction with the Cover Assembly (para.6).

- (a) Within F.C.S. limits. Accept.
- (2) Scores.
 - (a) Less than 0.005 in. Accept, if repair does not violate F.C.S. limits in (1).
 - (0,130 mm) deep.
- (3) Fretting.
 - (a) Less than 0.001 in. Accept, if repair does not violate F.C.S. limits in (1).
 - (0,030 mm) deep.

12. Lubricating Oil Nozzle (304-220) (SB.72-1 or 72-39 Standard)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Nozzle Oilway.

NOTE: The diameter of the oilway is 0.069-0.071 in.
(1,753-1,803 mm) for both SB.72-1 and 72-39 standard.

- (1) Check for damage.
 - (a) Any damage. Reject.
- (2) Check for obstruction and contamination.
 - (a) Entirely free of contamination and obstruction. Accept.
 - (b) Obstructed or contamination present. Reject for cleaning and investigation.
- C. Inspect Abutment Face with Tube End (304-210).

- (1) Scores.
 - (a) Less than 0.005 in. Accept, if repair preserves sealing capability.
 - (0,130 mm) deep, not more than one third across face.
- (2) Nicks and burrs. Accept, if repair preserves sealing capability.

13. Labyrinth Ring (305-230)

A. Inspect Bore of No.16 Windback Labyrinth Seal.

- (1) Overheating discolouration. Accept.

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- (2) Nicks and burrs. Accept after repair.
- (3) Grooving.
 - (a) Damage greater than (b). Accept after repair (Ref. 72-51-01 Repair No.3).
 - (b) Rubbing extending over an arc not greater than 90 degrees and regardless of width over face, provided that maximum depth does not exceed 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.
- (4) Distortion.
 - (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S. Accept.
- (5) Contamination.
 - (a) Bore entirely free of contamination. Accept.
 - (b) Contamination present in bore. Reject for cleaning.

B. Carry Out Dimensional Checks.

- (1) Check bore and clearance (F.C.S. 602-199).

NOTE: Carry out this check in conjunction with the HP Compressor Rotor (Ref.72-33-00).

- (a) Outside F.C.S. limits Accept after repair.
- (b) Within F.C.S. limits. Accept.

C. Inspect Bolt Locations.

- (1) Wear and fretting.
 - (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

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(2) Nicks and burrs.

Accept, if repair
preserves surface
flatness.

14. Squeeze Film Jet (305-260)

A. Inspect Threads (Ref.72-09-00-Inspection/Check).

B. Inspect Jet Oilways.

NOTE: The long and short oilway bores are 0.154-0.166 in.
(3,912-4,217 mm) and 0.125-0.127 in. (3,175-3,226 mm)
respectively.

(1) Check for obstruction and Contamination.

(a) Entirely free of contamination or
obstruction. Accept.

(b) Obstructed or contamination present Reject for cleaning
and investigation.

C. Inspect Location Surfaces.

(1) Scores, nicks and burrs.

(a) Less than 0.001 in. Accept, if repair
(0,030 mm) deep. maintains profile
and sealing capability.

15. Bearing Housing (305-380)

NOTE: If SB.72-17 Part 4 is embodied the bearing retaining
ring (305-340 to 370) and housing must be retained as a
matched set.

A. Inspect Thread Inserts and Tube Threads (Ref.72-09-00
Inspection/Check).

B. Inspect Locating Pins.

(1) Damaged or insecure. Reject.

C. Inspect No.14 and 15 Labyrinth Seal Housing Bores.

(1) Overheating.

(a) Overheating discolour- Accept.
ation.

(2) Nicks and burrs. Accept after repair.

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(3) Grooving (No.14 Seal).

- (a) Damage greater than (b). Accept after repair (Ref. 72-51-01 Repair No.2).
- (b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.

(4) Grooving (No.15 Seal).

- (a) Damage greater than (b). Accept after repair (Ref. 72-51-01 Repair No.2).
- (b) Rubbing extending over an arc not greater than 90 degrees and regardless of width over face, provided that maximum depth does not exceed 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.

(5) Distortion.

- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S. Accept.

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D. Carry Out Dimensional Checks.

- (1) Check cover assembly location diameter and cover/
bearing housing clearance (F.C.S. 602-190).

NOTE: Carry out this check in conjunction with
the Cover Assembly (para.6).

(a) Outside F.C.S. limits. Reject.

(b) Within F.C.S. limits. Accept.

- (2) Check No.14 and 15 labyrinth seal and HP turbine main
bearing bores and clearances (F.C.S. 602-193/194/195).

NOTE: Carry out this check in conjunction with
the HP Rotor (Ref.72-33-00 Inspection/
Check).

(a) Outside F.C.S. limits. Reject (Ref.72-51-01
Repair).

(b) Within F.C.S. limits. Accept.

E. Inspect Bearing Support Abutment Face.

- (1) Nicks and burrs. Accept, if repair
preserves surface
flatness.

- (2) Fretting.

(a) Less than 0.002 in. Accept, if repair
(0,050 mm) deep. preserves surface
flatness.

F. Inspect Tube End Spherical Locations.

- (1) Scores.

(a) Less than 0.002 in. Accept, if repair
(0,050 mm) deep. preserves sealing
capability.

- (2) Fretting.

(a) Less than 0.002 in. Accept, if repair
(0,050 mm) deep. preserves sealing
capability.

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(3) Nicks and burrs.

Accept, if repair preserves sealing capability.

G. Inspect Bolt Locations.

(1) Wear and fretting.

(a) Bolt-holes slightly worn.

Accept after repair.

(2) Nicks and burrs.

Accept, if repair preserves surface flatness.

H. Inspect HP Turbine Bearing Housing Bores.

(1) Inspect bearing housing bores for contamination.

(a) Bores entirely free of contamination.

Accept.

(b) Contamination present in bores.

Reject for cleaning.

16. Shroud Assembly (306-20)

A. Inspect No.17 and 18 Labyrinth Seal Bores.

(1) Overheating discolouration.

Accept.

(2) Grooving.

(a) Damage greater than (b).

Accept after repair (Ref. 72-51-01 Repair No.4).

(b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0.130 mm) and that F.C.S. limits are not violated.

Accept.

(3) Distortion.

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- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S. Accept.

- (4) Nicks and burrs. Accept, if repair does not violate F.C.S. limits.

B. Inspect Bolt Locations.

- (1) Wear and fretting.

- (a) Any bolt holes elongated. Reject.

- (2) Nicks and burrs. Accept, if repair preserves surface flatness.

C. Carry Out Dimensional Checks.

- (1) Check Labyrinth Housing and Bearing Support Location diameters (F.C.S. 602-232 and 602-233).

NOTE: Carry out these checks in conjunction with the Bearing Support (para.17) and the Labyrinth Housing (Ref.72-51-02 Inspection/Check).

- (a) Within F.C.S. limits. Accept.

- (2) Check No.17 and 18 Labyrinth Seal Bore diameter and clearances (F.C.S. 602-200/201).

NOTE: Carry out this check in conjunction with the HP Rotor (Ref.72-33-00 Inspection/Check).

- (a) Outside F.C.S. limits. Accept after repair (Ref.72-51-01 Repair).

- (b) Within F.C.S. limits. Accept.

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17. Bearing Support (306-40)

A. Inspect Shouldered Pins (6 off).

(1) Damage and security.

- (a) Any damage or any
insecure pins.

Reject.

B. Inspect Bearing Housing Abutment Face.

(1) Fretting.

- (a) Not more than 0.002 in.
(0,050 mm) deep.

Accept, if repair
preserves surface
flatness.

C. Inspect Bolt Locations.

(1) Wear and fretting.

- (a) Any bolt-holes
elongated.

Reject.

(2) Nicks and burrs.

Accept, if repair
preserves surface
flatness.

18. Insulation (304-50/60/90/100/193/243, 305-10 (Pre SB.72-20)/20
and 306-10)

A. Inspect Blankets.

(1) Dents and tears.

- (a) Tears, irregular
dents, or punctures.

Reject.

- (b) Dents with smooth
contours.

Accept.

(2) Welds.

- (a) Broken spot welds or
parted seams.

Reject.

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(3) Filler.

WARNING: THE FILLER MATERIAL IS CARCINOGENIC AND ALL NECESSARY SAFETY PRECAUTIONS MUST BE TAKEN.

- | | | |
|-----|---|---------|
| (a) | Powdering and collapse of filler. | Reject. |
| (b) | Carry out shake/rattle test to detect balls of degraded filler. | Reject. |
| (c) | Carry out close inspection for powder around vents and fretted areas. | Reject. |

NOTE: Press blanket with finger tips and note any lack of "cushion" effect.

B. Inspect Fasteners and Attachment Lugs.

- | | | |
|-----|-------------------------|--|
| (1) | Distortion. | Accept, if repair will not cause cracking. |
| (2) | Cracking or separation. | Reject. |

19. Brackets (302-180/190)

A. Inspect Brackets.

- | | | |
|-----|--|----------------------|
| (1) | Nicks and burrs. | Accept after repair. |
| (2) | Wear and fretting. | |
| (a) | Attachment face thickness reduced by not more than 5 per cent. | Accept. |
| (b) | Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |

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(3) Scoring.

- (a) Not more than
0.010 in. (0,250 mm)
in depth.

Accept after repair
providing material
thickness is not
reduced by more than
5 per cent.

(4) Distortion.

Accept if compatibility
is preserved.

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20. Adjusting Washers (306-100 to 185/200 to 310) (SB.72-86)

NOTE: Refer to 72-51-02 for Pre SB.72-86 standard.

NOTE: These items may require selection during assembly.

A. Inspect Abutment Faces.

- | | |
|------------------------------|--|
| (1) Nicks, burrs and scores. | Accept, provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area. |
| (2) Fretting and wear. | Reject. |

21. Tube (305-200)

A. Inspect Tube Bore.

- | | |
|--|----------------------|
| (1) Inspect tube bore for contamination. | |
| (a) Bore entirely free of contamination. | Accept. |
| (b) Contamination present in bore. | Reject for cleaning. |

22. Screwed Connector (305-150)

A. Inspect Connector Bore.

- | | |
|---|----------------------|
| (1) Inspect connector bore for contamination. | |
| (a) Bore entirely free of contamination. | Accept. |
| (b) Contamination present in bore. | Reject for cleaning. |

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23. Filter Assembly (304-215B) (SB.72-8800-311)

A. Inspect Nozzle Oilway.

NOTE: The diameter of the oilway is 0.092/0.094 in.
(2,34/2,39 mm).

(1) Check for damage.

(a) Any damage. Reject.

(2) Check for obstruction and contamination.

(a) Entirely free of obstruction and contamination. Accept.

(b) Obstructed or contamination present. Reject for cleaning and investigation.

B. Inspect Filter Element.

(1) Check for damage.

(a) Any damage. Reject.

(2) Check for obstruction and contamination.

(a) Entirely free of obstruction and contamination. Accept.

(b) Obstructed or contamination present. Reject for cleaning and investigation.

C. Inspect Abutment Face with Tube End.

(1) Scores.

(a) Less than 0.005 in. (0,13 mm) deep, not more than one third across face. Accept, if repair preserves sealing capability.

(2) Nicks and burrs. Accept, if repair preserves sealing capability.

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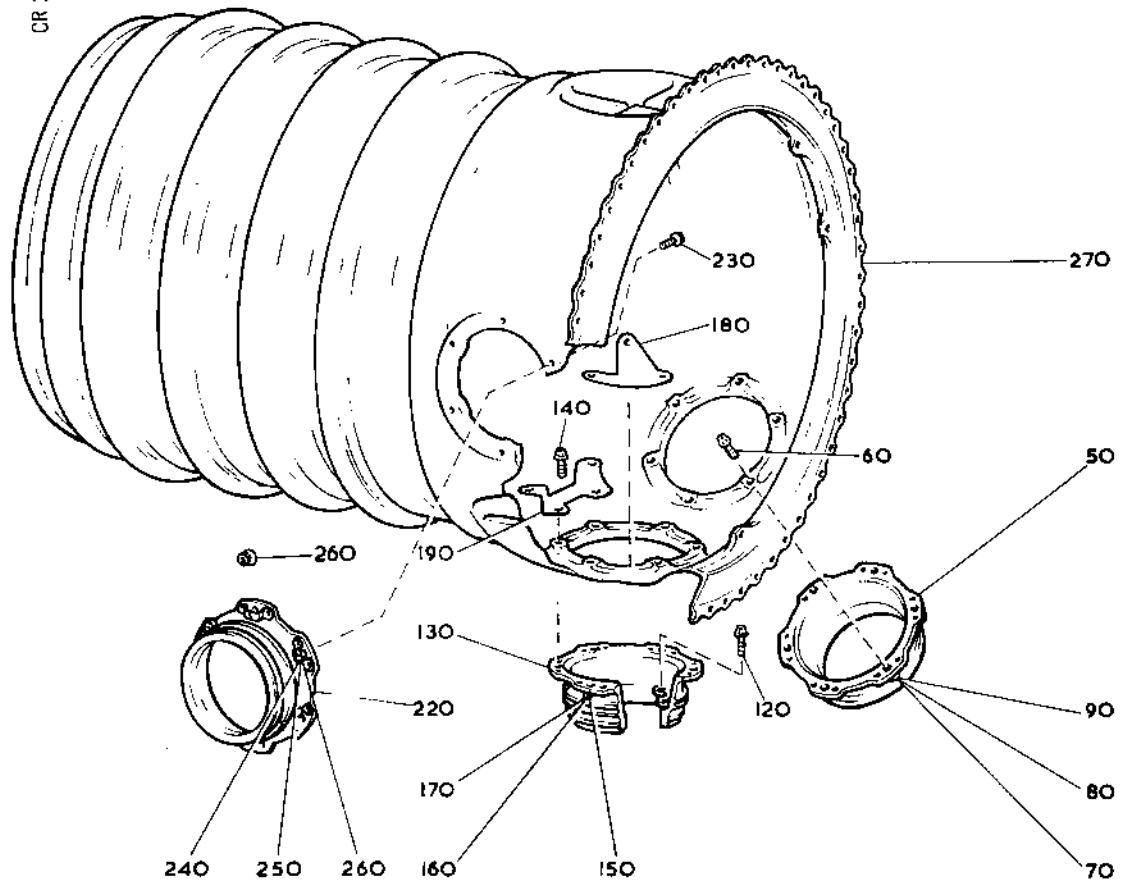
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Outer Air Duct and Couplings
Figure 302

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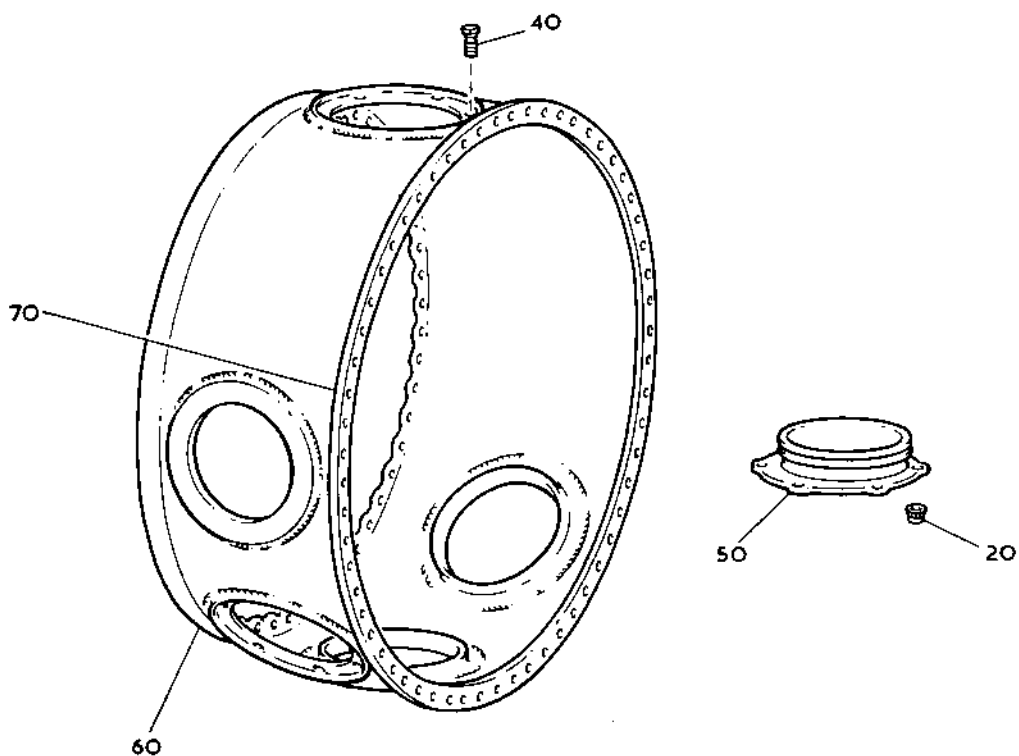


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Air Duct
Figure 303

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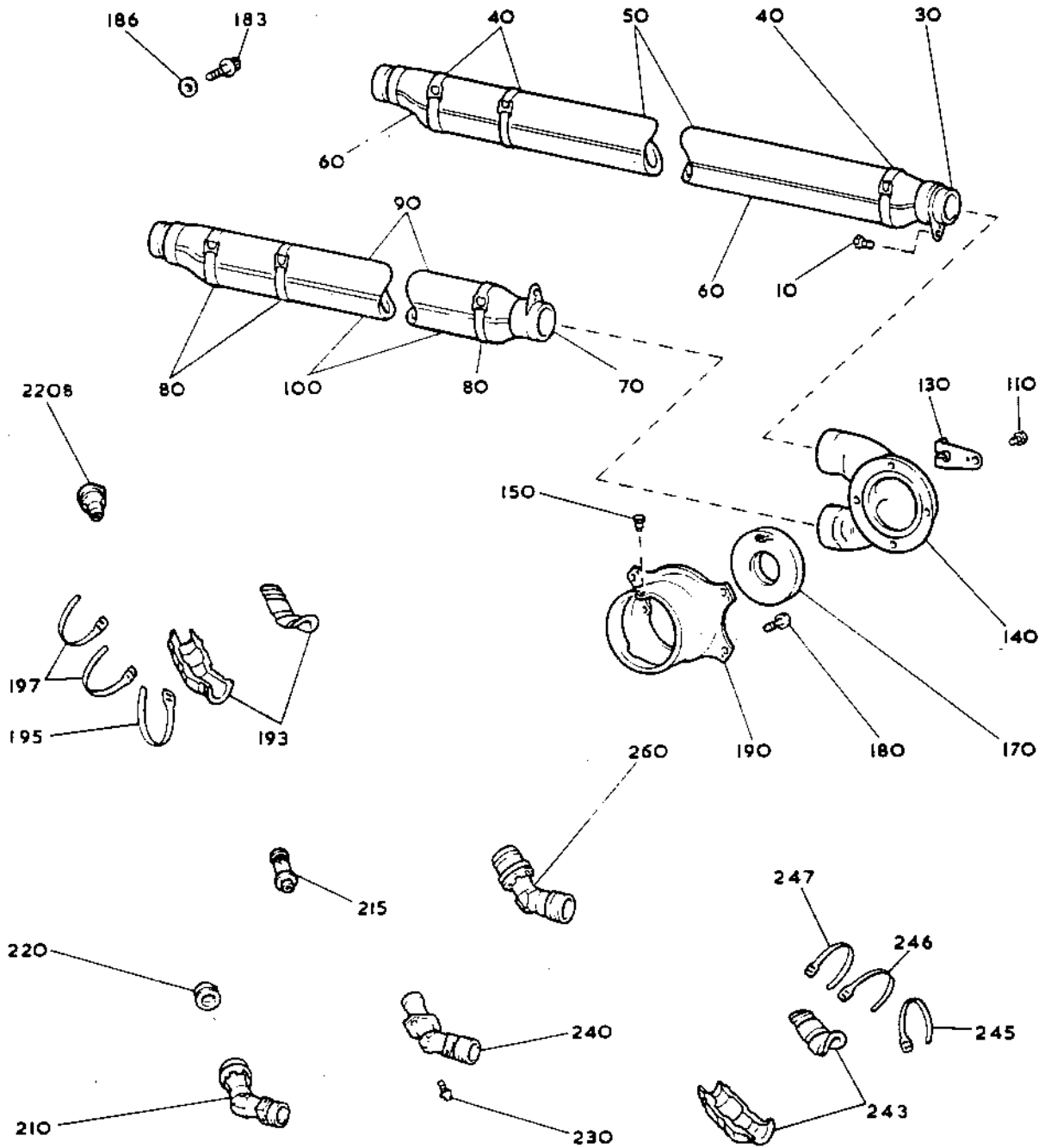
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Tubes and Fittings
Figure 304

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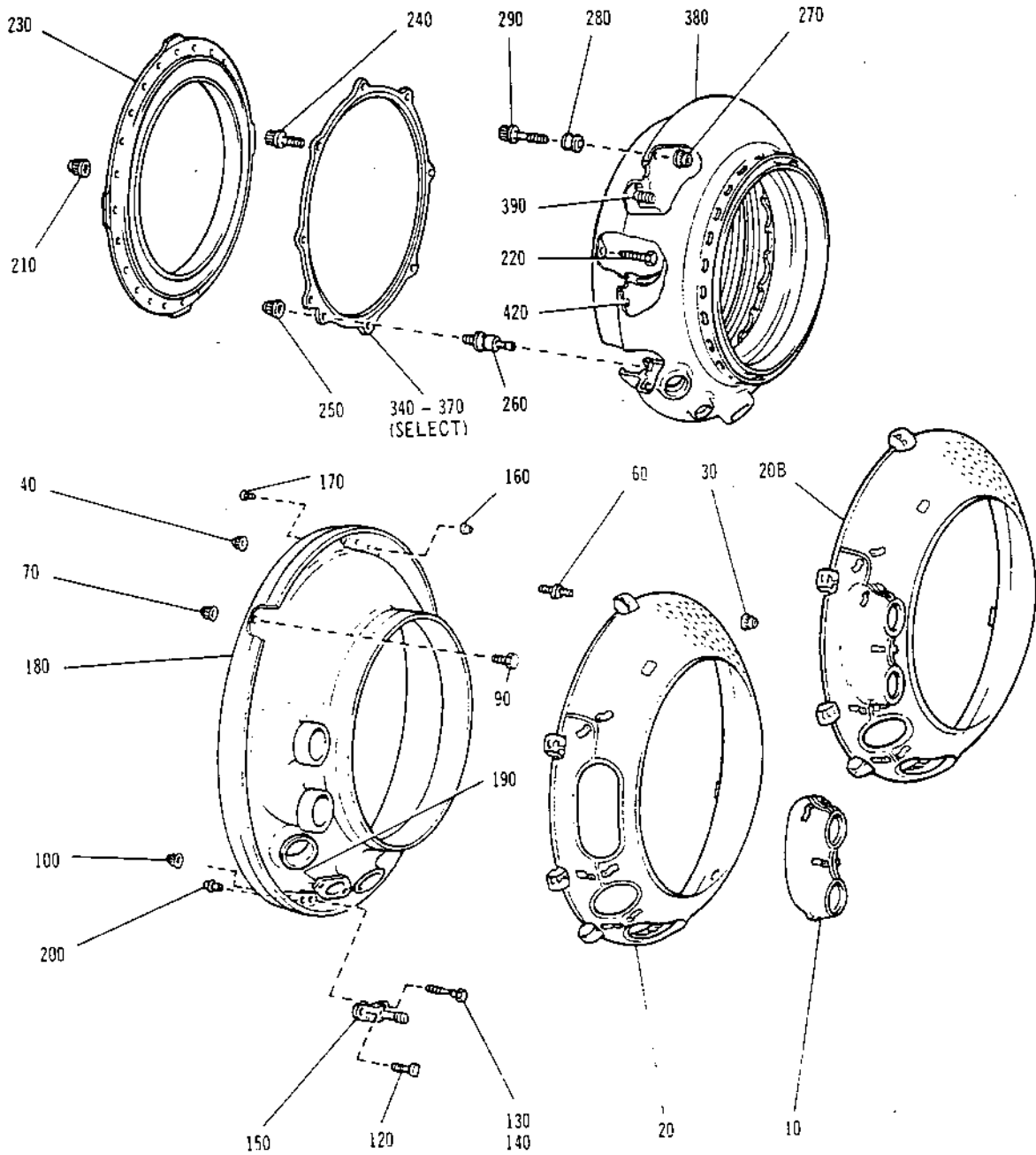
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Bearing Housing and Fittings
Figure 305

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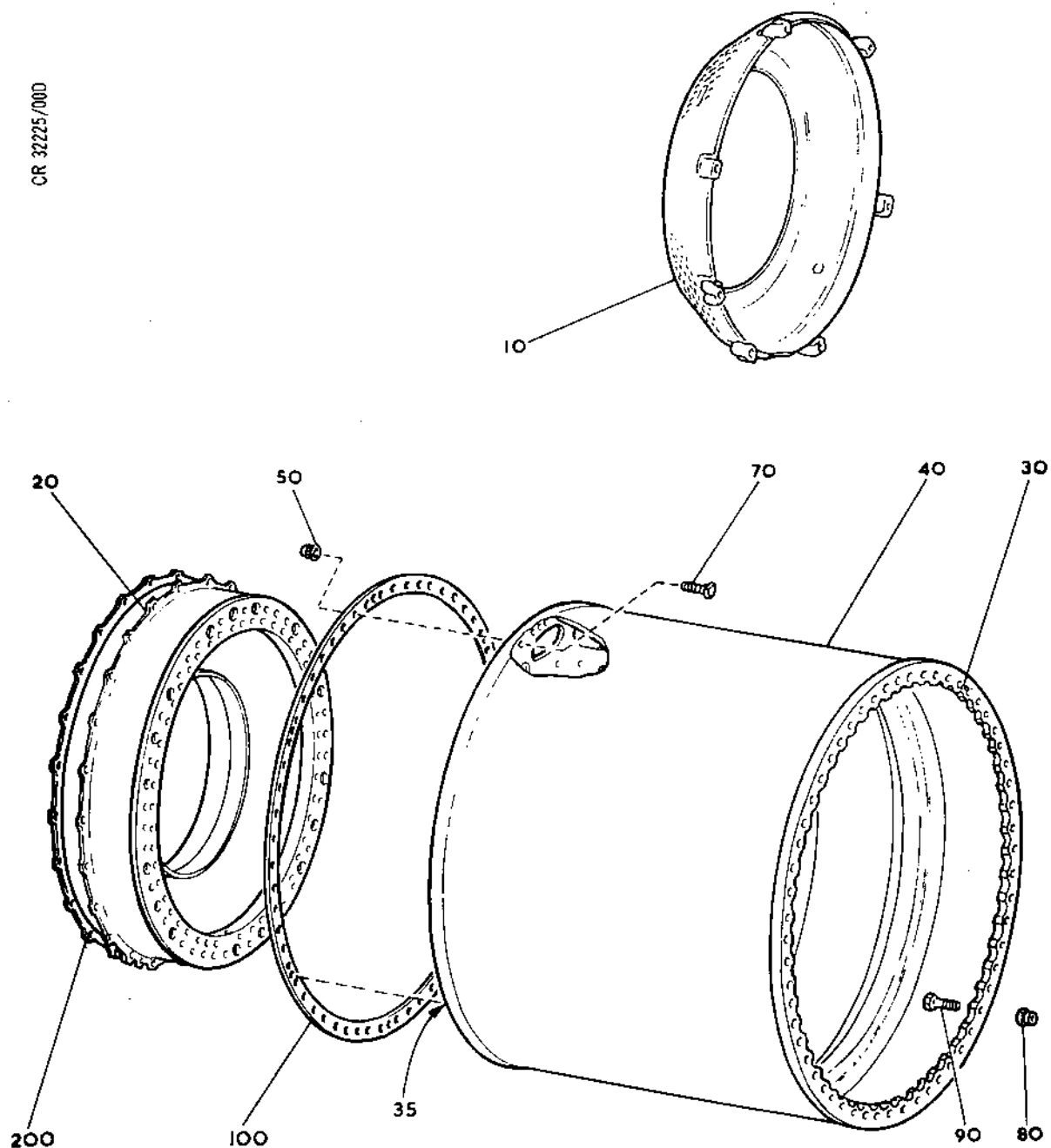
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Bearing Support and Shroud
Figure 306

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HP TURBINE NOZZLES - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

(1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

No current requirement

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

302	10	Ring	FlA
302	40)		
302	50)	Nozzle Vane	FlA
302	60)		
302	150	Support Cone	FlA
302	200	Retaining Plate	FlA
302	210	Labyrinth Housing	FlA

Items to be Fluorescent Dye Crack Tested
Table 302

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No current requirement

TN29092

Crack Detection Test Diagram
Figure 301

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	75-51-02	Fig.1
303	Not applicable	

Cross References to Illustrated Parts Catalogue
Table 303

4. Ring (302-10)

A. Inspect Nozzle Vane Locating Slots.

(1) Fretting.

(a) Not more than 0.005 in. (0,130 mm) deep.	Accept after repair.
---	-------------------------

5. Nozzle Vane Assemblies (302-40 - 30 off and 302-50/60 - 1 off each) (Ref.SB.72-64 and 72-124)

A. Inspect Locating Lug and All Abutment Faces (Ref.Fig.303).

(1) Fretting.

(a) Less than 0.002 in. (0,050 mm) deep.	Accept after repair.
---	-------------------------

B. Inspect Locking Pin Location (Ref.Fig.303).

(1) Fretting.

(a) Less than 0.002 in. (0,050 mm) deep.	Accept, if repair does not violate F.C.S. limits in (2).
---	---

(2) Check pin location width (F.C.S.601-240).

NOTE: Carry out this check in conjunction with the
Vane Locking Pins (Ref. Combustion Chamber
Outer Case 72-42-01 Inspection/Check).

(a) Within F.C.S. limits.	Accept.
---------------------------	---------

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TN31156

British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

TEMPORARY REVISION No. 72-504

Insert in 72-51-02 Inspection/Check before Page 305

REASON FOR ISSUE:

To give frettage acceptance standards for H.P. N.G.V. liner tubes at the inner platform (MRA 47).

ACTION

Add a BEOL Note to Para. 5E to read:

BEOL NOTE: Frettage of the ends of the liner tube at the inner platform is acceptable without repair, up to the loss of 50% of the tube circumference.



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C. Inspect Rotor Blade Seal Faces (Ref.Fig.303).

(1) Rotor tip rub scores.

- | | |
|---|-------------------------|
| (a) Less than 0.015 in.
(0,380 mm) deep. | Accept after
repair. |
|---|-------------------------|

D. Inspect Pack Aluminizing.

(1) Chips and burrs.

- | | |
|--|--|
| (a) Any individual area
greater than 0.25 sq. in.
(40,3 sq. mm). | Reject for
touch-up
with Sermaloy J
(Ref.72-09-05
Repair). |
|--|--|

- (b) No individual area greater
than 0.25 sq. in.
(40,3 sq. mm).

- | | |
|---------------------------------------|--|
| (i) More than four
separate areas. | Reject for
touch-up
with Sermaloy J
(Ref.72-09-05
Repair). |
|---------------------------------------|--|

- | | |
|--|---------|
| (ii) Up to four separate
areas, none less than
0.5 in. (12,7 mm)
apart. | Accept. |
|--|---------|

(2) Hair-line cracks.

- | | |
|--|-------------------------------|
| (a) Parent material
penetrated. | Reject, subject to
para.E. |
| (b) Pack aluminizing only
affected. | Accept. |

E. Inspect Vane Liners.

- | | |
|-----------------|---|
| (1) Any damage. | Accept after repair
(Ref.72-51-02
Repair No.2). |
|-----------------|---|

F. Inspect Vane Aerofoils (Ref.Fig.303).

NOTE: Crack length to be taken as "straight line"
distance between extremities, regardless of
crack path.

NOTE: Unshaded area is measured vertically from
platform surface.

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NOTE: Nozzle vane assemblies which have been subject to braze repairs of the vane aerofoil on two previous occasions, should not be accepted for further repair. A third braze repair may be carried out if the vane aerofoil cracks are within the limits detailed in para 5.F.(1).

(1) Aerofoil cracks.

- | | |
|---|------------------------|
| (a) Less than 0.010 in.
(0,25 mm) wide and
0.500 in. (12,70 mm)
in length. Not less
than 0.500 in.
(12,70 mm) from any
adjacent cracks. | Accept after
repair |
|---|------------------------|

(2) General Cracks.

- | | |
|--|--------------------|
| (a) More than one crack per
vane, regardless of
location and length, and
contained with the
unshaded zone i.e. the
area measured 0.250 in.
(6,35 mm) vertically from
the under surface of the
outer platform and
extending across the vane. | Reject for repair. |
| (b) A crack wholly or
partly within shaded zone. | Reject for repair. |
| (c) A crack extending into
platform (but excluding
fillet radius). | Reject for repair. |
| (d) A crack extending more
than 0.50 in. (12,7 mm)
from trailing edge,
contained with the
unshaded zone. | Reject for repair. |
| (e) A crack, extending to
within 0.50 in. (12,7 mm)
of leading edge, or
1.00 in. (25,4 mm) of
trailing edge, contained
within the unshaded zone. | Reject for repair. |

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- (3) Any other damage (except pack aluminizing - para.D). Reject.

6. Adjusting Washers (302-90 to 135 and 250 to 315) (Pre SB.72-86)

NOTE: Refer to 72-51-01 for SB.72-86 standard.

NOTE: These items may require selection during assembly.

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores.

Accept, provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

- (2) Fretting and wear.

Reject.

7. Nozzle Vane Support Cone (302-150)

A. Inspect Vane Locating Groove.

- (1) Fretting.

- (a) Tapering to not more than 0.005 in. (0,130 mm) deep on sloping face; light witness mark only on locating diameter.

Accept after repair.

B. Inspect Shouldered Locating Pins (302-70 - 12 off).

- (1) Damage and security.

- (a) Any damage or any insecure pins.

Reject.

C. Inspect Abutment Faces.

- (1) Nicks and burrs.

Accept, if repair preserves surface flatness.

D. Inspect Bolt Locations.

- (1) Wear and fretting.

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- (a) Bolt holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

8. Labyrinth Retaining Plate (302-200)

A. Inspect Extraction Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Bolt Locations.

(1) Wear and fretting.

- (a) Bolt holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

C. Inspect Abutment Faces.

(1) Nicks and burrs.

Accept, if repair preserves surface flatness.

9. Labyrinth Housing (302-210)

A. Inspect Labyrinth Housing Bores.

(1) Security and distortion of seal rings.

- (a) Any insecurity or distortion.

Reject.

(2) Nicks and burrs.

Accept after repair.

(3) Grooving.

- (a) Any damage greater than (b).

Accept after repair (Ref. 72-51-02 Repair No.1).

- (b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated.

Accept.

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(4) Distortion.

- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S.

Accept.

B. Inspect Abutment Faces.

- (1) Nicks and burrs.

Accept, if repair preserves surface and does not violate F.C.S. limits.

C. Inspect Bolt Locations.

- (1) Wear and fretting.

- (a) Bolt holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

D. Carry Out Dimensional Checks.

- (1) Check Nos.19, 20, 21 and 22 labyrinth seal bores and clearances (F.C.S. 601-203/204/208/209).

NOTE : Carry out these checks in conjunction with the HP Turbine Rotor (Ref.72-51-03 Inspection/Check).

- (a) Within F.C.S. limits.

Accept.

- (2) Check Shroud Unit location diameter and clearance (F.C.S. 601-232).

NOTE : Carry out this check in conjunction with the Shroud Assembly (Ref.72-51-01 Inspection/Check).

- (a) Within F.C.S. limits.

Accept.

10. Sealing Strips (302-45/47/55/57/65/67) (SB.72-124)

A. Inspect Strips.

- (1) Any damage.

Reject.

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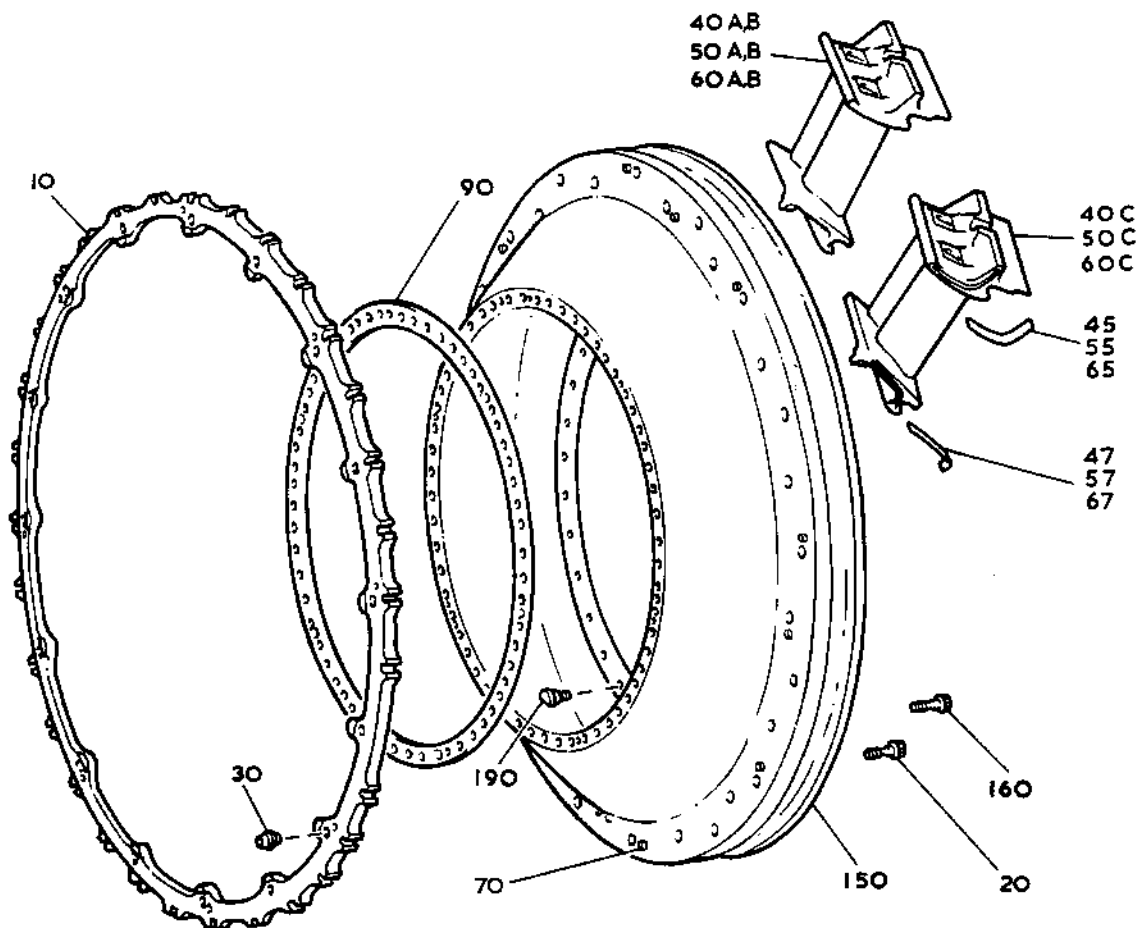
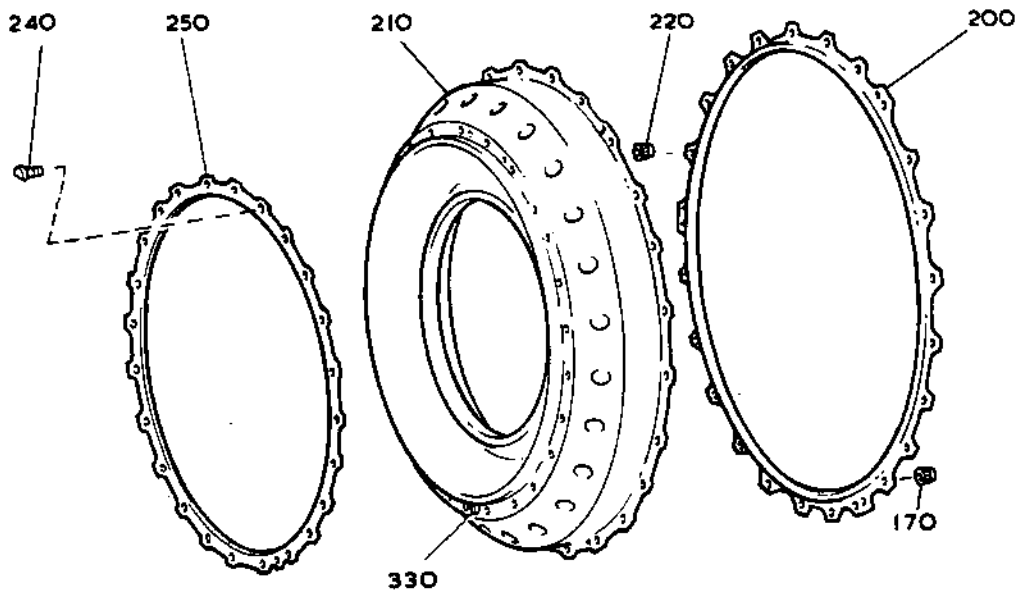
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CR 32267/00C



HP Turbine Nozzles
Figure 302

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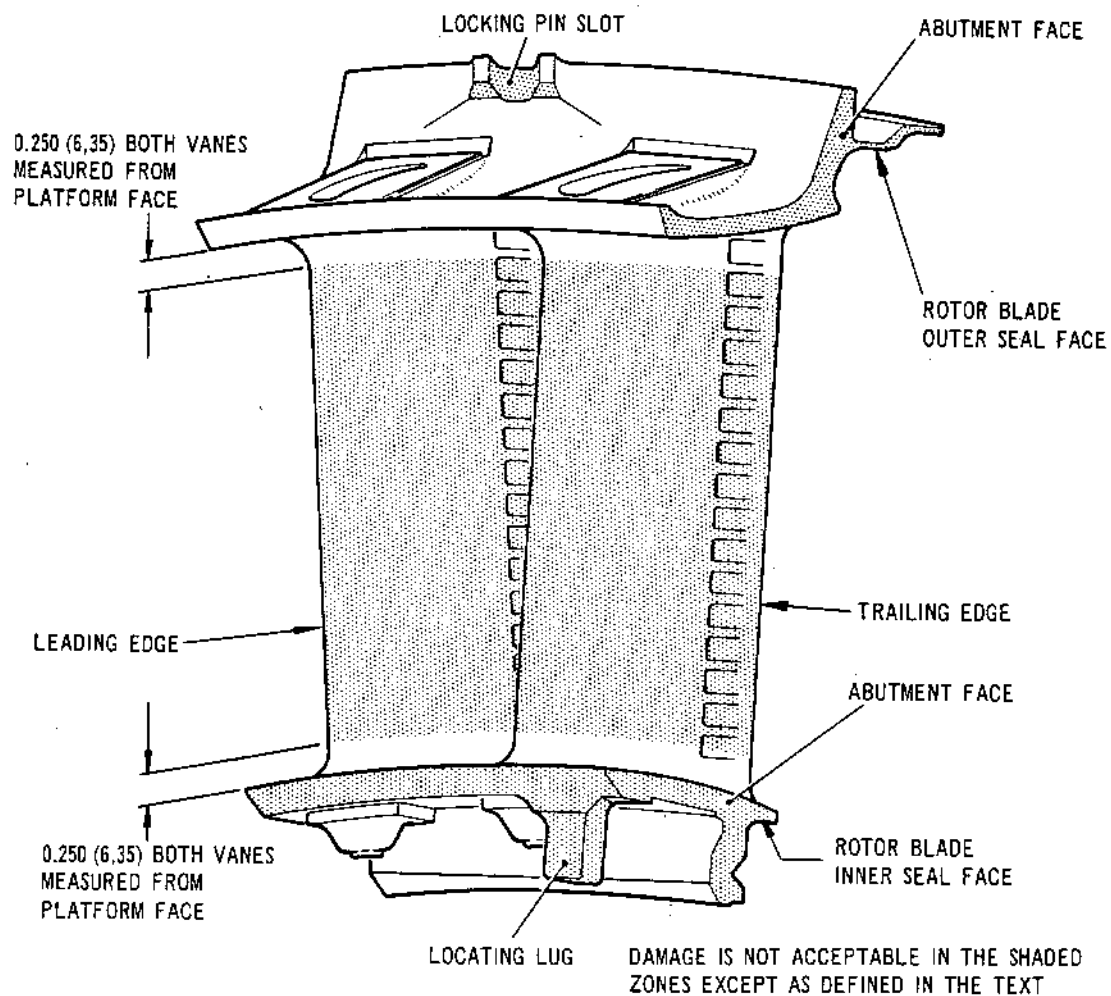
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Nozzle Inspection Zones
Figure 303

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HP TURBINE ROTOR - INSPECTION/CHECK1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards. Special attention must be paid to critical areas of certain specified items during inspection. An instruction to this effect is included in the inspection detailed for the specified item.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

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3. Crack Detection

A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.
- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

No current requirement

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

Items marked with an asterisk (*) in Table 302 feature defined critical areas. (Ref.Fig.310). In addition to the general overall crack detection examination, special attention must also be paid to these defined critical areas during the inspection.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

302	30	Turbine Blades	F2A
302	70*	Rotor Disk	F2A

Items to be Fluorescent Dye Crack Tested
Table 302

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No Current Requirement

Crack Detection Test Diagram
Figure 301

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FIG. NO.	ILLUSTRATED PARTS CATALOGUE EQUIVALENT
----------	--

301	Not applicable	
302	72-51-03	Fig.1
303	Not applicable	
304	Not applicable	
305	Not applicable	
306	Not applicable	
307	Not applicable	
308	Not applicable	
309	Not applicable	

Cross References to Illustrated Parts Catalogue
Table 303

4. HP Turbine Rotor Blades (302-30)

NOTE: Before commencing this inspection, ensure that the turbine slackness check was carried out during dis-assembly (Ref.72-51-03 Disassembly).

A. Inspect Blades (Ref.Fig.303 to 307).

(1) Cracks.

- | | |
|--|---------|
| (a) Other than in (b),
(c) and (d). | Reject. |
| (b) Cracks interconnecting
cooling holes in the
bridge piece, or from
the edge of the bridge
piece to the nearest
hole. | Accept. |
| (c) Cracks at the bridge
piece notch corners and
extending not more than
0.010 in. (0,250 mm) in
length on to the top
surface of the bridge
piece. | Accept. |

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ATP TEMPORARY REVISION

British airways

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OLYMPUS 593 OVERHAUL MANUAL

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

Dennis Howard

For Chief Technical and Industrial Services Engineer CAA Design Approval No.DAI/8566/78

TEMPORARY REVISION NO.72-567

Insert in 72-51-03 after page 304

REASON FOR ISSUE

BEOL NOTE added

ACTION

Read the following NOTE after paragraph 4 heading:-

BEOL NOTE:

Where blades belonging to British Airways are divorced for any reason from the O9 module in which they arrived at BEOL, they are to be life marked by vibro peening using the following coding table. The life in hours is to be obtained by reference to the module log card in conjunction (if applicable) to the previous H.P. turbine blade build life record sheet. Individual reference to blades on the blade build sheet is possible due to the unique serial numbering of the blades. The marking is to be confined to the area on the underside of the inner platform concave side.

A 0-100	J 801-900	R 1,601-1,700
B 101-200	K 901-1,000	S 1,701-1,800
C 201-300	L 1,001-1,100	T 1,801-1,900
D 301-400	M 1,101-1,200	U 1,901-2,000
E 401-500	N 1,201-1,300	V 2,001-2,100
F 501-600	O 1,301-1,400	W 2,101-2,200
G 601-700	P 1,401-1,500	X 2,201-2,300
H 701-800	Q 1,501-1,600	Y 2,301-2,400
		Z 2,401-2,500

Only one letter should be used to denote an achieved life: should an occasion arise where the life exceeds the range covered by the Chart, the letter Z must be used in conjunction with one other letter to denote the life marking required.

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- (d) Cracks in the bridge piece Accept.
 braze at the notch corner
 and on the underside of
 the shroud along the short
 braze face but not extend-
 ing into the long braze
 face and not extending
 into any parent metal.

- (2) Distortion of outer shroud platform.

- (a) Trailing edge of platform Accept.
 distorted but remains
 convex or flat.

- (3) Distortion of bridge piece and underlying shroud
 metal (Pre SB 72-8692-260 standard).

NOTE: To check the bridge piece for distortion place
 a straight edge diagonally across the bridge
 piece i.e. corner to corner. Using feeler
 gauges check the gap between the straight edge
 and the bridge piece at the centre of each
 diagonal as follows:

- (a) Flatness on the short Accept.
 diagonal, i.e. from
 leading edge notch
 radius to trailing
 edge notch radius,
 within 0.005 in.
 (0,13 mm).

- (b) Flatness on the long Accept.
 diagonal, i.e. from
 leading edge corner
 to trailing edge
 corner, within
 0.010 in. (0,25 mm).

- (4) Distortion of bridge piece and underlying shroud
 metal (SB 72-8692-260 standard).

NOTE: To check the bridge piece for distortion place
 a straight edge across the upper surface along
 the long diagonal from the leading edge corner
 to the trailing edge corner.

- (a) Bridge piece distorted Accept.
 but upper surface
 remains flat or convex.

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(5) Overheating.

- (a) Obvious burning, erosion, deposition of material or damage to pack-aluminising. Reject.
- (b) Reported or suspected high temperature indication.
- (i) Select one blade from set for laboratory examination.
- (ii) Machine two 1.00 x 0.040 in. (25,4 x 10,2) wide sections from the trailing edge of the blade, extending from 1.375 to 3.375 in. (34,9 to 85,7) above the root platform. Machine one radial section from the blade. Refer to Fig.304. Use an elastic slitting wheel for these operations, with adequate cooling.
- (iii) Mount the sections in an appropriate mounting compound (e.g. Bakelite). The trailing edge sections must be mounted such that the concave surface may be metallographically prepared. Mount the root section on the cut face.
- (iv) Grind and polish the sections. The trailing edge sections must be ground sufficiently to remove the aluminide coating and its diffusion zone.

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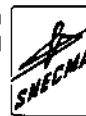
- (v) Electrolytically etch the polished surfaces to reveal the microstructure using an etching solution of the following composition:-
 - 5 parts Nitric Acid (HNO₃)
 - 15 parts Hydrochloric Acid (HCL)
 - 70 parts Water (H₂O)
 - 10 parts Glycerol
- (vi) Wash in clean cold water and dry.
- (vii) Examine the sections using an optical metallurgical microscope and compare the trailing edge and root microstructures.
- (viii) Overheating results in changes in the gamma prime precipitate morphology ranging from coalescence through partial solution to complete solution.
- (c) Trailing edge structures, as examined in (b), which are the same as those in the root, or which exhibit coalescence of the gamma prime precipitate morphology. For photographic standard of acceptable micro-structure, Ref.Figs.305 and 306. Accept remaining blades of set.
- (d) Trailing edge structures, as examined in (b), which exhibit partial or complete solution of the gamma prime precipitates. For photographic standard of unacceptable micro-structure, Ref.Fig.307. Reject.

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(6) Impact damage (Ref.Fig.303).

NOTE: All acceptable damage must be smooth-contoured, crack-free, and not penetrating cooling passages.

- | | | |
|-----|--|---|
| (a) | Not more than
0.015 in. (0,38 mm)
in diameter and not
more than 0.004 in.
(0,10 mm) in depth
in Zone D. | Accept, subject to (b),
(c) and (d). |
| (b) | Not more than
0.030 in. (0,76 mm)
in diameter and not
more than 0,006 in.
(0,15 mm) in depth
in Zone A. | Accept, subject to (a),
(c) and (d). |
| (c) | Not more than
0.070 in. (1,78 mm)
in diameter and not
more than 0.008 in.
(0,20 mm) in depth
in Zone B. | Accept, subject to (a),
(b) and (d). |
| (d) | Not more than
0.125 in. (3,17 mm)
in diameter and not
more than 0.010 in.
(0,25 mm) in depth
in Zone C. | Accept, subject to (a),
(b) and (c). |

(7) Deformation of leading and trailing edges (Ref. Fig.303).

NOTE: All acceptable damage must be smooth-contoured and crack-free.

- | | | |
|-----|--|-------------------------|
| (a) | Any deformation in
Zone A. | Reject. |
| (b) | Not more than
0.010 in. (0,25 mm) in
Zone B. | Accept, subject to (c). |
| (c) | Not more than
0.020 in. (0,50 mm) in
Zone C. | Accept, subject to (b). |



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- (d) Any trace of wall section collapse into the No.1 and 2 cooling holes. Reject.
 - B. Check Cooling Air Passages.
 - (1) Any obstruction. Reject for re-cleaning (Ref.72-51-03 Cleaning).
 - C. Inspect Abutment Faces (Ref.Fig.303).
 - (1) Scores, nicks and burrs. Accept after repair.
 - (2) Fretting and wear.
 - (a) Not more than 0.010 in. (0,250 mm) on platforms. Accept.
 - (b) Light witness mark or minimal pitting only on bridge piece faces. Accept.
 - D. Inspect Blade Roots.
 - (1) Wear and fretting of serrations.
 - (a) Light, even witness mark on flanks, with no stepping. Accept.
 - E. Inspect Platform Seal Fins.
 - (1) Nicks and burrs. Accept after repair.
- 5. HP Turbine Rotor Disk (302-70)
 - A. Inspect Hirth Serration Flanks.
 - (1) Fretting.
 - (a) Identify original machining witness mark; measure crests and troughs of any fretting.



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- (i) Not more than 0.001 in. (0,030 mm) above and below witness mark. Accept.

B. Inspect Bolt Location Bores.

CAUTION: THE BOLT HOLE BORES ARE A CRITICAL AREA (Ref.Fig.310). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

(1) Scores.

- (a) Any scoring at bolt land locations. Reject.

C. Inspect Blade Root Locations.

CAUTION: THE RIM SLOT BOTTOMS ARE A CRITICAL AREA. (Ref. Fig.310). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

(1) Fretting and wear.

- (a) Light, even witness mark on flanks, with no stepping. Accept.

D. Carry Out Dimensional Checks.

- (1) Check labyrinth seal ring location bore and diameter (F.C.S.601-230/210).

NOTE: Carry out this check in conjunction with the labyrinth seal rings (para.4).

- (a) Within F.C.S. limits. Accept.

- (2) Check disk bore dimensions (Ref.Fig.308).

- (a) Measure and record diameters A, B and C at eight positions.

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- (b) Note and record etched bore dimension on rear face of blade retaining lug.

NOTE: Nominal bore is 6.550-6.555 in.
(166,370-166,497 mm).

- (i) Any variation of more than 0.001 in. (0,030 mm) from etched dimension. Reject for investigation.

- (ii) Dimensions within 0.001 in. (0,030 mm) of etched dimension. Accept.

- (3) Check disk diameter (Ref.Fig.309).

NOTE: The turbine disk rim true diameter cannot be measured directly due to the odd number of blade root slots.

NOTE: Refer to documentation and/or inspection sheets to determine positions at which previous dimension checks were carried out, and ensure that the same positions are used for the current dimension check.

- (a) Measure the diameter at eight positions, ensuring that the measurements are carried out at the positions detailed in Fig.309. Record the positions (if not recorded previously) on the appropriate documentation and/or inspection sheets.

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- (b) Compare the dimensions with the previously recorded dimensions obtained at the same positions detailed in Fig.309, or if not available, with the etched dimension on the rear face of the blade retaining lug.
- (i) Any variation of more than 0.003 in. (0,080 mm) from previously recorded dimension obtained at the positions detailed in Fig.309. Reject for investigation
- (ii) Any variation of more than -0.005 in. (0,130 mm) or +0.001 in. (0,030 mm) from etched dimension on disk. Reject for investigation.
- (iii) Dimensions within limits of (i) or (ii). Accept.
- (4) Check axial set of disk (Ref.Fig.308).
- (a) Measure and record dimension E at eight positions; datum is front face of disk at centre bore.
- (i) Dimension outside limits in (ii). Reject for investigation.
- (ii) Dimension F 1.333-1.338 in. (33,8582-33,9852 mm). Accept.

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E. Hardness Check.

- (1) If the turbine items have been returned for inspection due to overheating (or suspected overheating), carry out a hardness test on the turbine disk as follows.
 - (a) Use an abrasive to smooth the surface of the disk at four equally spaced positions, on each side of the disk, between the blade root locations (Ref. Fig.308).
 - (b) Test the hardness, at the smoothed areas of the disk, using a 5 kg load. The disk is acceptable provided that:
 - (i) The hardness value at all the positions tested is greater than 350 HV.
 - (ii) The difference between the maximum and minimum values at the eight positions tested is less than 20 HV.
 - (iii) The hardness values at the four positions tested on the front face of the disk are not consistently different from those on the rear face.
- (2) All test results whether or not they meet the acceptable hardness values, should be forwarded together with the disk serial No. to CESO, Rolls-Royce plc, Bristol.

F. Inspect for Corrosion.

- | | |
|---|---|
| <ol style="list-style-type: none">(1) Carry out visual and binocular inspections. Identify any areas of corrosion pitting or areas of adherent oxide. | Submit details to Rolls-Royce plc for individual assessment |
|---|---|

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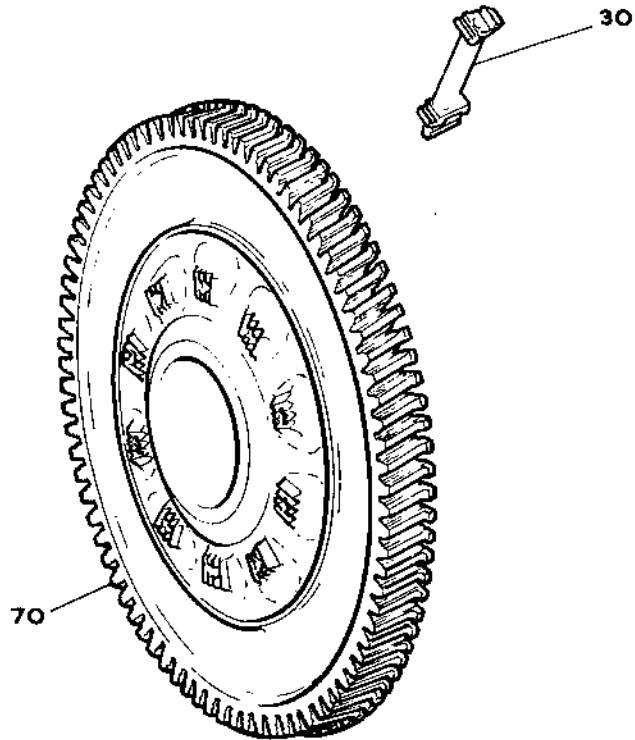


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HP Turbine Rotor
Figure 302

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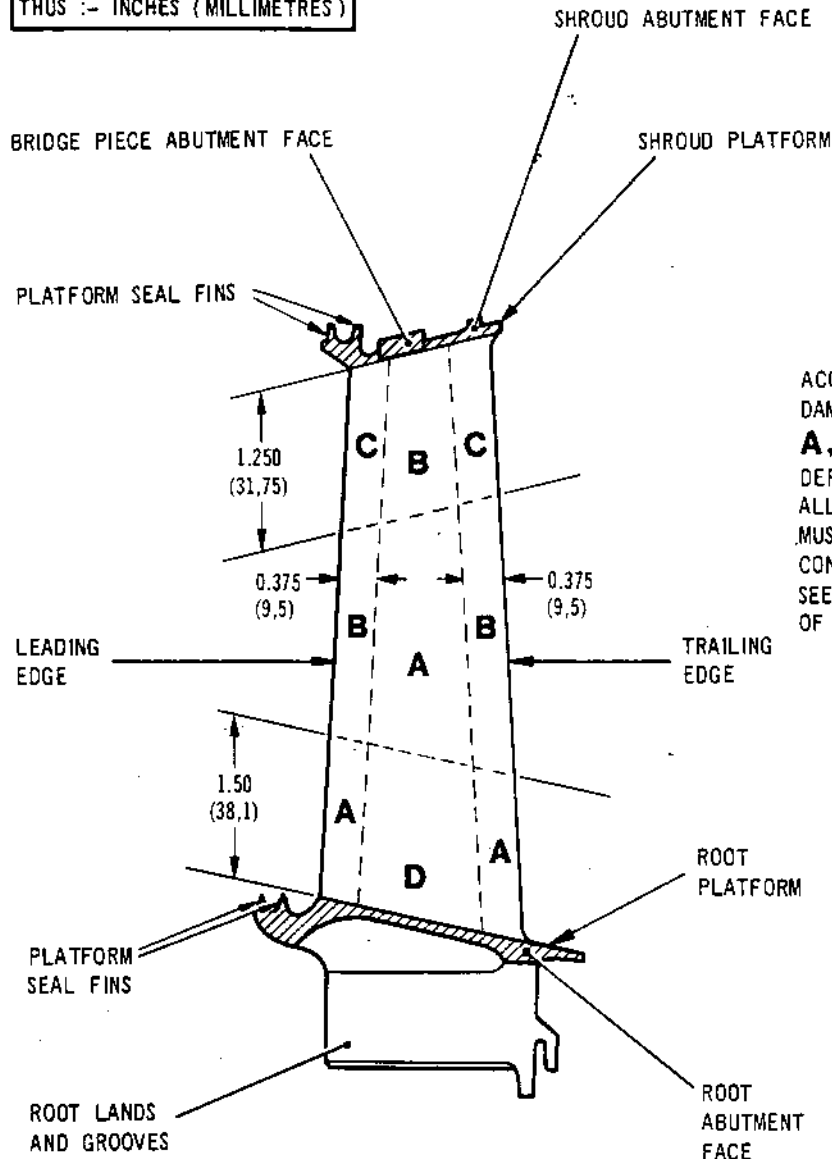
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



Blade Inspection Zones (Part 1 of 2)
Figure 303

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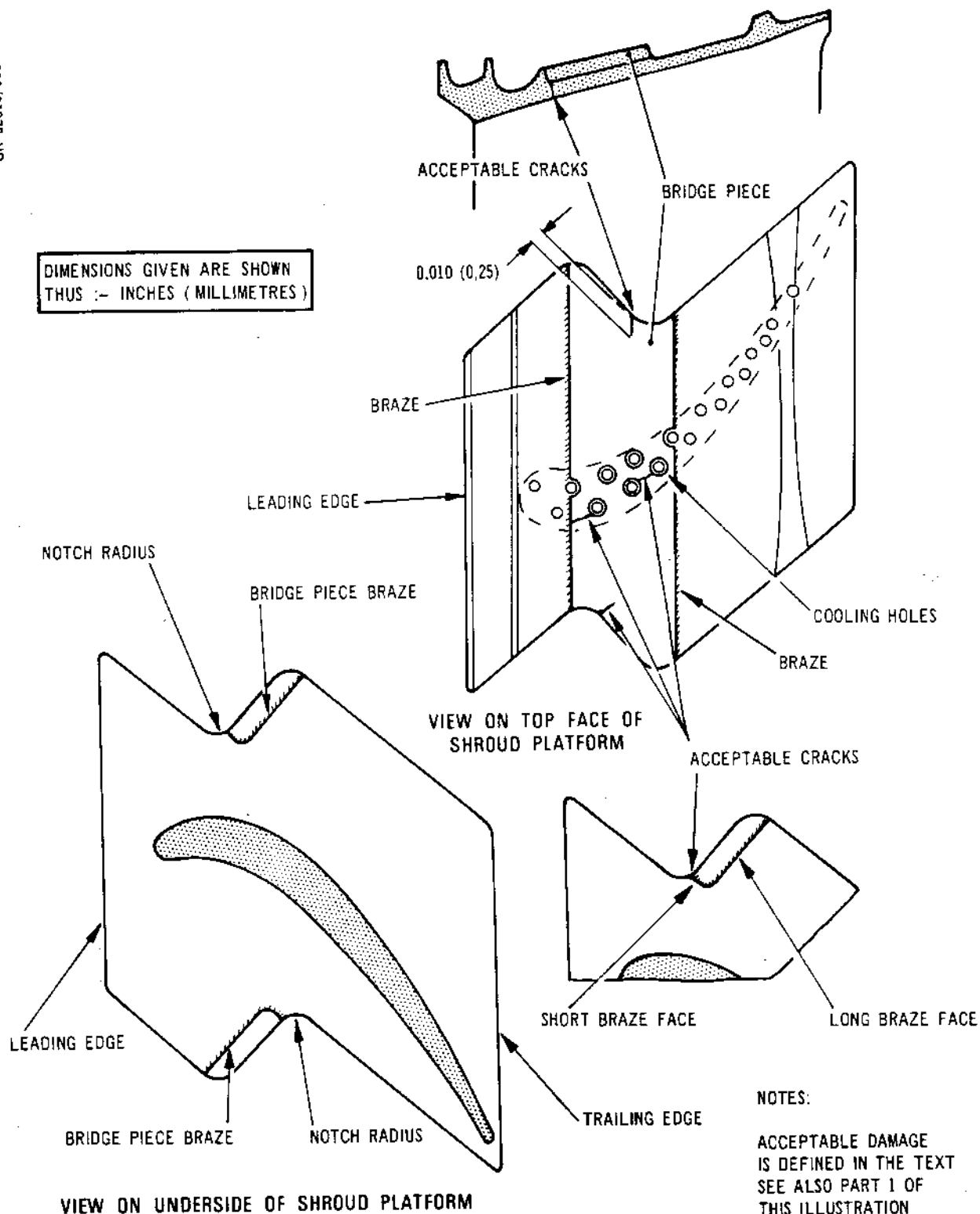
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Blade Inspection Zones (Part 2 of 2)
Figure 303

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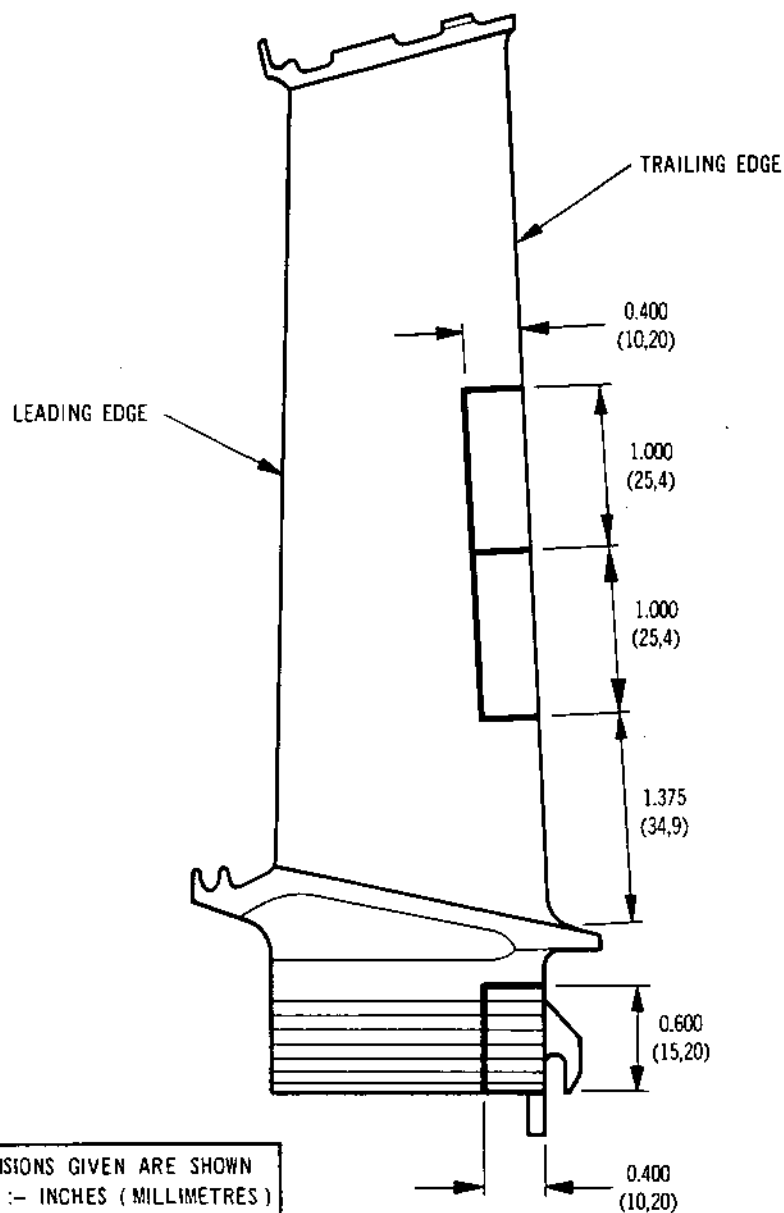


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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Blade Sections for Laboratory Examination
Figure 304

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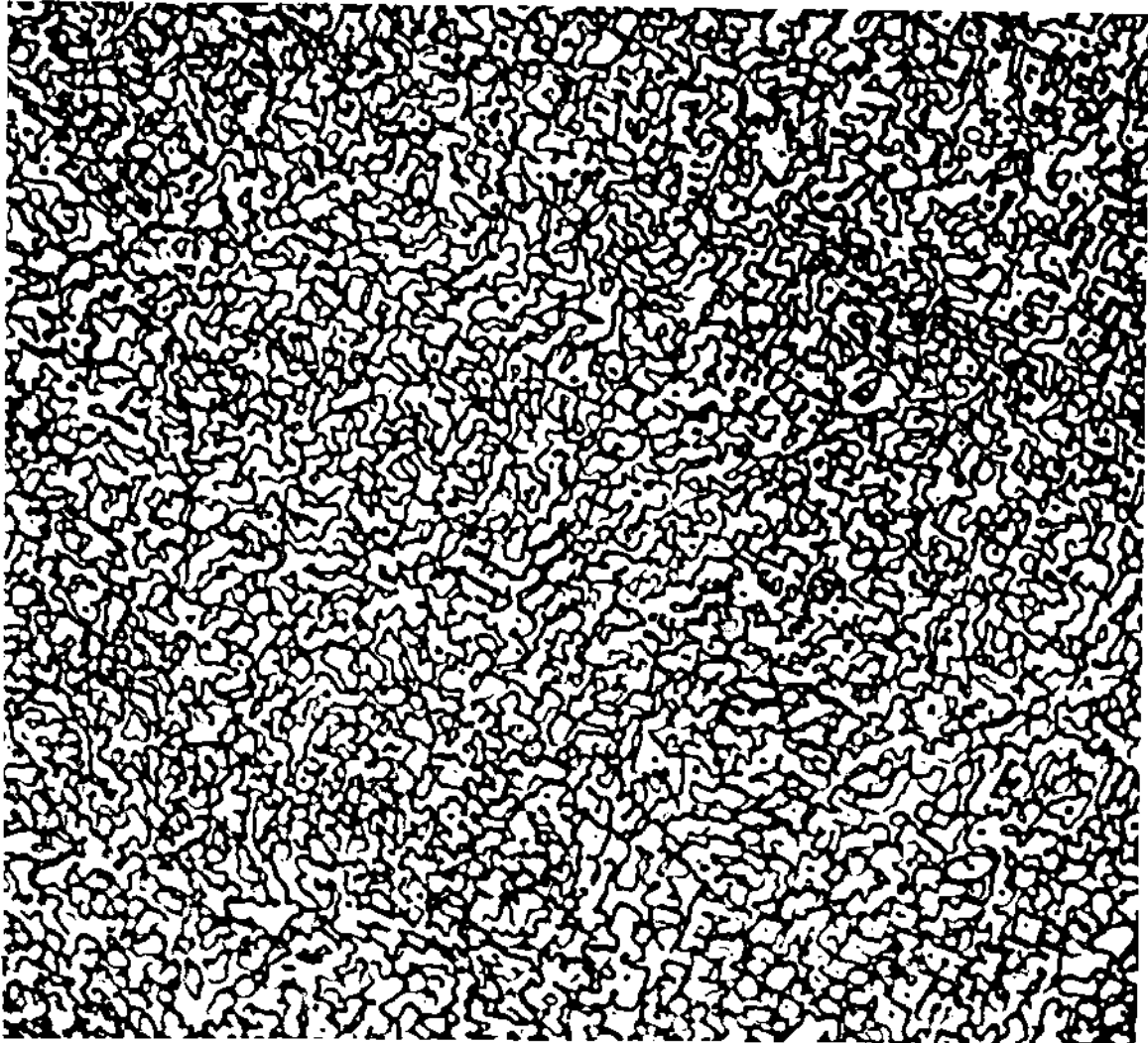


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TYPICAL SATISFACTORY STRUCTURE

ETCHANT - AQUA REGIA GLYCEROL - ELECTROLYTIC

MAGNIFICATION X 1000

Satisfactory Structure, Blades Suitable for Further Service
Figure 305

INSPECTION/CHECK

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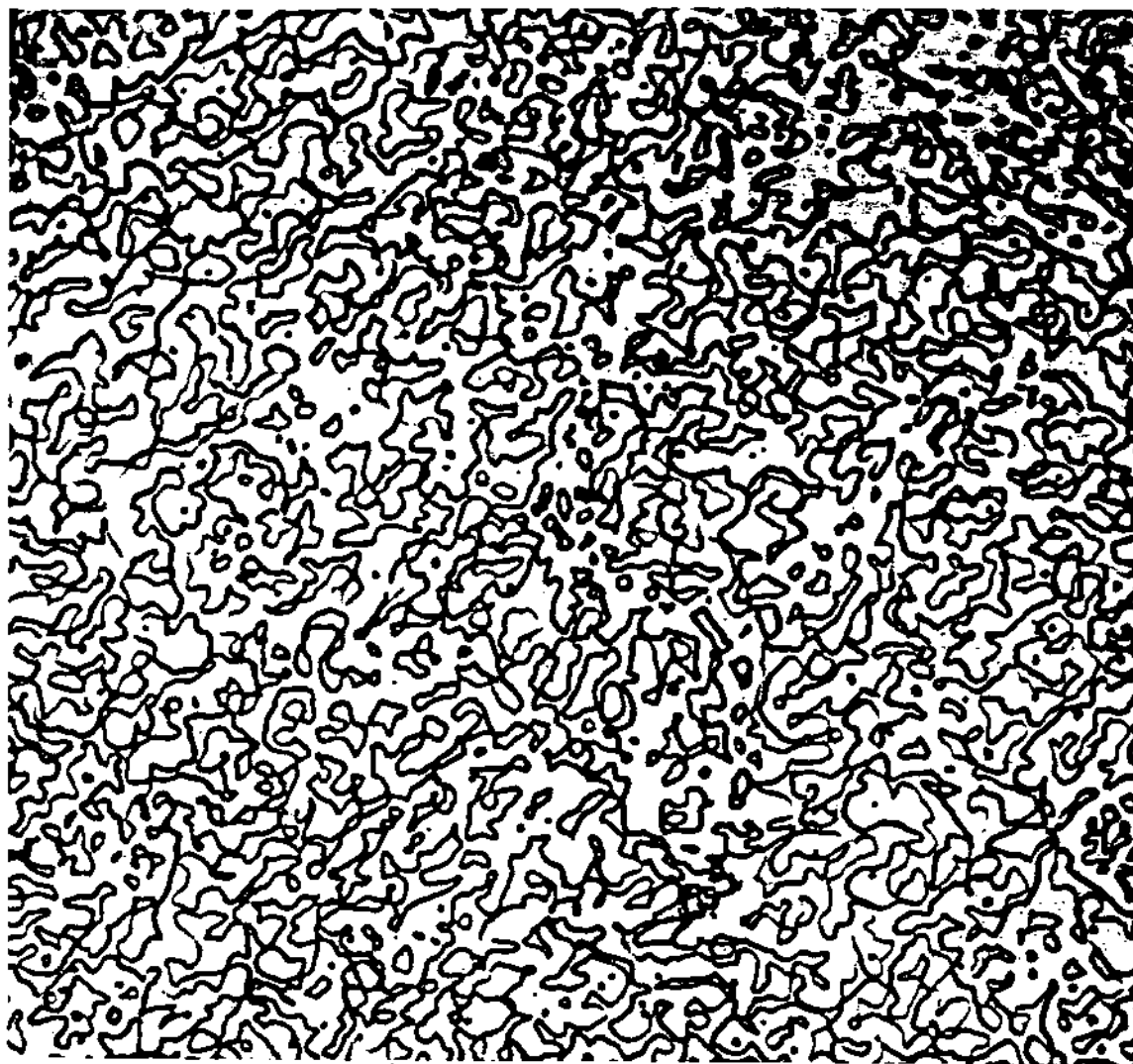


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TYPICAL ACCEPTABLE STRUCTURE WITH
COALESCENCE OF GAMMA PRIME PRECIPITATE

ETCHANT - AQUA REGIA GLYCEROL - ELECTROLYTIC

MAGNIFICATION X 1000

Satisfactory Structure, Blades Suitable for Further Service
Figure 306

INSPECTION/CHECK

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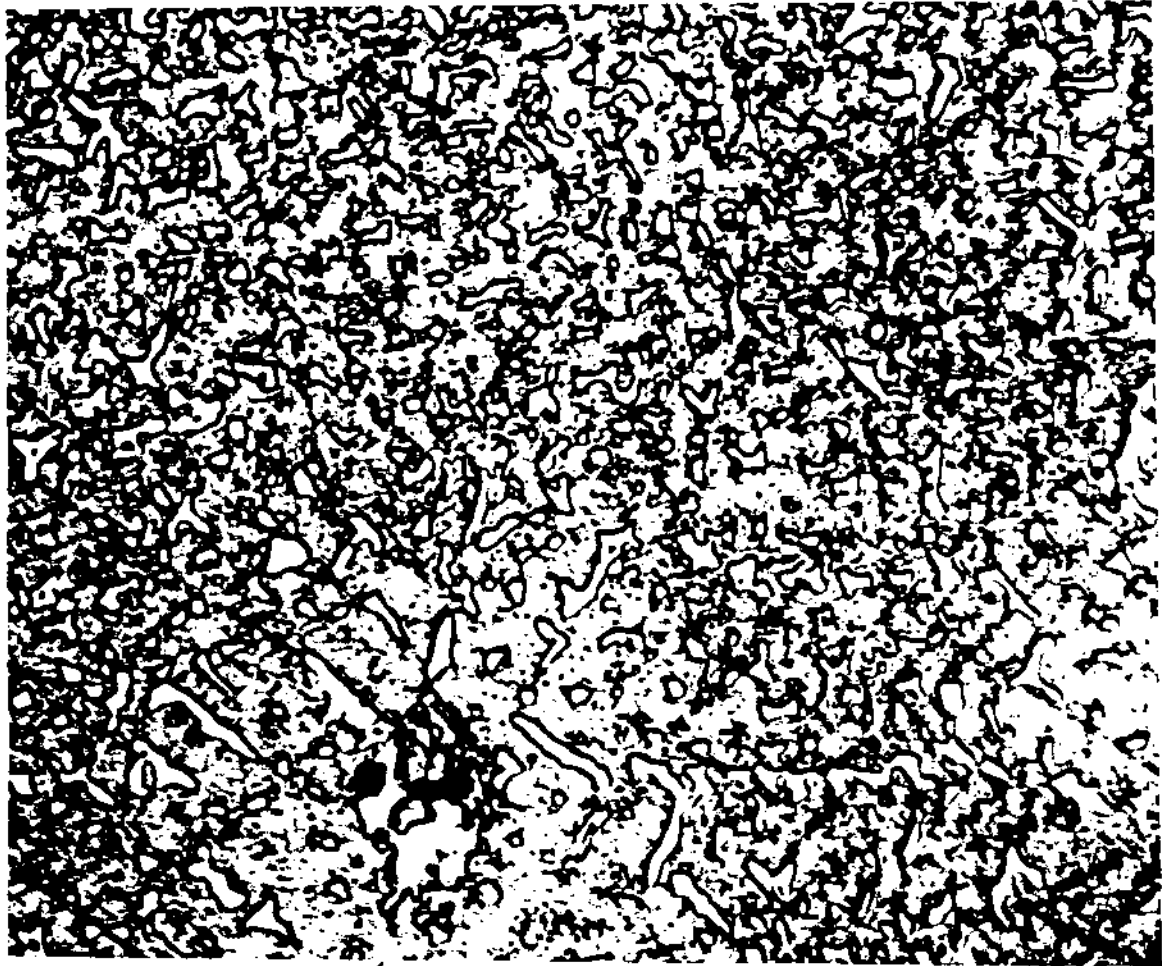


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TYPICAL UNACCEPTABLE STRUCTURE
WITH PARTIAL SOLUTION OF
GAMMA PRIME PRECIPITATES

ETCHANT - AQUA REGIA GLYCEROL - ELECTROLYTIC

MAGNIFICATION X 1000

Unacceptable Structure, Blades Not Suitable
for Further Service
Figure 307

INSPECTION/CHECK

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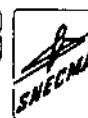
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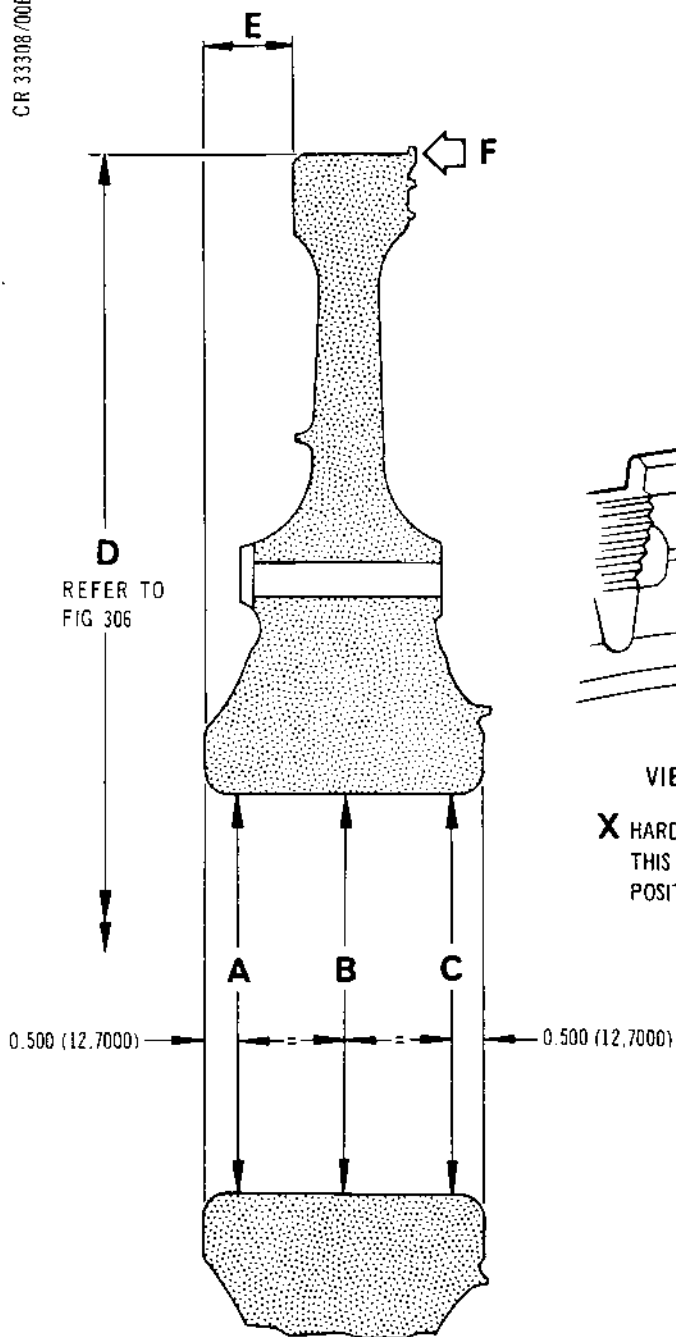
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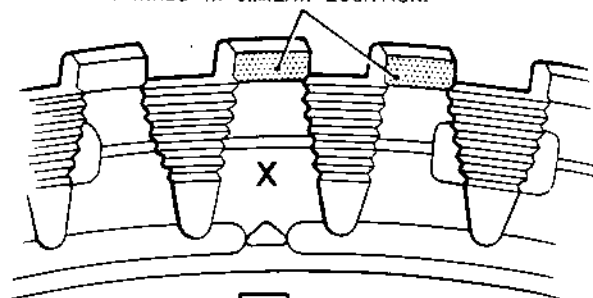
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

DIMENSIONS **A B C** AND **D** ETCHED
ON ONE OR MORE OF THESE FACES
TO NEAREST 0.001 (0.0254)
NOTE: AMOUNT OF UNBALANCE
MARKED IN SIMILAR LOCATION.



F

VIEW ON REAR FACE OF DISK RIM

X HARDNESS CHECK TO BE CARRIED OUT AT
THIS LOCATION AT FOUR EQUALLY SPACED
POSITIONS ON EACH SIDE OF THE DISK.

A	NOMINAL D 6.555 (166.4970)
B	D 6.550 (166.3700)
C	
D	NOMINAL D 27.110 (688.5940)
E	1.338 (33.9852)
	1.333 (33.8582)

Rotor Disk Dimension Checks and Hardness Check Position
Figure 308

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72-51-03

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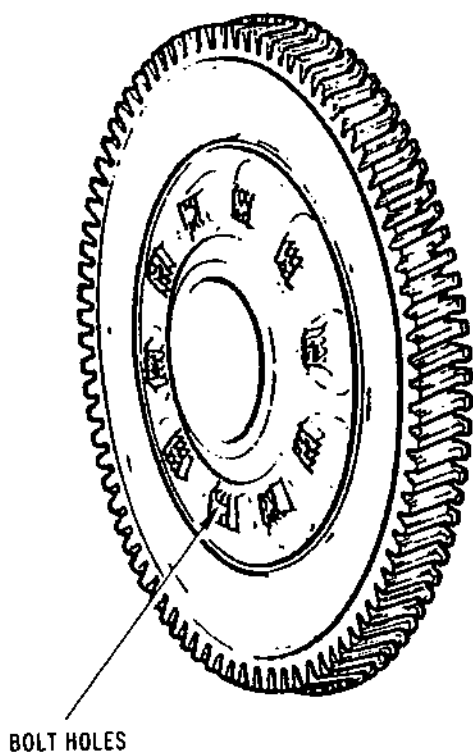
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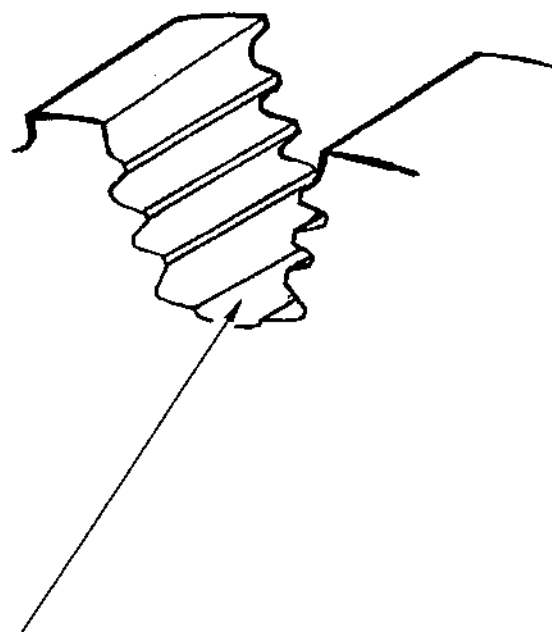


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BOLT HOLES



RIM SLOT BOTTOM

HP Turbine Disc - Inspection Critical Areas
Figure 310

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HP TURBINE ROTOR - HUB AND LABYRINTH ASSEMBLIES -
INSPECTION/CHECK

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HP TURBINE ROTOR - HUB AND LABYRINTH ASSEMBLIES -
INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards. Special attention must be paid to critical areas of certain specified items during inspection. An instruction to this effect is included in the inspection detailed for the specified item.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

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3. Crack Detection

A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.
- (2) Items to be crack tested by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	35	Adjusting Washer	MP1

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

Items marked with an asterisk (*) in Table 302 feature defined critical areas. (Ref.Fig.304). In addition to the general overall crack detection examination, special attention must also be paid to these defined critical areas during the inspection.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	10	Plain Round Nut	F2A
302	30	Keywasher	F2A
302	160	Labyrinth Seal Ring	F2A
302	180	Externally Relieved Body Bolt	F2A
302	250/290	Seal Ring and Damping Ring	F2A
302	300*/310	Hub and Centering Ring Assembly	F2A

Items to be Fluorescent Dye Crack Tested
Table 302

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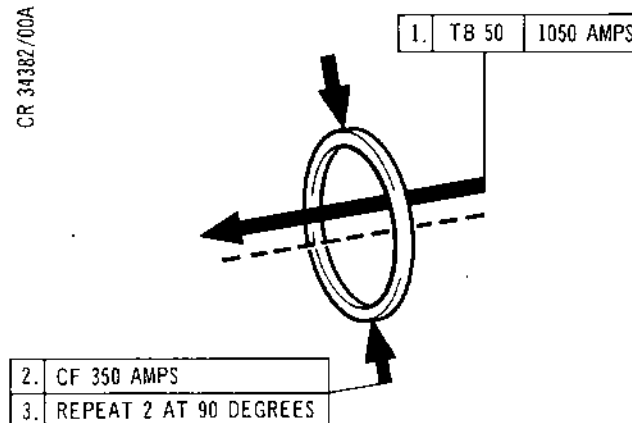
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ADJUSTING WASHER (302-35)

TN34590

Crack Detection Test Diagram
Figure 301

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-51-04	Fig.1
303	Not applicable	

Cross References to Illustrated Parts Catalogue
Table 303

CAUTION: THIS IS A ROTATING ASSEMBLY. ENSURE THAT ANY FREE OR CAPTIVE SELF-LOCKING NUTS (REGARDLESS OF SIZE) HAVE BEEN REPLACED BEFORE THE ASSEMBLY IS RELEASED FOR SERVICE (REF.72-09-00 INSPECTION/CHECK). FAILURE TO DO SO MAY RESULT IN ENGINE DAMAGE.

NOTE: Inspect all balancing weights (302-200) for general condition. Reject any damaged weight; any attempt at repair will render the weights suspect for balancing purposes. Retain any undamaged weights for possible selection and use during assembly.

4. Labyrinth Seal Rings (302-160/250)

CAUTION: SEAL RING 302-250 IS BALANCED WITH A DAMPER RING IN POSITION. IF SEAL AND DAMPER RING ARE SEPARATED PRIOR TO INSPECTION, COMPLETE INSPECTION OF SEAL RING AS DETAILED SUBSEQUENTLY, BUT DO NOT RELEASE EITHER ITEM FOR USE UNTIL ASSEMBLED, RE-BALANCED AND SUBJECTED TO RE-INSPECTION.

A. Inspect Labyrinth Seal Fins.

- (1) Overheating discolouration. Reject.
- (2) Rubbing.
 - (a) Slight rubbing within F.C.S. limits. Accept.

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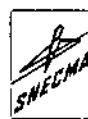
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(3) Nicks and burrs.

Accept after repair.

(4) Damage to fin edges.

Accept after repair, providing that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that all blends on adjacent fins are separated radially by not less than five times fin depth at their ends, and that F.C.S. limits are not violated.

NOTE: Greater damage will require repair
(Ref.72-51-04 Repair No.1, 2, 4 and 5).

B. Inspect Rotor Disk Location Diameter and Turbine Hub Abutment Face (302-250).

(1) Scoring.

(a) Not more than 0.005 in. (0,130 mm) deep at face, or 0.002 in. (0,050 mm) at locating diameter. Accept if repair does not violate F.C.S. limits.

(2) Fretting.

(a) Not more than 0.002 in. (0,050 mm) deep at disk locating diameter. Accept if repair does not violate F.C.S. limits.

(3) Nicks and burrs.

Accept after repair.

C. Inspect Rotor Disk Locating Bore, Rotor Shaft Locating Diameter and Disk Abutment Face (302-160).

(1) Scoring.

(a) Not more than 0.005 in. (0,130 mm) deep at face or 0.002 in. (0,050 mm) at locating bore; not more than 0.001 in. (0,030 mm) at locating diameter. Accept if repair does not violate F.C.S. limits.

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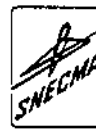
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- (2) Nicks and burrs. Accept after repair.
- D. Inspect Bolt Location Bores (302-160).

(1) Scores.

- (a) Any scoring at bolt land locations. Reject.

(2) Elongation.

- (a) No elongation of through-bolt-holes; not more than 0.030 in. (0,760 mm) at balance bolt-holes. Accept.

E. Carry Out Dimensional Checks.

- (1) Check the following diameters and bore on 302-160.

NOTE: Carry out these checks in conjunction with the rotor disk (72-51-03), the HP rotor shaft (Ref. 72-33-02), the LP turbine nozzles (Ref. 72-52-01) and LP turbine rotor (Ref.72-52-02).

Location	F.C.S. Ref.
HP rotor shaft (dia.)	601-207
HP turbine disk (bore)	601-210
No.26A labyrinth (dia.)	601-211
No.26B labyrinth (dia.)	601-212
No.24 labyrinth (dia.)	601-229

- (a) Within F.C.S. limits Accept.

- (2) Check the following diameters on 302-250.

NOTE: Carry out these checks in conjunction with the HP turbine nozzles (Ref.72-51-02) and the rotor disk (72-51-03).

Location	F.C.S. Ref.
HP turbine disk	601-230
No.23 labyrinth	601-231

- (a) Within F.C.S. limits. Accept.

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5. Externally Relieved Body Bolts - 10 Off (302-180)

NOTE: Before inspecting externally relieved body bolts check all bolts are identified with the letter 'T' on the threaded end of the bolt (Ref. S.B.72-87).

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Check Bolts for Bowing (Ref.Fig.303).

(1) Support bolt on locating diameters; set indicator to location diameter below bolthead. Rotate bolt and record total indicator reading (TIR).

(a) TIR not more than Accept.
0.015 in. (0,381 mm).

C. Inspect Bolt Location Diameters.

(1) Damage.

(a) Light contact marks Accept.
only.

D. Inspect Circlip Grooves.

(a) Light contact marking Accept.
only.

6. Turbine Hub (302-300)

CAUTION: HUB UNITS HAVE A CENTERING RING SHRUNK INTO INNER-MOST BORE OF DISHED FACE; BOTH ITEMS ARE BALANCED TOGETHER AS AN ASSEMBLY. IF CENTERING RING IS NOT IN POSITION, INSPECT HUB AS DETAILED SUBSEQUENTLY, BUT DO NOT RELEASE FOR USE UNTIL CENTERING RING HAS BEEN REFITTED OR REPLACED AND ASSEMBLY HAS BEEN RE-BALANCED AND SUBJECTED TO RE-INSPECTION.

A. Inspect Hirth Serration Flanks.

CAUTION: THE HIRTH SERRATIONS ARE A CRITICAL AREA. (Ref. Fig.304). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

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(1) Fretting.

(a) Identify original machining witness mark; measure crests and troughs of any fretting.

(i) Not more than 0.001 in. (0,030 mm) above and below witness mark. Accept.

B. Inspect Nos.16 to 22 Seal Fins.

(1) Overheating discolouration. Reject.

(2) Rubbing.

(a) Slight rubbing within F.C.S. limits. Accept.

(3) Nicks and burrs. Accept after repair.

(4) Damage to fin edges. Accept after repair, providing that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that all blends on adjacent fins are separated radially by not less than five times fin depth at their ends, and that F.C.S. limits are not violated.

NOTE: Damage greater than this will require repair (Ref.72-51-04 Repair No.3).

C. Inspect Splines.

CAUTION: THE SPLINES ARE A CRITICAL AREA. (Ref.Fig.304). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

(1) Nicks and burrs. Accept after repair.

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(2) Fretting on flanks.

- (a) Not more than 0.001 in. Accept, providing F.C.S. (0,030 mm) above or limits are not violated. below machining witness mark.

D. Inspect Location Bores for Rotor Shaft and Centering Ring (See CAUTION).

- (1) Nicks and burrs. Accept, if repair does not violate F.C.S. limits.

E. Inspect Bolt Location Bores.

CAUTION: THE BOLT HOLE BORES ARE A CRITICAL AREA. (Ref.Fig.304). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

NOTE: Examine the hub and check that a letter T is marked adjacent the Part No. If the letter T is not present, and the hub life is between 500 and 2250 cycles, the hub must be crack tested to the F3A process and examined for cracks at all areas adjacent the bolt-holes (Ref. S.B.72-8673-240).

(1) Cracks.

- (a) Any cracks. Reject.

(2) Scores.

- (a) Any scoring at bolt land locations. Reject.

F. Carry Out Dimensional Checks.

(1) Check drive shaft location bore (F.C.S.601-198).

NOTE: Make this check in conjunction with the HP compressor drive shaft (Ref.72-33-02).

- (a) Within F.C.S. limits. Accept.

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- (2) Check No.16, 17, 18, 19, 20, 21 and 22 labyrinth fin diameters (F.C.S.601-199/200/201/203/204/208 and 209).

NOTE: Make these checks in conjunction with the HP turbine bearing support (Ref.72-51-01) and the HP nozzles (72-51-02).

(a) Within F.C.S. limits. Accept.

- (3) Check square dimensions of splines (Ref.72-09-00 Inspection/Check) (F.C.S. 601-202).

NOTE: Make this check in conjunction with the HP compressor drive shaft (Ref.72-33-02).

NOTE: Dimensional check should be carried out by identifying splines at the adjusting washer location end.

NOTE: This item contains 87 splines, pitched as for 88 with one uncut at master spline.

(a) Any side of square outside F.C.S. limits. Reject.

(b) Within F.C.S. limits. Accept.

- (4) Check centering ring bore (F.C.S.601-206).

NOTE: See CAUTION. If centering ring not fitted, check locating bore in hub (F.C.S.601-205).

NOTE: Make this check in conjunction with the HP compressor drive shaft (Ref.72-33-00). If centering ring is not fitted, check also replacement centering ring diameter (F.C.S.601-205).

(a) Within F.C.S. limits. Accept.

G. Inspect for Corrosion.

- (1) Carry out visual and binocular inspections. Identify any areas of corrosion pitting or areas of adherent oxide.

Submit details to Rolls-Royce plc for individual assessment

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7. Centering Ring (Not Illustrated)

NOTE: This item is shrunk into centre bore of turbine hub (para.6). Observe CAUTION at head of para.6 if centering ring has been displaced or dislodged from hub, and inspect as detailed. If in position, follow para.6.F.(4).

A. Inspect Locating Faces and Bore.

- (1) Nicks, burrs and scores. Accept, if repair does not violate F.C.S. limits.

B. Carry Out Dimensional Checks.

NOTE: Make this check in conjunction with the turbine hub (para.6) and HP compressor drive shaft (Ref. 72-33-00).

- (1) Check locating diameter and bore (F.C.S. 601-205 and 601-206).

(a) Within F.C.S. limits. Accept.

8. Adjusting Washer (302-35)

NOTE: This item may require selection during assembly.

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores. Accept, provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

(2) Fretting and wear. Reject.

9. HP Turbine Hub Securing Nut (302-10)

A. Inspect Threads (Ref. 72-09-00 Inspection/Check).

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B. Inspect Silver Plating.

- (1) Any damage more than minor pitting or scratches. Reject for re-plating (Ref.72-09-08, Repair).

NOTE: Because of the difficulty in ascertaining the presence of silver plate it is recommended that this nut is re-plated at every overhaul.

C. Inspect Spanner Locations.

(1) Damage.

- (a) Any damage that may affect tool operation or safety. Reject.
- (b) Any other minor damage. Accept after repair.

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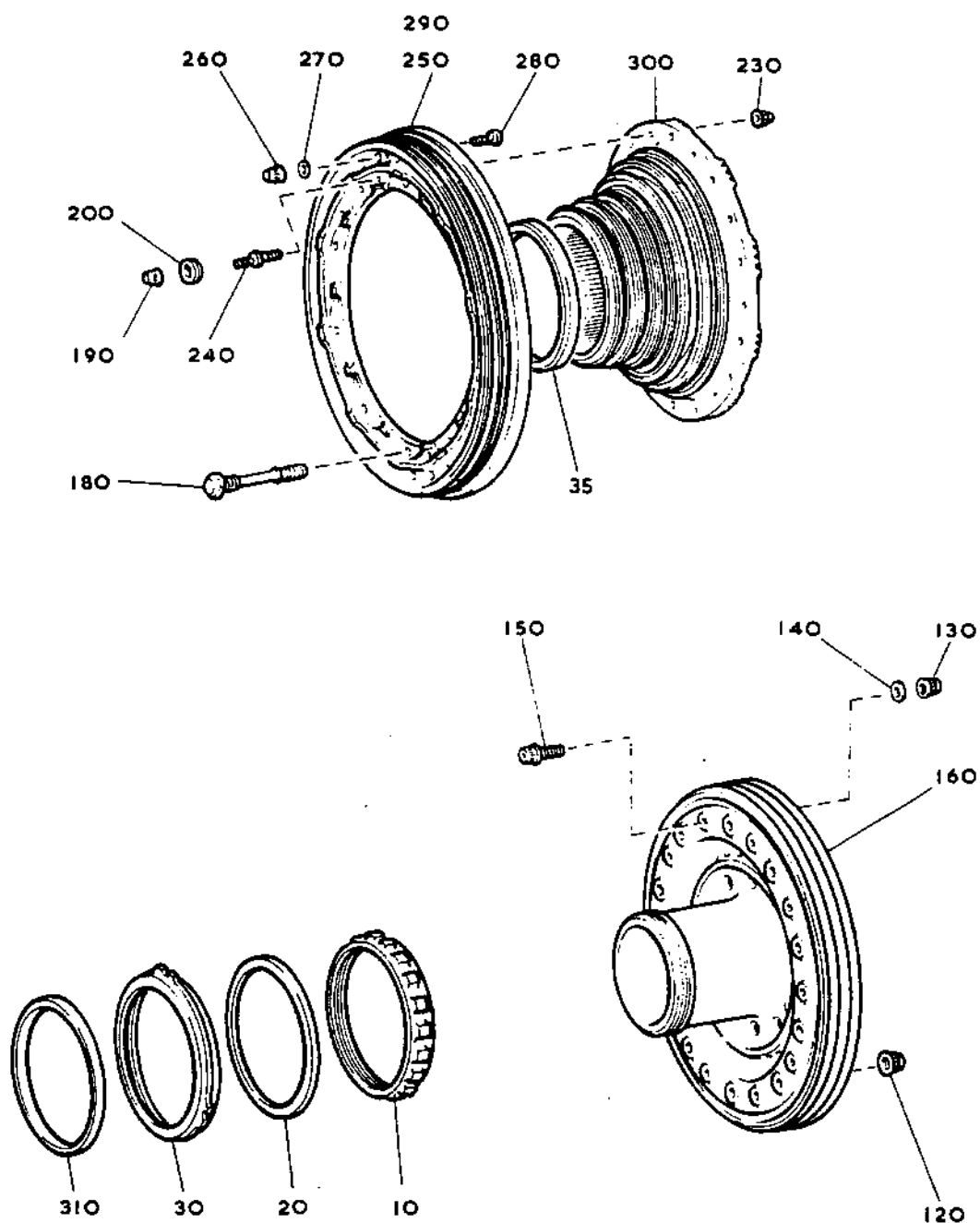


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HP Turbine Rotor
Hub and Labyrinth Assemblies,
Figure 302

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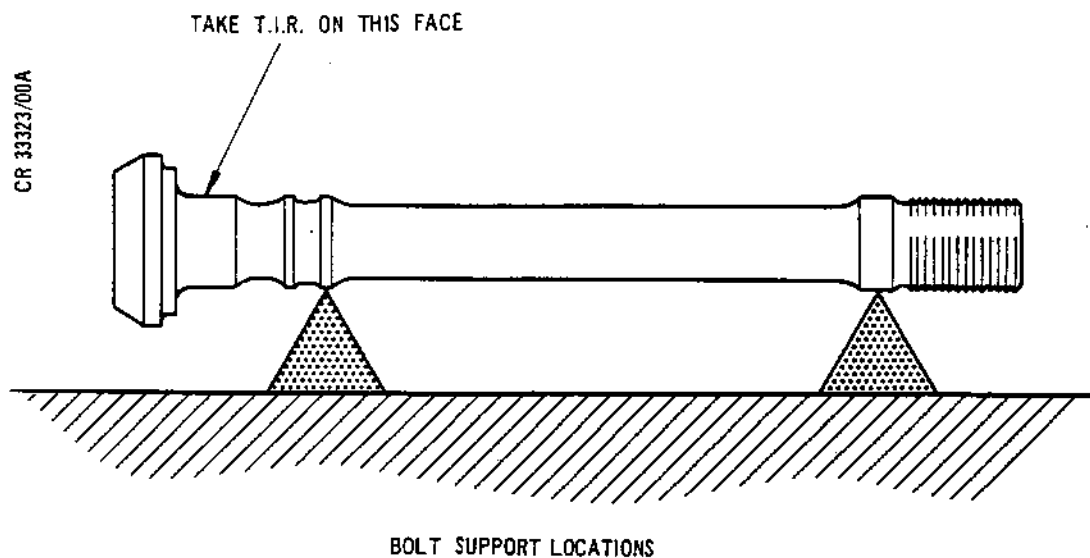


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Bolt Bow Check
Figure 303

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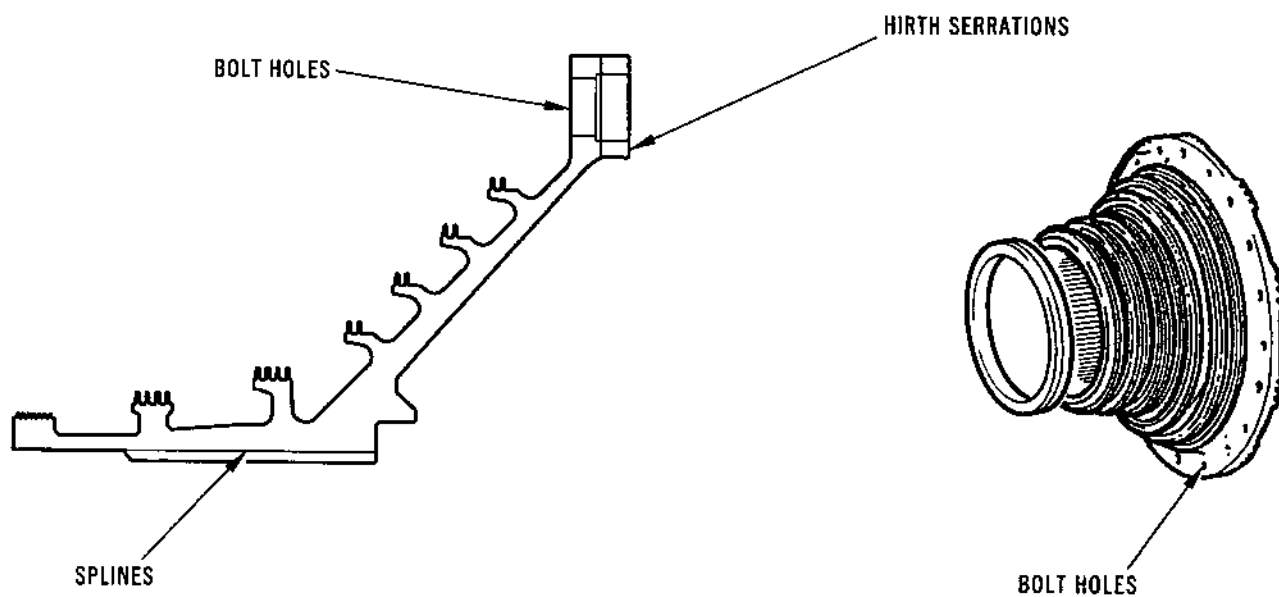


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HP Turbine Hub - Inspection Critical Areas
Figure 304

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LP TURBINE NOZZLES - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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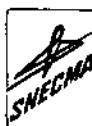
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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

No current requirement

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

302	10	Cover	FlA
302	80	LP Turbine Nozzle Vane	FlA
302	90	LP Turbine Nozzle Vane	FlA
302	100	LP Turbine Nozzle Vane	FlA
302	110	LP Turbine Nozzle Vane	FlA
302	120	Nozzle Vane Support Diaphragm	FlA

Items to be Fluorescent Dye Crack Tested
Table 302

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No current requirement

TN8565

Crack Detection Test Diagram
Figure 301

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FIG.NO.	ILLUSTRATED PARTS CATALOGUE EQUIVALENT
---------	--

301	Not applicable
302	72-52-01 Fig.1
303	Not applicable

Cross References to Illustrated Parts Catalogue
Table 303

4. Cover Assembly (302-10)

A. Inspect Tube Attachment Welds.

(1) Cracks. Reject.

B. Inspect Abutment Face and Support Diaphragm Location
Diameter.

(1) Nicks, burrs and scores. Accept after
repair if F.C.S.
limits are not
violated.

C. Inspect Bolt Locations.

(1) Wear and fretting.

(a) Bolt-holes elongated not more than 0.030 in.
(0,760 mm); thickness
not reduced more than
5 per cent. Accept.

D. Inspect Thermocouple Probe Shields.

(1) Nicks and Burrs. Accept after
repair.

(2) Distortion. Reject.

(3) Fretting. Reject.

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E. Carry Out Dimensional Check.

- (1) Check the support diaphragm location bore
(F.C.S.601-238).

NOTE: Make this check in conjunction with the
support diaphragm (para.7).

(a) Within F.C.S. limits. Accept.

5. Retaining Plates - 6 off (302-70)

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores. Accept after
repair.

B. Inspect Bolt Locations.

- (1) Wear and fretting.

(a) Bolt-holes elongated not Accept.
more than 0.030 in.
(0,760 mm); thickness
not reduced more than
5 per cent.

6. Nozzle Vanes - 13 off (302-80), - 8 off (302-90), - 1 off
(302-100), - 2 off (302-110)

A. Inspect All Locating Faces (Ref.Fig.303).

- (1) Fretting.

(a) Not more than 0.002 in. Accept.
(0,050 mm) on outer
location and platform
faces; tapering to not
more than 0.010 in.
(0,250 mm) on front and
rear diaphragm location
faces.

B. Inspect Thermocouple Probe Tubes.

- (1) Security.

(a) Tube secure in location. Accept.

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- (2) Distortion. Reject.
- C. Inspect Inner and Outer Rotor Blade Seal Faces
(Ref.Fig.303).
- (1) Grooving.
- (a) Not more than 0.015 in. Accept after
(0,380 mm) deep. repair.
- D. Inspect Pack Aluminising.
- (1) Chips and burrs.
- (a) Any individual area Reject for
greater than 0.25 sq.in. touch-up
(40,3 sq.mm). with Sermaloy J
(Ref.72-09-05
Repair).
- (b) No individual area
- greater than 0.25 sq.in.
(40,3 sq.mm).
- (i) More than four Reject for
separate areas. touch-up
with Sermaloy J
(Ref.72-09-05
Repair).
- (ii) Up to four separate Accept.
areas, none less
than 0.500 in.
(12,700 mm) apart.
- (2) Hair-line cracks.
- (a) Parent material Reject.
penetrated.
- (b) Pack aluminizing only Accept.
affected.
- E. Inspect Vane Aerofoils (Ref.Fig.303).

NOTE: Crack length is to be taken as straight line
distance between extremities, regardless of crack
path.

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NOTE: The unshaded area on the vane defined in Figure 303 is measured vertically from the platform surface.

NOTE: Nozzle vane assemblies which have been subject to braze repairs of the vane aerofoil on two previous occasions, should not be accepted for further repair. A third repair may be carried out if the vane aerofoil cracks are within the limits detailed in para.6.E.(1).

(1) Aerofoil cracks

- | | |
|---|------------------------|
| (a) Less than 0.010 in.
(0,25 mm) wide and
0.500 in. (12,70 mm)
in length. Not less
than 0.500 in.
(12,70 mm) from any
adjacent cracks. | Accept after
repair |
|---|------------------------|

(2) General Cracks.

- | | |
|---|--------------------|
| (a) More than one crack,
or one crack greater than
0.125 in. (3,180 mm) in
length, per vane at
concave surface vent hole. | Reject for repair. |
| (b) More than one crack per
vane contained within the
unshaded zone i.e. the
area measured 0.500 in.
(12,70 mm) vertically from
the under surface of the
outer platform and extend-
ing across the vane. | Reject for repair. |
| (c) A crack extending more than
1.125 in. (28,350 mm) from
the trailing edge of left-
hand vane, contained within
the unshaded zone. | Reject for repair. |
| (d) A crack extending more than
0.750 in. (19,050 mm) from
the trailing edge of right-
hand vane, contained within
the unshaded zone. | Reject for repair. |

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- | | | |
|-----------------------------|---|--|
| (e) | A crack wholly or partly within the shaded zone of the vane other than (a). | Reject for repair. |
| (f) | A crack extending into the platform (excluding the fillet radius). | Reject for repair. |
| (3) Minimum Wall Thickness. | | |
| (a) | Minimum wall thickness and above as detailed in Fig.303. | Accept unless bulging or cracking evident. |
| (b) | Wall thickness 0.030 in. (0,76 mm) to 0.039 in. (0,99 mm). | Quarantine. |
| (c) | Wall thickness 0.029 in. (0,74 mm) and below. | Scrap. |

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7. Nozzle Vane Support Diaphragm (302-120)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect No.24 and 25 Labyrinth Seal Bores.

(1) Security and distortion
of seal rings.

(a) Any insecurity or distortion. Reject.

(2) Grooving.

(a) Any damage greater than (b). Reject.

(b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.

(3) Fretting.

(a) Any amount, around total housing circumference. Accept if F.C.S. limits are not violated.

(b) Local fretting, extending over a total arc of not more than 60 degrees and not greater than 0.005 in. (0,130 mm) deep. Accept.

(4) Distortion.

(a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S. Accept.

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C. Inspect Cover Abutment and Spigot Locating Faces.

- (1) Nicks, burrs and scores.

Accept after
repair if F.C.S.
limits are not
violated.

D. Inspect Bolt Locations.

- (1) Wear and fretting.

- (a) Bolt-holes elongated
not more than
0.030 in. (0,760 mm);
thickness not reduced
more than 5 per cent.

Accept.

E. Inspect Nozzle Vane Location Faces (Ref.Fig.306).

- (1) Wear of rear location face.

- (a) Not greater than 0.020 in.
(0,500 mm) deep.

Accept.

- (2) Fretting of front location hook flanks (Ref.Fig.306).

- (a) Fretting on any flank with
a local depth greater than
0.050 in. (1,270 mm).

Reject.

- (b) Fretting greater than
0.005 in. (0,130 mm) in
depth and covering more
than 50 per cent of the
total flank area of any
one segment.

Reject.

- (c) Not more than 8 segments
with localised fretting
on either flank greater
than 0.030 in. (0,760 mm)
in depth but not more
than 0.050 in. (1,270 mm).

Accept.

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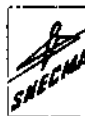
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F. Inspect Vane Location Segments.

(1) Fretting.

- | | |
|---|-------------------------|
| (a) Not more than 0.030 in.
(0,760 mm) on one side
only of locating dogs. | Accept. |
| (b) Fretting at thermocouple
probe bore. | Accept after
repair. |

G. Inspect Air Seal Fin.

(1) Damage.

- | | |
|------------------|--|
| (a) Edge damage. | Accept after repair,
provided that damage
is carefully blended
to remove burrs, is
confined to not more
than 30% of fin
perimeter, and maximum
depth is not greater
than 0.010 in. (0,25
mm). |
|------------------|--|

H. Carry Out Diaphragm Distortion Checks (Ref.Fig.305 and 306).

(1) Check vane location segment
diameter.

NOTE: Station 1, at engine vertical centre-line,
can be identified by TOP engraved on face F.

- (a) Measure and record
diameter A between
stations 1-5, 2-6,
3-7 and 4-8. Note and
record maximum deviation
from nominal diameter of
24.620 in. (625,350 mm).

- | | |
|---|---|
| (i) Maximum deviation
greater than plus
0.030 in. (0,760 mm)
or minus 0.050 in.
(1,270 mm). | Reject for repair
and crack test. |
| (ii) Maximum deviation
not more than in
(i). | Accept, if dis-
tortion wave check
is satisfactory
(para.(2)). |

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(2) Check wave distortion on face C.

(a) Support diaphragm at three equi-spaced points on face B; use matched rollers.

(b) Identify station 1 at face C. Set dial test indicator at zero on outer edge of face C at station 1.

(c) Record total indicator readings (T.I.R.) on outer edge of face C at stations 2 to 8 inclusive.

(i) Any T.I.R. more than 0.015 in. (0,380 mm).

Reject.

(ii) No T.I.R. greater than 0.015 in. (0,380 mm).

Accept, subject to satisfactory vane location diameter check (para.(1)).

J. Carry Out Dimensional Checks.

(1) Check cover assembly location bore (F.C.S.601-238).

NOTE: Make this check in conjunction with the cover (para.4).

(a) Within F.C.S. limits.

Accept.

(2) Check No.24 and 25 labyrinth seal bores (F.C.S.601-228/229).

NOTE: Make these checks in conjunction with the HP and LP turbine rotors (Ref.72-51-03 and 72-52-02).

(a) Within F.C.S. limits.

Accept.

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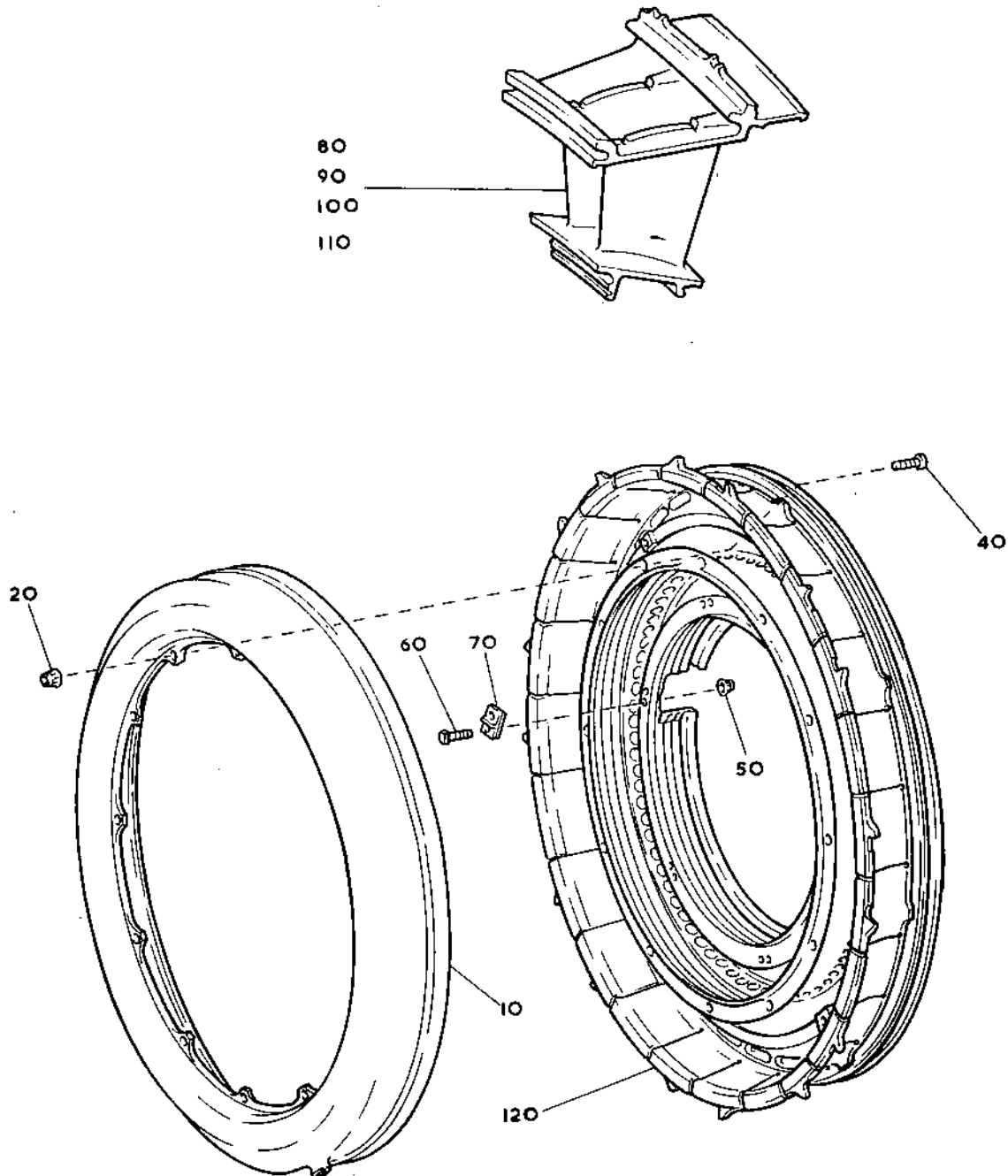
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LP Turbine Nozzle
Figure 302



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COMBUSTION CASE
ABUTMENT FACE

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

EXHAUST DIFFUSER
ABUTMENT FACES

RIGHT-HAND VANE

LEFT-HAND VANE

SEGMENT ABUTMENT FACE
BOTH SIDES

LEADING EDGES

DAMAGE IS NOT ACCEPTABLE IN THE SHADED
ZONES EXCEPT AS DEFINED IN THE TEXT

VENT HOLES
(CONCAVE FACES)

SEGMENT ABUTMENT
FACE BOTH SIDES

DIAPHRAGM
ABUTMENT FACE

DIAPHRAGM
ABUTMENT FACE

0.500 (12,7) BOTH VANES
MEASURED FROM
PLATFORM FACE

ROTOR SHROUD
PLATFORM

TRAILING EDGES

LEFT-HAND
VANE

RIGHT-HAND
VANE

Nozzle Vane Inspection Details
Figure 303 (Sheet 1 of 2)

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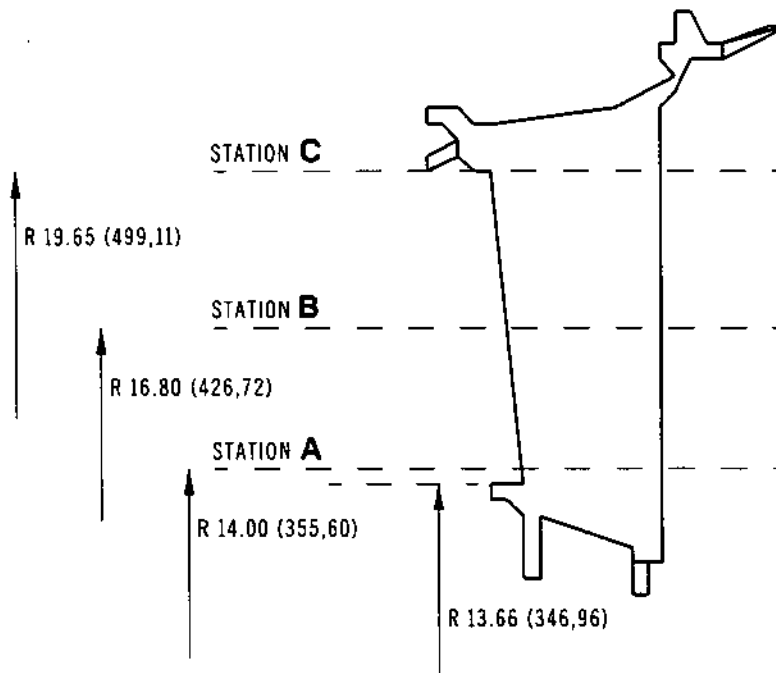


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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

WALL THICKNESS (MIN)		
MEASURED AT STATION :		
A	CONCAVE SURFACE	0.040 (1,02)
A	CONVEX SURFACE	0.040 (1,02)
B	CONCAVE SURFACE	0.045 (1,14)
B	CONVEX SURFACE	0.070 (1,78)
C	CONCAVE SURFACE	0.070 (1,78)
C	CONVEX SURFACE	0.100 (2,54)
MINIMUM WALL THICKNESSES BETWEEN STATIONS ARE PRO RATA.		

Nozzle Vane Inspection Details
Figure 303 (Sheet 2 of 2)

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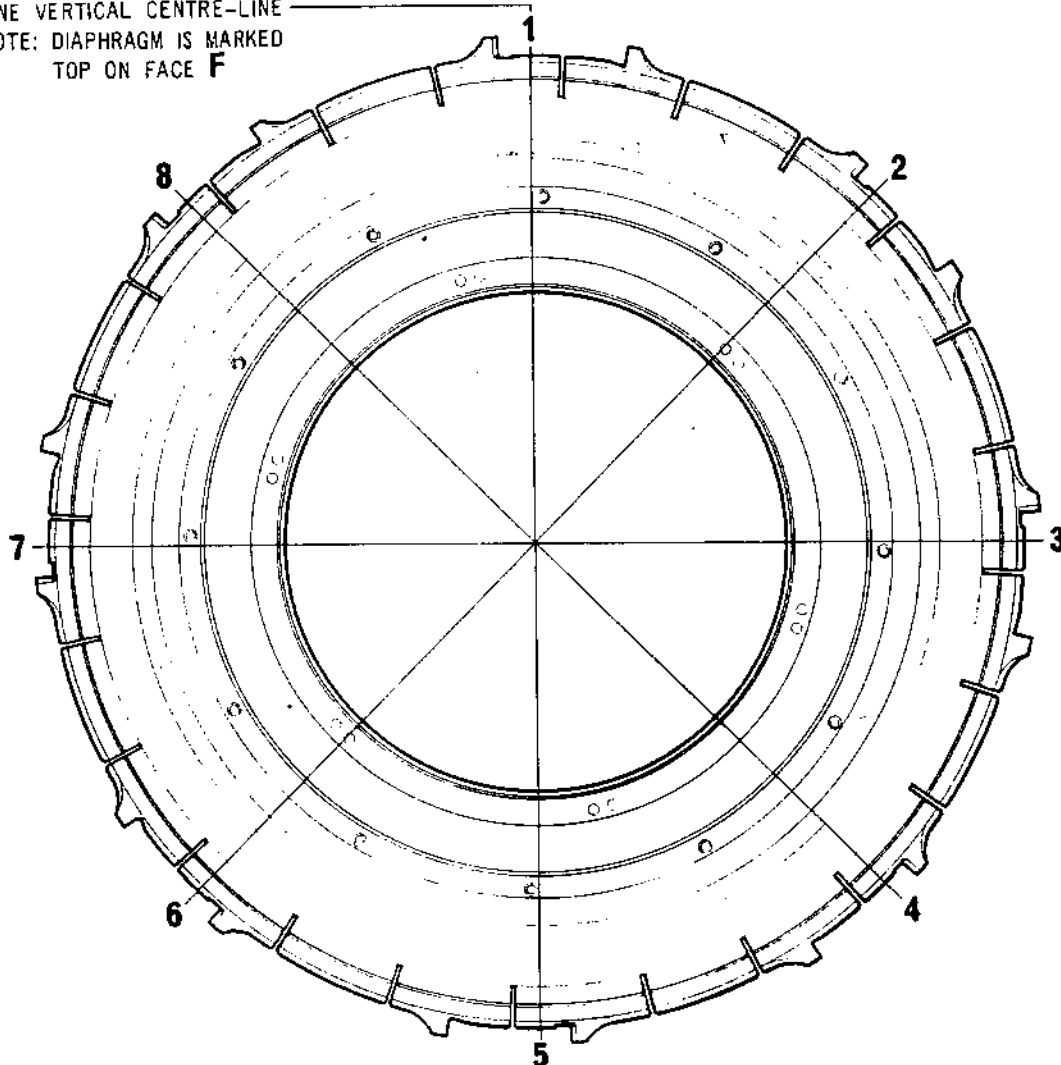


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ENGINE VERTICAL CENTRE-LINE
NOTE: DIAPHRAGM IS MARKED
TOP ON FACE **F**

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VIEW ON FRONT FACE OF DIAPHRAGM SHOWING 45-DEGREE MEASURING STATIONS

ROLLERS AT FACE B -SET TO ZERO AT STATION 1	FACE C WAVE DISTORTION	
	RECORDED T.I.R.	STATION
		1
		2
		3
		4
		5
		7
		8
MAXIMUM DISTORTION	()	

Diaphragm Distortion Check
(Part One of Two)
Figure 304

INSPECTION/CHECK

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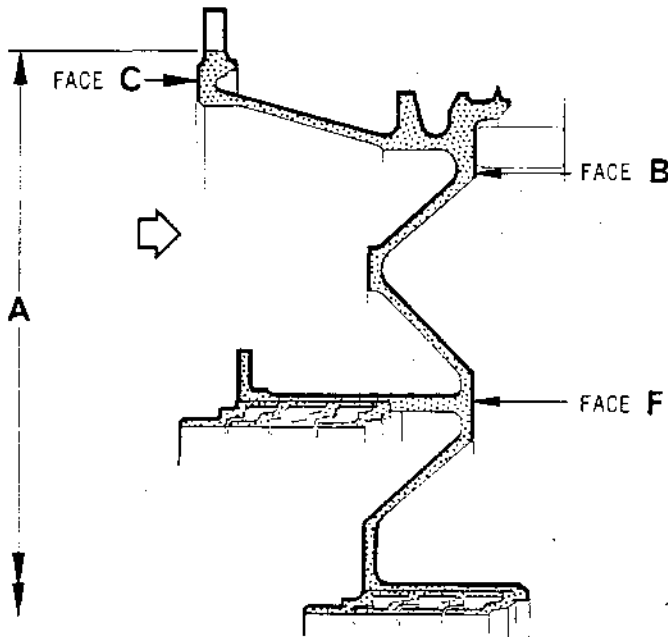
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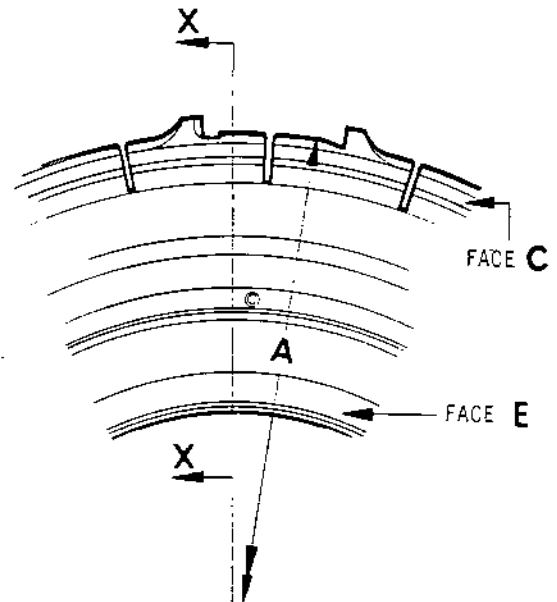
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SECTION XX



VIEW IN DIRECTION OF ARROW
ON FRONT FACE OF
DIAPHRAGM AT ENGINE VERTICAL
CENTER-LINE (STATION 1)

VANE LOCATION SEGMENT DIAMETER		
	RECORDED D	BETWEEN STATIONS
		1-5
		2-6
		3-7
		4-8
NOMINAL D	24.620 (625.350)	
MAXIMUM VARIATION	()	

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Diaphragm Distortion Check
(Part Two of Two)
Figure 305

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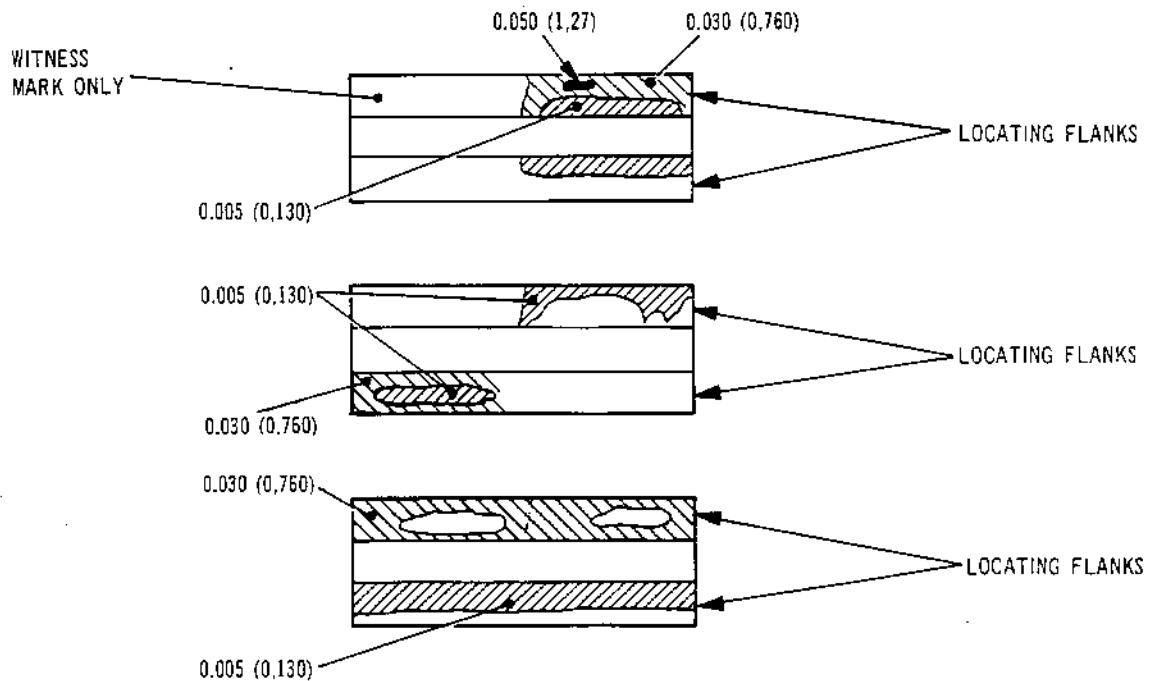
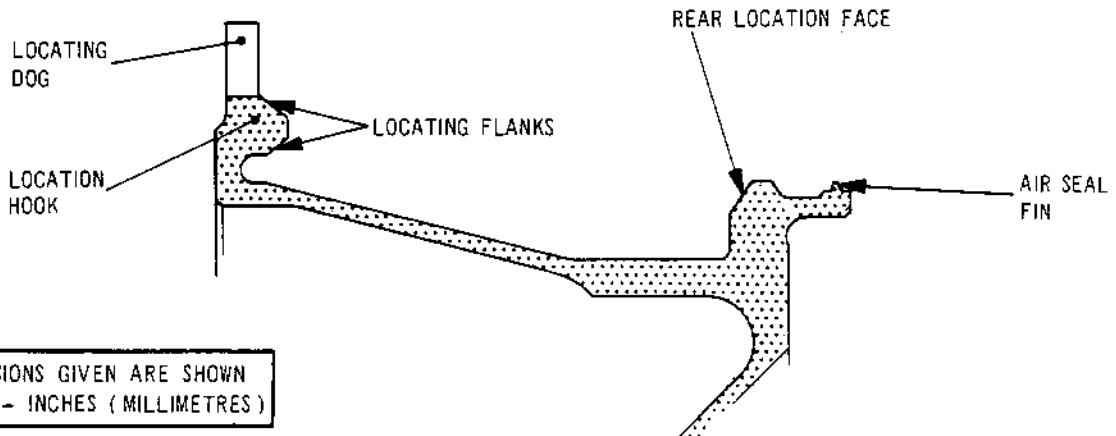
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Examples of Typical Location Hook Fretting Patterns
Figure 306

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LP TURBINE ROTOR - INSPECTION/CHECK

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LP TURBINE ROTOR - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards. Special attention must be paid to critical areas of certain specified items during inspection. An instruction to this effect is included in the inspection detailed for the specified item.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

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3. Crack Detection

A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.
- (2) Items to be crack tested by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	130	Retaining Nut	MP1
302	140	Bearing Inner Track	MP1
303	10	Retaining Nut	MP1

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

Items marked with an asterisk (*) in Table 302 feature defined critical and sensitive areas. (Ref.Figs.309 and 310). In addition to the general overall crack detection examination, special attention must also be paid to these defined critical and sensitive areas during the inspection.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	100	Labyrinth Ring	F2A
302	110	Labyrinth Housing	F2A
302	120	Externally Relieved Body Bolt	F1A
302	200	Cooling Air Duct	F2A
302	210*	Hub Assembly with)	F3A
302	220	Centering Ring)	
302	230	Turbine Blades	F2A
302	250*	Turbine Disk	F2A
303	20	Cupwasher	F1A

Items to be Fluorescent Dye Crack Tested
Table 302

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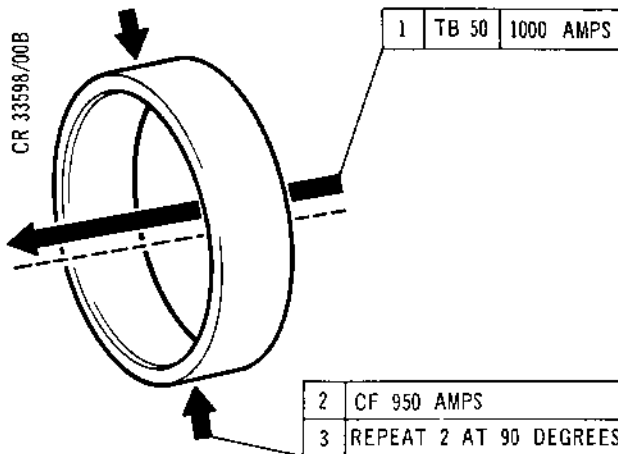
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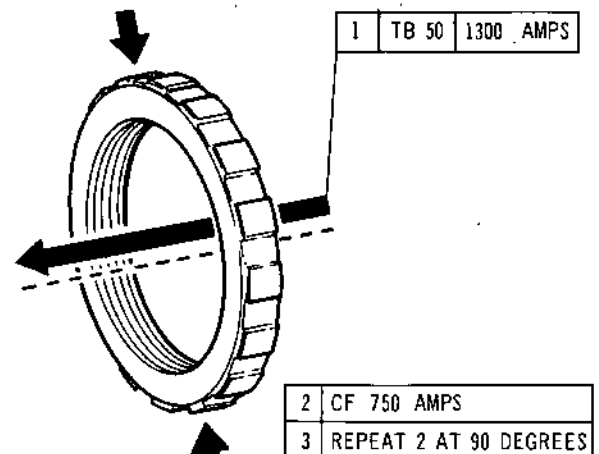
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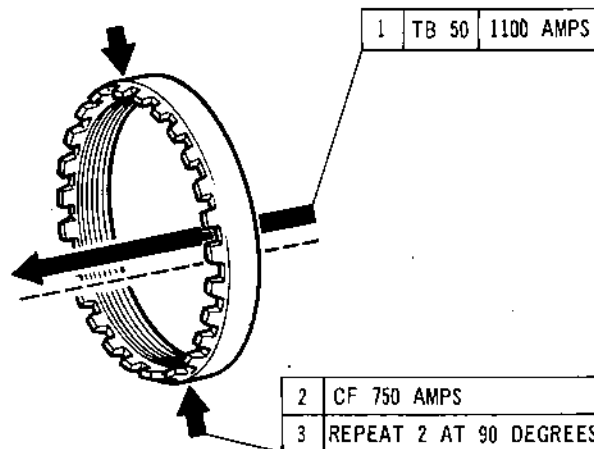
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BEARING INNER TRACK (302-140)



RETAINING NUT (303-10)



RETAINING NUT (302-130)

Crack Detection Test Diagram
Figure 301

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-52-02	Fig.1
303	72-52-02	Fig.2
304	Not applicable	
305	Not applicable	
306	Not applicable	
307	Not applicable	

Cross References to Illustrated Parts Catalogue
Table 303

CAUTION: THIS IS A ROTATING ASSEMBLY. ENSURE THAT ANY FREE OR CAPTIVE SELF-LOCKING NUTS (REGARDLESS OF SIZE) HAVE BEEN REPLACED BEFORE THE ASSEMBLY IS RELEASED FOR SERVICE (REF.72-09-00 INSPECTION/CHECK). FAILURE TO DO SO MAY RESULT IN ENGINE DAMAGE.

NOTE: Inspect all balancing weights (302-30/160) for general condition. Reject any damaged items; any attempt at repair will render them suspect for balancing purposes. Retain any undamaged items for possible selection and use during assembly.

4. Labyrinth Ring (302-100)

A. Inspect No.25 Labyrinth Seal Fins.

- | | |
|--|----------------------|
| (1) Overheating discolouration. | Reject. |
| (2) Rubbing. | |
| (a) Slight rubbing within F.C.S. limits. | Accept. |
| (3) Nicks and burrs. | Accept after repair. |

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(4) Damage to fin edges.

Accept after repair, providing that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that blends on adjacent fins are separated radially by not less than five times fin depth at their ends, and that F.C.S. limits are not violated.

Note: Greater damage will require repair (Ref.72-52-02 Repair No.2 and 8).

B. Inspect Disk and Laybrinth Housing Abutment Faces.

(1) Scoring.

(a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.

(2) Nicks and burrs. Accept after repair.

C. Inspect Bolt Locations.

(1) Wear and fretting.

(a) Balancing bolt holes elongated not more than 0.030 in. (0,760 mm), light witness mark only at shouldered bolt locations. Accept.

(2) Scores.

(a) No scores at bolt land locations. Accept.

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D. Carry Out Dimensional Checks.

- (1) Check No.25 seal fin diameters (F.C.S.601-228).

NOTE: Make this check in conjunction with the LP Turbine Nozzles (Ref.72-52-01).

- (a) Within F.C.S. limits. Accept.

5. Labyrinth Housing (302-110)

A. Inspect Nos.26A and 26B Labyrinth Seal Bores.

- (1) Grooving.

- (a) Any damage greater than (b). Accept after repair (Ref. 72-52-02 Repair No.3).

- (b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.

- (2) Fretting.

- (a) Any amount, around total housing circumference. Accept if F.C.S. limits are not violated.

- (b) Local fretting, extending over a total arc of not more than 60 degrees and not greater than 0.005 in. (0,130 mm) deep. Accept.

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(3) Distortion.

- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S. Accept.

B. Inspect Disk/Labyrinth Ring Abutment Faces and Hub/Cooling Air Duct Location Bores.

(1) Scoring.

- (a) Not more than 0.005 in. (0,130 mm) deep. Accept, if repair preserves F.C.S. limits.

(2) Nicks and burrs.

Accept, if repair preserves F.C.S. limits.

C. Inspect Bolt Locations.

(1) Wear and fretting.

- (a) Bolt holes elongated not more than 0.030 in. (0,760 mm); flange thickness not reduced more than 5 per cent. Accept.

(2) Nicks and burrs.

- (a) Small edges burrs. Accept after repair.

(3) Scores.

- (a) Any scoring at bolt land locations. Reject.

D. Carry Out Dimensional Checks.

- (1) Check Nos.26A and 26B labyrinth seal bores (F.C.S.601-211 and 212).

NOTE: Make this check in conjunction with the HP Turbine Rotor (Ref.72-51-03).

- (a) Within F.C.S. limits. Accept.

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- (2) Check cooling air duct and turbine disk location bores (F.C.S.601-213 and 214).

NOTE: Make these checks in conjunction with the Cooling Air Duct (para.9) and LP Turbine Rotor Disk (para.13).

(a) Within F.C.S. limits. Accept.

6. Externally Relieved Body Bolts - 10 off (302-120)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Check Bolts for Bowing (Ref.Fig.306).

- (1) Support bolt on central waisted portion; set indicator to location diameter below bolthead. Rotate bolt and record total indicator reading (TIR).

(a) TIR not more than 0.005 in. (0,127 mm). Accept.

C. Inspect Bolt Locating Lands.

- (1) Wear and fretting.

(a) Light contact marks only. Accept.

7. Retaining Nut (302-130 and 303-10)

A. Inspect Threads (Ref.72-09-00) Inspection/Check).

B. Inspect Silver Plating.

- (1) Any damage more than minor pitting or scratches. Reject for re-plating (Ref.72-09-08, Repair).

NOTE: Because of the difficulty in ascertaining the presence of silver plate it is recommended that these nuts are re-plated at every overhaul.

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C. Inspect Spanner Locations.

(1) Damage.

(a) Any damage that may affect tool operation or safety. Reject.

(b) Any other minor damage. Accept after repair.

8. Bearing Inner Track (302-140)

A. Inspect Track (Ref.72-09-00 Inspection/Check).

NOTE: Carry out this inspection in conjunction with the LP Turbine Bearing (Ref.72-52-03).

B. Carry Out Dimensional Check.

(1) Check bearing inner track bore (F.C.S.601-221).

NOTE: Carry out this check in conjunction with the Hub Assembly (para.10).

(a) Within F.C.S. limits. Accept.

9. Cooling Air Duct (302-200)

A. Inspect Duct Walls (Ref.72-09-00 Inspection/Check - Rigid Tubes).

(1) Distortion. Accept after repair if concentricity and profile are maintained.

B. Inspect Abutment Faces and Locating Diameters.

(1) Nicks and burrs; scores not greater than 0.005 in. (0,130 mm) deep. Accept after repair if F.C.S. limits are preserved.

(2) Wear and fretting.

(a) Not more than 0.002 in. (0,050 mm) deep. Accept after repair if F.C.S. limits are preserved.

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C. Inspect Bolt Locations.

(1) Wear and fretting.

- (a) Bolt holes elongated not more than 0.030 in. (0,760 mm); flange thickness not reduced more than 5 per cent. Accept.

(2) Nicks and burrs.

- (a) Small edge burrs. Accept after repair.

D. Carry Out Dimensional Checks.

- (1) Check labyrinth housing and rotor disk location diameters (F.C.S.601-213 and 215).

NOTE: Make these checks in conjunction with the Labyrinth Housing (para.5) and the Rotor Disk (para.13).

- (a) Within F.C.S. limits. Accept.

10. Hub Assembly (302-210)

CAUTION: HUB UNITS HAVE A CENTERING RING SHRUNK INTO BORE AT RETAINING NUT POSITION; BOTH ITEMS ARE BALANCED TOGETHER AS AN ASSEMBLY. IF CENTERING RING IS NOT IN POSITION, INSPECT HUB AS DETAILED SUBSEQUENTLY, BUT DO NOT RELEASE FOR USE UNTIL CENTERING RING HAS BEEN REFITTED OR REPLACED AND ASSEMBLY HAS BEEN RE-BALANCED AND SUBJECTED TO RE-INSPECTION.

A. Inspect Hirth Serrations.

(1) Fretting.

- (a) Identify original machining witness mark; measure crests and troughs of any fretting.
- (i) Not more than 0.001 in. (0,03 mm) above and below witness mark. Accept.

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B. Inspect Bolt Location Bores.

CAUTION: THE BOLT HOLE BORES ARE A CRITICAL AREA. (Ref.Fig.309). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

NOTE: Examine the hub and check that a letter T is marked adjacent the Part No. If the letter T is not present, and the hub life is between 500 and 2250 cycles, the hub must be crack tested to the F3A process and examined for cracks at all areas adjacent the bolt-holes (Ref. S.B.72-8673-240).

(1) Cracks.

(a) Any cracks. Reject.

(2) Scores.

(a) Any scoring at bolt land locations. Reject.

C. Inspect No.27, 28 and 29 Labyrinth and No.30 Windback Seals.

(1) Overheating discolouration. Reject.

(2) Rubbing

(a) Slight rubbing within F.C.S. limits. Accept.

(3) Nicks and burrs. Accept after repair.

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(4) Damage to fin edges.

Accept after repair, providing that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that blends on adjacent fins are separated radially by not less than five times fin depth at their ends, and the F.C.S. limits are not violated.

NOTE: Damage greater than this will required repair (Ref.72-52-02 Repair No.1).

D. Inspect Splines.

CAUTION: THE SPLINES ARE A CRITICAL AREA. (Ref.Fig.309). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

- (1) Nicks and burrs. Accept after repair.
- (2) Fretting on flanks.
 - (a) Not more than 0.001 in. (0,030 mm) above or below machining witness mark. Accept.

E. Inspect Location Bores for Drive Shaft and Centering Ring (see CAUTION).

- (1) Nicks and burrs. Accept, if repair does not violate F.C.S. limits.

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F. Inspect Flange Fillet Radius.

CAUTION: THE FLANGE FILLET RADIUS IS A CRITICAL AREA.
(Ref. Fig.309). SPECIAL ATTENTION MUST BE
PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING
THE GENERAL OVERALL INSPECTION.

(1) Cracks. Reject.

G. Inspect Vent Holes.

CAUTION: THE VENT HOLES ARE A CRITICAL AREA.
(Ref. Fig.309). SPECIAL ATTENTION MUST BE
PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING
THE GENERAL OVERALL INSPECTION.

(1) Cracks. Reject.

H. Carry Out Dimensional Checks.

(1) Check cooling air duct location bore (F.C.S.601-215).

NOTE: Make this check in conjunction with the
cooling air duct (para.9).

(a) Within F.C.S. limits. Accept.

(2) Check drive shaft location bore (F.C.S.601-216).

NOTE: Make this check in conjunction with the
LP compressor drive shaft (Ref.72-31-04).

(a) Within F.C.S. limits. Accept.

(3) Check diameter of Nos.27, 28, 29 and 30 seals.
(F.C.S.602-227 and 217/218/219).

NOTE: Make this check in conjunction with the
LP turbine bearing support (Ref.72-52-03).

(a) Within F.C.S. limits. Accept.

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- (4) Check square dimensions of splines (Ref.72-09-00 Inspection/Check) (F.C.S.601-220).

NOTE: Make this check in conjunction with the LP compressor drive shaft (Ref.72-31-04).

- (a) Identify master spline at adjusting washer location end.

NOTE: This item contains 59 splines, pitched as for 60 with one uncut at master spline.

- (b) Any side of square outside F.C.S. limits. Reject.

- (c) Within F.C.S. limits. Accept.

- (5) Check centering ring bore (F.C.S.602-224).

NOTE: See CAUTION. If centering ring not fitted, check location bore in hub (F.C.S.601-225).

NOTE: Make this check in conjunction with the LP compressor drive shaft (Ref.72-31-04). If ring not fitted, check also replacement centering ring diameter (F.C.S.601-225).

- (a) Within F.C.S. limits. Accept.

- (6) Check bearing inner track location diameter (F.C.S.601-221).

NOTE: Make this check in conjunction with the bearing inner race (para.8).

- (a) Within F.C.S. limits. Accept.

J. Inspect for Corrosion.

- (1) Carry out visual and binocular inspections. Identify any areas of corrosion pitting or areas of adherent oxide.

Submit details to Rolls-Royce plc for individual assessment

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11. Centering Ring (302-220)

NOTE: This item is shrunk into centre bore of turbine hub (para.10). Observe CAUTION at head of para.10 if centering ring has been displaced or dislodged from hub, and inspect as detailed. If in position, follow para.10.F.(5).

A. Inspect Locating Faces and Bore.

(1) Nicks, burrs and scores.

Accept, if repair does not violate F.C.S. limits.

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ATP TEMPORARY REVISION

British airways

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OLYMPUS 593 OVERHAUL MANUAL

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

David Howard

For Chief Technical and Industrial Services Engineer CAA Design Approval No.DA1/8566/78

TEMPORARY REVISION NO.72-568

Insert in 72-52-02 after page 314

REASON FOR ISSUE

BEOL NOTE added

ACTION

Read the following BEOL NOTE after paragraph 12 existing 2nd NOTE

BEOL NOTE:

Where blades belonging to British Airways are divorced for any reason from the Ol1 Module in which they arrived at BEOL, they are to be life marked by vibro peening using the following coding table. The life in hours is to be obtained by reference to the module log card in conjunction (if applicable) to the previous L.P. turbine blade build life record sheet.

Individual reference to blades on the blade build sheet is possible due to the unique serial numbering of the blades. The marking is to be confined to the area on the front surface of the fir tree root extension but must not approach closer than 0.060" to the run out of the fillet radius on the end of the serrations.

A	0-100	J	801-900	R	1,601-1,700
B	101-200	K	901-1,000	S	1,701-1,800
C	201-300	L	1,001-1,100	T	1,801-1,900
D	301-400	M	1,101-1,200	U	1,901-2,000
E	401-500	N	1,201-1,300	V	2,001-2,100
F	501-600	O	1,301-1,400	W	2,101-2,200
G	601-700	P	1,401-1,500	X	2,201-2,300
H	701-800	Q	1,501-1,600	Y	2,301-2,400
				Z	2,401-2,500

Only one letter should be used to denote an achieved life; should the occasion arise where the life exceeds the range covered by the chart, the letter Z must be used in conjunction with one other letter to denote the life marking required.

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B. Carry Out Dimensional Checks.

NOTE: Make this check in conjunction with the turbine hub (para.10) and LP compressor drive shaft (Ref.72-31-04).

12. LP Turbine Blades - 79 off (302-230)

NOTE: Before commencing this inspection, ensure that the turbine slackness check was carried out during disassembly (Ref.72-52-02 Disassembly).

NOTE: Engines may have blades to either bridge piece or pad standard.

A. Inspect Blades (Ref.Fig.304/305).

(1) Cracks.

(a) Other than in (b) and (c). Reject.

(b) Between cooling holes in bridge piece; in bridge piece braze on underside of shroud from notch radius, but not extending into long face. Accept.

(c) In short face of pad braze, on either surface, but not extending into long face. Accept.

(2) Distortion of outer shroud platform.

(a) Obvious distortion downstream of bridge piece on convex side of aerofoil. Reject.

(3) Distortion of bridge piece.

(a) Flatness on diagonal (short) from leading to trailing edge notch radius within 0.002 to 0.003 in. (0,050 to 0,076 mm) and not more than 0.010 in. (0,250 mm) on opposite (long) diagonal. Accept.

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(4) Overheating.

- | | | |
|-----|--|---------|
| (a) | Obvious burning, erosion,
deposition of material. | Reject. |
|-----|--|---------|

(5) Impact damage (Ref.Fig.304/305).

NOTE: All acceptable damage must be smooth-contoured, crack-free, and not penetrating cooling passages.

- | | | |
|-----|---|----------------------------|
| (a) | Any damage outside
zones A, B and C. | Reject. |
| (b) | Any measurable damage
in zone A. | Reject. |
| (c) | Not more than 0.080 in.
(2,030 mm) in diameter
and not more than 0.010 in.
(0,250 mm) in depth in
zone B. | Accept, subject
to (d). |
| (d) | Not more than 0.125in.
(3,170 mm) in diameter
and not more than 0.015 in.
(0,380mm) in depth in
zone C. | Accept,
subject to (c). |

(6) Deformation of leading and trailing edges
(Ref.Fig.304/305).

NOTE: All acceptable damage must be smooth-contoured and crack-free.

- | | | |
|-----|--|----------------------------|
| (a) | Any deformation in zone A. | Reject. |
| (b) | Not more than 0.010 in.
(0,250 mm) in zone B. | Accept, subject
to (c). |
| (c) | Not more than 0.020 in.
(0,500 mm) in zone C. | Accept, subject
to (b). |

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B. Check Cooling Air Passages.

- (1) Any obstruction.

Reject for re-
cleaning (Ref.
72-52-02 Cleaning).

C. Inspect Abutment Faces (Ref.Fig.304/305).

- (1) Scores, nicks and burrs.

Accept after
repair.

- (2) Fretting and wear.

- (a) Not more than 0.010 in.
(0,250 mm) on platforms.

Accept.

- (b) Light witness mark or
minimal pitting only
on bridge piece faces.

Accept.

D. Inspect Blade Roots.

- (1) Wear and fretting of serrations.

- (a) Light, even witness mark
on flanks, with no
stepping.

Accept.

E. Inspect Platform Seal Fins.

- (1) Nicks and burrs.

Accept after
repair.

F. Inspect Root Extension Front Face
and Root Heel.

- (1) Rubbing.

- (a) Axial rub marks not more
than 0.015in. (0,380 mm).

Accept.

- (b) Light rub marks only on
root heel.

Accept.

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13 Turbine Rotor Disk (302-250)

A. Inspect Hirth Serration Flanks.

(1) Fretting.

- (a) Identify original machining witness mark; measure crests and troughs of any fretting.

- (i) Not more than 0.001 in. (0,030 mm) above and below witness mark. Accept.

B. Inspect Bolt Location Bores.

CAUTION: THE BOLT HOLE BORES ARE A CRITICAL AREA. (Ref.Fig.310). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

(1) Scores.

- (a) Any scoring at bolt land locations. Reject.

C. Inspect Blade Root Locations.

CAUTION: THE RIM SLOTS ARE A CRITICAL AREA. (Ref.Fig.310). SPECIAL ATTENTION MUST BE PAID TO THIS AREA FOR SIGNS OF DAMAGE DURING THE GENERAL OVERALL INSPECTION.

(1) Fretting and wear.

- (a) Light, even witness mark on flanks, with no stepping. Accept.
- (b) Light rub mark only on rear face between root locations. Accept.

(2) Rubbing.

- (a) Not more than 0.005 in. (0,130 mm) between locations on rear face. Accept.

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D. Inspect No.26 Labyrinth Housing Abutment Faces and Location Diameter.

(1) Scoring.

(a) Not more than 0.005 in. (0,130 mm) deep.	Accept, if repair preserves F.C.S. limits.
---	--

(2) Nicks and burrs.	Accept, if repair preserves F.C.S. limits.
----------------------	--

E. Inspect Boss Fillet Radius.

CAUTION: THE BOSS FILLET RADIUS IS A CRITICAL AREA.
(Ref. Fig.310). SPECIAL ATTENTION MUST
BE PAID TO THIS AREA FOR SIGNS OF DAMAGE
DURING THE GENERAL OVERALL INSPECTION.

(1) Cracks.	Reject.
-------------	---------

F. Carry Out Dimensional Checks.

(1) Check labyrinth housing location diameter (F.C.S 601-214).

NOTE: Make this check in conjunction with No.26
labyrinth housing (para.5).

(a) Within F.C.S. limits.	Accept.
---------------------------	---------

(2) Check disk bore dimensions (Ref.Fig.307).

(a) Measure and record
diameters A, B and C
at eight positions.

(b) Note and record etched
bore dimension on rear
face of blade retaining
lug.

NOTE: Nominal bore is 5.100-55.110 in.
(129, 540-129, 794 mm).

(i) Any variation of more than 0.001 in. (0,030 mm) from etched dimension.	Reject for investigation.
---	------------------------------

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- (ii) Dimension within 0.001 in. (0,030 mm) of etched dimension. Accept.

(3) Check disk diameter (Ref.Fig.308).

NOTE: The turbine disk true diameter cannot be measured directly due to the odd number of blade root slots.

NOTE: Refer to documentation and or inspection sheets to determine positions at which previous dimension checks were carried out, and ensure that the same positions are used for the current dimension check.

- (a) Measure the diameter at eight positions, ensuring that the measurements are carried out at the positions detailed in Fig.308. Record the position (if not recorded previously) on the appropriate documentation and/or inspection sheets.
- (b) Compare the dimensions with the previously recorded dimensions obtained at the same positions detailed in Fig.308, or if not available, with the etched dimension on the rear face of the blade retaining lug.

- (i) Any variations of more than 0.003 in. (0,080 mm) from previously recorded dimension obtained at the positions detailed in Fig.308. Reject for investigation.
- (ii) Any variations of more than -0.005 in. (0,130 mm) or +0.001 in. (0,030 mm) from etched dimension on disk. Reject for investigation.

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(iii) Dimensions within limits of (i) or (ii). Accept.

(4) Check axial set of disk (Ref.Fig.307).

(a) Measure and record dimension E at eight positions. Datum is front face of labyrinth housing support ring on disk front face. Measured distance is from datum to front face of disk edge between root locations.

(i) Dimensions outside limits in (ii). Reject for investigation.

(ii) Dimension within 0.449-0.454 in. (11,400-11,530 mm). Accept.

G. Hardness Check.

(1) In the event that the turbine items have been returned for inspection due to overheating (or suspected overheating), carry out a hardness test on the turbine disk as follows.

(a) Smooth the disk with an abrasive, at four equally spaced positions on each face of the disk around the rims, centrally on the metal between the blade root locations (Ref.Fig.307).

(b) Test the hardness of the disk at the smoothed areas of the disk using a 5 kg load. The disk is acceptable providing the hardness value is above 350 HV, the variation between the maximum and minimum values is less than 20 HV, and there is no consistent difference in the value of hardness between the front and rear faces.

(2) All results whether or not they meet the acceptable hardness values, should be forwarded together with the disk serial No. to Rolls-Royce plc, Bristol.

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H. Inspect for Corrosion.

- (1) Carry out visual and binocular inspections. Identify any areas of corrosion pitting or areas of adherent oxide.

Submit details to Rolls-Royce plc for individual assessment

14. Cupwasher (303-20)

A. Inspect Cupwasher (Ref.72-09-00 Inspection/Check).

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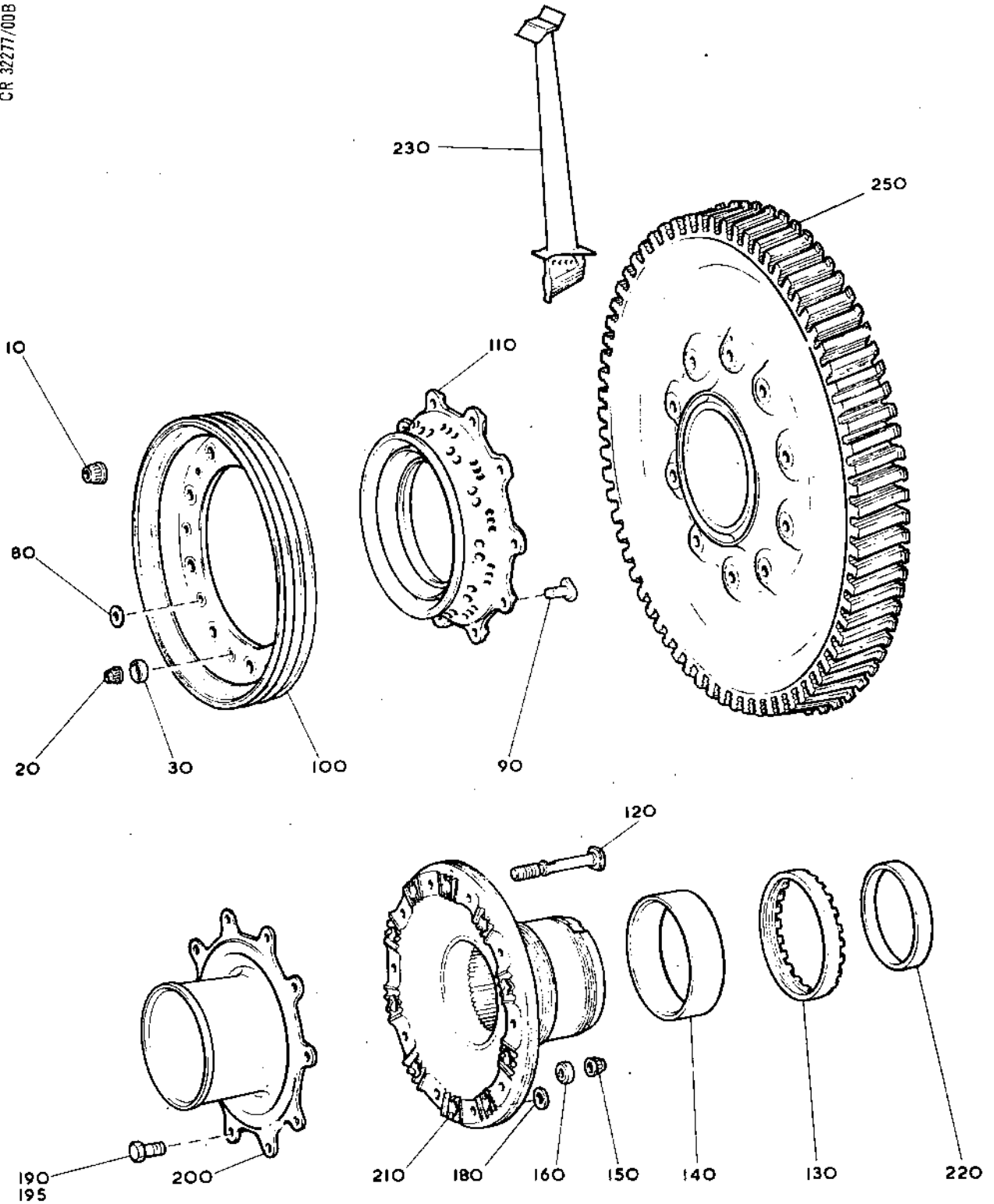
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LP Turbine Rotor (Part One of Two)
Figure 302

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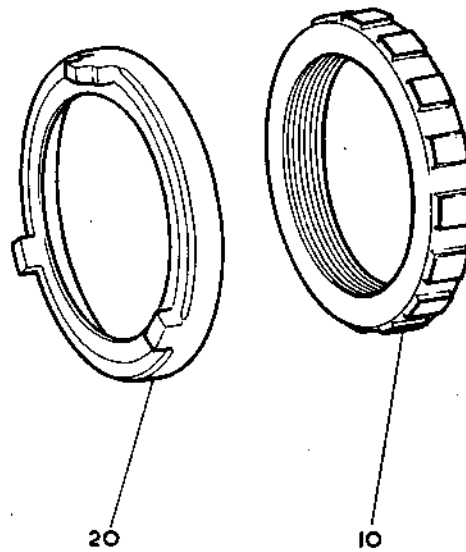


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LP Turbine Rotor (Part Two of Two)
Figure 303

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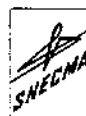
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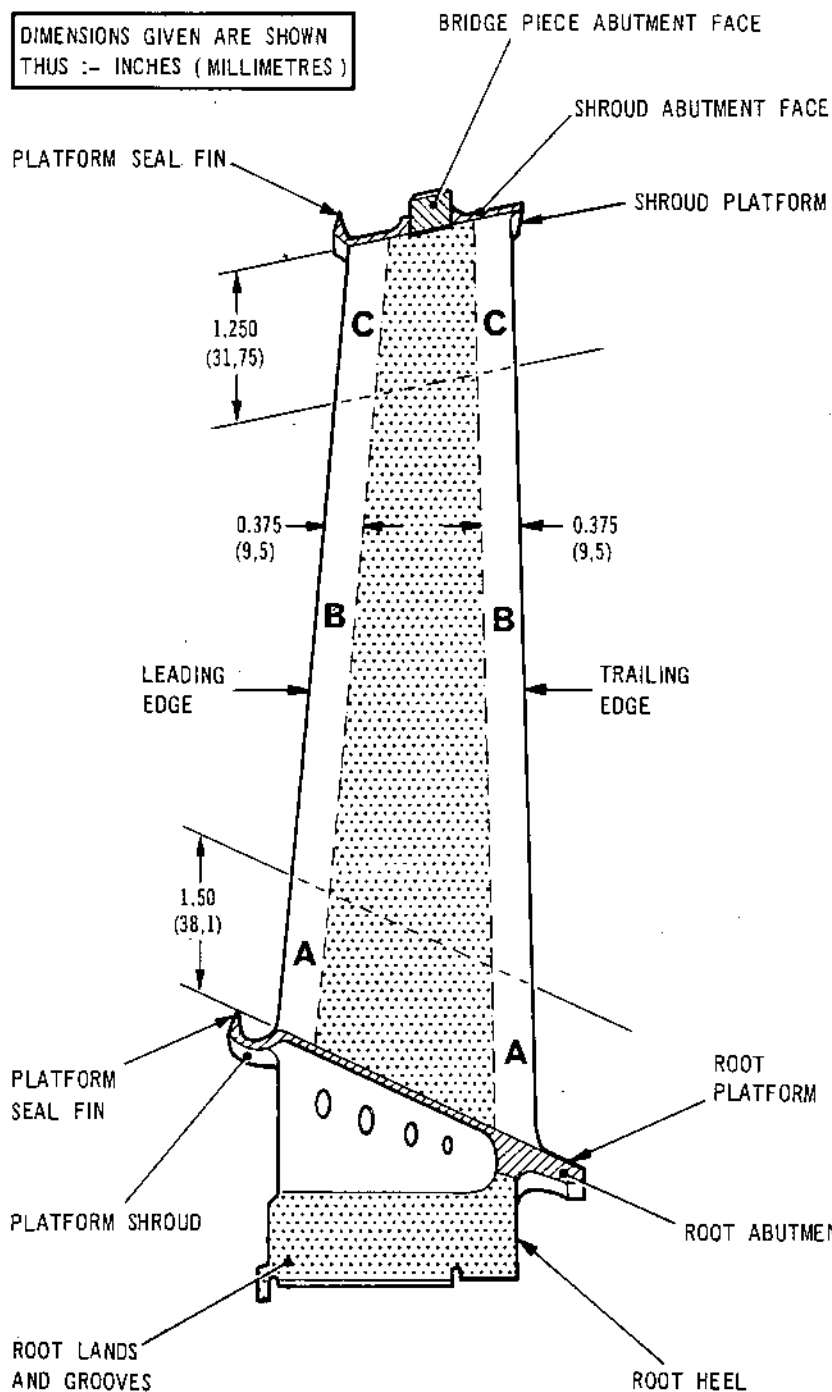
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CR 32969/00C

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



NOTES :
DAMAGE IS NOT
ACCEPTABLE IN THE
SHADED ZONES EXCEPT
ABUTMENT FACES AND
ROOT LANDS.
DAMAGE IN ZONES
A, B AND C IS
DEFINED IN THE TEXT.
ALL ACCEPTABLE DAMAGE
MUST BE OF SMOOTH
CONTOUR.
SEE ALSO PART 2
OF THIS ILLUSTRATION

Rotor Blade Inspection Zones (Part One of Two)
Figure 304

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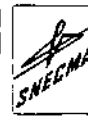
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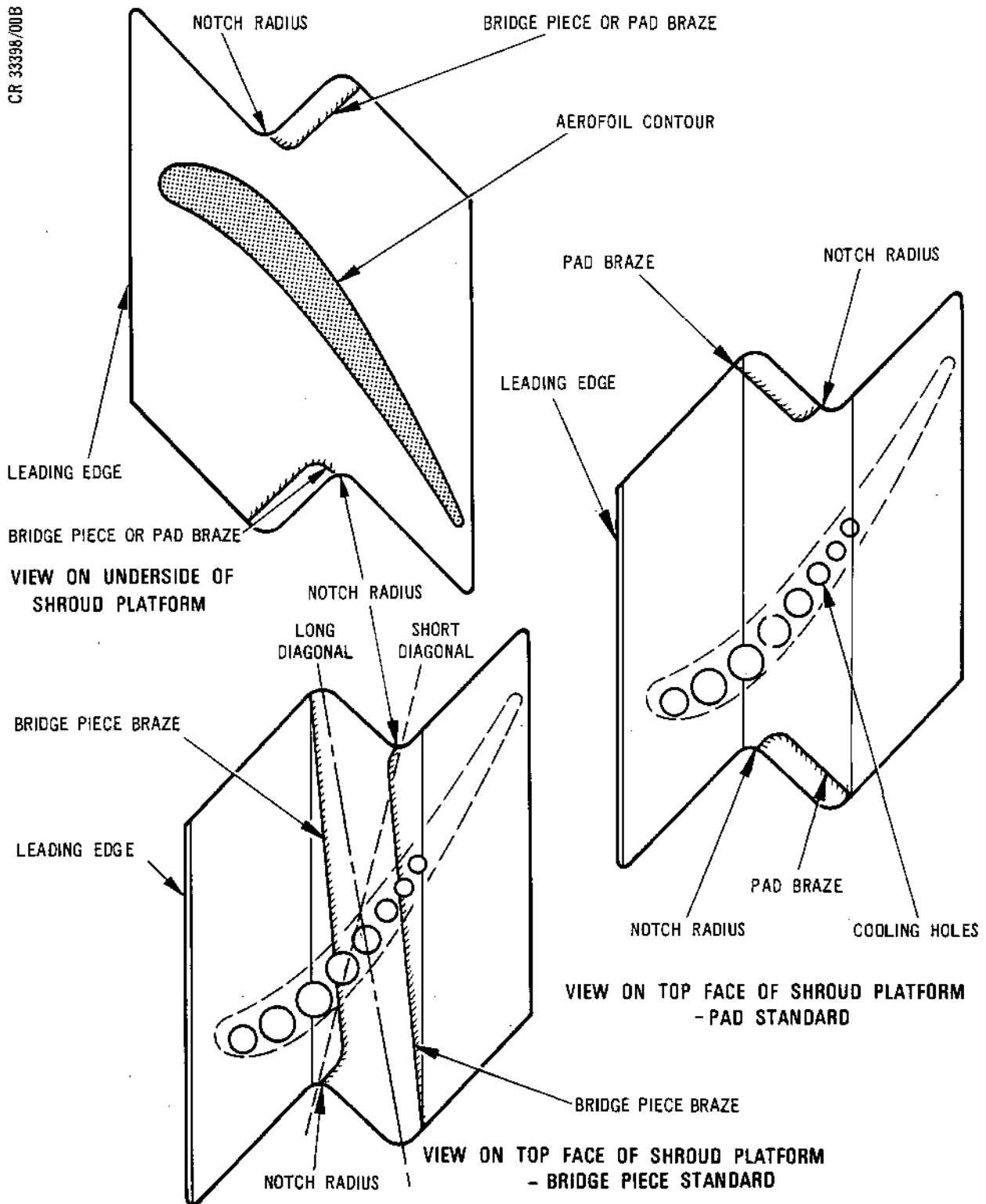
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Rotor Blade Inspection Zones (Part Two of Two)
Figure 305

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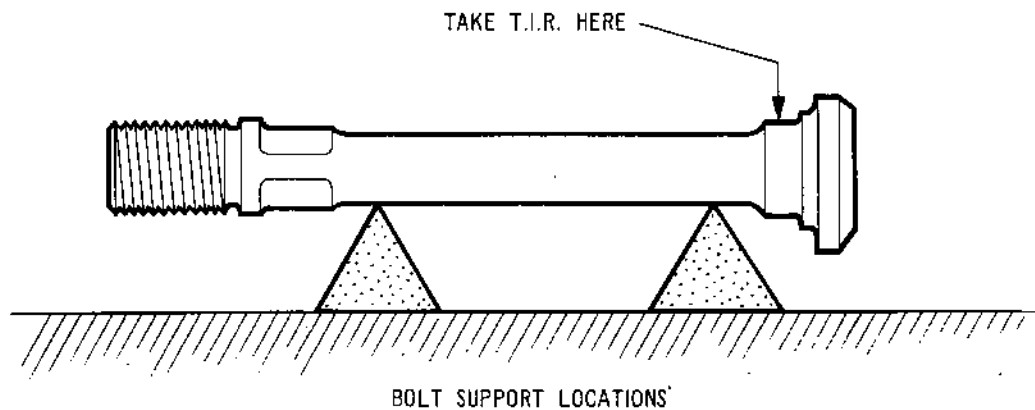
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Turbine Through-bolt Bow Check
Figure 306

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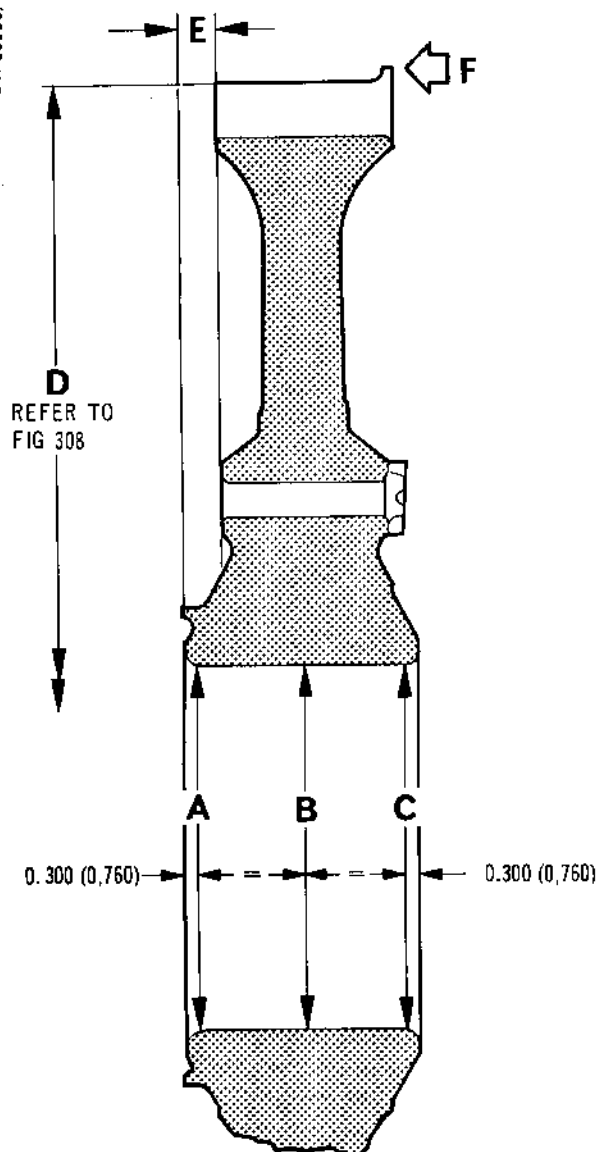
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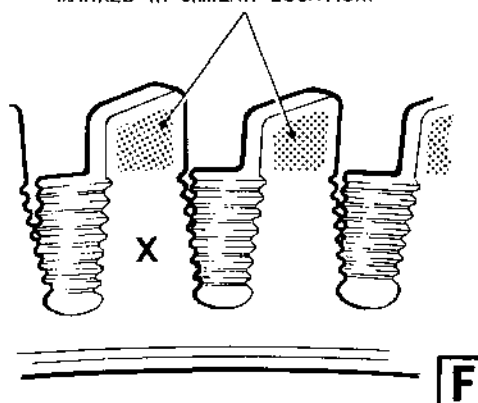


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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

DIMENSIONS **A B C** AND **D** ETCHED
ON ONE OR MORE OF THESE FACES
TO NEAREST 0.001 (0,0254)
NOTE: AMOUNT OF UNBALANCE
MARKED IN SIMILAR LOCATION.



VIEW ON REAR FACE OF DISK RIM

X HARDNESS CHECK TO BE CARRIED OUT AT
THIS LOCATION AT FOUR EQUALLY SPACED
POSITIONS ON EACH SIDE OF THE DISK.

A	NOMINAL D	5.110 (129,794)
B		5.100 (129,540)
C		
D	NOMINAL D	21.360 (542,544)
		21.350 (542,290)
E		0.454 (11,530)
		0.449 (11,400)

Turbine Disk Dimensional Checks and Hardness Check Position
Figure 307

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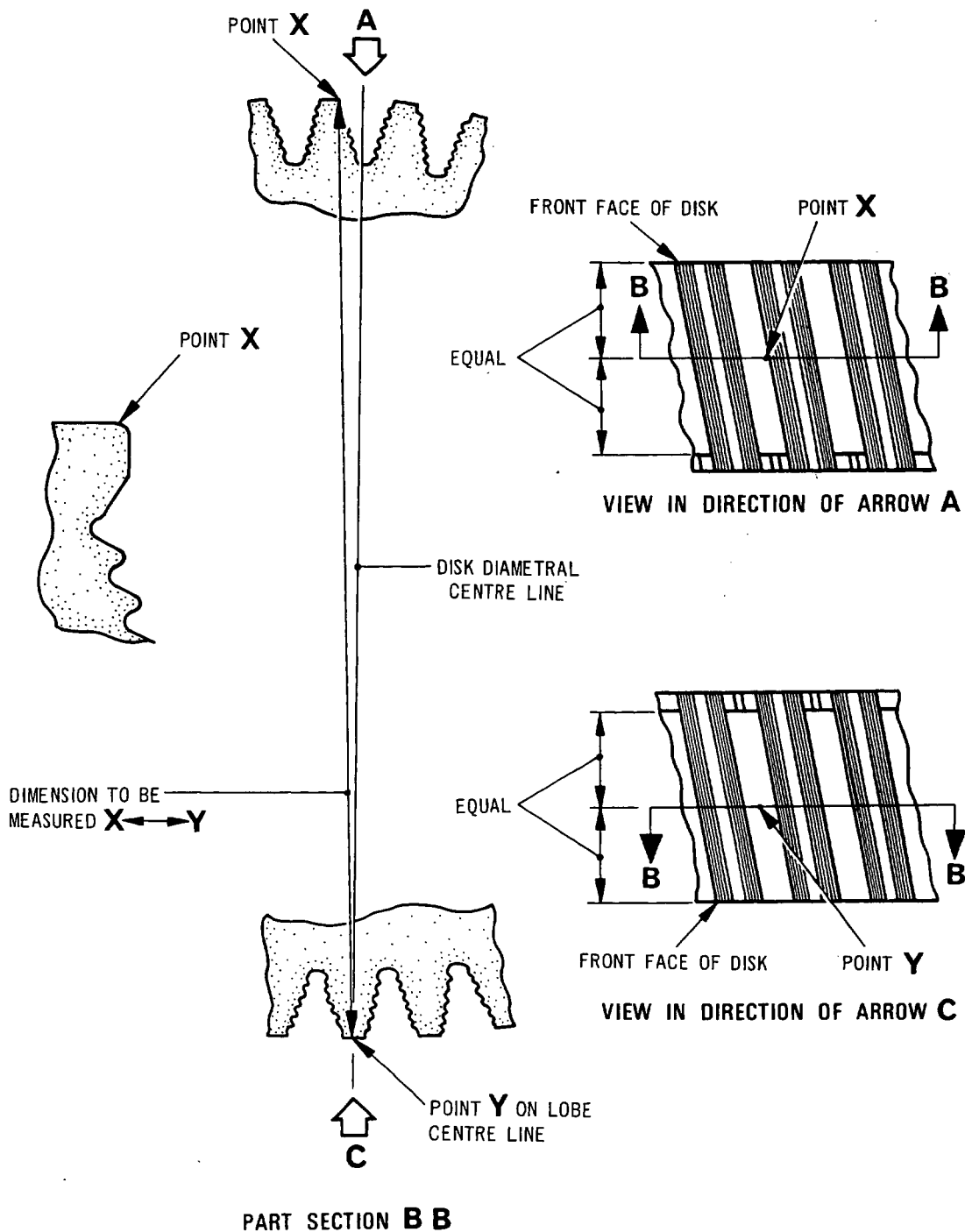


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Rotor Disk Diameter Check
Figure 308

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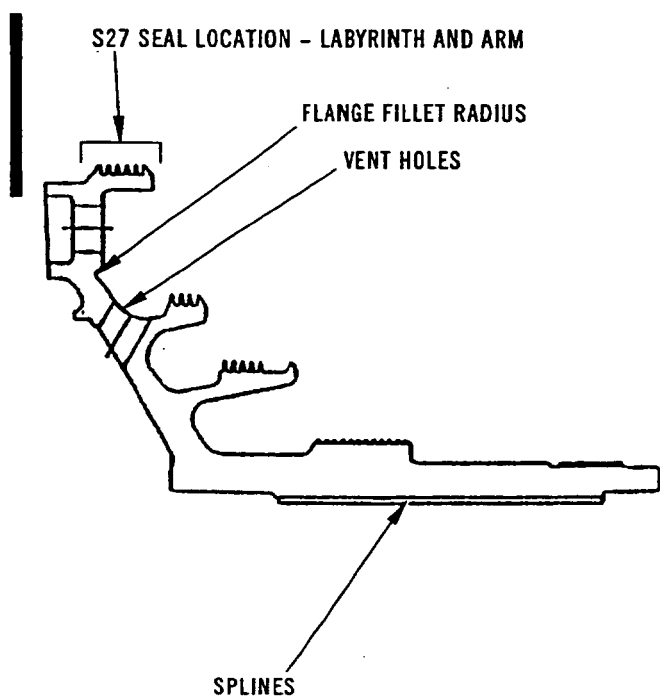
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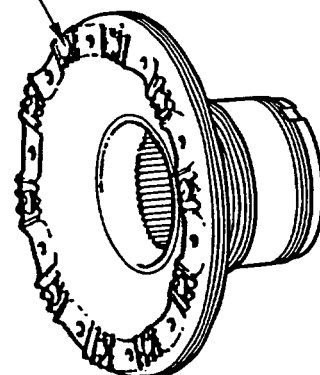


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FLANGE BOLT HOLES (0.5 DIA.)



LP Turbine Hub - Inspection Critical Areas
Figure 309

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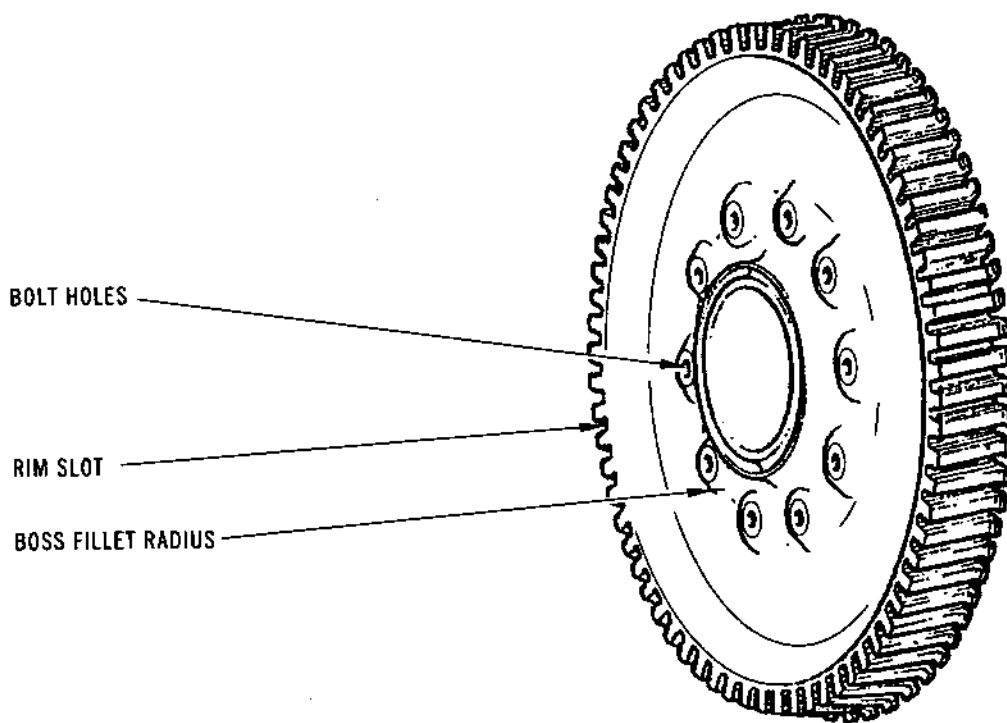
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LP Turbine Disc - Inspection Critical Areas
Figure 310

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LP TURBINE BEARING SUPPORT - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
303	140	Parallel Roller Bearing - Outer Track - Cage	MP1 MP1

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	110	Oil Tube	FlA
302	120	Oil Tube	FlA
302	160	Rear Cover	FlA
303	20	Air Feed Socket	FlA
303	40	Vent Socket	FlA
303	100	Seal Housing	FlA
303	180	Outer Labyrinth Housing	FlA
303	190	Bearing Housing	FlA
303	220	Retaining Ring	FlA

Items to be Fluorescent Dye Crack Tested
Table 302

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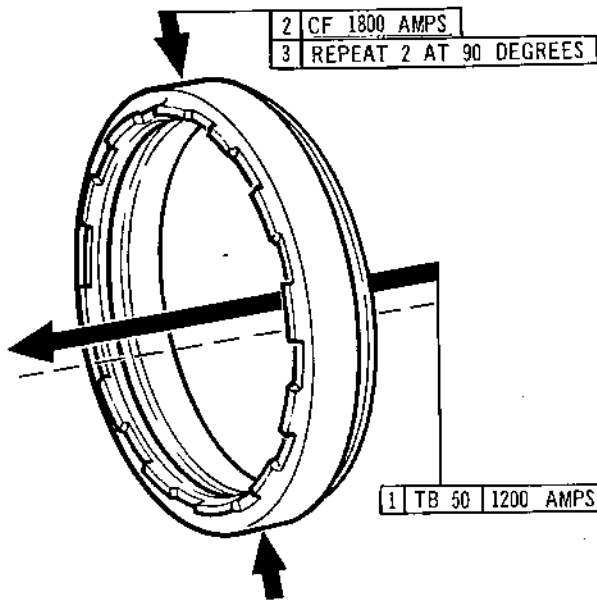
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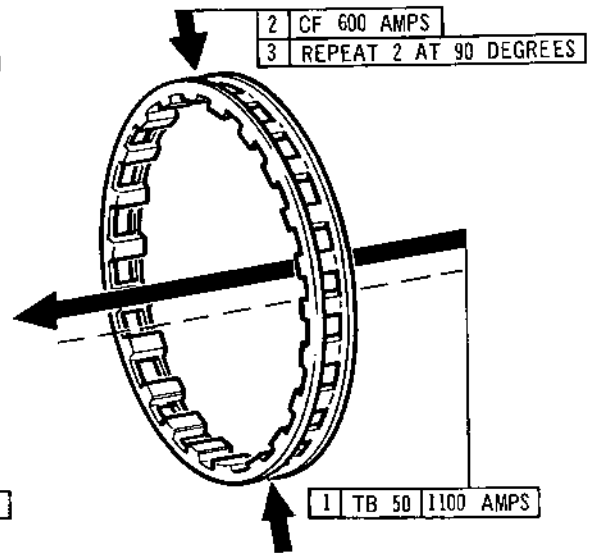


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PARALLEL ROLLER BEARING - OUTER TRACK (303-140)



PARALLEL ROLLER BEARING - CAGE (303-140)

Crack Detection Test Diagram
Figure 301

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FIG. NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-52-03	Fig.1
303	72-52-03	Fig.2

Cross References to Illustrated Parts Catalogue.
Table 303

4. Insulating Blankets (302-10/32/36/38/40/50)

A. Inspect Spot Welding.

(1) Damage.

(a) Broken spot welds or parted seams.	Accept after repair (Ref.72-52-03 Repair No.3).
---	---

B. Inspect Blanket.

(1) Damage.

(a) Tears, punctures and irregular dents.	Accept after repair (Ref.72-52-03 Repair No.3).
(b) Dents of smooth contour.	Accept.

(2) Filler.

WARNING: THE FILLER MATERIAL IS CARCINOGENIC AND ALL
NECESSARY SAFETY PRECAUTIONS MUST BE TAKEN.

(a) Powdering and collapse of filler.	Reject.
(b) Carry out shake/ rattle test to detect balls of degraded filler.	Reject.

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- (c) Carry out close inspection for powder around vents and fretted areas.

Reject.

NOTE: Press blanket with finger tips and search for any lack of "cushion" effect.

5. Cover (302-70)

A. Inspect Cover.

- (1) Nicks and burrs.

Accept after repair.

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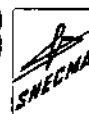
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B. Inspect Bolt Locations.

(1) Wear and fretting.

- | | |
|--|---------|
| (a) Any elongation of bolt-holes. | Reject. |
| (b) Flange thickness not reduced more than 5 per cent. | Accept. |

C. Inspect Headless Pin Location.

NOTE: Make this check in conjunction with the Headless Shoulder Pin (para.9).

(1) Damage.

- | | |
|--|----------------------|
| (a) Any damage other than slight edge burrs. | Reject. |
| (b) Slight edge burrs only. | Accept after repair. |

(2) Compatibility.

- | | |
|--------------------------------|---------|
| (a) Cover compatible with pin. | Accept. |
|--------------------------------|---------|

D. SB.72-180 standard cover (1-70B)

- | | |
|---|----------------------|
| (1) Inspect security of the two peened bolts. | Accept after repair. |
|---|----------------------|

6. Transfer Block (302-80)

A. Inspect Abutment Faces.

- | | |
|--|--|
| (1) Nicks and burrs; scoring not more than 0.005 in. (0,130 mm) deep and not more than half-way across sealing face. | Accept after repair providing sealing capability is preserved. |
|--|--|

B. Inspect Oil Tube Location Bore.

- | | |
|---|--|
| (1) Nicks and burrs; scoring not more than 0.005 in. (0,130 mm) deep. | Accept after repair providing sealing capability is preserved. |
| (2) Compatibility (Ref.para.8.B(2)). | |
| (a) Oil tube a tight firm fit in transfer block bore. | Accept. |

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7. Oil Tube (302-110)

A. Inspect Tube (Ref.72-09-00 Inspection/Check).

B. Inspect Attachment Flange.

- (1) Nicks and burrs; scoring not more than 0.005 in. (0,130 mm) deep and not more than half-way across sealing face.

Accept after repair providing sealing capability is preserved.

C. Inspect Bolt Locations.

- (1) Wear and fretting.

- (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm); flange thickness not reduced more than 10 per cent.

Accept.

8. Oil Tube (302-120) (Ref.SB.72-40 Part 2)

A. Inspect Tube (Ref.72-09-00 Inspection/Check).

B. Inspect Silver Plated Ends.

- (1) Damage.

- (a) Any exposure of parent metal.

Reject for re-plating (Ref.72-09-00 Repair).

- (2) Compatibility.

NOTE: For compatibility checks the oil tube must enter the oil transfer block without undue resistance. With the tube located in the transfer block there must be no detectable lateral movement between the tube and transfer block.

- (a) Oil tube a tight firm fit in transfer block bore (302-80, para.6).

Accept.

C. Inspect Attachment Flange.

- (1) Nicks and burrs.

Accept after repair.

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(2) Wear and fretting.

- (a) Bolt-hole elongated
not more than 0.030 in.
(0,760 mm); flange
thickness not reduced
more than 10 per cent.

Accept.

9. Headless Shoulder Pin (302-150)

A. Inspect Pin.

NOTE: Make this check in conjunction with the Cover
(para.5) and Rear Cover (para.10).

- (1) Damage.
(2) Compatibility.

Reject.

- (a) Pin compatible with
both covers.

Accept.

10. Rear Cover (302-160)

A. Inspect Self-locking Shank Nuts 302-190 (Ref.72-09-00
Inspection/Check).

B. Inspect Front and Rear Abutment Flanges.

- (1) Nicks and burrs; scoring
not more than 0.005 in.
(0,130 mm) deep and not
extending right across
sealing face.

Accept after repair
providing sealing
capability is
preserved.

C. Inspect Internal Flange.

- (1) Nicks, burrs and scores.
(a) On general area.
(b) At bolt locations,
slight scores only.

Accept after
repair.

Accept after
repair.

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(2) Dents.

- (a) Smooth-contoured, free of punctures or impact marks.

Accept after repair.

D. Inspect Union Nut 302-200 and Ferrule 302-210 (Ref.72-09-00 Inspection/Check).

E. Inspect Casing Body.

- (1) Nicks, burrs and scores.

Accept after repair.

(2) Dents.

- (a) Smooth-contoured, free of punctures or impact marks.

Accept after repair.

F. Inspect Chopper Mechanism Bush and Sealing Ring Groove.

- (1) Nicks and burrs.

Accept, if repair preserves seal groove profile.

(2) Scores.

- (a) Not more than 0.005 in. (0,130 mm) deep.

Accept after repair providing seal ring groove sealing capability is preserved.

G. Inspect Chopper Mechanism Mounting.

- (1) Nicks, burrs and scores.

Accept after repair.

(2) Wear and fretting.

- (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm); flange thickness not reduced more than 5 per cent.

Accept.

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H. Inspect Bolt Locations.

(1) Wear and fretting.

- | | | |
|-----|--|---------|
| (a) | Bolt-holes elongated
not more than 0.030 in.
(0,760 mm); flange
thickness not reduced
more than 10 per cent. | Accept. |
|-----|--|---------|

J. Inspect Headless Pin Locations.

NOTE: Make these checks in conjunction with the
Headless Shoulder Pins (para.9).

(1) Damage.

- | | | |
|-----|---|-------------------------|
| (a) | Any damage other than
slight edge burrs. | Reject. |
| (b) | Slight edge burrs only. | Accept after
repair. |

(2) Compatibility.

- | | | |
|-----|-------------------------------------|---------|
| (a) | Cover compatible
with both pins. | Accept. |
|-----|-------------------------------------|---------|

K. Carry Out Dimensional Checks.

- (1) Check cover assembly locating diameter (F.C.S.
601-260).

NOTE: Make this check in conjunction with the
Cover Assembly (para.14).

- | | | |
|-----|-----------------------|---------|
| (a) | Within F.C.S. limits. | Accept. |
|-----|-----------------------|---------|

11. Air Feed Socket (303-20) and Vent Sockets - 2 off (303-40)

A. Inspect Locating Surfaces.

- | | | |
|-----|---|---|
| (1) | Nicks and burrs. | Accept after
repair. |
| (2) | Fretting. | |
| (a) | Not more than 0.001 in.
(0,030 mm) deep. | Accept after repair
providing F.C.S.
limits not violated. |

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B. Inspect Bolt Locations.

(1) Wear and fretting.

- (a) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm); flange
thickness not reduced
more than 10 per cent.

Accept.

C. Carry Out Dimensional Check.

- (1) Check seal ring "gap in position" (F.C.S.602-254) at
normal location.

NOTE: Use new seal ring for this check (Ref.72-53-00
Turbine Exhaust Diffuser).

- (a) Gap within F.C.S. limits.

Accept.

12. Cover - 2 off (303-90)

A. Inspect Abutment Face.

- (1) Nicks, burrs and scores.

Accept after
repair.

B. Inspect Bolt Locations.

(1) Wear and fretting.

- (a) Bolt-holes not elongated
more than 0.030 in.
(0,760 mm); flange
thickness not reduced
more than 10 per cent.

Accept.

13. Seal Housings - 2 off (303-100)

A. Inspect Bore.

- (1) Nicks and burrs.

Accept, if repair
does not violate
F.C.S. limits.

(2) Fretting.

- (a) Not more than 0.001 in.
(0,030 mm) deep.

Accept, providing
F.C.S. limit is
not violated.

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B. Inspect Abutment Face.

- (1) Nicks, burrs and scores.

Accept after
repair.

C. Inspect Bolt Locations.

- (1) Wear and fretting.

- (a) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm); flange
thickness not reduced
more than 10 per cent.

Accept.

D. Carry Out Dimensional Checks.

- (1) Check seal gap in bore location, using new seal
(F.C.S.602-248 and 252).

NOTE: Make this check in conjunction with the Seal
Rings, Ref.72-53-00 (302-410, 303-20).

- (a) Within F.C.S. limits.

Accept.

14. Cover Assembly (303-110)

A. Inspect Self-locking Shank Nuts (Ref.72-09-00 Inspection/
Check).

B. Inspect Front and Rear Locating Bore Faces.

- (1) Nicks, burrs and scores.

Accept, providing
repair does not
violate F.C.S.
limits.

- (2) Fretting.

- (a) Not more than 0.002 in.
(0,050 mm) deep.

Accept, providing
repair does not
violate F.C.S.
limits.



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C. Inspect Seal Housing and Socket Locating Bores.

- (1) Nicks, burrs and scores. Accept after repair.
- (2) Fretting.
 - (a) Not more than 0.003 in. (0,080 mm) deep. Accept after repair.

D. Inspect Bolt Locations.

- (1) Wear and fretting.
 - (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm); flange thickness not reduced more than 10 per cent. Accept.

E. Inspect Cover Skin.

- (1) Dents.
 - (a) Smooth-contoured, free of punctures or impact marks. Accept, if repairable without cracking.

F. Carry Out Dimensional Checks.

- (1) Check bearing housing and rear cover assembly locating bores (F.C.S.601-257 and 260).

NOTE: Make this check in conjunction with the Bearing Housing (para.18) and the Rear Cover (para.10).

- (a) Within F.C.S. limits. Accept.

15. Sleeve Assembly (303-130)

A. Inspect Front and Rear Locating Bore Faces.

- (1) Nicks, burrs and scores. Accept, providing repair does not violate F.C.S. limits.

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(2) Fretting.

- (a) Not more than 0.002 in.
(0,020 mm) deep.

Accept, providing
repair does not
violate F.C.S.
limits.

B. Inspect Seal Housing and Socket Location Bores.

- (1) Nicks, burrs and scores.

Accept after
repair.

(2) Fretting.

- (a) Not more than 0.003 in.
(0,080 mm) deep.

Accept after
repair.

C. Inspect Sleeve Skin.

- (1) Dents.

- (a) Smooth-contoured, free
of punctures or impact
marks.

Accept if repair-
able without
cracking.

D. Carry Out Dimensional Checks.

- (1) Check bearing housing locating bores (F.C.S.601-258
and 259).

NOTE: Make this check in conjunction with the
Bearing Housing (para.18).

- (a) Within F.C.S. limits.

Accept.

16. LP Turbine Bearing Outer Race and Rollers (303-140)

A. Inspect Bearing (Ref.72-09-00 Inspection/Check).

B. Inspect Locating Dogs.

- (1) Nicks and burrs.

Accept after
repair.

(2) Wear.

- (a) Not more than 0.001 in.
(0,030 mm) on flanks.

Accept.

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(3) Distortion.

Reject.

C. Carry Out Dimensional Checks.

(1) Check track outer diameter (F.C.S.601-223).

NOTE: Make this check in conjunction with the Bearing Housing (para.18).

(a) Within F.C.S. limits. Accept.

(2) Check diametric clearance (F.C.S.601-222).

NOTE: Make this check in conjunction with the LP Turbine Bearing Inner Track (Ref.72-52-01).

(a) Within F.C.S. limits. Accept.

17. Outer Labyrinth Housing (303-180)

A. Inspect Nos.27 and 28 Labyrinth Seal Housing Bores.

(1) Nicks and burrs.

Accept after repair.

(2) Grooving.

(a) Any damage greater than (b).

Accept after repair (Ref.72-52-03 Repair No.1).

(b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated.

Accept.

(3) Distortion.

(a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S.

Accept.

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B. Inspect Abutment Face and Bearing Housing Location Diameter.

(1) Nicks, burrs and scores.

(a) On abutment face.

Accept after repair.

(b) On location diameter.

Accept, if repair does not violate F.C.S. limits.

(2) Fretting.

(a) Not more than 0.002 in.
(0,050 mm) deep on location diameter.

Accept, if repair does not violate F.C.S. limits.

C. Inspect Bolt Locations.

(1) Wear and fretting.

(a) Bolt-holes elongated not more than 0.010 in.
(0,250 mm); flange thickness not reduced more than 5 per cent.

Accept.

D. Carry Out Dimensional Checks.

(1) Check bearing housing locating diameter (F.C.S. 601-226).

NOTE: Make this check in conjunction with the Bearing Housing (para.18).

(a) Within F.C.S. limits.

Accept.

(2) Check bores of Nos.27 and 28 labyrinth seal housings (F.C.S.601-227 and 217).

NOTE: Make this check in conjunction with the LP Turbine Rotor Hub (Ref.72-52-02).

(a) Within F.C.S. limits.

Accept.

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18. LP Turbine Bearing Housing (303-230)

A. Inspect No.29 Labyrinth Seal Housing Bore.

- (1) Nicks and burrs. Accept after repair.
- (2) Grooving.
 - (a) Damage greater than (b). Accept after repair (Ref.72-52-03 Repair No.2 and No.4).
 - (b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.
- (3) Distortion.
 - (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S. Accept.

B. Inspect No.30 Windback Seal Housing Bore.

- (1) Nicks and burrs. Accept after repair.
- (2) Grooving.
 - (a) Any damage greater than (b). Accept after repair (Ref.72-52-03 Repair No.2 and No.4).

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- (b) Rubbing extending over an arc not greater than 90 degrees and regardless of width over face, provided that maximum depth does not exceed 0.005 in. (0,130 mm) and that F.C.S. limits are not violated. Accept.
- (3) Distortion.
- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below minimum permissible dimension in F.C.S. Accept.
- C. Inspect Bearing Track Location.
- (1) Nicks and burrs. Accept, if repair does not violate F.C.S. limits.
- (2) Fretting.
- (a) Not more than 0.001 in. (0,030 mm) deep. Accept, if repair does not violate F.C.S. limits.
- D. Inspect Bearing Track Locating Dogs.
- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
- (a) Not more than 0.001 in. (0,030 mm) on flanks. Accept.
- (3) Distortion. Reject.
- E. Inspect Location Bores and Diameters and Abutment Face.
- (1) Nicks, burrs and scores.
- (a) On abutment face. Accept after repair.



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(b) On location faces.

Accept, if repair
does not violate
F.C.S. limits.

(2) Fretting.

(a) Not more than 0.005 in.
(0,130 mm) deep on
location faces.

Accept, if repair
does not violate
F.C.S. limits.

F. Inspect Bolt Locations.

(1) Wear and fretting.

(a) Bolt-holes elongated
not more than 0.010 in.
(0,250 mm); flange
thickness not reduced
by more than 5 per cent.

Accept after
repair.

G. Inspect Tube Attachment Threads (Ref.72-09-00 Inspection/
Check).

H. Inspect the Seatings.

(1) Nicks and burrs.

Accept, if repair
preserves sealing
capability.

(2) Scores.

(a) Not more than 0.002 in.
(0,050 mm) deep.

Accept, if repair
preserves sealing
capability.

J. Inspect Oilways (Ref.SB.72-40).

(1) Obstruction.

(a) Any obstruction.

Reject for re-
cleaning (Ref.
72-52-03 Cleaning).

(2) Fretting.

(a) Fretting at signal oil
supply tube (302-120)
location bore, not more
than 0.001 in.
(0,030 mm) deep.

Accept, if repair
preserves sealing
capability.

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K. Carry Out Dimensional Checks.

- (1) Check Nos.29 and 30 seal housing bores (F.C.S. 601-218 and 219).

NOTE: Make this check in conjunction with the LP Turbine Rotor Hub Unit (Ref.72-52-02).

(a) Within F.C.S. limits. Accept.

- (2) Check bearing location bore (F.C.S.601-223).

NOTE: Make this check in conjunction with the LP Turbine Bearing Outer Track (para.16).

(a) Within F.C.S. limits. Accept.

- (3) Check sleeve and cover locating diameters (F.C.S. 601-257, 258 and 259).

NOTE: Make these checks in conjunction with the Cover Assembly (para.14) and Sleeve Assembly (para.15).

19. Retaining Ring (303-220)

NOTE: A gap of 0.0005 in. (0,013 mm) to 0.0015 in. (0,040 mm) will be required between the Retaining Ring and the LP Turbine Bearing at Sub-Assembly.

NOTE: The following inspection/check procedures are set out subject to the Retaining Ring being acceptable at Sub-Assembly (Ref.72.52.03 SUB-ASSEMBLY).

A. Inspect Bearing and Bearing Housing Locations.

- (1) Nicks and burrs. Accept after repair.

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(2) Fretting and wear.

- (a) Not more than 0.005 in.
(0,130 mm) in depth and
not exceeding more than
10 per cent of the total
contact area.

Accept after
repair subject to
sub-assembly dimen-
sional checks.

B. Inspect Retaining Ring.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Distortion.

- (a) Any distortion.

Reject.

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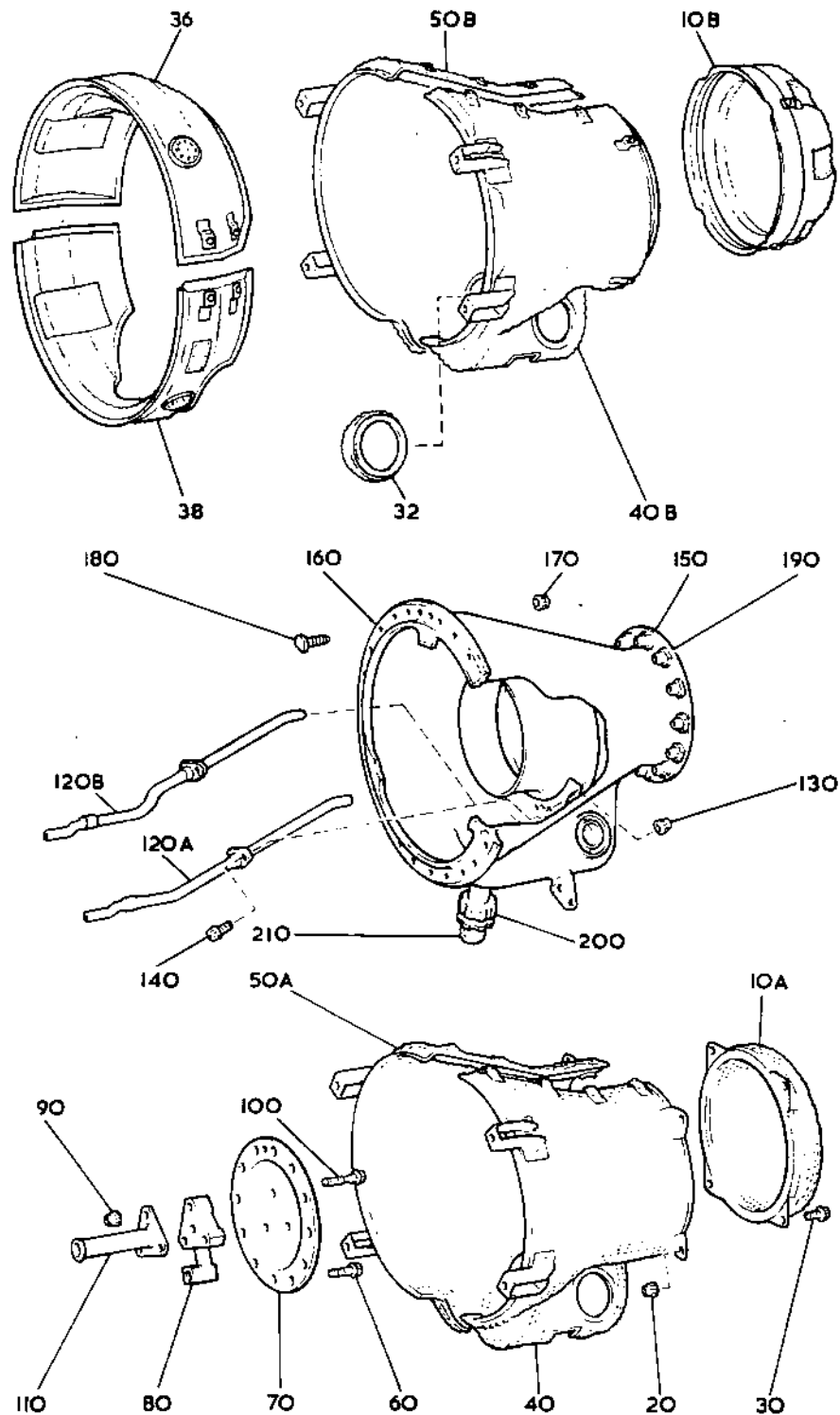
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Bearing Support Rear Cover and Fittings
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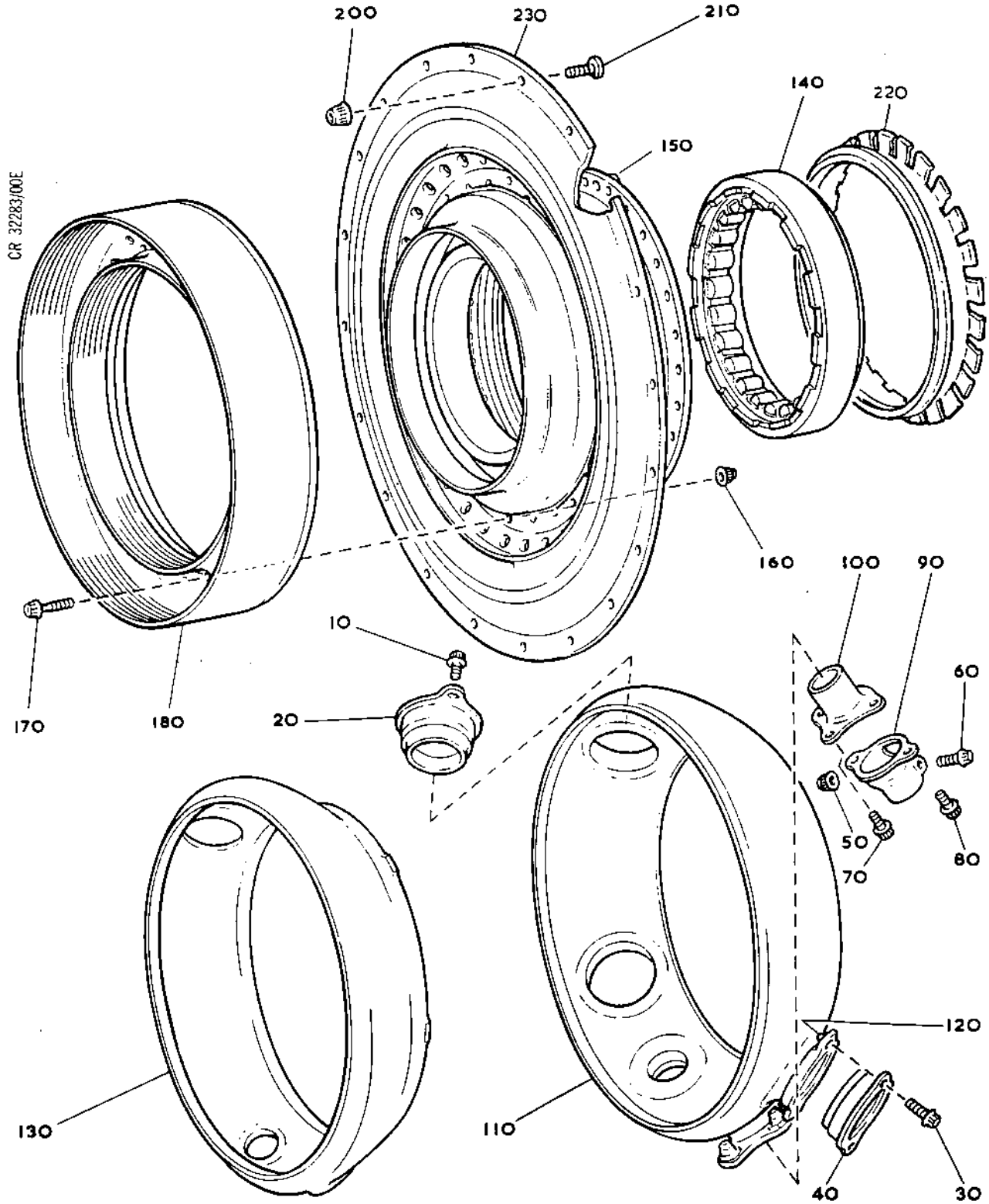
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Bearing Housing and Fittings
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TURBINE EXHAUST DIFFUSER - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

(1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

No current requirement

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
---------	----------	-------------	---------

302	50	Elbow	F1A
302	60	Duct Assembly	F1A
302	90	Seal Housing	F1A
302	120	Locking Plate	F1A
302	140	Seal Carrier	F1A
302	220	Elbow	F1A
302	230	Duct Assembly	F1A
302	260	Seal Housing	F1A
302	290	Locking Plate	F1A
302	310	Seal Carrier	F1A
302	330	Tube Assembly	F1A
302	340	Seal Housing Assembly	F1A
302	420	Tube Assembly	F1A
303	30	Tube Assembly	F1A
303	40	Seal Housing Assembly	F1A

Items to be Fluorescent Dye Crack Tested
Table 302 (Continued)

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FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
303	120	Elbow	F1A
303	130	Duct	F1A
303	160	Seal Housing	F1A
303	190	Locking Plate	F1A
303	210	Seal Carrier	F1A
304	30	Containment Shield Assembly	F1A
305	70	Blanking Cover	F1A
305	160	Bolt	F1A
305	230	Turbine Exhaust Diffuser Outer Case	F1A
306	90	Rear Lifting Bracket	F1A
306	130	Mounting Bracket	F1A
306	250	Support Plate	F1A
306	320	Mounting Bracket	F1A
307	90	Mounting Bracket	F1A
307	290	Mounting Bracket	F1A
308	120	Mounting Bracket	F1A
308	350	Mounting Bracket	F1A
309	70	Mounting Bracket	F1A
309	110	Support Plate	F1A
309	240	Mounting Bracket	F1A
310	40	Turbine Exhaust Diffuser Inner Diffuser	F1A

Items to be Fluorescent Dye Crack Tested
Table 302 (Concluded)

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No current requirement

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Crack Detection Test Diagram
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FIG. NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-53-00	Fig.1
303	72-53-00	Fig.2
304	72-53-00	Fig.3
305	72-53-00	Fig.4
306	72-53-00	Fig.5
307	72-53-00	Fig.6
308	72-53-00	Fig.7
309	72-53-00	Fig.8
310	72-53-00	Fig.9

Cross References to Illustrated Parts Catalogue
Table 303

4. Brackets (302-40/200/210, 303-110/115, 306-160,
307-150/180/250/270/280 and 308-40/110/220/250/280)

A. Inspect Brackets.

- | | |
|--|---------------------------------------|
| (1) Distortion. | Accept if compatibility is preserved. |
| (2) Wear and fretting. | |
| (a) Attachment face thickness reduced not more than 10 per cent. | Accept after repair. |
| (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |
| (3) Nicks and burrs. | Accept after repair. |

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(4) Scoring.

- (a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing material
thickness is not
reduced by more
than 10 per cent.

5. Elbows (302-50/220 and 303-120)

A. Inspect Tube Seal Location.

- (1) Fretting.

Accept after
repair providing
sealing
capabilities are
unimpaired.

- (2) Nicks and burrs.

- (a) Small dressable amounts.

Accept after
repair if surface
flatness preserved.

B. Inspect Face of Case Abutment Flange.

- (1) Fretting.

- (a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair if surface
flatness preserved.

- (2) Nicks and burrs.

- (a) Small dressable amounts.

Accept after
repair.

C. Inspect Ducting (Ref.72-09-00 Inspection/Check Rigid Tubes).

D. Distortion.

Accept if
compatibility is
preserved.

6. Air Duct Assemblies (302-60/230 and 303-130) (Ref. S.B.72-129
and 72-130)

A. Inspect Face of Case Abutment Flange.

- (1) Distortion.

Accept if
compatibility is
preserved.

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- (2) Scores.
- (a) Not more than 0.005 in.
(0,130 mm) in depth. Accept after repair providing score does not extend right across sealing face.
- (3) Nicks and burrs.
- (a) Small dressable amounts. Accept after repair if surface flatness preserved and sealing capabilities are unimpaired.
- B. Inspect Seal Housing Location.
- (1) Distortion. Accept if compatibility is preserved.
- (2) Scores.
- (a) Not more than 0.005 in.
(0,130 mm) deep. Accept after repair providing score does not extend right across sealing face and surface flatness preserved.
- C. Inspect Thread Inserts (Pre S.B.72-130) (Ref.72-09-00 Inspection/Check).
- D. Inspect Ducting (Ref.72-09-00 Inspection/Check Rigid Tubes).
- (1) Distortion. Accept if duct bore dimensions have not been reduced.
- (2) Fretting.
- (a) Not more than 0.007 in.
(0,180 mm) deep. Accept after repair. If fretting exceeds the limit refer to SB.72-8018-129.
7. Seal Housings (302-90/260 and 303-160)
- A. Inspect Seal Location Bore (F.C.S.601-254).
- (1) Fretting.
- (a) Not more than 0.001 in.
(0,030 mm) deep. Accept, if within F.C.S. limits after repair.



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(2) Nicks, scores and burrs.

Reject.

(3) Wear.

(a) Within F.C.S. limits.

Accept.

B. Inspect Duct Abutment Flange.

(1) Scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept if score
does not extend
right across
sealing face.

(2) Nicks and burrs.

(a) Small dressable areas.

Accept after
repair.

C. Inspect Thread Inserts (Ref.72-09-00 Inspection/Check).

8. Locking Plates (302-120/290 and 303-190)

A. Inspect Locking Plates.

(1) Distortion.

Accept if
compatibility is
preserved.

(2) Wear and fretting.

(a) Attachment face thickness
reduced by not more than 10
per cent.

Accept after
repair.

(b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

(3) Nicks and burrs.

Accept after repair.

9. Seal Carriers (302-140/310 and 303-210)

A. Inspect Seal Carrier (F.C.S.601-254).

(1) Wear.

(a) Within F.C.S. limits.

Accept.

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(2) Fretting.

- (a) Not more than 0.001 in.
(0,030 mm) deep.

Accept, if within
F.C.S. limits after
repair.

(3) Nicks and burrs.

Accept, if within
F.C.S. limits after
repair.

10. Seal Housing Assemblies (302-340 and 303-40)

A. Inspect Seal Location Bores.

(1) Wear.

- (a) Not more than 0.010 in.
(0,250 mm) deep.

Accept.

(2) Fretting.

- (a) Not more than 0.010 in.
(0,250 mm) deep.

Accept after
repair.

(3) Nicks and burrs.

Accept after
repair.

B. Inspect Casing Abutment Flange.

(1) Distortion.

Accept if
compatibility is
preserved.

(2) Wear and fretting.

- (a) Attachment face thickness
reduced by not more than
10 per cent.

Accept after
repair.

- (b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.



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(3) Scoring.

- (a) Not more than 0.005 in.
(0,130 mm) deep.

Accept if score
does not extend
right across the
sealing face.

(4) Nicks and burrs.

Accept after
repair.

11. Tubes, Oil Scavenge and Feed (302-330 and 303-30)

A. Inspecting Insulating Blanket. (Not applicable to
SB.72-102 standard).

- (1) Torn, fractured, defective spot-welding. Reject.
- (2) Minor dents with smooth contour. Accept.
- (3) Powdering and collapse of filler. Reject.

NOTE: Press blanket with finger tips and note any
lack of 'cushion' effect to detect powdering.

B. Inspect Tubes (Ref.72-09-00 Inspection/Check).

NOTE: On units incorporating SB.72-48, check that the
jet guard (303-25) has been removed for inspection
(Ref. Para.30).

C. Inspect Seal Housing Location.

- (1) Wear.
- (a) Not more than 0.020 in.
(0,500 mm) deep. Accept.
- (2) Nicks and burrs. Accept after
repair.
- (3) Fretting.
- (a) Not more than 0.020 in.
(0,500 mm) deep. Accept after
repair.

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(4) Clearance in housing (Ref.F.C.S.601-249/253).

D. Inspect Sealing Nipple and Seating.

(1) Nicks and burrs.

Accept, if sealing
capability unim-
paired after repair.

(2) Fretting.

(a) Not more than 0.001 in.
(0,030 mm) deep.

Accept, if sealing
capability unim-
paired after repair.

E. Inspect Bearing Housing Seal Groove (Ref.Fits and Clearances F.C.S.601-251).

NOTE: Carry out this check in conjunction with the Seal Ring Assembly (303-20 para.12).

(1) Within F.C.S. limits.

Accept.

12. Seal Ring Assembly (302-410 and 303-20)

A. Carry Out Dimensional Checks (Ref.72-53-00 Fits and Clearances F.C.S.601-247/248/251/252).

NOTE: Carry out these checks in conjunction with the Seal Housing (Ref.72-52-03/303-100), the Oil Feed Tube (303-30) and the Cold Air Vent Tube (302-420).

(1) Within F.C.S. limits.

Accept.

13. Tube, Cold Air Vent (302-420)

A. Inspect Tube (Ref.72-09-00 Inspection/Check).

NOTE: When inspecting these tubes, large areas of moderate fretting in the form of numerous small smooth-edged pits may be accepted, without complete blending, provided that the minimum wall thickness is not less than 0.035 in. (0,890 mm).

B. Inspect Spherical Elbow Location (F.C.S.601-250).

NOTE: Carry out the following dimensional check in conjunction with the mating tube assembly (Ref. 75-02-03 Inspection/Check - 302-240).

(1) Wear.

(a) Within F.C.S. limits.

Accept.

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(2) Nicks and burrs.

Accept, if within
F.C.S. limits
after repair.

(3) Scores.

Reject.

C. Inspect Bearing Housing Seal Groove (Ref.72-53-00 Fits and Clearances F.C.S.601-247).

NOTE: Carry out this check in conjunction with the Seal Ring Assembly (302-410 para.12).

(1) Within F.C.S. limits

Accept.

14. Retaining Plates - 4 Off (304-10)

A. Inspect Plates.

(1) Distortion.

Accept if
compatibility is
preserved.

(2) Wear and fretting.

(a) Attachment face thickness
reduced by not more than
10 per cent.

Reject.

(b) Bolt-holes elongated not
more than 0.030 in.
(0,720 mm).

Accept after
repair.

(3) Nicks and burrs.

Accept, if attach-
ment face thickness
preserved after
repair.

15. Headless Pins - 4 Off (304-20)

A. Inspect Pins.

(1) Distortion.

Reject.

(2) Fretting.

(a) Not more than 0.002 in.
(0,050 mm) deep.

Accept after
repair.

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(3) Nicks, burrs and scores.

(a) Extensive.

Reject.

(b) Small dressable amounts.

Accept after
repair.

16. Containment Shield (304-30)

A. Inspect Shield.

(1) Scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair.

B. Inspect Mounting Bracket Locations.

(1) Wear and fretting.

Accept, if surface
flatness retained
after repair.

(2) Nicks and burrs.

Accept, if surface
flatness retained
after repair.

C. Inspect Thread Inserts (Ref.72-09-00 Inspection/Check).

17. Blanking Covers - 5 Off (305-70), External Bosses - 5 Off (305-120) and Internal Plates - 5 Off (305-140)

A. Inspect Covers, Bosses and Plates (Pre SB.72-31).

(1) Distortion.

Accept if
compatibility is
preserved.

(2) Scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair.

(3) Nicks and burrs.

Accept after
repair.

18. Gaskets - 4 Off (305-130) (Pre SB.72-31) Not illustrated

A. Inspect Silver Plating.

(1) Flaking, scores, erosion.

Reject.

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19. Shouldered Pin (305-150)

A. Inspect Pin.

(1) Any damage.

Reject.

20. Retaining Bolts (305-160) 20 off

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

21. Hollow-headed Pins - 10 Off (305-180)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Pin Surfaces.

(1) Scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair.

(2) Fretting.

(a) Not more than 0.002 in.
(0,050 mm) on diameter.

Accept.

22. Trunnion Nuts - 20 Off (305-190)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Surface.

(1) Nicks and burrs.

Accept after
repair.

23. Turbine Exhaust Diffuser Outer Case (305-230)

A. Inspect Flange Abutment and Attachment Faces.

(1) Scores.

(a) Not more than 0.005 in.
(0,130 mm) or more.

Accept, if score
does not extend
right across mating
face.

(2) Nicks and burrs.

Accept, if repair
preserves surface
flatness.

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(3) Distortion.

Accept if
compatibility is
preserved.

B. Inspect Bolt Locations.

(1) Nicks and burrs.

Accept after repair.

(2) Fretting and wear.

(a) Any bolt-holes elongated.

Reject.

(b) Bolthead locations worn.

Accept, if location
function retained.

C. Inspect All External Abutment Faces.

(1) Scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept, if score
does not extend
across sealing face.

(2) Nicks and burrs.

Accept, if repair
preserves surface
flatness.

D. Inspect Inner Diffuser Case Locating Faces.

(1) Nicks and burrs.

Accept after repair.

E. Inspect Hollow-headed Pin and Locking Plate Locations.

(1) Nicks and burrs.

Accept after repair.

F. Inspect Outer Surface.

(1) Nicks and burrs.

Accept after repair.

G. Inspect Shouldered Pin Locations.

NOTE: The shouldered pins will normally be assembled, one pin (Ref.305-150) in the rear flange at the top position, and two pins (Ref.76-21-02/1-110) at No.6 vane position on the outside of the case. If the pins are assembled, secure and serviceable, do not remove. If one or more of the pins are damaged, remove and reject the damaged pin(s).

(1) Scuffs, gouges and out of round.

Accept after repair
(Ref.72-53-00,
Repair No.2).

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24. Bracket Assemblies (306-50/190/280, 307-30/210/380,
308-180/310 and 309-30/140/200)

A. Inspect Captive Nuts and Retainers (Ref.72-09-00 Inspection/
Check).

B. Inspect Brackets.

(1) Distortion and dents.

Accept, if com-
patibility is
preserved.

(2) Nicks and burrs.

Accept after repair.

(3) Wear or fretting.

(a) Attachment face thickness
reduced not more than
10 per cent.

Accept after repair.

(b) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

25. Rear Lifting Bracket (306-90)

A. Inspect Bracket.

(1) Distortion.

Reject.

(2) Wear and fretting.

(a) Bolt-holes elongated.

Reject.

(b) Pin location wear not
exceeding 0.001 in.
(0,030 mm).

Accept.

26. Mounting Brackets (306-130/320, 307-90/290, 308-120/350
and 309-70/240)

A. Inspect Brackets.

(1) Distortion.

Reject.

(2) Scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair.

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(3) Wear at flange bolt-holes.

(a) Bolt-holes elongated not more than 0.030 in. (0,760 mm) along the lateral axis only. Accept after repair.

(4) Wear at containment shield bolt-holes.

(a) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

(5) Nicks and burrs. Accept after repair.

27. Support Plates (306-250 and 309-110)

A. Inspect Plates.

(1) Distortion. Reject.

(2) Scores.

(a) Not more than 0.005 in. (0,130 mm) deep on the diffuser case flange. Accept after repair, and subject to satisfactory crack detection.

(3) Nicks and burrs. Accept after repair.

B. Inspect Bolt Locations.

(1) Fretting and wear.

(a) Attachment face thickness reduced not more than 10 per cent. Accept after repair.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

(2) Nicks and burrs. Accept after repair.

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28. Mounting Plates (307-260/440 and 308-80)

A. Inspect Plates.

- | | |
|--|----------------------|
| (1) Distortion. | Reject. |
| (2) Fretting and wear. | |
| (a) Attachment face thickness reduced not more than 10 per cent. | Accept after repair. |
| (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |

B. Inspect Attachment Faces and Spigot Bore.

- | | |
|-------------------------|---|
| (1) Nicks and burrs. | |
| (a) At attachment face. | Accept, if repair preserves surface flatness. |
| (b) At spigot bore. | Accept, if repair preserves concentricity. |

29. Turbine Exhaust Diffuser Inner Assembly (310-40)

A. Inspect Front and Rear Abutment Flanges.

- | | |
|--|---|
| (1) Fretting. | |
| (a) Not more than 0.002 in. (0,050 mm) deep. | Accept. |
| (2) Nicks and burrs. | Accept, if repair preserves surface flatness. |

B. Inspect Bolt Locations (Front Flange).

- | | |
|----------------------|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
|----------------------|----------------------|

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(2) Fretting and wear.

- (a) Any bolt-holes elongated. Reject.
- (b) Bolthead locations worn. Accept, if location function retained.

C. Inspect Threaded Components and Retainers (Ref.72-09-00 Inspection/Check).

NOTE: Items 310-10/20/30 are not used on assemblies with SB.72-31 incorporated.

NOTE: Assemblies with SB.72-31 incorporated have captive bolts with anchor plates (310-80/90) at the rear flange; unmodified engines have nuts and retainers (310-60/70).

D. Inspect Vane Surfaces and Abutment Faces.

(1) Dents (Ref.72-09-00 Inspection/Check Rigid Tubes).

- (a) Large, irregular dents; dents with impact marks. Reject.
- (b) Small dents with smooth contours not more than 2 per cent of 'normal' section thickness. Accept, if oil/air tubes not fouling.

(2) Nicks and burrs. Accept after repair.

(3) Fretting of inner surfaces (vaness carrying oil and air tubes).

- (a) Less than 10 per cent of sheet thickness. Accept.

(4) Metallic splatter.

- (a) Less than 0.010 in. (0,250 mm) in depth. Accept providing surface is no rougher than the unsplattered parent surface.

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E. Inspect Trunnion Nut (305-190) Locations.

(1) Scores.

(a) Less than 0.005 in. Accept after
(0,130 mm) deep. repair.

(2) Nicks and burrs. Accept after
repair.

F. Inspect Inner Case.

(1) Dents (Ref.72-09-00 Inspection/Check Rigid Tubes).

(a) Large, irregular dents; Reject.
dents with impact marks.

(b) Small dents with smooth Accept, if repair
contours not more than maintains profile.
2 per cent of normal
section thickness.

(2) Nicks and burrs. Accept after
repair.

(3) Metallic splatter.

(a) Less than 0.010 in. Accept providing
(0,250 mm) in depth. surface is no
rougher than the
unsplattered
parent surface.

30. Jet Guard (303-25 SB.72-48)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Oilway.

(1) Oilway unobstructed. Accept.

C. Inspect Jet Guard.

(1) Nicks and burrs. Accept after
repair.

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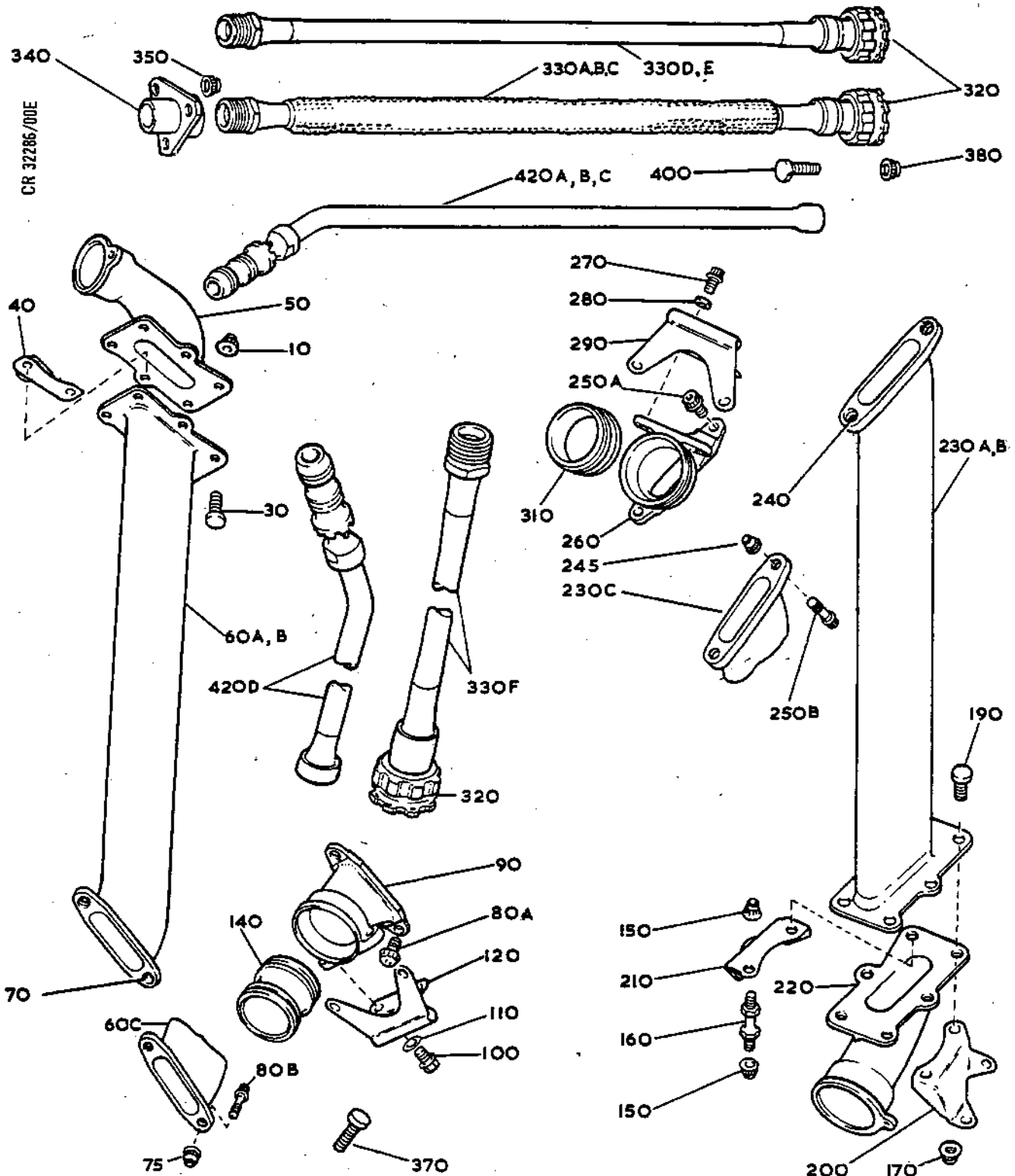
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Turbine Exhaust Diffuser, Air Ducts and Oil Tubes
(Vanes 2, 4 and 5)
Figure 302

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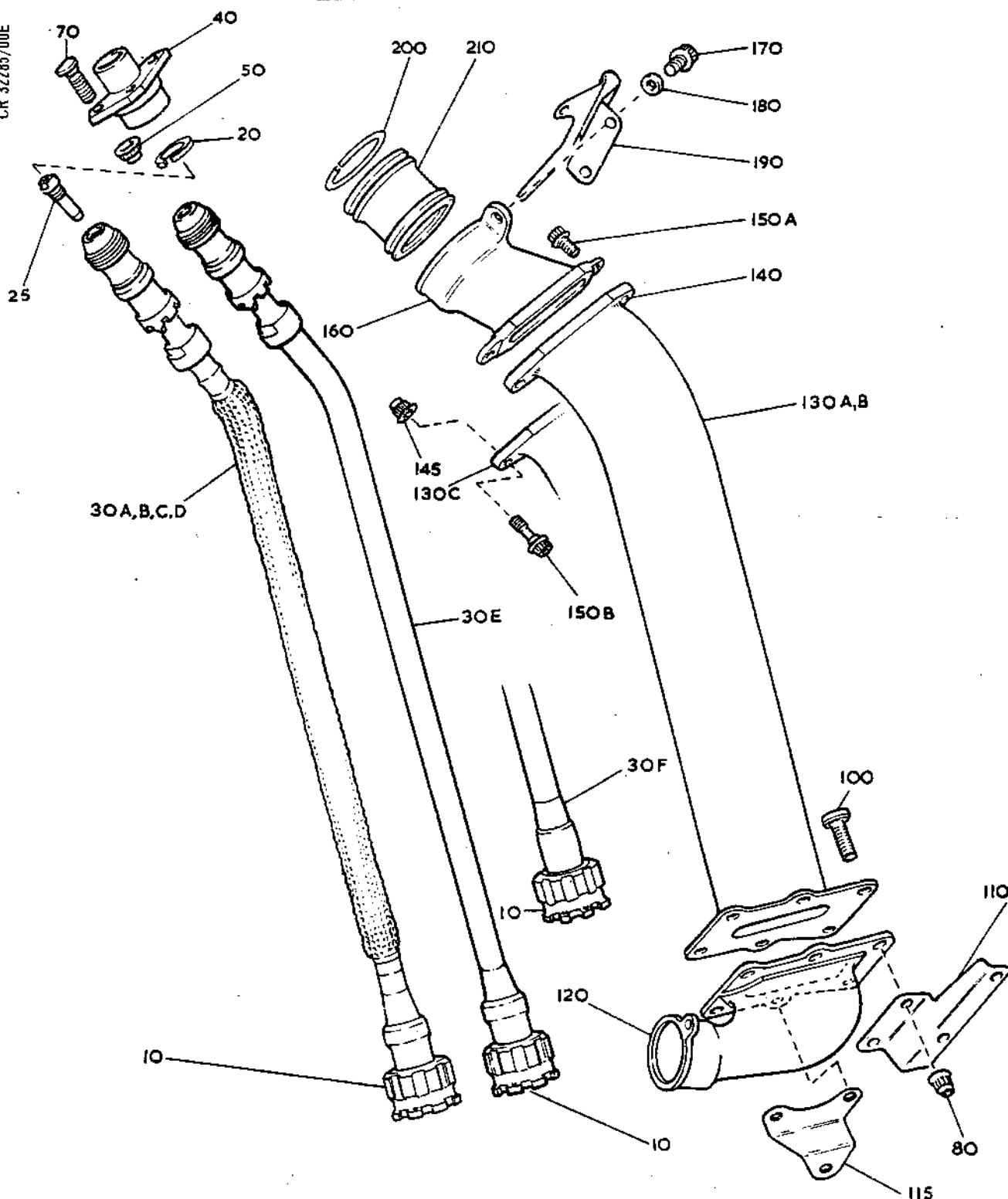


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CR 32285/00E



Turbine Exhaust Diffuser, Air Duct and Oil Tube
(Vanes 6 and 7)
Figure 303

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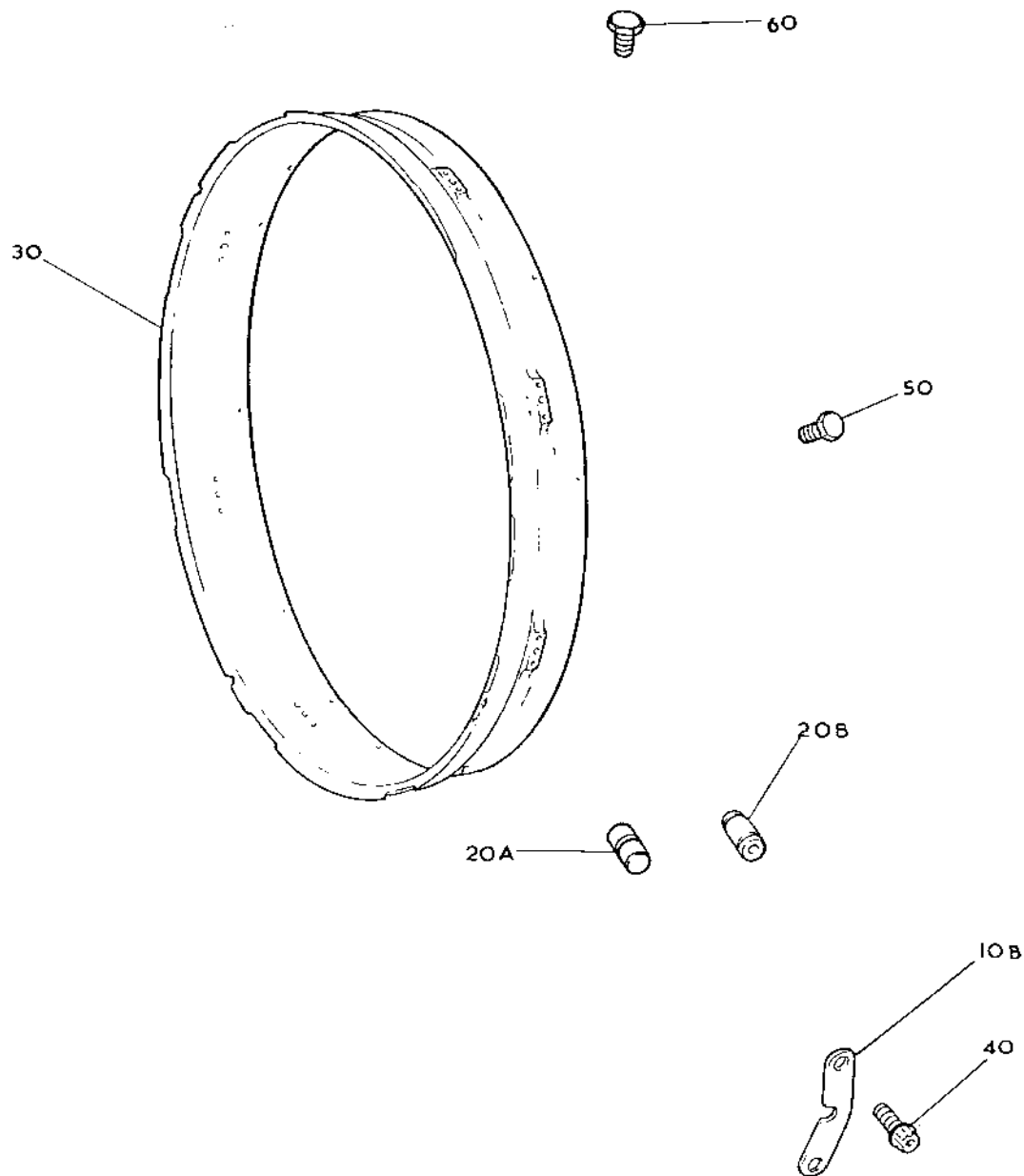
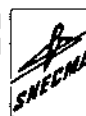
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Turbine Exhaust Diffuser, Containment Shield
Figure 304

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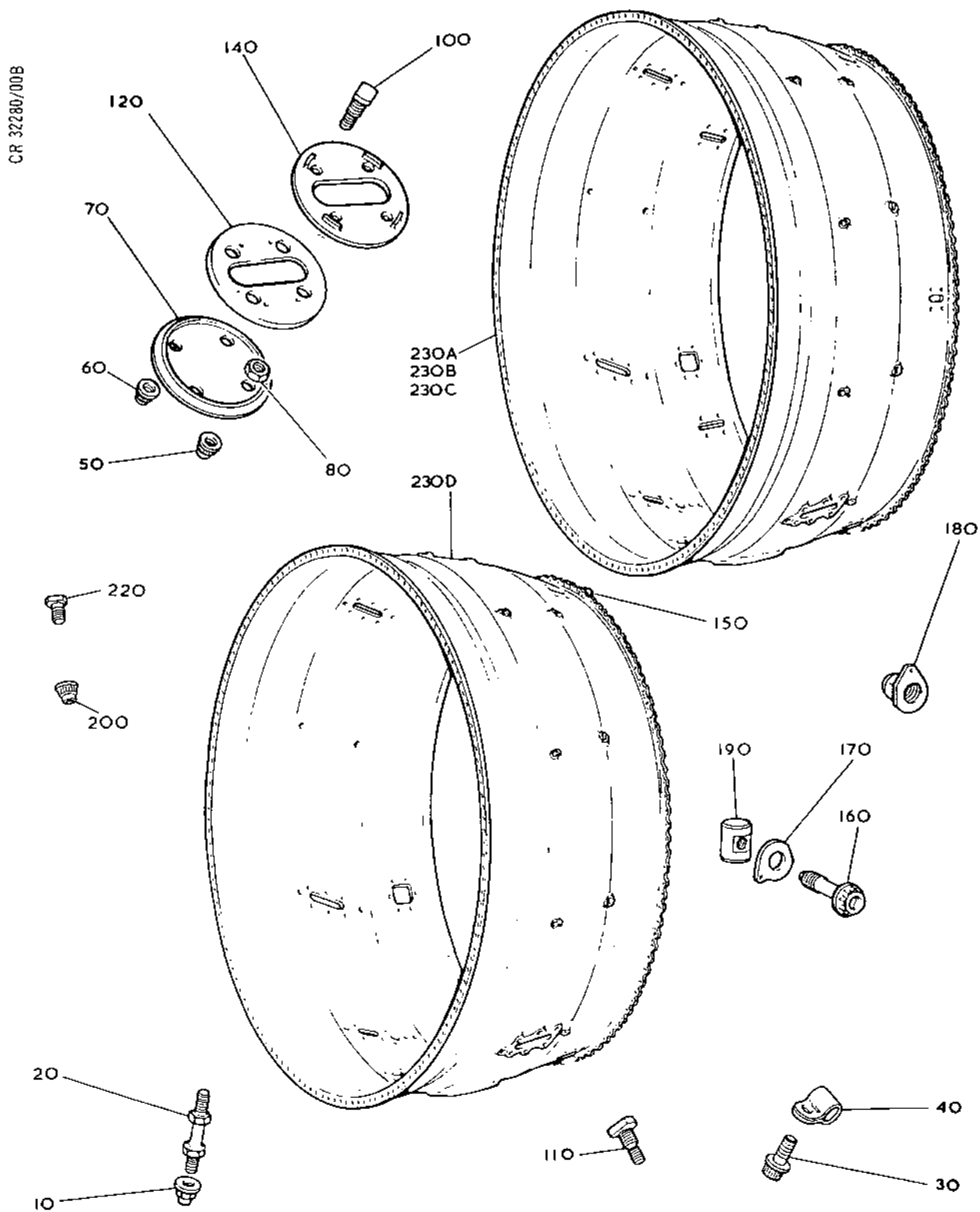
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Turbine Exhaust Diffuser, Outer Case and Fittings
Figure 305

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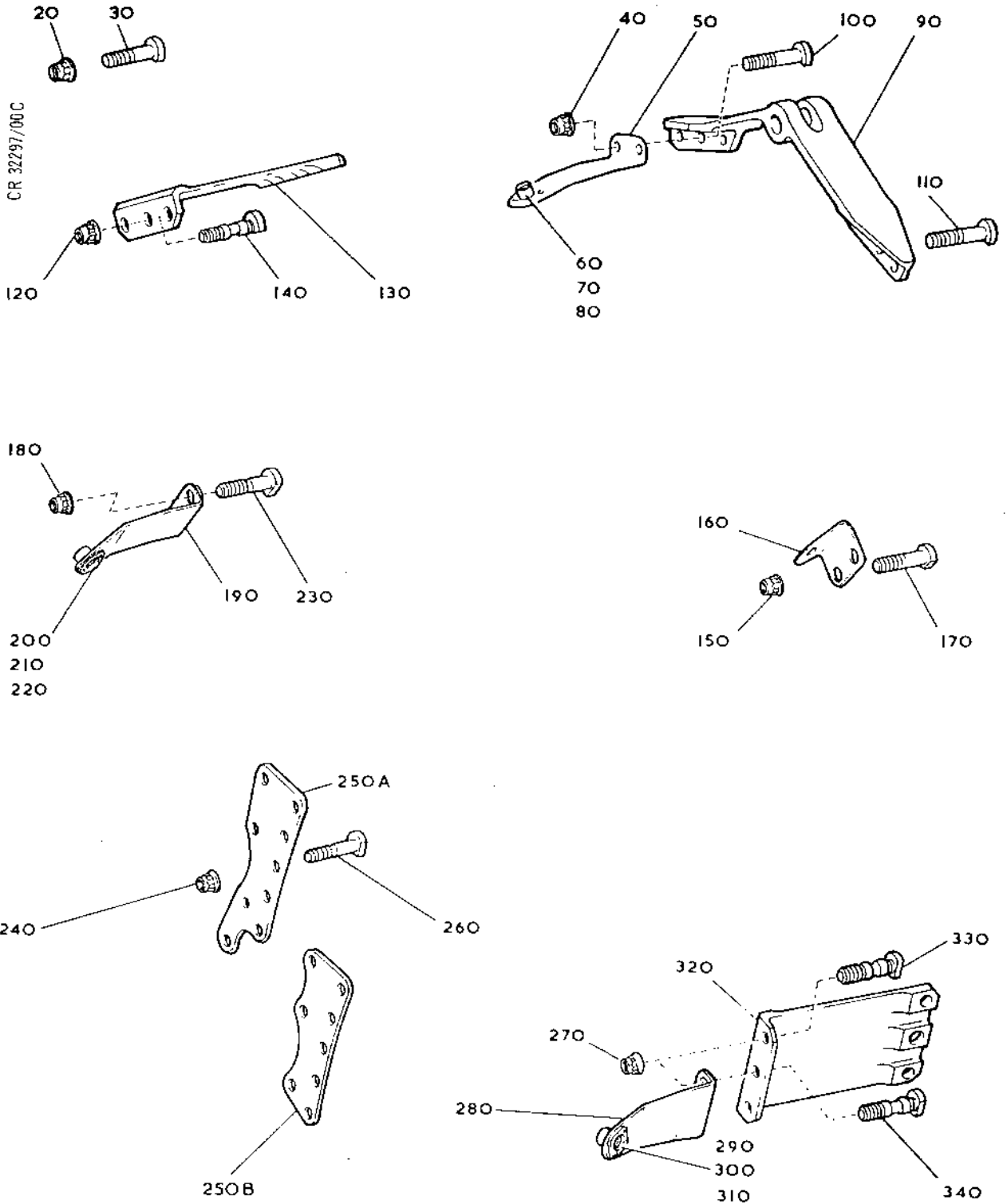
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Turbine Exhaust Diffuser, Outer Case Attaching Parts
Figure 306

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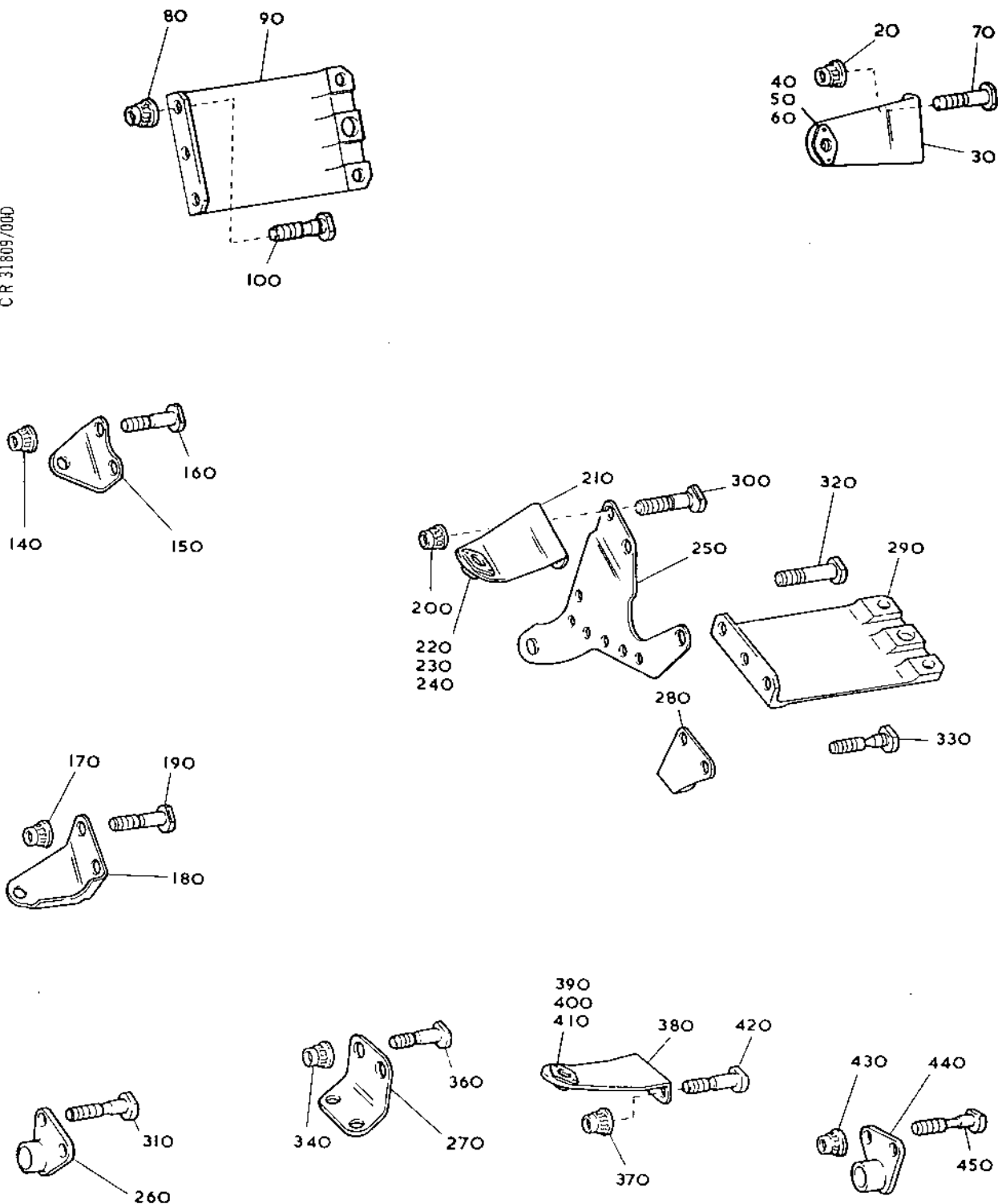


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CR 31809/000



Turbine Exhaust Diffuser, Outer Case Attaching Parts
Figure 307

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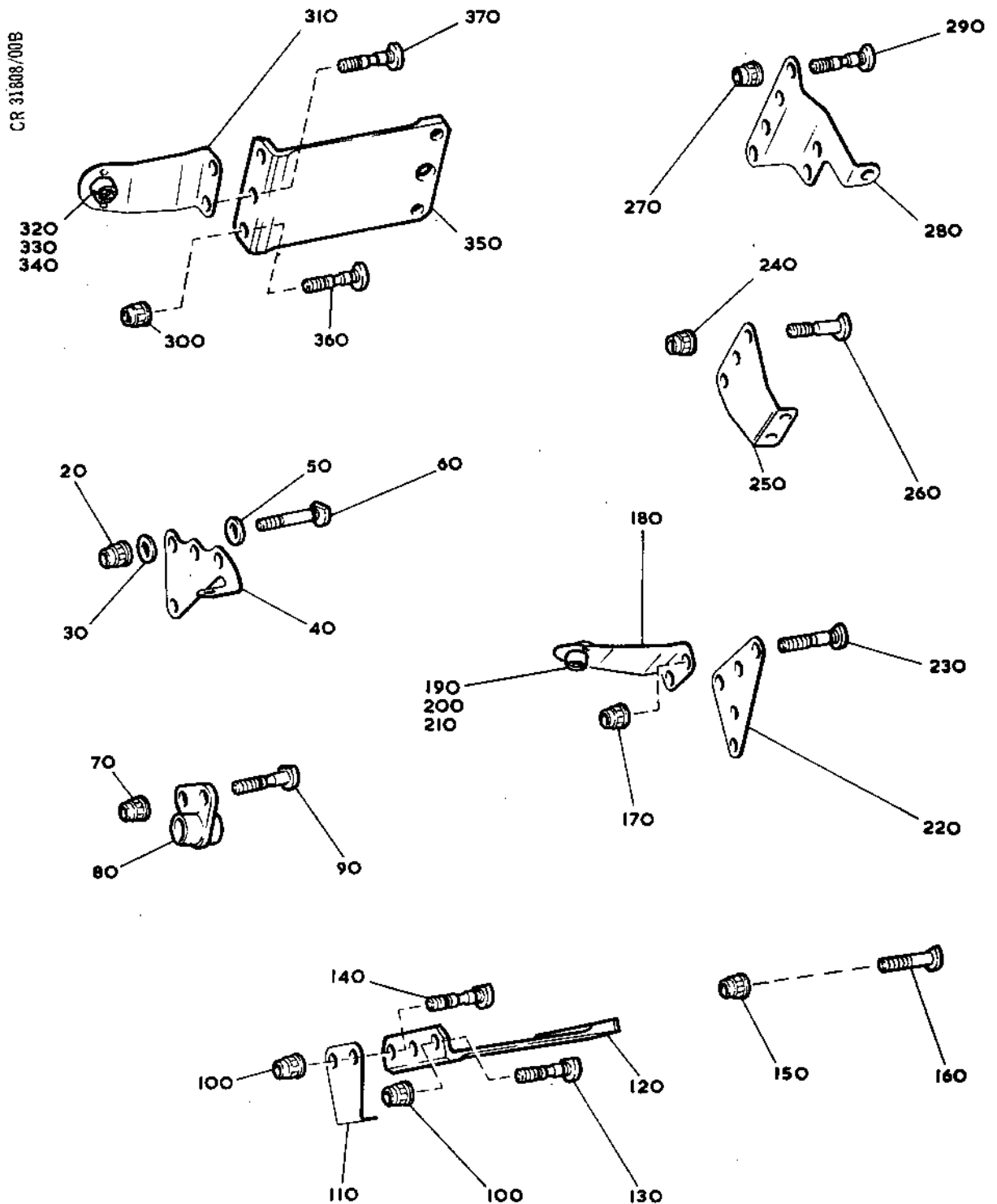
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Turbine Exhaust Diffuser, Outer Case Attaching Parts
Figure 308

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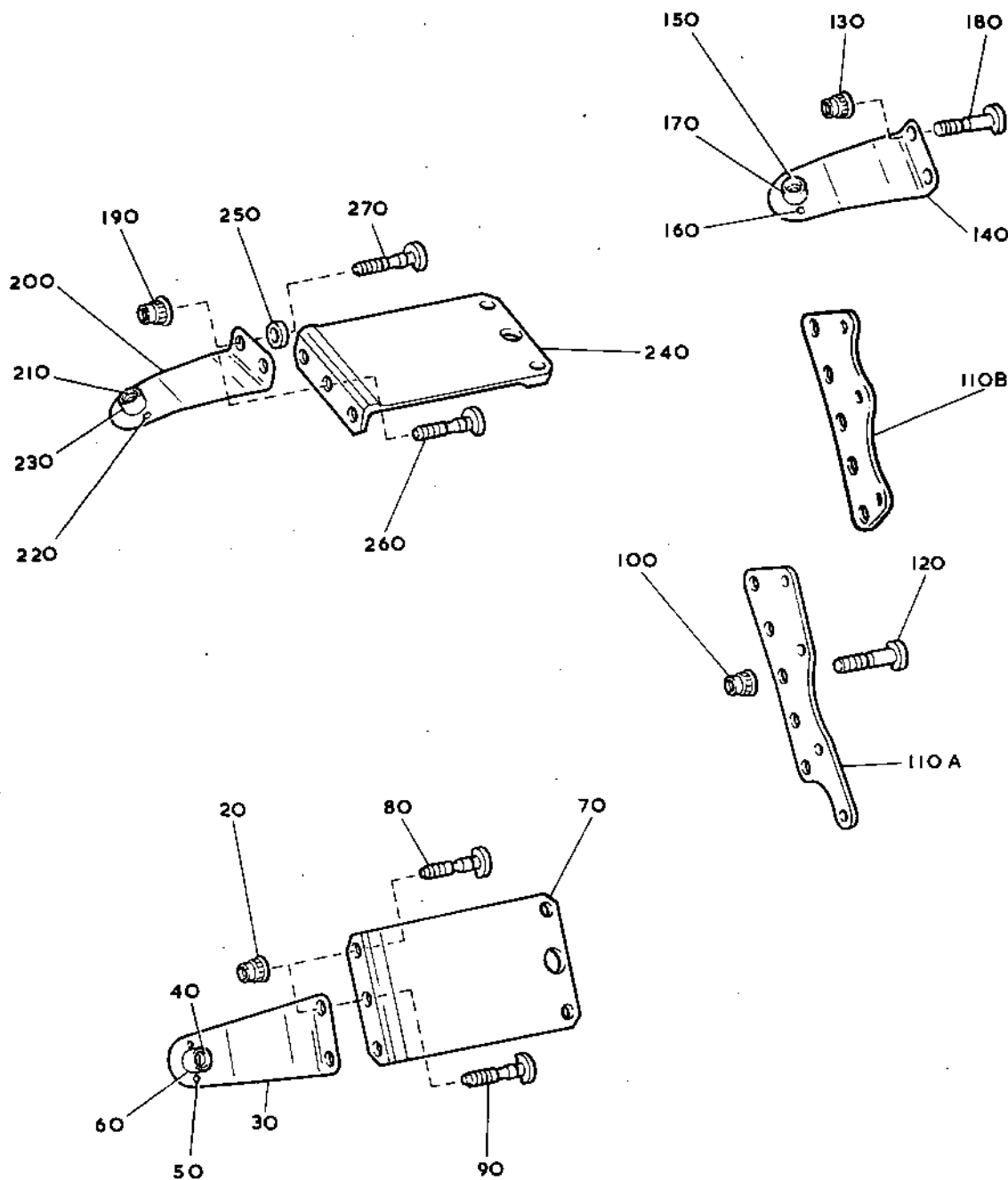


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CR 31807/00 C



Turbine Exhaust Diffuser, Outer Case Attaching Parts
Figure 309

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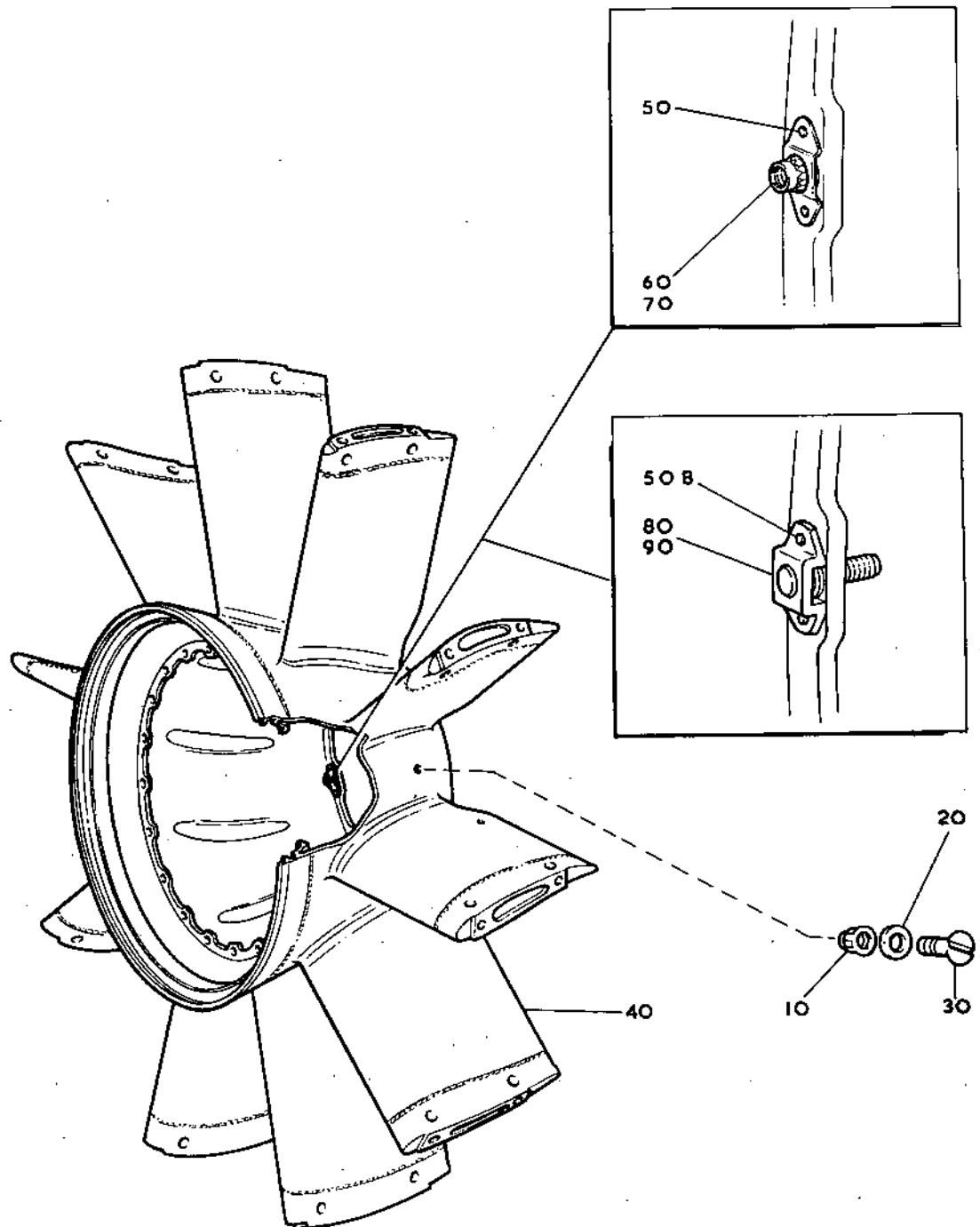
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Turbine Exhaust Diffuser, Inner Assembly
Figure 310

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SPHERICAL JOINT FLANGE - INSPECTION/CHECK

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INSPECTION**1. Introduction****A. Inspection - General**

- (1) The estimate inspection, prepared during overhaul on the modules or separate disassembled components, has the object of :
- eliminating worn or deteriorated components which are impossible or too costly to be repaired. However, these components can be kept because certain sound portions of them may be usable for the repair of an identical component.
 - Indicating the modifications to be applied to bring up to a new standard.
 - Indicating the repairs to be carried out. If this repair has not been envisaged, make a request to the SNECMA repair design office.
 - Eliminating components that have reached their life limitation.

B. Preparation to the "Estimate" Inspection

- (1) Following disassembly, suitable cleaning for each component is given in the "cleaning" of the Overhaul Manual.

NOTE: Take care that any assembly "awaiting inspection" be stored in the "bins" or containers provided for this purpose.

This inspection must be carried out on thoroughly clean parts.

Place all the parts, making up the sub-assemblies, on the inspection tables covered with anti-shock material (Lino or similar material).

- (2) Make a list of the modifications to be applied for each sub-assembly.
- (3) Inspect the parts.

C. Estimate Inspection

CAUTION: THE COMPONENTS MUST BE HANDLED WITH THE GREATEST CARE DURING THE INSPECTION OPERATIONS SO AS TO AVOID SHOCKS, SCRATCHES, ETC.

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- (1) Personnel in charge of this inspection must have a thorough knowledge of the instructions given in the Inspection and Repair sections of this manual and in the corresponding chapter 70.

They must be conscious of the importance of their decisions and of their consequences. A good technical and functional knowledge of the accessory will enable this personnel to carry out an efficient and intelligent inspection, particularly in vital zones.

- (2) The inspection methods to be used are as follows :

- visual inspection
- inspection for soundness
- dimensional inspection

NOTE - It is recommended that these inspection methods be followed as per the indicated order so that faulty, not repairable components detected during visual or soundness inspections can be rejected prior to dimensional inspection.

If new defects appear, the repairer must request SNECMA to design a repair scheme.

- (3) During the inspection, each component must be labelled (see chapter 70-10-00) so as to indicate :

- if it is suitable to be put back into service
- if a repair is necessary
- if it must be renewed

Labelling of components may also be used to note the value of certain dimensions measured which can affect a clearance or a tolerance. This makes it possible for the Inspection Dpt. to check the clearance or tolerance during final assembly.

D. Protection against corrosion after inspection

- (1) After inspection, when a fairly long time elapses before rebuild, carry out a temporary protection on steel components by using a dessicant oil such as Ensis Fluid 254 (P 309). Renew the protection every 4 days.

2. Visual inspection

- A. Visual inspection is an operation which starts on reception of the accessory (inventory), continues during disassembly on table inspection, re-assembly, testing and dispatching.

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**ATP
TEMPORARY
REVISION**

British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

David Hamilton

For Chief Technical and Industrial Services Engineer CAA Design Approval No.DA1/8566/78

TEMPORARY REVISION NO.72-569

Insert in 72-54-01 before page 303

REASON FOR ISSUE

BEOL NOTE added

ACTION

Read the following NOTE after last paragraph of 3A

NOTE: When performing fluorescent penetrant inspection (M502B)
Ardrox 970 P10 electrostatically sprayed can be used in
lieu of Ardrox 970 P5.

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- (1) Visual inspection generally concerns the following points :
- each part is inspected to ascertain its general condition and make sure that it is fit for service. Refer to chapter 70-21-00.
 - components made up of sheet metal elements must not feature sharp wounds, sheet metal burns, great distortions or burns.
 - threads and tapped holes must not be deteriorated.
 - hinge parts (such as pins/bores of bushes ; ball joint inner ring/outer ring of rods...) must not show seizing marks or scratches, otherwise remove them by emery cloth.
 - flaking of metallised zones of components is not acceptable.
 - rivets used to attach the various components on riveted assemblies must not be shaken loose, rotating or missing, otherwise change them.
 - self-locking nuts must have a satisfactory locking torque. See chapter 70-21-00 otherwise change them.
 - crimped self-locking nuts must be satisfactorily crimped. See chapter 70-21-00, otherwise change them.
- (2) Measures to be taken in relation to the faults found on parts are given in paragraph 5 "Parts Inspection".

3. Inspection for soundness

- A. The object of the inspection for soundness is to ensure that the module components are not cracked.

The inspection methods used are as follows :

- Visual inspection
- Inspection using dye penetrant see chapter 70-20-10.

M502 B - Inspection by fluorescent penetrant washable by water (except titanium parts) P by spraying T by dipping.

- B. The tabulation below gives the appropriate method for each component.

PARTS TO BE INSPECTED		INSPECTION METHOD	REMARKS AND ZONES REQUIRING CAREFUL EXAMINATION
IPL	DESCRIPTION		
6-10	Drain fuel pipe	M 502 B (P)	Weld beads

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PARTS TO BE INSPECTED		INSPECTION METHOD	REMARKS AND ZONES REQUIRING CAREFUL EXAMINATION
IPL	DESCRIPTION		
6-180	Spherical joint flange	M 502 B (P)	Weld beads
6-150	Cover strip	M 502 B (P)	

4. Dimensional inspection

A. General

(1) Measuring instruments

Choice of the measuring instrument must be made in relation to the precision desired.

(a) Instrument classification

Two kinds of measuring instruments are to be distinguished :

- standard and universal inspection tools such as: slide gages, micrometers, depth gages, miscellaneous dial gages, etc.

This equipment is part of the provisioning items, is procurable in the trade and require no particular comment, provided that it is available in the required quantity and precision and satisfies, to the requirements for the work to be undertaken.

- Special inspection equipment such as : bases, supports, rigs, jigs, etc.

These tools are identified by a type number in the manual text, at the exact place where they are used.

(b) Calibration

Measuring instruments used in overhaul are to be checked periodically according to a procedure defined in relation to master instruments (SNECMA to be informed of procedure), themselves checked against the official master instruments of the country concerned.

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The Official Control Authorities of the countries where repairs are carried out will have to take steps to ensure that the repairer has set up suitable structure and equipment.

In the absence of a procedure in the countries concerned, the repairer will request from SNECMA the procedure applied in their workshop.

B. Dimensional inspection of parts

Details concerning the dimensional inspection and the acceptance criteria are given in paragraph 5 "Parts inspection".

5. Parts inspection

A. Drain fuel pipe (6-10)

(1) Visual inspection

- (a) Deterioration of the union threads entails renewal of the union.
- (b) Local distortion of the cup is acceptable on condition that it is located in the zone with bent edges. In such case, re-shape the cup.

(2) Inspection for soundness

- (a) Cracks located in the weld beads joining the various components must be eliminated by filling up with weld.

B. Spherical joint flange (6-180)

(1) Visual inspection

- (a) Wear marks located in the area which mates with the reheat duct are acceptable after blending using emery cloth.
- (b) Thread deterioration of the bush fitted to the riveted boss is cause for renewal of the bush, according to REP 6-180-3.
- (c) Thread deterioration of the tapped holes located in all the bosses is cause for restoration of the parts by installation of bushes.



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- (d) Deterioration of nuts providing for retention of the cover strip, is cause for nut renewal in accordance with REP 6-180-2.
- (2) Inspection for soundness
- (a) Cracks progressing in weld beads of bosses and flanges must be repaired through fill-up welding in accordance with REP 6-180-1
- (3) Dimensional inspection
- (a) Increase in the average inner diameter of the rear flange, measured in planes P1 and P2, at a temperature of 20° C is :
- . acceptable if average diameter is less than or equal to 1037,1 mm (40.831 in.).
 - . unacceptable if average diameter is greater than 1037,1 mm (40.831 in.) and requires the reconditioning of the flange by metallization

CAUTION - A 10°C TEMPERATURE VARIATION RESULTS IN A 0,13 mm (0.00512 in.) DIFFERENCE ON THE FLANGE DIAMETER.

Inspection method (see figure 301)

The average inner diameter of the rear flange in plane P1 then in plane P2, is found by working out the arithmetical mean of the 18 values recorded in the plane concerned.

For these measurements, proceed as follows :

Mark on the inner diameter 18 generatrices equally distributed on the rear flange half circumference.

CAUTION - IN ANY CASE, MARKING MUST NOT DETERIORATE THE SURFACE CONDITION OF THE FLANGE INNER DIAMETER.

- . Round the flange inner diameter using the resizing tool - SC 118.
- . Calibrate the TESA, UNIMASTER gage (TESA S.A.- 1020 - RENENS -VD/SWITZERLAND Agent in France : SYNERGIE, 27 avenue Philippe Auguste 75011 PARIS - Tél. 357.21.00).

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Fit the gauge with :

- . the extension tubes required for obtaining the dimension to be checked.
- . the supports that are correctly adjusted to ascertain the measuring plane (P1 then P2).
- . Bear the gauge supports on to the flange edge, then measure.
- . Repeat this operation at the level of the 18 marks.

C. Cover strip (6-150)

(1) Visual inspection

- (a) Distorted condition of the tabs providing for attachment of the cover strip is unacceptable. If distortion is not associated with cracking, re-shape the tab ; otherwise renew the tab in accordance with REP 6-150-3.
- (b) Local distortion in the cover strip is unacceptable and requires re-shaping in accordance with REP 6-150-1.

(2) Inspection for soundness

- (a) Cracks progressing in the cover strip attachment tabs are unacceptable. Renew tabs in accordance with REP 6-150-3
- (b) Cracks affecting the cover strip may be either :
 - 1 weld filled according to REP 6-150-2, if they are isolated and lying in a non-oxidized zone,
 - 2 or patch repaired according to REP 6-150-4, if the filler welding method is not practicable.

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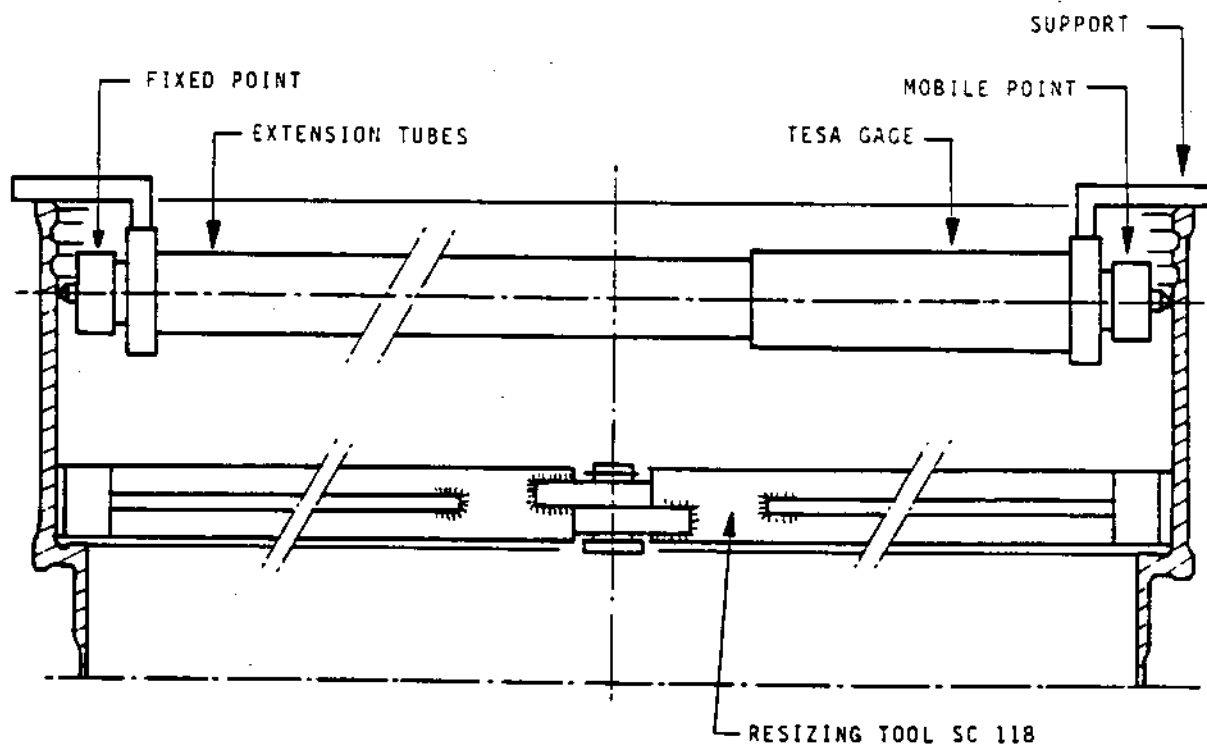


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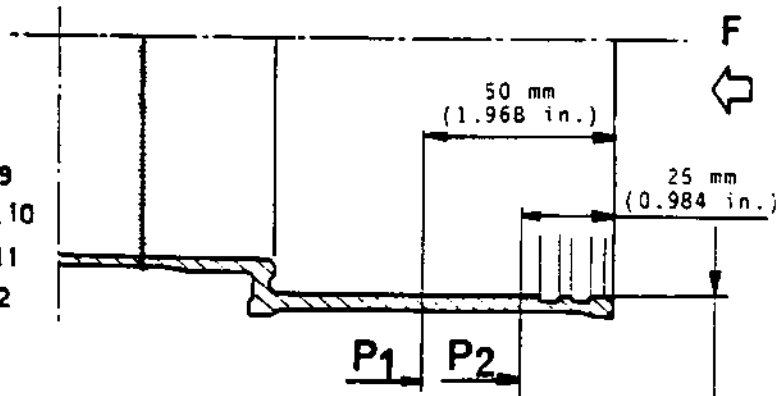
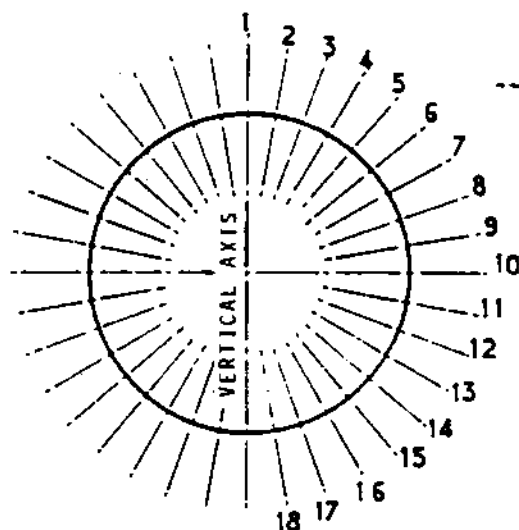


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sneema



SCHEMATIC **F** VIEW



AVERAGE INNER DIAMETER
= 1036,9 mm (40.823 in.) THEORETICAL
≅ 1037,1 mm (40.831 in.) ACCEPTABLE
≠ 1037,1 mm (40.831 in.) UNACCEPTABLE

Check of the Average Inner Diameter of the Rear Flange
Figure 301

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INTERNAL ACCESSORY DRIVES - INSPECTION/CHECK

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INTERNAL ACCESSORY DRIVES - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.
- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig. 301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG. NO.	ITEM NO.	DESCRIPTION	PROCESS
302	30	HP Labyrinth Operating Probe	MP1
302	41	Bevel Zerol Gear(Driver)	MP1
302	42	Bevel Zerol Gearshaft (Pinion)	MP1
302	43	Bevel Zerol Gearshaft (Pinion)	MP1
302	50	Adjusting Washer	MP1
302	175	Damping Plate	MP1
302	200	Bearing Housing	MP1
302	205	Oil Catcher Ring	MP1
302	210	Adjusting Washer	MP1
302	300	Spacer Sleeve	MP1
302	320	Roller Bearing	
		- Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
302	330	HP Drive Housing Assembly	MP1
302	370	Roller Bearing	
		- Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
302	380	Ball Bearing	
		- Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
302	470	Adjusting Washer	MP1
302	560	Roller Bearing	
		- Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
302	565	Damping Plate	MP1
302	570	HP Drive Housing Assembly	MP1
303	20	Bevel Zerol Gear	MP1
303	30	Adjusting Washer	MP1
303	140	Roller Bearing	
		- Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
303	180	Bearing Housing Assembly	MP1

Items to be Magnetic Particle Crack Tested
Table 301

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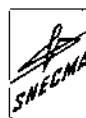
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B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	50 to 170		
	210 to 275		
	410 to 550	Adjusting Washer	F1A
302	390	Inner Spacer Sleeve	F1A
302	400	Outer Spacer Sleeve	F1A
303	30 to 115	Adjusting Washer	F1A
303	150	Inner Distance Piece	F1A
303	160	Outer Distance Piece	F1A

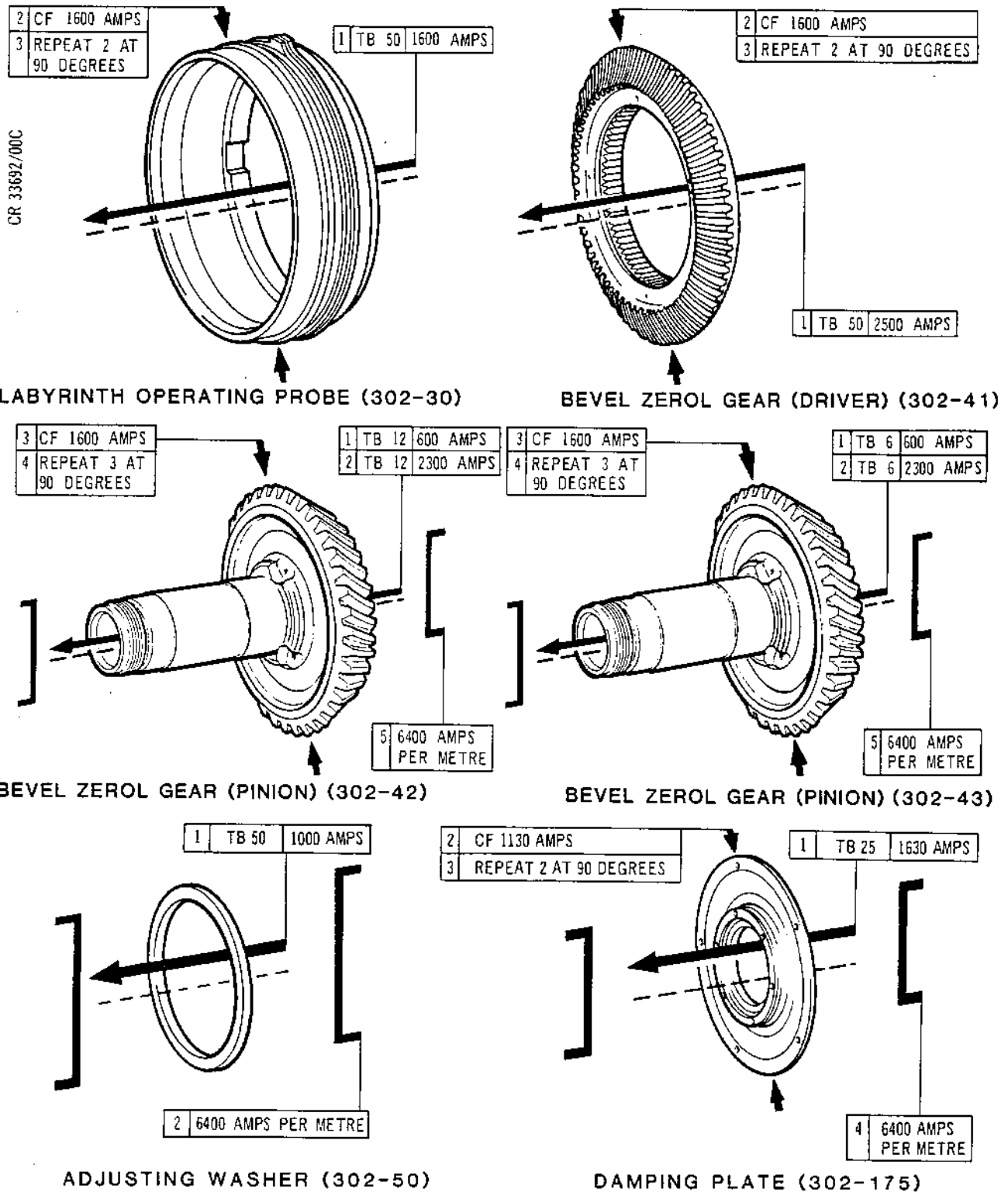
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Table 302

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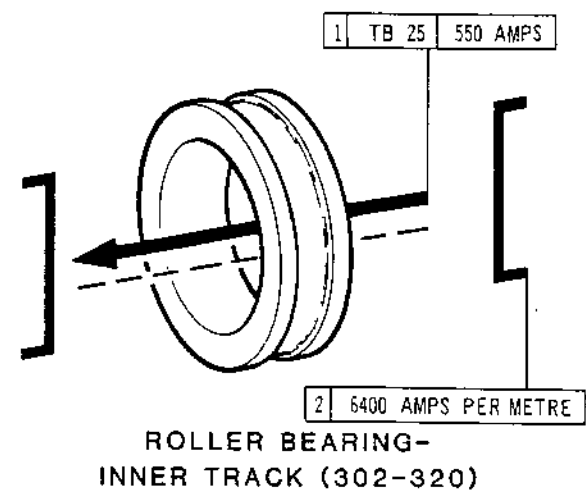
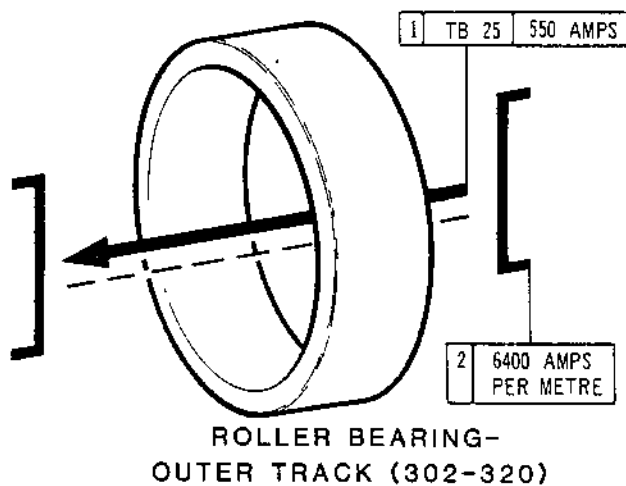
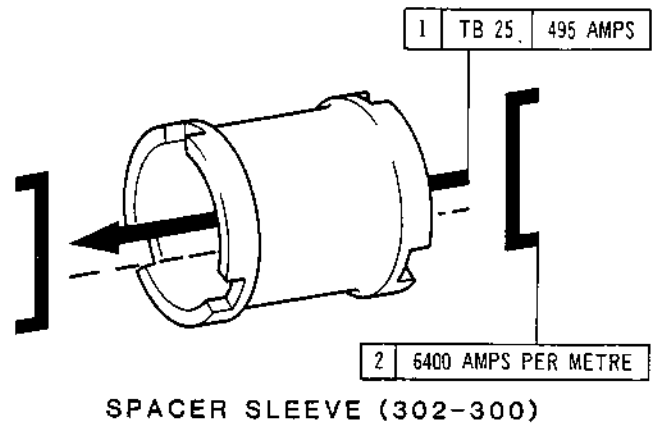
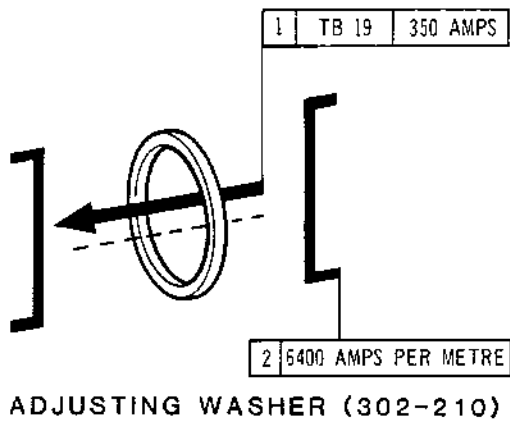
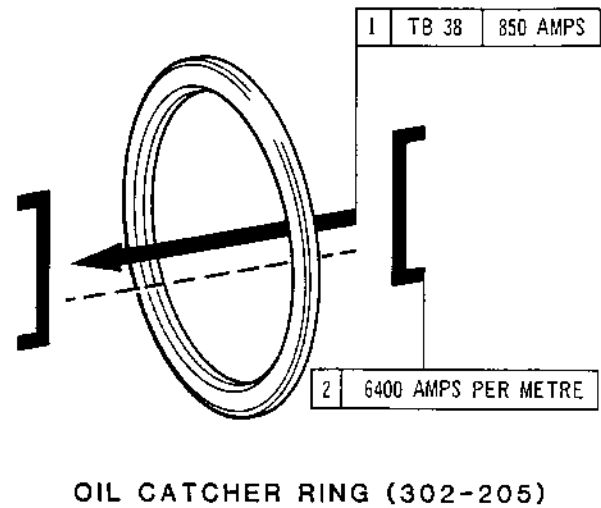
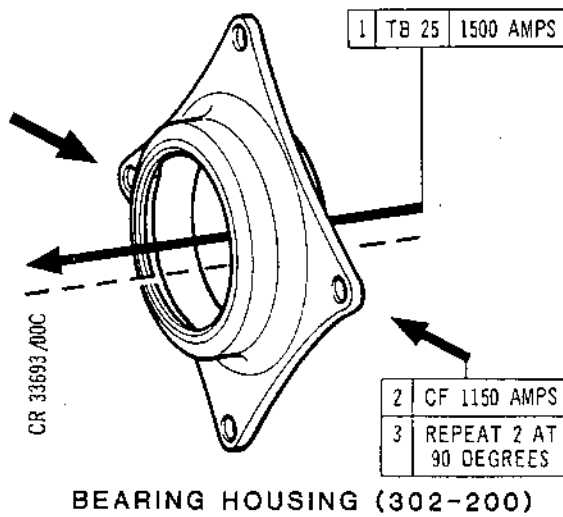
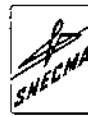
Crack Detection Test Diagram
Figure 301 (Sheet 1)



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Crack Detection Test Diagram
Figure 301 (Sheet 2)

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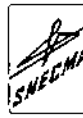
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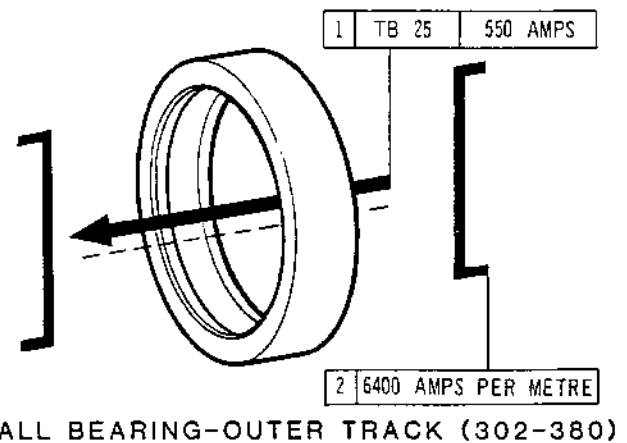
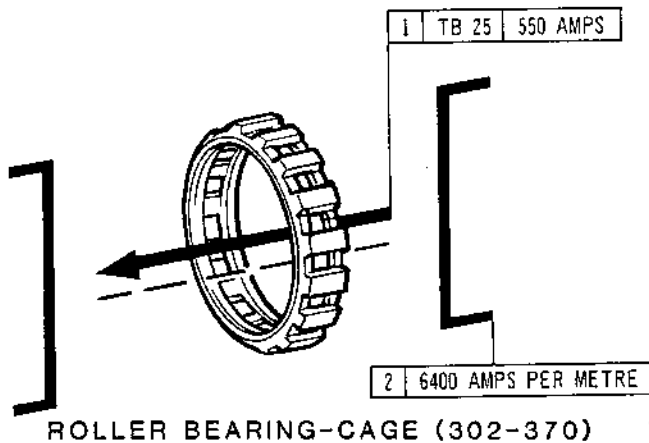
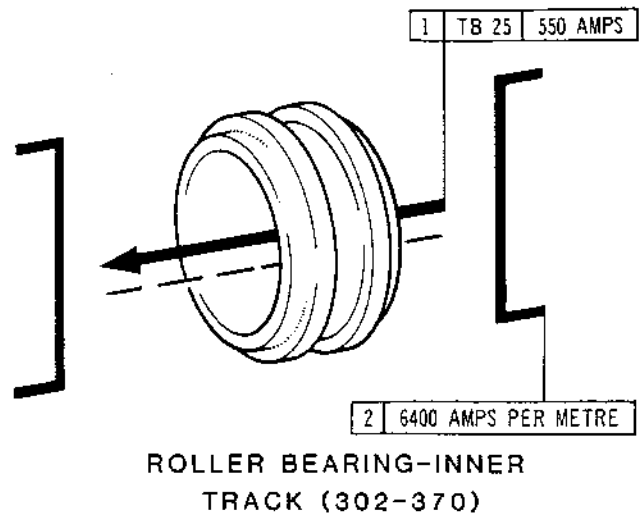
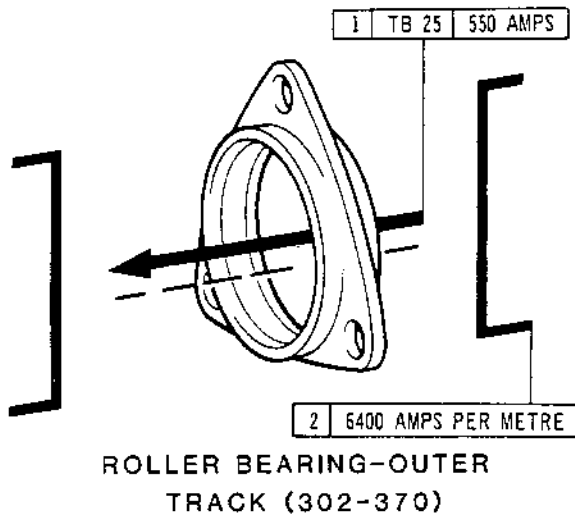
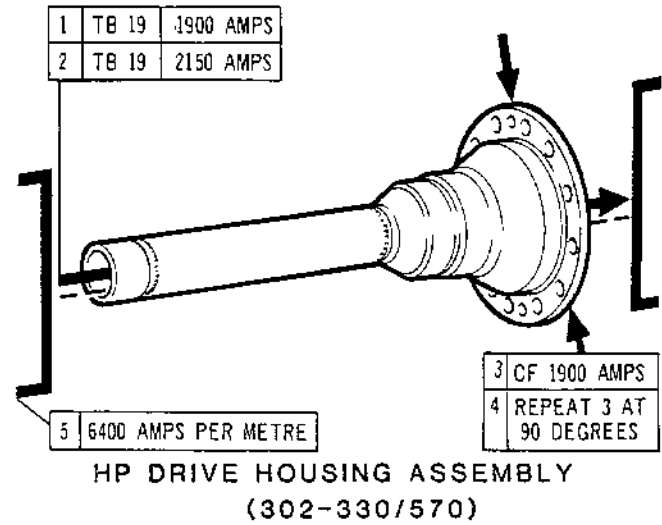
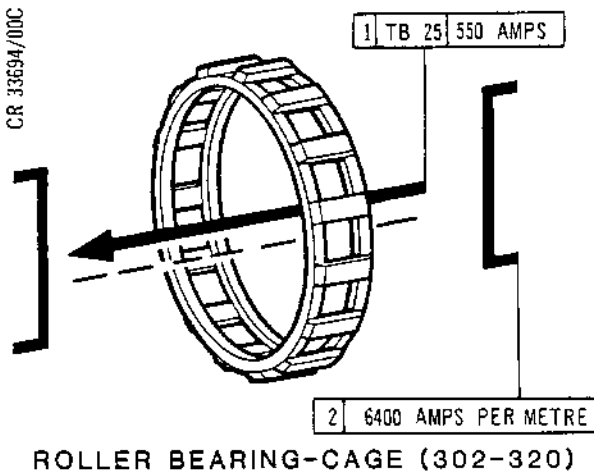
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Crack Detection Test Diagram
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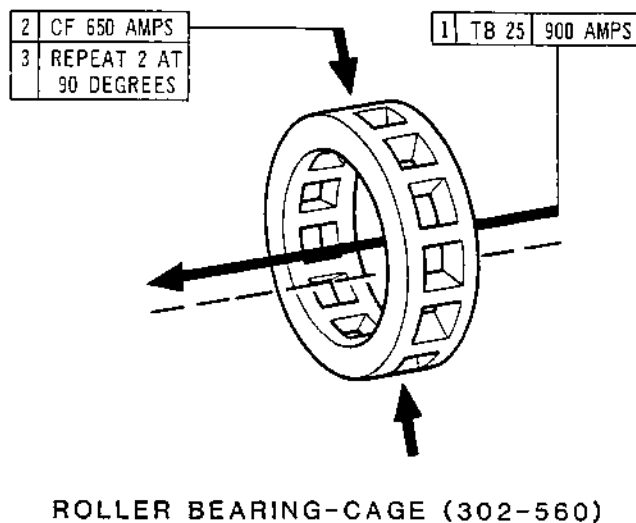
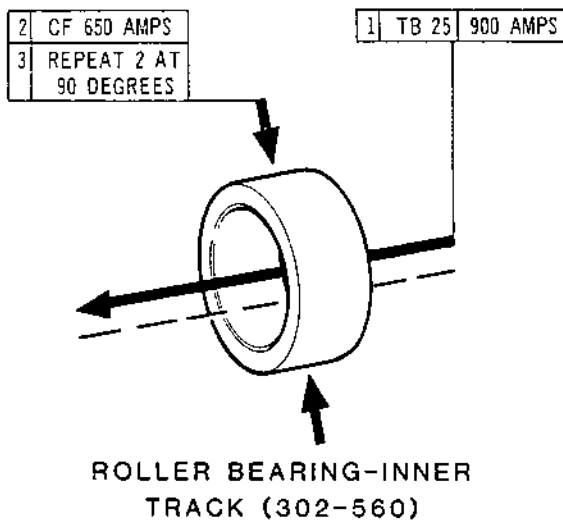
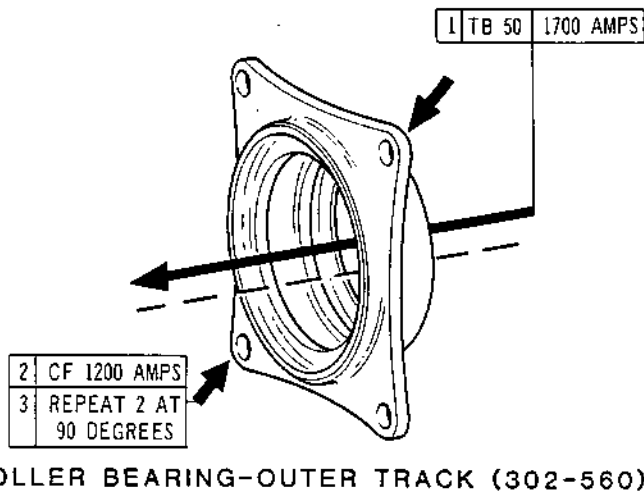
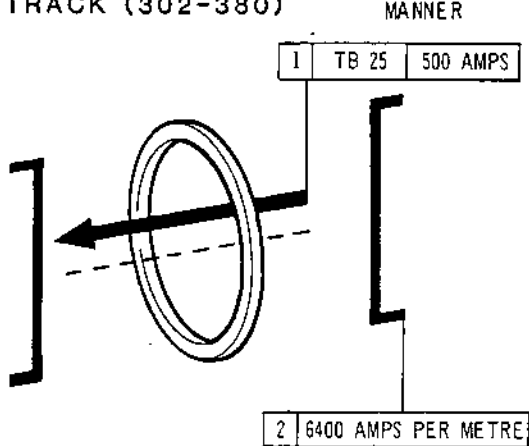
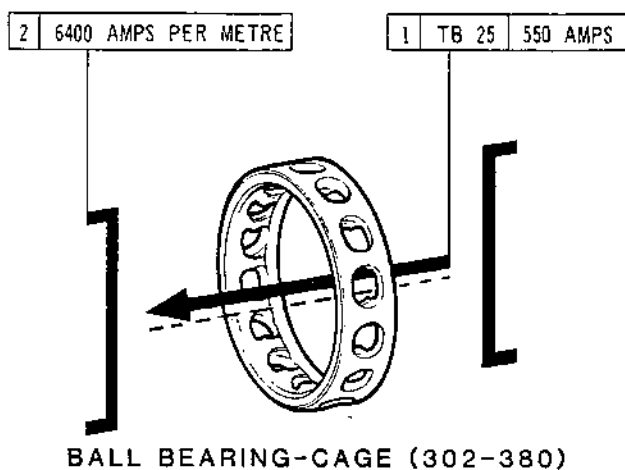
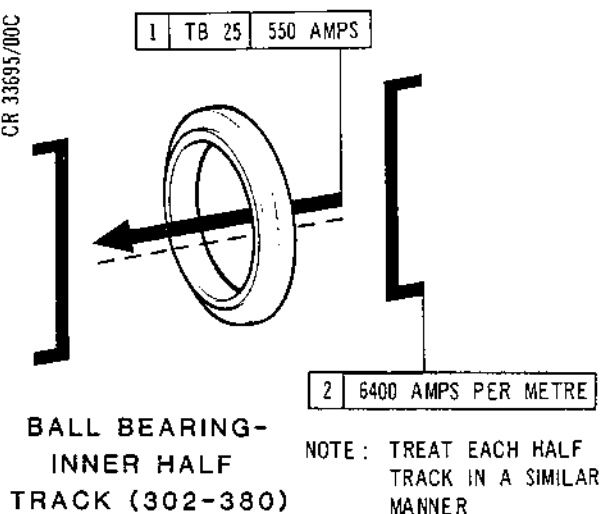
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Crack Detection Test Diagram
Figure 301 (Sheet 4)

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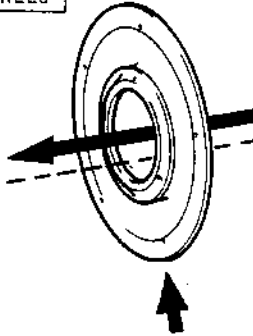
- | | |
|---|------------------------|
| 2 | CF 1060 AMPS |
| 3 | REPEAT 2 AT 90 DEGREES |

- | | | |
|---|-------|-----------|
| 1 | TB 25 | 1560 AMPS |
|---|-------|-----------|

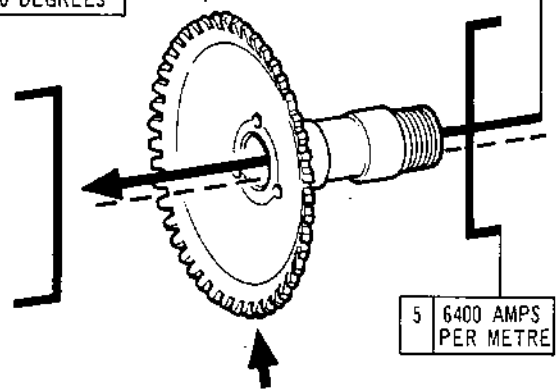
- | | |
|---|------------------------|
| 3 | CF 1150 AMPS |
| 4 | REPEAT 3 AT 90 DEGREES |

- | | | |
|---|-------|-----------|
| 1 | TB 12 | 650 AMPS |
| 2 | TB 12 | 1700 AMPS |

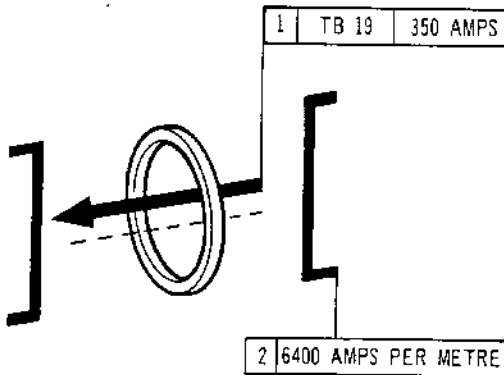
CR 35908/00A



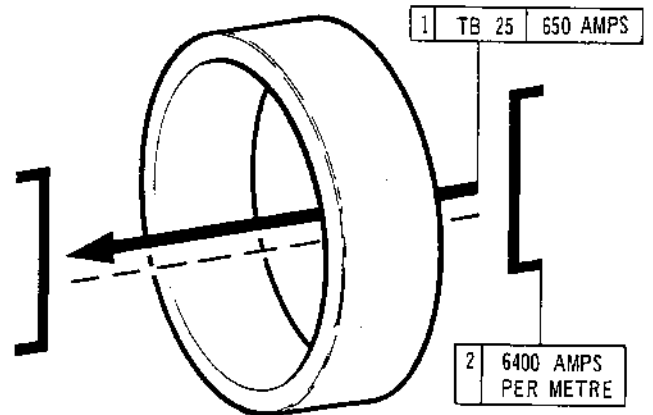
DAMPING PLATE (302-565)



BEVEL ZEROL GEAR (303-20)



ADJUSTING WASHER (303-30)



ROLLER BEARING-OUTER TRACK (303-140)

Crack Detection Test Diagram
Figure 301 (Sheet 5)

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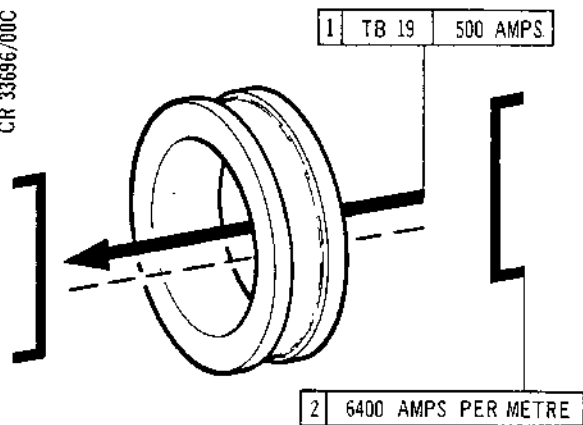


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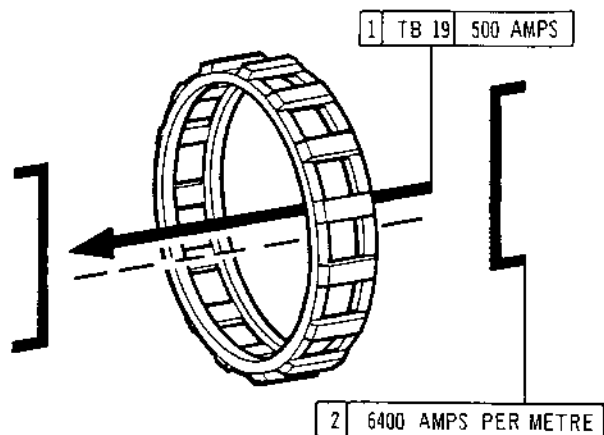
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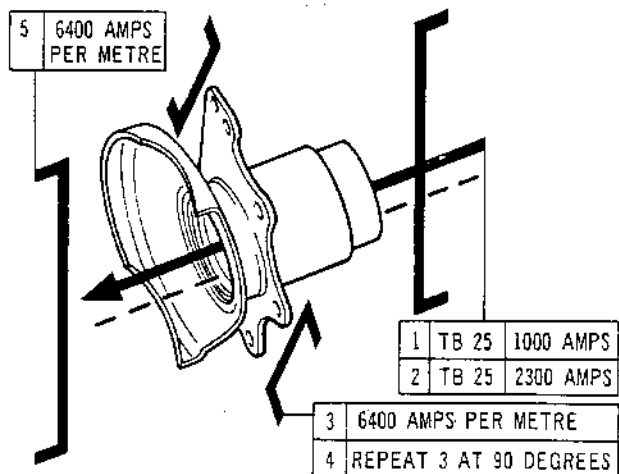
CR 33696/00C



ROLLER BEARING-INNER TRACK (303-140)



ROLLER BEARING-CAGE (303-140)



BEARING HOUSING ASSEMBLY (303-180)

Crack Detection Test Diagram
Figure 301 (Sheet 6)

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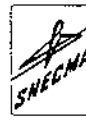
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FIG.NO. ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-61-00	Fig.1
303	72-61-00	Fig.2

**Cross References to Illustrated Parts Catalogue
Table 303****4. Retaining Nut (302-10)****A. Inspect Threads (Ref.72-09-00 Inspection/Check).****B. Inspect Spanner Locations.****(1) Nicks and burrs.****Accept after
repair.****C. Inspect Silver Plating.****(1) Damage or wear.****Reject for re-
plating (Ref.
72-09-08, Repair).****5. Locking Washer (302-20)****A. Inspect Locking Washer (Ref.72-09-00 Inspection/Check).****6. HP Labyrinth Operating Probe (Thrust Bearing Failure Ring
302-30)****A. Carry Out Dimensional Checks (Ref.72-61-00 Fits and
Clearances F.C.S. 601-61/62/63).****NOTE:** These checks are to be carried out in conjunction
with the Static Labyrinth Ring (Ref. I.P.C.
72-32-00/5-30), the Static Seal Ring Housing
Assembly (Ref. I.P.C.72-32-00/5-40) and the Bevel
Zerol Gear Assembly (302-40).**B. Inspect Labyrinth Seal Housing Bore.****(1) Nicks and burrs.****Accept after repair.****(2) Grooving.****(a) Any damage greater than
(b).****Accept after repair.****INSPECTION/CHECK****72-61-00****Page 309
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- (b) Any number of grooves, provided that they are all contained within an arc not greater than 60 degrees of bore mean circumference, that maximum depth is not greater than 0.005 in. (0,130 mm) and that F.C.S. limits are not violated.

Accept.

(3) Distortion.

- (a) Provided that minimum local clearance is not more than 0.006 in. (0,150 mm) below the minimum permissible dimension in the F.C.S.

Accept.

C. Inspect Labyrinth Seal.

(1) Fin damage.

- (a) Any damage greater than (b).

Accept after repair.

NOTE: Any damage greater than (b) may require reforming (Ref.72-61-00 Repair No.1).

- (b) Damage to fins.

Accept after repair provided, that only one blend is made to each fin, that finished blends are not more than one-half fin depth deep or five times fin depth long, that all blends on adjacent blades are separated radially by not less than five times fin depth at their ends, and that F.C.S. limits are not violated.

(2) Nicks and burrs.

Accept after repair.

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D. Inspect Knocker Lobes.

- (1) Nicks and burrs.

Accept after
repair.

E. Inspect Locking Washer Locations.

- (1) Nicks and burrs.

Accept after
repair.

7. Bevel Zerol Gearshaft Assembly (302-40)

- A. Carry Out Dimensional Checks (Ref.72-61-00 Fits and Clearances F.C.S. 601-61/77, 602-415/418/420/423/428/431/432/435/439/441).

NOTE: Carry out these checks in conjunction with the following components, Labyrinth Probe (302-30), Oil Baffle (Ref. I.P.C.72-32-00/2-100), Spacer Sleeve (302-390), Roller Bearing (302-370), Ball Bearing (302-380), Roller Bearing (302-560), Roller Bearing (303-140), Ball Bearing (302-290), Spacer Sleeve (302-300), Roller Bearing (302-320), Inner Distance Piece (303-150), Ball Bearing (303-170).

- B. Inspect Threads (Ref.72-09-00 Inspection/Check).

- C. Inspect Splines (Ref.72-09-00 Inspection/Check).

- D. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

- (1) Wear on non-working surfaces.

- (a) Fretting not more than
0.002 in. (0,050 mm)
in depth.

Accept after
repair.

- (2) Nicks and burrs on non-working
surfaces.

Accept after
repair.

- (3) Wear on working surfaces.

Accept subject to
F.C.S. checks on
assembly.

8. Adjusting Washer (302-50 to 170, 210 to 275, 410 to 460, 470 to 550 and 303-30 to 115)

NOTE: These items may require selection during assembly.

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A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores.

Accept provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

- (2) Fretting and wear.

Reject.

9. Bearing Housing (302-200)

- A. Carry Out Dimensional Checks (Ref.72-09-00 Fits and Clearances F.C.S. 602-429).

NOTE: Carry out these checks in conjunction with Ball Bearing (302-290).

B. Inspect Bearing Housing.

- (1) Nicks and burrs.

Accept after repair.

- (2) Wear.

- (a) Smooth wear within F.C.S. limits.

Accept.

- (3) Scoring.

- (a) Not more than 0.010 in. (0,250 mm) in depth.

Accept after repair providing repair does not violate F.C.S. limits.

10. Ball and Roller Bearings (302-290/320/370/380/560/, 303-140/170)

- A. Inspect Bearing (Ref.72-09-00 Inspection/Check).

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- B. Carry Out Dimensional Checks (Ref.72-61-00 Fits and Clearances F.C.S. 602-416/417/418/420/421/422/426/427/428/429/430/431/433/434/435/441/442/443).

NOTE: Carry out these checks in conjunction with HP Drive Housing (302-570), Bevel Zerol Gears (302-40), Bearing Housing (303-180), Bevel Zerol Gear (303-20), Bearing Housing (302-200), HP Drive Housing (302-330).

11. Spacer Sleeves (302-300/390)

- A. Carry Out Dimensional Checks (Ref.72-61-00 Fits and Clearances F.C.S. 602-415/432).

NOTE: Carry out these checks in conjunction with Bevel Zerol Gear (302-40).

- B. Inspect Spacer Sleeves.

(1) Nicks and burrs.

Accept after
repair.

12. HP Drive Housing Assembly (302-330/570)

- A. Inspect Threads (Ref.72-09-00 Inspection/Check).

- B. Carry Out Dimensional Checks (Ref.72-61-00 Fits and Clearances F.C.S. 602-416/422/433).

NOTE: Carry out these checks in conjunction with Ball and Roller Bearings (302-320/370/380).

- C. Inspect Drive Housing.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Bolt holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

(b) Smooth wear in bearing
location within F.C.S.
limits.

Accept.

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D. Inspect Metaflex Seal Location.

(1) Damage. Reject.

E. Inspect Drive Shaft Tube.

(1) Dents (Ref.72-09-00 Inspection/Check Rigid Tubes).

(a) Dents at seal boss location. Reject.

(2) Wear.

(a) Fretting at seal boss location. Reject.

F. Inspect Attachment Flange.

(1) Nicks and burrs. Accept after repair.

(2) Scores.

(a) Not more than 0.010 in.
(0,250 mm) in depth. Accept after repair.

13. Metaflex Seal (302-345/590)

A. Inspect Metaflex Seal.

(1) Damage.

(a) Spot weld failure. Reject.

(b) Any other damage. Accept if checks during assembly are satisfactory.

14. Outer Spacer Sleeve (302-400)

A. Inspect Outer Spacer Sleeve Abutment Faces.

(1) Nicks and burrs. Accept after repair.

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(2) Wear.

(a) Any fretting.

Reject.

15. Bevel Zerol Gear (303-20)

- A. Inspect Threads (Ref.72-09-00 Inspection/Check).
- B. Inspect Splines (Ref.72-09-00 Inspection/Check).
- C. Carry Out Dimensional Checks (Ref.72-61-00 Fits and Clearances F.C.S. 602-428/439/441).

NOTE: Carry out these checks in conjunction with Roller Bearing (303-140), Inner Distance Piece (303-150), and the Ball Bearing (303-170).

- D. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

(1) Wear on non-working surfaces.

(a) Fretting not more than
0.002 in. (0.050 mm)
in depth.

Accept after
repair.

(2) Nicks and burrs on non-working
surfaces.

Accept after
repair.

(3) Wear on working surfaces.

Accept subject to
F.C.S. checks on
assembly.

16. Inner Distance Piece (303-150)

- A. Carry Out Dimensional Check (Ref.72-61-00 Fits and Clearances F.C.S. 602-439).

NOTE: Carry out this check in conjunction with the Bevel Zerol Gear (303-20).

- B. Inspect Distance Piece Abutment Faces.

(1) Wear.

(a) Any wear.

Reject.

(2) Nicks and burrs.

Accept after
repair.

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17. Outer Distance Piece (303-160)

- A. Carry Out Dimensional Check (Ref.72-61-00 Fits and Clearances F.C.S. 602-444).

NOTE: Carry out this check in conjunction with the Bearing Housing Assembly (303-180).

- B. Inspect Distance Piece Abutment Faces.

(1) Wear.

(a) Any wear.

Reject.

(2) Nicks and burrs.

Accept after repair.

18. Bearing Housing Assembly (303-180)

- A. Carry Out Dimensional Checks (Ref.72-61-00 Fits and Clearances F.C.S. 602-426/443/444).

NOTE: Carry out these checks in conjunction with Roller Bearing (303-140), Ball Bearing (303-170) and Outer Distance Piece (303-160).

(1) Alignment.

(a) Bearing housing mounting flange not normal to bearing location axis.

Reject.

- B. Inspect Bearing and Distance Piece Locations.

(1) Scores.

(a) Not more than 0.005 in. (0,130 mm) in depth.

Accept after repair providing repair does not violate F.C.S. limits.

(2) Nicks and burrs.

Accept after repair providing repair does not violate F.C.S. limits.

- C. Inspect Retaining Ring Groove.

(1) Nicks and burrs.

Accept after repair.

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D. Inspect Bearing Housing Mounting Flange.

(1) Wear.

- | | | |
|-----|--|----------------------|
| (a) | Reduction of material thickness not more than 10 per cent. | Accept. |
| (b) | Bolt holes elongated not more than 0.015 in. (0,380 mm). | Accept after repair. |

(2) Scores.

- | | | |
|-----|---|----------------------|
| (a) | Not more than 0.005 in. (0,130 mm) in depth at bolt head locations. | Accept after repair. |
|-----|---|----------------------|

(3) Nicks and burrs.

Accept after repair.

(4) Distortion.

- | | | |
|-----|--------------------------------|---------|
| (a) | Any distortion from true form. | Reject. |
|-----|--------------------------------|---------|

19. Housing Support (303-210)

A. Inspect Housing Support.

(1) Wear.

- | | | |
|-----|---|----------------------|
| (a) | Reduction of material thickness of not more than 10 per cent. | Accept. |
| (b) | Bolt holes elongated not more than 0.015 in. (0,380 mm). | Accept after repair. |

(2) Scores.

- | | | |
|-----|---|----------------------|
| (a) | Not more than 0.010 in. (0,250 mm) in depth at bolt head locations. | Accept after repair. |
|-----|---|----------------------|

(3) Nicks and burrs.

Accept after repair.

20. Self-locking Nuts (302-190/360, 303-10)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

- | | | |
|----|---|------------------------------------|
| B. | Inspect the self-locking feature of each nut to ensure that it has an elliptical feature and not a four lobe feature (Ref.SB.72-105). | Reject any four lobe featured nut. |
|----|---|------------------------------------|

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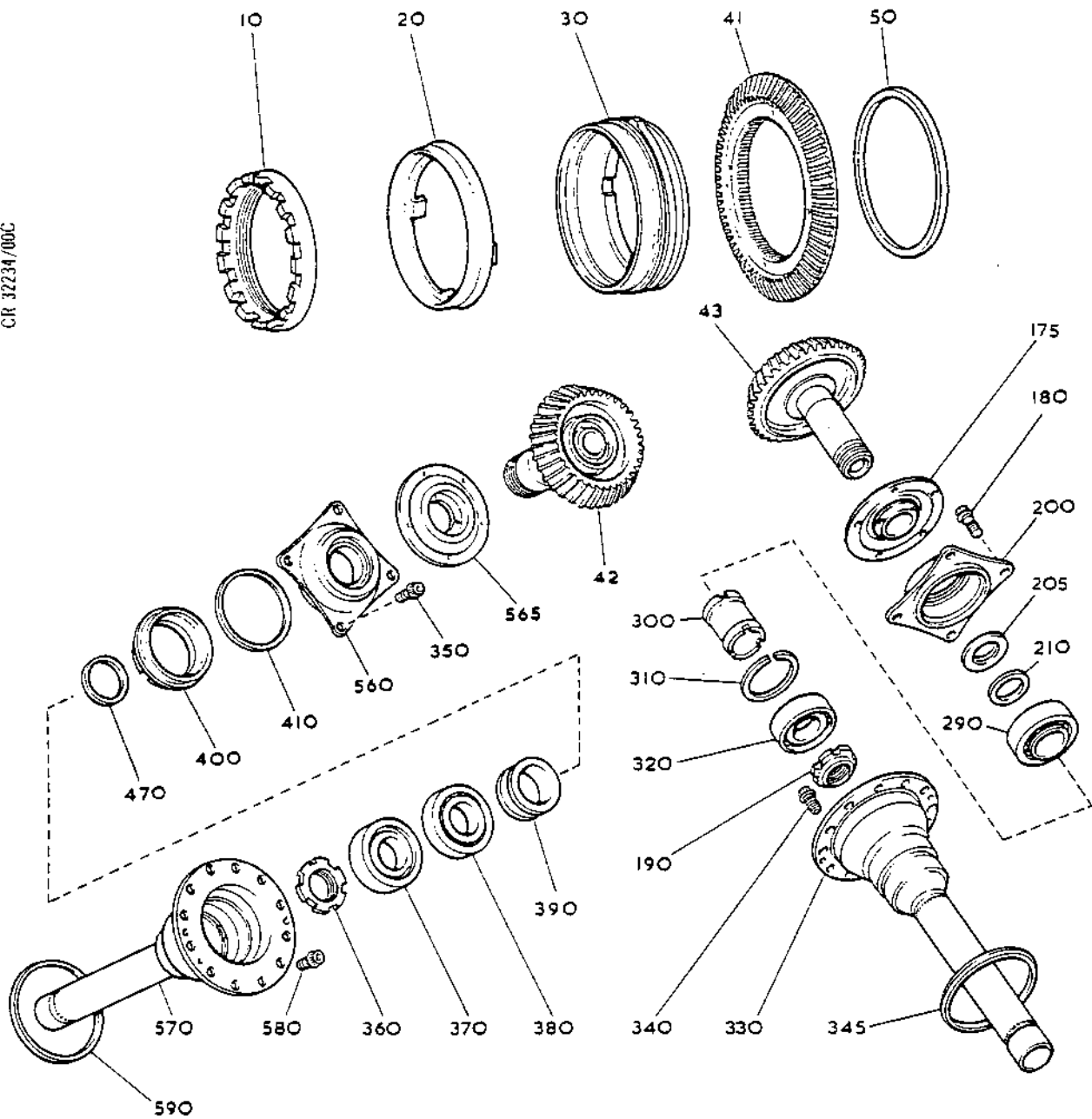


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LH and RH Accessory Gearboxes, Internal Accessory Drives
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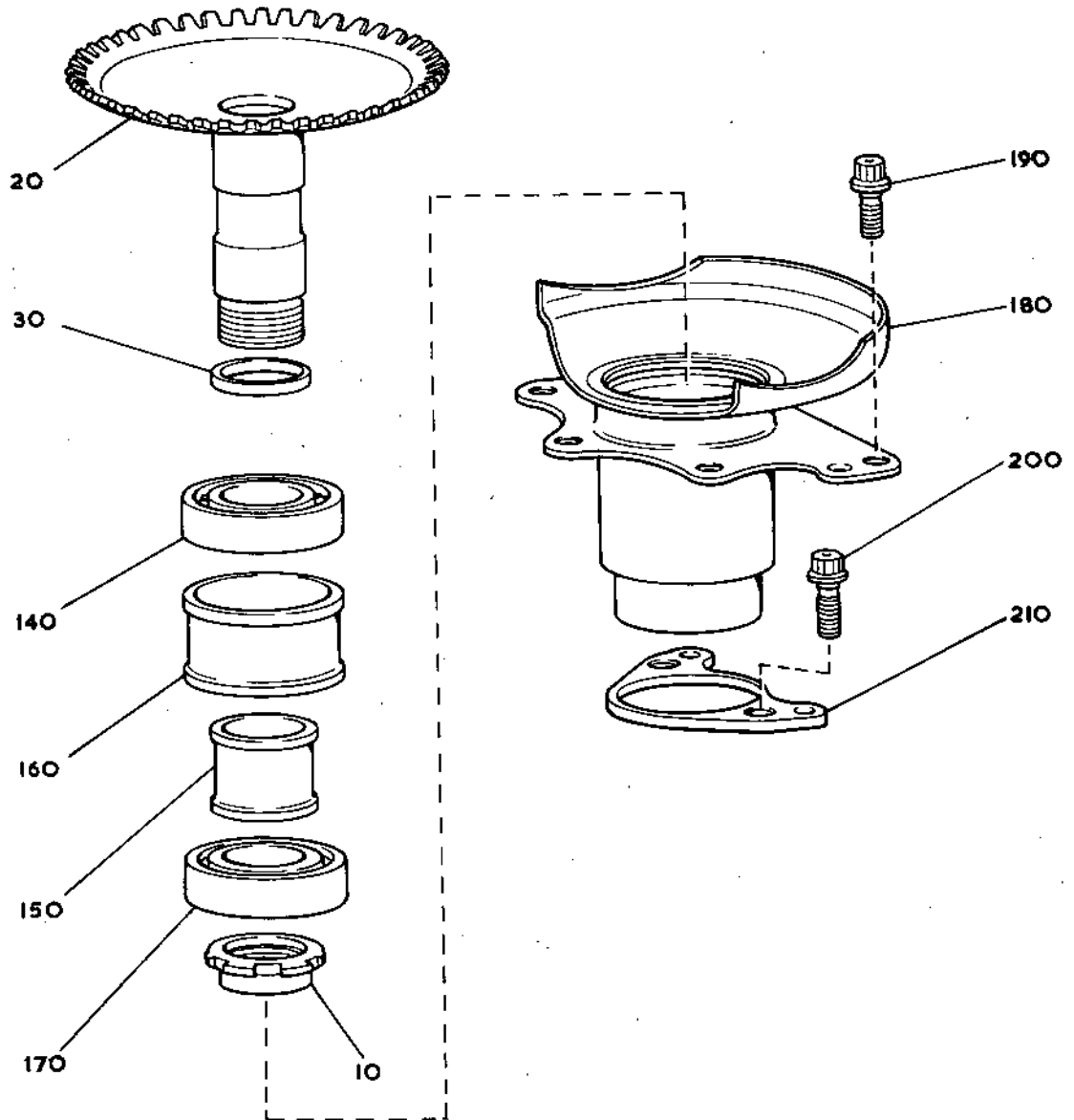
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LP Tacho Drive, Internal Accessory Drives
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LEFT-HAND ACCESSORY GEARBOX ASSEMBLY -
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LEFT-HAND ACCESSORY GEARBOX, ASSEMBLY - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
303	50	Flange Coupling	MP1
303	60	Coupling Ring	MP1
305	90	Externally Relieved Bolt	MP1
307	40	Flange Coupling	MP1
307	50	Coupling Ring	MP1
310	10	Shaft Self-locking Nut	MP1
310	40A	Adjusting Washer Pre SB.72-90	MP1
310	40B	Adjusting Washer SB.72-90	MP1
310	170	Idler Spur Gear Pre SB.72-90	MP1
310	135/136/ 137/138	Bevel Gearshaft Assembly SB.72-90	MP1
310	132	Bevel Gear Spiral Pre SB.72-90	MP1
310	133	Bevel Gear Pinion	MP1
310	150	Shaft Self-locking Nut	MP1
310	160	Parallel Roller Bearing - Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
310	180	Driving Shaft	MP1
310	200	Shaft Nut	MP1
310	270	Adjusting Washer	MP1
310	360	Parallel Roller Bearing - Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
311	10	Shaft Nut	MP1
311	20	Parallel Roller Bearing - Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
311	40	Shaft Nut	MP1

Items to be Magnetic Particle Crack Tested
Table 301 (Continued)

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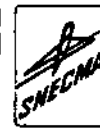


FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
311	50	Parallel Roller Bearing - Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
311	60	Idler Spur Gear	MP1
311	70	Retaining Nut	MP1
311	120	Shaft Nut	MP1
311	130	Parallel Roller Bearing - Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
311	140	Quillshaft	MP1
311	180	Gear Shaft	MP1
312	10	Retaining Nut	MP1
312	140	Bevel Zerol Gear Assembly	MP1
312	150	Shaft Nut	MP1
312	190	Quillshaft	MP1
312	200	Drive Shaft	MP1
312	240	Parallel Roller Bearing - Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
312	250	Plain Round Nut	MP1
312	290	Adjusting Washer	MP1
312	380A	Parallel Roller Bearing - Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
312	380B	Parallel Roller Bearing - Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
312	420	Bearing Housing	MP1

Items to be Magnetic Particle Crack Tested
Table 301 (Concluded)

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B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	130	Gearbox Mounting Bracket Rear	FlA
302	310	Gearbox Mounting Bracket Front	FlA
303	150	Retaining Bracket	FlA
304	40	Front Cover Assembly	FlA
305	360	Diaphragm	FlA
307	150	Bracket	FlA
308	200	Lifting Bracket Assembly	FlA
309	10	LH Gearbox Case Assembly	FlA
310	220A/B	Plate, Load Spreading	FlA
312	20	Cupwasher	FlA

Items to be Fluorescent Dye Crack Tested
Table 302

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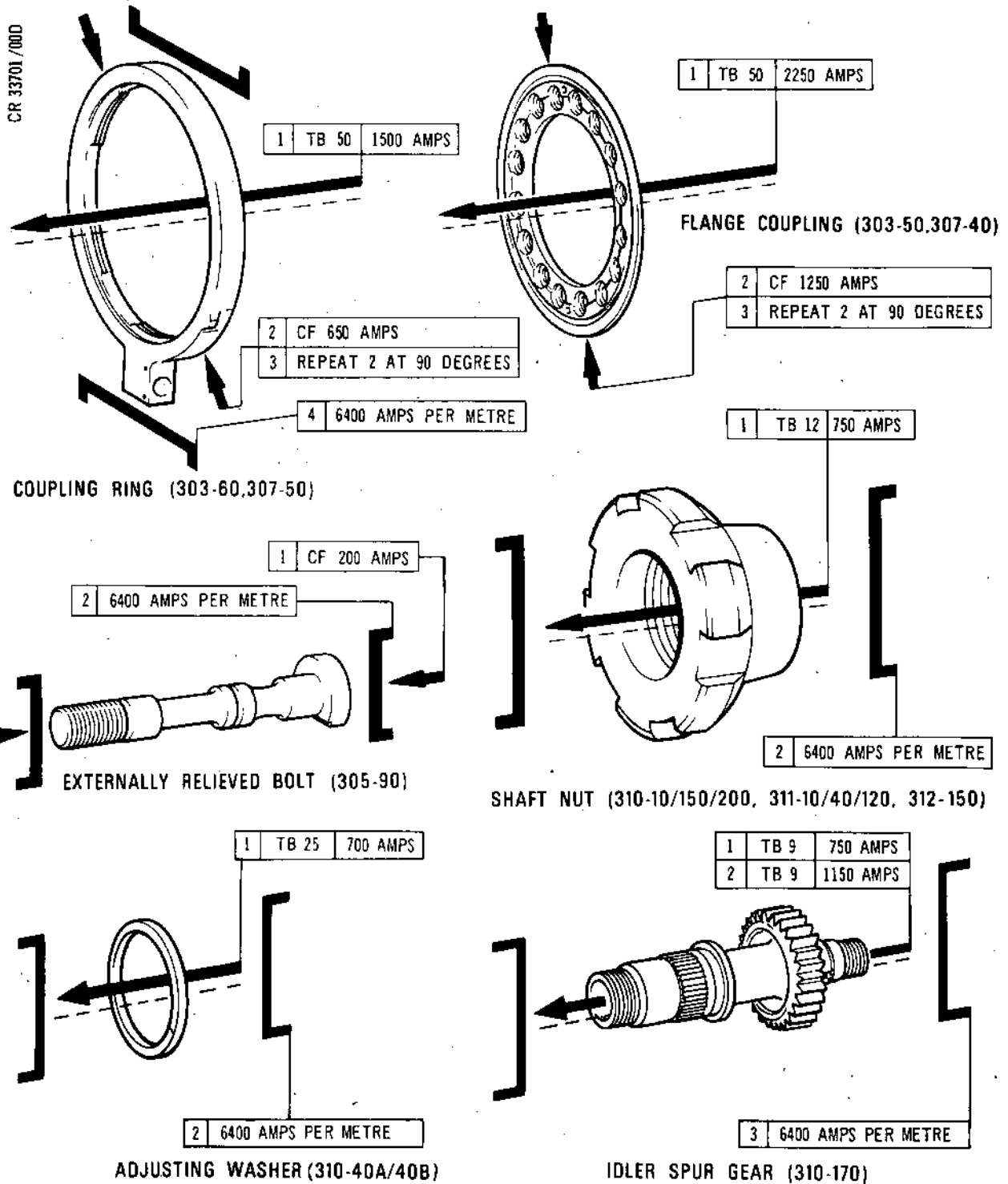


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Crack Detection Test Diagram
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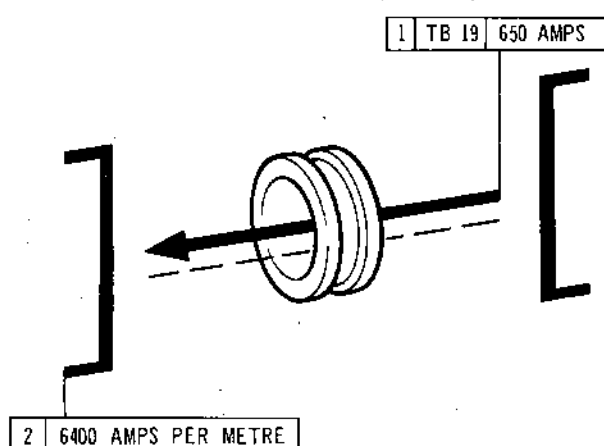
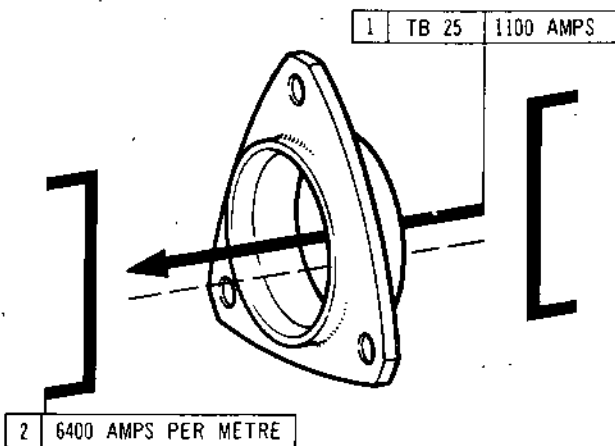
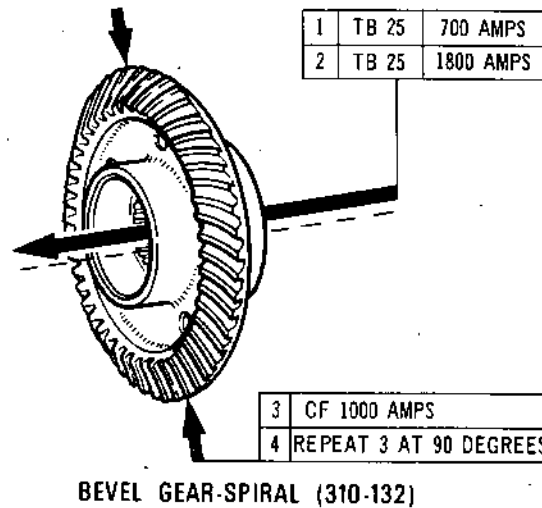
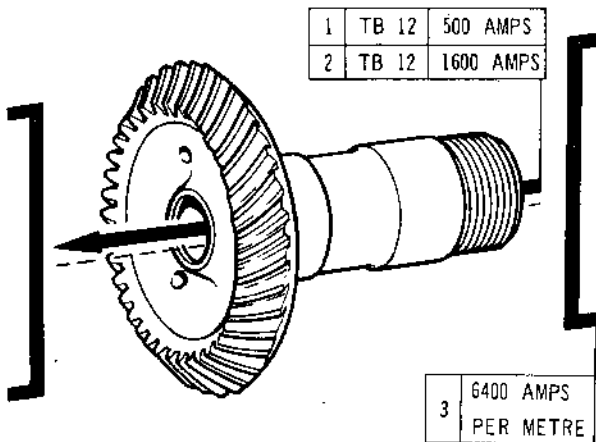
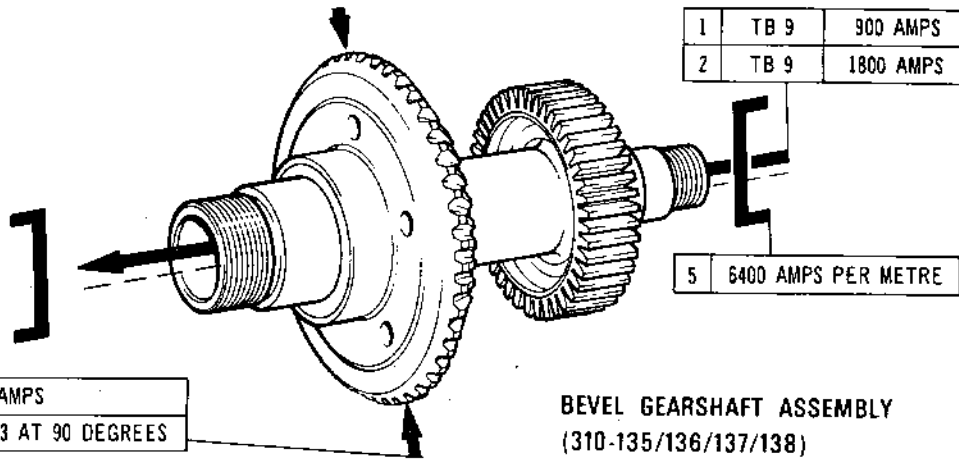
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CR 33702/00C



Crack Detection Test Diagram
Figure 301 (Sheet 2 of 10)

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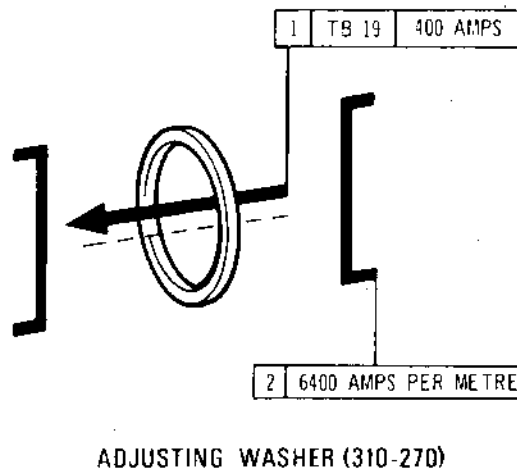
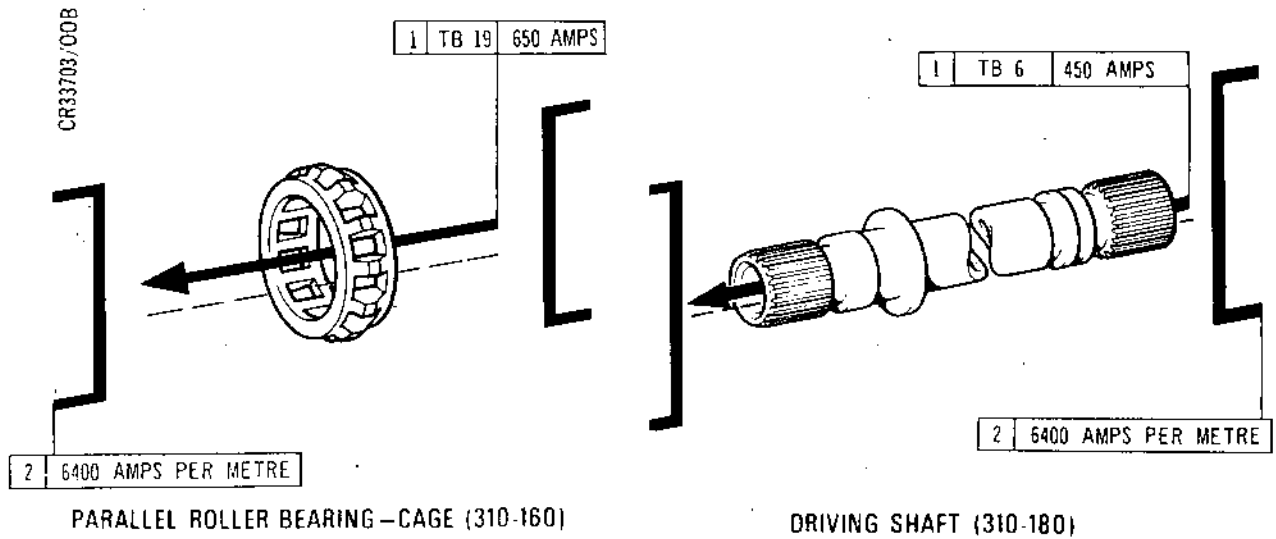


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Crack Detection Test Diagram
Figure 301 (Sheet 3 of 10)

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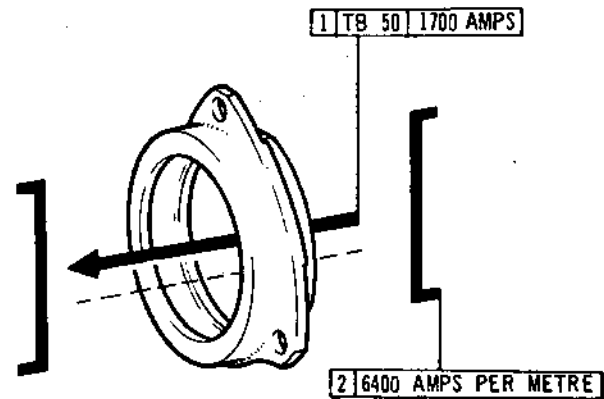


OLYMPUS 593

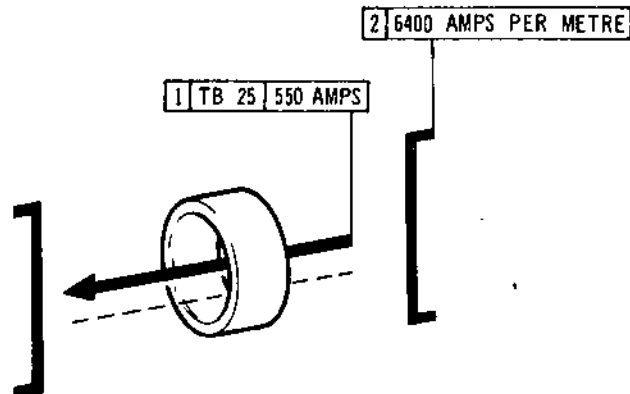
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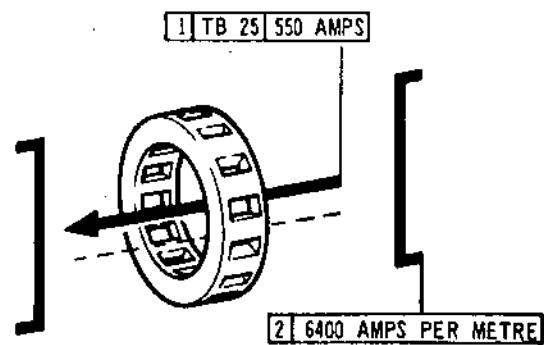
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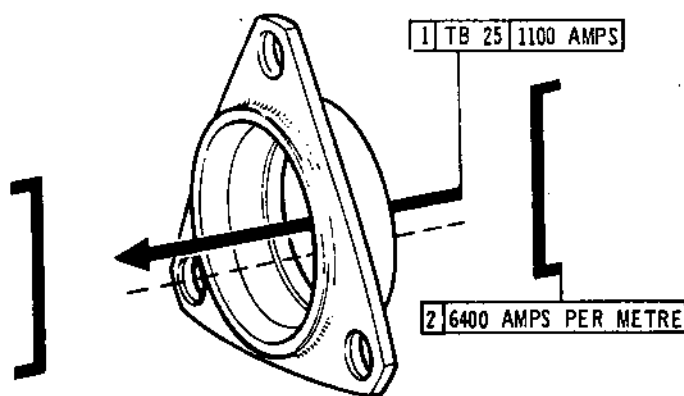
PARALLEL ROLLER BEARING - OUTER TRACK (310-360)



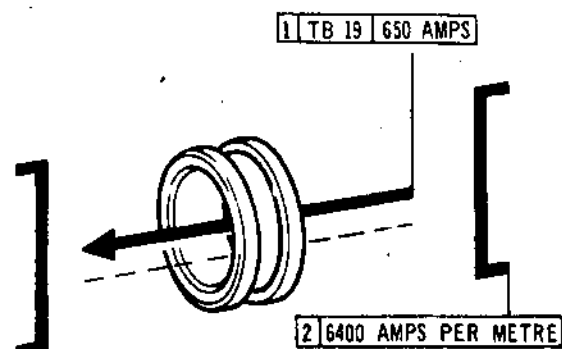
PARALLEL ROLLER BEARING - INNER TRACK (310-360)



PARALLEL ROLLER BEARING - CAGE (310-360)



PARALLEL ROLLER BEARING
OUTER TRACK (311-20)



PARALLEL ROLLER BEARING
INNER TRACK (311-20)

Crack Detection Test Diagram
Figure 301 (Sheet 4 of 10)

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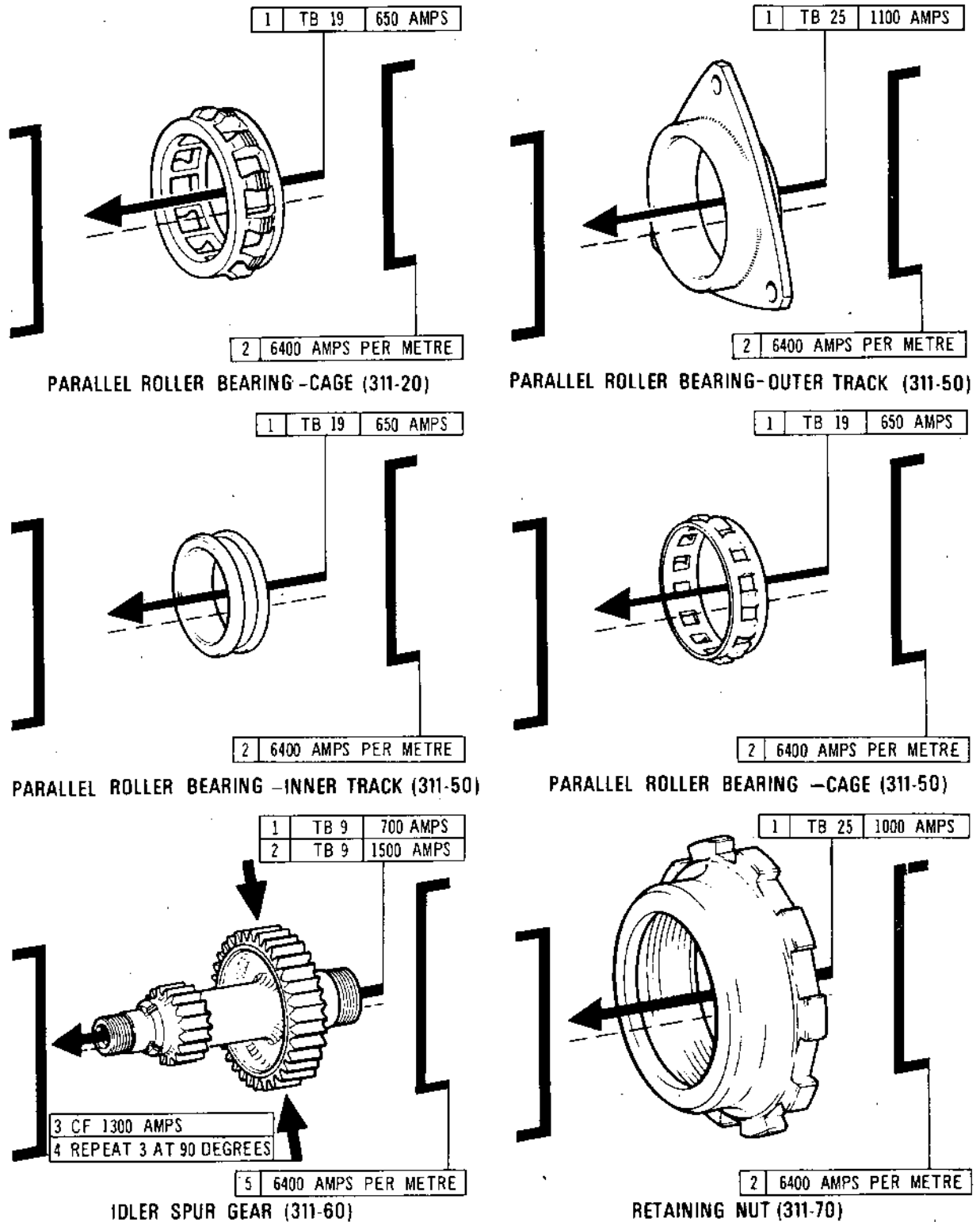
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CR 33705/00A



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Crack Detection Test Diagram
Figure 301 (Sheet 5 of 10)

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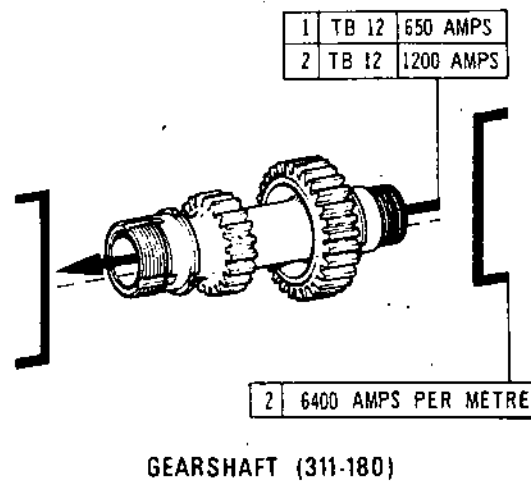
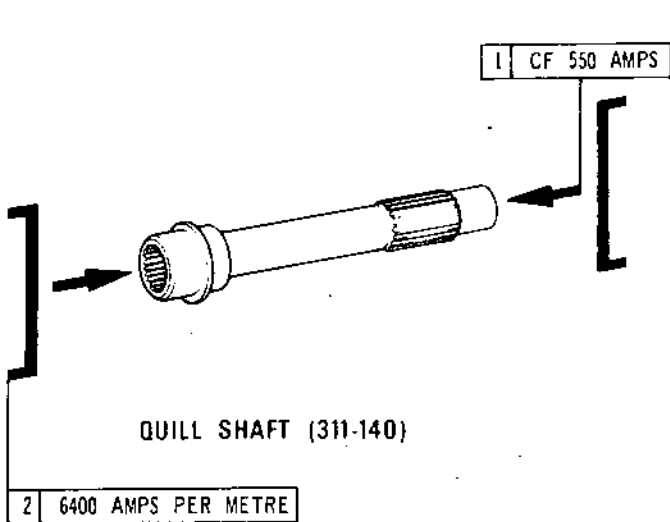
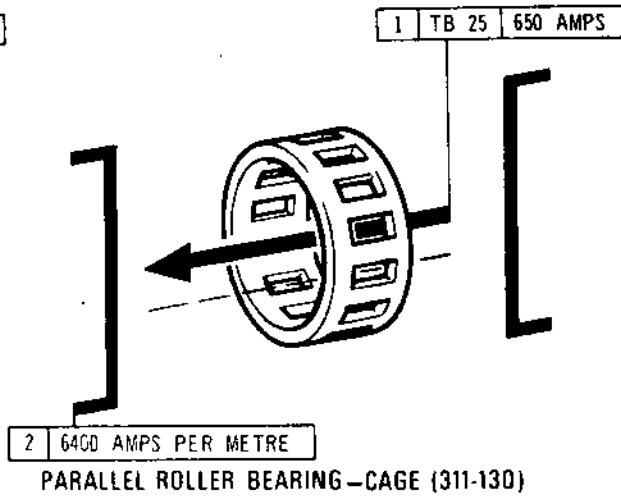
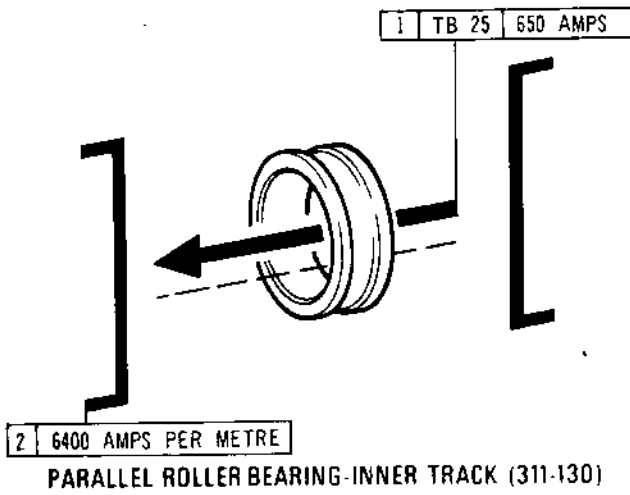
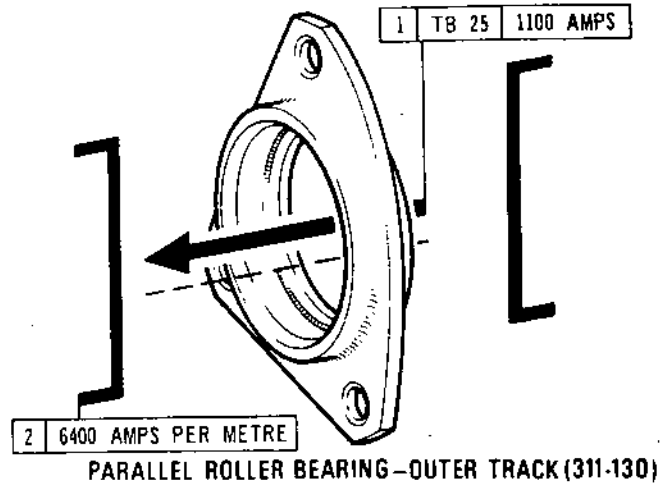
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Crack Detection Test Diagram
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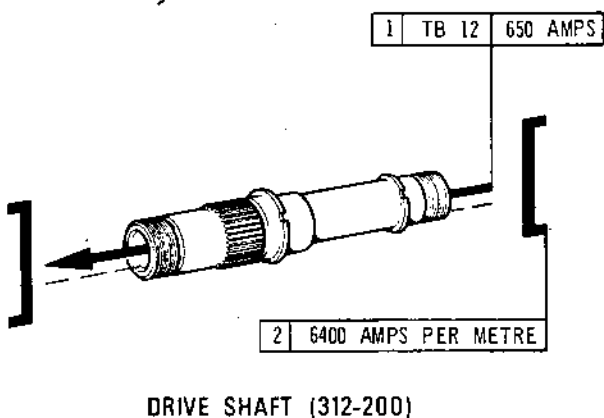
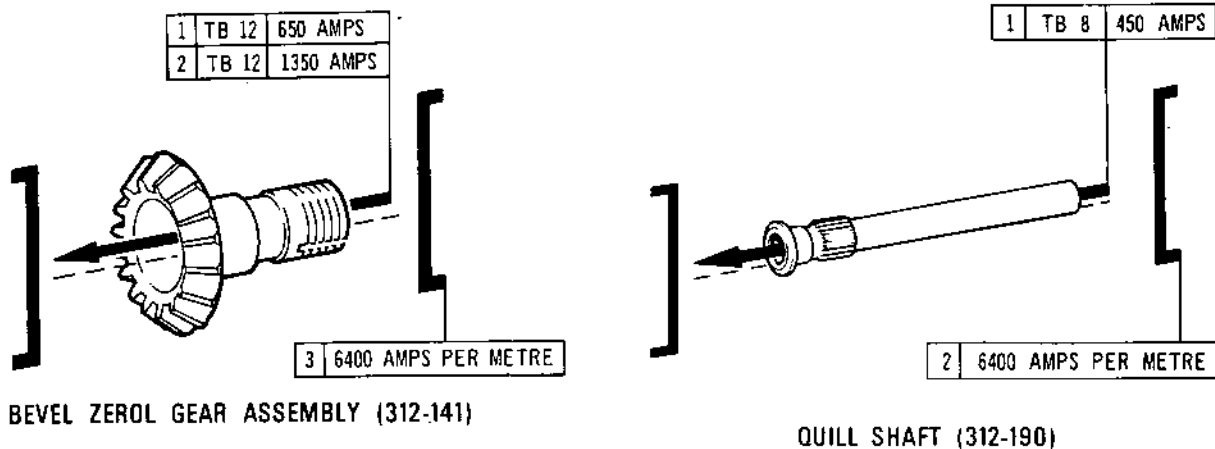
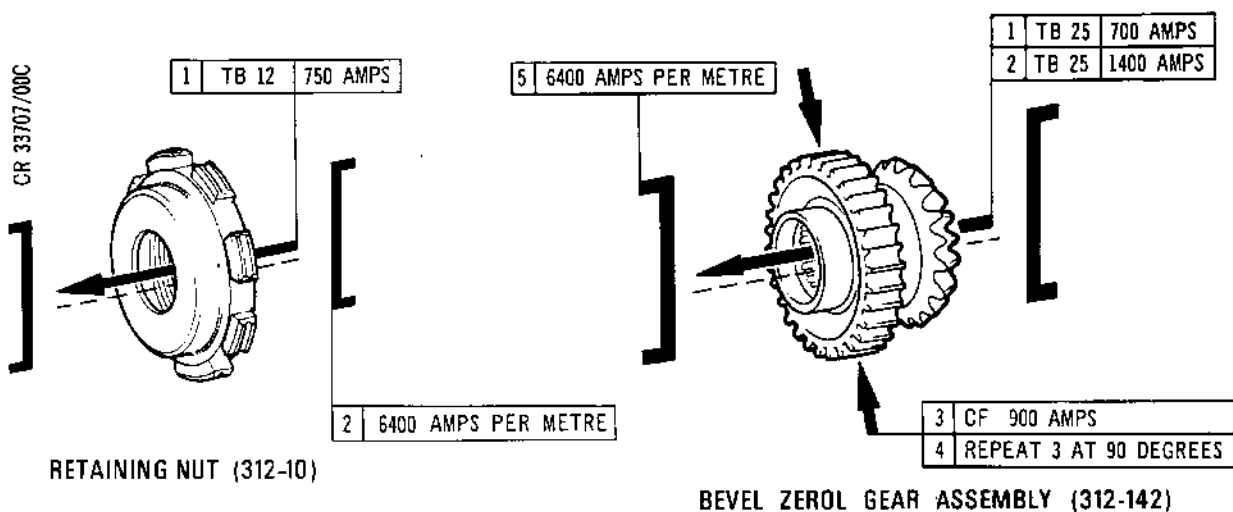
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Crack Detection Test Diagram
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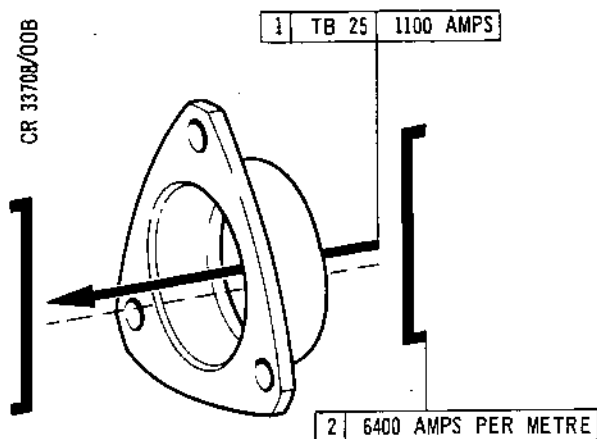


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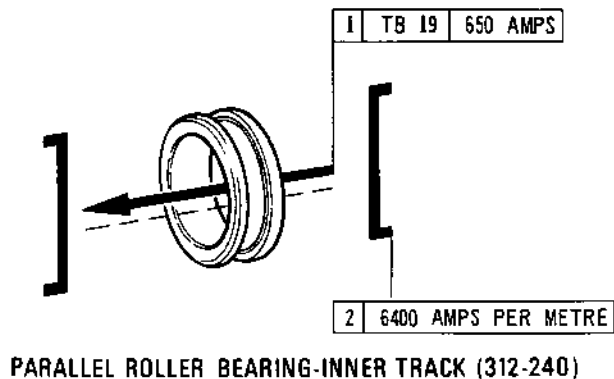
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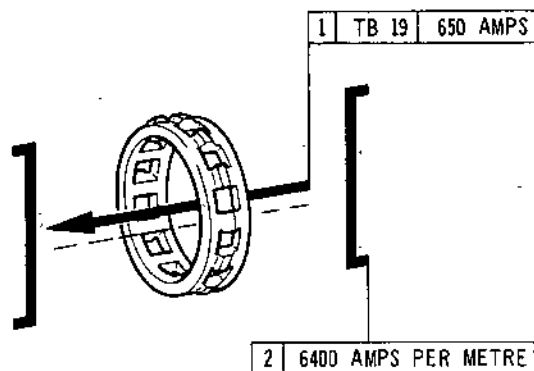
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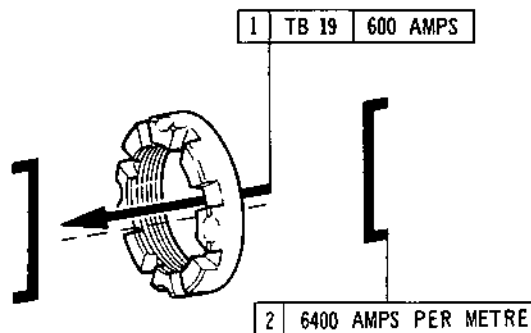
PARALLEL ROLLER BEARING-OUTER TRACK (312-240)



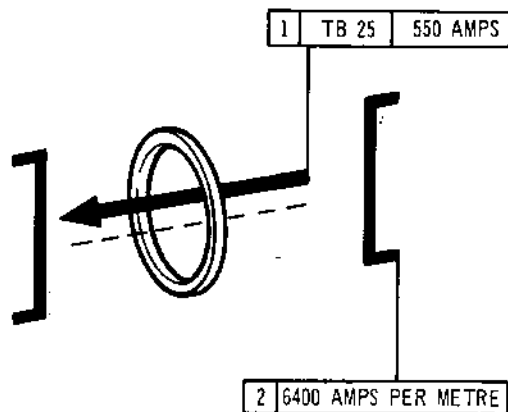
PARALLEL ROLLER BEARING-INNER TRACK (312-240)



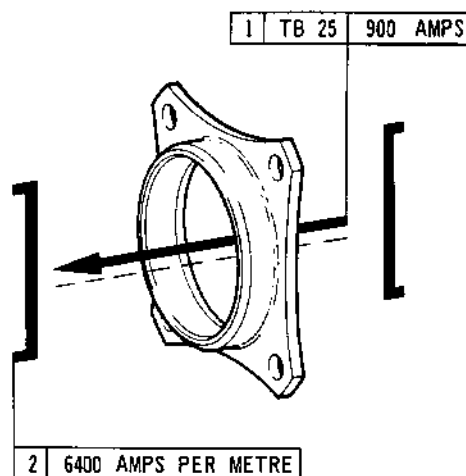
PARALLEL ROLLER BEARING-CAGE (312-240)



PLAIN ROUND NUT (312-250)



ADJUSTING WASHER 312-290



PARALLEL ROLLER BEARING-OUTER TRACK (312-380A)

Crack Detection Test Diagram
Figure 301 (Sheet 8 of 10)

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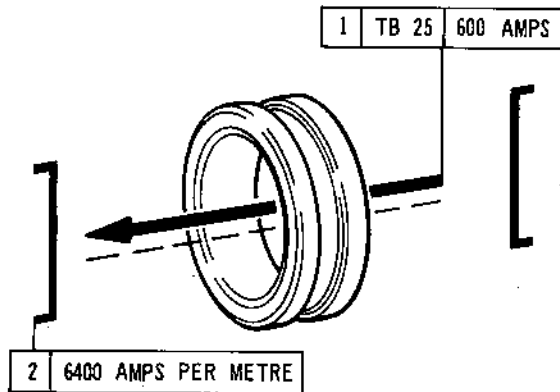


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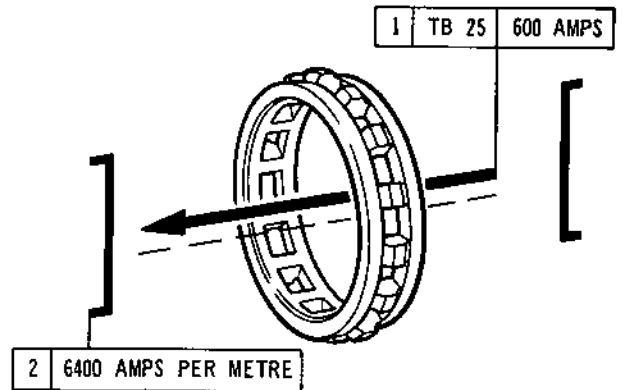
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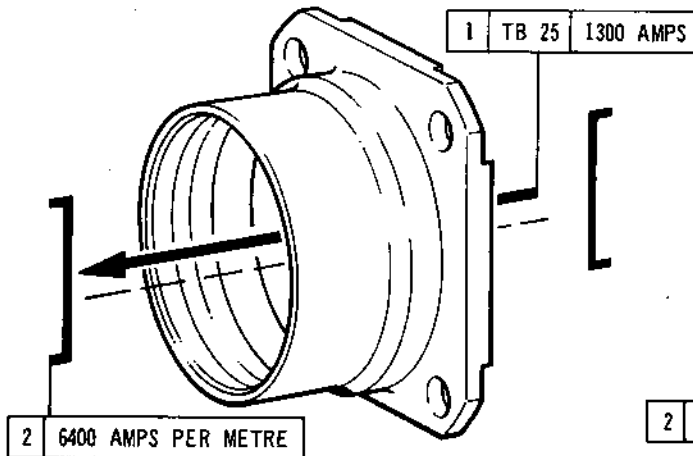
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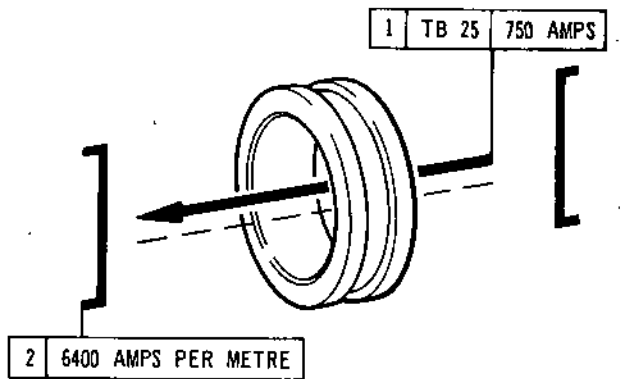
PARALLEL ROLLER BEARING-INNER TRACK (312-380A)



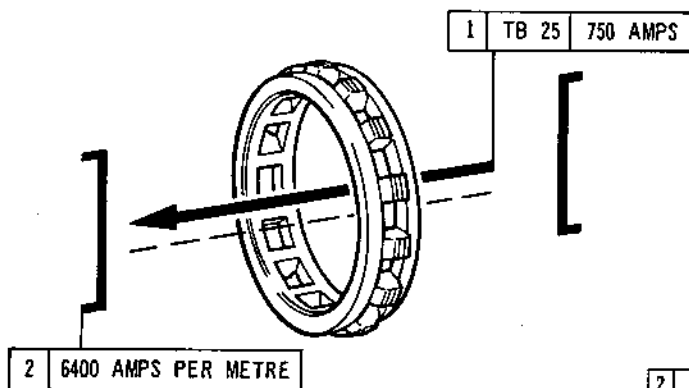
PARALLEL ROLLER BEARING-CAGE (312-380A)



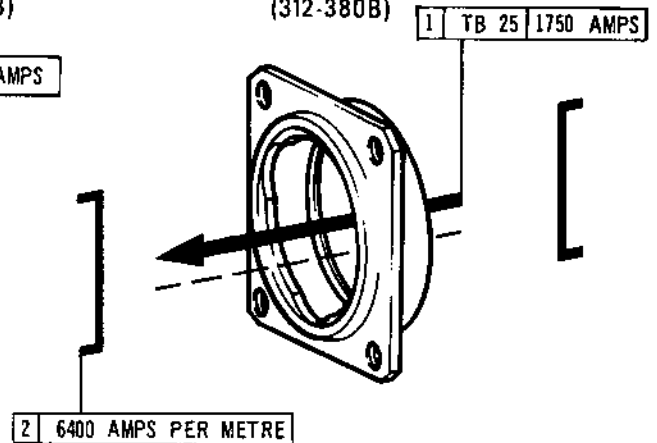
PARALLEL ROLLER BEARING -OUTER TRACK (312-380B)



PARALLEL ROLLER BEARING-INNER TRACK
(312-380B)



PARALLEL ROLLER BEARING-CAGE (312-380B)



BEARING HOUSING (312-420)

Crack Detection Test Diagram
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No current requirement

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FIG.NO. ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-62-01	Fig.1
303	72-62-01	Fig.2
304	72-62-01	Fig.3
305	72-62-01	Fig.4
306	72-62-01	Fig.5
307	72-62-01	Fig.6
308	72-62-01	Fig.7
309	72-62-01	Fig.8
310	72-62-02	Fig.1 and 1A
311	72-62-03	Fig.1
312	72-62-04	Fig.1

Cross Reference to Illustrated Parts Catalogue
Table 303

4. Adjusting Shim (302-10 to 65/140 to 185/220 to 275/320 to 355)

NOTE: These items will require selection during assembly.

A. Inspect Abutment Faces.

(1) Nicks, burrs and scores.

Accept, provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

(2) Fretting and wear.

Reject.

5. Gearbox Mounting Bracket Assemblies (302-130/310)

A. Inspect Shank Self-locking Nuts (Ref.72-09-00 Inspection/Check).

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B. Inspect Attachment Faces.

(1) Wear.

- (a) Not more than 10 per cent reduction of flange thickness.

Accept after repair providing surface flatness is maintained.

- (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

- (c) Hollow pin holes elongated.

Reject.

(2) Scores.

- (a) Not more than 0.010 in. (0,250 mm) in depth on contact faces.

Accept after repair providing flange thickness is not reduced by more than 10 per cent.

C. Inspect General Condition of Mounting Bracket.

- (1) Nicks and burrs.

Accept after repair.

6. Coupling Flange (303-50, 307-40)

A. Inspect Gearbox Attachment Face.

- (1) Nicks, burrs, scores and wear.

Accept after repair providing sealing capabilities are unimpaired.

- (2) Wear at bolt locations.

- (a) Bolt-holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

B. Inspect Corruplus Seal Groove.

- (1) Nicks and burrs.

Accept after repair.

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(2) Wear.

- (a) Light witness marks provided that surface roughness in grooves is not more than 50 micro inches (1,25 micrometres).

Accept after repair provided that sealing capabilities are unimpaired.

C. Inspect Coupling Ring Assembly Retaining Flange.

- (1) Nicks, burrs, scores and wear.

Accept after repair providing 90 per cent of effective flange thickness is maintained.

D. Inspect General Condition of Coupling Flange.

- (1) Nicks and burrs.

Accept after repair.

- (2) Wear and scores.

- (a) Light wear and scoring at bolthead locations.

Accept after repair.

7. Coupling Ring Assembly (303-60, 307-50)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Anvils.

- (1) Nicks and burrs.

Accept after repair.

C. Inspect Coupling Interrupted Threads.

- (1) Using a new standard mating component, check the compatibility of the interrupted thread to ensure adequate torque clearance between the spherical nut and the retaining bracket.

- (2) Nicks and burrs.

Accept after repair.

- (3) Wear.

- (a) Fretting not more than 0.001 in. (0,030 mm) in depth.

Accept after repair providing compatibility is preserved.

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D. Inspect Spherical Nut Location.

(1) Security.

- | | |
|--|---------|
| (a) Spherical nut secure in its location and free to move within bounds of locking pins. | Accept. |
|--|---------|

8. Retaining Bracket (303-150, 307-140)

A. Inspect Abutment Flange.

(1) Wear.

- | | |
|--|----------------------|
| (a) Not more than 10 per cent reduction in flange thickness. | Accept after repair. |
| (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |

- | | |
|----------------------|----------------------|
| (2) Nicks and burrs. | Accept after repair. |
|----------------------|----------------------|

B. Inspect Spherical Washer Location.

(1) Wear.

- | | |
|---|----------------------|
| (a) Fretting not more than 0.010 in. (0,250 mm) in depth. | Accept after repair. |
|---|----------------------|

(2) Scores.

- | | |
|--|----------------------|
| (a) Not more than 0.005 in. (0,130 mm) deep. | Accept after repair. |
|--|----------------------|

- | | |
|----------------------|----------------------|
| (3) Nicks and burrs. | Accept after repair. |
|----------------------|----------------------|

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9. Support Brackets (304-20, 306-50B, 308-190B)

A. Inspect Attachment Face.

(1) Wear and fretting.

(a) Not more than 10 per cent reduction in flange thickness. Accept after repair.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

(2) Scores.

(a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair providing material thickness is not reduced by more than 10 per cent.

B. Inspect Bracket.

(1) Nicks and burrs. Accept after repair.

(2) Distortion. Accept if compatibility is preserved.

10. End Plate (304-30, 306-60, 308-270) and Retaining Bracket (307-150)

A. Inspect Abutment Face.

(1) Wear.

(a) Not more than 10 per cent reduction in flange thickness. Accept after repair.

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- (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.
- (2) Nicks and burrs. Accept after repair.
- (3) Scores.
 - (a) Not more than 0.010 in. (0,250 mm) in depth and not extending more than half-way across sealing face. Accept after repair.

11. Front Cover Assembly (304-40)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Inserts.

(1) Security.

- (a) Inserts secure and maintaining interference fit.

Accept.

C. Inspect Gearbox Abutment Face.

(1) Nicks, burrs, scores and wear.

Accept after repair providing sealing capabilities are unimpaired.

(2) Wear.

- (a) Bolt-holes elongated not more than 0.010 in. (0,250 mm).

Accept after repair.

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(3) Flatness.

- (a) Sealing surface face flat within 0.0015 in.
(0,040 mm) T.I.R. Accept.

D. Inspect Filter Assembly Locations.

- (1) Nicks and burrs. Accept after repair.

(2) Wear.

- (a) Fretting not more than 0.002 in. (0,050 mm) in depth. Accept after repair.

(3) Scores.

- (a) Not more than 0.002 in. (0,050 mm) in depth. Accept after repair.

E. Inspect Bearing Outer Track Locations.

- (1) Nicks and burrs. Accept after repair.

(2) Wear.

- (a) Fretting not more than 0.010 in. (0,250 mm) deep. Accept after repair.

(3) Scores.

- (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair.

F. Inspect Coupling Ring and End Plate Locations.

- (1) Nicks and burrs. Accept after repair.

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(2) Wear.

- (a) Fretting not more than
0.005 in. (0,130 mm)
in depth.

Accept after repair
providing sealing
capabilities are
unimpaired.

(3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth
and not extending right
across the sealing face.

Accept after repair
providing sealing
capabilities are
unimpaired.

(4) Flatness of coupling ring attachment face.

- (a) Sealing surface face flat
within 0.0015 in.
(0,040 mm) T.I.R. and
sealing surface concentric
with the centre line of
first stage pump drive
housing.

Accept.

G. Inspect General Condition of Front Cover.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

- (a) Bolt-holes other than
bolt-holes on gearbox
attachment face elongated
not more than 0.030 in.
(0,720 mm).

Accept after
repair.

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H. Inspect Stepped Headless Pin.

NOTE: The Stepped Headless Pin (304-320) will normally be retained in the Front Cover.

- (1) Nicks and burrs. Accept after repair.
- (2) Security.
 - (a) Pin secure in location. Accept.
- (3) Scores.
 - (a) Not more than 0.010 in. Accept after repair.
(0,250 mm) in depth.

12. Bearing Outer Track (304-340/410 Pre SB.72-9, 306-170 Pre Mod.7510)

NOTE: These items are not loaded during engine run and may subsequently be deleted by SB.72-9 and Mod.7510. Where necessary carry out inspection procedures in accordance with Standard Practices (Ref.72-09-00 Inspection/Check).

13. Retaining Cap (304-370/440)

- A. Inspect Thread (Ref.72-09-00 Inspection/Check).
- B. Inspect Retaining Cap.
 - (1) Nicks and burrs. Accept after repair.
 - (2) Wear.
 - (a) Bolt-hole elongated not more than 0.030 in. Accept after repair.
(0,760 mm).

14. Connector (304-380)

- A. Inspect Thread (Ref.72-09-00 Inspection/Check).

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B. Inspect Connector.

- | | |
|--|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Light witness marks on outside diameters. | Accept after repair. |
| (3) Scores. | |
| (a) Not more than 0.002 in. (0,050 mm) in depth. | Accept after repair. |
| (4) Obstruction. | |

CAUTION: DO NOT USE HARD OBJECTS TO CLEAR OBSTRUCTIONS.

- | | |
|------------------------------------|---------|
| (a) Orifices clear of obstruction. | Accept. |
|------------------------------------|---------|

15. Filter (304-390/460)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Filter.

- | | |
|---|---|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Dents. | |
| (a) Any dents in perforated plate. | Accept subject to satisfactory crack detection. |
| (3) Wear. | |
| (a) Light witness marks on outside diameters. | Accept after repair. |

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16. Oil Jet (304-450/470/490, 306-20/30/90/110, 310-230) and Nozzle Assembly (310-250B) (SB.72-7510-166) 310-250C (SB.72-32)

- A. Inspect Threads (Ref.72-09-00 Inspection/Check).
- B. Inspect Oilway.

CAUTION: DO NOT USE HARD OBJECTS TO CLEAR OBSTRUCTIONS.

(1) Obstructions.

- (a) Orifice clear of obstruction. Accept.

C. Inspect General Condition of Oil Jet.

(1) Wear.

- (a) Not more than 10 per cent reduction of attachment flange thickness. Accept after repair.
- (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

- (2) Nicks and burrs. Accept after repair.

17. Diaphragm (305-360)

A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.601-285, 602-289/291/294).

- (1) Dimensionally check this component in conjunction with the Ball Bearing Journal (310-30), Parallel Roller Bearing Journal (311-20), Ball Bearing Journal (311-100) and Ball Bearing Journal (312-40).

B. Inspect Gearbox Abutment Faces.

- (1) Nicks and burrs. Accept after repair.

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(2) Wear.

- | | |
|--|----------------------|
| (a) Fretting on gearbox attachment face not more than 0.010 in. (0,250 mm) in depth. | Accept after repair. |
| (b) Any elongation of bolt-holes. | Reject. |

C. Inspect Bearing Journal Location Bores.

- | | |
|--|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Scores. | |
| (a) Not more than 0.010 in. (0,250 mm) in depth. | Accept after repair. |
| (3) Wear. | |
| (a) Light witness mark. | Accept. |

D. Inspect Flanged Pin Locations.

- | | |
|--|----------------------|
| (1) Scores. | |
| (a) Not more than 0.010 in. (0,250 mm) in depth. | Accept after repair. |
| (2) Wear. | |
| (a) Light witness mark. | Accept. |
| (b) Any elongation. | Reject. |

18. Oil Strainer Assembly (306-10/80)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

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B. Inspect Strainer.

- (1) Tears and punctures. Reject.
- (2) Obstruction.
- (a) Strainer holes 100 per cent clear. Accept.

19. Hollow Pin (306-180) (Ref.SB.72-18)

A. Inspect Hollow Pin.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
- (a) Light witness mark. Accept.
- (3) Scores.
- (a) Not more than 0.005 in. (0,130 mm) deep. Accept after repair.

20. Cover Assembly (308-120)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Attachment Face.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores.
- (a) Not more than 0.010 in. (0,250 mm) in depth and not extending right across the sealing area. Accept after repair providing sealing capabilities are unimpaired.

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(3) Wear.

- (a) Not more than 10 per cent reduction in flange thickness.

Accept after repair providing sealing capabilities are unimpaired.

21. Lifting Bracket Assembly (308-200)

A. Inspect Tube (Ref.72-09-00 Inspection/Check).

B. Inspect Attachment Flange.

- (1) Nicks and burrs.

Accept after repair.

(2) Wear.

- (a) Not more than 10 per cent reduction in flange thickness.

Accept after repair.

- (b) Bolt-holes elongated not more than 0.010 in. (0,250 mm).

Accept after repair.

(3) Scores.

- (a) Not more than 0.010 in. (0,250 mm) in depth.

Accept after repair providing repair does not reduce flange thickness by more than 10 per cent.

22. Flanged Connector (308-240)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Flange.

- (1) Nicks and burrs.

Accept after repair.

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(2) Wear.

- | | | |
|-----|--|--|
| (a) | Not more than 5 per cent reduction in flange thickness. | Accept after repair providing sealing capabilities are unimpaired. |
| (b) | Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |

(3) Scores.

- | | | |
|-----|--|--|
| (a) | Not more than 0.010 in. (0,250 mm) in depth and not extending right across the sealing face. | Accept after repair providing sealing capabilities are unimpaired. |
|-----|--|--|

C. Inspect Tube Seating.

(1) Wear.

- | | | |
|-----|---------------------|---------|
| (a) | Light witness mark. | Accept. |
|-----|---------------------|---------|

(2) Scores.

- | | | |
|-----|--|--|
| (a) | Not more than 0.002 in. (0,050 mm) in depth. | Accept after repair providing sealing capabilities are unimpaired. |
|-----|--|--|

23. LH Gearbox Case Assembly (309-10)

A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.601-270/275/279, 602-303/307/310/312).

(1) Dimensionally check this component in conjunction with the following bearing journals.

- (a) Ball Bearing Journal (310-260A) (para.25) (Pre-SB.72-7510-166) and Parallel Roller Bearing Journal (310-360) (para.31) (Pre-SB.72-7510-166), Integral Bearings (310-260B) (para.32) (SB.72-7510-166) or (310-260C) (SB.72-8651-246).
- (b) Parallel Roller Bearing Journal (312-380A) (para.31) (Pre-SB.72-7510-166) or Integral Bearing (312-380B) (para.32) (SB.72-7510-166).
- (c) Parallel Roller Bearing Journal (310-160, 311-50/130 and 312-240) (para.31).

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B. Inspect all Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Front Cover Attachment Face.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores. Accept after repair providing sealing capabilities are unimpaired.
 - (a) Not more than 0.005 in. (0,130 mm) in depth and not extending right across the sealing face.
- (3) Wear. Accept after repair providing sealing capabilities are unimpaired.
- (4) Flatness. Accept.
 - (a) Sealing surface face flat within 0.0015 in. (0,040 mm) T.I.R.

D. Inspect Intermediate Case Adapter Flange Attachment Face.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores. Accept after repair providing sealing capabilities are unimpaired.
 - (a) Not more than 0.005 in. (0,130 mm) in depth and not extending right across the sealing face.
- (3) Wear. Accept after repair providing sealing capabilities are unimpaired.

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(4) Flatness and concentricity.

- | | |
|---|---------|
| (a) Sealing surface face
flat within 0.0015 in.
(0,040 mm) T.I.R. and
sealing surface is
concentric with the
centre line of the
bearing journal
housing. | Accept. |
| (b) Sealing face
perpendicular within
0.002 in. (0,050 mm)
of the attachment
flange bore. | Accept. |

E. Inspect F.C.U. Coupling Flange Attachment Face.

- | | |
|---|---|
| (1) Nicks and burrs. | Accept after
repair. |
| (2) Scores. | |
| (a) Not more than 0.005 in.
(0,130 mm) in depth and
not extending right across
the sealing face. | Accept after repair
providing sealing
capabilities are
unimpaired. |
| (3) Wear. | Accept after repair
providing sealing
capabilities are
unimpaired. |
| (4) Flatness. | |
| (a) Sealing surface face
flat within 0.0015 in.
(0,040 mm) T.I.R. | Accept. |

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F. Inspect Rear Cover Assembly Attachment Face.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores.
 - (a) Not more than 0.005 in. (0,130 mm) in depth and not extending right across the sealing face. Accept after repair providing sealing capabilities are unimpaired.
- (3) Wear. Accept after repair providing sealing capabilities are unimpaired.
- (4) Flatness.
 - (a) Sealing surface face flat within 0.0015 in. (0,040 mm) T.I.R. Accept.

G. Inspect Main Oil Pump Attachment Flange.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores.
 - (a) Not more than 0.005 in. (0,130 mm) in depth and not extending right across the face width. Accept after repair providing flatness tolerances in (4) are maintained.
- (3) Wear.
 - (a) Fretting not more than 0.003 in. (0,080 mm) in depth. Accept after repair providing flatness tolerances are maintained.

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(b) Any elongation of bolt holes. Reject.

(4) Flatness.

(a) Sealing surface face flat within 0.0015 in. (0,040 mm) T.I.R. Accept.

H. Inspect All Bearing Journal Location Bores.

(1) Nicks and burrs. Accept after repair.

(2) Scores.

(a) Not more than 0.005 in. (0,130 mm) in depth. Accept after repair.

(3) Wear.

(a) Light witness mark. Accept providing F.C.S. limits are not violated.

J. Inspect Mounting Bracket Attachment Faces.

(1) Nicks and burrs. Accept after repair.

(2) Scores.

(a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair.

(3) Wear.

(a) Light witness mark. Accept.

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K. Inspect Diaphragm Locations.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores.
 - (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair subject to satisfactory crack detection.
- (3) Wear.
 - (a) Fretting not more than 0.002 in. (0,050 mm) in depth. Accept after repair.

L. Inspect All Tube and End Cover Attachment Faces.

- (1) Nicks and burrs. Accept after repair.
- (2) Scores.
 - (a) Not more than 0.005 in. (0,130 mm) in depth and not extending right across the sealing face. Accept after repair providing sealing capabilities are unimpaired.
- (3) Wear. Accept after repair providing sealing capabilities are unimpaired.

M. Inspect Gearbox Case for General Condition.

- (1) Nicks and burrs. Accept after repair.

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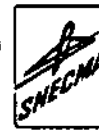
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(2) Gouging and bruising.

Accept after repair
providing crack
detection investi-
gation is
satisfactory.

24. Shaft Nut (310-10)

A. Inspect Shaft Nut.

(1) Flatness.

(a) Not less than 50 per
cent evenly distributed
contact on nut thrust
face.

Accept.

(2) Nicks and burrs.

Accept after
repair.

NOTE: Refer to para.44 for additional inspection.

25. Ball Bearing Journal (310-30/260, 311-100, 312-40/410)

A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances).

(1) Dimensionally check Ball Bearing Journals (310-30/260) in conjunction with Diaphragm (305-360) (para.17). Gearbox Case (309-10) (para.23), Spiral Bevel Pinion (310-133) (para.29 or 30) and Idler Spur Gear (310-170) (Pre S.B.72-90) or (310-138) (S.B.72-90) (para.28 or 29).

(a) Within F.C.S. limits.

Accept.

(2) Dimensionally check Ball Bearing Journal (311-100) in conjunction with Diaphragm (305-360) (para.17), Gearbox Case (309-10) (para.23), and Gearshaft (311-180) (para.39).

(a) Within F.C.S. limits.

Accept.

(3) Dimensionally check Ball Bearing Journals (312-40/410) in conjunction with Gearbox Case (309-10) (para.23), Driving Shaft (312-200) (para.43) and Bevel Zerol Gear Assembly (312-140) (para.40).

(a) Within F.C.S. limits.

Accept.

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- (4) Check overall bearing diameters as follows.

Bearing Identity	F.C.S. Reference
310-30	601-270
310-260	602-294
311-100	601-285
312-40	602-289

- (a) Within F.C.S. limits. Accept.

- (5) Check diametral clearances and end-float as follows.

Bearing Identity	F.C.S. Reference
310-30	601-272
310-260	602-295
311-100	601-284
312-40	602-288
312-410	602-315

- (a) Within F.C.S. limits. Accept.

- (6) Check bearing bore as follows.

Bearing Identity	F.C.S. Reference
310-30	601-271
310-260	602-296
311-100	601-283
312-40	602-287
312-410	602-314

- (a) Within F.C.S. limits. Accept.

B. Inspect Bearing (Ref.72-09-00 Inspection/Check).

- (1) Wear.

- | | |
|--|----------------------|
| (a) Not more than 5 per cent reduction in flange thickness. | Accept after repair. |
| (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |

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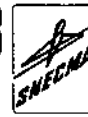
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26. Adjusting Washer (310-40A to 110A) (Pre SB.72-90) (310-40B to 114A) (SB.72-90) (310-270 to 335/312-50 to 120/290A to 365A) (310-270B to 335B SB.72-8651-246) (312/290B to 365B (SB.72-8651-246))

NOTE: These items will require selection during assembly.

- A. Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.602-522).

NOTE: This applies only to Adjusting Washers (310-40B to 114A) (SB.72-90).

- (1) Dimensionally check the washer in conjunction with the Bevel Gearshaft Assembly (310-130) (para.29).

(a) Within F.C.S. limits. Accept.

- B. Inspect Abutment Faces.

- (1) Nicks, burrs and scores. Accept provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

(2) Fretting and wear. Reject.

27. Locating Sleeve (310-120) (Pre SB.72-90) and (312-130)

- A. Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.602-297/298/319/320).

NOTE: Figure 601 (Ref.72-62-00 Fits and Clearances) is to (SB.72-90) standard. For dimension location purposes however, positions 297 and 298 are used for (Pre SB.72-90) reference.

- (1) Dimensionally check Locating Sleeve (310-120) (Pre SB.72-90) in conjunction with the Spiral Bevel Gear (310-132) (para.30) and Idler Spur Gear (310-170) (para.28).

(a) Within F.C.S. limits. Accept.

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- (2) Dimensionally check Locating Sleeve (312-130) in conjunction with the Bevel Zerol Gear (312-140) (para.40) and Driving Shaft (312-200) (para.43).

(a) Within F.C.S. limits. Accept.

B. Inspect Abutment Faces.

(1) Nicks and burrs. Accept after repair.

(2) Wear. Accept provided that repair preserves surface flatness and that designed effective thickness is maintained over 90 per cent of contact face area.

28. Idler Spur Gear (310-170) (Pre SB.72-90)

- A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.602-296/297/300/301).

NOTE: Figure 601 (Ref.72-62-00 Fits and Clearances) is to (SB.72-90) standard. For dimension location purposes however, positions 296 and 297 are used for (Pre SB.72-90) reference.

- (1) Dimensionally check this component in conjunction with the Ball Bearing Journal (310-30) (para.25), Locating Sleeve (310-120) (para.27), Bevel Gear Assembly (310-130) (para.30) and the Parallel Roller Bearing Journal (310-160) (para.31).

(a) Within F.C.S. limits. Accept.

- B. Inspect Threads (Ref.72-09-00 Inspection/Check).

- C. Inspect Splines (Ref.72-09-00 Inspection/Check).

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D. Inspect Bevel Gear Location.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Not more than 0.003 in.
(0,080 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

E. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

(1) Wear on non-working surfaces.

(a) Fretting not more than
0.002 in. (0,050 mm)
in depth.

Accept after
repair.

(2) Nicks and burrs on non-working
surfaces.

Accept after
repair.

(3) Wear on working surfaces.

Accept subject to
checks on assembly.

F. Inspect Bearing Locations.

(1) Nicks and burrs.

Accept after
repair.

(2) Scores.

(a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

(3) Wear.

(a) Not more than 0.002 in.
(0,050 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

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29. Bevel Gearshaft Assembly (310-130) (SB.72-90)

NOTE: This assembly is composed of (310-135/136/137/138) and includes matched bevel gear pinion (310-133).

A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.601-271/276, 602-296/301/522).

- (1) Dimensionally check the Spiral Bevel Pinion (310-133) in conjunction with the Ball Bearing Journal (310-260A) (para.25), Parallel Roller Bearing Journal (310-360A) (para.31) (Pre Mod.7510), or Integral Bearing (310-260B) (para.32) (Mod.7510).

(a) Within F.C.S. limits. Accept.

- (2) Dimensionally check the Spur Gearshaft (310-138A) in conjunction with the Ball Bearing Journal (310-30) (para.25), Parallel Roller Bearing Journal (310-160) (para.31) and Adjusting Washer (310-40B) (para.26) (SB.72-90).

(a) Within F.C.S. limits. Accept.

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

- (1) Wear on non-working surfaces.

(a) Fretting not more than 0.002 in. (0,050 mm) in depth. Accept after repair.

- (2) Nicks and burrs on non-working surfaces. Accept after repair.

- (3) Wear on working surfaces. Accept subject to F.C.S. checks on assembly.

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D. Inspect Bearing Locations.

- | | | |
|-----|---|---|
| (1) | Nicks and burrs. | Accept after repair. |
| (2) | Scores. | |
| (a) | Not more than 0.010 in.
(0,250 mm) in depth. | Accept after repair providing F.C.S. limits are not violated. |
| (3) | Wear. | |
| (a) | Not more than 0.002 in.
(0,050 mm) in depth. | Accept after repair providing F.C.S. limits are not violated. |

E. Inspect Gearshaft Assembly.

- | | | |
|-----|---|---|
| (1) | Wear. | |
| (a) | Any fretting on the bevel gear adjusting washer face. | Reject. |
| (2) | Nicks and burrs. | Accept after repair. |
| (3) | Security. | |
| (a) | Interference fit of centering ring maintained. | Accept providing the outer faces of the centering ring are not less than 0.010 in. (0,250 mm) below the bevel gear adjusting washer face. |
| (b) | Interference fit of bevel gear to gearshaft maintained. | Accept. |

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30. Bevel Gear Assembly (310-130) (Pre SB.72-90)

NOTE: This is a matched gear assembly composed of Spiral Bevel Pinion (310-133) and Spiral Bevel Gear (310-132).

A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.601-271/276).

- (1) Dimensionally check the Spiral Bevel Pinion (310-133) in conjunction with the Ball Bearing Journal (310-260A) (para.25), Parallel Roller Bearing Journal (310-360) (para.31) (Pre-SB.72-7510-166), Integral Bearing (310-260B) (para.32) (SB.72-7510-166) or (310-260C) (SB.72-8651-246).

(a) Within F.C.S. limits. Accept.

- (2) Dimensionally check the Spiral Gear Bevel (310-132) in conjunction with the Idler Spur Gear (310-170) (para.28).

(a) Within F.C.S. limits. Accept.

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

- (1) Wear on non-working surfaces.

(a) Fretting not more than 0.002 in. (0,050 mm) in depth. Accept after repair.

- (2) Nicks and burrs on non-working surfaces. Accept after repair.

- (3) Wear on working surfaces. Accept subject to F.C.S. checks on assembly.

D. Inspect Bearing Locations.

- (1) Nicks and burrs. Accept after repair.

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(2) Scores.

- (a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

(3) Wear.

- (a) Not more than 0.002 in.
(0,050 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

31. Parallel Roller Bearing Journal (310-160 and 310-360 (Pre SB.72-7510-166), 311-20/50/130, 312-240 and 312-380A)

A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances).

- (1) Dimensionally check Roller Bearing Journals (310-160/360) in conjunction with the Gearbox Case (309-10) (para.23), Idler Spur Gear (310-170) (Pre SB.72-90) or (310-138) (SB.72-90) (para.28 or 29) and Spiral Bevel Pinion (310-133) (para.29 or 30).

- (a) Within F.C.S. limits. Accept.

- (2) Dimensionally check Roller Bearing Journals (311-20/50/130) in conjunction with the Gearbox Case (309-10) (para.23), Diaphragm (305-60) (para.17), Idler Spur Gear (311-60) (para.35) and Gear Shaft (311-180) (para.39).

- (a) Within F.C.S. limits. Accept.

- (3) Dimensionally check Roller Bearing Journals (312-240/380) in conjunction with the Gearbox Case (309-10) (para.23), Driving Shaft (312-200) (para.43) and Bevel Zerol Gear (312-141) (para.40).

- (a) Within F.C.S. limits. Accept.

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- (4) Check overall bearing diameters as follows.

NOTE: Figures 601 and 602 (Ref.72-62-00 Fits and Clearances) are to SB.72-7510-166 standard. For dimension location purposes however, positions 601-275/276/277 and 602-311/312/313 are used for Pre SB.72-7510-166 reference.

Bearing Identity	F.C.S. Reference
310-160	602-303
310-360 (Pre SB.72-7510-166)	601-275
311-20	602-291
311-50	602-307
311-130	601-279
312-240	602-310
312-380A (Pre SB.72-7510-166)	602-312

(a) Within F.C.S. limits. Accept.

- (5) Check diametral clearances and end-float as follows.

Bearing Identity	F.C.S. Reference
310-160	602-302
310-360 (Pre SB.72-7510-166)	601-277
311-20	602-292
311-50	602-305
311-130	601-280
312-240	602-309
312-380A (Pre SB.72-7510-166)	602-311

(a) Within F.C.S. limits. Accept.

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(6) Check bearing bore as follows.

Bearing Identity	F.C.S. Reference
310-160	602-301
310-360 (Pre SB.72-7510-166)	601-276
311-20	602-293
311-50	602-306
311-130	601-281
312-240	602-308
312-380A (Pre SB.72-7510-166)	602-313

(a) Within F.C.S. limits. Accept.

B. Inspect Bearing (Ref.72-09-00 Inspection/Check).

(1) Wear.

- | | |
|--|----------------------|
| (a) Not more than 5 per cent reduction in flange thickness. | Accept after repair. |
| (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |

32. Integral Bearing (310-260B and 312-380B) (SB.72-7510-166)
(310-260C) (SB.72-8651-246)

A. Dimensional Checks (Ref.72-62-00 Fits and Clearances).

(1) Dimensionally check Integral Bearing (310-260B) in conjunction with the Gearbox Case (309-10) (para.23) and Spiral Bevel Pinion (310-133) (para.29 or 30).

(a) Within F.C.S. limits. Accept.

(2) Dimensionally check Integral Bearing (312-380B and C) in conjunction with the Gearbox Case (309-10) (para.23) and Bevel Zerol Gear Pinion (312-140) (para.40).

(a) Within F.C.S. limits. Accept.

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(3) Check overall bearing diameters as follows.

Bearing Identity	F.C.S. Reference
310-260B	601-270/275
310-260C	601-270-275
312-380B	602-312

(a) Within F.C.S. limits. Accept.

(4) Check diametral clearances and end-float as follows.

Bearing Identity	F.C.S. Reference
310-260B	601-277
310-260C	601-277
312-380B	602-311

(a) Within F.C.S. limits. Accept.

(5) Check bearing bore as follows.

Bearing Identity	F.C.S. Reference
310-260B	601-276
310-260C	601-276
312-380B	601-313

(a) Within F.C.S. limits. Accept.

B. Inspect Bearing Housings (Ref.72-09-00 Inspection/Check).

(1) Wear.

- | | |
|--|----------------------|
| (a) Not more than 5 per cent reduction in flange thickness. | Accept after repair. |
| (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |

33. Driving Shaft (310-180)

A. Inspect Splines (Ref.72-09-00 Inspection/Check).

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B. Inspect Retaining Ring Groove.

- (1) Nicks and burrs. Accept after repair.
- (2) Fretting on adjacent lands.
 - (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair.

C. Inspect Flanged Ring.

- (1) Nicks and burrs. Accept.

D. Inspect Shaft.

- (1) Nicks and burrs. Accept after repair.
- (2) Bowing.
 - (a) Any signs of bowing. Reject.

34. Spacer Sleeve (310-350, 312-390)

A. Inspect Abutment Faces.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Not more than 0.005 in. (0,130 mm) in depth. Accept after repair providing 90 per cent of effective circumference is maintained.

35. Idler Spur Gear (311-60)

A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.602-293/306).

- (1) Dimensionally check this component in conjunction with the Parallel Roller Bearing Journals (311-20/50) (para.31).
 - (a) Within F.C.S. limits. Accept.

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B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Gear Teeth.

(1) Wear on non-working surfaces.

(a) Fretting not more than
0.002 in. (0,050 mm)
in depth.

Accept after
repair.

(2) Nicks and burrs on non-working
surfaces.

Accept after
repair.

(3) Wear on working surfaces.

Accept subject to
checks on assembly.

D. Inspect Bearing Locations.

(1) Nicks and burrs.

Accept after
repair.

(2) Scores.

(a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

(3) Wear.

(a) Not more than 0.002 in.
(0,050 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

36. Cupwasher (311-80, 312-20/260)

A. Inspect Cupwasher (Ref.72-09-00 Inspection/Check).

37. Quillshaft (311-140)

A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and
Clearances F.C.S.601-286).

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- B. Inspect Splines (Ref.72-09-00 Inspection/Check).
- C. Inspect Threads (Ref.72-09-00 Inspection/Check).
- D. Inspect Shaft.

- (1) Nicks and burrs. Accept after repair.
- (2) Bowing.
 - (a) Any signs of bowing. Reject.
- (3) Wear.
 - (a) Not more than 0.010 in. (0,250 mm) in depth at retaining nut location. Accept after repair.

■ 38. Screwed Sleeve (311-150)

- A. Inspect Threads (Ref.72-09-00 Inspection/Check).

■ 39. Gearshaft (311-180)

- A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.601-281/283/286).

- (1) Dimensionally check this component in conjunction with the Parallel Roller Bearing Journal (311-130) (para.31) Ball Bearing Journal (311-100) (para.25) and the Quillshaft (312-190) (para.42).

- (a) Within F.C.S. limits. Accept.

- B. Inspect Splines (Ref.72-09-00 Inspection/Check).
- C. Inspect Threads (Ref.72-09-00 Inspection/Check).
- D. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

- (1) Wear on non-working surfaces.
 - (a) Fretting not more than 0.002 in. (0,050 mm) in depth. Accept after repair.

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- | | |
|--|---------------------------------------|
| (2) Nicks and burrs on non-working surfaces. | Accept after repair. |
| (3) Wear on working surfaces. | Accept subject to checks on assembly. |

E. Inspect Retaining Ring Groove.

- | | |
|----------------------|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Light fretting. | Accept. |

F. Inspect Bearing Locations.

- | | |
|---|---|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Scores. | |
| (a) Not more than 0.010 in.
(0,250 mm) in depth. | Accept after repair providing F.C.S. limits are not violated. |
| (3) Wear. | |
| (a) Not more than 0.002 in.
(0,050 mm) in depth. | Accept after repair providing F.C.S. limits are not violated. |

40. Bevel Zerol Gear Assembly (312-140)

A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.602-313/314/317/319).

- | | |
|--|---------|
| (1) Dimensionally check this assembly in conjunction with the Parallel Roller Bearing Journal (312-380A) (Pre Mod.7510) (para.31) or Integral Bearing (312-380B) (Mod.7510) (para.32), Ball Bearing Journal (312-40) (para.25), Driving Shaft (312-200) (para.43) and Locating Sleeve (312-130) (para.27). | |
| (a) Within F.C.S. limits. | Accept. |

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- B. Inspect Threads (Ref.72-09-00 Inspection/Check).
C. Inspect Splines (Ref.72-09-00 Inspection/Check).
D. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

(1) Wear on non-working surfaces.

(a) Fretting not more than
0.002 in. (0,050 mm) in
depth.

Accept after
repair.

(2) Nicks and burrs on non-working
surfaces.

Accept after
repair.

(3) Wear on working surfaces.

Accept subject to
checks on assembly.

E. Inspect Bearing Locations.

(1) Nicks and burrs.

Accept after
repair.

(2) Scores.

(a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

(3) Wear.

(a) Not more than 0.002 in.
(0,050 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

41. Oil Trap Sleeve (312-170) Oil Feed Sleeve (312-180)

A. Inspect Quillshaft Locations.

(1) Nicks and burrs.

Accept after
repair.

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(2) Wear.

(a) Light witness mark. Accept.

(3) Scores.

(a) Not more than 0.005 in. Accept after
(0,130 mm) deep. repair.

B. Inspect Oil Orifices.

CAUTION: DO NOT USE HARD OBJECTS TO CLEAR OBSTRUCTIONS.

(1) Obstructions.

(a) Any obstructions. Reject for cleaning
investigation.

42. Quillshaft (312-190)

A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.602-321).

B. Inspect Splines (Ref.72-09-00 Inspection/Check).

C. Inspect Quillshaft.

(1) Nicks and burrs. Accept after
repair.

(2) Wear.

(a) Fretting on driving shaft location not more than
0.003 in. (0,080 mm) in depth. Accept after
repair.

(3) Bowing.

(a) Any signs of bowing. Reject.

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43. Driving Shaft (312-200)

A. Carry Out Dimensional Checks (Ref.72-62-00 Fits and Clearances F.C.S.602-287/308/317/320/321).

- (1) Dimensionally check this component in conjunction with the Parallel Roller Bearing Journal (312-240) (para.31), Bevel Zerol Gear (312-140) (para.40), Locating Sleeve (312-130) (para.27), Ball Bearing Journal (312-40) (para.25) and Quillshaft (312-190) (para.42).

(a) Within F.C.S. limits. Accept.

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Splines (Ref.72-09-00 Inspection/Check).

D. Inspect Bearing Locations.

(1) Nicks and burrs. Accept after repair.

(2) Scores.

(a) Not more than 0.010 in.
(0,250 mm) in depth. Accept after repair providing F.C.S. limits are not violated.

(3) Wear.

(a) Not more than 0.002 in.
(0,050 mm) in depth. Accept after repair providing F.C.S. limits are not violated.

E. Inspect Bore.

(1) Nicks and burrs. Accept.

(2) Wear.

(a) Light fretting not more than 0.003 in. (0,080 mm) in depth. Accept after repair.

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(3) Scores.

- (a) Not more than 0.010 in. Accept after
(0,250 mm) in depth. repair.

F. Inspect Bevel Gear Location.

- (1) Nicks and burrs. Accept after
repair.

(2) Wear.

- (a) Light fretting not more Accept after repair
than 0.003 in. (0,080 mm) providing F.C.S.
in depth. limits are not
violated.

(3) Scores.

- (a) Not more than 0.005 in. Accept after repair
(0,130 mm) in depth. providing F.C.S.
limits are not
violated.

G. Inspect Bevel Gear Abutment Flange.

- (1) Nicks and burrs. Accept after
repair.

(2) Wear.

- (a) Not more than 0.003 in. Accept after
(0,080 mm) in depth. repair.

44. Self-locking Nuts (310-10/150/200, 311-10/40/120, 312-150)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Self-Locking Feature.

- (1) Inspect the self-locking feature Reject any four
of each nut to ensure that it lobe featured nut.
has an elliptical feature and
not a four lobe feature (Ref.
SB.72-105).

NOTE: Items deleted by SB.72-9 are not included.

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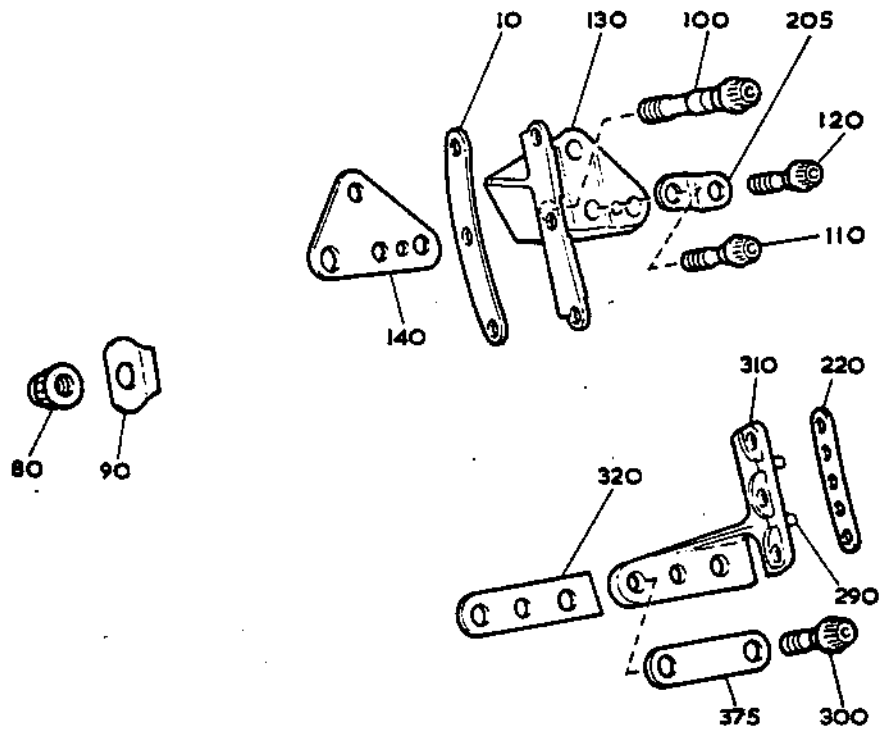
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LH Gearbox Accessory Case, Installation Fittings
Figure 302

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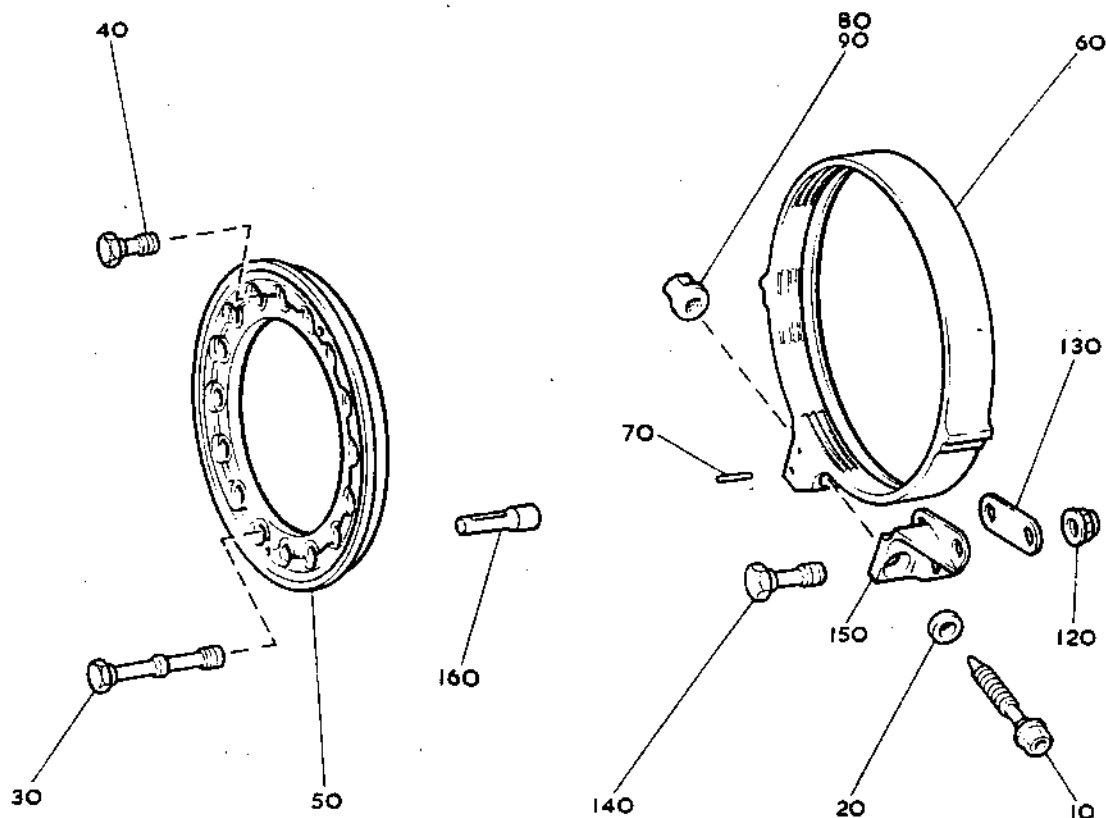


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TN14559

LH Gearbox Accessory Case, Stage 1 Fuel Pump
Installation Fittings
Figure 303

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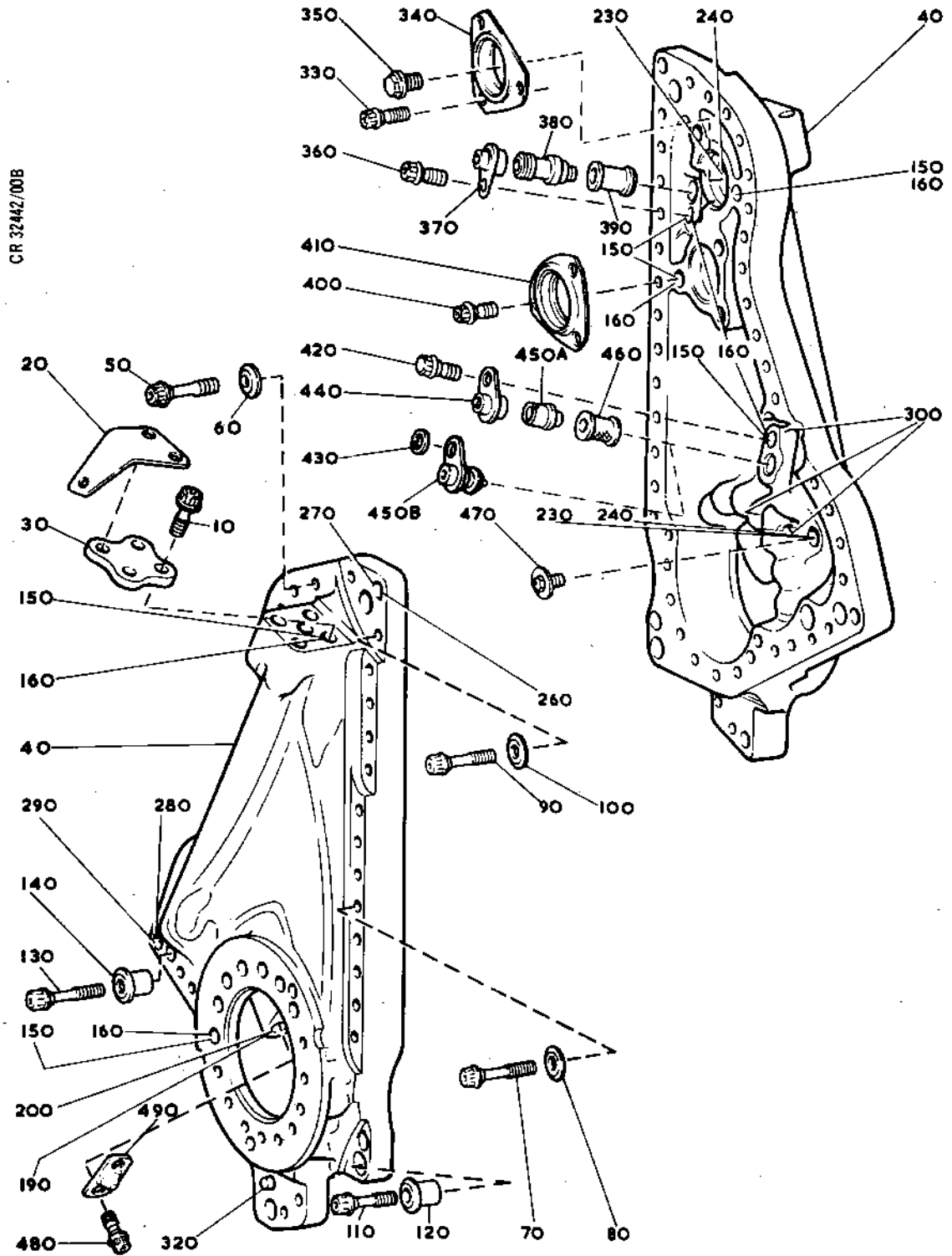
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LH Gearbox Accessory Case, Front Cover and Fittings
Figure 304

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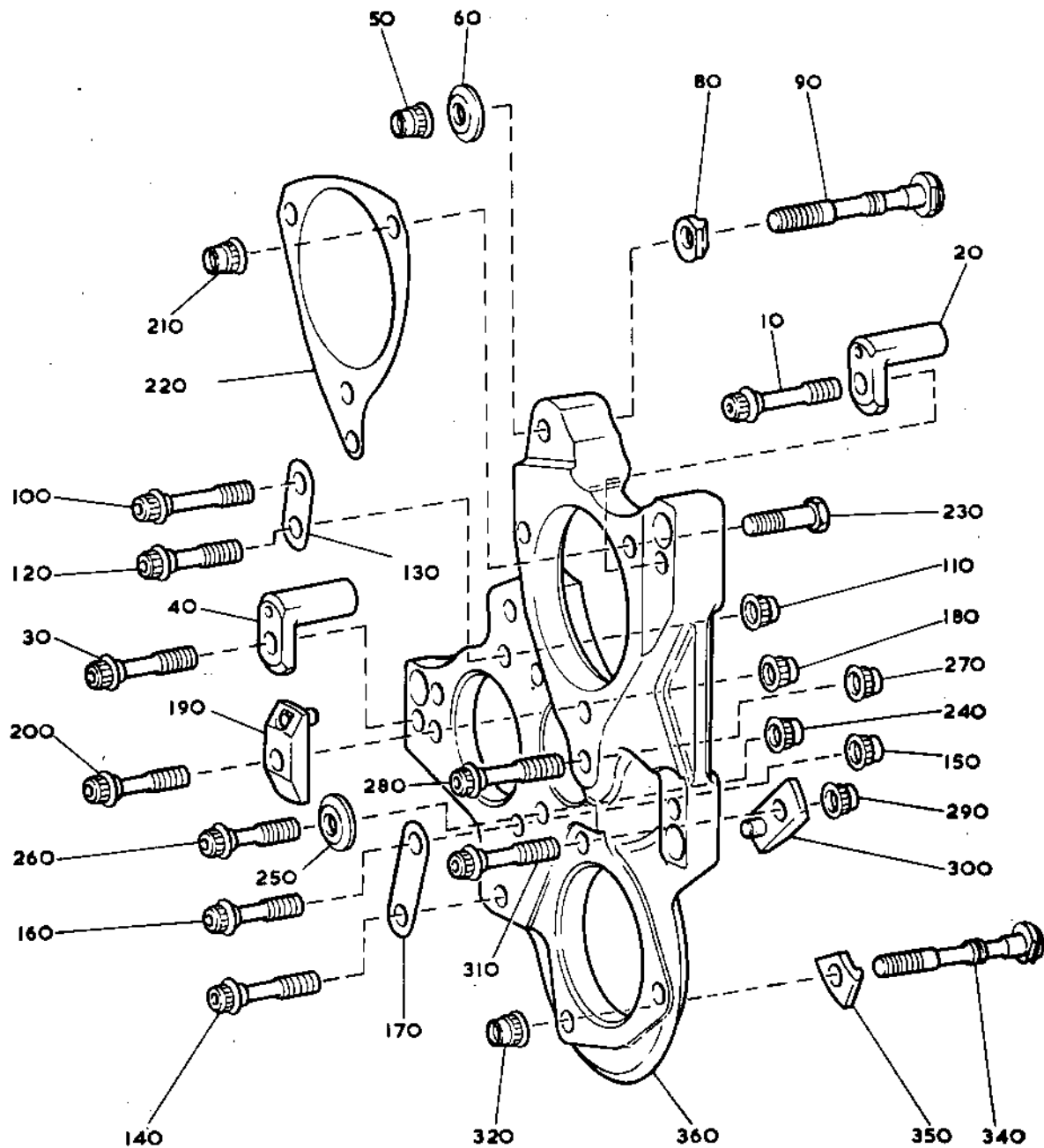


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IN14632

LH Gearbox Accessory Case, Diaphragm
Figure 305

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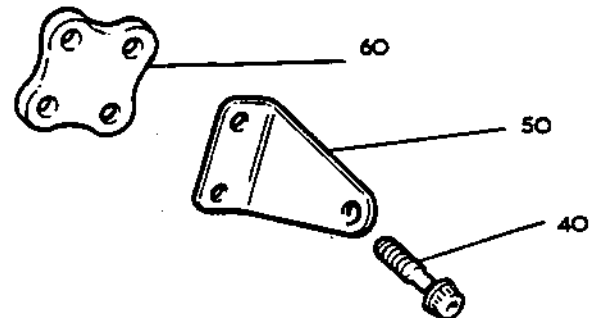
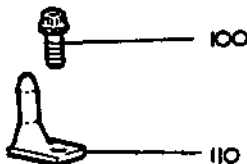
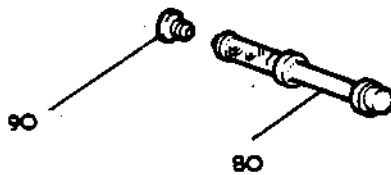
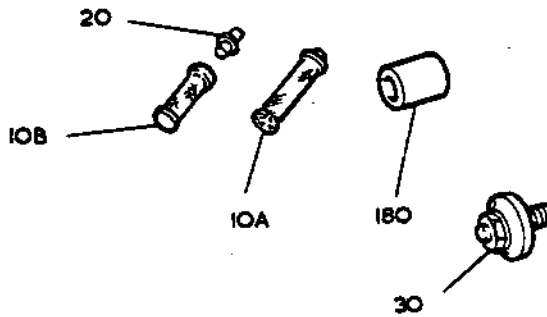
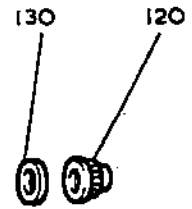
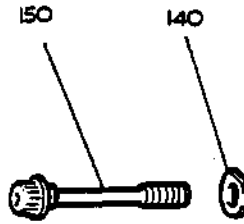
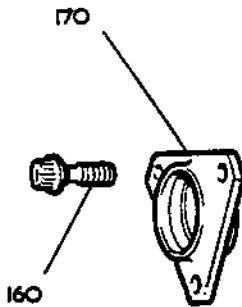


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LH Gearbox Accessory Case, Oilway Filters and Oil Jets
Figure 306

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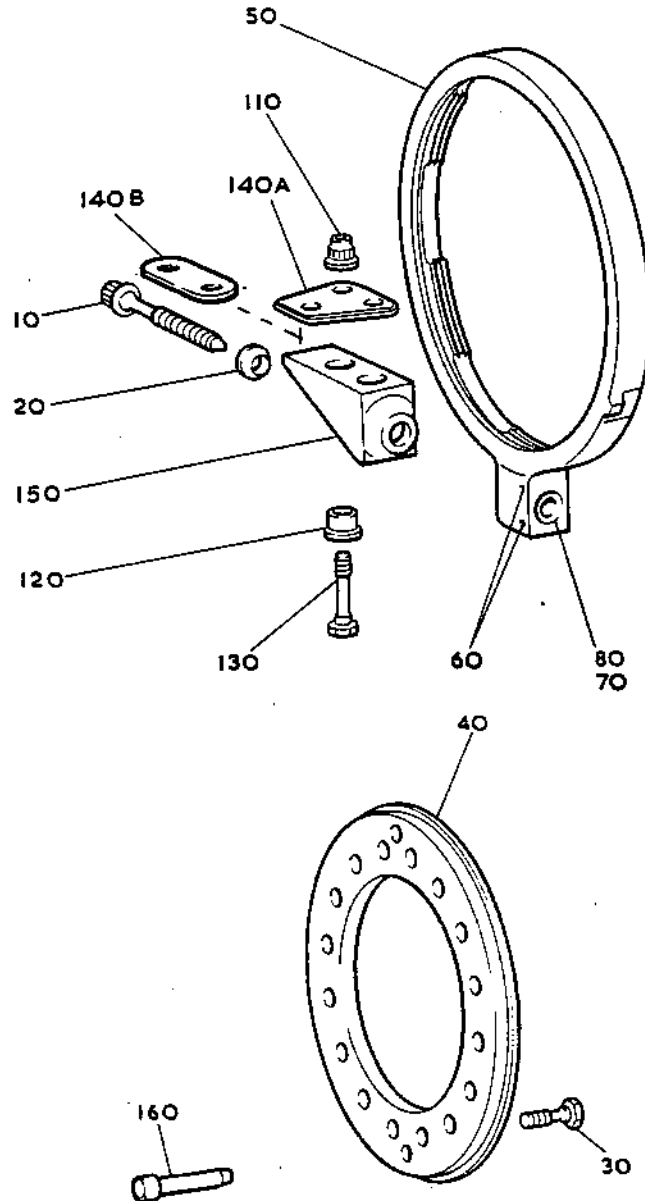


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LH Gearbox Accessory Case, FCU Installation Fittings
Figure 307

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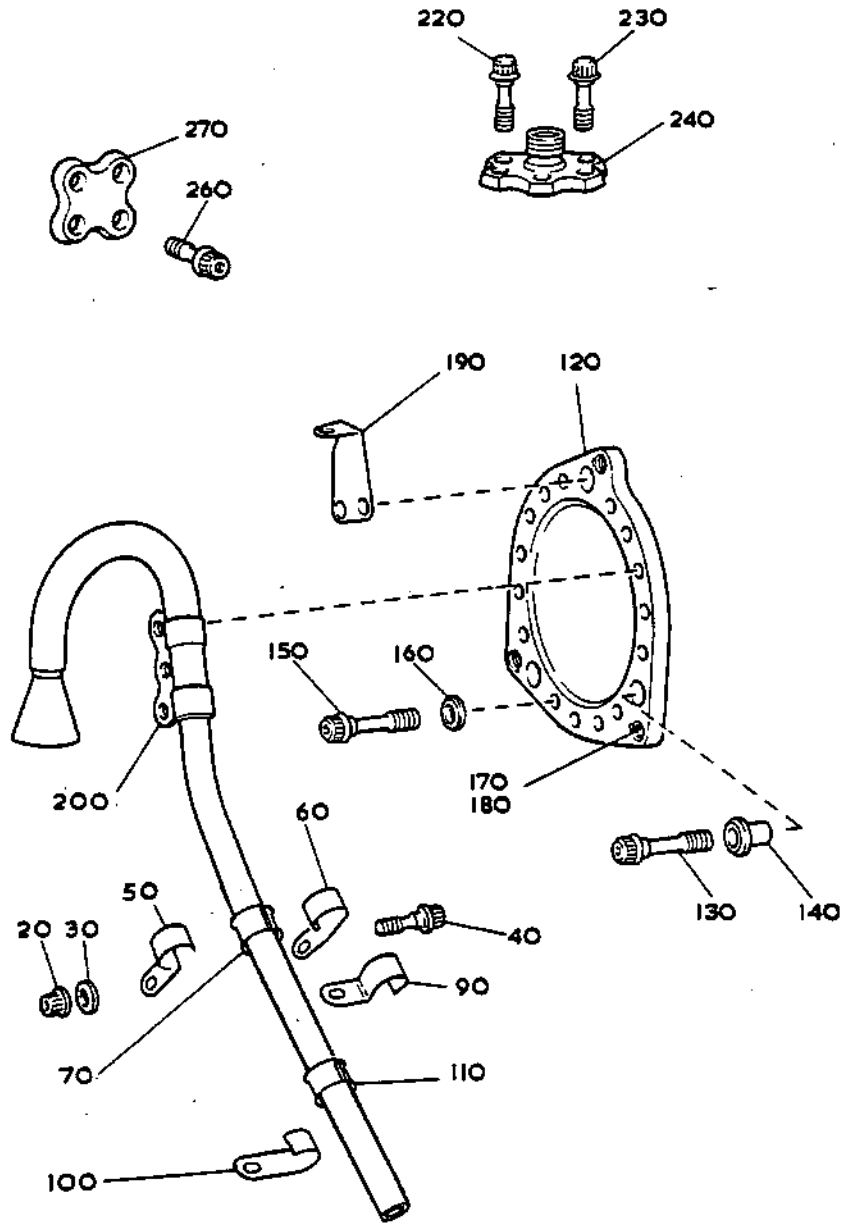


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LH Gearbox Accessory Case, External Fittings
Figure 308

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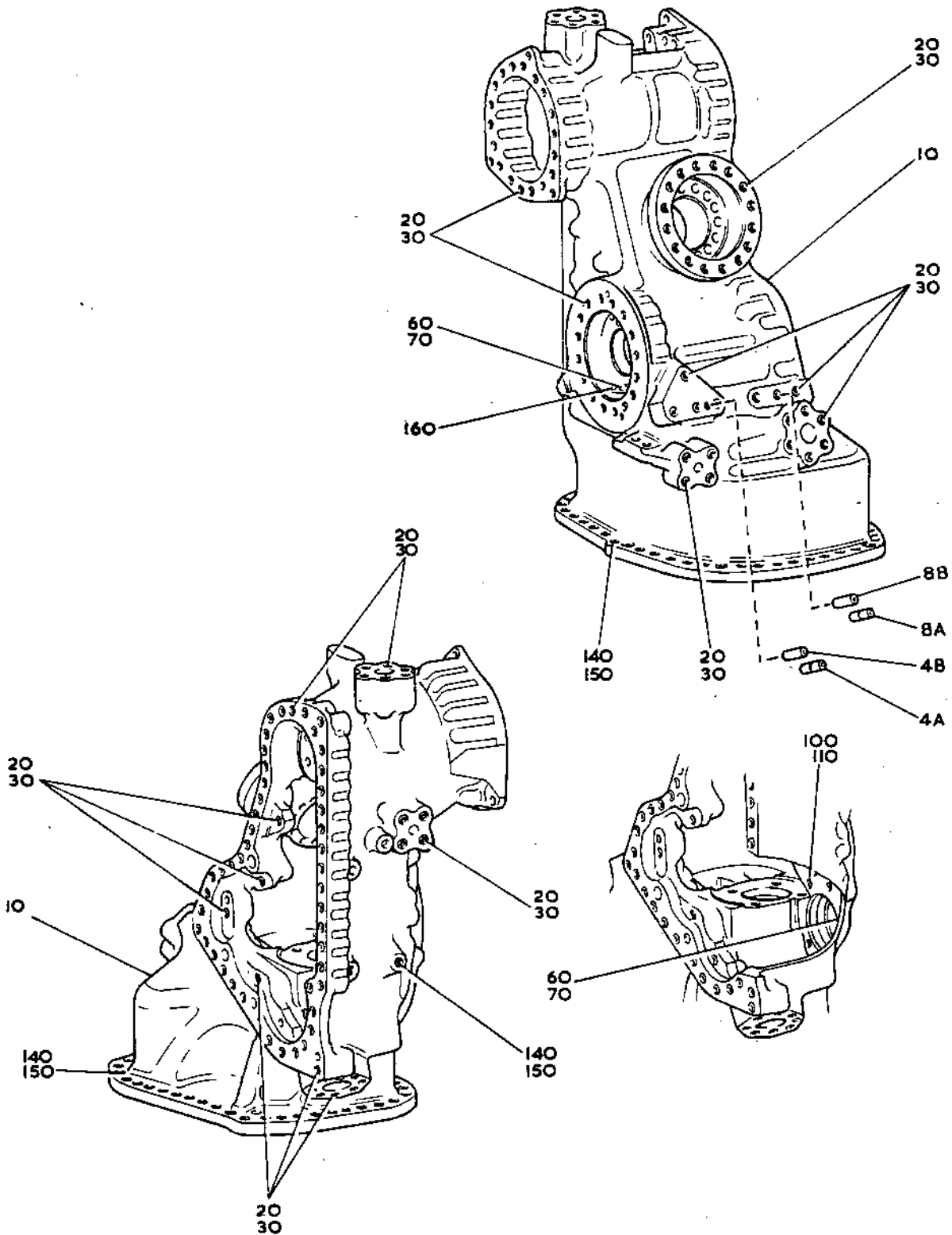


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LH Gearbox Accessory Case, Case Assembly
Figure 309

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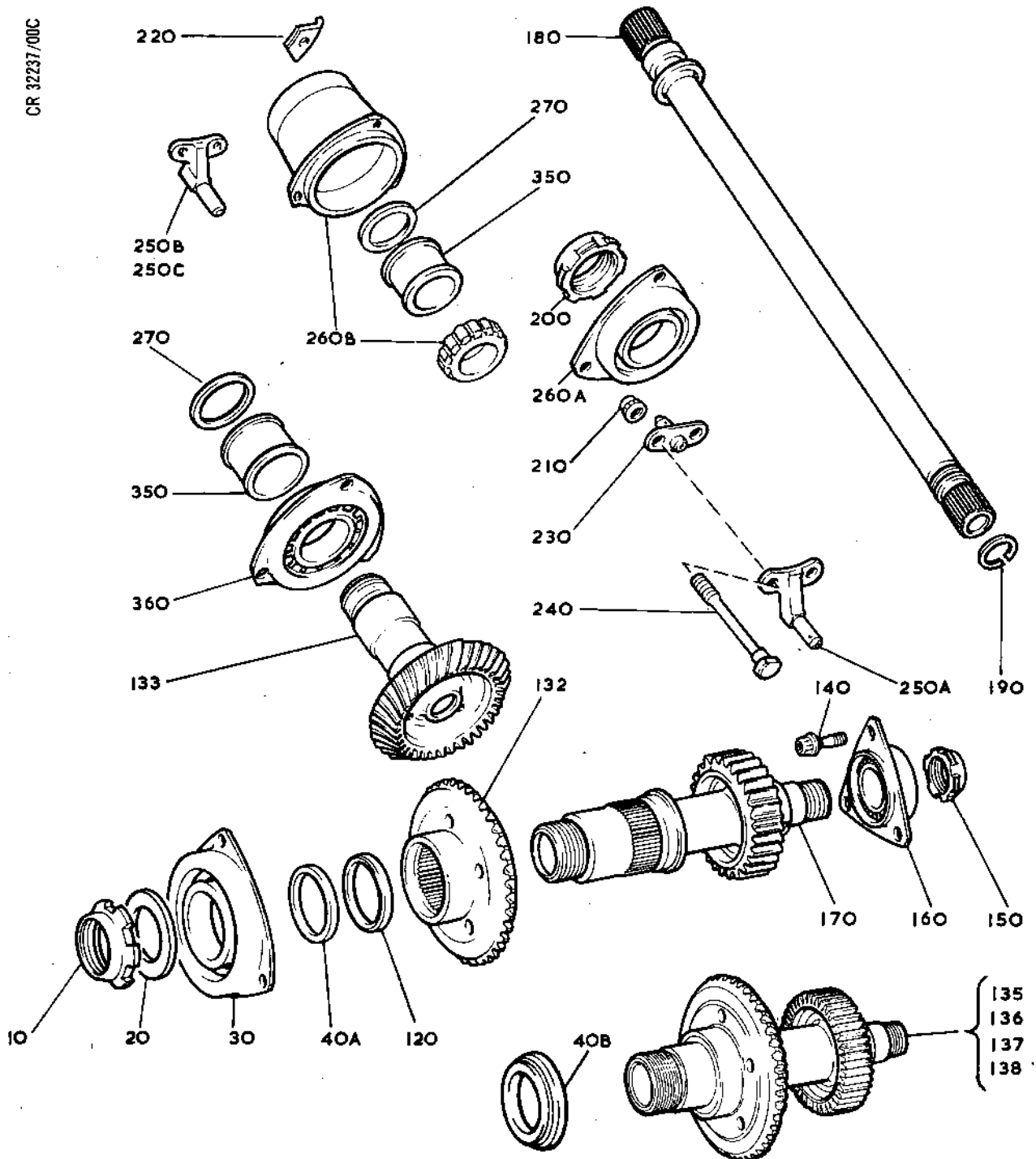
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LH Accessory Gearbox, Main Drives
Figure 310

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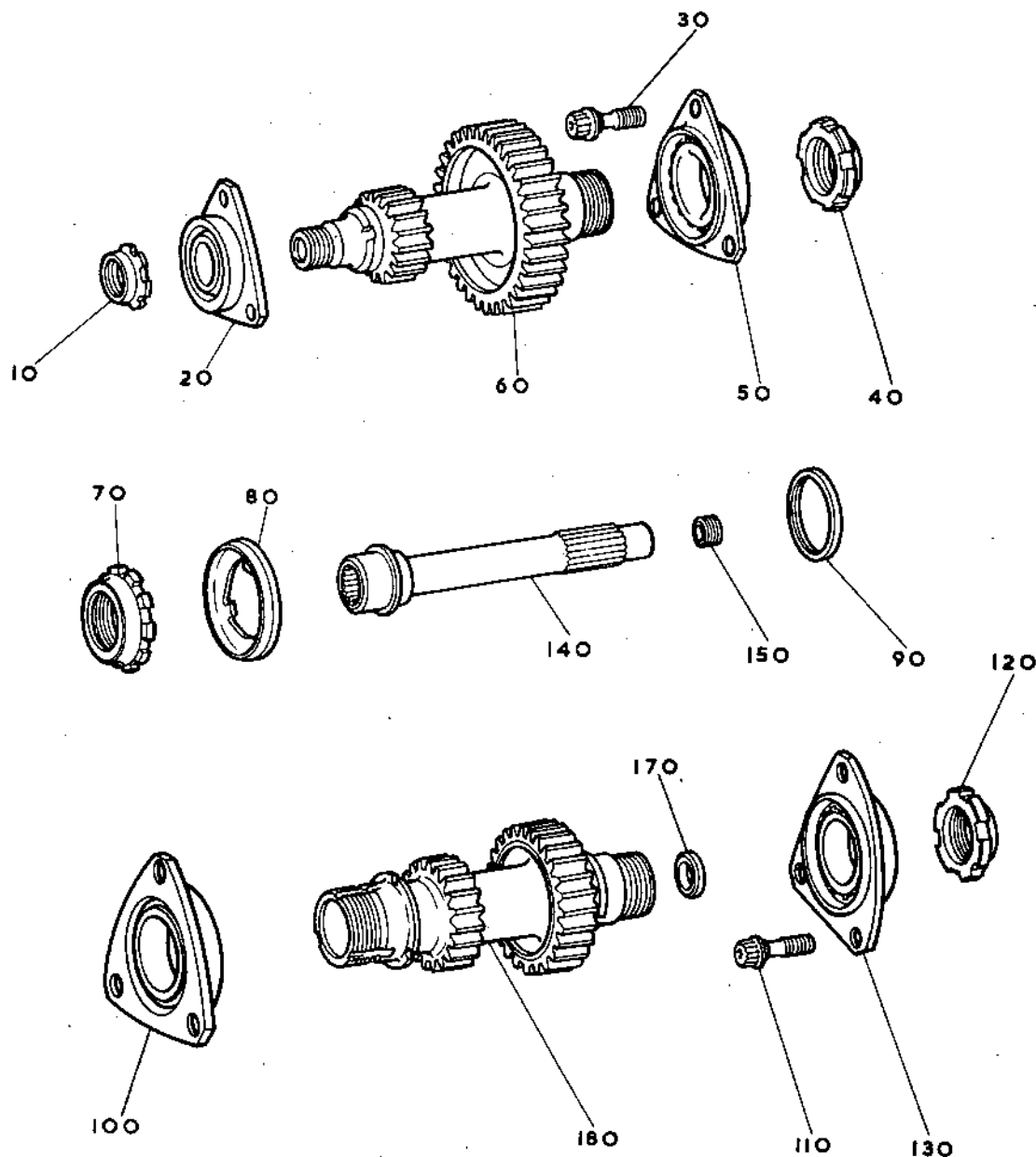
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Stage 1 Fuel Pump and Roller Gear Drives
Figure 311

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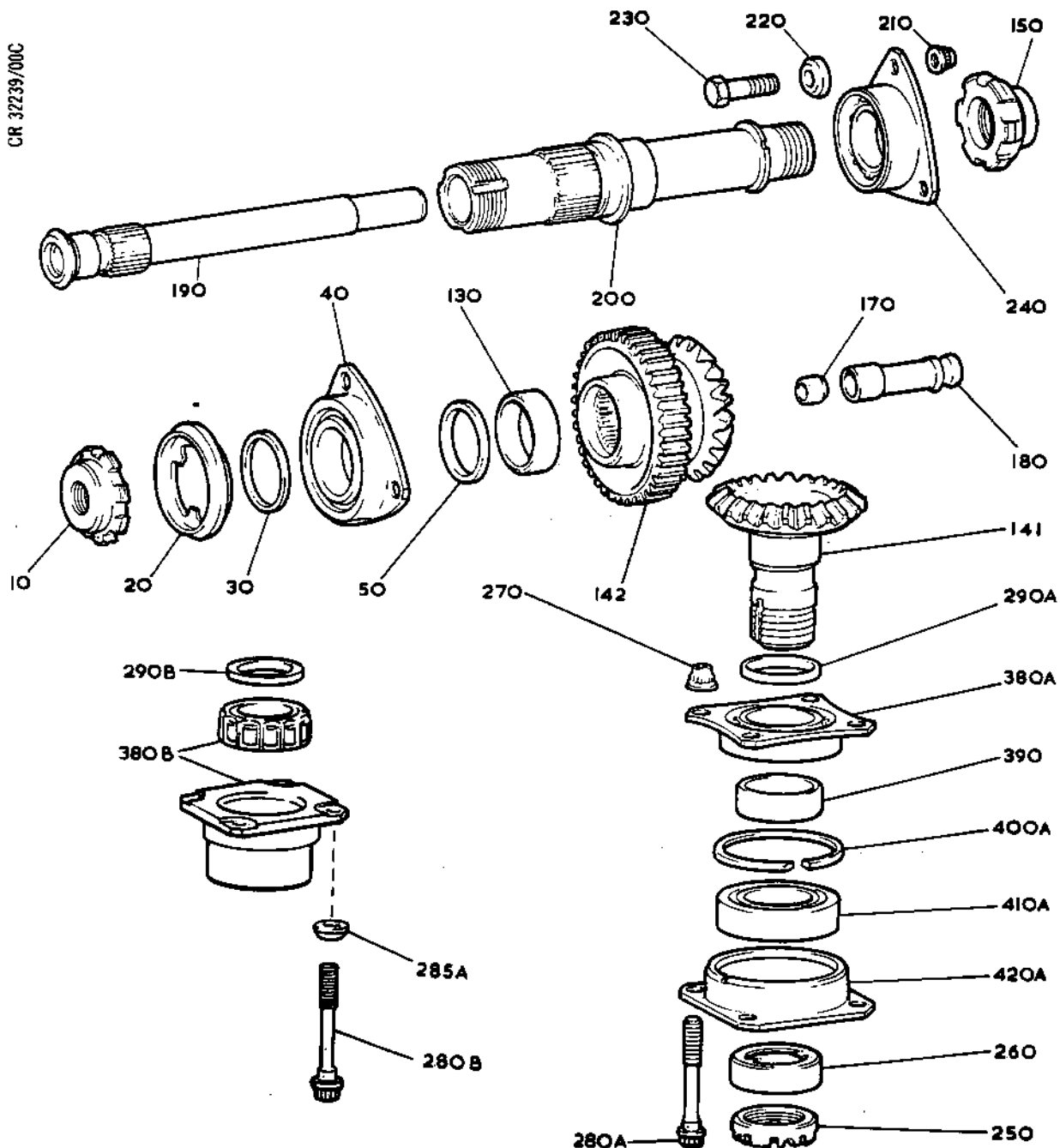
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TN24570

Fuel Control Unit and Main Oil Pump Drives
Figure 312

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LEFT-HAND ACCESSORY GEARBOX CASE ASSEMBLY -
INSPECTION/CHECK

For information on the inspection/check of the Left-hand
Accessory Gearbox Case Assembly, refer to 72-62-00
Inspection/Check.

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LEFT-HAND ACCESSORY GEARBOX MAIN DRIVES - INSPECTION/CHECK

For information on the inspection/check of the Left-hand
Accessory Gearbox Main Drives, refer to 72-62-00 Inspection/
Check.

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FIRST STAGE FUEL PUMP DRIVE AND IDLER GEAR -
INSPECTION/CHECK

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For information on the inspection/check of the First Stage
Fuel Pump Drive and Idler Gear, refer to 72-62-00
Inspection/Check.

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FUEL CONTROL UNIT DRIVE AND MAIN OIL PUMP DRIVE -
INSPECTION/CHECK

For information on the inspection/check of the Fuel Control Unit Drive and Main Oil Pump Drive, refer to 72-62-00 Inspection/Check.

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RIGHT-HAND ACCESSORY GEARBOX ASSEMBLY - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

- (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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OVERHAUL

- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
303	30	Nut	MP1
303	210	Nut	MP1
304	70	Coupling Ring	MP1
305	420	Bearing Outer Ring	MP1
305	440	Bearing Outer Ring	MP1
306	40	Hand Turning Shaft	MP1
306	50	Driving Shaft	MP1
306	110	Scavenge Spur Gear	MP1
309	80	Coupling Ring	MP1
312	40	Flexible Coupling Shaft	MP1
312	60	Spiral Bevel Gear	MP1
312	90	Parallel Roller Bearing -	
		Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
312	100	Adjusting Washer	MP1
312	270	Ball Bearing - Outer	
		Track	MP1
		- Inner Half Track	MP1
		- Cage	MP1
312	300	Parallel Roller Bearing -	
		Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
312	420	Shaft Nut	MP1
312	430	Parallel Roller Bearing -	
		Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1

Items to be Magnetic Particle Crack Tested
Table 301 (Continued)

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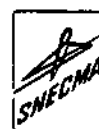


FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
312	500	Ball Bearing - Outer Track	MP1
		- Inner Half Track	MP1
		- Cage	MP1
312	510	Bearing Housing	MP1
312	610	Bevel Gear	MP1
312	620	Shaft Nut	MP1
312	630	Parallel Roller Bearing	
		- Inner Track	MP1
		- Cage	MP1
312	640	Spur Gear	MP1
313	40	Splined Shaft	MP1
313	80	Housing	MP1
313	240	Spur Gear Assembly	MP1
313	260	Parallel Roller Bearing	
		- Inner Track	MP1
		- Cage	MP1
314	10	Shaft Nut	MP1
314	50	Parallel Roller Bearing -	
		Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
314	60	Gear Assembly	MP1
314	100	Parallel Roller Bearing -	
		Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
314	110	Idler Shaft	MP1
314	120	Shaft Nut	MP1
314	170	Parallel Roller Bearing -	
		Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1

Items to be Magnetic Particle Crack Tested
Table 301 (Continued)

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FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
314	180	Spacer Sleeve	MP1
314	190	Spur Gear	MP1
315	110	Parallel Roller Bearing - Outer Track	MP1
		- Inner Track	MP1
		- Cage	MP1
315	200	Spur Gear Shaft	MP1

Items to be Magnetic Particle Crack Tested
Table 301 (Concluded)**B. Fluorescent Dye Crack Detection.**

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	110	Gearbox Mounting Bracket	FlA
302	240	Gearbox Mounting Bracket	FlA
303	120	Bracket	FlA
303	140	Adapter	FlA
303	310	Bracket	FlA
303	330	Adapter	FlA
304	50	Plain Flange	FlA
304	120	Mounting Bracket	FlA
305	90	Front Cover	FlA
305	400	Retaining Ring Assembly	FlA
305	450	Blank Covers	FlA
306	60	Scavenge Pump Cover	FlA
306	120	Scavenge Pump Cover	FlA
307	10	Rim Clenching Clamp Assembly	FlA
309	160	Mounting Bracket	FlA

Items to be Fluorescent Dye Crack Tested
Table 302 (Continued)

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FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
307	130	Rim Clenching Clamp Assembly	FlA
308	60	Pump Adapter	FlA
308	150	Adapter	FlA
308	180	Adapter Assembly	FlA
309	60	Plain Flange	FlA
309	160	Mounting Bracket	FlA
311	30	Gearbox Case	FlA
312	30	Key Washer	Fl/S3
312	320	Bearing Housing	FlA
313	110	Oil Transfer Sleeve	FlA
313	120	Oil Metering Plate	FlA
314	140	Washer Plate	FlA
315	80	Seal Sleeve	FlA
315	160	Seal Sleeve	FlA

Items to be Fluorescent Dye Crack Tested
Table 302 (Concluded)

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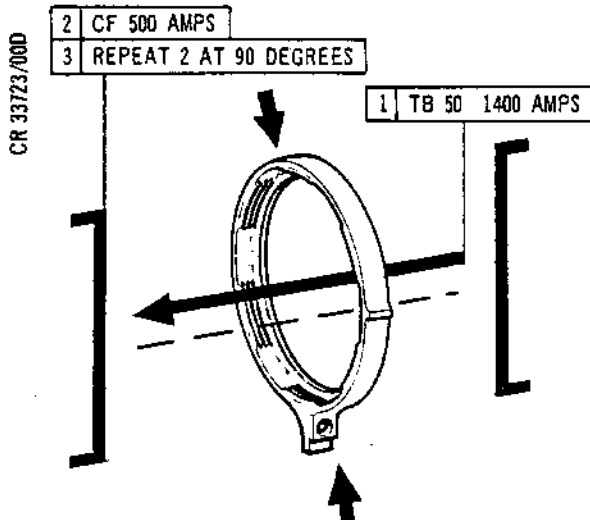
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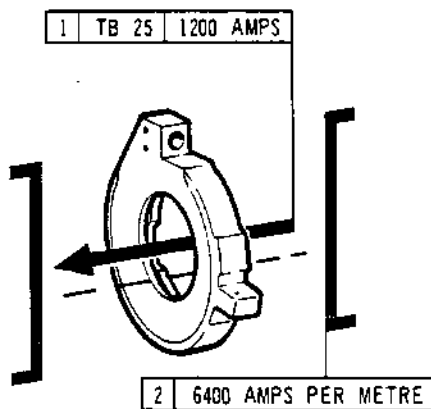


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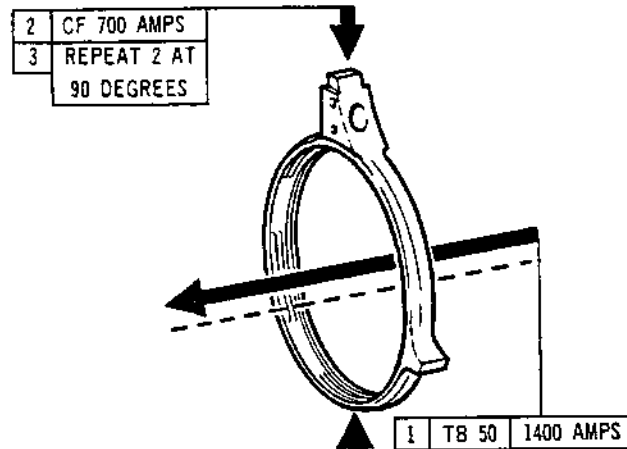
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COUPLING RING ASSEMBLY (311-4)



NUT ASSEMBLY (303-30/210)



COUPLING RING (304-70)

Crack Detection Test Diagram
Figure 301 (Sheet 1 of 12)

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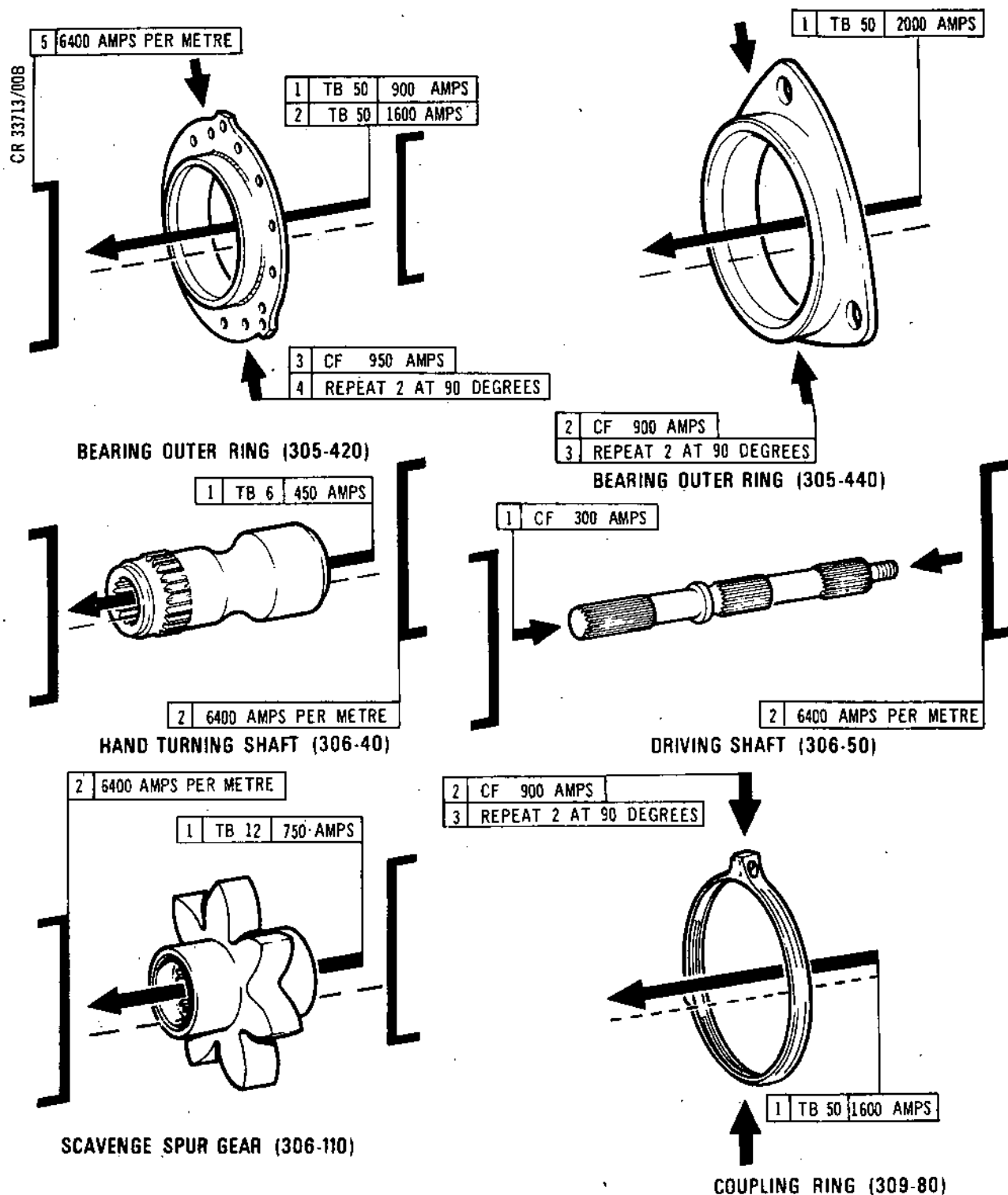
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Crack Detection Test Diagram
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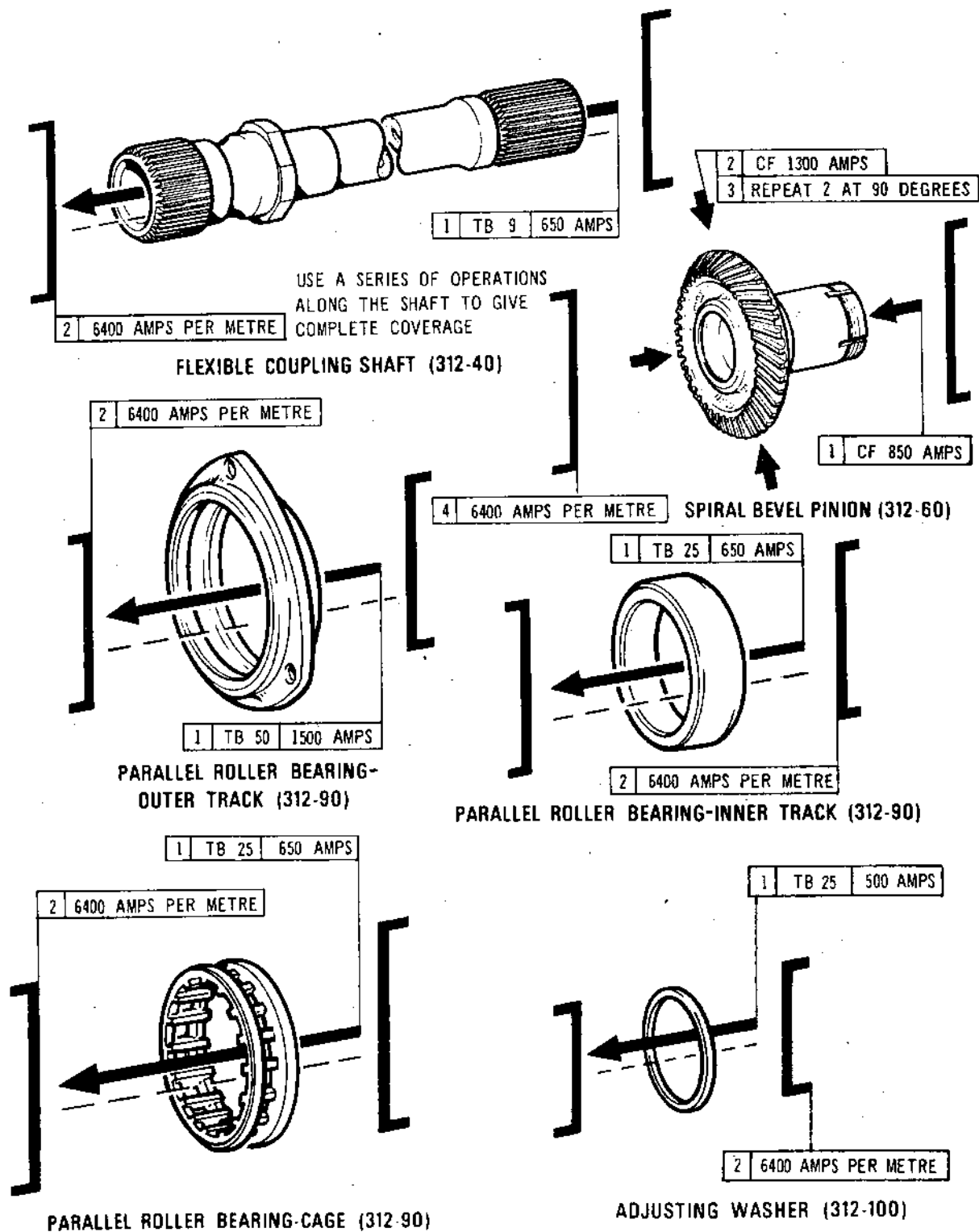
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Crack Detection Test Diagram
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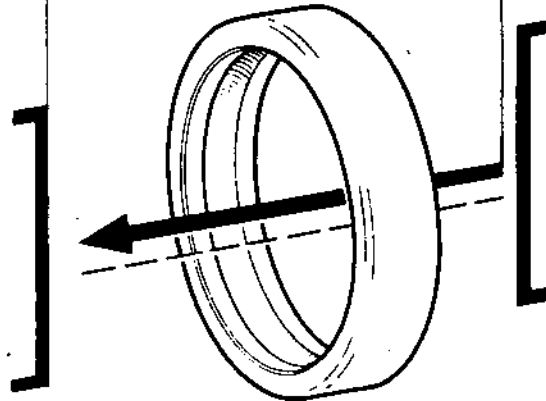
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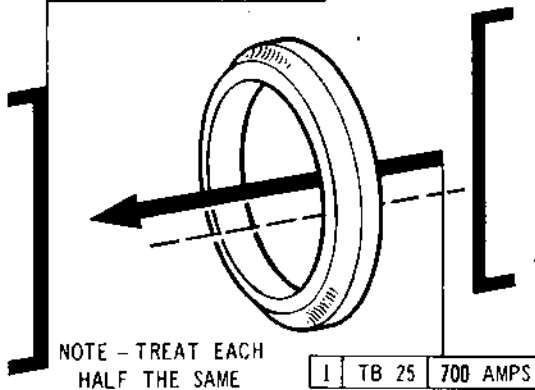
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2 6400 AMPS PER METRE 1 TB 25 700 AMPS



BALL BEARING-OUTER TRACK (312-270)

2 6400 AMPS PER METRE

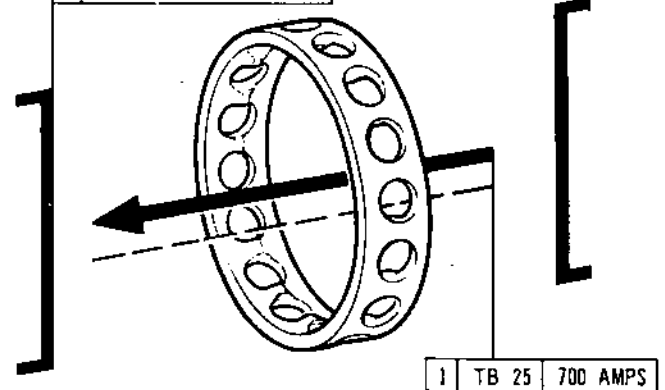


NOTE - TREAT EACH
HALF THE SAME

1 TB 25 700 AMPS

BALL BEARING-INNER HALF TRACKS (312-270)

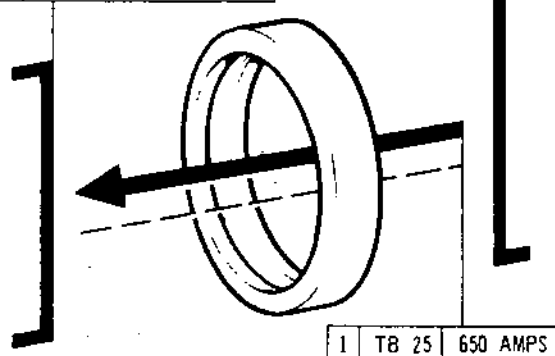
2 6400 AMPS PER METRE



1 TB 25 700 AMPS

BALL BEARING-CAGE (312-270)

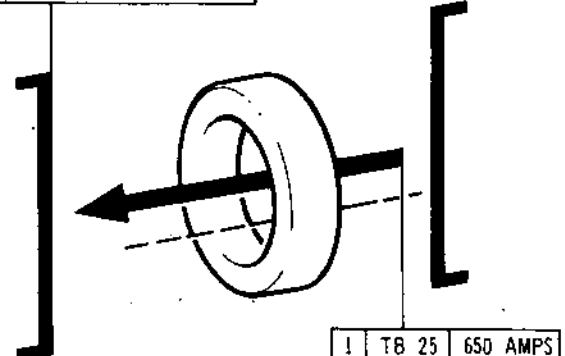
2 6400 AMPS PER METRE



1 TB 25 650 AMPS

PARALLEL ROLLER BEARING-OUTER TRACK (312-300)

2 6400 AMPS PER METRE



1 TB 25 650 AMPS

PARALLEL ROLLER BEARING-INNER TRACK (312-300)

Crack Detection Test Diagram
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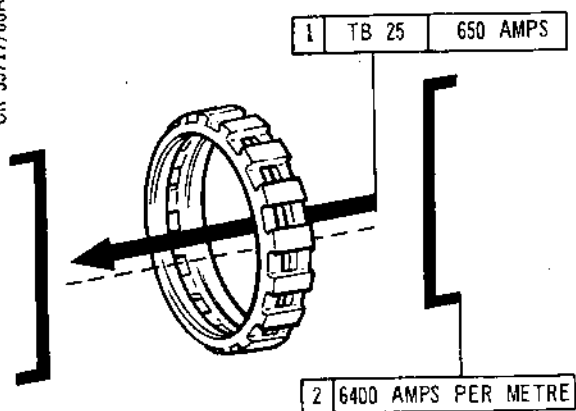


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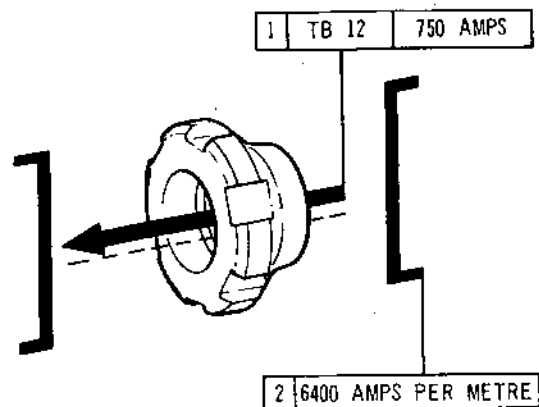
MK.610-14-28
OVERHAUL



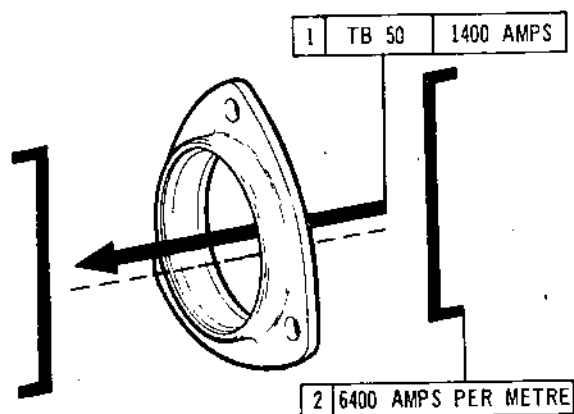
CR 33717/00A



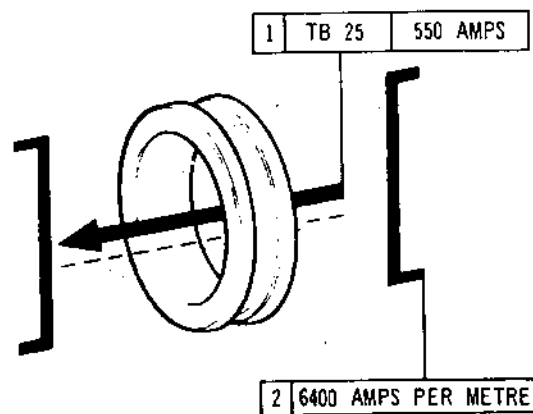
PARALLEL ROLLER BEARING-CAGE (312-300)



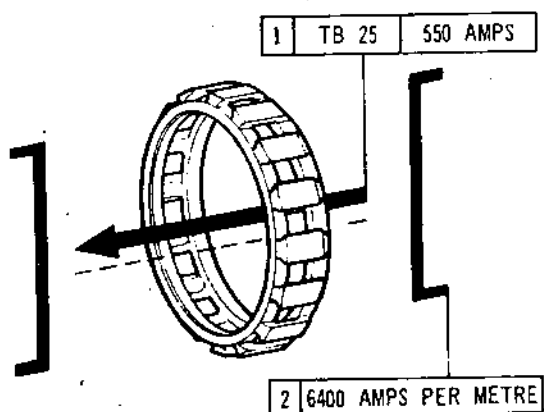
SHAFT NUT (312-420)



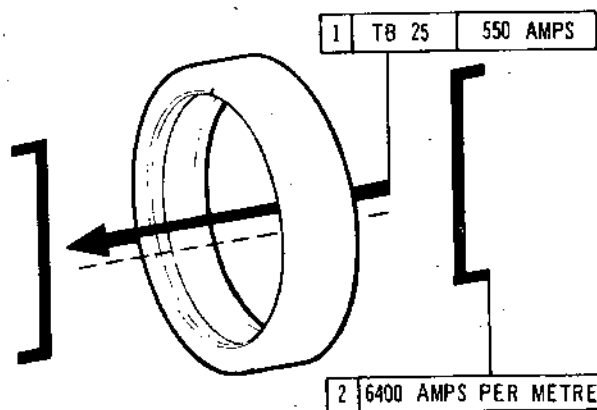
PARALLEL ROLLER BEARING-OUTER TRACK (312-430)



PARALLEL ROLLER BEARING-INNER TRACK (312-430)



PARALLEL ROLLER BEARING-CAGE (312-430)



BALL BEARING-OUTER TRACK (312-500)

Crack Detection Test Diagram
Figure 301 (Sheet 5 of 12)

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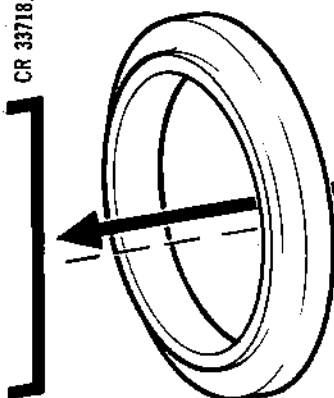


OLYMPUS 593

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CR 33718/00A



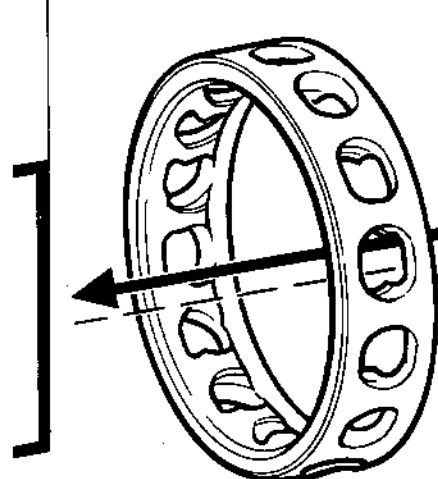
BALL BEARING-INNER
HALF TRACK (312-500)

1 TB 25 550 AMPS

2 6400 AMPS PER METRE

NOTE: TREAT EACH HALF
TRACK IN A SIMILAR
MANNER

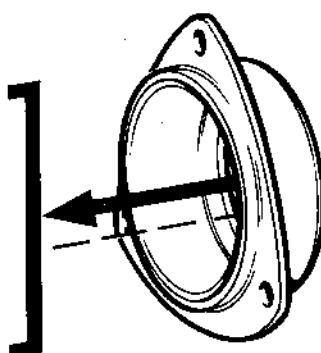
2 6400 AMPS PER METRE



1 TB 25 550 AMPS

BALL BEARING-CAGE (312-500)

1 TB 50 1300 AMPS



BEARING HOUSING (312-510)

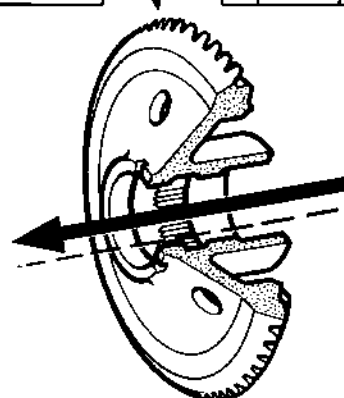
2 6400 AMPS PER METRE

3 CF 1650 AMPS

4 REPEAT 3 AT 90 DEGREES

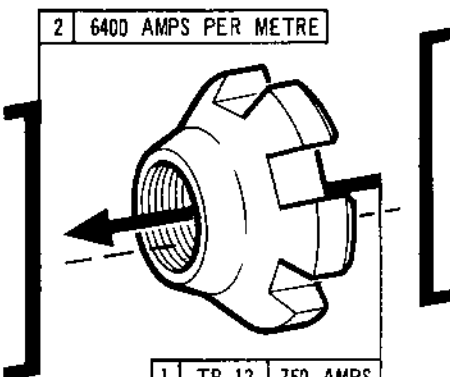
1 TB 25 900 AMPS

2 TB 25 2500 AMPS



BEVEL GEAR (312-610)

2 6400 AMPS PER METRE

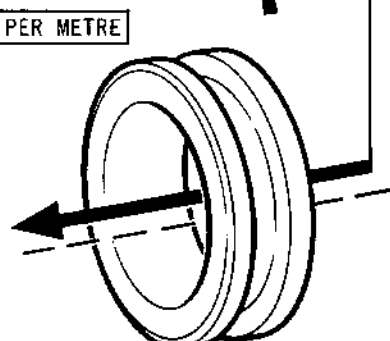


SHAFT NUT (312-620)

2 6400 AMPS PER METRE

1 TB 12 750 AMPS

1 TB 25 850 AMPS



PARALLEL ROLLER BEARING-INNER TRACK
(312-630)

Crack Detection Test Diagram
Figure 301 (Sheet 6 of 12)

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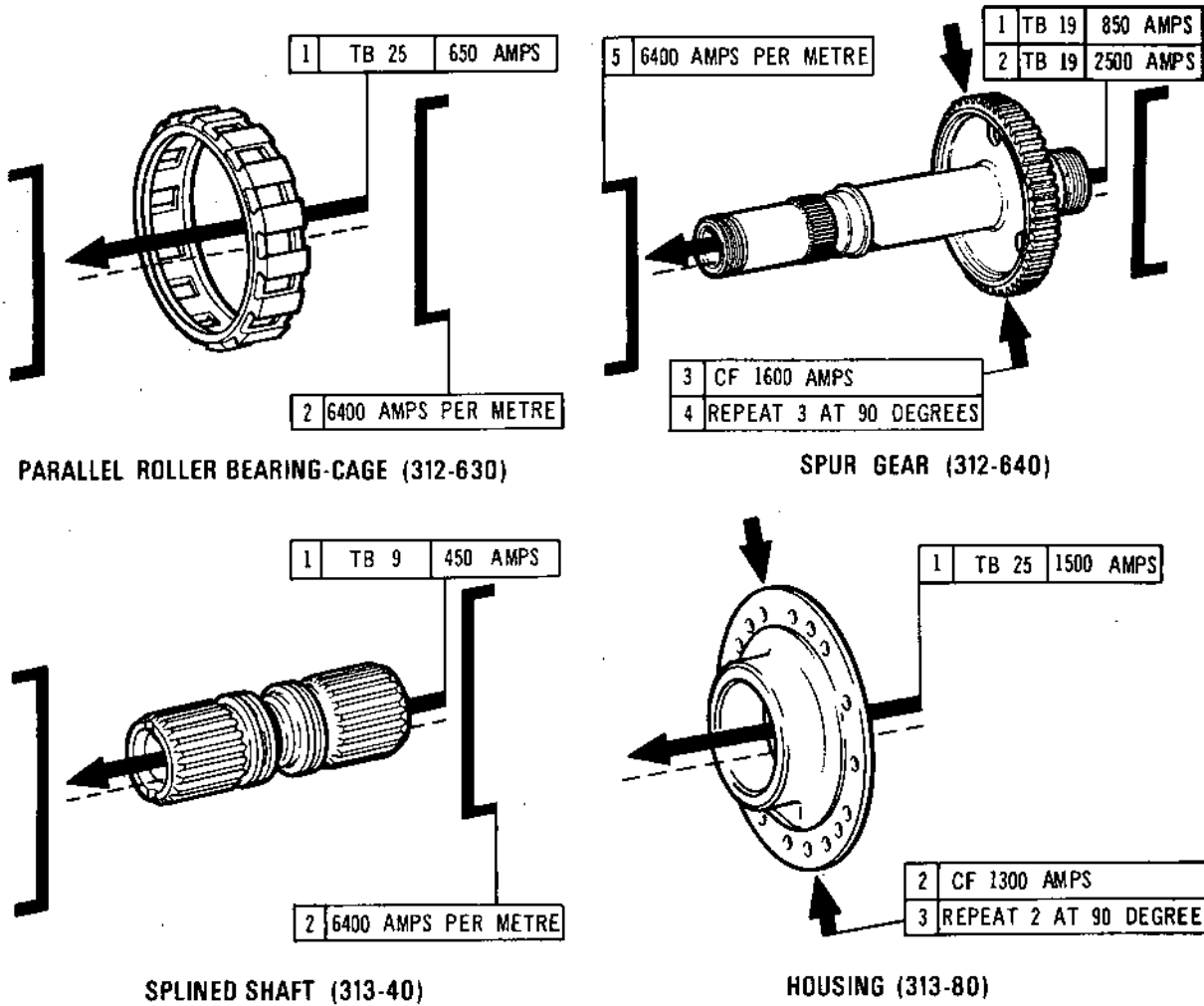


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TN28659

Crack Detection Test Diagram
Figure 301 (Sheet 7 of 12)

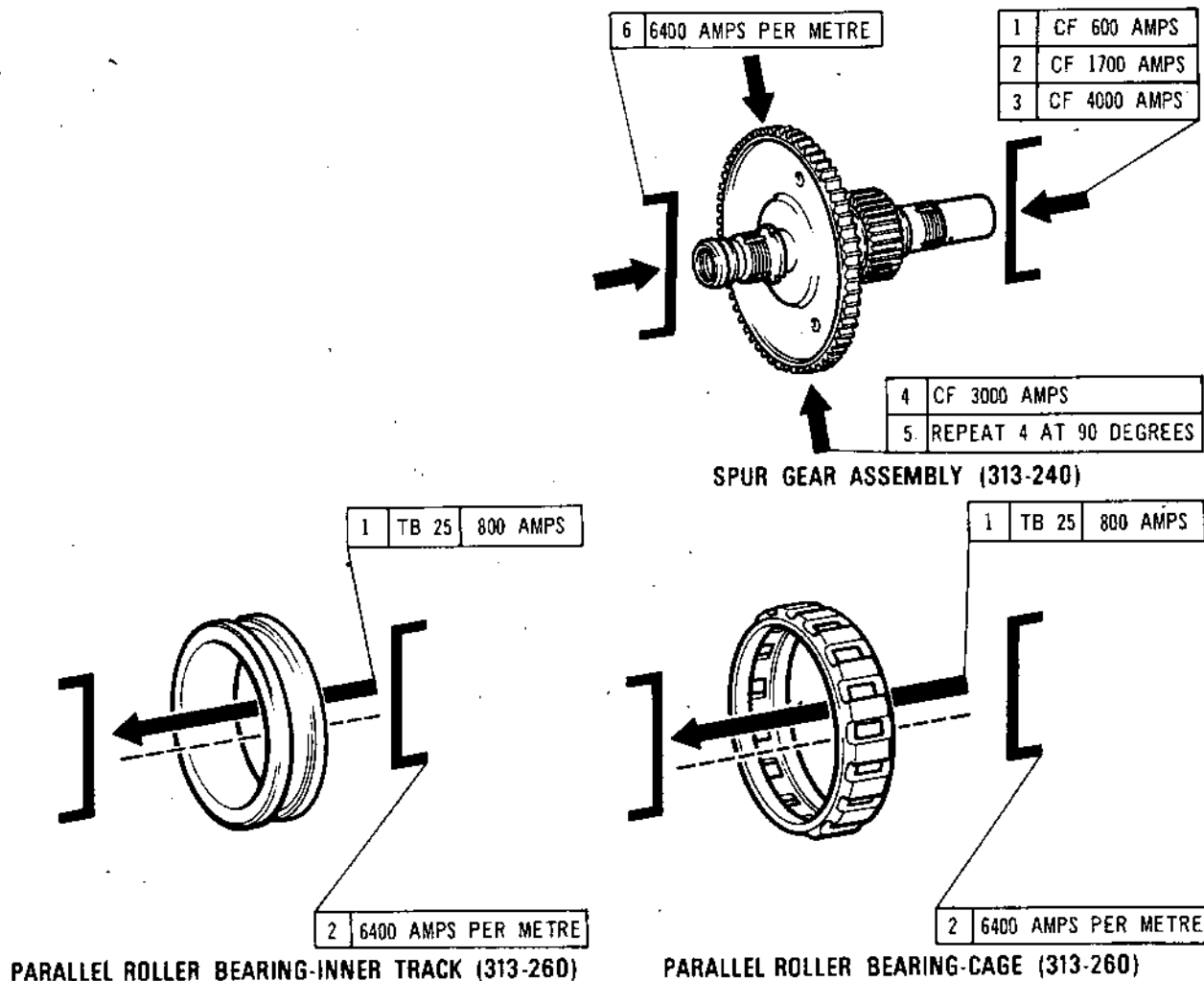
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Crack Detection Test Diagram
Figure 301 (Sheet 8 of 12)

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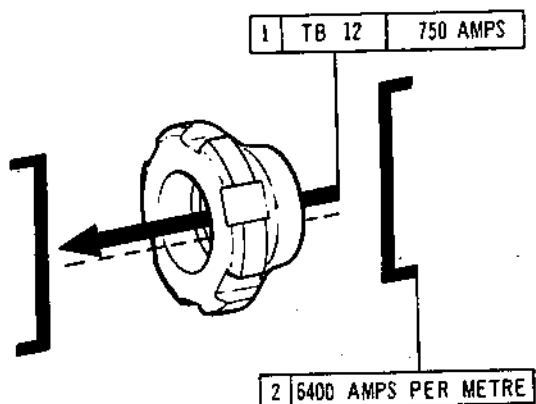
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CR 33721/00B

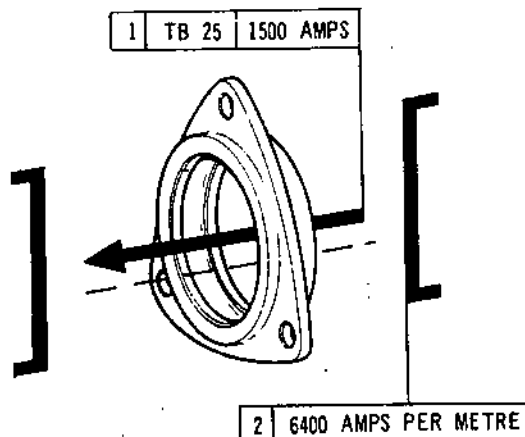


OLYMPUS 593

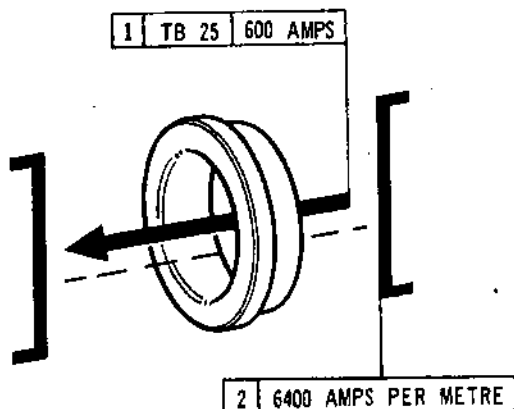
MK. 610-14-28
OVERHAUL



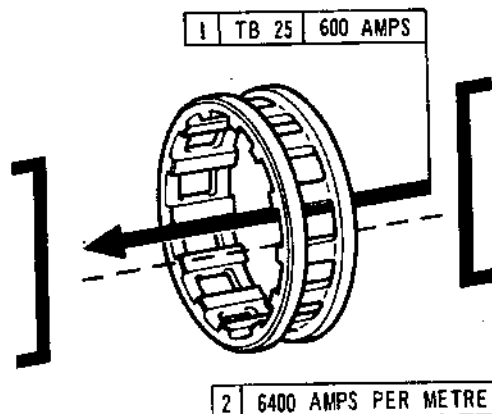
SHAFT NUT (314-10)



PARALLEL ROLLER BEARING
-OUTER TRACK (314-50)



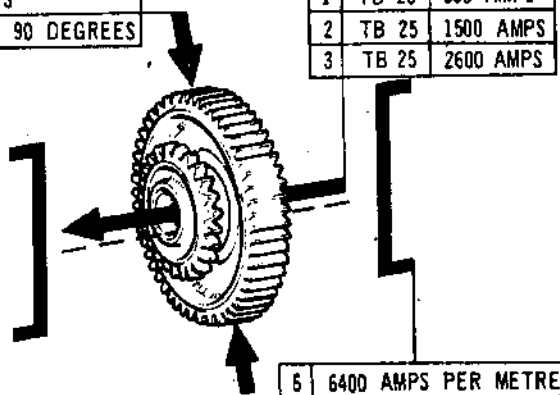
PARALLEL ROLLER BEARING
-INNER TRACK (314-50)



PARALLEL ROLLER BEARING -CAGE (314-50)

4	CF	1700 AMPS
5	REPEAT 3 AT 90 DEGREES	

1	TB 25	650 AMPS
2	TB 25	1500 AMPS
3	TB 25	2600 AMPS



GEAR ASSEMBLY (314-60)

Crack Detection Test Diagram
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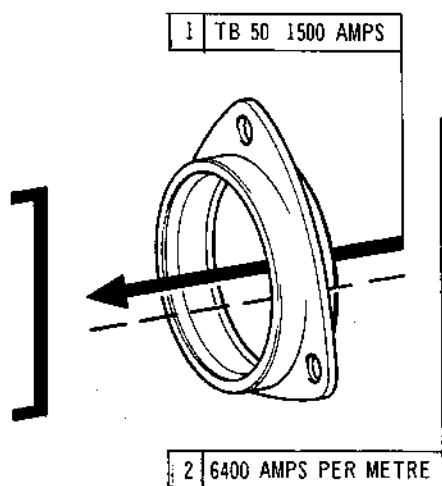


OLYMPUS 593

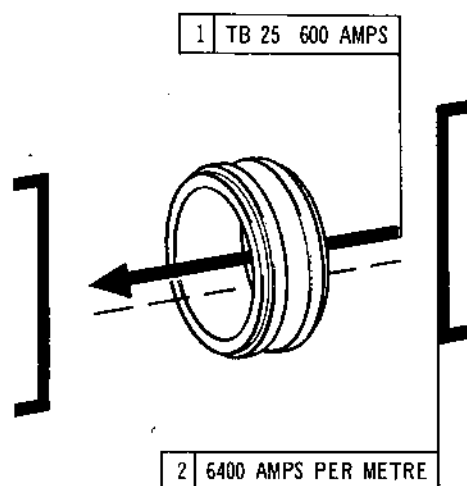
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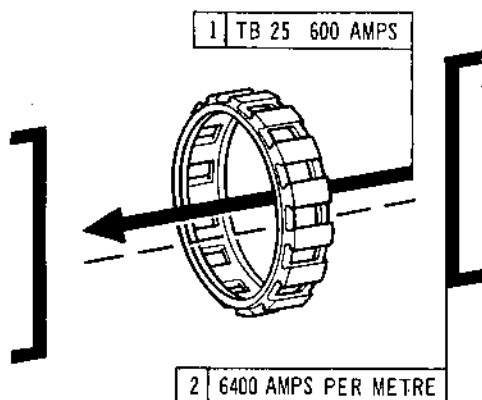
CR 33722/00A



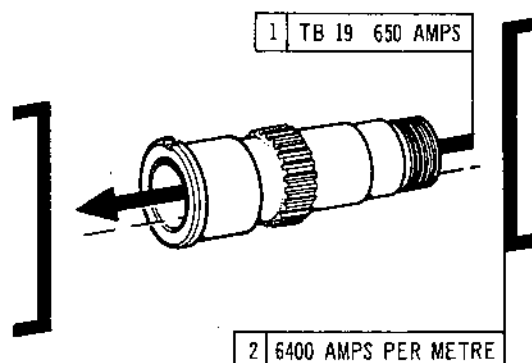
PARALLEL ROLLER BEARING-OUTER TRACK (314-100)



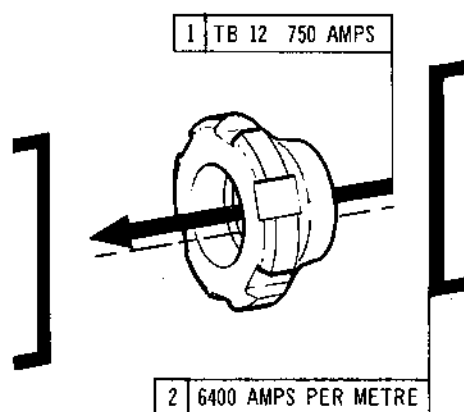
PARALLEL ROLLER BEARING
-INNER TRACK (314-100)



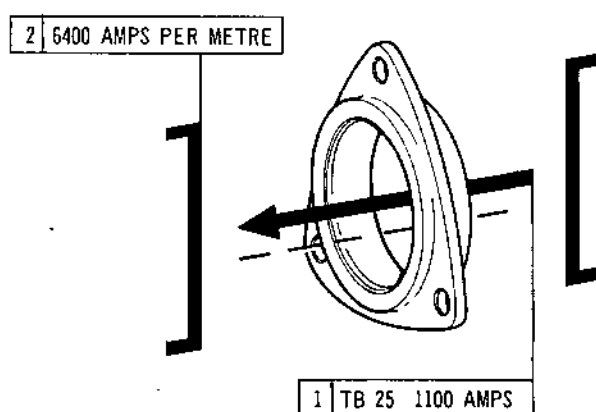
PARALLEL ROLLER BEARING -CAGE (314-100)



IDLER SHAFT (314-110)



SHAFT NUT (314-120)



PARALLEL ROLLER BEARING
-OUTER TRACK (314-170)

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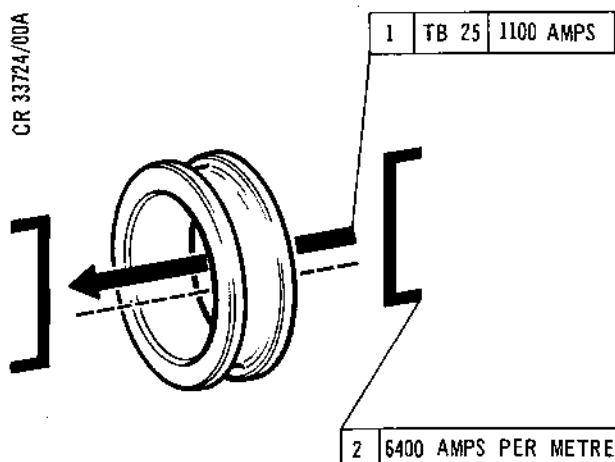


OLYMPUS 593

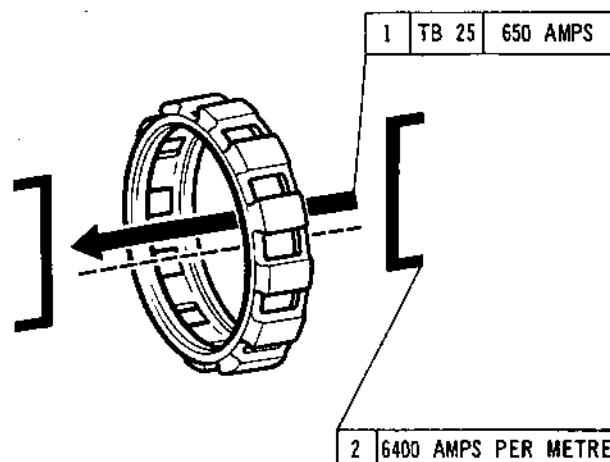
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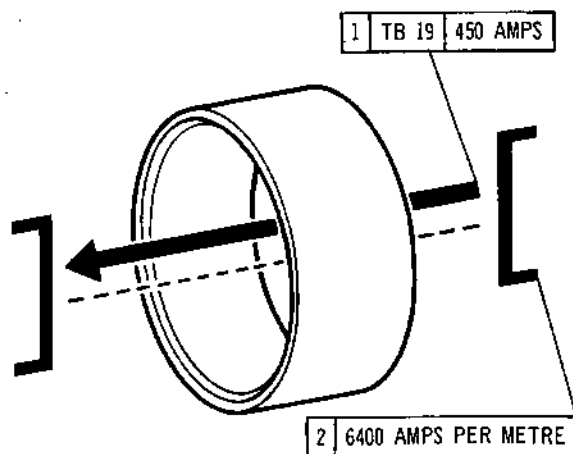
CR 33724/00A



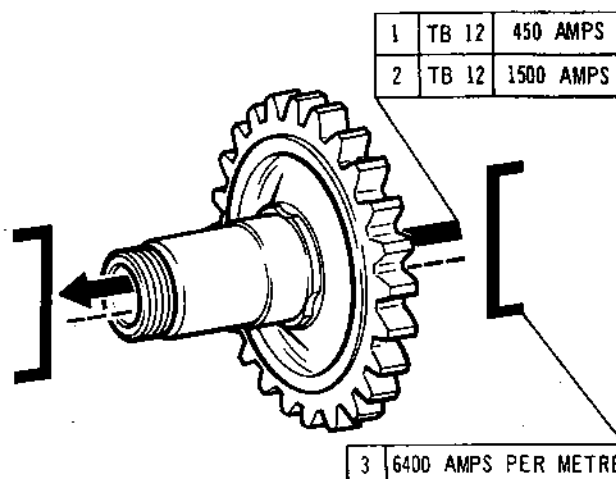
PARALLEL ROLLER BEARING -INNER TRACK (314-170)



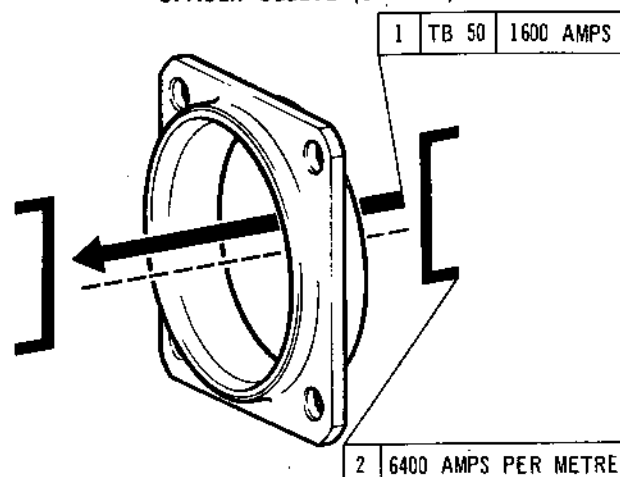
PARALLEL ROLLER BEARING -CAGE (314-170)



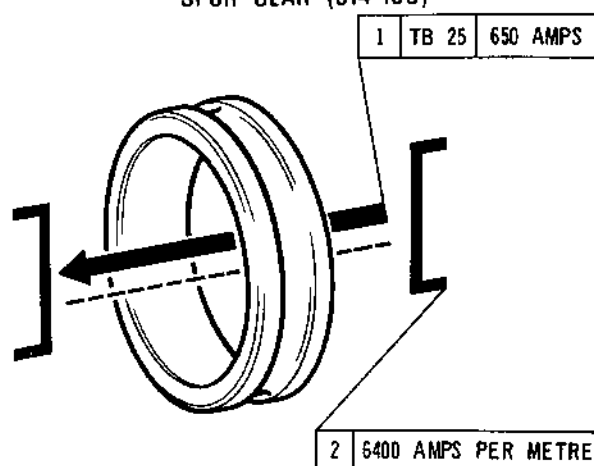
SPACER SLEEVE (314-180)



SPUR GEAR (314-190)



PARALLEL ROLLER BEARING-OUTER TRACK (315-110)



PARALLEL ROLLER BEARING -INNER TRACK (315-110)

Crack Detection Test Diagram
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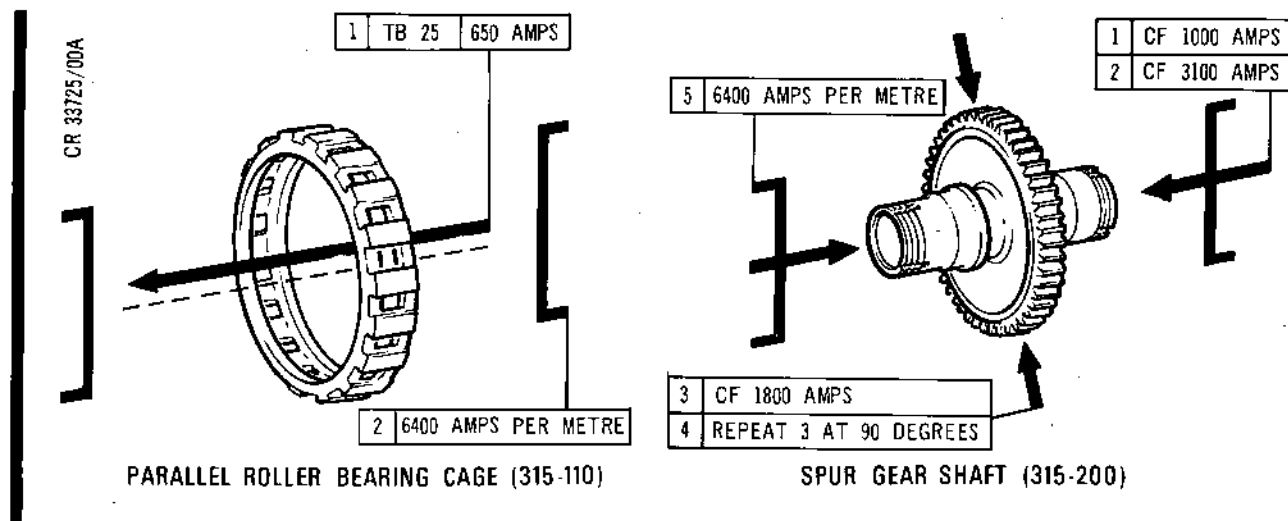
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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	72-63-01	Fig.1
303	72-63-01	Fig.2
304	72-63-01	Fig.3
305	72-63-01	Fig.4
306	72-63-01	Fig.5
307	72-63-01	Fig.6
308	72-63-01	Fig.7
309	72-63-01	Fig.8
310	72-63-01	Fig.9
311	72-63-01	Fig.10
312	72-63-02	Fig.1
313	72-63-03	Fig.1
314	72-63-04	Fig.1
315	72-63-05	Fig.1

Cross References to Illustrated Parts Catalogue
Table 303

4. Adjusting Plate (302-20 to 45/120 to 145/160 to 205, 312-440 to 485) Adjusting Shim (302-250 to 295) and Adjusting Washer (312-100 to 255/180 to 255/520 to 595)

NOTE: These items will require selection during assembly.

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores.

Accept provided
that repair
preserves surface
flatness and that
designed effective
thickness is main-
tained over 90 per
cent of contact
face area.

- (2) Fretting and wear.

Reject.

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5. Nut Retainer (302-80)

A. Inspect Nut Retainer.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Any wear in nut retaining locations. Reject.
 - (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.
- (3) Distortion. Accept providing compatibility is preserved.

6. Hollow Headed Pin (302-100/230)

A. Inspect Mounting Bracket Abutment Face.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Fretting not more than 0.005 in. (0,130 mm) in depth. Accept after repair providing designed effective flatness is maintained over 90 per cent of face area.

B. Inspect Hollow Headed Pin.

- (1) Scores.
 - (a) Not more than 0.010 in. (0,250 mm) in depth. Accept after repair.

7. Gearbox Mounting Bracket (302-110/240)

A. Inspect Intermediate Case Attachment Flange.

- (1) Nicks and burrs. Accept after repair.

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(2) Wear and fretting.

(a) Not more than 5 per cent reduction in flange thickness. Accept.

(b) Bolt-holes elongated not more than 0.010 in. (0,250 mm). Accept after repair.

(3) Scores.

(a) Not more than 0.005 in. (0,130 mm) in depth. Accept after repair.

B. Inspect Gearbox Attachment Flange.

(1) Nicks and burrs. Accept after repair.

(2) Wear and fretting.

(a) Not more than 5 per cent reduction in flange thickness. Accept.

(b) Hollow headed pin holes elongated. Reject.

(3) Scores.

(a) Not more than 0.005 in. (0,130 mm) in depth. Accept after repair.

C. Inspect Mounting Bracket.

(1) Nicks and burrs. Accept after repair.

(2) Distortion. Accept providing compatibility is preserved.

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8. Coupling Ring Assembly (304-70, 309-80)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Anvil.

(1) Nicks and burrs.

Accept after
repair.

C. Inspect Coupling Interrupted Thread.

NOTE: Using a new standard mating component, check the compatibility of the interrupted thread to ensure adequate torque clearance between the spherical nut and the mounting bracket.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Fretting not more
than 0.001 in.
(0,030 mm) in depth.

Accept providing
compatibility is
preserved.

D. Inspect Spherical Nut Location.

(1) Security.

(a) Spherical nut secure
in its location and
free to move within
bounds of locking
pins.

Accept.

9. Mounting Bracket (304-120, 309-160)

A. Inspect Abutment Flange.

(1) Wear.

(a) Not more than 10 per
cent reduction in
flange thickness.

Accept after
repair.

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- (b) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

- (2) Nicks and burrs.

Accept after
repair.

B. Inspect Spherical Washer Location.

- (1) Wear.

- (a) Fretting not more than
0.010 in. (0,2540 mm)
in depth.

Accept after
repair.

- (2) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair.

- (3) Nicks and burrs.

Accept after
repair.

10. Nut Assembly (303-30/210)

- A. Inspect Spherical Nut Thread (Ref.72-09-00 Inspection/
Check).

- B. Inspect Nut Assembly Interrupted Thread.

NOTE: Using a new standard Adapter (303-140/330), check
the compatibility of the interrupted thread to
ensure adequate torque clearance between the
spherical nut and the bracket.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Fretting not more than
0.001 in. (0,030 mm)
in depth.

Accept providing
compatibility is
preserved.

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C. Inspect Spherical Nut Location.

(1) Security.

- (a) Spherical nut secure in its location and free to move within bounds of locking pins. Accept.

D. Inspect Anvil.

- (1) Nicks and burrs. Accept after repair.

E. Inspect Nut Assembly for General Condition.

- (1) Nicks and burrs. Accept after repair.

11. Magnetic Screwed Plug Assembly (303-80)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Test Magnetic Plug for Magnetism.

- (1) Examine the probe for defects.
- (2) The probe must be capable of lifting three unmagnetised steel 0.5 in. (13 mm) diameter balls.
- (3) Assemble a protective sleeve to the probe and place the magnetic plug in a suitable container.
- (a) Within testing limits. Accept.

12. Drain Valve and Body Assembly (303-90), Cover Assembly (303-270)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

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B. Inspect Valve Body.

- (1) Nicks and burrs.

Accept providing
sealing
capability is
maintained after
repair.

C. Check Spring Action.

- (1) Check spring action by manually depressing valve and ensuring its return under spring pressure.

D. Inspect Metaflex Seal Location.

- (1) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) deep and not
extending more than half
way across face.

Accept after
lapping providing
sealing
capabilities are
maintained.

13. Bracket (303-120/310)

A. Inspect Attachment Flange.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Not more than 5 per
cent reduction in
flange thickness.

Accept after
repair.

- (b) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

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(3) Scores.

- | | | |
|-----|---|-------------------------|
| (a) | Not more than 0.005 in.
(0,130 mm) deep. | Accept after
repair. |
|-----|---|-------------------------|

B. Inspect Spherical Washer Location.

(1) Wear.

- | | | |
|-----|---------------------|---------|
| (a) | Light witness mark. | Accept. |
|-----|---------------------|---------|

14. Adapter (303-140/330)

A. Inspect Attachment Flange.

- | | | |
|-----|------------------|-------------------------|
| (1) | Nicks and burrs. | Accept after
repair. |
|-----|------------------|-------------------------|

(2) Wear.

- | | | |
|-----|--|-------------------------|
| (a) | Not more than 5 per
cent reduction of
flange thickness
on bolt location
face only. | Accept after
repair. |
|-----|--|-------------------------|

- | | | |
|-----|--|-------------------------|
| (b) | Bolt-holes elongated
not more than 0.030 in.
(0,760 mm). | Accept after
repair. |
|-----|--|-------------------------|

(3) Scores.

- | | | |
|-----|---|--|
| (a) | Not more than 0.003 in.
(0,080 mm) in depth. | Accept after
repair providing
repair maintains
90 per cent of
effective designed
abutment area. |
|-----|---|--|

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B. Inspect Corruplus and Metaflex Seal Grooves.

(1) Nicks and burrs.

- | | | |
|-----|--|-------------------------|
| (a) | Not more than 0.002 in.
(0,050 mm) in depth on
groove edges. | Accept after
repair. |
|-----|--|-------------------------|

(2) Wear.

- | | | |
|-----|--|--|
| (a) | Not more than 0.002 in.
(0,050 mm) in depth
at the base of groove. | Accept providing
wear does not
encroach on seal
contact area. |
| (b) | Not more than 0.002 in.
(0,050 mm) in depth
on seal groove walls. | Accept. |

(3) Scores.

- | | | |
|-----|---|--|
| (a) | Not more than 0.002 in.
(0,050 mm) in depth. | Accept after
repair providing
scores do not
cross the seal
contact area. |
|-----|---|--|

C. Inspect Nut Assembly Location Interrupted Threads.

NOTE: Using a new standard Nut Assembly (303-30/210),
check the compatibility of the interrupted thread
to ensure adequate torque clearance between the
spherical nut and the bracket.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

- | | | |
|-----|---|--|
| (a) | Not more than 0.001 in.
(0,030 mm) in depth. | Accept providing
compatibility is
preserved. |
|-----|---|--|

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15. Spring (303-170/360)

A. Inspect Spring (Ref.72-09-00 Inspection/Check).

- (1) Check spring compression load (Ref.72-63-00 Fits and Clearances F.C.S.603-413/414) using spring test equipment (Ref.72-09-00 Inspection/Check).

(a) Within F.C.S. limits. Accept.

16. Filter Assembly (303-180) and Strainer Element Assembly (303-370)

A. Inspect Screen.

- (1) Damage.

(a) Punctures, tears or separation from the cage. Reject.

(b) Damage or faulty brazed joints. Reject.

B. Inspect Cage.

- (1) Cracks and distortion. Reject.

(2) Nicks, burrs and scores. Accept if unbroken contact is maintained after repair.

C. Inspect Spring Location.

- (1) Scores, nicks and burrs. Accept after repair.

D. Inspect End Face.

- (1) Scores, nicks and burrs. Accept after repair.

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E. Inspect Valve Body Location.

- (1) Nicks, burrs and scores. Accept after repair.

17. Valve Body Assembly (303-380)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Strainer Element Location.

- (1) Nicks and burrs. Accept after repair.

(2) Wear.

- (a) Light witness mark. Accept.

(3) Scores.

- (a) Not more than 0.002 in.
(0,050 mm) in depth. Accept after repair.

C. Inspect General Condition of Valve Body.

- (1) Nicks and burrs. Accept after repair.

18. Flow Restrictor Plug (303-390)

A. Inspect Flow Restrictor.

- (1) Nicks and burrs. Accept after repair.

(2) Wear.

- (a) Light witness mark. Accept.

(3) Scores.

- (a) Not more than 0.002 in.
(0,050 mm) in depth. Accept after repair.

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19. Plain Flange (304-50, 309-60)

A. Inspect Gearbox Attachment Face.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear and scoring (304-50).

(a) Light polish marks
provided that surface
roughness is not more
than 32 micro inches
(0,8 micrometres) on
the Corruplus seal
location.

Accept after repair
providing sealing
capabilities are
unimpaired.

B. Inspect Corruplus Seal Groove (309-60).

(1) Nicks and burrs.

Accept after
repair.

(2) Wear

(a) Light witness marks
provided that surface
roughness in grooves is
not more than 50
micro inches (1,25
micrometres).

Accept after repair
providing sealing
capabilities are
unimpaired.

C. Inspect Coupling Ring Retaining Flange.

(1) Nicks and burrs.

Accept after
repair.

(2) Scores.

(a) Light scoring not more
than 0.003 in. (0,080 mm)
in depth.

Accept after
repair.

(3) Wear.

(a) Fretting not more than
0.010 in. (0,250 mm)
in depth.

Accept after
repair providing
90 per cent of
effective flange
thickness is
maintained.

D. Inspect Coupling Flange for General Condition.

(1) Nicks and burrs.

Accept after
repair.

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(2) Wear and scores.

(a) Light wear and scoring
at bolthead locations.

Accept after
repair.

20. Relief Valve Cap (305-10) (Ref.SB.72-8)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Valve Cap.

(1) Nicks and burrs.

Accept after
repair.

21. Retainer Sleeve (305-30)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Retainer Sleeve.

(1) Nicks and burrs.

Accept after
repair.

22. Blanking Plate (305-40)

A. Inspect Blanking Plate.

(1) Nicks and burrs.

(a) Not more than 0.003 in.
(0,080 mm) in depth.

Accept after
repair.

(2) Wear.

(a) Not more than 0.010 in.
(0,250 mm) in depth
on retainer sleeve
face.

Accept after repair
providing 90 per
cent of effective
designed contact
area is maintained.

(3) Scores.

(a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair.

23. Blank Cover (305-70) (Ref.SB.72-41)

A. Inspect Blank Cover.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear and scores.

Accept after repair
providing sealing
capabilities are
unimpaired.

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24. Front Cover Assembly (305-90)

- A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.601-398/400/401/403, 602-335/339).

NOTE: Carry out these checks in conjunction with the Bush (305-230), Outer Bearing Ring (305-440), the Outer Bearing Ring (305-420) and the Blank Gear (306-160B).

(1) Within F.C.S. limits. Accept.

- B. Inspect All Threads (Ref.72-09-00 Inspection/Check).

- C. Inspect Inserts.

(1) Security.

(a) Inserts secure and maintaining interference fit. Accept.

- D. Inspect Gearbox Abutment Face.

(1) Nicks and burrs. Accept after repair providing sealing capabilities are unimpaired.

(2) Scores.

(a) Not more than 0.003 in. (0,080 mm) in depth and not extending right across the sealing face. Accept after repair providing sealing capabilities are unimpaired.

(3) Wear.

(a) Fretting not more than 0.003 in. (0,080 mm) in depth. Accept after repair providing flatness tolerances in (4) are maintained.

(b) Bolt-holes elongated not more than 0.010 in. (0,250 mm). Accept after repair.

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(4) Flatness.

- (a) Sealing surface face
flat within 0.0015 in.
(0,040 mm) T.I.R.

Accept.

E. Inspect Filter Assembly Location.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

- (a) Fretting not more than
0.002 in. (0,050 mm)
in depth.

Accept after
repair.

(3) Scores.

- (a) Not more than 0.002 in.
(0,050 mm) in depth.

Accept after
repair.

F. Inspect Outer Bearing Ring Locations.

(1) Nicks and burrs.

Accept after repair
providing F.C.S.
limits are not
violated.

(2) Wear.

- (a) Fretting not more than
0.010 in. (0,250 mm)
deep.

Accept after repair
providing F.C.S.
limits are not
violated.

(3) Scores.

- (a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

G. Inspect Plain Flange Abutment Face.

(1) Nicks and burrs.

Accept after
repair.

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(2) Wear and scores.

Accept after repair
providing sealing
capabilities are
unimpaired.

(3) Flatness.

(a) Sealing surface face
flat within 0.0015 in.
(0,040 mm) T.I.R. and
sealing surface con-
centric with the centre
line of air starter
drive housing. Sealing
surface must be parallel
with the gearbox abut-
ment face within
0.002 in. (0,050 mm)
T.I.R.

Accept.

H. Inspect Oil Tube and Pressure Switch Abutment Faces.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear and scores.

Accept after repair
providing sealing
capabilities are
unimpaired.

(3) Flatness.

(a) Sealing surface face of
oil tube abutment faces
flat within 0.0015 in.
(0,040 mm) T.I.R.

Accept.

J. Inspect Bearing Outer Track Locations.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair
providing 90 per
cent of effective
designed contact
area is maintained.

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- (b) Bolt-holes elongated
not more than 0.010 in.
(0,250 mm).

Accept after
repair.

(3) Scores.

- (a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after
repair.

K. Inspect Scavenge Pump Case Locations.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Light witness mark.

Accept providing
flatness tolerances
in (4) are
unimpaired.

(3) Scores.

- (a) Not more than 0.002 in.
(0,050 mm) in depth
and not extending more
than half-way across
the sealing face and
not interconnecting any
oilways and bolt-holes.

Accept after
repair providing
sealing
capabilities are
unimpaired.

(4) Flatness.

- (a) Sealing surface face flat
within 0.0015 in.
(0,040 mm) T.I.R. and
parallel with the main
gearbox abutment face
within 0.0005 in.
(0,0130 mm) T.I.R.

Accept.

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L. Inspect Oil Transfer Tube and Hollow Pin Locations.

- (1) Nicks and burrs.

Accept after repair
providing repair
restores profile.

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(2) Wear.

(a) Light witness mark.

Accept.

(3) Scores.

(a) Scoring not more than
0.005 in. (0,130 mm)
in depth.

Accept after repair
providing repair
restores profile.

25. Bush (305-230, 306-80/140)

A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.601-390/394/395/396/398/400/401/403/404/405/406/409/411/412).

NOTE: Carry out these checks in conjunction with the Scavenge Pump Cover (306-60), the Scavenge Pump Case (306-120) and the Front Cover Assembly (305-90).

(1) Within F.C.S. limits.

Accept.

B. Inspect Bush.

(1) Nicks, burrs, scores and wear.

Accept after repair
providing F.C.S.
limits are not
violated.

26. Bracket (305-280/290, 308-100/270, 309-170)

A. Inspect Bracket.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear and fretting.

(a) Not more than 5 per
cent reduction in
flange thickness.

Accept after
repair.

(b) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

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(3) Distortion.

Accept if
compatibility is
preserved.

(4) Scoring.

(a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing material
thickness is not
reduced by more
than 10 per cent.

27. Oil Jet (305-320) and Filter Assembly (305-340)

NOTE: The following inspection procedures are only applicable
to Pre SB.72-23.

A. Inspect Gearbox Abutment Locations.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Not more than 5 per
cent peripheral wear.

Accept.

B. Inspect End Faces.

(1) Scores, nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Light witness marks.

Accept.

C. Inspect Jet Orifice.

NOTE: Do not use hard objects to clear obstructions.

(1) Obstructions.

(a) Orifice clear of
obstructions.

Accept.

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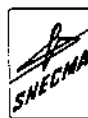
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D. Inspect Filter Element.

(1) Damage.

- | | |
|---|----------------------|
| (a) Punctures, tears or separation from end pieces. | Reject. |
| (b) Damaged or faulty brazed joints. | Reject. |
| (c) Cracks and distortion. | Reject. |
| (d) Nicks, burrs and scores. | Accept after repair. |

28. Retaining Ring Assembly (305-400)

A. Inspect Self-locking Shank Nuts (Ref.72-09-00 Inspection/Check).

B. Inspect Attachment Flange.

- | | |
|---|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Not more than 0.005 in. (0,130 mm) in depth. | Accept after repair. |
| (b) Attachment bolt-holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |

C. Inspect Outer Bearing Ring Location.

- | | |
|--|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Light witness mark. | Accept. |
| (3) Scores. | |
| (a) Not more than 0.005 in. (0,130 mm) in depth. | Accept after repair. |

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28A. Blank Cover (305-460)

A. Inspect Abutment Faces.

- (1) Nicks, burrs and scores.

Accept after
repair providing
seating capabilities
are
unimpaired.

29. Outer Bearing Ring (305-420/440)

A. Carry Out Dimensional Checks (Ref. 72-63-00 Fits and Clearances F.C.S. 602-335/336/339/340).

NOTE: Carry out these checks in conjunction with the Front Cover (305-90), the Roller Bearing Journal (312-630) and the Roller Bearing Journal (313-260).

- (1) Within F.C.S. limits.

Accept.

B. Inspect Attachment Flange.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Light witness mark.

Accept.

- (b) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

- (3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) deep.

Accept after
repair.

30. Hand Turning Shaft (306-40)

A. Inspect Splines (Ref. 72-09-00 Inspection/Check).

B. Inspect Shaft for General Condition.

- (1) Nicks and burrs.

Accept after
repair.

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31. Driving Shaft (306-50)

- A. Inspect Thread (Ref.72-09-00 Inspection/Check).
- B. Inspect Splines (Ref.72-09-00 Inspection/Check).
- C. Inspect Shaft for General Condition.

(1) Nicks and burrs.

Accept after
repair.

32. Scavenge Pump Cover Assembly (306-60)

- A. Carry Out Dimensional Check (Ref.72-63-00 Fits and Clearances F.C.S.601-411/412).

NOTE: Carry out these checks in conjunction with the Bush (306-80).

- B. Inspect Scavenge Pump Abutment Face.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Even wear, with no
stepping and within
F.C.S. limits.

Accept.

(3) Scores.

(a) Not more than 0.003 in.
(0,080 mm) in depth
and not extending more
than half-way across
any sealing contact
area.

Accept after repair
providing sealing
capabilities are
unimpaired.

(4) Flatness.

(a) Sealing surface face
flat within 0.0004 in.
(0,0101 mm) T.I.R.

Accept.

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C. Inspect Scavenge Pump Cover for General Condition.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Not more than 0.010 in. (0,250 mm) in depth at bolthead locations. Accept after repair providing sealing capabilities are unimpaired.

D. Inspect Hollow Pin Location.

- (1) Wear.
 - (a) Light witness mark. Accept after repair.
 - (b) Any elongation. Reject.

33. Scavenge Spur Gear - 2 Off (306-110) and Pressure Spur Gear - 2 Off (306-160A)

NOTE: If modification SB.72-23 is embodied, the two pressure spur gears (306-160A) are replaced by static gear blanks (306-160B). In this case, inspect the blanks in accordance with Fits and Clearances and Standard Practices (Ref.72-09-00, Inspection/Check).

- A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.601-390/391/392/393/394/406/407/408/409 and 601-396/398/403/404 on static gear blanks).

NOTE: Carry out these checks in conjunction with the Scavenge Pump Cover (306-60), the Driving Shaft (306-50), the Scavenge Pump Case (306-120) and the Bushes (306-80/140).

- (1) Within F.C.S. limits. Accept.

- B. Inspect Splines (Ref.72-09-00 Inspection/Check).

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C. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

- | | |
|--|--|
| (1) Nicks and burrs. | Accept if repair does not violate F.C.S. limits. |
| (2) Wear and fretting. | |
| (a) Stepped, or more than 0.005 in. (0,130 mm) deep. | Reject. |
| (b) Smooth wear within F.C.S. limits. | Accept. |

D. Inspect Journals.

- | | |
|---|--|
| (1) Nicks, burrs and scores. | Accept if repair does not violate F.C.S. limits. |
| (2) Wear and fretting. | |
| (a) Even wear, with no stepping and within F.C.S. limits. | Accept. |

E. Inspect End Faces.

- | | |
|--|--|
| (1) Scores. | |
| (a) Less than 0.005 in. (0,130 mm) deep. | Accept if repair does not violate F.C.S. limits. |

34. Scavenge Pump Case Assembly (306-120)

- A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.601-392/393/394/395/396/404/405/406/407/408).

NOTE: Carry out these checks in conjunction with the Spur Gear (306-110), the Bush (306-140) and the Blank Gear (306-160).

- | | |
|---------------------------|---------|
| (1) Within F.C.S. limits. | Accept. |
|---------------------------|---------|

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B. Inspect Scavenge Pump Cover Abutment Face.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Light witness mark. Accept.
- (3) Scores.
 - (a) Not more than 0.005 in. (0,130 mm) in depth and not extending more than half-way across any sealing contact area. Accept after repair providing sealing capabilities are unimpaired.
- (4) Flatness.
 - (a) Sealing surface face flat within 0.0004 in. (0,0101 mm) T.I.R. Accept.

C. Inspect Spur Gear Location.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Even wear with no stepping and within F.C.S. limits. Accept.

D. Inspect Front Cover Abutment Face.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Light witness mark. Accept.

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(3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth
and not extending more
than half-way across
any sealing contact
area.

Accept after repair
providing sealing
capabilities are
unimpaired.

(4) Flatness.

- (a) Sealing surface face
flat within 0.0004 in.
(0,0101 mm) T.I.R.
and parallel with the
scavenge pump cover
abutment face within
0.0005 in. (0,0130 mm)
T.I.R.

Accept.

E. Inspect Scavenge Pump Case for General Condition.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Bolt-holes elongated.

Reject.

35. Rim Clenching Clamp Assembly (307-10/130)

- A. Carry Out Bedding Check (Ref.72-09-00 Inspection/Check).
B. Inspect Threads (Ref.72-09-00 Inspection/Check).
C. Inspect Bossed and Plain Segments.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Any wear.

Accept providing
bedding check
is satisfactory.

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- | | |
|---|---------|
| (b) Pin holes elongated. | Reject. |
| (c) Even wear with no stepping on boss lands. | Accept. |

36. Blank Cover Assembly (307-120/270)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Abutment Face and Rim Clench Clamp Locations.

- | | |
|----------------------|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
|----------------------|----------------------|

(2) Wear.

- | | |
|-------------------------|---------|
| (a) Light witness mark. | Accept. |
|-------------------------|---------|

- | | |
|--|----------------------|
| (b) Stepped pin locating holes elongated not more than 0.010 in. (0,250 mm). | Accept after repair. |
|--|----------------------|

(3) Scores.

- | | |
|--|----------------------|
| (a) Not more than 0.005 in. (0,130 mm) in depth and not extending right across the contact face. | Accept after repair. |
|--|----------------------|

C. Inspect Seal Ring Spigot.

- | | |
|----------------------|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
|----------------------|----------------------|

(2) Wear.

- | | |
|--|--|
| (a) Not more than 0.005 in. (0,130 mm) in depth. | Accept after repair providing sealing capabilities are unimpaired. |
|--|--|

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(3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth
and not extending
across the seal ring
groove.

Accept after repair
providing sealing
capabilities are
unimpaired.

37. Pump Adapter Assembly (308-60/150)

- A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and
Clearances F.C.S.602-352/358).

NOTE: Carry out these checks in conjunction with the
Gearbox Case (311-30) and the Adapter Assembly
(308-180).

- (1) Within F.C.S. limits.

Accept.

- B. Inspect Threads (Ref.72-09-00 Inspection/Check).

- C. Inspect Gearbox Attachment Face.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Not more than 10 per
cent reduction in
flange thickness.

Accept after repair
providing 90 per
cent of effective
designed contact
area is maintained
and sealing
capabilities are
unimpaired.

- (b) Bolt-holes elongated
not more than 0.030 in.
(0,760 mm).

Accept after
repair.

(3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth at
the bolthead locations.

Accept after
repair.

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- (b) Not more than 0.005 in.
(0,130 mm) in depth on
attachment face and
not extending more
than half-way across
the face.

Accept after repair
providing sealing
capabilities are
unimpaired.

D. Inspect Seal Ring Groove (Item 308-60 only).

- (1) Nicks, burrs and scores.

Accept after repair
providing sealing
capabilities are
unimpaired.

- (2) Wear.

Accept after repair
providing sealing
capabilities are
unimpaired.

E. Inspect Seal Retaining Flange and Bore.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Light witness mark.

Accept.

- (3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) deep
axially.

Accept after
repair.

- (b) Any circumferential
scores.

Reject.

F. Inspect Main and Stand-by Hydraulic Pump Locations.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Light witness mark.

Accept.

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- (b) Stepped pin location elongated not more than 0.010 in. (0,250 mm).

Accept after repair.

(3) Scores.

- (a) Not more than 0.005 in. (0,130 mm) deep.

Accept after repair.

G. Inspect Rim Clenching Clamp Locations.

- (1) Nicks and burrs.

Accept after repair.

(2) Wear.

- (a) Light fretting not more than 0.002 in. (0,050 mm) in depth.

Accept after repair.

(3) Scores.

- (a) Not more than 0.005 in. (0,130 mm) in depth.

Accept after repair.

H. Inspect Pump Adapter Assembly Bore.

- (1) Nicks and burrs.

Accept after repair providing sealing capabilities are unimpaired.

(2) Wear.

- (a) Light fretting at seal ring location.

Accept providing sealing capabilities are unimpaired.

(3) Scores.

- (a) Score extending across the seal ring location.

Reject.

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38. Adapter Assembly (308-180)

- A. Carry Out Dimensional Check (Ref.72-63-00 Fits and Clearances F.C.S.602-358/360).

NOTE: Carry out this check in conjunction with the Pump Adapter Assembly (308-150) and the Ball Bearing Journal (315-190).

- B. Inspect Threads (Ref.72-09-00 Inspection/Check).

- C. Inspect Gearbox Attachment Flange.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Not more than 5 per cent reduction in flange thickness.

Accept after repair providing 90 per cent of effective designed contact area is maintained.

- (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm).

Accept after
repair.

- (c) Not more than 0.005 in. (0,130 mm) in depth at load spreading washer locations.

Accept after
repair.

- (3) Scores.

- (a) Not more than 0.005 in. (0,130 mm) in depth on attachment face.

Accept after
repair.

- (b) Not more than 0.005 in. (0,130 mm) in depth at load spreading washer locations.

Accept after
repair.

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D. Inspect Oil Jet Location.

(1) Wear.

(a) Light witness mark. Accept.

E. Inspect Ball Bearing Journal Location.

(1) Nicks and burrs.

Accept after repair.

(2) Wear.

(a) Not more than 0.005 in.
(0,130 mm) in depth
on attachment face. Accept after repair
providing 90 per
cent of effective
designed contact
area is maintained.

(3) Scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth. Accept after
repair.

F. Inspect Pump Adapter Assembly Location.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Not more than 0.005 in.
(0,130 mm) in depth. Accept after repair
providing 90 per
cent of effective
designed contact
area is
maintained.

(b) Light witness mark in
Corruplus seal groove. Accept.

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(3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth
and not extending across
the Corruplus seal
groove or more than half-
way across the contact
face.

Accept after repair
providing sealing
capabilities are
unimpaired.

39. Front Sleeve (310-10) and Strainer Jet (310-30)

NOTE: The following inspection procedures will be used for
any intermediate inspections prior to overhaul. These
items have been deleted by SB.72-83 and will
subsequently be removed at first overhaul.

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Attachment Flange.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Not more than 5 per
cent reduction in
flange thickness.

Accept after
repair.

C. Inspect Orifice.

NOTE: Do not use hard objects to clear obstruction.

- (1) Obstructions.

- (a) Orifice clear of
obstructions.

Accept.

40. Strainer Element Assembly (310-60)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

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B. Inspect Strainer.

- (1) Tears and punctures. Reject.
- (2) Obstruction.
 - (a) Strainer holes 100 per cent clear. Accept.

41. Jet Assembly (310-70)

A. Inspect Attachment Flange.

- (1) Nicks and burrs. Accept after repair.
- (2) Wear.
 - (a) Not more than 5 per cent reduction in flange thickness. Accept after repair.
 - (b) Bolt-holes elongated not more than 0.010 in. (0,250 mm). Accept after repair.

B. Inspect Orifice.

NOTE: Do not use hard objects to clear obstruction.

- (1) Obstructions.
 - (a) Orifice clear of obstructions. Accept.

42. Strainer Body (310-90)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Strainer Body.

- (1) Nicks and burrs. Accept after repair.

NOTE: Do not use hard objects to clear obstruction.

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(2) Obstruction.

(a) Orifice clear of
obstruction.

Accept.

43. Strainer Sleeve (310-100)

A. Inspect Sleeve.

NOTE: Do not use hard objects to clear obstructions.

(1) Obstructions.

(a) Orifice clear of
obstructions.

Accept.

(2) Nicks and burrs.

Accept after
repair.

(3) Wear.

(a) Light witness mark
in bore.

Accept.

44. Strainer Assembly (310-110)

A. Inspect Strainer.

(1) Tears and punctures.

Reject.

(2) Cleanliness.

(a) Strainer element
not clogged.

Accept.

(3) Nicks and burrs.

Accept after
repair.

45. Strainer Housing Assembly (310-120)

NOTE: The Strainer Housing will normally be retained in the Gearbox Case (311-30) and will only be removed if damage is suspected.

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

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B. Inspect Strainer Housing.

- (1) Nicks and burrs on serrations.

Accept after repair.

46. Hollow Pin (310-140)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Pin.

- (1) Nicks and burrs.

Accept after repair.

- (2) Wear.

- (a) Light witness mark.

Accept.

47. Cover (311-20)

A. Inspect Abutment Face.

- (1) Wear.

- (a) Not more than 10 per cent reduction in material thickness.

Accept after repair.

- (b) Bolt-holes elongated not more than 0.030 in. (0,760 mm).

Accept after repair.

- (2) Nicks, burrs and scores.

- (a) Not more than half-way across the face.

Accept after repair.

48. RH Gearbox Case Assembly (311-30)

A. Inspect All Threads (Ref.72-09-00 Inspection/Check).

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- B. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.601-383/397, 602-343/349/352/365/373/376/377).

NOTE: Carry out these checks in conjunction with the Parallel Roller Bearing Journal (314-50/100/160, 315-110), Pump Adapter Assembly (308-60), Ball Bearing Journal (313-190), Parallel Roller Bearing (312-430) and the Strainer Housing Assembly (310-120).

NOTE: F.C.S.602-376 will need to be carried out only if the Strainer Housing Assembly (310-120) has been removed from the Gearbox Case.

(1) Within F.C.S. limits. Accept.

- C. Inspect Front Cover Attachment Face.

(1) Nicks and burrs. Accept after repair.

(2) Scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth
and not extending right
across the sealing face. Accept after repair
providing sealing
capabilities are
unimpaired.

(3) Wear. Accept after repair
providing sealing
capabilities are
unimpaired.

(4) Flatness.

(a) Sealing surface face
flat within 0.0015 in.
(0,040 mm) T.I.R. Accept.

- D. Inspect All Accessory and Bearing Attachment Faces.

(1) Nicks and burrs. Accept after repair.

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(2) Wear.

- (a) Fretting not more than
0.003 in. (0,080 mm)
in depth.

Accept after repair
providing flatness
tolerances in (4)
are maintained.

(3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth
and not extending right
across the sealing face.

Accept after repair
providing sealing
capabilities are
unimpaired.

(4) Flatness.

- (a) All sealing and
attachment faces
flat within 0.0015 in.
(0,040 mm) T.I.R.
and parallel with
the front cover
attachment face
within 0.002 in.
(0,050 mm) T.I.R.

Accept.

E. Inspect Intermediate Case Attachment Face.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

- (a) Any wear at the
Corruplus seal
location.
- (b) Fretting not more
than 0.003 in.
(0,080 mm) in depth
in areas other than (a).

Accept after repair
providing repair
maintains sealing
capabilities.

Accept after
repair.

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- (c) Bolt-holes elongated
not more than 0.010 in.
(0,250 mm).

Accept after
repair.

(3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) and not
extending across the
Corruplus seal
location.

Accept after repair
providing repair
maintains sealing
capabilities.

F. Inspect Gearbox Mounting Bracket Abutment Faces.

- (1) Nicks and burrs.

Accept after
repair.

(2) Scores.

- (a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after
repair.

(3) Wear.

- (a) Fretting not more
than 0.005 in.
(0,130 mm) in depth.

Accept after repair
providing 90 per
cent of effective
designed contact
area is maintained.

G. Inspect General Condition of Gearbox Case.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Gouging and bruising.

Accept after repair
providing crack
detection
investigation is
satisfactory.

49. Keywasher (312-30)

- A. Inspect Cup (Ref.72-09-00 Inspection/Check).

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B. Inspect Keywasher.

(1) Nicks and burrs.

- (a) Not more than 0.005 in. (0,130 mm) deep on locking dogs. Accept after repair.

(2) Wear.

- (a) Not more than 0.005 in. (0,130 mm) in depth at nut location. Accept after repair.

50. Flexible Coupling Shaft (312-40)

A. Inspect Splines (Ref.72-09-00 Inspection/Check).

B. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.601-328/329).

NOTE: Carry out these checks in conjunction with the Spiral Bevel Gear Wheel (312-60) and the Spacer Sleeve (312-50).

- (1) Within F.C.S. limits Accept.

C. Inspect Coupling Shaft.

- (1) Nicks and burrs. Accept after repair.

(2) Bowing.

- (a) Any signs of bowing. Reject.

51. Spacer Sleeve (312-50)

A. Inspect Splines (Ref.72-09-00 Inspection/Check).

B. Carry Out Dimensional Check (Ref.72-63-00 Fits and Clearances F.C.S.601-329).

NOTE: Carry out this check in conjunction with the Flexible Coupling Shaft (312-40).

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(1) Within F.C.S. limits.

Accept.

C. Inspect Spacer Sleeve.

(1) Nicks and burrs.

(a) Not more than 0.005 in.
(0,130 mm) deep at
contact faces.

Accept after repair
providing 90 per
cent of effective
designed length
is maintained.

52. Spiral Bevel Gear Wheel Assembly (312-60)

A. Inspect Splines (Ref.72-09-00 Inspection/Check).

B. Carry Out Dimensional Check (Ref.72-63-00 Fits and
Clearances F.C.S.601-328).

NOTE: Carry out this check in conjunction with the
Flexible Coupling Shaft (312-40).

(1) Within F.C.S. limits.

Accept after
repair.

C. Inspect Thread (Ref.72-09-00 Inspection/Check).

D. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

(1) Wear on non-working surface.

(a) Fretting not more than
0.002 in. (0,050 mm)
in depth.

Accept after
repair.

(2) Nicks and burrs on non-
working surfaces.

Accept after
repair.

(3) Wear on working surfaces.

Accept subject to
F.C.S. checks on
assembly.

E. Inspect Bearing Locations.

(1) Nicks and burrs.

Accept after
repair.

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(2) Scores.

- (a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

(3) Wear.

- (a) Not more than 0.002 in.
(0,050 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

53. Parallel Roller Bearing Journal (312-90/300/430/630)

- A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances).

NOTE: Carry out these checks in conjunction with the Gearbox Case (311-30), Bevel Gear (312-60), Bearing Housing (312-320/510) and the Spur Gear (312-640) and the Outer Bearing Ring (305-440).

- (1) Check overall bearing diameters as follows:

Bearing Identity	F.C.S. Reference
312-90	601-324
312-300	601-330
312-430	602-377

- (a) Within F.C.S. limits. Accept.

- (2) Check diametral clearances and end-float as follows:

Bearing Identity	F.C.S. Reference
312-90	601-323
312-300	601-326
312-430	602-378
312-630	602-336

- (a) Within F.C.S. limits. Accept.

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(3) Check bearing bore as follows:

Bearing Identity	F.C.S. Reference
312-90	601-332
312-300	601-327
312-430	602-374
312-630	602-337

(a) Within F.C.S. limits. Accept.

B. Inspect Bearing (Ref.72-09-00 Inspection/Check).

(1) Wear on attachment flanges where applicable.

(a) Not more than 5 per cent reduction in flange thickness. Accept after repair.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

54. Ball Bearing Journal (312-270/500)

A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances).

NOTE: Carry out these checks in conjunction with the Bevel Spiral Gear (312-60), Bearing Housings (312-320/510), and the Spur Gear (312-640).

(1) Check overall bearing diameters as follows:

Bearing Identity	F.C.S. Reference
312-270	601-325
312-500	602-380

(a) Within F.C.S. limits. Accept.

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(2) Check diametral clearances and end-float as follows:

Bearing Identity	F.C.S. Reference
312-270	601-334
312-500	602-379

(a) Within F.C.S. limits. Accept.

(3) Check bearing bore as follows:

Bearing Identity	F.C.S. Reference
312-270	601-331
312-500	602-375

(a) Within F.C.S. limits. Accept.

B. Inspect Bearing (Ref.72-09-00 Inspection/Check).

55. Bearing Housings (312-320/510)

A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.601-324/325/330 and 602-380).

NOTE: Carry out these checks in conjunction with the Parallel Roller Bearing (312-90/300) and the Ball Bearings (312-270/500).

(1) Within F.C.S. limits. Accept.

B. Inspect Gearbox Attachment Face.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Not more than 5 per cent reduction in flange thickness at bolthead location. Accept after repair.



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- (b) Bolt-holes elongated
not more than 0.010 in.
(0,250 mm).

Accept after
repair.

(3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth
and not extending across
the Corruplus seal
location in groove.

Accept after
repair.

(4) Surface finish.

- (a) Light polish mark
provided that surface
roughness is not more
than 32 micro inches
(0,8 micrometres) on
the Corruplus seal
location.

Accept after repair
providing sealing
capabilities are
unimpaired.

C. Inspect Bearing Locations.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Light witness mark.

Accept providing
F.C.S. limits
are not violated.

(3) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) deep
axially.

Accept after repair
providing F.C.S.
limits are not
violated.

D. Inspect Corruplus Seal Groove.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Light witness mark
provided that surface
roughness in grooves is
not more than
50 micro inches
(1,25 micrometres).

Accept after repair
providing sealing
capabilities are
unimpaired.

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(3) Scores.

(a) Not more than 0.002 in.
(0,050 mm) in depth.

Accept after repair
providing scores do
not cross the seal
contact area.

E. Inspect Bearing Housing for General Condition.

(1) Nicks and burrs.

Accept after
repair.

56. Assembly Segment (312-330)

A. Inspect Thread Inserts (Ref.72-09-00 Inspection/Check).

B. Inspect Segments.

(1) Nicks and burrs.

Accept after
repair.

(2) Scores.

(a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after
repair.

57. Bevel Gear (312-610)

A. Carry Out Dimensional Check (Ref.72-63-00 Fits and
Clearances F.C.S.602-382).

NOTE: Carry out this check in conjunction with the
Spur Gear (312-640).

(1) Within F.C.S. limits.

Accept.

B. Inspect Splines (Ref.72-09-00 Inspection/Check).

C. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

(1) Wear on non-working surfaces.

(a) Fretting not more than
0.002 in. (0,050 mm)
in depth.

Accept after
repair.

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(2) Nicks and burrs on non-working surfaces.

Accept after repair.

(3) Wear on working surfaces.

Accept subject to F.C.S. checks on assembly.

58. Spur Gear (312-640)

A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.602-337/374/375/382).

NOTE: Carry out these checks in conjunction with the Parallel Roller Bearings (312-430/630), the Ball Bearing (312-500) and the Spiral Bevel Gear (312-610).

(1) Within F.C.S. limits.

Accept.

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Splines (Ref.72-09-00 Inspection/Check).

D. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

(1) Wear on non-working surfaces.

(a) Fretting not more than 0.002 in. (0,050 mm) in depth.

Accept after repair.

(2) Nicks and burrs on non-working surfaces.

Accept after repair.

(3) Wear on working surfaces.

Accept subject to F.C.S. checks on assembly.

E. Inspect Bearing Locations.

(1) Nicks and burrs.

Accept after repair.

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(2) Scores.

- (a) Not more than 0.010 in.
(0,250 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

(3) Wear.

- (a) Not more than 0.002 in.
(0,050 mm) in depth.

Accept after repair
providing F.C.S.
limits are not
violated.

59. Shaft Retainer Sleeve (313-20)

A. Inspect Retainer Sleeve.

- (1) Nicks and burrs.

Accept after
repair.

- (2) Wear.

- (a) Any wear.

Reject.

60. Splined Shaft (313-40)

A. Inspect Splines (Ref.72-09-00 Inspection/Check).

B. Inspect Seal Locations.

- (1) Nicks and burrs.

Accept after
repair providing
sealing
capabilities are
unimpaired.

(2) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after
repair.

61. Jet Body (313-60)

A. Inspect Jet Body.

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(1) Obstruction.

(a) Jet obstructed.

Reject for cleaning investigation.

NOTE: Do not use hard objects to clean out oilway.

NOTE: If jet is found to be obstructed inspect the relevant corresponding components for oil starvation.

B. Inspect Abutment Flange.

(1) Nicks and burrs.

Accept after repair if sealing capabilities are unimpaired.

62. Multiple Jet (313-70)

A. Inspect Multiple Jet.

(1) Obstruction.

(a) Multiple jet obstructed.

Reject for cleaning investigation.

NOTE: Do not use hard objects to clean out oilways.

NOTE: If multiple jet is found to be obstructed inspect the relevant corresponding components for oil starvation.

63. Housing (313-80)

A. Carry Out Dimensional Check (Ref.72-63-00 Fits and Clearances F.C.S.602-366).

NOTE: Carry out this check in conjunction with the Oil Transfer Sleeve 313-110.

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

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C. Inspect Housing Bore.

(1) Fretting.

- (a) Not more than 0.001 in.
(0,030 mm) in depth at
sealing ring locations.

Accept after
repair providing
sealing capability
is unimpaired.

D. Inspect Floating Key Ring Locating Slots.

(1) Nicks and burrs.

Accept after
repair.

E. Inspect Abutment Face.

(1) Nicks and burrs.

Accept after
repair.

(2) Scores.

- (a) Not more than 0.005 in.
(0,130 mm) in depth and
not extending across the
full width of the face.

Accept after
repair.

(3) Wear.

- (a) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

64. Floating Key Ring (313-90)

A. Inspect Floating Key Ring.

(1) Nicks and burrs.

Accept after repair
ensuring sharp
edges are removed
from locating slots
and lugs.



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65. Oil Transfer Sleeve (313-110)

- A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.602-366/367/369).

NOTE: Carry out these checks in conjunction with the Spur Gear Assembly (313-240) and the Housing (313-80).

- B. Inspect Seal Ring Grooves and Adjacent Lands.

(1) Wear.

- (a) Fretting not more than
0.002 in. (0,050 mm) in
depth on lands.

Accept after
repair.

(2) Nicks and burrs.

Accept after
repair.

- C. Inspect Locating Lugs.

(1) Nicks and burrs.

Accept after
repair.

66. Oil Metering Plate (313-120)

- A. Inspect Oil Metering Plate.

(1) Nicks and burrs.

Accept after repair
providing sealing
capabilities are
unimpaired.

(2) Scores.

- (a) Not more than 0.003 in.
(0,080 mm) in depth and
not extending more than
halfway across the face.

Accept after repair
providing sealing
capabilities are
unimpaired.

(3) Wear.

- (a) Bolt-holes elongated not
more than 0.030 in.
(0,760 mm).

Accept after
repair.

66A. Plain Round Nut (313-140)

- A. Inspect Thread (Ref.72-09-00, Inspection/Check).

- B. Inspect Spanner Castellations.

(a) Nicks and burrs.

Accept after
repair.

- C. Inspect Silver Plate.

- (a) Any exposure of parent
metal.

Reject for replat-
ing (Ref.72-09-00,
Repair).

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sneema

67. Ball bearing (313-190) and Roller Bearing (313-260)

- A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.602-339/340/341/371/372/373).

NOTE: Carry out these checks in conjunction with the Spur Gear Assembly (313-240) the Bearing Outer Ring (305-420) and the RH Gearbox Case Assembly (311-30).

- B. Inspect Bearings (Ref.72-09-00 Inspection/Check).

68. Spur Gear Assembly (313-240)

- A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.602-341/367/369/371).

NOTE: Carry out these checks in conjunction with the Roller Bearing (313-260), the Oil Transfer Sleeve (313-110), and the Ball Bearing (313-190).

- B. Inspect Threads (Ref.72-09-00 Inspection/Check).

- C. Inspect Splines (Ref.72-09-00 Inspection/Check).

(1) Wear on flanks not more than Accept.
0.009 in. (0.229 mm) in depth.

- D. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

(1) Wear or non-working surfaces.

(a) Fretting not more than Accept after
0.002 in. (0.050 mm) in repair.
depth.

(2) Nicks and burrs on non-working Accept after
surfaces. repair.

(3) Wear on working surfaces. Accept subject to
F.C.S. checks on
assembly.

- E. Inspect Bearing Locations.

(1) Nicks and burrs. Accept after
repair.

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(2) Wear.

(a) Smooth wear within F.C.S. limits. Accept.

F. Inspect Oil Transfer Sleeve Locations.

(1) Wear.

(a) Smooth wear within F.C.S. limits. Accept.

69. Parallel Roller Bearing Journal (314-50/100/160A, and 170 Pre SB.72-4 and 314-160B SB.72-4)

A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.602-343/344/345/362/363/364/365/601-383/384/385/386/387/389/397).

NOTE: Carry out these checks in conjunction with the Gearbox Case (311-30), the Idler Shaft (314-110) and the Spur Gear (314-190).

B. Inspect Bearing (Ref.72-09-00 Inspection/Check).

70. Gear Assembly (314-60)

A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.602-346/361).

NOTE: Carry out these checks in conjunction with the Idler Shaft (314-110).

B. Inspect Splines (Ref.72-09-00 Inspection/Check).

C. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

(1) Wear on non-working surfaces.

(a) Fretting not more than 0.002 in. (0,050 mm) in depth. Accept after repair.

(2) Nicks and burrs on non-working surfaces. Accept after repair.



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(3) Wear on working surfaces.

Accept subject to
F.C.S. checks on
assembly.

71. Idler Shaft (314-110)

A. Carry Out Dimensional Checks (Ref.72-63-03 Fits and Clearances F.C.S.602-345/346/361/362/363).

NOTE: Carry out these checks in conjunction with the Roller Bearing Journal (314-100), the Gear Assembly (314-60) and the Roller Bearing Journal (314-50).

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Splines (Ref.72-09-00 Inspection/Check).

D. Inspect Bearing Location.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Smooth wear within
F.C.S. limits.

Accept.

(3) Scores.

(a) Not more than 0.005 in.
(0,130 mm) in depth.

Accept after repair
providing repair
does not violate
F.C.S. limits.

E. Inspect Abutment Flange.

(1) Nicks and burrs.

Accept after
repair.

(2) Wear.

(a) Fretting not more than
0.002 in. (0,050 mm) deep.

Accept after
repair.

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72. Spacer Sleeve (314-180)

A. Inspect Spacer Sleeve.

- | | |
|---|----------------------|
| (1) Nicks and burrs. | Accept after repair. |
| (2) Wear. | |
| (a) Any wear at abutment faces. | Reject. |
| (3) Scores. | |
| (a) Not more than 0.002 in. (0,050 mm) in depth in the bore of the spacer sleeve. | Accept after repair. |

73. Spur Gear (314-190)

A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.601-385/387).

NOTE: Carry out these checks in conjunction with the Roller Bearing Journals (314-160/170).

B. Inspect Threads (Ref.72-09-00 Inspection/Check).

C. Inspect Splines (Ref.72-09-00 Inspection/Check).

D. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

- | | |
|---|--|
| (1) Wear on non-working surfaces. | |
| (a) Fretting not more than 0.002 in. (0,050 mm) in depth. | Accept after repair. |
| (2) Nicks and burrs on non-working surfaces. | Accept after repair. |
| (3) Wear on working surfaces. | Accept subject to F.C.S. checks on assembly. |

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E. Inspect Bearing Locations.

(1) Extraction damage.

(a) Circumferential scoring.

Reject.

(b) Scoring not more than
0.005 in. (0,130 mm)
deep.

Accept after repair
providing repair
does not violate
F.C.S. limits.

74. Plain Round Nut (315-20/130)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect Retaining Ring Groove.

(1) Nicks and burrs.

Accept after
repair.

C. Inspect Spanner Castellations.

(1) Nicks and burrs.

Accept after
repair.

75. Adjusting Washer (315-40 to 55)

NOTE: This item may require selection during assembly.

A. Inspect Abutment Faces.

(1) Nicks, burrs and scores.

Accept, provided
that repair pre-
serves surface
flatness and that
designed effective
thickness is main-
tained over 90 per
cent of contact
face area.

(2) Fretting and wear.

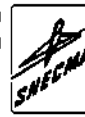
Reject.



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76. Seal/L Seal (315-70/150)

A. Inspect Carbon Sealing Face.

(1) Chipping at edges.

(a) Face width reduced by less than 20% at any point. Accept.

B. Measure Carbon Standout.

(1) Carbon standout less than 0.090 in. (2,29 mm). Reject.

(2) Measured carbon standout less than 0.005 in. (0,13 mm) different from value previously recorded on rear of seal. Accept.

(3) Measured carbon standout more than 0.005 in. (0,13 mm) different from value previously recorded on seal carry out full load check.

Within Limit: 18 lbf (80,07 N) Accept.
MIN at 0.590 in.
(14,99 mm) working
length.

33 lbf (146,79 N)
MAX at 0.530 in.
(13,46 mm) working
length (Ref.72-09-00)

Outside above limits. Reject.

Engrave new value of standout on rear of seal.

C. Carry out Compression Test.

(1) Manually operate bellows within cup by depressing seal face.

(a) Bellows sticking or not returning seal to a square position against limit washer. Reject.

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- (b) Bellows operate smoothly under light compression and seal returns to square position against limit washer. Accept.

D. Inspect Bore, Outer Locating Diameter and Abutment Faces.

(1) Scoring nicks and burrs.

- (a) Light dressable damage. Accept after repair providing sealing capabilities are unimpaired.

77. Seal Sleeve (315-80/160)

- A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.602-350/357).

NOTE: Carry out these checks in conjunction with the Spur Gear Shaft (315-200).

B. Inspect Seal Sleeve.

- (1) Nicks and burrs. Accept after repair.

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INSPECTION/CHECK

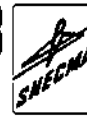
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78. Mating Seal Ring (315-90/170)

- A. Carry out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.602-351/359).

NOTE: Carry out these checks in conjunction with the Spur Gear Shaft (315-200).

- B. Inspect Seal Ring.

(1) Measure seal ring thickness.

- | | |
|--|---------|
| (a) Thickness greater than
0.2625 in. (6,668 mm). | Accept. |
|--|---------|

(2) Parallelism.

- | | |
|--|---------|
| (a) Front and rear faces
parallel within 0.001 in.
(0,025 mm). | Accept. |
|--|---------|

(3) Squareness.

- | | |
|---|---------|
| (a) Bore of ring square with
Sealol seal mating face
within 0.001 in. (0,025 mm). | Accept. |
|---|---------|

(4) Scores.

- | | |
|---|--|
| (a) Not more than 0.001 in.
(0,025 mm) deep on
mating face. | Accept after repair
(Ref.72-63-05
Repair No.1. |
|---|--|

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79. Parallel Roller Bearing (315-110) and Ball Bearing (315-190)

- A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.602-349/353/354/355/356/360).

NOTE: Carry out these checks in conjunction with the Spur Gear Shaft (315-200).

- B. Inspect Bearing (Ref.72-09-00 Inspection/Check).

- C. Inspect Attachment Flange.

(1) Nicks and burrs. Accept after repair.

(2) Wear.

(a) Not more than 5 per cent reduction in flange thickness. Accept after repair.

(b) Bolt-holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

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80. Spur Gear Shaft (315-200)

- A. Carry Out Dimensional Checks (Ref.72-63-00 Fits and Clearances F.C.S.602-350/351/353/356/357/359).

NOTE: Carry out these checks in conjunction with the Seal Sleeve (315-80/160), the Seal Ring (315-90/170), the Parallel Roller Bearing (315-110) and the Ball Bearing (315-190).

- B. Inspect Threads (Ref.72-09-00 Inspection/Check).

- C. Inspect Splines (Ref.72-09-00 Inspection/Check).

(1) Wear on flanks not more than 0.009 in. (0.229 mm) in depth. Accept.

- D. Inspect Gear Teeth (Ref.72-09-00 Inspection/Check).

(1) Wear on non-working surfaces.

(a) Fretting not more than 0.002 in. (0.050 mm) in depth. Accept after repair.

(2) Nicks and burrs on non-working surfaces. Accept after repair.

(3) Wear on working surfaces. Accept subject to F.C.S. checks on assembly.

- E. Inspect Bearing and Mating Seal Ring Locations.

(1) Extraction damage.

(a) Circumferential scoring. Reject.

(b) Scoring not more than 0.005 in. (0.130 mm) deep. Accept after repair providing repair does not violate F.C.S. limits.

81. Self-locking Nuts (312-420/620, 314-10/120)

- A. Inspect Threads (Ref.72-09-00 Inspection/Check).

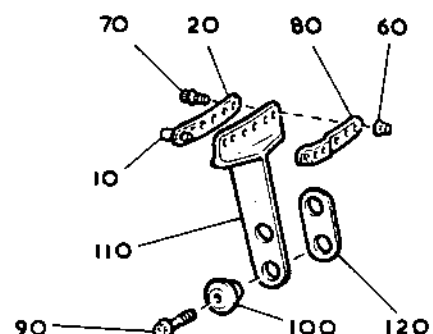
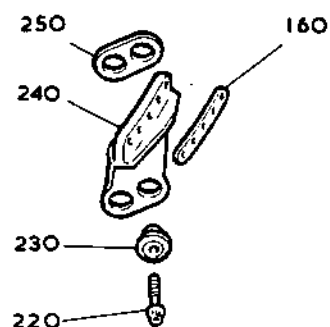
- B. Inspect the self-locking feature of each nut to ensure that it has an elliptical feature and not a four lobe feature (Ref.SB.72-105). Reject any four lobe featured nut.

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RH Gearbox Accessory Case, Installation Fittings
Figure 302

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BS00000229/5



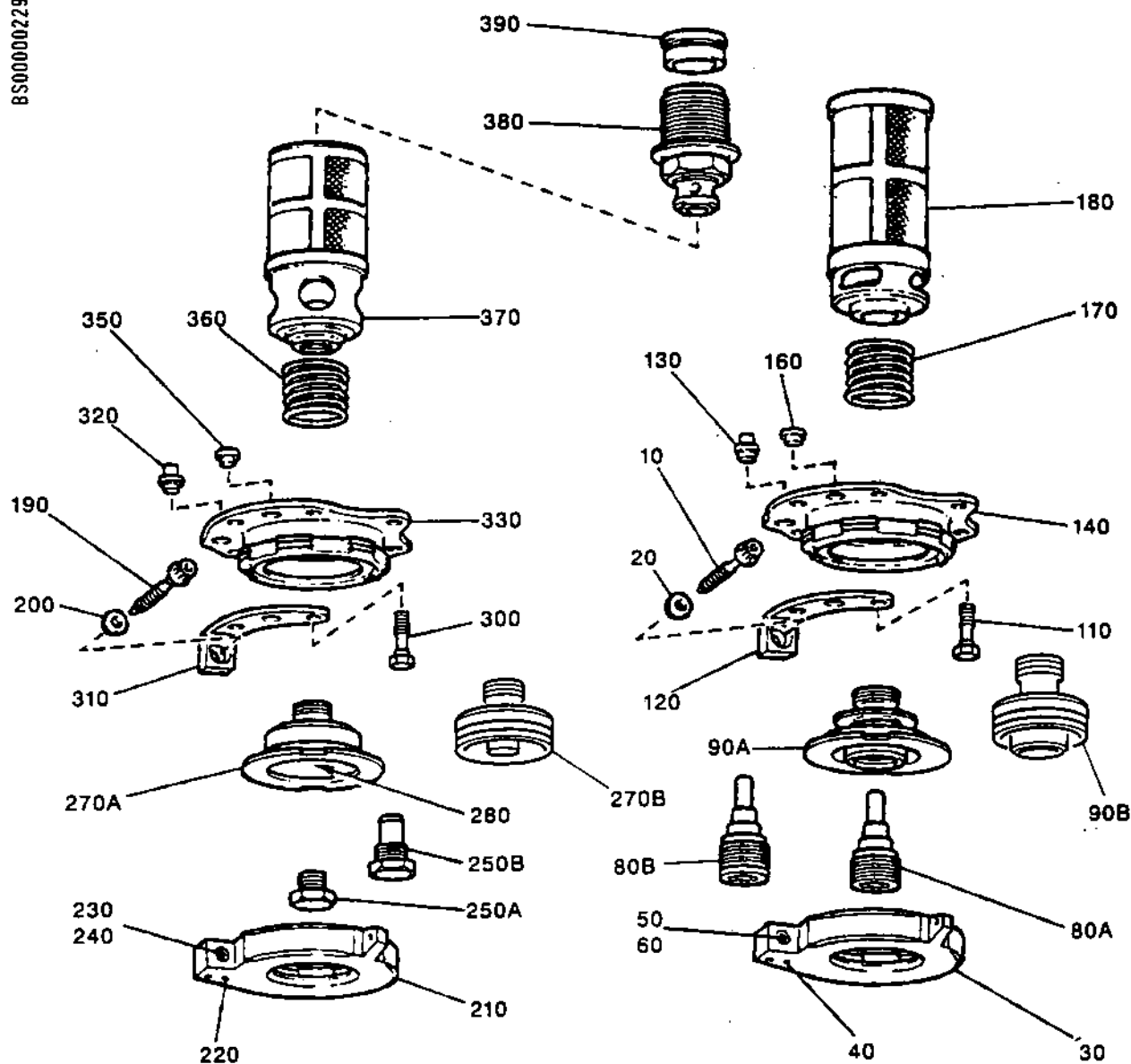
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RH Gearbox Accessory Case, Oil Pressure and Scavenge
Filters, Drain Valves and Magnetic Plugs
Figure 303

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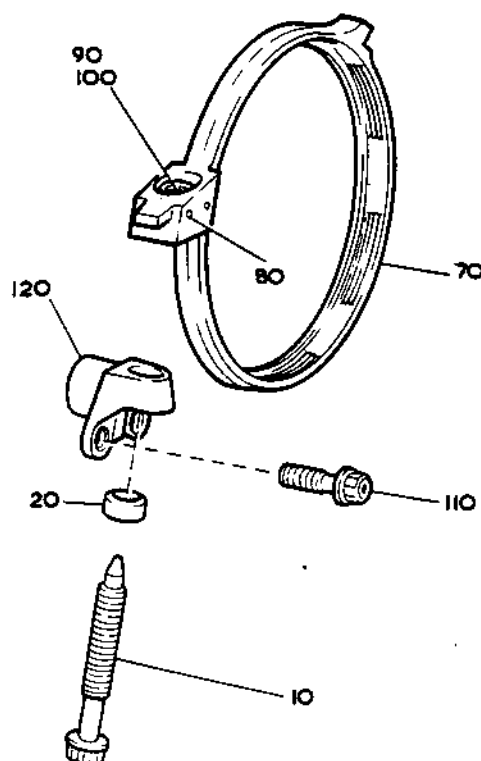
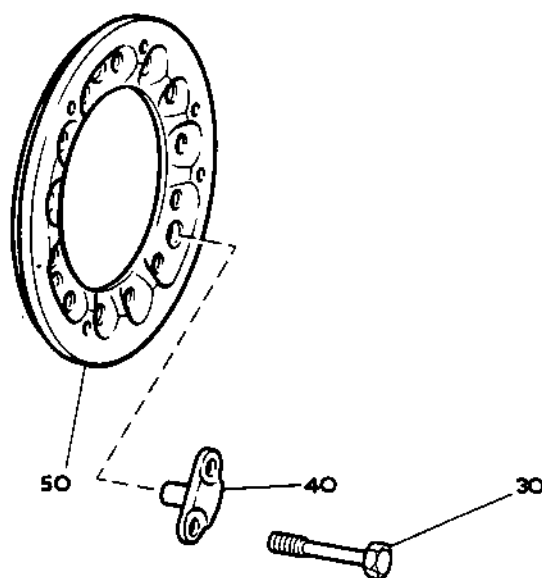
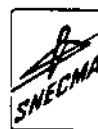
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RH Gearbox Accessory Case, Air Starter Installation
Fittings
Figure 304

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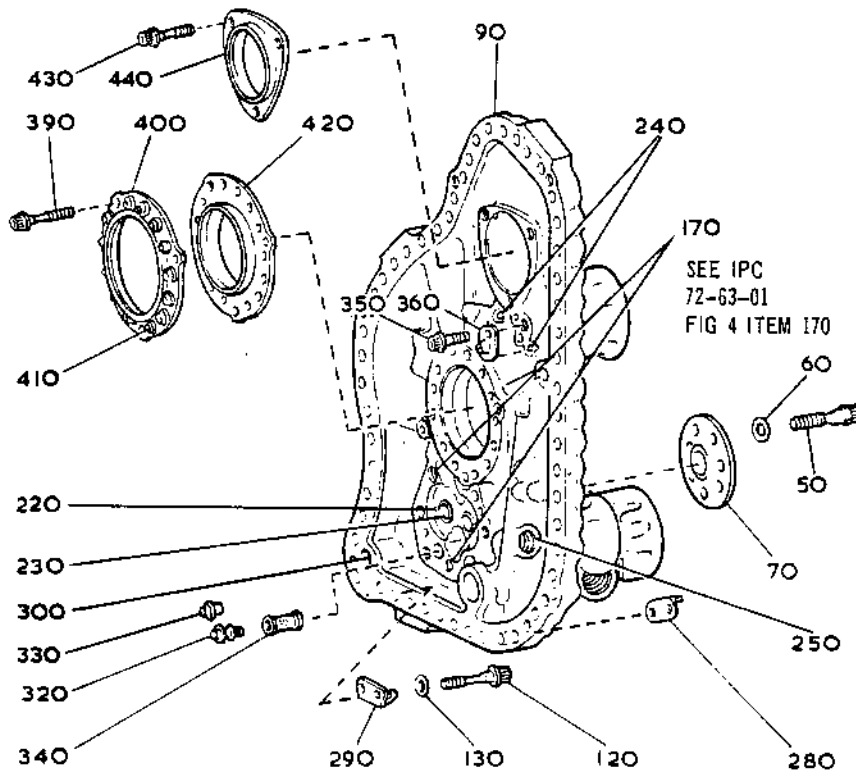
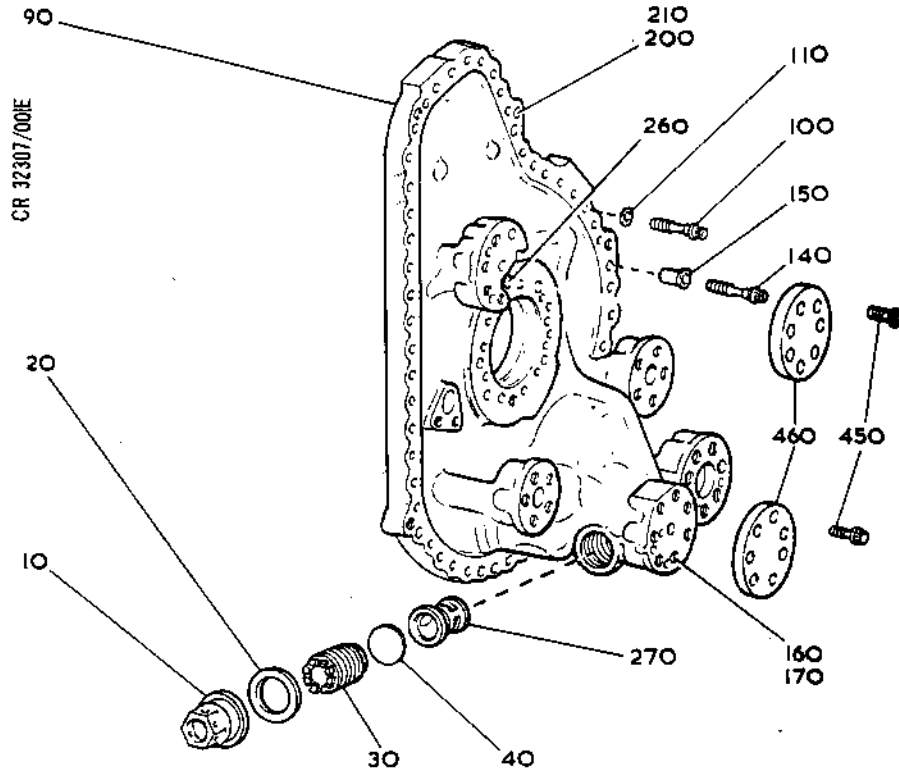
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RH Gearbox Accessory Case, Front Cover and Fittings
Figure 305

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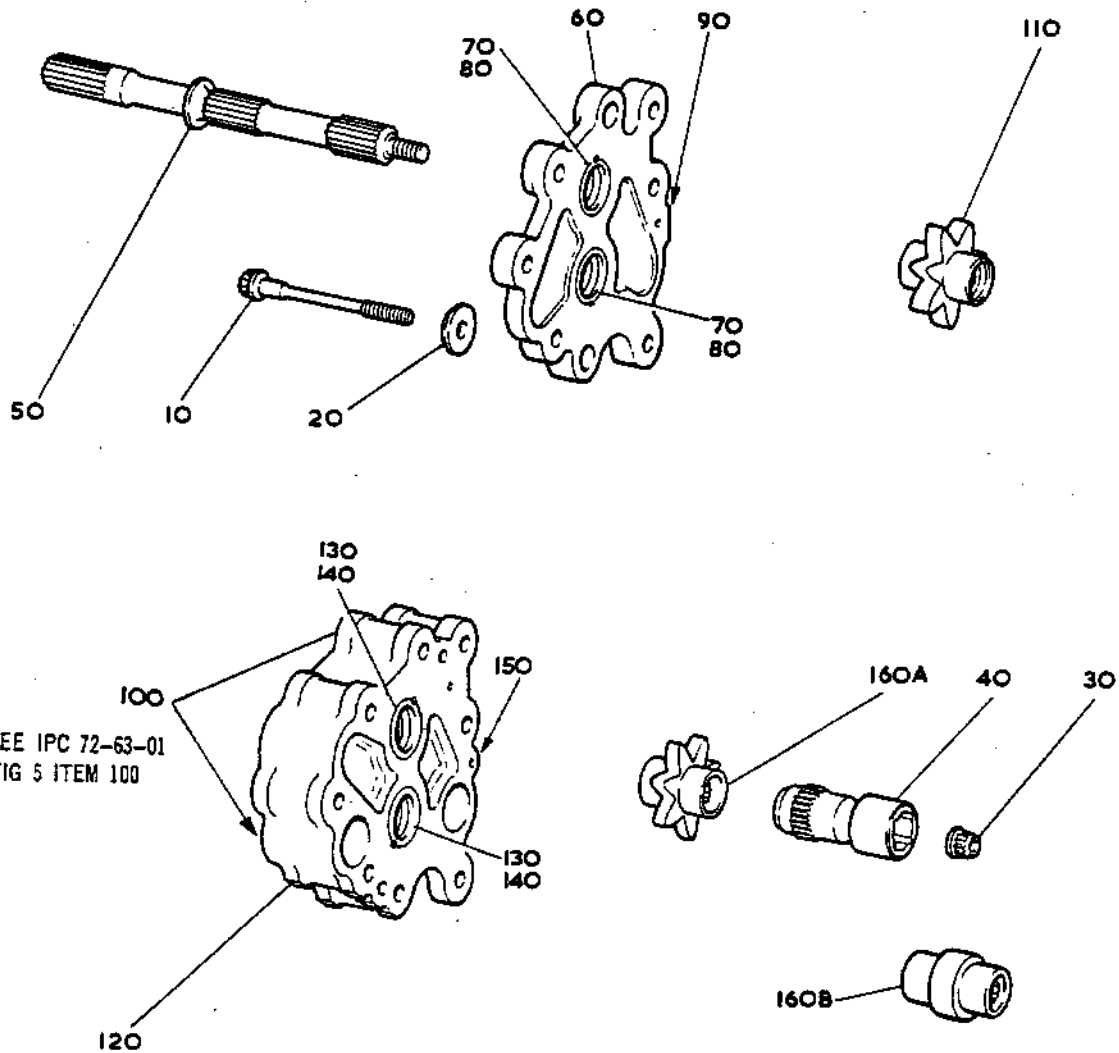
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CR 32306/00C

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RH Gearbox Accessory Case, Oil Pump
Figure 306

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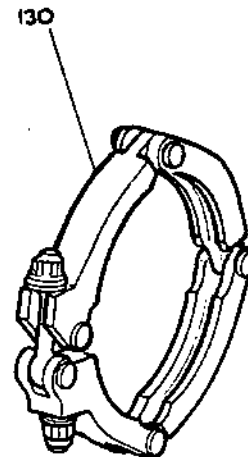
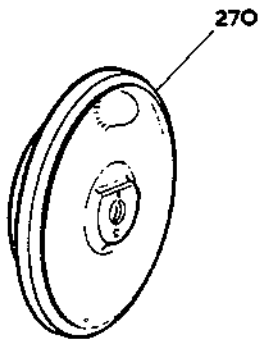
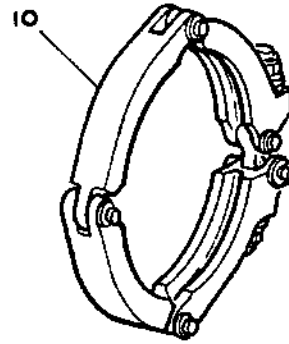
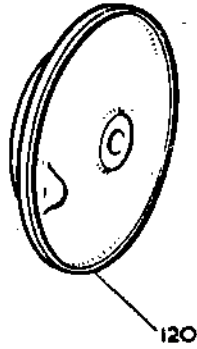
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RH Gearbox Accessory Case, Main and Stand-by
Hydraulic Pump Installation Fittings
Figure 307

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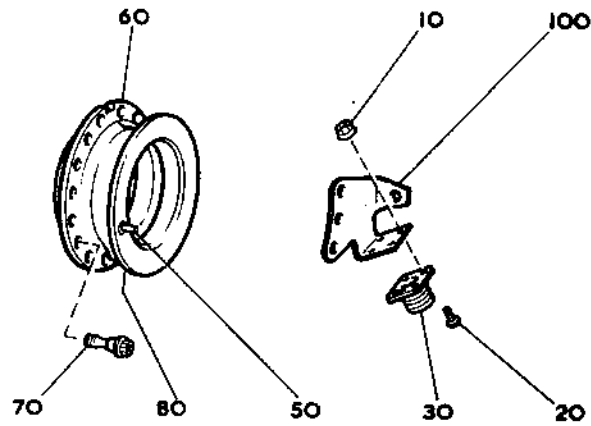
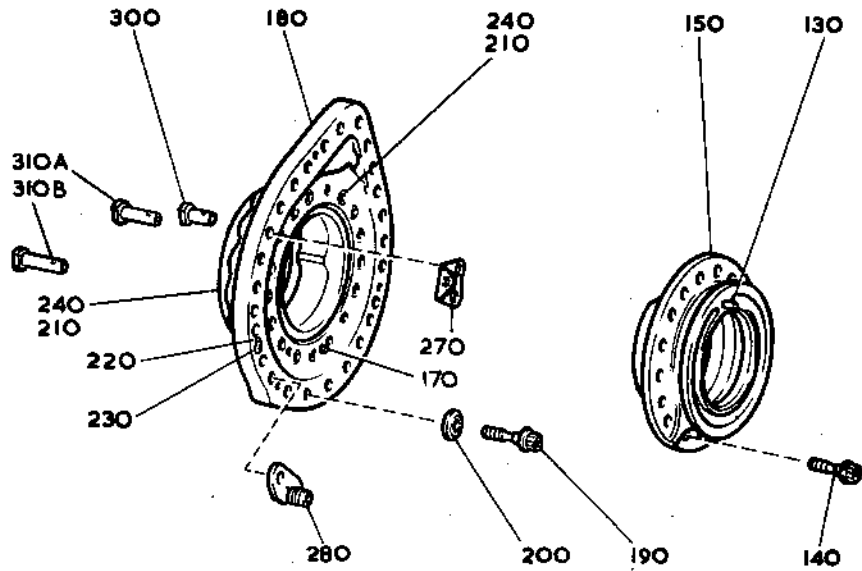
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RH Gearbox Accessory Case, Main and Stand-by
Hydraulic Pump Adapters
Figure 308

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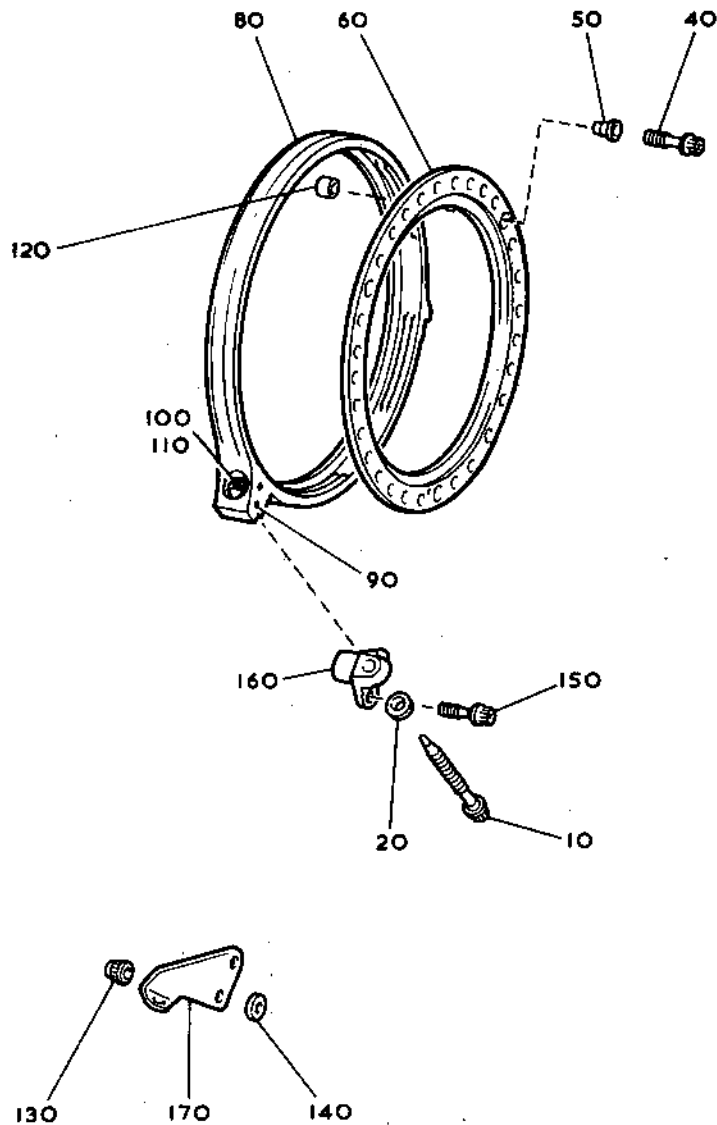


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TN8748

RH Gearbox Accessory Case, IDG Installation Fittings
Figure 309

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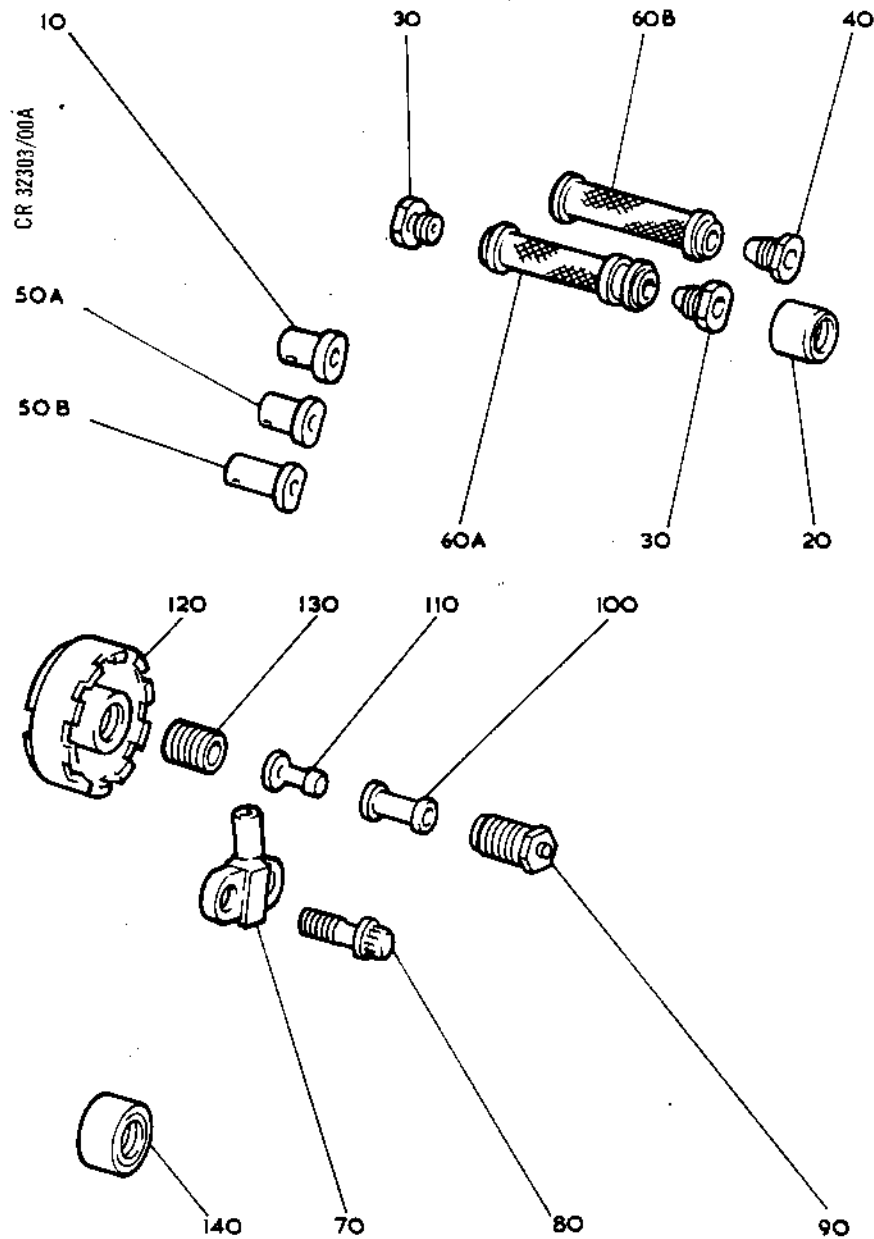
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RH Gearbox Accessory Case, Oilway Filters
and Oil Jets
Figure 310

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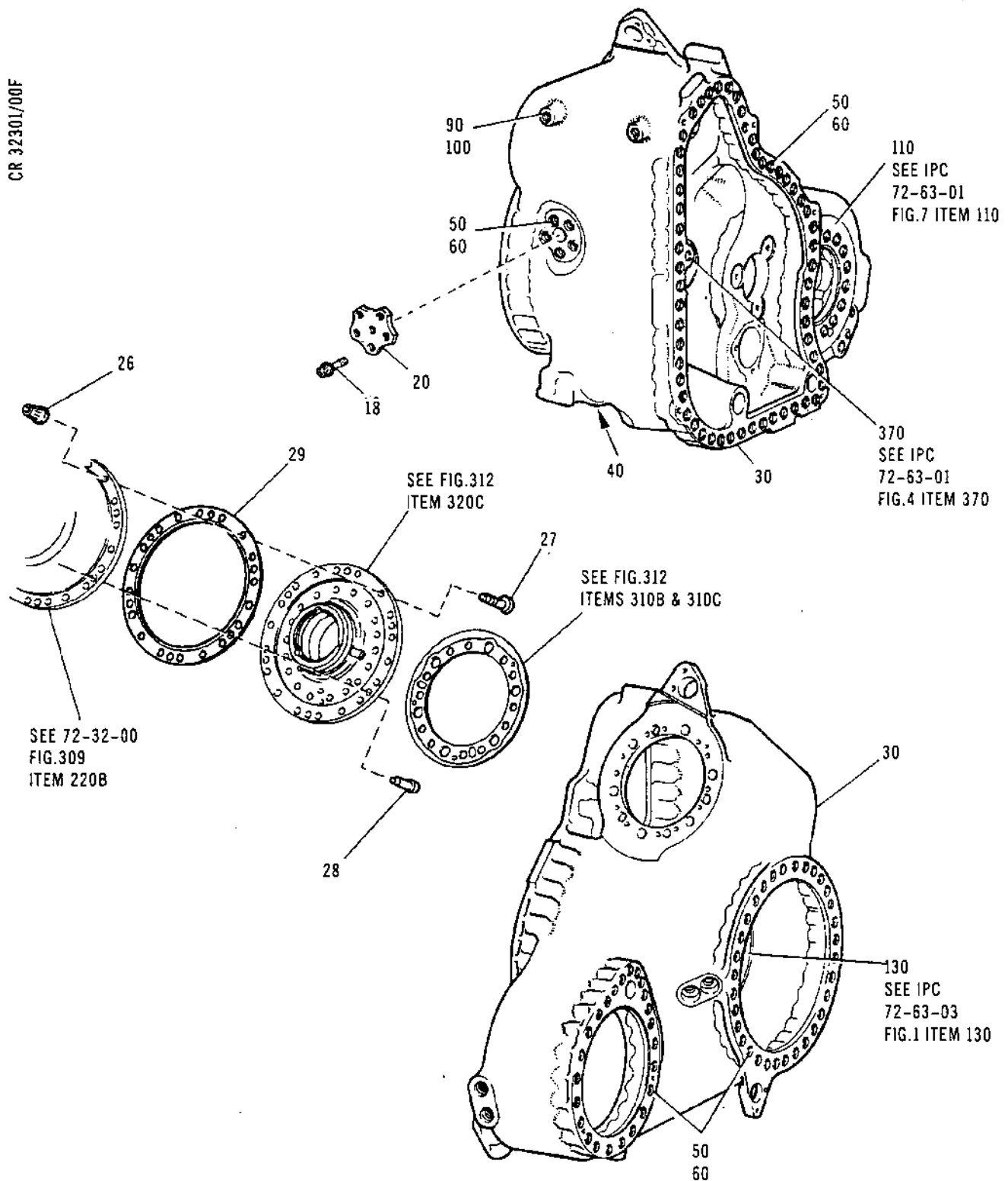


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CR 32301/00F



RH Gearbox Accessory Case, Case Assembly
Figure 311

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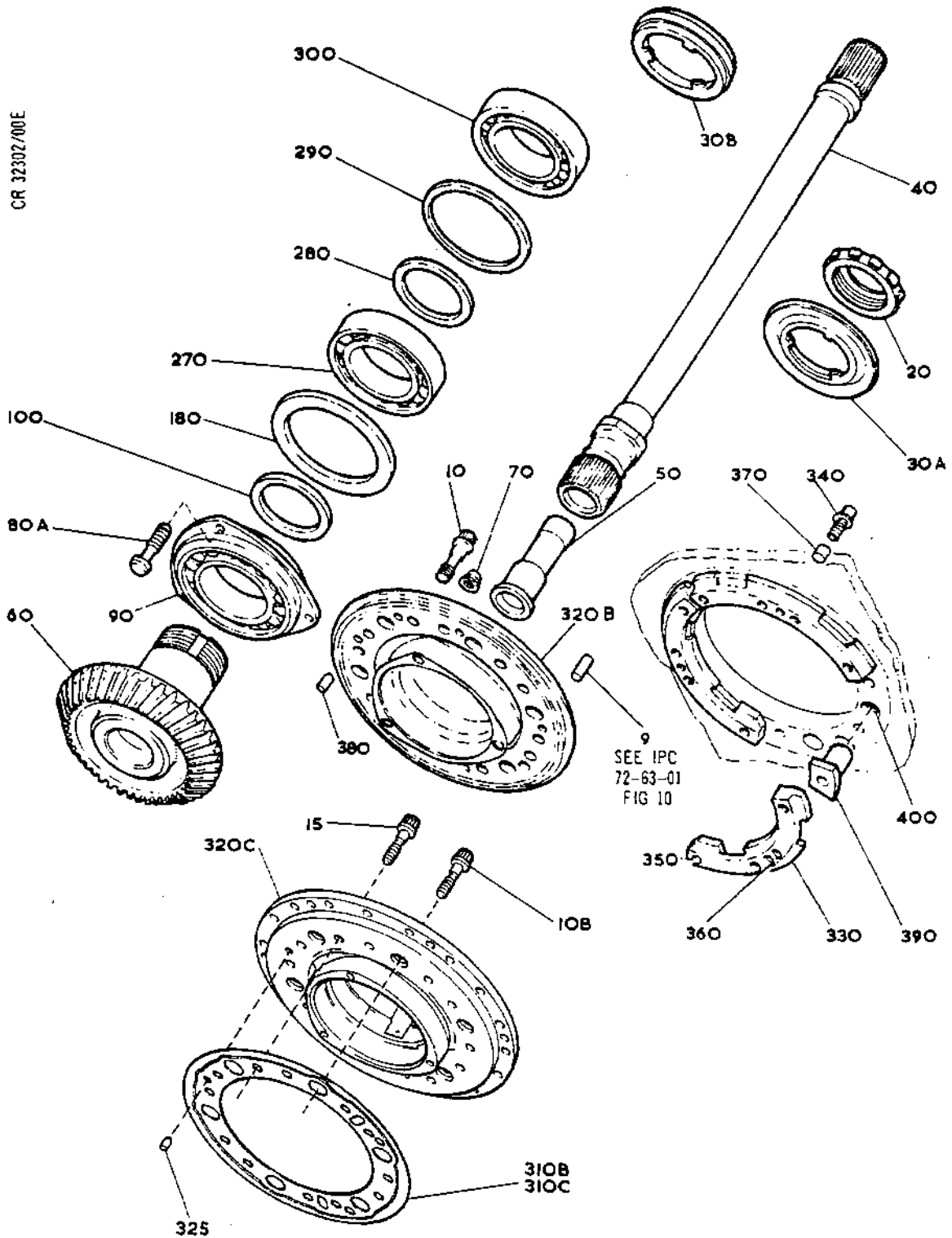


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Right-hand Gearbox Main Drives
Figure 312 (Sheet 1 of 2)

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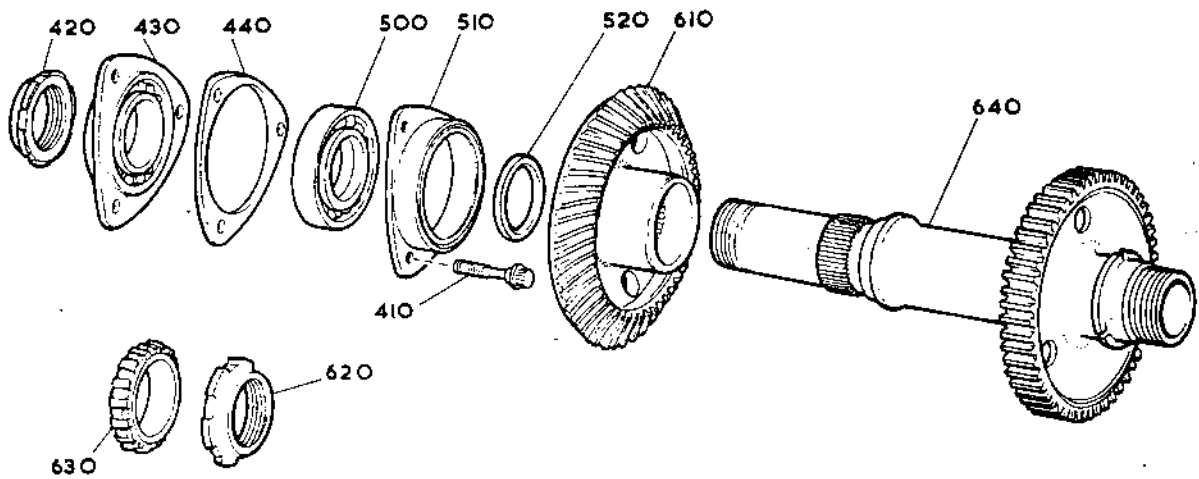
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Right-hand Gearbox Main Drives
Figure 312 (Sheet 2 of 2)

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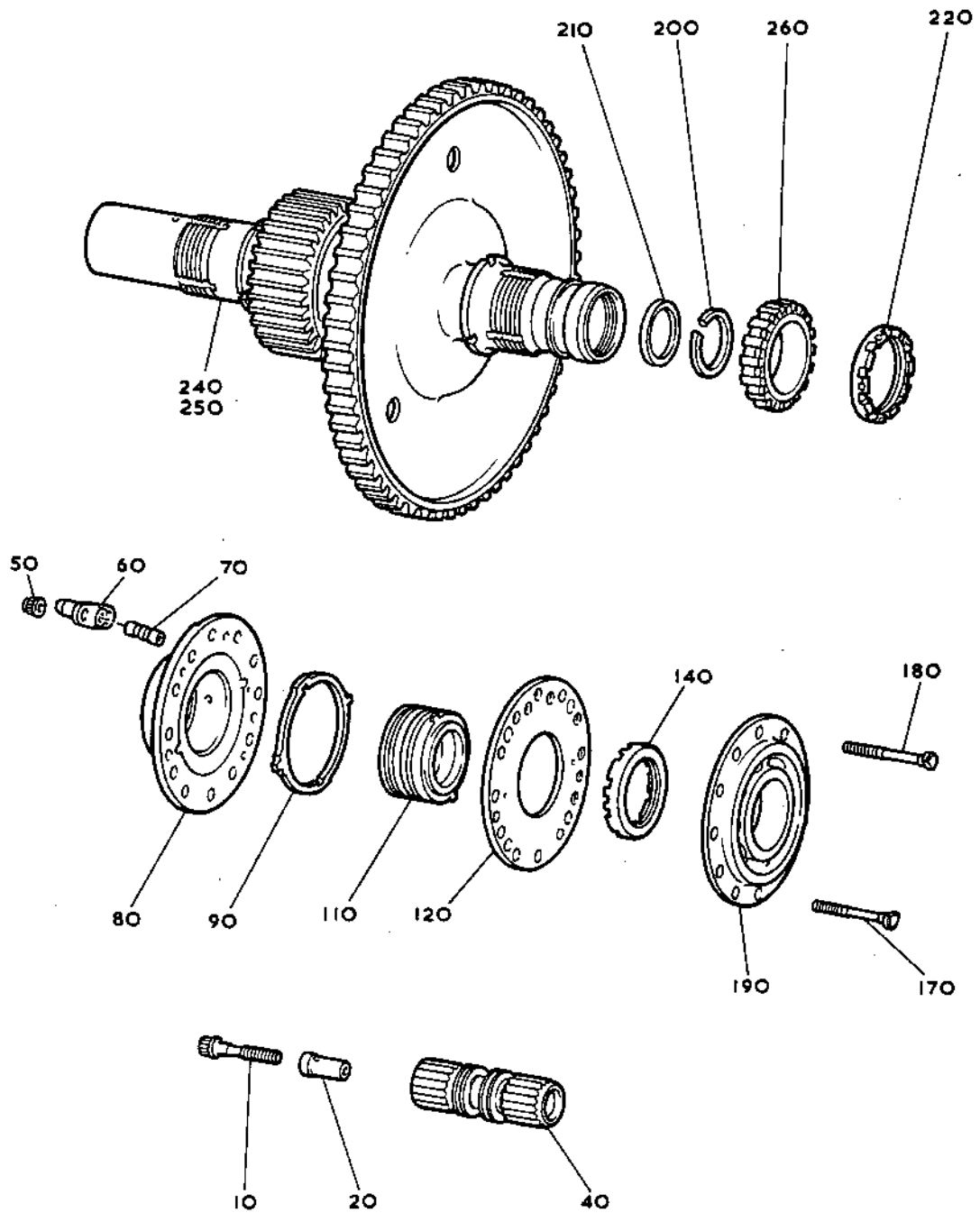


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Air Starter and IDG Drives
Figure 313

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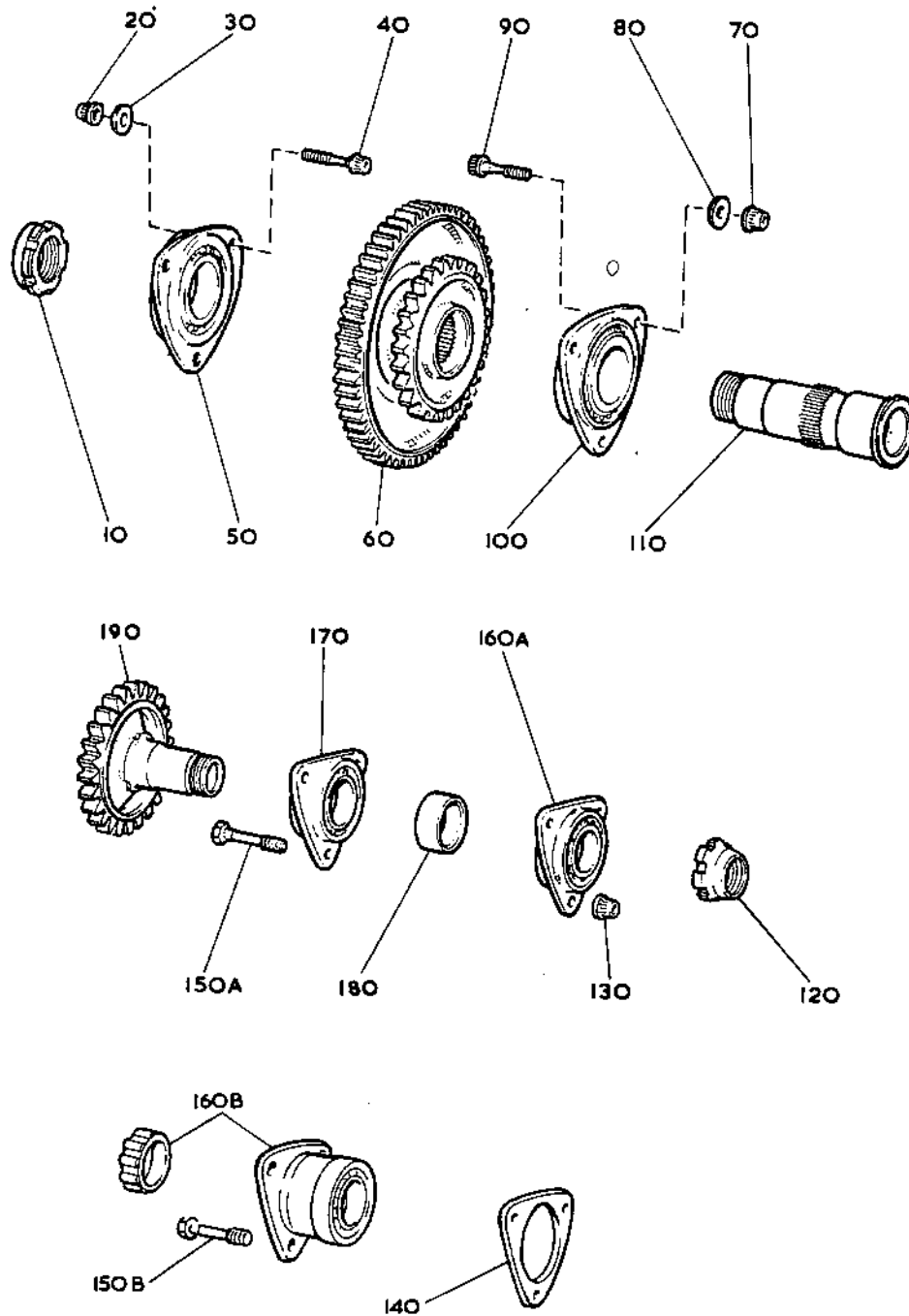
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Scavenge Oil Pump Drive and Idler Shaft
Figure 314

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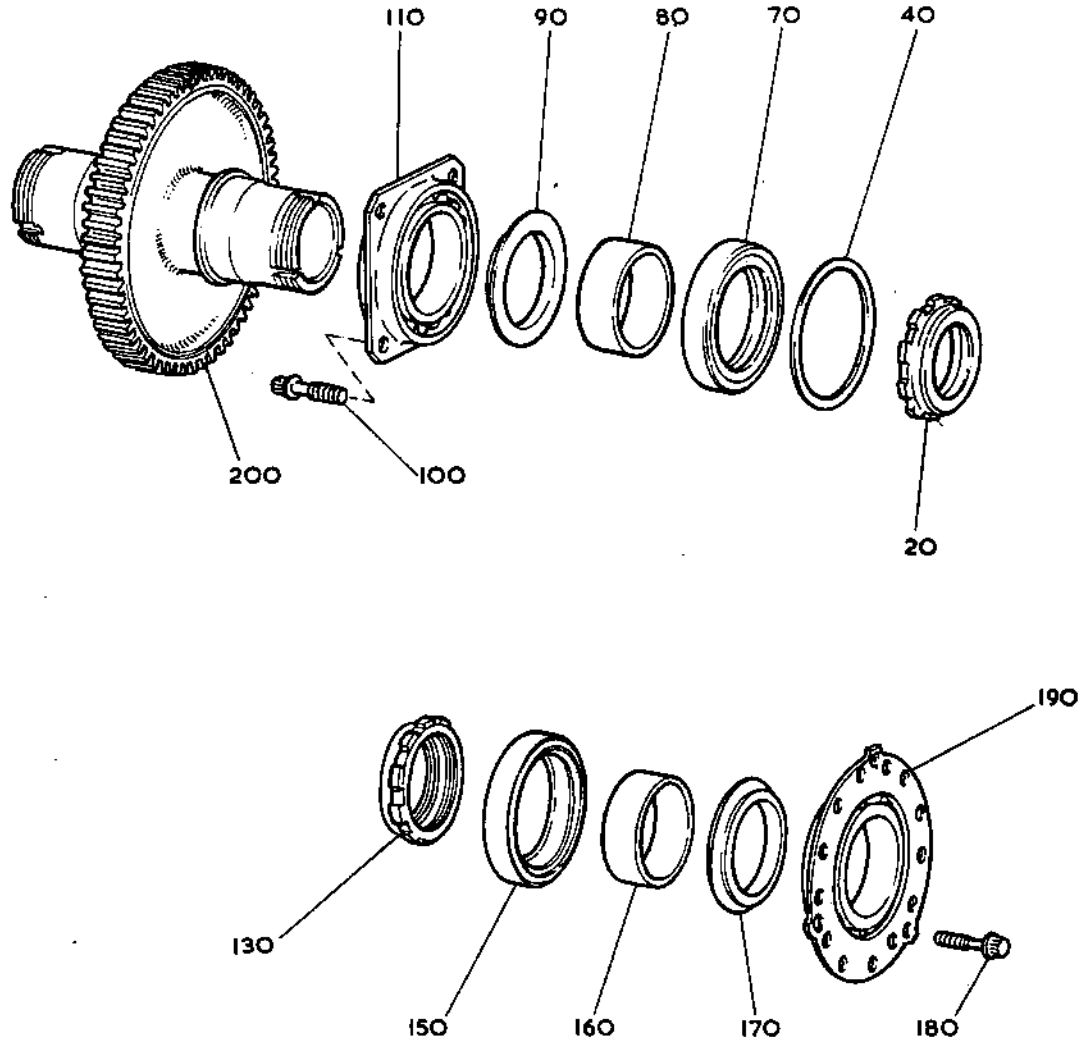
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Main and Stand-by Hydraulic Pumps Drives
Figure 315

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RIGHT-HAND ACCESSORY GEARBOX CASE ASSEMBLY -
INSPECTION/CHECK

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For information on the inspection/check of the Right-hand
Accessory Gearbox Case Assembly, refer to 72-63-00
Inspection/Check.

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RIGHT-HAND ACCESSORY GEARBOX MAIN DRIVES -
INSPECTION/CHECK

For information on the inspection/check of the Right-hand
Accessory Gearbox Main Drives, refer to 72-63-00
Inspection/Check.

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AIR STARTER DRIVE AND IDG DRIVE - INSPECTION/CHECK

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For information on the inspection/check of the Air Starter Drive and IDG Drive, refer to 72-63-00 Inspection/Check.

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SCAVENGE OIL PUMP DRIVE AND IDLER SHAFT - INSPECTION/CHECK

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For information on the inspection/check of the Scavenge Oil Pump Drive and Idler Shaft, refer to 72-63-00 Inspection/Check.

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MAIN AND STAND-BY HYDRAULIC PUMP DRIVES - INSPECTION/CHECK

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For information on the inspection/check of the Main and
Stand-by Hydraulic Pump Drives, refer to 72-63-00
Inspection/Check.

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DRIVE, PULSE PROBE AND HOUSING - INSPECTION/CHECK

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DRIVE, PULSE PROBE AND HOUSING - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.
 - (1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	40	Shearing Quillshaft	MP1
302	80	Splined Drive Shaft	MP1

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
302	20	Cover	FLA
302	90	Sump Case	FLA

Items to be Fluorescent Dye Crack Tested
Table 302

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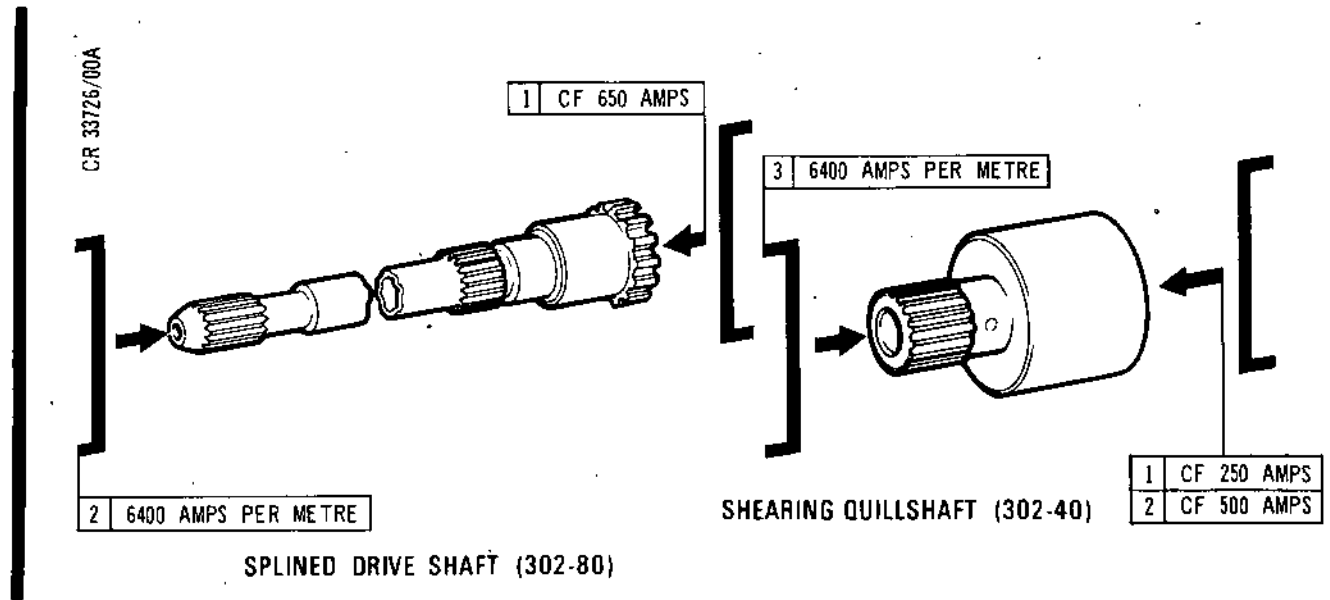
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Crack Detection Test Diagram
Figure 301

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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301
302

Not applicable
72-64-00 Fig.1

Cross References to Illustrated Parts Catalogue
Table 303

4. Cover (302-20) (Ref.SB.72-41)

A. Inspect Attachment Face.

(1) Scores

- (a) Less than 0.010 in.
(0,250 mm) deep, but not
extending more than half-
way across the face

Accept, if repair
preserves surface
flatness and
sealing capability

(2) Nicks and burrs

Accept, if repair
preserves surface
flatness and
sealing capability

(3) Wear

- (a) Bolt holes elongated less
than 0.030 in.
(0,760 mm)

Accept after repair

5. Shearing Quillshaft (302-40) (Ref.SB.72-3)

A. Inspect Splines (Ref.72-09-00 Inspection/Check).

6. Ball Bearing Journal (302-70)

A. Inspect Bearing Journal (Ref. 72-09-00 Inspection/Check).

7. Splined Drive Shaft (302-80)

A. Inspect Thread (Ref. 72-09-00 Inspection/Check).

B. Inspect Splines (Ref. 72-09-00 Inspection/Check).

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C. Inspection Bearing Location.

(1) Nicks, burrs and scoring Accept after repair

D. Inspect Toothed Wheel.

(1) Nicks and burrs Accept after repair

(2) Excessive damage or
broken teeth Reject

E. Inspect General Condition of Drive Shaft.

(1) Nicks and burrs Accept after repair

8. Sump Case (302-90)

A. Inspect Threads (Ref. 72-09-00 Inspection/Check).

B. Inspect Air Tube Seating.

(1) Scoring

(a) Less than 0.005 in. Accept after repair
(0,130 mm) in depth

C. Inspect Abutment Flanges.

(1) Scores

(a) Less than 0.010 in. Accept, if repair
(0,250 mm) deep, but not preserves surface
extending more than half- flatness and
way across the face sealing capabilities

(2) Nicks and burrs

Accept, if repair
preserves surface
flatness and
sealing capabilities

(3) Wear

(a) Bolt holes elongated less Accept after repair
than 0.030 in. (0,760 mm)

D. Inspect Oil and Air Holes.

(1) Obstruction Reject for cleaning
investigation

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(2) Nicks and burrs.

Accept after
repair.

E. Inspect Pulse Probe Drive Thrust Bearing Location.

(1) Nicks, burrs and scoring

Accept after
repair.

(2) Spinning.

Reject.

9. Self-locking Nut (302-50)

A. Inspect Threads (Ref.72-09-00 Inspection/Check).

B. Inspect self-locking feature.

(1) Inspect the self-locking
feature of the nut to ensure
that it has an elliptical
feature and not a four lobe
feature (Ref.SB.72-105).

Reject any four
lobe featured nut.

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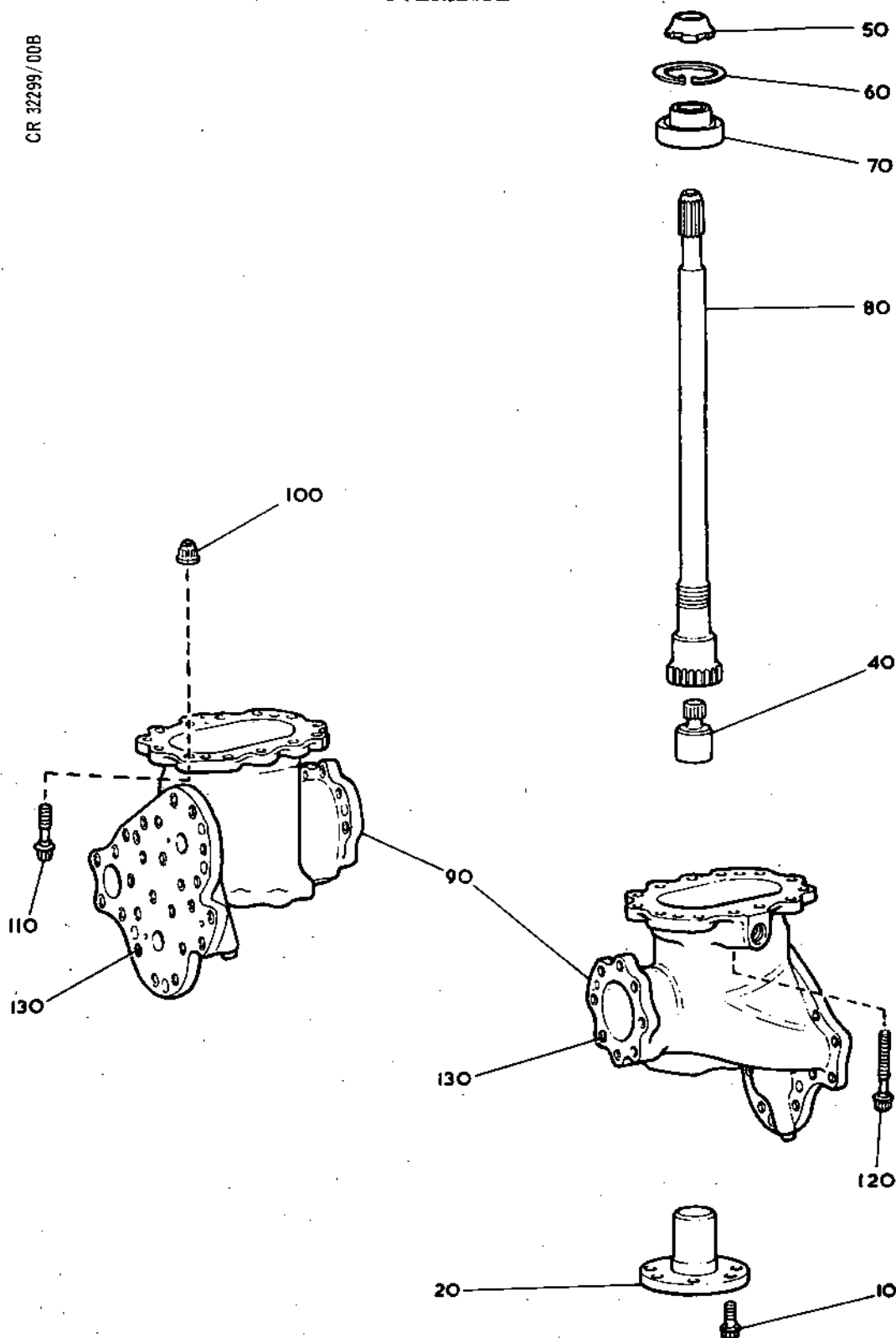
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Pulse Probe Housing and Drive
Figure 302

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MAIN OIL PUMP - INSPECTION/CHECK

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A. Inspect Thread	313

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MAIN OIL PUMP - INSPECTION/CHECK

1. General

- A. Each item in this chapter is given a two-part identification; thus, 302-20 refers to Figure 302 and to Item 20 called out on that figure. Each item may be further identified by its Part Number by the use of Table 303, which cross-refers figures in this chapter to the equivalent chapter and figure in the Illustrated Parts Catalogue (I.P.C.); the called-out item number will be the same on both figures.
- B. All items which will be crack tested are listed in Tables 301 and 302.
- C. Dimensional checks are cross referenced to the equivalent Fits and Clearances Schedule (F.C.S.) chapter against the item concerned.
- D. When the inspection of an item discloses a minor defect that requires rectification, it is defined as 'Accept after repair'. On all such occasions the item must be rectified in accordance with Standard Practices 72-09-22 Repair. Where a Ref.No. follows 'Accept after repair' e.g. (Ref.72-21-01 Repair No.1), a specific Repair Scheme is available to which the item must be rectified. Items that are rejected, or for which a repair scheme is not currently available, should be held at the discretion of the operator, as service experience may prove the need for a repair.
- E. On completion of a repair, rectification or test, the item(s) must be inspected, to ensure that the necessary work has been satisfactorily completed.

2. General Inspection

- A. Inspect all items illustrated in this chapter, whether specified or not, in accordance with Standard Practices (Ref.72-09-00 Inspection/Check). In addition, carry out the inspections detailed for the specified items, from para.4 onwards.
- B. Inspection terms used in this chapter are explained in Standard Practices (Ref.72-09-00 Inspection/Check).

3. Crack Detection

- A. Magnetic Particle Crack Detection.

(1) Submit the items listed in Table 301 to crack detection in accordance with the process quoted.

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- (2) Items to be crack detected by this method are illustrated in the Crack Detection Test Diagram (Fig.301). For details of the processes, refer to 72-09-00 Inspection/Check.

FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
304	120	Quillshaft	MP1
304	400	No.4 Scavenge Pump Gear	MP1
304	410	No.4 Scavenge Pump Gear	MP1
304	480	No.5 Scavenge Pump Gear	MP1
304	490	No.5 Scavenge Pump Gear	MP1
304	500	Quillshaft	MP1
305	100	No.2 and 3 Scavenge Pump Gear	MP1
305	110	No.2 and 3 Scavenge Pump Gear	MP1
305	170	No.1 Scavenge Pump Gear	MP1
305	180	No.1 Scavenge Pump Gear	MP1
305	280	Pressure Pump Gear	MP1
305	300	Pressure Pump Gear	MP1
306	130	Scavenge Pump Gear	MP1

Items to be Magnetic Particle Crack Tested
Table 301

B. Fluorescent Dye Crack Detection.

- (1) Submit the items listed in Table 302 to crack detection in accordance with the process quoted. For details of the processes, refer to 72-09-00 Inspection/Check.

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FIG.NO.	ITEM NO.	DESCRIPTION	PROCESS
304	290	Scavenge Pump Case	FlA
304	420	Scavenge Pump Case	FlA
305	50	Scavenge Pump Case	FlA
305	120	Scavenge Pump Case	FlA
305	210	Scavenge Pump Case	FlA
306	160	Pressure Pump Case	FlA

Items to be Fluorescent Dye Crack Tested
Table 302

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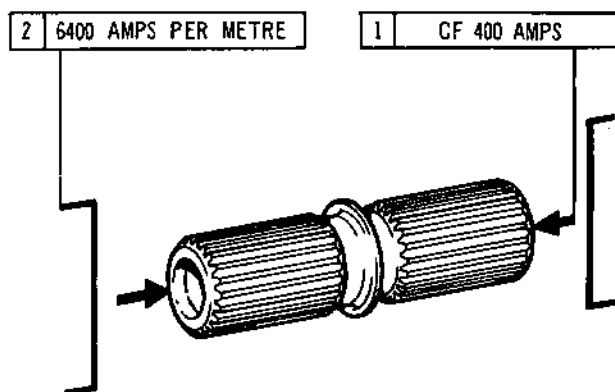


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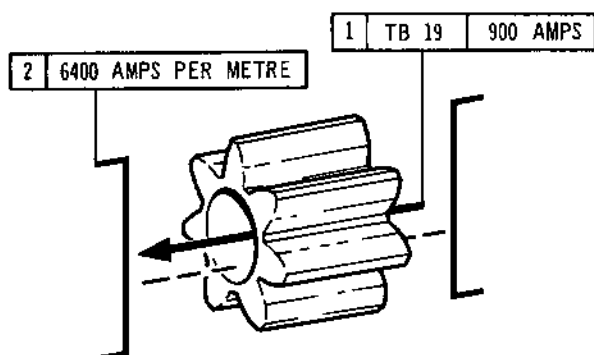
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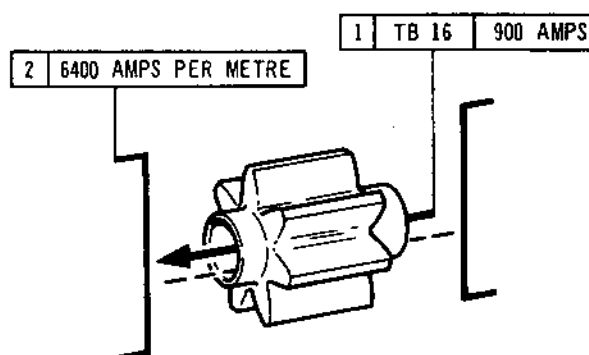
CR 33103/00B



QUILL SHAFT (304-120)



No.4 SCAVENGE PUMP GEAR (304-400)



No.4 SCAVENGE PUMP GEAR (304-410)

66601N1

Crack Detection Test Diagram
Figure 301 (Sheet 1 of 4)

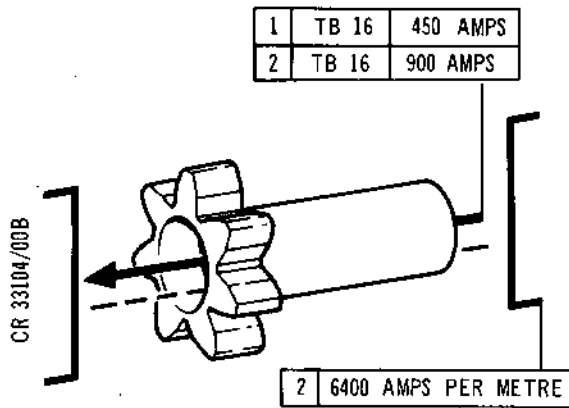
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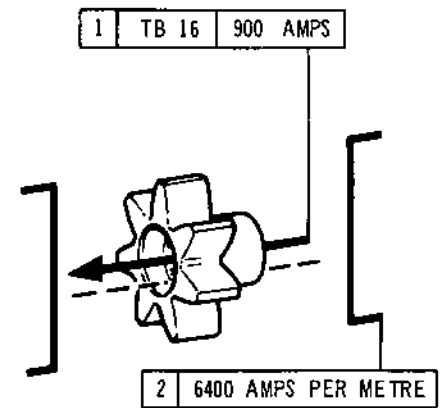
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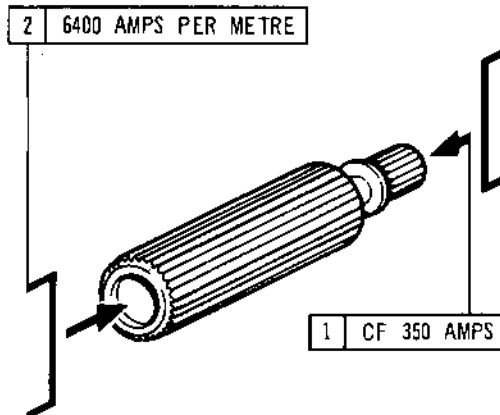
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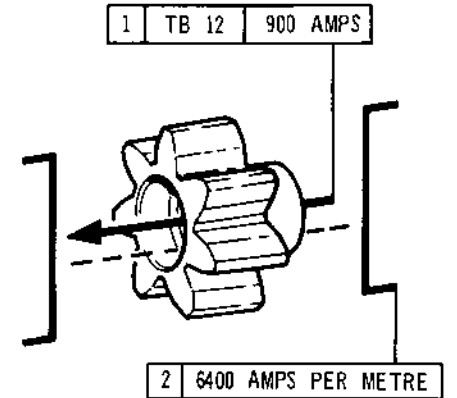
No.5 SCAVENGE PUMP GEAR (304-480)



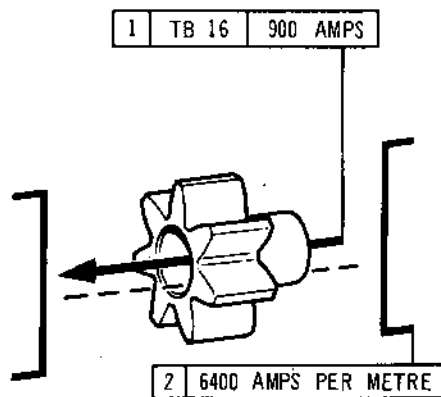
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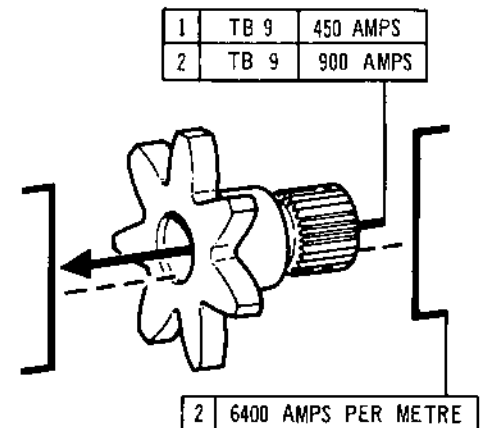
QUILL SHAFT (304-500)



No.2 AND 3 SCAVENGE PUMP GEAR (305-100)



No.2 AND 3 SCAVENGE PUMP GEAR (305-110)



No.1 SCAVENGE PUMP GEAR (305-170)

Crack Detection Test Diagram
Figure 301 (Sheet 2 of 4)

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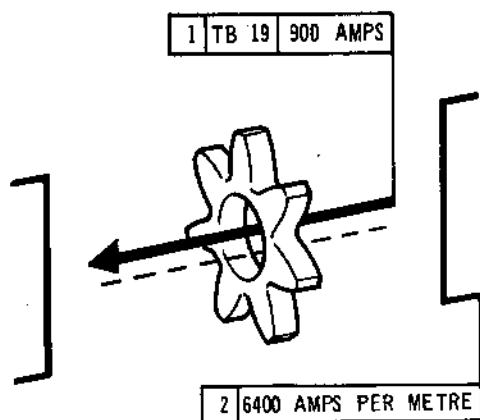


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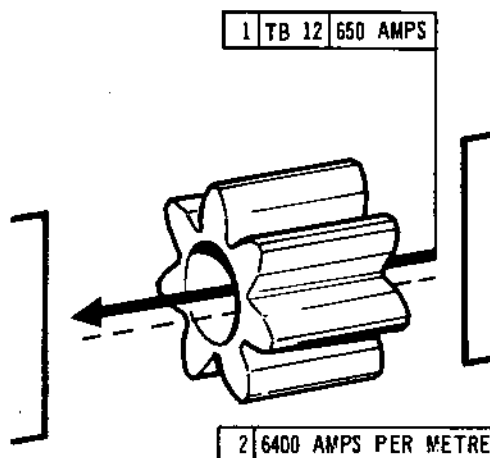
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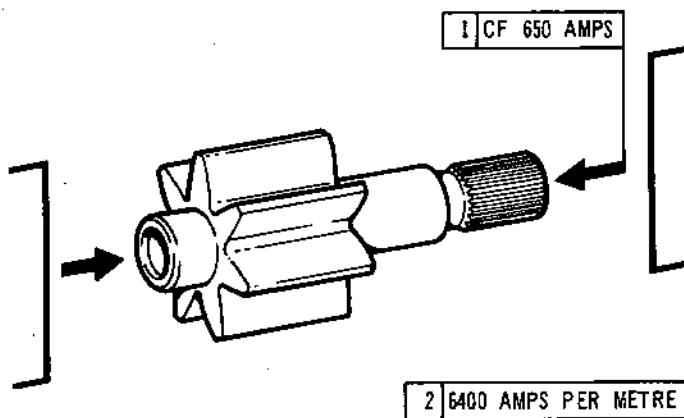
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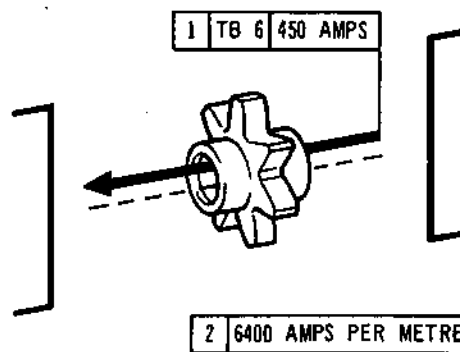
No.1 SCAVENGE PUMP GEAR (305-180)



PRESSURE PUMP GEAR (305-280)



PRESSURE PUMP GEAR (305-300)



SCAVENGE PUMP GEAR (306-130)

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Crack Detection Test Diagram
Figure 301 (Sheet 3 of 4)

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Crack Detection Test Diagram
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FIG.NO.

ILLUSTRATED PARTS CATALOGUE EQUIVALENT

301	Not applicable	
302	76-65-00	Fig.1
303	76-65-00	Fig.2 & 2A
304	76-65-00	Fig.3
305	76-65-00	Fig.4
306	76-65-00	Fig.5
307	Not applicable	

Cross References to Illustrated Parts Catalogue
Table 303

4. Brackets (302-60/70/130/220/320/380/390 and 306-100)

A. Inspect Brackets.

(1) Wear.

- | | | |
|-----|---|----------------------|
| (a) | Attachment face thickness reduced not more than 5 per cent. | Accept. |
| (b) | Bolt holes elongated not more than 0.030 in. (0,760 mm). | Accept after repair. |

(2) Scoring.

- | | | |
|-----|--|--|
| (a) | Not more than 0.010 in. (0,250 mm) in depth. | Accept after repair providing material thickness is not reduced by more than 5 per cent. |
|-----|--|--|

(3) Distortion.

Accept is compatibility is preserved.

(4) Nicks and burrs.

Accept after repair.

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5. Bracket Assembly (302-330)

A. Inspect Bracket Assembly.

(1) Inspect captive nut and retainer (Ref.72-09-00 Inspection/Check).

(2) Wear.

(a) Attachment face thickness reduced not more than 5 per cent and bolt holes elongated not more than 0.030 in. (0,760 mm). Accept after repair.

(3) Nicks, burrs and fretting. Accept after repair.

6. Retaining Ring (303-30) Pre SB.72-27 and SB.72-27 Standard (303-80) Pre SB.72-27 and SB.72-27 Standard

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Filter Cover Contact Areas.

(1) Nicks, burrs and scores. Accept after repair.

C. Inspect Silver Plate.

(1) Any exposure of parent metal. Reject for replating (Ref.72-09-00, Repair).

7. Pressure Filter Cover (303-40) Pre SB.72-49 and Retainer Assembly (303-45) SB.72-49

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Strainer and Retaining Ring Contact Areas.

(1) Scoring.

(a) Not more than 0.005 in. (0,130 mm) deep and not extending more than half-way across face. Accept after repair if sealing capability is preserved.

(2) Nicks and burrs. Accept after repair if sealing capability is unimpaired.

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8. Strainer Assembly (303-50) Pre SB.72-49, Outer Element Assembly (303-57) SB.72-49 and Inner Element Assembly (303-59) SB.72-49

NOTE: Where the strainer (303-50) is to Pre SB.72-49 standard, ensure that the strainer does not exceed 5.400 ± 0.010 in. ($137,16 \pm 0,25$ mm) in length. Where the length of the strainer is in excess of the above limits, refer to SB.72-112 for the rectification procedure.

A. Inspect Screen.

(1) Damage.

(a) Punctures, tears or separation from the cage. Reject.

(b) Damaged or faulty brazed joints. Reject.

B. Inspect Cage.

(1) Cracks and distortion. Reject.

(2) Nicks, burrs and scores. Accept if unbroken contact is maintained after repair.

C. Inspect Filter Cover and Spring Location.

(1) Scores, nicks and burrs. Accept after repair.

D. Inspect End Face.

(1) Scores, nicks and burrs. Accept after repair.

9. Magnetic Screwed Plug (303-70)

NOTE: This item is not a standard fitting.

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

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B. Test Magnetic Plug For Magnetism.

- (1) Examine the probe for defects.
- (2) The probe must be capable of lifting three unmagnetised steel 0.5 in. (13 mm) diameter balls.
- (3) Assemble a protective sleeve to the probe and place the magnetic plug in a suitable container.
 - (a) Within testing limits. Accept.

10. Drain and Valve Body Assembly (303-90)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Valve Body.

- (1) Nicks and burrs. Accept providing sealing capability is maintained after repair.

C. Check Spring Action.

- (1) Check spring action by manually depressing valve and ensuring its return under spring pressure.

D. Inspect Pressure Pump Case Sealing Face.

- (1) Scoring.
 - (a) Not more than 0.005 in. (0,130 mm) deep and not extending more than half-way across face. Accept after lapping providing sealing capabilities are maintained.

11. Inner and Outer Strainer Assembly (303-100/110)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Screen.

- (1) Punctures, tears or separation from cage. Reject.

C. Inspect Cage.

- (1) Cracks and distortion. Reject.

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(2) Nicks, burrs and scores.

Accept providing
unbroken contact
is maintained
after repair.

D. Inspect Inner and Outer Strainer Locations.

(1) Damage to inner strainer
centralising clips located
in the outer strainer bore.

Accept, if assembly
is satisfactory
after repair.

(2) Nicks, burrs and scores.

Accept after
repair.

12. Spring (303-120 and 303-54 SB.72-49)

A. Inspect Spring.

(1) Check spring compression load of each spring (Ref.
72-65-00 Fits and Clearances F.C.S.601-456 and -457).
Use spring test equipment (Ref.72-09-00 Inspection/
Check).

(a) Within F.C.S. limits.

Accept.

13. Filter Cover (304-30)

A. Inspect Abutment Face.

(1) Nicks, burrs and scores.

Accept after repair
providing sealing
capability is not
impaired.

B. Inspect Cover.

(1) Nicks, burrs and scores.

Accept after repair
providing sealing
capability is not
impaired.

14. Jet (304-40)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Abutment Face.

(1) Nicks, burrs and scores.

Accept after
repair.

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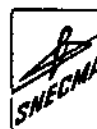
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15. Sediment Strainer (304-60)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Abutment Locations.

(1) Nicks, burrs and scores.

Accept after
repair.

C. Inspect Strainer Element.

(1) Dents, fractures and
separation from end pieces.

Reject.

16. Check Valve Cover (304-80)

A. Inspect Abutment Face.

(1) Nicks, burrs and scores.

Accept after
repair providing
sealing capabil-
ity is not
impaired.

B. Inspect Distance Piece Locating Dogs.

(1) Distortion and fractures.

Reject.

(2) Nicks and burrs.

Accept after
repair.

C. Inspect Cover.

(1) Nicks, burrs and scores.

Accept after
repair if sealing
capability is
unimpaired.

17. Spring (304-100)

A. Inspect Spring.

(1) Check spring compression load (F.C.S.601-458).
Use spring test equipment (Ref.72-09-00 Inspection/
Check).

(a) Within F.C.S. limits.

Accept.

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18. Check Valve (304-110)

A. Inspect Sealing Face in area of Witness Mark.

- (1) Nicks, burrs and scores. Accept after lap-
ping if leakage
check is satis-
factory in
conjunction with
304-470 (Ref.
72-65-00,
Testing).
- (2) Surface flatness. (Use helium light band equipment,
Ref.72-09-00 Inspection/Check).
- (a) Flatness more than three Accept after lap-
helium light bands. pping providing
leakage check is
satisfactory
(Ref.72-65-00,
Testing).
- (b) Flatness within three helium Accept.
light bands.

B. Inspect Spring Location.

- (1) Fretting. Accept after
repair.

19. Quillshaft (304-120 and 304-500)

A. Inspect Splines (Ref.72-09-00 Inspection/Check).

B. Carry out Dimensional Checks (Ref.Fig.307).

NOTE: Carry out these checks in conjunction with the
gear splines (para.20.A.).

- (1) Check overall spline backlash clearances (Ref.
72-65-00, Fits and Clearances) as follows:

Quillshaft Identity	F.C.S. Reference
304-120	602-477
304-500	601-460
	602-482/492/494

- (2) Nicks and burrs. Accept after
repair.

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20. Pump Gears (304-400/410/480/490, 305-100/110/170/180/280/
300 and 6-130)

A. Inspect Splines (Ref.72-09-00 Inspection/Check).

B. Carry out Dimensional Checks (Ref.Fig.307).

NOTE: Carry out the following checks in conjunction
with the quillshafts (para.19.B.).

- (1) Check overall spline backlash clearances
(Ref.72-65-00 Fits and Clearances) as follows:

Gear Identity	F.C.S. Reference
304-410	602-477/482
304-490	602-492
305-110	602-494
306-130	602-460

C. Inspect Journals.

- (1) Nicks, burrs and scores.

Accept if
repair does not
violate F.C.S.
limits in para.F.
and subject to
satisfactory pump
rig test (Ref.
72-65-00).

- (2) Wear and fretting.

- (a) Even wear, with no
stepping, within F.C.S.
limits.

Accept subject
to para.F.

D. Inspect Gear Teeth (Ref.72-09-00, Inspection/Check).

- (1) Nicks and burrs.

Accept, if repair
does not violate
F.C.S. limits in
para.F.

- (2) Wear and fretting.

- (a) Stepped, or more than
0.005 in. (0,130 mm) deep.

Reject.

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- (b) Smooth wear within F.C.S. limits.

Accept subject to para.F.

E. Inspect End Faces.

(1) Scores.

- (a) Less than 0.005 in.
(0,130 mm) deep.

Accept if repair does not violate F.C.S. limits in para.F.

F. Carry out Dimensional Checks (Ref.Fig.306).

NOTE: Carry out these checks in conjunction with the Scavenge and Pressure Pump Cases (paras.21 and 27).

- (1) Check overall gear diameter (Ref.72-65-00 Fits and Clearances) as follows:

Gear Identity	F.C.S. Reference
304-400	602-470
304-410	602-480
304-480	602-518
304-490	602-486
305-100	602-514
305-110	602-491
305-170	602-509
305-180	602-495
305-280	601-449
305-300	601-453
306-130 (Driving)	601-459
306-130 (Driven)	601-464

- (a) Within F.C.S. limits.

Accept.

- (2) Check gear width (Ref.72-65-00 Fits and Clearances) as follows:

Gear Identity	F.C.S. Reference
304-400	602-469
304-410	602-479
304-480	602-517
304-490	602-487
305-100	602-512
305-110	602-493

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Gear Identity	F.C.S. Reference
---------------	------------------

305-170	602-507
305-180	602-497
305-280	601-448
305-300	601-454
306-130 (Driving)	601-468
306-130 (Driven)	601-465

(a) Within F.C.S. limits. Accept.

- (3) Check gear journal diameters at upper and lower casing bush locations (Ref.72-65-00 Fits and Clearances) as follows:

NOTE: Carry out the following checks in conjunction with para.21.C., 27.C. and 27.E.(1).

Gear Identity	F.C.S. Reference
---------------	------------------

304-410	602-478/484
304-480	602-473/520
304-490	602-489 (lower only)
305-100	602-516 (upper only)
305-110	602-498/501
305-170	602-510 (lower only)
305-300	602-504 (upper)
	601-455 (lower)
306-130 (Driving)	601-461/467
306-130 (Driven)	601-463/466

(a) Within F.C.S. limits. Accept.

- (4) Check gear journal diameters at gear bore locations (Ref.72-65-00 Fits and Clearances) as follows:

NOTE: Carry out these checks in conjunction with the gear bore checks in para.(5).

Gear Identity	F.C.S. Reference
---------------	------------------

304-410	602-485
304-480	602-471
304-490	602-490
305-110	602-500
305-170	602-511
305-300	602-506

(a) Within F.C.S. limits. Accept.

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- (5) Check gear bore diameters (Ref.72-65-00 Fits and Clearances) as follows:

NOTE: Carry out these checks in conjunction with para.(4).

Gear Identity	F.C.S. Reference
304-400	602-471
304-490	602-485
305-100	602-511
305-110	602-490
305-170	602-506
305-180	602-500
305-280	601-450
	(see para.22)

- (a) Within F.C.S. limits. Accept.

- (6) Check backlash of gear splines (Ref.72-65-00 Fits and Clearances) as follows:

NOTE: These checks are integrated with each gear listed below.

Gear Identity	F.C.S. Reference
305-100	602-515
305-170	602-513/515
305-300	602-513

- (a) Within F.C.S. limits. Accept.

21. Scavenge Pump Case and CB Case Assemblies (304-290/420, 305-50/120/210)

- A. Inspect Screw Thread Inserts (Ref.72-09-00 Inspection/Check).

- B. Inspect Mating Faces.

- (1) Scoring.

- | | |
|--|--|
| (a) Not more than 0.005 in. (0,130 mm) deep; scores not extending across the full width of the face. | Accept after repair providing specified flatness is restored Ref.para.(3). |
|--|--|

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(2) Nicks and burrs.

Accept after
repair.

(3) Flatness (Ref.Fig.308).

(a) Surface flat within
0.001 in. (0,030 mm)
T.I.R.

Accept providing
both surfaces are
parallel within
these limits.

C. Inspect Bushing Sleeves.

NOTE: Carry out dimensional checks in conjunction with
para.20.F.(3).

(1) Check the bushing sleeve bore diameters (Ref.
72-65-00 Fits and Clearances) as follows:

Bush Identity	F.C.S. Reference
304-310	602-473/478
304-450	602-484/520
305-90	602-489/516
305-160	602-498/510
305-250	602-504
305-270	602-501
305-290	601-450

(a) Within F.C.S. limits.

Accept.

(2) Scoring.

(a) Scoring of any description.

Accept if repair
does not violate
F.C.S. limits.

(3) Security.

(a) Bushing sleeves not secure
in scavenge pump case
 housings.

Reject.

D. Inspect Gear Chambers.

NOTE: Carry out dimensional checks in conjunction with
para.20.F. (1), (2) and (3).

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- (1) Check the gear chamber bore diameters (Ref.72-65-00 Fits and Clearances) as follows:

Scavenge Pump Case F.C.S. Reference

304-290	602-470/480
304-420	602-486/518
305-50	602-491/514
305-120	602-495/509
305-210	601-459/464
305-210	601-461/463

(Ref.20.F.(3))

- (a) Within F.C.S. limits. Accept.

- (2) Check the gear chamber recess depth (Ref.72-65-00 Fits and Clearances) as follows:

Scavenge Pump Case F.C.S. Reference

304-290	602-469/479
304-420	602-487/517
305-50	602-493/512
305-120	602-497/507
305-210	601-465/468

- (a) Within F.C.S. limits. Accept.

- (3) Scoring and wear. Accept after repair providing running clearances are within F.C.S. limits and subject to satisfactory pump rig test (Ref.72-65-00, Testing).

- E. Inspect Headless Pin (Pressure Pump Journal) Location in Scavenge Pump Case.

NOTE: Carry out the following check in conjunction with para.22.B.

Scavenge Pump Case F.C.S. Reference

305-210	601-447
---------	---------

- (1) Check pin bore of case.

- (a) Inside F.C.S. limit. Accept.

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- F. Inspect Check Valve Seating for Flatness (304-470).
(Use Helium Light Band Equipment Ref.72-09-00 Inspection/Check).

- (1) Nicks, burrs and scores. Accept providing within three helium light bands after lapping and leakage check is satisfactory in conjunction with 304-110 (Ref. 72-65-00, Testing).

- G. Inspect General Condition of Scavenge Pump Case.

- (1) Nicks, burrs and scratches. Accept after repair.
- (2) Security of screwed plugs.
- (a) Screwed plugs loose in location. Reject.

22. Straight Headless Pin (Pressure Pump Journal) (305-200)

- A. Inspect Headless Pin.

- (1) Wear and scores. Accept providing dimensions are within F.C.S. limits after repair.

- B. Carry out Dimensional Checks (Ref.Fig.306).

NOTE: Carry out the following checks in conjunction with Scavenge and Pressure Pump Case and Pressure Pump Gear (paras.21.E., 20.F.(5) and 27.F.).

- (1) Check overall pin diameter.

F.C.S. Reference

601-447/450/451

- (a) Within F.C.S. limits. Accept.

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23. Relief Valve Cap (306-10) (Ref.SB.72-8)

A. Inspect Thread (Ref.72-09-00 Inspection/Check).

B. Inspect Valve Cap.

(1) Nicks and burrs.

Accept after
repair.

24. Spring (306-50)

A. Inspect Spring (Ref.72-09-00 Inspection/Check).

(1) Check spring compression load (F.C.S.601-445).
(Use spring test equipment (Ref.72-09-00
Inspection/Check).

(a) Within F.C.S. limits.

Accept.

25. Valve (306-70)

A. Inspect Valve.

NOTE: Carry out this check in conjunction with Valve Guide
(306-80).

(1) Scoring.

Accept after
repair providing
valve slides freely
within sleeve.

26. Valve Guide (306-80)

A. Inspect Valve Guide.

NOTE: Carry out this check in conjunction with Valve
(306-70).

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(1) Scoring.

Accept after
repair providing
the valve slides
freely within
sleeve.

(2) Wear.

Accept after
repair.

27. Pressure Pump Case (306-160)

A. Inspect Screw Thread Inserts (Ref.72-09-00 Inspection/Check).

B. Inspect CB Case Mating Face.

(1) Nicks and burrs.

Accept after
repair.

(2) Scoring.

(a) Not more than 0.005 in.
(0,130 mm) in depth and
not extending across more
than half of the face width.

Accept after
repair providing
specified flatness
is restored.

(3) Flatness (Ref.Fig.309).

(a) The surface flat within
0.0003 in. (0,0080 mm)
T.I.R. per 2.000 in.
(50,8 mm) length.

Accept.

C. Inspect Gearbox Attachment Flange.

(1) Scoring.

(a) Not more than 0.005 in.
(0,130 mm) in depth and
not extending across the
face width.

Accept after
repair providing
specified flatness
is restored.

(2) Nicks and burrs.

Accept after
repair.

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(3) Flatness (Ref.Fig.309).

- (a) The surface flat within Accept.
0.0001 in. (0,0080 mm)
T.I.R. per 2.000 in.
(50,8 mm) length.

D. Inspect Bushing Sleeve (306-300).

NOTE: Carry out dimensional check in conjunction
with the gear journal (305-300) in
para.20.F.(3).

- (1) Check the bushing sleeve bore diameter
(Ref.72-65-00 Fits and Clearances) as follows:

Bush Identity	F.C.S. Reference
306-300	601-455

- (a) Within F.C.S. limits. Accept.
- (2) Scoring.
- (a) Scoring of any description. Accept if within
F.C.S. limits
after repair.
- (3) Security.
- (a) Where bushing sleeves are Reject.
not secure in the pressure
pump case housing.

E. Inspect Gear Chambers.

NOTE: Carry out dimensional checks in conjunction
with the gear diameters as detailed in
para.20.F.(1).

- (1) Check the gear chamber bore diameters (Ref.72-65-00
Fits and Clearances) as follows:

Pressure Pump Case	F.C.S. Reference
306-160	601-449/453

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(a) Within F.C.S. limits. Accept.

- (2) Check the gear chamber recess depth (Ref.72-65-00 Fits and Clearances) as follows:

F.C.S. Reference

601-448/454

(a) Within F.C.S. limits. Accept.

- (3) Scoring and wear. Accept after repair providing running clearances are within F.C.S. limits and subject to satisfactory pump rig test (Ref.72-65-00, Testing).

F. Inspect Gear Journal Locations.

NOTE: Carry out dimensional checks in conjunction with gears (306-130) detailed in para.20.F.(3).

- (1) Check the gear journal locations (Ref.72-65-00 Fits and Clearances) as follows:

F.C.S. Reference

601-466/467

(a) Within F.C.S. limits. Accept.

- (2) Wear.

(a) Smooth unstepped wear within F.C.S. limits. Accept subject to F.C.S.

- (3) Scoring. Accept after repair if running clearances are within F.C.S. limits.

G. Inspect Headless Pin (Pressure Pump Journal) Location.

NOTE: Carry out the following check in conjunction with para.22.B.

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F.C.S. Reference

601-451

(1) Check pin bore of case.

(a) Inside F.C.S. limit.

Accept.

H. Inspect Tube Flange Abutment Faces.

(1) Nicks and burrs.

(2) Scoring.

(a) Not more than 0.005 in.
(0,130 mm) deep and not
extending across the full
width of the contact face.

Accept after
repair providing
sealing capabil-
ities are not
impaired.

(3) Flatness.

(a) These surfaces flat within
0.0001 in. (0,0030 mm)
T.I.R. per 2.00 in.
(50,8 mm) length.

Accept.

J. Inspect Valve Retaining Sleeve and Adjuster
(306-40/60).

(1) Inspect Threads (Ref.72-09-00 Inspection/Check).

K. Inspect Insert Ring (306-260/280).

(1) Inspect Threads (Ref.72-09-00 Inspection/Check).

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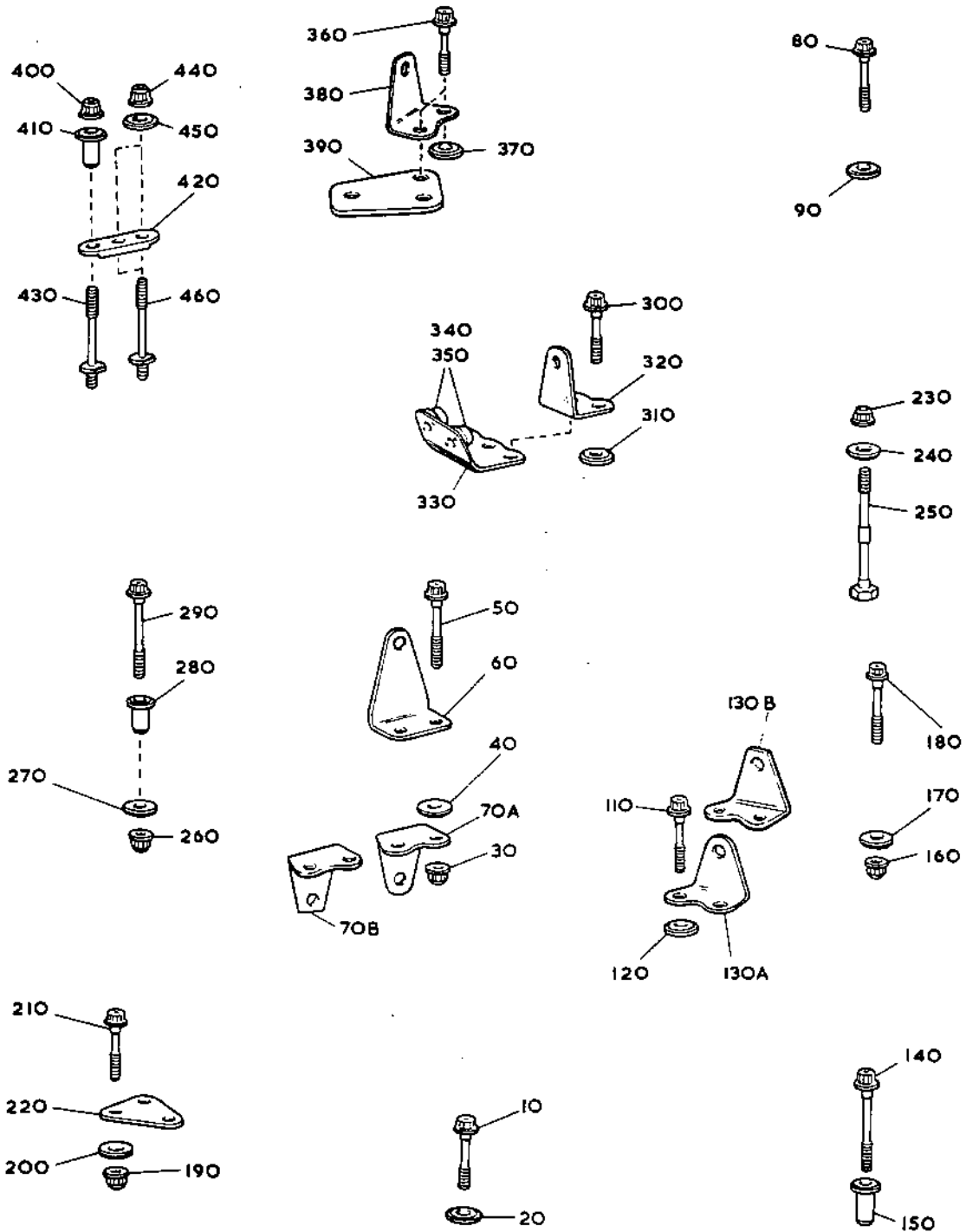


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Main Oil Pump Brackets
Figure 302

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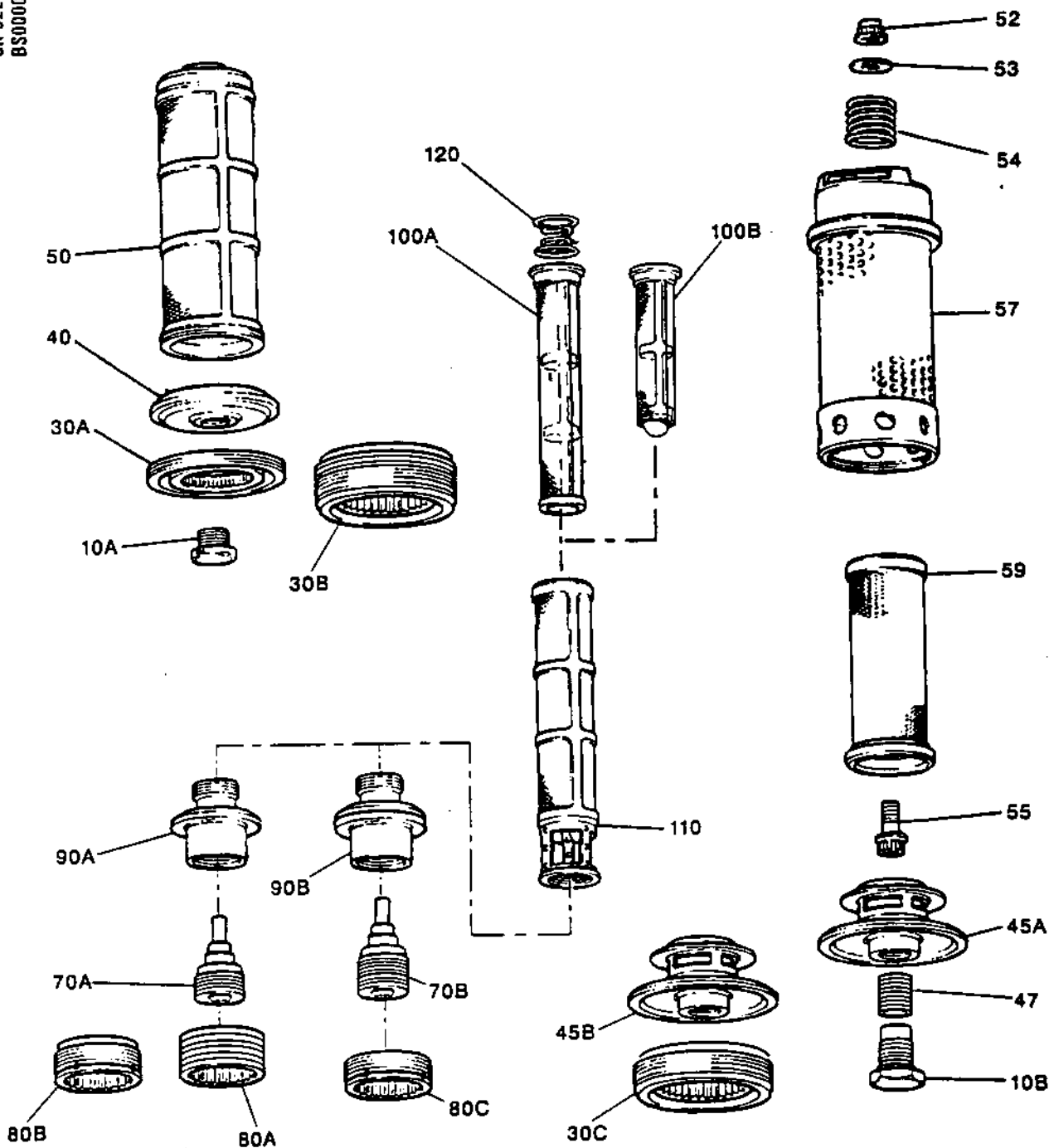
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Main Oil Pump, Strainers, Drain Valves and Magnetic Plugs
Figure 303

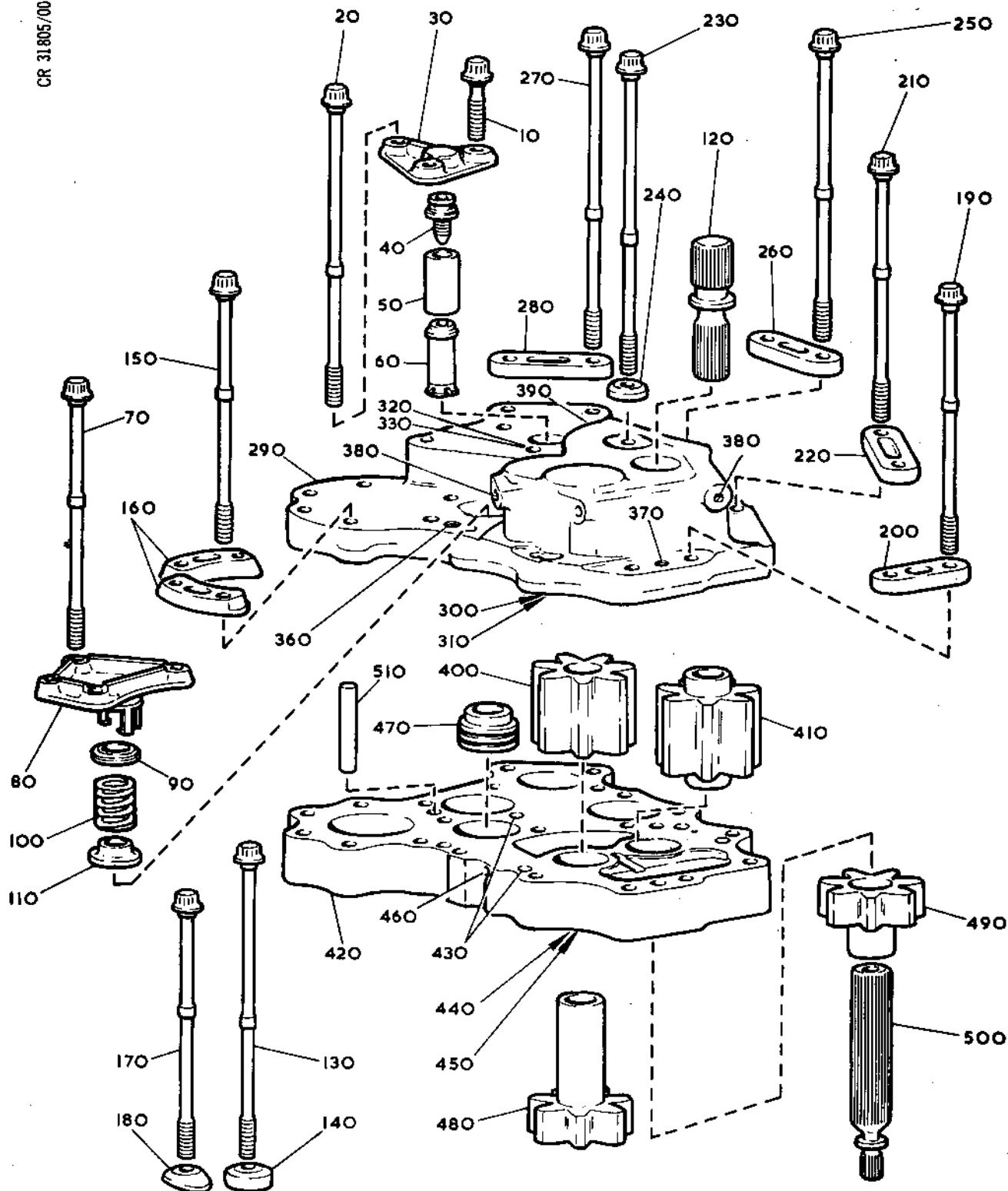
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Main Oil Pump, HP and LP Turbine Bearing Scavenge Pump
Figure 304

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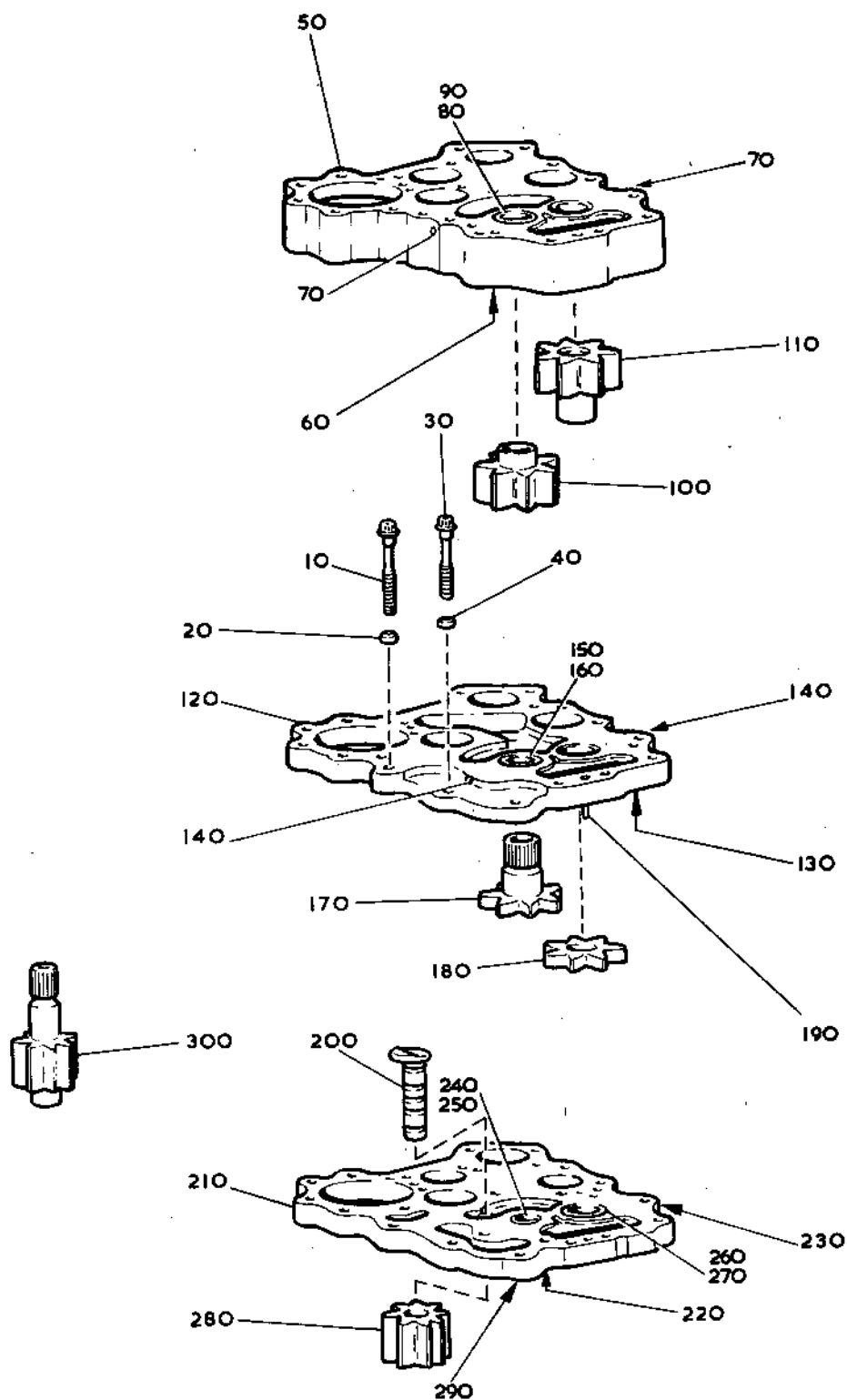


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Main Oil Pump, LP and HP Compressor Thrust Bearings
and LP Compressor Front Bearing Scavenge Pumps
Figure 305

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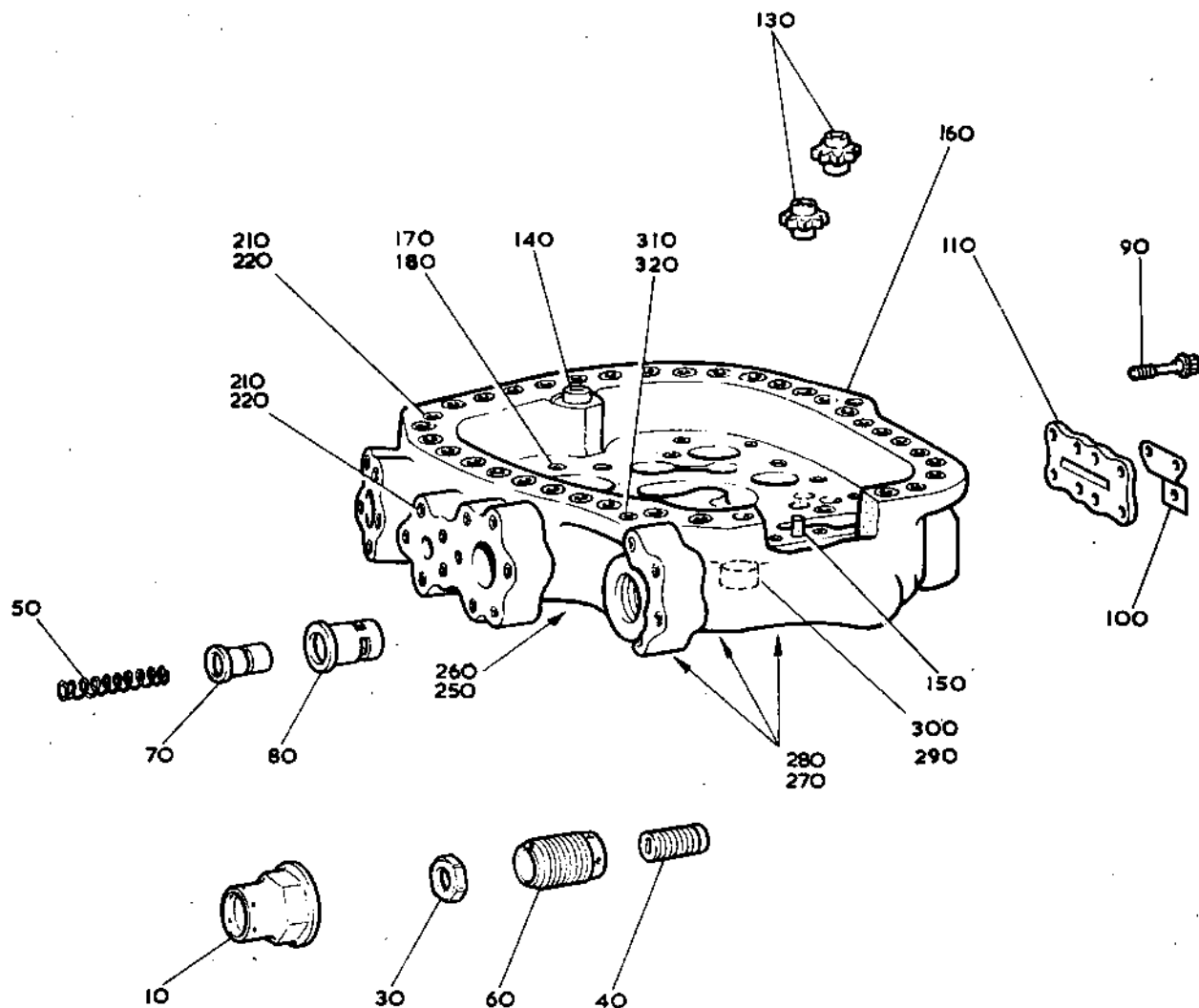
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Main Oil Pump, Pressure Pump
Figure 306

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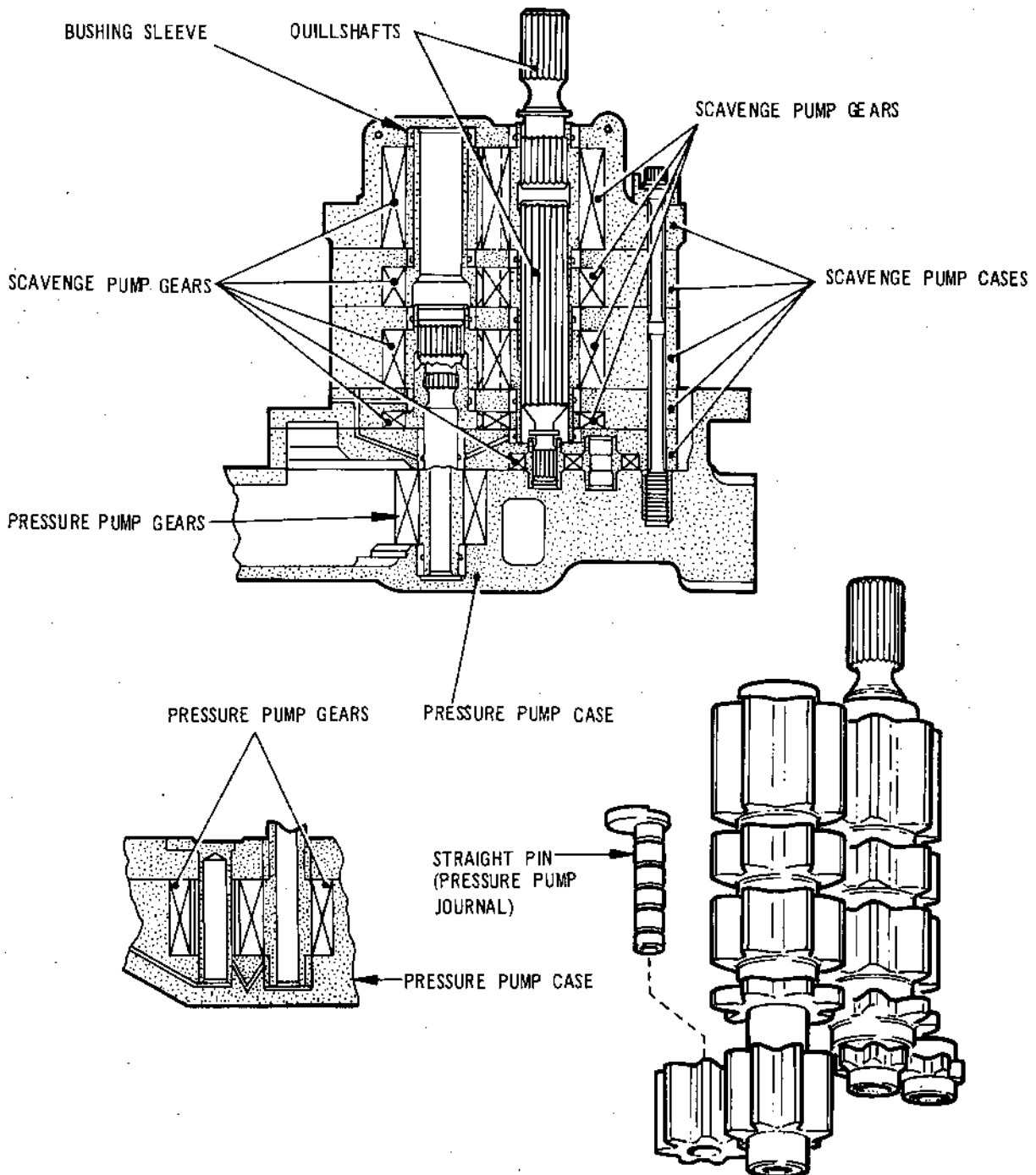


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Main Oil Pump Arrangement
Figure 307

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	441	Apr 1/77		403	Sep 1/80
	442	Apr 1/77		404	Sep 1/80
	443	Apr 1/77		405	Sep 1/80
	444	Apr 1/77		406	Sep 1/80
	445	Apr 1/77		407	Sep 1/80
	446	Apr 1/77		408	Sep 1/80
	447	Apr 1/77		409	Sep 1/80
	448	Apr 1/77		410	Sep 1/80
	449	Apr 1/77		411	Sep 1/80
	450	Apr 1/77		412	Sep 1/80
	451	Dec 1/80		413	Sep 1/80
	452	Apr 1/77		414	Sep 1/80
	453	Dec 1/80	72-09-26		
	454	Apr 1/77	Contents	1	Sep 1/80
	455	Apr 1/77		401	Sep 1/80
	456	Apr 1/77		402	Sep 1/80
	457	Apr 1/77		403	Sep 1/80
	458	Apr 1/77		404	Sep 1/80
	459	Apr 1/77		405	Sep 1/80
	460	Apr 1/77		406	Sep 1/80
72-09-22			72-09-27		
Contents	1	Apr 1/77	Contents	1	Oct 1/81
	401	Apr 1/77		401	Oct 1/81
	402	Apr 1/77	72-09-28		
	403	Apr 1/77	Contents	1	Oct 1/81
	404	Jan 4/93		401	Jun 1/92
72-09-23				402	Oct 1/81
Contents	1	Aug 1/77	72-09-29		
	401	Sep 30/94	Contents	1	Jun 1/92
	402	Aug 1/77		401	Jun 1/92
	403	Aug 1/77		402	Jun 1/92
	404	Aug 1/77		403	Jun 1/92
				404	Jun 1/92

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72-09-30			72-21-01		
Contents	1	Dec 31/99	Contents	1	Jun 1/91
	401	Jul 31/93	Repair No.1	401	Oct 1/76
	402	Jul 31/93		402	Oct 1/76
	403	Jul 31/93	Repair No.2	401	Jul 1/81
	404	Jul 31/93		402	Jul 1/81
	405	Jul 31/93		403	Jul 1/81
	406	Jul 31/93		404	Jul 1/81
	407	Jul 31/93		405	Jul 1/81
	408	Jul 31/93		406	Jul 1/81
				407	Jul 1/81
72-09-31	401	Jun 30/01		408	Jul 1/81
	402	Jul 31/93		409	Jul 1/81
	403	Jun 30/01		410	Jul 1/81
	404	Jun 30/01		411	Jul 1/81
	405	Jun 30/01		412	Jul 1/81
	406	Dec 1/97		413	Jul 1/81
	407	Dec 1/97		414	Jul 1/81
	408	Dec 31/01		415	Jul 1/81
	409	Dec 1/97		416	Jul 1/81
	410	Jun 30/01	Repair No.3	401	Jun 1/91
	411	Dec 1/97		402	Jun 1/91
	412	Jun 30/01		403	Jun 1/91
	412A	Jun 30/01		404	Jun 1/91
	412B	Jun 30/01			
	413	Jun 30/01			
	414	Jun 30/01			
	415	Jun 30/01			
	416	Jun 30/01			
	417	Jun 30/01			
	418	Dec 1/97			
	419	Dec 1/97			
	420	Dec 1/97			
	421	Jun 30/01			
	422	Jun 30/01			
	423	Dec 31/01			
	424	Dec 1/97			
	425	Dec 1/97			
	426	Dec 1/97			
	427	Dec 1/97			
	428	Dec 1/97			
	429	Dec 1/97			
	430	Dec 1/97			
	431	Dec 1/97			
	432	Dec 1/97			
	433	Dec 1/97			
	434	Dec 1/97			

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72-22-01			72-23-01		
Contents	1	Jan 4/93	Contents	1	Jun 1/76
Repair No.1	401	Jul 1/81	Repair No.1	401	Aug 1/75
	402	Oct 1/76		402	Sep 30/94
	403	Oct 1/76		403	Aug 1/75
	404	Oct 1/76		404	Aug 1/75
	405	Oct 1/76	Repair No.2	401	Aug 1/75
	406	Oct 1/76		402	Sep 30/94
Repair No.2	401	Jan 4/93		403	Aug 1/75
	402	Jan 4/93	Repair No.3	401	Jun 1/76
	403	Jan 4/93		402	Jun 1/76
	404	Jan 4/93		403	Jun 1/77
	405	Jan 4/93		404	Jun 1/76
	406	Jan 4/93		405	Jun 1/76
	407	Jan 4/93		406	Jun 1/76
	408	Jan 4/93	72-31-01		
	409	Jan 4/93	Contents	1	Apr 1/82
	410	Jan 4/93	Repair No.1	401	Jun 30/01
	411	Jan 4/93		402	Jun 30/01
	412	Jan 4/93		403	Jun 30/01
	413	Jan 4/93		404	Jun 1/78
	414	Jan 4/93		405	Oct 1/76
	415	Jan 4/93	Repair No.2	401	Nov 1/76
	416	Dec 31/00		402	Nov 1/76
	417	Jan 4/93		403	Nov 1/76
	418	Jan 4/93		404	Nov 1/76
	419	Jan 4/93		405	Nov 1/76
	420	Jan 4/93		406	Nov 1/76
	421	Jan 4/93		407	Nov 1/76
	422	Jan 4/93			
	423	Jan 4/93			
	424	Dec 31/00			
	425	Dec 31/00			
	426	Jan 4/93			
	427	Jan 4/93			
	428	Jan 4/93			
	429	Jan 4/93			
	430	Jan 4/93			
	431	Jan 4/93			
Repair No.3	401	Jan 4/93			
	402	Jan 4/93			
	403	Jan 4/93			
	404	Jan 4/93			
	405	Jan 4/93			
	406	Jan 4/93			
	407	Jan 4/93			
	408	Jan 4/93			

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72-31-01 (Cont'd.)			72-31-03 (Cont'd.)		
Repair No.3	401	Sep 1/80	Repair No.1	401	Dec 1/91
	402	Sep 1/80		402	Jun 1/80
	403	Jul 1/81		403	Aug 1/75
	404	Sep 1/80		404	Aug 1/75
	405	Sep 1/80		405	Aug 1/75
	406	Sep 1/80		406	Aug 1/75
	407	Dec 1/88		407	Aug 1/75
	408	Sep 1/80		408	Aug 1/75
	409	Dec 1/88	Repair No.2	401	Jul 1/81
	410	Sep 1/80		402	Apr 1/78
	411	Dec 1/88		403	Jan 9/76
	412	Sep 1/80		404	Jan 9/76
	413	Dec 1/88		405	Jan 9/76
	414	Sep 1/80	Repair No.3	401	Jul 1/81
	415	Sep 1/80		402	Feb 1/79
Repair No.4	401	Jun 1/88		403	Aug 1/75
	402	Dec 1/83		404	Aug 1/75
	403	Apr 1/82	Repair No.4	401	Jun 1/82
	404	Apr 1/82		402	Jun 1/82
	405	Dec 1/83		403	Jun 1/76
	406	Dec 1/83		404	Jun 1/76
	407	Apr 1/82		405	Jun 1/76
	408	Dec 1/88		406	Jun 1/82
	409	Apr 1/82	Repair No.5	401	Jul 1/81
	410	Apr 1/82		402	Apr 1/78
	411	Jun 1/89		403	Jun 1/76
	412	Sep 1/83		404	Jun 1/76
	413	Sep 1/83	Repair No.6	401	Jan 31/95
72-31-02				402	Jan 31/95
Contents	1	Jul 1/81		403	Dec 30/98
Repair No.1	401	Nov 1/76		404	Dec 30/98
	402	Nov 1/76		404A	Dec 30/98
	403	Jun 1/96		404B	Dec 30/98
	404	Nov 1/76		405	Jan 31/95
	405	Nov 1/76		406	Nov 1/76
	406	Dec 1/91		407	Nov 1/76
Repair No.2	401	Jul 1/81		408	Nov 1/76
	402	Jul 1/81		409	Nov 1/76
	403	Jul 1/81		410	Nov 1/76
	404	Jul 1/81		411	Nov 1/76
	405	Jul 1/81	Repair No.7	401	Dec 1/95
	406	Jul 1/81		402	Dec 1/95
	407	Jul 1/81		403	Jan 4/93
72-31-03				404	Apr 1/80
Contents	1	Jun 1/83		405	Apr 1/80
Contents	2	Jun 30/95		406	Dec 1/95

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72-31-03 (Cont'd.)			72-31-03 (Cont'd.)		
Repair No.7	407	Jul 1/81	Repair No.12	404	Jul 31/93
	408	Dec 1/95		405	Jul 31/93
Repair No.8	401	Aug 1/81		406	Jul 31/93
	402	Mar 1/81		407	Jul 31/93
	403	Mar 1/81	Repair No.13	401	Dec 1/88
	404	Mar 1/81		402	Jan 31/94
	405	Mar 1/81		403	Jun 1/98
	406	Mar 1/81		404	Dec 1/88
	407	Mar 1/81		405	Jan 31/94
	408	Mar 1/81		406	Dec 1/88
	409	Mar 1/81		407	Dec 1/88
	410	Mar 1/81		408	Jun 1/98
	411	Mar 1/81		409	Dec 1/88
	412	Jun 1/82		410	Jan 31/94
	413	Jun 1/82		411	Dec 1/88
	414	Jun 1/82		412	Jan 31/94
	415	Mar 1/81		413	Jan 31/94
	416	Mar 1/81		414	Jan 31/94
	417	Mar 1/81		415	Jan 31/94
	418	Mar 1/81		416	Jan 31/94
Repair No.9	401	Dec 31/01		417	Dec 1/88
	402	Dec 31/01	Repair No.14	401	Jan 31/94
	403	Dec 1/82		402	Jan 31/94
	404	Dec 31/01		403	Jan 31/94
	405	Dec 1/82		404	Jan 31/94
	406	Dec 1/82		405	Jan 31/94
	407	Dec 1/82		406	Jan 31/94
Repair No.10	401	Jan 4/93		407	Jan 31/94
	402	Dec 30/98		408	Jan 31/94
	403	Dec 1/82		409	Jan 31/94
	404	Dec 1/82		410	Jan 31/94
	405	Dec 1/82		411	Jan 31/94
Repair No.11	401	Jun 1/83		412	Jan 31/94
	402	Jun 1/83		413	Jan 31/94
	403	Dec 30/98		414	Jun 30/95
	404	Jun 1/83		415	Jan 31/94
	405	Dec 30/98		416	Jan 31/94
	406	Dec 1/90		417	Jan 31/94
	407	Jun 1/83		418	Jan 31/94
	408	Mar 1/85		419	Jan 31/94
	409	Jun 1/83		420	Jan 31/94
	410	Jun 1/83	Repair No.15	401	Jan 31/95
	411	Jun 1/83		402	Jan 31/95
Repair No.12	401	Jul 31/93		403	Jan 31/95
	402	Jul 31/93		404	Jan 31/95
	403	Jul 31/93		405	Jan 31/95

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72-31-03 (Cont'd.)			72-31-04 (Cont'd.)		
Repair No.15	406	Jan 31/95	Repair No.4	401	Dec 1/91
	407	Jan 31/95		402	Dec 1/91
Repair No.16	401	Jun 30/95		403	Dec 1/91
	402	Jun 30/95		404	Jan 31/94
	403	Dec 31/00		405	Jan 31/94
	404	Dec 31/00		406	Jul 31/93
	405	Dec 31/00		407	Dec 1/91
	406	Jun 30/95		408	Dec 1/91
	407	Jun 30/95		409	Dec 1/91
	408	Jun 30/95		410	Dec 1/91
	409	Jun 30/95	Repair No.5	401	Dec 1/97
72-31-04				402	Dec 1/97
Contents	1	Dec 1/97		403	Dec 1/97
Repair No.1	401	Dec 1/91	Repair No.6	401	Dec 1/97
	402	Jun 1/82		402	Dec 1/97
	403	Aug 1/75		403	Dec 1/97
	404	Aug 1/75		404	Dec 1/97
	405	Aug 1/75		405	Dec 1/97
	406	Jun 1/82			
Repair No.2	CANCELLED				
Repair No.3	401	Jun 1/99			
	402	Jun 1/99			
	403	Dec 1/89			
	404	Jan 31/94			
	405	Jun 1/99			
	406	Jun 1/99			
	407	Jun 1/99			
	408	Jun 1/99			
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	410	Jun 1/99			

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72-32-00			72-32-00		
Contents	1	Sep 30/94	(Cont'd.)		
Contents	2	Jun 1/99	Repair No.10	401	Oct 1/76
Contents	3	Jul 31/93		402	Oct 1/76
Repair No.1	401	Sep 30/94		403	Oct 1/76
Repair No.2	401	Sep 30/94		404	Oct 1/76
Repair No.3	401	Jan 31/95		405	Oct 1/76
	402	Sep 30/94		406	Oct 1/76
	403	Aug 1/75		407	Oct 1/76
	404	Aug 1/75	Repair No.11	401	Sep 30/94
Repair No.4	401	Sep 30/94		402	Feb 1/77
Repair No.5	401	Sep 30/94		403	Feb 1/77
Repair No.6	401	Sep 30/94		404	Feb 1/77
Repair No.8	401	Jan 31/95	Repair No.12	401	Jan 4/93
	402	Jun 1/96		402	Feb 1/77
	403	Jun 1/92		403	Jun 1/92
	404	Jun 1/92		404	Feb 1/77
	405	Jan 31/95	Repair No.13	401	Jun 30/01
	406	Jun 1/76		402	Jun 1/99
	407	Jun 1/76		403	Jun 1/99
	408	Dec 1/87		404	Jun 1/99
	409	Jul 1/76		405	Jun 1/99
	410	Jun 1/76		406	Jun 1/99
	411	Jun 1/87		407	Jun 1/99
Repair No.9	401	Jan 31/95		408	Jun 1/99
	402	Jun 1/96		409	Jun 1/99
	403	Jun 1/76		410	Jun 1/99
	404	Jun 1/76		411	Jun 1/99
	405	Jan 31/95	Repair No.14	401	Oct 1/76
	406	Jun 1/76		402	Oct 1/76
	407	Jun 1/76		403	Oct 1/76
	408	Jun 1/76	Repair No.15	401	Oct 1/76
	409	Jun 1/76		402	Oct 1/76
	410	Jun 1/76		403	Oct 1/76
			Repair No.16	401	Oct 1/79
				402	Oct 1/79
				403	Oct 1/79
				404	Oct 1/79
				405	Oct 1/79
				406	Oct 1/79
				407	Oct 1/79

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72-32-00 (Cont'd.)			72-32-00 (Cont'd.)		
Repair No.17	401	Jun 30/95	Repair No.23	401	Jun 1/92
	402	Apr 1/82		402	Jun 1/92
	403	Jan 4/93		403	Jun 1/92
Repair No.18	401	Mar 1/84		404	Jun 1/92
	402	Jun 1/83		405	Jun 1/92
	403	Jun 1/90		406	Jun 1/92
	404	Jun 1/83		407	Jun 1/92
Repair No.19	401	Jun 1/88		408	Jun 1/92
	402	Jun 1/88	Repair No.24	401	Jun 1/92
	403	Jun 1/88		402	Jun 1/92
	404	Jun 1/88		403	Jun 1/92
	405	Jun 1/92		404	Jun 1/92
Repair No.20	401	Jun 1/92		405	Jun 1/92
	402	Jun 1/92		406	Jun 1/92
	403	Jun 1/92			
	404	Jun 1/92			
	405	Jun 1/92			
	406	Jun 1/92			
	407	Jun 1/92			
	408	Jun 1/92			
Repair No.21	401	Jun 1/92			
	402	Jun 1/92			
	403	Jun 1/92			
	404	Jun 1/92			
	405	Jun 1/92			
	406	Jun 1/92			
	407	Jun 1/92			
	408	Jun 1/92			
Repair No.22	401	Jun 1/92			
	402	Jun 1/92			
	403	Jun 1/92			
	404	Jun 1/92			
	405	Jun 1/92			
	406	Jun 1/92			
	407	Jun 1/92			
	408	Jun 1/92			

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			Repair No.4	401	Jun 1/91
				402	Jun 1/91
Repair No.25	401	Jul 31/93		403	Jun 1/91
	402	Jul 31/93		404	Jun 1/91
	403	Jul 31/93		405	Jun 1/91
Repair No.26	401	Jan 4/93		406	Jun 1/91
	402	Jan 4/93		407	Jun 1/91
	403	Jan 4/93		408	Jun 1/91
	404	Jan 4/93		409	Jun 1/91
	405	Jan 4/93	Repair No.5	401	Jul 31/93
Repair No.27	401	Jun 1/99		402	Jul 31/93
	402	Jan 4/93		403	Jul 31/93
	403	Jan 4/93		404	Jul 31/93
	404	Jan 4/93		405	Jul 31/93
	405	Jan 4/93		406	Jul 31/93
	406	Jan 4/93		407	Jul 31/93
	407	Jan 4/93		408	Jul 31/93
	408	Jan 4/93		409	Jul 31/93
Repair No.28	401	Jul 31/93	Repair No.6	401	Sep 30/94
	402	Jul 31/93		402	Sep 30/94
72-33-01				403	Sep 30/94
Contents	1	Jun 30/95		404	Sep 30/94
Repair No.1	401	Jul 1/76	Repair No.7	401	Jun 30/95
	402	Oct 1/77		402	Jun 30/95
	403	Oct 1/77		403	Jun 30/95
	404	Jul 1/76		404	Jun 30/95
Repair No.2	401	Nov 1/76		405	Jun 30/95
	402	Nov 1/76		406	Jun 30/95
	403	Aug 1/77		407	Jun 30/95
	404	Nov 1/76			
	405	Nov 1/76			
	406	Nov 1/76			
	407	Nov 1/76			
	408	Nov 1/76			
Repair No.3	401	Dec 1/89			
	402	Jun 1/92			
	403	Jun 1/83			
	404	Jun 1/83			
	405	Jun 1/83			
	406	Dec 1/89			
	407	Jun 1/83			
	408	Dec 1/89			
	409	Jun 1/83			

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Contents	1	Jun 1/92	(Cont'd.)		
Contents	2	Dec 1/88	Repair No.6	408	Oct 1/79
Contents	3	Dec 31/99		409	Oct 1/79
Contents	4	Jan 4/93		410	Oct 1/79
Contents	5	Dec 1/97	Repair No.7	401	Sep 1/78
Contents	6	Dec 1/97		402	Sep 1/78
Repair No.1	401	Jan 4/93		403	Sep 1/78
	402	Jun 1/82		404	Sep 1/78
	403	Aug 1/75		405	Sep 1/78
	404	Aug 1/75		406	Sep 1/78
	405	Aug 1/75		407	Sep 1/78
	406	Aug 1/75		408	Sep 1/78
	407	Aug 1/75		409	Sep 1/78
	408	Aug 1/75		410	Sep 1/78
	409	Jun 1/82	Repair No.8	401	Nov 1/78
Repair No.2	401	Jun 1/82		402	Nov 1/78
	402	Jun 1/82		403	Nov 1/78
	403	Dec 1/79		404	Nov 1/78
	404	Dec 1/79		405	Nov 1/78
	405	Jun 1/82		406	Nov 1/78
	406	Feb 1/80		407	Nov 1/78
	407	Aug 1/75		408	Nov 1/78
	408	Jun 1/82		409	Nov 1/78
Repair No.3	401	Jun 1/92		410	Nov 1/78
	402	Apr 1/78		411	Nov 1/78
	403	Aug 1/75	Repair No.9	401	Sep 1/78
	404	Aug 1/75		402	Sep 1/78
	405	Aug 1/75		403	Sep 1/78
Repair No.4	401	Jul 1/81		404	Sep 1/78
	402	Apr 1/78		405	Sep 1/78
	403	Jun 1/76		406	Sep 1/78
	404	Jun 1/76		407	Sep 1/78
Repair No.5	401	Jun 1/76		408	Sep 1/78
	402	Aug 1/80		409	Sep 1/78
	403	Jun 1/76		410	Sep 1/78
	404	Jun 1/76		411	Sep 1/78
Repair No.6	401	Jun 30/97	Repair No.10	401	Dec 1/91
	402	Oct 1/79		402	Feb 1/81
	403	Dec 30/98		403	Jul 1/79
	404	Dec 30/98		404	Jul 1/79
	404A	Dec 30/98	Repair No.11	401	Jun 30/01
	404B	Dec 30/98		402	Jun 30/01
	405	Oct 1/79		403	Jul 1/79
	406	Aug 1/82		404	Jul 1/79
	407	Oct 1/79			

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72-33-02			72-33-02		
(Cont'd.)			(Cont'd.)		
Repair No.12	CANCELLED		Repair No.18	401	Dec 1/91
Repair No.13	401	Jan 2/80		402	Apr 1/83
	402	Jan 2/80		403	Apr 1/83
	403	Jan 2/80		404	Jul 31/93
	404	Jan 2/80		405	Apr 1/83
	405	Jan 2/80	Repair No.19	401	Sep 1/83
	406	Jan 2/80		402	Sep 1/83
	407	Jan 2/80		403	Sep 1/83
	408	Jul 31/93		404	Sep 1/83
	409	Jan 2/80		405	Sep 1/83
	410	Jan 2/80	Repair No.20	401	Sep 1/83
	411	Jan 2/80		402	Dec 1/91
	412	Jan 2/80		403	Sep 1/83
	413	Feb 1/83		404	Sep 1/83
	414	Jan 2/80		405	Sep 1/83
	415	Jun 1/96		406	Sep 1/83
	416	Jan 2/80		407	Sep 1/83
	417	Jan 2/80		408	Sep 1/83
Repair No.14	401	Jan 4/93		409	Jun 30/95
	402	Apr 1/80		410	Jun 1/96
	403	Jan 4/93	Repair No.21	401	Sep 1/83
	404	Apr 1/80		402	Sep 1/83
	405	Apr 1/80		403	Sep 1/83
	406	Jan 4/93		404	Sep 1/83
Repair No.15	401	May 1/80		405	Sep 1/83
	402	May 1/80		406	Jun 1/90
	403	May 1/80		407	Sep 1/83
	404	May 1/80		408	Sep 1/83
	405	May 1/80		409	Sep 1/83
	406	May 1/80	Repair No.22	401	Jun 30/95
	407	May 1/80		402	Jun 30/95
Repair No.16	401	Jun 1/89		403	Jun 30/95
	402	May 1/80		404	Jun 30/95
	403	May 1/80		405	Jul 31/93
	404	May 1/80	Repair No.23	401	Dec 30/98
	405	Jun 1/89		402	Dec 30/98
	406	May 1/80		403	Dec 30/98
	407	May 1/80		404	Dec 1/88
Repair No.17	401	Dec 1/95		405	Dec 30/98
	402	Dec 1/95			
	403	Dec 1/95			
	404	Sep 1/83			
	405	Dec 1/95			
	406	Dec 30/98			
	407	Dec 1/95			

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72-33-02			72-33-02		
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Repair No.23	406	Dec 30/98	Repair No.26	401	Jun 1/90
	407	Dec 1/88		402	Jun 1/90
	408	Dec 1/88		403	Jun 1/90
	409	Dec 30/98		404	Jun 1/90
	410	Jan 31/94	Repair No.27	401	Dec 1/97
	411	Dec 1/88		402	Dec 1/97
	412	Dec 30/98		403	Jun 1/90
	413	Dec 30/98		404	Jun 1/90
	414	Jan 31/94		405	Jan 31/94
	415	Jan 31/94		406	Jun 1/90
	416	Jan 31/94		407	Jan 31/94
Repair No.24	401	Jun 1/96		408	Jun 1/90
	402	Dec 31/00		409	Jun 1/90
	403	Dec 31/00		410	Jan 31/94
	404	Dec 31/00		411	Jan 31/94
	405	Dec 31/00		412	Jan 31/94
	406	Dec 31/00		413	Jun 1/90
	406A	Dec 31/00		414	Jun 1/90
	406B	Dec 31/00		415	Jun 1/90
	407	Jun 1/96		416	Jan 31/94
	408	Jun 1/96		417	Jan 31/94
	409	Jun 1/96		418	Jan 31/94
	410	Jun 1/96			
	411	Jun 1/96			
	412	Jun 1/96			
	413	Jun 1/96			
	414	Dec 31/00			
Repair No.25	401	Jun 1/96			
	402	Dec 31/00			
	403	Dec 31/00			
	404	Dec 31/00			
	405	Dec 31/00			
	406	Dec 31/00			
	406A	Dec 31/00			
	406B	Dec 31/00			
	407	Jun 1/96			
	408	Jun 1/96			
	409	Jun 1/96			
	410	Jun 1/96			
	411	Jun 1/96			
	412	Jun 1/96			
	413	Jun 1/96			
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Repair No.28	401	Jan 31/94	Repair No.34	401	Dec 1/97
	402	Jan 31/94		402	Jul 31/93
	403	Jan 31/94		403	Apr 1/91
	404	Jan 31/94		404	Dec 1/96
	405	Jan 31/94		405	Apr 1/91
Repair No.29	401	Dec 1/90		406	Apr 1/91
	402	Dec 1/90		407	Apr 1/91
	403	Dec 1/90		408	Apr 1/91
	404	Dec 1/90		409	Apr 1/91
Repair No.30	401	Dec 1/90		410	Apr 1/91
	402	Dec 1/90	Repair No.35	401	Apr 1/91
	403	Dec 1/90		402	Apr 1/91
	404	Dec 1/90		403	Apr 1/91
	405	Dec 1/90		404	Apr 1/91
Repair No.31	401	Jan 4/93	Repair No.36	401	Jan 4/93
	402	Jan 4/93		402	Jan 4/93
	403	Jan 4/93		403	Jan 4/93
	404	Jan 4/93		404	Jan 4/93
	405	Jan 4/93	Repair No.37	401	Jan 31/95
	406	Jan 4/93		402	Jan 31/95
Repair No.32	401	Dec 1/95		403	Jan 31/95
	402	Dec 1/95		404	Jan 31/95
	403	Dec 1/95		405	Jan 31/95
	404	Dec 1/95		406	Jan 31/95
Repair No.33	401	Jun 1/96		407	Jan 31/95
	402	Jun 1/96		408	Jan 31/95
	403	Jun 1/96	Repair No.38	401	Dec 1/91
	404	Jun 1/96		402	Dec 1/91
	405	Jun 1/96		403	Dec 1/91
	406	Jun 1/96		404	Dec 1/91
	407	Jun 1/96		405	Dec 1/91
	408	Jun 1/96		406	Dec 1/91
	409	Jun 1/96		407	Dec 1/91
	410	Jun 1/96		408	Dec 1/91
	411	Jun 1/96	Repair No.39	401	Dec 1/91
	412	Jun 1/96		402	Dec 1/91
	413	Jun 1/96		403	Dec 1/91
	414	Jun 1/96		404	Dec 1/91
	415	Jun 1/96		405	Dec 1/91
	416	Jun 1/96		406	Dec 1/91
	417	Jun 1/96		407	Dec 1/91
	418	Jun 1/96			
	408	Jun 1/96			

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72-33-02			72-33-02		
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Repair No.40	401	Dec 1/91	Repair No.48	401	Dec 1/95
	402	Dec 1/91		402	Dec 1/95
	403	Dec 1/91		403	Dec 1/95
	404	Dec 1/91		404	Dec 1/95
	405	Dec 1/91	Repair No.49	401	Jun 1/96
Repair No.41	401	Jun 1/92		402	Jun 1/96
	402	Jun 1/92		403	Jun 1/96
	403	Jun 1/92		404	Jun 1/96
	404	Jun 1/92		405	Jun 1/96
	405	Jun 1/92		406	Jun 1/96
Repair No.42	401	Jun 1/92		407	Jun 1/96
	402	Jun 1/92		408	Jun 1/96
	403	Jun 1/92		409	Jun 1/96
	404	Jun 1/92		410	Jun 1/96
	405	Jun 1/92		411	Jun 1/96
Repair No.43	401	Dec 31/00		412	Jun 1/96
	402	Dec 31/00		413	Jun 1/96
	403	Jun 30/01		414	Jun 1/96
	404	Jun 30/01		415	Jun 1/96
	405	Jun 30/01		416	Jun 1/96
	406	Jun 30/01		417	Jun 1/96
	407	Jun 30/01	Repair No.50	401	Jul 31/93
	408	Dec 31/00		402	Jul 31/93
	409	Jun 30/01		403	Jul 31/93
	410	Dec 31/00		404	Dec 31/99
	411	Dec 31/00		405	Dec 30/98
	412	Dec 31/00		406	Jul 31/93
	413	Jun 30/01		407	Jul 31/93
	414	Dec 31/00		408	Jul 31/93
Repair No.44	401	Jan 4/93		409	Jul 31/93
	402	Jan 4/93		410	Jul 31/93
	403	Jan 4/93		411	Jul 31/93
	404	Jan 4/93	Repair No.51	401	Jan 31/94
	405	Jan 4/93		402	Jan 31/94
Repair No.46	401	Dec 1/95		403	Jan 31/94
	402	Jun 1/92		404	Jan 31/94
	403	Jun 1/92		405	Jan 31/94
	404	Jun 1/92		406	Jan 31/94
	405	Jun 1/92		407	Jan 31/94
	406	Jun 1/92		408	Jan 31/94
Repair No.47	401	Jun 1/92		409	Jan 31/94
	402	Jun 30/95			
	403	Jun 1/92			
	404	Jun 1/92			
	405	Jun 1/92			

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Repair No.51	410	Jan 31/94	Repair No.2	401	Dec 1/91
	411	Jan 31/94		402	Jun 1/96
	412	Jan 31/94		403	Feb 1/81
	413	Jan 31/94		404	Feb 1/81
Repair No.52	401	Sep 30/94		405	Feb 1/81
	402	Sep 30/94		406	Feb 1/81
	403	Sep 30/94		407	Feb 1/81
	404	Sep 30/94		408	Feb 1/81
Repair No.53	401	Sep 30/94		409	Feb 1/81
	402	Sep 30/94		410	Feb 1/81
	403	Sep 30/94		411	Feb 1/81
	404	Sep 30/94		412	Feb 1/81
Repair No.54	401	Jun 1/96	Repair No.3	401	Feb 1/83
	402	Jun 1/96		402	Feb 1/83
	403	Jun 1/96		403	Feb 1/83
	404	Jun 1/96		404	Feb 1/83
	405	Jun 1/96		405	Feb 1/83
	406	Jun 1/96		406	Feb 1/83
	407	Sep 30/94		407	Feb 1/83
	408	Sep 30/94	Repair No.4	401	Dec 1/87
	409	Sep 30/94		402	Dec 1/87
	410	Sep 30/94		403	Dec 1/87
Repair No.55	401	Jan 31/95		404	Dec 1/87
	402	Jan 31/95		405	Dec 1/87
	403	Jan 31/95	Repair No.5	401	Jan 31/95
	410	Sep 30/94		402	Jan 31/95
Repair No.56	401	Dec 1/97		403	Jan 31/95
	402	Dec 1/97		404	Jan 31/95
	403	Dec 1/97		405	Jan 31/95
	404	Dec 1/97		406	Jan 31/95
Repair No.57	401	Dec 1/97		407	Jan 31/95
	402	Dec 1/97	Repair No.6	401	Jan 4/93
	403	Dec 1/97		402	Jan 4/93
	404	Dec 1/97		403	Jan 4/93
	405	Dec 1/97		404	Jan 4/93
Repair No.58	401	Dec 1/97		405	Jan 4/93
	402	Dec 1/97		406	Jan 4/93
	403	Dec 1/97		407	Jan 4/92
	404	Dec 1/97		408	Jan 4/93
				409	Jan 4/93
72-34-00			72-41-01		
Contents	1	Jan 4/93	Contents	1	Dec 1/97
Repair No.1	401	Jan 9/76	Contents	2	Jun 1/98
	402	Jan 9/76	Contents	3	Jun 30/00
	403	Aug 1/75	Repair No.1	CANCELLED	
	404	Aug 1/75	Repair No.2	CANCELLED	

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Repair No.3	CANCELLED		Repair No.7	430	Jun 1/84
Repair	CANCELLED			431	Mar 1/81
No.4-1				432	Mar 1/81
Repair	CANCELLED			433	Dec 31/99
No.4-5				434	Jun 1/84
Repair	CANCELLED			435	Jun 1/85
No.4-15				436	Dec 1/86
Repair	CANCELLED			437	Jun 1/84
No.4-18				438	Sep 1/83
Repair	CANCELLED			439	Mar 1/81
No.4-38				440	Sep 1/83
Repair No.5	CANCELLED			441	Sep 1/83
Repair No.6	CANCELLED			442	Sep 1/83
Repair No.7	401	Jun 1/85	Repair No.8	401	Jun 1/98
	402	Jun 30/00		402	Jun 1/98
	403	Jun 1/85		403	Dec 31/01
	404	Jun 1/85		404	Jun 1/98
	405	Dec 1/86		405	Jun 1/98
	406	Mar 1/81		406	Jun 1/98
	407	Mar 1/81		407	Jun 1/98
	408	Mar 1/81		408	Jun 1/98
	409	Dec 1/82		409	Jun 1/98
	410	Mar 1/81	Repair No.9	401	Jun 1/85
	411	Jun 1/96		402	Dec 1/82
	412	Mar 1/81		403	Jun 30/00
	413	Jun 1/96		404	May 1/81
	414	Jun 1/84		404A	Jun 1/88
	415	Mar 1/81		404B	Jun 1/88
	416	Jun 1/85		405	Dec 1/86
	417	Jun 1/84		406	May 1/81
	418	Mar 1/81		407	Jun 1/88
	419	Dec 31/99		408	Jun 1/88
	420	Mar 1/81		409	Jun 1/88
	420A	Jun 1/83		410	May 1/81
	420B	Jun 1/83		411	May 1/81
	421	Dec 1/82		412	May 1/81
	422	Mar 1/81		413	May 1/81
	423	Dec 1/86		414	Dec 1/86
	424	Jun 1/96		415	Jun 1/88
	424A	Dec 1/86		416	May 1/81
	424B	Dec 1/86		416A	Dec 1/86
	425	Jan 4/93		416B	Dec 1/86
	426	Mar 1/81		417	Dec 1/86
	427	Sep 1/83		418	May 1/81
	428	Mar 1/81		419	Dec 1/86
	429	Jun 1/84		420	Jun 1/85

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Repair No.9	421	Jun 1/88	Repair No.10	427	Dec 31/99
	422	Jun 1/88		428	May 1/81
	423	Aug 1/81		429	Jun 1/88
	424	Sep 1/83		430	Jun 1/88
	425	Dec 31/99		431	Dec 1/82
	426	May 1/81		432	Dec 1/82
	427	Dec 31/99	Repair No.11	401	Jun 1/85
	428	May 1/81		402	Aug 1/81
	429	Jun 1/88		403	Jun 1/85
	430	Jun 1/88		404	Jun 1/85
	431	Dec 1/86		404A	Dec 1/86
	432	Jun 1/85		404B	Jun 30/00
Repair No.10	401	Jun 1/96		405	Jun 1/87
	402	Dec 1/82		406	Dec 1/86
	403	Jun 30/00		407	Mar 1/84
	404	Jun 1/84		408	Mar 1/84
	404A	Jun 1/88		409	Jun 1/88
	404B	Jun 1/88		410	Jun 1/88
	405	Dec 1/86		410A	Jun 1/88
	406	Jun 1/88		410B	Jun 1/88
	407	Jun 1/88		411	Jun 1/96
	408	Jun 1/88		412	Mar 1/84
	409	Jun 1/88		413	Mar 1/84
	410	May 1/81		414	Mar 1/84
	411	May 1/81		415	Jun 1/85
	412	May 1/81		416	Jun 1/96
	413	May 1/81		416A	Dec 1/86
	414	Sep 1/83		416B	Dec 1/86
	414A	Jun 1/91		417	Jun 1/88
	414B	Sep 1/83		418	Jun 1/88
	414C	Sep 1/83		419	Jun 1/88
	414D	Sep 1/83		420	Dec 31/99
	415	May 1/81		421	Dec 1/86
	416	May 1/81		422	Mar 1/84
	417	May 1/81		423	Jun 1/92
	418	Jun 1/88		424	Mar 1/84
	419	Jun 1/85		425	Mar 1/84
	420	Jun 1/85		426	Jun 1/88
	421	Jun 1/88		427	Jun 1/96
	422	May 1/81		428	Jun 1/85
	423	Jun 1/88		429	Dec 31/99
	424	Sep 1/83		430	Mar 1/84
	424A	Dec 1/86		431	Mar 1/84
	424B	Dec 1/86		432	Mar 1/84
	425	Dec 1/86		433	Jan 4/93
	426	May 1/81		434	Mar 1/84

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Repair No.11	435	Mar 1/84	Repair No.16	404	Dec 1/83
	436	Mar 1/84		405	Dec 31/99
	437	Mar 1/84		406	Dec 1/83
	438	Jun 1/85		407	Dec 1/83
	439	Jun 1/96		408	Jan 31/94
	440	Mar 1/84	Repair No.17	401	Jun 30/00
	441	Mar 1/84		402	Dec 1/84
	442	Mar 1/84		403	Dec 1/84
	443	Dec 31/99		404	Dec 1/84
	444	Mar 1/84		405	Dec 31/99
	445	Mar 1/84		406	Dec 1/84
	446	Mar 1/85		407	Dec 1/84
	447	Jun 1/85		408	Dec 31/99
	448	Jun 1/88		409	Dec 1/84
	449	Mar 1/84	Repair No.18	401	Dec 1/84
	450	Mar 1/84		402	Dec 31/00
	451	Mar 1/84		403	Dec 1/84
	452	Mar 1/84	Repair No.19	401	Jun 30/01
	453	Mar 1/84		402	Jun 30/01
Repair No.12	CANCELLED			403	Jun 30/97
Repair No.13	CANCELLED			404	Jun 30/97
Repair No.14	401	Jun 30/97		405	Jun 30/97
	402	Jun 30/97	Repair No.20	401	Jul 31/93
	403	Jun 30/97		402	Jun 30/00
	404	Jun 30/97		403	Jun 1/88
	405	Jun 30/97		404	Jun 1/88
	406	Jan 31/95		405	Jun 1/88
	407	Jan 31/95		406	Jun 1/88
	408	Jan 31/95		407	Jun 1/88
	409	Jun 30/97		408	Jun 1/88
	410	Jan 31/95		409	Jun 1/88
	411	Jun 30/97		410	Jun 1/88
Repair No.15	401	Jun 30/97		411	Jun 1/88
	402	Jun 30/00		412	Jun 1/88
	403	Dec 1/83		413	Jun 1/88
	404	Jun 1/91		414	Jun 1/88
	405	Dec 1/83		415	Jun 1/88
	406	Dec 1/83		416	Jun 1/88
	407	Dec 1/83		417	Jun 1/88
	408	Dec 1/83		418	Jun 1/88
	409	Jun 30/00		419	Jun 1/88
	410	Jun 30/00		420	Jun 1/88
	411	Jun 30/00		421	Jun 1/88
Repair No.16	401	Jun 30/00		422	Jun 1/88
	402	Dec 1/83		423	Jun 1/88
	403	Dec 1/83		424	Jun 1/88

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Repair No.20	425	Dec 31/99	Repair No.26	404	Dec 1/96
	426	Jun 1/88		405	Dec 1/96
	427	Jun 1/88		406	Dec 1/96
	428	Jun 1/88		407	Dec 1/96
	429	Jun 1/88		408	Dec 1/96
	430	Jun 1/88		409	Dec 1/96
	431	Jun 1/88		410	Dec 1/96
	432	Jun 1/88		411	Dec 1/96
Repair No.21	401	Jun 30/97		412	Dec 1/96
	402	Dec 1/88		413	Dec 1/96
	403	Dec 1/88		414	Dec 1/96
	404	Dec 1/88		415	Dec 1/96
	405	Dec 1/88		416	Dec 1/96
	406	Dec 1/88		417	Dec 1/96
	407	Dec 1/88		418	Jun 30/00
Repair No.22	401	Jun 1/90		419	Dec 1/96
	402	Jun 1/90		420	Dec 1/96
	403	Jun 1/90		421	Dec 1/96
Repair No.23	401	Jun 30/00		422	Dec 1/96
	402	Jun 30/97		423	Dec 1/96
	403	Jun 30/97		424	Dec 1/96
	404	Jun 30/97		425	Dec 1/96
	405	Jul 31/93		426	Dec 1/96
	406	Jul 31/93		427	Dec 1/96
Repair No.24	TO BE ISSUED		Repair No.27	401	Dec 31/99
Repair No.25	401	Jun 30/00		402	Dec 31/99
	402	Sep 30/94		403	Jun 30/00
	403	Sep 30/94		404	Dec 31/99
	404	Sep 30/94		405	Jun 30/97
	405	Dec 31/99		406	Jun 30/97
	406	Sep 30/94		407	Jun 30/97
	407	Sep 30/94		408	Dec 31/99
	408	Sep 30/94		409	Jun 30/97
	409	Dec 31/99		410	Jun 30/97
	410	Dec 31/99		411	Jun 30/97
	411	Sep 30/94		412	Dec 31/99
	412	Sep 30/94		413	Jun 1/88
	413	Sep 30/94		414	Jun 30/97
	414	Sep 30/94		415	Dec 31/99
	415	Sep 30/94		416	Jun 30/97
	416	Sep 30/94		417	Dec 31/99
	417	Sep 30/94		418	Jun 30/97
	418	Sep 30/94		419	Jun 30/97
Repair No.26	401	Dec 1/960		420	Jun 30/97
	402	Jun 30/00		421	Dec 31/99
	403	Dec 1/96		422	Dec 31/99

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72-42-01			72-41-01		
(Cont'd.)			(Cont'd.)		
Repair No.27	423	Jun 30/97	Repair No.27	469	Jun 30/97
	424	Dec 31/99		470	Jun 30/97
	425	Jun 30/97		471	Jun 30/97
	426	Dec 31/99		472	Jun 30/97
	427	Dec 31/99		473	Jun 30/97
	428	Jun 30/97		474	Jun 30/97
	429	Dec 31/99		475	Dec 31/99
	430	Dec 31/99		476	Dec 31/99
	431	Jun 30/97		477	Dec 31/99
	432	Jun 30/97		478	Jun 30/97
	433	Jun 30/97		479	Jun 30/97
	434	Dec 31/99		480	Jun 30/97
	435	Dec 31/99		481	Dec 31/99
	436	Jun 30/97		482	Dec 31/99
	437	Jun 30/97	Repair No.28	401	Jun 1/98
	438	Jun 30/97		402	Jun 1/98
	439	Jun 30/97		403	Jun 1/98
	440	Dec 31/99		404	Jun 1/98
	441	Jun 30/97		405	Jun 1/98
	442	Jun 30/97		406	Jun 1/98
	443	Jun 30/97		407	Jun 1/98
	444	Dec 31/99		408	Jun 1/98
	445	Dec 31/99		409	Jun 1/98
	446	Dec 31/99		410	Jun 1/98
	447	Jun 30/97		411	Jun 1/98
	448	Dec 31/99		412	Jun 1/98
	449	Dec 31/99		413	Jun 1/98
	450	Dec 31/99		414	Jun 1/98
	451	Dec 31/99		415	Jun 1/98
	452	Dec 31/99	Repair No.29	401	Jun 30/00
	453	Jun 30/97		402	Jun 30/00
	454	Jun 30/97		403	Jun 30/00
	455	Jun 30/97		404	Jun 30/00
	456	Dec 31/99		405	Jun 30/00
	457	Jun 30/97		406	Jun 30/00
	458	Jun 30/97		407	Jun 30/00
	459	Jun 30/97		408	Jun 30/00
	460	Jun 30/97	72-42-01		
	461	Jun 30/00	Contents	1	Sep 30/94
	462	Jun 30/97	Repair No.1	401	Jun 1/91
	463	Jun 30/97		402	Jun 1/91
	464	Jun 30/97		403	Jun 1/91
	465	Jun 1/97		404	Jun 1/91
	466	Dec 31/99			
	467	Dec 31/99			
	468	Dec 31/99			

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72-42-01			72-51-01		
(Cont'd.)			(Cont'd.)		
Repair No.2	401	Jun 1/91	Repair No.4	401	Aug 1/75
	402	Jun 1/91		402	Sep 30/94
	403	Jun 30/95		403	Aug 1/75
	404	Jun 1/91		404	Aug 1/75
Repair No.3	401	Jun 1/91	Repair No.5	CANCELLED	
	402	Jun 1/91	Repair No.6	401	Dec 1/88
	403	Jun 1/91		402	Dec 1/88
	404	Jun 1/91		403	Dec 1/88
Repair No.4	401	Dec 1/91		404	Feb 1/80
	402	Dec 1/91	Repair No.7	401	Jun 1/83
	403	Dec 1/91		402	Jun 1/83
	404	Dec 1/91		403	Jun 1/83
	405	Dec 1/91		404	Jun 1/83
Repair No.5	401	Dec 1/91		405	Jun 1/83
	402	Dec 1/91		406	Jun 1/83
	403	Dec 1/91		407	Jun 1/83
	404	Dec 1/91		408	Jun 1/83
	405	Dec 1/91		409	Jun 1/83
	406	Dec 1/91	Repair No.8	401	Dec 1/87
	407	Dec 1/91		402	Dec 1/87
Repair No.6	401	Jul 31/93		403	Dec 1/87
	402	Jul 31/93		404	Dec 1/87
	403	Jul 31/93		405	Dec 1/87
	404	Jul 31/93	Repair No.9	401	Dec 1/87
	405	Jul 31/93		402	Dec 1/87
	406	Jul 31/93		403	Dec 1/87
Repair No.7	401	Sep 30/94		404	Dec 1/87
	402	Sep 30/94		405	Dec 1/87
	403	Sep 30/94		406	Dec 1/87
	404	Sep 30/94		407	Dec 1/87
72-51-01			Repair No.10	401	Jun 1/88
Contents	1	Jun 1/98		402	Jun 1/88
Repair No.1	401	Aug 1/75		403	Jun 1/88
	402	Sep 30/94		404	Jun 1/88
	403	Aug 1/75		405	Jun 1/88
	404	Aug 1/75		406	Jun 1/88
Repair No.2	401	Aug 1/75		407	Jun 1/88
	402	Sep 30/94		408	Jun 1/88
	403	Aug 1/75	Repair No.11	401	Dec 1/91
	404	Aug 1/75		402	Dec 31/99
	405	Aug 1/75		403	Dec 1/91
Repair No.3	401	Aug 1/75		404	Dec 1/91
	402	Sep 30/94		405	Dec 1/91
	403	Aug 1/75		406	Dec 1/91
				407	Dec 1/91
				408	Dec 1/91

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72-51-01			72-51-02		
Repair No.12	401	Jan 4/93	(Cont'd.)		
	402	Jan 4/93	Repair No.5	401	Jun 1/91
	403	Jan 4/93		402	Jun 30/01
	404	Jan 4/93		403	Jun 30/01
Repair No.13	401	Jun 1/98		404	Jun 30/01
	402	Jun 1/98		405	Jan 31/94
	403	Jun 1/98		406	Mar 1/81
	404	Jun 1/98		407	Mar 1/81
	405	Jun 1/98		408	Mar 1/81
	406	Jun 1/98		409	Mar 1/81
	407	Jun 1/98	Repair No.6	401	Feb 1/82
	408	Jun 1/98		402	Feb 1/82
	409	Jun 1/98		403	Feb 1/82
	410	Jun 1/98		404	Feb 1/82
	411	Jun 1/98		405	Feb 1/82
72-51-02				406	Feb 1/82
Contents	1	Jan 31/94	Repair No.7	401	Feb 1/82
Repair No.1	401	Aug 1/75		402	Feb 1/82
	402	Aug 1/75		403	Feb 1/82
	403	Aug 1/75		404	Feb 1/82
	404	Aug 1/75		405	Feb 1/82
Repair No.2	401	Jun 30/01		406	Feb 1/82
	402	Apr 1/82	Repair No.8	401	Jan 4/93
	403	Jun 30/01		402	Dec 1/95
	404	Jun 30/01		403	Jun 1/90
	405	Sep 30/94		404	Jun 1/90
	406	Mar 1/81		405	Dec 1/95
	407	Mar 1/81		406	Jun 1/90
	408	Mar 1/81		407	Jun 1/96
	409	Mar 1/81		408	Dec 1/95
Repair No.4	401	Jan 31/94		409	Jun 1/90
	402	Aug 1/82		410	Jun 1/90
	403	Aug 1/82		411	Dec 1/95
	404	Jun 1/91		412	Dec 1/95
	405	Jan 31/94	Repair No.9	401	Dec 1/95
	406	Feb 1/80		402	Dec 1/95
	407	Apr 1/82		403	Dec 1/95
	408	Feb 1/80		404	Dec 1/95
	409	Feb 1/80		405	Dec 1/95
	410	Apr 1/82		406	Dec 1/95
	411	Apr 1/82		407	Jan 31/94
	412	Apr 1/82		408	Jan 31/94
	413	Apr 1/82	Repair No.9	409	Jan 31/94
	414	Apr 1/82		410	Jan 31/94
				411	Jan 31/94
				412	Jan 31/94

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72-51-02 (Cont'd.)			72-51-03 (Cont'd.)		
Repair No.10	401	Jun 1/91	Repair No.7	401	Jun 30/00
	402	Jun 1/91		402	Jun 30/00
	403	Jun 1/91		403	Jun 30/00
	404	Jun 1/91		404	Jun 30/00
	405	Jun 1/91		405	Jun 30/00
	406	Jun 1/91		406	Jun 30/00
	407	Jun 1/91		407	Jun 30/00
Repair No.11	401	Jan 31/94		408	Jun 30/00
	402	Jan 31/94		409	Jun 30/00
	403	Jan 31/94		410	Jun 30/00
Repair No.12	401	Jan 31/94		411	Jun 30/00
	402	Jan 31/94		412	Jun 30/00
	403	Jan 31/94		413	Jun 30/00
Repair No.13	401	Jan 31/94		414	Jun 30/00
	402	Jan 31/94	72-51-04		
	403	Jan 31/94	Contents	1	Jan 31/94
72-51-03			Repair No.1	401	Jun 1/82
Contents	1	Jun 30/00		402	Jun 1/82
Repair No.1	401	Aug 1/81		403	Oct 1/76
	402	May 1/80		404	Oct 1/76
	403	May 1/80		405	Oct 1/76
	404	Dec 30/98		406	Jun 1/82
	405	May 1/80	Repair No.2	401	Oct 1/76
	406	Dec 1/87		402	Apr 1/78
	407	May 1/80		403	Oct 1/76
Repair No.2	401	Jan 4/93		404	Oct 1/76
	402	Sep 1/80		405	Oct 1/76
	403	Dec 30/98		406	Oct 1/76
	404	Sep 1/80		407	Oct 1/76
Repair No.3	401	Feb 1/82	Repair No.3	401	Jun 1/82
	402	Feb 1/82		402	Jun 1/82
	403	Dec 30/98		403	Sep 30/94
	404	Feb 1/82		404	Oct 1/76
	405	Jul 31/93		405	Oct 1/76
Repair No.4	CANCELLED			406	Oct 1/76
Repair No.5	401	Dec 31/99		407	Jun 1/82
	402	Dec 31/99	Repair No.4	401	Jun 1/90
	403	Dec 31/99		402	Jun 1/90
	404	Dec 31/99		403	Jun 1/90
	405	Dec 31/99		404	Jun 1/90
	406	Dec 31/99		405	Jun 1/90
Repair No.6	401	Dec 1/91		406	Jun 1/90
	402	Dec 30/98		407	Jun 1/90
	403	Dec 1/91		408	Jun 1/90
				409	Jun 1/90
				410	Jan 31/94

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72-51-04			72-51-04		
(Cont'd.)			(Cont'd.)		
Repair.4	411	Jan 31/94	Repair No.7	401	Apr 1/91
(Cont'd.)	412	Jan 31/94		402	Apr 1/91
	413	Jun 1/90		403	Apr 1/91
	414	Jun 1/90		404	Apr 1/91
	415	Jun 1/90		405	Apr 1/91
	416	Jun 1/90		406	Apr 1/91
	417	Jun 1/90	72-52-01		
	418	Jun 1/90	Contents	1	Sep 30/94
Repair No.5	401	Jan 4/93	Contents	2	Dec 31/99
	402	Jan 4/93	Repair No.1	401	Jun 30/00
	403	Jan 4/93		402	Feb 1/82
	404	Jan 4/93		403	Dec 31/99
	405	Jan 4/93		404	Sep 1/80
	406	Jan 4/93		405	Dec 31/99
	407	Jan 4/93		406	Dec 31/99
	408	Jan 4/93		407	Dec 31/99
	409	Jan 4/93	Repair No.2	401	Jun 30/01
	410	Jan 4/93		402	Jun 30/01
Repair No.6	401	Jun 30/95		402A	Jun 30/01
	402	Jun 30/95		402B	Jun 30/01
	403	Dec 1/88		403	Feb 1/82
	404	Jan 31/94		404	Feb 1/82
	405	Jan 31/94		405	Jun 30/01
	406	Dec 1/88		406	Dec 1/84
	407	Jan 31/94		407	Dec 31/99
	408	Jan 31/94		408	Dec 31/99
	409	Dec 1/88		409	Jun 30/01
	410	Dec 1/88	Repair No.3	401	Jun 30/00
	411	Dec 1/88		402	Dec 31/99
	412	Jan 31/94		403	Oct 1/82
	413	Jan 31/94		404	Sep 1/80
	414	Dec 1/88		405	Oct 1/81
	415	Jan 31/94		406	Sep 1/80
	416	Jan 31/94		407	Apr 1/82
	417	Jan 31/94		408	Apr 1/82
	418	Jan 31/94		409	Apr 1/82
	419	Jan 31/94		410	Sep 1/80
	420	Jan 31/94		411	Jun 1/87
	421	Jan 31/94		412	Sep 1/80
	422	Jan 31/94		413	Jun 1/87
	423	Jan 31/94		414	Apr 1/82
	424	Jan 31/94	Repair No.4	401	Jun 30/00
	425	Jan 31/94			
	426	Jan 31/94			
	427	Jan 31/94			
	428	Jan 31/94			

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72-52-01					
(Cont'd.)					
Repair No.5	401	Jun 30/01			
	402	Jun 30/01			
	402A	Jun 30/01			
	402B	Jun 30/01			
	403	Feb 1/82			
	404	Feb 1/82			
	405	Jun 30/01			
	406	Dec 31/00			
	407	Jun 30/01			
Repair No.6	401	Jun 30/00			
	402	Jun 1/90			
	403	Jan 4/93			
	404	Jan 4/93			
	405	Jun 1/90			

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72-52-01 (Cont'd.)			72-52-01 (Cont'd.)		
Repair No.7	401	Jun 1/91	Repair No.14	404	Dec 1/95
	402	Jun 1/91		405	Dec 31/99
	403	Jun 1/91		406	Dec 1/95
	404	Dec 30/98		407	Dec 1/95
	405	Dec 30/98		408	Dec 1/95
Repair No.8	401	Dec 1/91		409	Dec 1/95
	402	Dec 1/91		410	Dec 1/95
	403	Dec 1/91		411	Dec 1/95
	404	Dec 1/91	Repair No.15	401	Jun 30/00
Repair No.9	401	Dec 1/91		402	Dec 30/98
	402	Jun 1/99		403	Jun 1/99
	403	Dec 30/98		404	Dec 30/98
	404	Dec 30/98		405	Dec 30/98
	405	Dec 30/98		406	Dec 30/98
	406	Dec 30/98	Repair No.16	To be Issued	
Repair No.10	401	Dec 31/00	Repair No.17	401	Jun 30/00
	402	Dec 30/98		402	Dec 31/99
	403	Dec 30/98		403	Dec 31/99
	404	Dec 31/00		404	Dec 31/99
	405	Dec 30/98		405	Dec 31/99
	406	Dec 30/98		406	Dec 31/99
	407	Dec 31/00		407	Dec 31/99
	408	Dec 30/98		408	Dec 31/99
	409	Dec 30/98		409	Dec 31/99
	410	Dec 30/98	72-52-02		
	411	Dec 30/98	Contents	1	Dec 31/99
	412	Dec 30/98	Repair No.1	401	Jul 1/81
	413	Dec 30/98		402	Apr 1/78
Repair No.11	401	Dec 1/96		403	Jan 9/76
	402	Dec 31/99		404	Jan 9/76
	403	Dec 31/00		405	Jan 9/76
	404	Dec 1/96		406	Jan 9/76
	405	Dec 31/00		407	Jan 9/76
	406	Jan 31/95	Repair No.2	401	Jan 9/76
	407	Jan 31/95		402	Jan 9/76
	408	Jan 31/95		403	Aug 1/75
	409	Jan 31/95		404	Aug 1/75
	410	Jan 31/95		405	Aug 1/75
	411	Jan 31/95	Repair No.3	401	Jan 9/76
Repair No.12	CANCELLED			402	Jan 9/76
Repair No.13	401	Jan 31/95		403	Aug 1/75
	402	Jan 31/95		404	Aug 1/75
	403	Jan 31/95			
Repair No.14	401	Jun 30/00			
	402	Dec 31/99			
	403	Dec 31/99			

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Repair No.4	401	Dec 1/91	Repair No.9	416	Dec 1/88
	402	Jul 1/80		417	Dec 1/88
	403	May 1/80		418	Jan 31/94
	404	Dec 30/98		419	Jan 31/94
	405	May 1/80		420	Jan 31/94
	406	Dec 1/87		421	Jan 31/94
	407	May 1/80		422	Jan 31/94
Repair No.5	401	Jun 1/97		423	Jan 31/94
	402	Jun 1/97		424	Jan 31/94
	403	Jun 1/97		425	Jan 31/94
	404	Jun 1/97		426	Jan 31/94
Repair No.6	401	Sep 1/81	Repair No.10	401	Jun 1/90
	402	Sep 1/81		402	Jun 1/90
	403	Dec 30/98		403	Jun 1/90
	404	Sep 1/81		404	Jun 1/90
Repair No.7	401	Dec 30/98	Repair No.11	401	Dec 30/98
	402	Feb 1/82		402	Dec 30/98
	403	Feb 1/82		403	Dec 30/98
Repair No.8	401	Jun 1/90		404	Dec 30/98
	402	Jun 1/90		405	Dec 30/98
	403	Jun 1/90		406	Dec 30/98
	404	Jun 1/82		407	Dec 30/98
	405	Jun 1/90		408	Dec 30/98
	406	Jun 1/90		409	Dec 30/98
	407	Sep 30/94		410	Dec 30/98
	408	Sep 30/94		411	Dec 30/98
	409	Sep 30/94		412	Dec 30/98
	410	Jun 1/90		413	Dec 30/98
	411	Jun 1/90		414	Dec 30/98
Repair No.9	401	Jan 31/94		415	Dec 30/98
	402	Jan 31/94		416	Dec 30/98
	403	Dec 1/88		417	Dec 30/98
	404	Jan 31/94		418	Dec 30/98
	405	Dec 1/88		419	Dec 30/98
	406	Dec 1/88		420	Dec 30/98
	407	Jan 31/94		421	Dec 30/98
	408	Jan 31/94		422	Dec 30/98
	409	Dec 1/88		423	Dec 30/98
	410	Dec 1/88		424	Dec 30/98
	411	Dec 1/88		425	Dec 30/98
	412	Jan 31/94		426	Dec 30/98
	413	Dec 1/88		427/428	Dec 30/98
	414	Jan 31/94			
	415	Jan 31/94			

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72-52-03			Repair No.11	401	Jun 1/92
(Cont'd.)				402	Jun 1/92
72-52-03				403	Jun 1/92
Contents	1	Jun 1/92		404	Jun 1/92
Repair No.1	401	Aug 1/75		405	Jun 1/92
	402	Aug 1/75		406	Jun 1/92
	403	Aug 1/75		407	Jun 1/92
	404	Aug 1/75	Repair No.12	401	Jun 1/92
Repair No.2	401	Jun 1/77		402	Jun 1/92
	402	Sep 30/94		403	Jun 1/92
	403	Jan 9/76		404	Jun 1/92
	404	Jan 9/76		405	Jun 1/92
Repair No.3	401	Dec 1/83		406	Jun 1/92
	402	Sep 1/84		407	Jun 1/92
	403	Jun 1/86			
	404	Jun 1/86	72-53-00		
	405	Oct 1/76	Contents	1	Jun 1/92
Repair No.4	CANCELLED		Contents	2	Jun 1/99
Repair No.5	401	Mar 1/84	Repair No.1	CANCELLED	
	402	Mar 1/84	Repair No.2	401	Apr 1/77
	403	Mar 1/84		402	Apr 1/77
	404	Mar 1/84		403	Apr 1/77
	405	Mar 1/84		404	Apr 1/77
Repair No.6	401	Jun 1/90		405	Apr 1/77
	402	Jun 1/90	Repair No.3	401	May 1/79
	403	Jun 1/90		402	May 1/79
	404	Jun 1/90		403	May 1/79
Repair No.7	401	Dec 1/91		404	Jun 1/84
	402	Dec 1/91		405	May 1/79
	403	Dec 1/91		406	May 1/79
	404	Dec 1/91		407	May 1/79
	405	Dec 1/91		408	May 1/79
Repair No.8	401	Dec 1/91		409	May 1/79
	402	Dec 1/91			
	403	Dec 1/91			
	404	Dec 1/91			
	405	Dec 1/91			
Repair No.9	401	Dec 1/91			
	402	Dec 1/91			
	403	Dec 1/91			
	404	Dec 1/91			
	405	Dec 1/91			
Repair No.10	401	Jun 1/92			
	402	Jun 1/92			
	403	Jun 1/92			
	404	Jun 1/92			

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72-53-00			72-53-00		
(Cont'd.)			(Cont'd.)		
Repair No.4	401	Dec 30/98	Repair No.8	401	Dec 1/88
	402	Dec 1/87		402	Jun 1/88
	403	Dec 31/00		403	Jun 1/88
	404	Dec 1/88		404	Jun 1/88
	405	Dec 1/88	Repair No.9	401	Jun 1/90
	406	Mar 1/80		402	Jun 1/90
	407	Mar 1/80		403	Jun 1/90
	408	Dec 1/88		404	Jun 1/90
	409	Mar 1/80	Repair No.10	401	Jan 4/93
	410	Jun 1/88		402	Dec 1/91
	411	Mar 1/80		403	Dec 1/91
	412	Mar 1/80		404	Dec 1/91
	413	Apr 1/80	Repair No.11	401	Dec 1/91
	414	Mar 1/80		402	Dec 1/91
	415	Mar 1/80		403	Dec 1/91
	416	Jun 1/88		404	Dec 1/91
	417	Jun 1/88		405	Dec 1/91
	418	Jun 1/88	Repair No.12	401	Dec 30/98
	419	Jun 1/88		402	Jun 1/92
	420	Mar 1/80		403	Jun 1/92
	421	Mar 1/80		404	Jun 1/92
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72-01-03	1	Tubes, Oil. Repair of fretting/damage by inert gas arc welding.	B.514566
	2	Tube A/O, Pump to air intake case connection - Repair of damaged and/or fretted areas	B.497468
	3	Tube A/O, Tube joint to turbine exhaust diffuser connection - Repair of damaged and/or fretted areas	B.497468
72-01-04	1	Tubes, Oil. Repair of fretting/damage by inert gas arc welding.	B.514566
72-21-01	1	Air Intake Fairing. Removing dents from outer skin.	B.478064

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	2	Fairing. Provision for removal and replacement of damaged fairing inner skin.	B.497500
	3	Air Intake Fairing. Repair of brackets in webs by welding.	B.513456
72-22-01	1	Air Intake Case. Repaired by welding.	B.488695
	2	Air Intake Case. Replacement of damaged vane and vane end.	B.488692
	3	Air Intake Case. Provision for the removal of cracking from the vane and outer platform by blending/polishing	B.514696
72-23-01	1	No.1 Bearing Seal land restored by application of an abradable coating.	B.470383
	2	No.2 Labyrinth Housing. Seal land restored by application of an abradable coating.	B.470384
	3	Bearing Housing. Replacement of Labyrinth Housing.	B.909985

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72-31-01	1	Stages 1-6 Compressor Vane Fixing Ring. Replacement of worn labyrinth ring.	B.488676-81
	2	LP Compressor Vane. Repair of vanes by blending and polishing with control of assembly condition.	B.930273-8 and B.930280
	3	LP Compressor Vane, Stages 1-6. Restoration of inner abutment faces by the application of detonation flame deposition.	B.497490-5
	4	LP Compressor Vane, Stages 1-6. Restoration of inner abutment faces by welding and the application of detonation flame deposition.	B.499480-5
72-31-02	1	Compressor Vanes and LP Exit Guide Vane. Repair of vanes by blending and polishing with control of assembly condition.	B.930279-80
	2	Exit Guide Vane Case. Restoration of dove- tail slot by welding.	B.497590

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72-31-03	1	LP Rotor Shaft Rear. Provision for restoring diameter of labyrinth fins by roll forming.	B.478082-5
	2	Rotor Shaft Front. Provision for restoring diameter of labyrinth fins by roll forming.	B.478067-8
	3	Rotor Shaft Front. 3.7535/3.7530 in. (95,34/95,33 mm) dia. roller bearing location restored by Plasma Flame Spraying with Metco 450.	B.478122
	4	LP Compressor Rotor Spacer Ring Stages 1-2, 2-3 and 3-4. Provision for restoring diameter of labyrinth fins by roll forming.	B.488596-8
	5	LP Compressor Rotor Spacer Ring Stages 4-5, 5-6 and 6-7. Provision for restoring diameter of labyrinth fins by roll forming.	B.488599
	6	LP Compressor Rotor Blades Stages 1-7. Repair of blades by blending and polishing with control of assembly condition.	B.930265-72

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	8	LP Compressor Rotor Stage 1-2, 2-3, 3-4, 4-5, 5-6, 6-7 Spacer Rings. Restoration of labyrinth fins by plasma weld.	B.497449-54
	9	LP Compressor Rotor Shaft Rear. Thrust bearing location restored by plasma flame spraying.	B.935531
	10	LP Compressor Rotor Disk, Stages 1 to 7. Blending of Handling and other Damage to Bore and Faces.	B.935533
	11	LP Compressor Rotor Blades Stage 1. Repair by blending and polishing.	B.935525
	12	LP Compressor Rotor Shaft Rear. Removal of corrosion by machining and grit blasting.	B.935539
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	16	Ring, Spacer, (LPC), Stages 1-2 to 6-7. Re-building of labyrinth fins by mechanised TIG welding.	B516426-3
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	6	Shaft, Drive, Compressor LP, Rear - Blending of damaged areas of serrations.	B.517842
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	8	Rear Outer Air Baffle Unit. Replacement of outer labyrinth housing.	B.488604
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	22	Housing, Assy. of, Labyrinth Outer. Removal and replace- ment of abradable coatings.	B.514666
	23	Housing, Labyrinth, Inner (HP). Removal and replacement of abradable coatings.	B.514667
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	2	HP Compressor Vane Stages 1-7. Repair of vanes by blending and polish- ing with control of assembly condition.	B.930289-96
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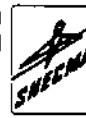
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	9	HP Compressor Rotor Shaft Front. Provision for re- building defective No.8 labyrinth by Plasma welding.	B.488618
	10	2nd Stage HP Comp- ressor Rotor Disk. Restoration of bolt- hole(s) by machining 0.005 in. (0,127 mm) from hole(s).	B.495681
	11	3rd Stage HP Comp- ressor Rotor Disk. Restoration of bolt- hole(s) by machining 0.005 in. (0,127 mm) from hole(s).	B.495682
	12	CANCELLED	
	13	HP Compressor Rotor Blades Stages 4-7. Repair of blades by cold coining.	B.495644-7

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	15	HP Compressor Rotor Disks Stages 2 and 3. Repair by blending to remove light impact and other damage.	B.497539
	16	HP Compressor Rotor Disks Stages 4 to 7. Repair by blending to remove light impact and other damage.	B.497540
	17	HP Compressor Drive Shaft Labyrinth No.13, 14, 15. Bearing location restored by plasma flame spraying with Metco 450.	B.476039
	18	HP Compressor Rotor Stage 2 to 3 spacer ring repaired by blending damage caused by boltheads.	B.499476
	19	HP Compressor Rotor Front - Repair by Removal of Score- marks in Bore by Machining.	B.499494
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	22	HP Compressor Drive Shaft. Air Transfer Tube Location with Tribomet Coating.	B.506054
	23	HP Compressor Drive Shaft. Labyrinth fins restored by TIG welding.	B.488639-41
	24	HP Compressor Rotor - Stage 2 disk repaired by removal of corrosion.	B.511542
	25	HP Compressor Rotor - Stage 3 disk repaired by removal of corrosion.	B.511719
	26	HP Compressor Rotor - Stage 7 disk repaired by blending minor damage.	B.512154
	27	HP Compressor Rotor Shaft Front - Repair No's.6 to 8 Labyrinths by TIG welding.	B.508136-8
	28	HP Compressor Rotor Shaft Front - Bearing location restored by tungsten carbide coating.	B.512713

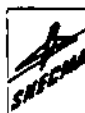
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	31	Ring Spacer Stages 3 to 4, 4 to 5, 5 to 6 and 6 to 7 - Removal of scoring on retaining bolt locating diameter.	B.513459
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	33	Disk Compressor Rotor HP Stage 3 - Restoration of front and rear location diameters by plasma spraying.	B.513817-18
	34	Ring Spacer Stage 4 to 5 (HPC) - Restoration front and rear location diameters by plasma spraying.	B.513847
	35	HP Compressor Rotor Stage 4 to 5 Spacer Ring - Removal of corrosion and blending of damage.	B.512616

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	37	HP Compressor Rotor - Restoration of abrasive coating on outer diameter of stages 3-4, 4-5, 5-6, 6-7 spacers by plasma spray.	B.513849-52
	38	Shaft Rotor Front (H.P.C.) Stages 1-2 Interstage labyrinth fins rebuilt by mechanised T.I.G. ("Dabber") welding and remachined.	B.513351
	39	Ring Spacer Stage 6-7 (H.P.C.). Pro- vision for restoration of front and rear outer location diameters by plasma spraying.	B.513857-58
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	41	Ring Spacer Stage 2-3. Restoration of front spigot location by plasma spray.	B.514498
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	43	Labyrinth No.12. Restore worn labyrinth fins by mechanised T.I.G. welding.	B.514548
	44	HP Comp. Drive Shaft. Removal of corrosion and/or scoring from front flange bolt holes by blending and polishing.	B.514987
	45	To be issued	B.515133
	46	Disk, Compressor HP Stage 1. Provision for local touch-up or re-application of anti-fret coating.	B.514428
	47	Blade, Compressor HP Stage 1. Provision for local touch-up or re-application of anti-fret coating.	B.514429
	48	Tube, Assembly of, Air Transfer. Removal and replacement of coating.	B.515456
	49	Disk, Compressor Rotor, HP, Stage 2. Provision for the restoration of front and/or rear location diameters by Plasma Spraying.	B.515436-7
	50	Blade, Compressor, HP Stages 1-3. Provision for blade aerofoil tip dressing to remove burrs and/or high metal.	B.515216-8

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	53	Spacer Ring, Stage 6-7 (HPC). Removal of light corrosion from inner surfaces by polishing.	B.516413
	54	Spacer Ring, Stage 3-4 (HPC). Provision for the restoration of the front and rear location diameters by Plasma spraying.	B.516405A-B
	55	Labyrinth, No.12. Removal of light corrosion from inner surfaces by polishing.	B.516644
	56	Shaft, Drive, Compressor HP - The blending of damage on the bolt locating diameter.	B.517751
	57	Shaft, Drive, Compressor HP - Remove fretting/corrosion from No.4 bearing inner race abutment shoulder.	SAL.B.517804

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	58	Ring, Spacer, Stage 3-4 (H.P.C) - Remove corrosion from bore by hand dressing.	SAL.B.517809
72-34-00	1	No.12-Labyrinth Seal. Seal lands restored by application of an abradable coating.	B.470389-94
	2	HP Compressor Diffuser Case. Restoration of damping ring location.	B.497459
	3	HP Compressor Diffuser Case. Restoration of worn seal housing bores by fitting flanged liners.	B.935535-6
	4	HP Compressor Diffuser Case. Labyrinth seal lands repaired by application of abradable coating.	B.506485
	5	Case Assy of Diffuser, Compressor HP. Provision for removal and replace- ment locally or completely of zinc 'Z' coating.	B.513507
	6	Diffuser Case. Repair of worn valve and inner seal bore housings by plasma spraying.	B.515097
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	2	CANCELLED	

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	5	CANCELLED	
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	8	Chamber Assembly, Combustion. Replacement of vaporisers.	B.517613
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	14	Combustion Chamber. Replacement of thermal barrier coating.	B.935546
	15	Combustion Chamber. Repair of damaged sections by patching.	B.935544
	16	Combustion Chamber. Repair of cracks by welding and blending of light impact damage.	B.935545
	17	Head Assembly. Repair by welding cracks and patching.	B.499432
	18	Restoration of used vaporiser retaining nuts.	B.935592
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	22	Combustion Chamber. Removal of minor cracks in vaporisers by blending.	B.506045
	23	Chamber, Assembly of, Combustion. Repair of cracking/burning in the No.7 inner cooling ring and adjacent for- ward section by direct/ puddle welding.	B.514672
	24	To be issued.	
	25	Combustion Chamber. Replacement of head, sub-assy of using engine run or new inner and/or outer barrels (Post Mod.8981).	B.516207
	26	Chamber, Assembly, Combustion. Replacement of head sub-assy. of using engine run or new inner and/or outer barrels (Post Mod. 9008).	B.517529-30
	27	Chamber, Assembly, Combustion. Replacement of damaged sections.	B.517456-93
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	29	Chamber, Assembly Combustion (Post Mod.72-9069). Complete Replacement of Thermal Barrier Coatings.	B.518353

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	2	Combustion Chamber Outer Case. Restoration of fretted ends of vane locking and extended head pins.	B.513668
	3	Flanged Sealing Bar. Restoration of fretted sealing diameter by welding.	B.513856
	4	Tube, Support, Assy of. Repair fractured lug by replacement of section.	B.513629
	5	Tube, A/O Support. Repair of defective tube by replacement of section.	B.513630
	6	Case, Assembly of, Outer Combustion Chamber. Repair of stripped thread at HPT NGV locking pin positions by fitting a solid insert.	B.515321
	7	Combustion Chamber Outer Case. Provision for the blending of damage on the bolt locating diameter.	B.516404
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	6	Outer Air Duct. Restoration of 14.6514/14.6500 in. (372,13/372,11 mm) bore dia. by Plasma spray.	B.492081
	7	No.13 Labyrinth Cover. Replacement of worn No.4 bearing cooling air tube housing.	B.497478
	8	HP Turbine Bearing Support. Tube elbow bores restored by renewing the existing anti- fret coating.	B.506296
	9	HP Turbine Bearing Support. Insulated tube assembly repaired by replacing the anti- fret coating.	B.507160

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	11	Duct A/O Air. Provision for restoration of fretted internal diameters of seal carriers.	B.513510
	12	Bearing Housing. Removal of distortion from rear flange by machining.	B.515001
	13	Blanket, Assy of Insulation, Front and Rear Covers. Repair of damaged blankets by patching and weld repair of bracket(s).	B.517833-4
72-51-02	1	Labyrinth Housing. Seal land(s) restored by application of an abradable coating.	B.478071-4
	2	HP Turbine Nozzle Vane. Provision for removal and replacement of liner sub-unit.	B.478014
	3	To be issued.	
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	7	CANCELLED	
	8	HP Turbine Nozzle. Restoration of outer seal surface with abrasion resistant coating.	B.512623
	9	HP Turbine Nozzle. Restoration of outer seal faces, thin wall sections and repair of cracks by brazing.	B.512706-8
	10	HP Turbine Nozzle Ring Assembly. Restoration of fretted retaining slots by welding.	B.513474
	11	Liner A/O. Replacement of outer liner.	B.499447
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	13	Liner A/O. Replacement of inner liner and tube end.	B.499449
72-51-03	1	HP Turbine Disks. Repair by blending to remove light impact and other damage. (Also see 72-52-02 Repair No.4).	B.497541

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	3	HP Turbine Disk. Blending of score marks in bolt holes.	B.499496
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	5	HP Turbine Blade - Restoration of worn sealing fin by welding.	B.513482
	6	Blade, Assembly of, Turbine, HP. Blending of damaged and/or cracked shroud seal fin.	B.513483
	7	Disk, Turbine Rotor HP. Removal of Flank Face Fretting From Hirth Serration Coupling by Grinding.	B.516017
72-51-04	1	No.23 Labyrinth. Provision for restoring diameter of labyrinth fins by roll forming.	B.478105
	2	No.24 and 26 Labyrinths. Provision for restoring diameter of labyrinth fins by roll forming.	B.478108-10
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	4	HP Turbine Labyrinth Seal Ring. Restoration of labyrinth fins (No.24 and 26 A and B) by plasma or TIG welding.	B.488620-22 B.512815-17
	5	HP Turbine Rotor. Repair of No.23 labyrinth fins by plasma or TIG welding.	B.488593
	6	HP Turbine Rotor Hub. Restoration of labyrinth fins by TIG welding.	B.488632-8
	7	Ring Labyrinth Seal Nos.24 and 26 - Restoration of outside location diameter by plasma spraying.	B.513490
72-52-01	1	LP Turbine Nozzle Vane. Removal and replacement of guide tube.	B.478060
	2	LP Turbine Nozzle Vane. Removal and replacement of blanking plates, retaining block, guide block and guide tube.	B.478061-A
	3	LP Turbine Nozzle Vane. Repair of cracks by welding.	B.497462-A

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	7	Nozzle Vane Support Diaphragm. Replacement of damaged No.24 and No.25 labyrinth rings.	B.513548
	8	Vane A/O Nozzle Turbine LP. Restoration of cracked outer blank plates.	B.512545
	9	Diaphragm, Assembly of. Nozzle vane support restore vane locating slots by welding.	B.513549
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	11	Vane, Assembly of Nozzle, Turbine, LP. Repair of trailing edge and fillet radius cracks by vacuum brazing.	B.515031
	12	CANCELLED	B.516056
	13	Diaphragm, Assembly of Nozzle Vane Support. Dressing of light fretting from the front flange adjacent to the vane hook location.	B.516721
	14	Vane, Assembly of Nozzle, Turbine, LP. Repair of trailing edge and fillet radius cracks by vacuum brazing (Post Mod.8993 Std).	B.517103
	15	Diaphragm, Assembly of, Nozzle Vane Support. Repair of crack(s) at locating dog (slot) positions by welding.	B.517822
	17	Diaphragm, Assembly of, Nozzle vane support. Restoration of worn seal fin by mechanised T.I.G. welding	B.518042
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	5	LP Turbine Disks. Repair by blending damage/defects in bolt-holes.	B.499437
	6	LP Turbine Disks. Repair by blending light scores in bore and faces.	B.499439
	7	LP Turbine Disk. Blending of fret marks on front face.	B.499469
	8	LP Turbine Rotor. Repair of No.25 labyrinth fins by plasma or TIG welding.	B.488619
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	11	Blade, Turbine LP Assembly of. Remove and replace defective bridgepiece.	B.517886
	1	Outer Housing Labyrinths, No's. 27 and 28. Seal lands restored by application of an abradable coating.	B.478116-7
	2	Bearing Housing, Labyrinths 29 and 30. Seal land restored by application of an abradable coating.	B.478118-9
	3	Insulation Blanket. Provision for patch repair of skin, lacing tags, brackets and damaged edges.	B.488670
	4	CANCELLED	
	5	Sleeve Assembly. Bores in sleeve assembly repaired by plasma flame spray.	B.935547-8
	6	Cover Assembly. Repair of cracks in flanged bosses by welding.	B.512675
	7	Socket Air Feed. Provision for restoration of 1.751 (44.48)/ 1.750 (44.45) bore by chrome plating.	B.513976

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	9	Cover Assembly Rear. Provision for replace- ment of defective No.5 oil scavenge tube.	B.513489
	10	Sleeve, Assy. of. Provision for replace- ment of defective air supply boss.	B.514697
	11	Socket, Air feed. Restoration of seal location bore by chromium plating.	B.514743
	12	Socket Vent. Restoration of seal location bore by plasma spray.	B.514744
72-53-00	1	CANCELLED	
	2	Exhaust Diffuser Outer Case. Provision for fitting oversize fast end diameter pins.	B.492906-11
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	13	Tube. Repair of damage to spherical sleeve location diameter by welding.	B.515008
	14	Duct, Assy of. Remove and replace damaged end fitting.	B.516913
	15	Housing Seal, Assy of. Remove and replace worn bush (Post Mod. 72-8588 Std.)	B.517938
72-61-00	1	HP Probe Operating Labyrinth fins. Provision for restoring diameter of labyrinth fins by roll forming.	B.478092
	2	Gearshaft Bevel Zerol Pinion. Removal of fretting on outer face by machining.	B.513508

REPAIR

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<u>Chapter/Section</u>	<u>Repair No.</u>	<u>Title</u>	<u>Scheme No.</u>
	3	Housing, Assembly of. Bearing 1.850 (46.99) 1.8507 (47,008) diameter bore restored by chromium plating.	B.513544
	4	Housing, Assembly of. HP Drive. Restoration of seal location by chromium plating.	B.514698
72-62-01	1	LH Gearbox Case. Restoration of faces and bores by plating and by fitting liners.	B.502620-5
	2	Ring, Assembly, Coupling. Worn location face restored by plasma spraying.	B.516649
72-62-02	1	Gearshaft Spur. Removal of corrosion pitting in undercut location by machining.	B.514856
72-63-01	1	RH Gearbox Case. Restoration of support lug at the constant speed drive alternator flange by welding.	B.495501
72-63-02	1	Bearing Housing. Sealing face restored by Plasma Flame deposition using Tungsten Carbide.	B.495548
	2	Housing Bearing. Provision for the restoration of sealing face by plasma spray.	B.513547

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<u>Chapter/Section</u>	<u>Repair No.</u>	<u>Title</u>	<u>Scheme No.</u>
72-63-05	1	RH Gearbox Hydraulic Pump Drives. Restoration of Sealol seals and mating rings.	B.510619-20
72-64-00	1	Case, Assy of Sump. Provision for restoration of circumferential band around pulse probe locating face.	B.513546
72-65-00	1	NOT ISSUED.	
	2	Case assembly of pressure pump corrosion/erosion upto 0.100 (2,54) depth in relief slot.	B.513631
	3	Case A/O Pressure Pump. Provision for fitting new insert, rings.	B.513619
	4	Main Oil Pump and Pin. Restoration of oil pump gear journals and pin using LWIN40 coating.	B.512304
	5	Case Assy. of, Pressure Pump. Restoration of corrosion/erosion by welding and fitting bushing sleeve(s).	B.515392-3
	6	Case Assy. of, Pressure Pump and Scavenge Pump. Replacement of damaged/loose bushes by fitting 0.005 (0,13) and/or 0.010 (0,25) oversize external diameter bushes.	B.514883-93

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OVERHAUL****CHAPTER 72****REPAIR****NUMERICAL LIST OF REPAIR SCHEMES**

This list contains schemes included in all Sections/Volumes of the Overhaul Manual.

<u>Scheme</u>	<u>Ch/Sect/Sub</u>	<u>Repair No.</u>
B.470383	72-23-01	1
B.470384	72-23-01	2
B.470389-94	72-34-00	1
B.470398	72-51-01	1
B.470399-400	72-51-01	2
B.476039	72-33-02	17
B.476079	72-33-02	7
B.476136	72-33-02	8
B.478014	72-51-02	2
B.478060	72-52-01	1
B.478061-A	72-52-01	2
B.478062	72-32-00	9
B.478063	72-52-01	5
B.478064	72-21-01	1
B.478067-8	72-31-03	2
B.478070	72-51-01	3
B.478071-4	72-51-02	1
B.478075-6	72-51-01	4
B.478082-5	72-31-03	1
B.478086-9	72-33-02	1
B.478090	72-31-04	1
B.478092	72-61-00	1
B.478093	72-32-00	3
B.478094	72-33-02	2
B.478095-7	72-33-02	3
B.478098-104	72-51-04	3
B.478105	72-51-04	1
B.478108-10	72-51-04	2
B.478112	72-52-02	2
B.478114-5	72-52-02	3
B.478116-7	72-52-03	1
B.478118-9	72-52-03	2
B.478122	72-31-03	3
B.478177-80	72-52-02	1
B.488586	72-33-02	4

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<u>Scheme</u>	<u>Ch/Sect/Sub</u>	<u>Repair No.</u>
B.488593	72-51-04	5
B.488595	72-33-02	5
B.488596-8	72-31-03	4
B.488599	72-31-03	5
B.488604	72-32-00	8
B.488616-7	72-33-01	1
B.488618	72-33-02	9
B.488619	72-52-02	8
B.488620-22	72-51-04	4
B.488623 (cancelled)	72-53-00	1
B.488624-6	72-31-03	14
B.488627	72-31-04	3
B.488628-31	72-52-02	9
B.488632-38	72-51-04	6
B.488639-41	72-33-02	23
B.488643	72-53-00	4
B.488645 (cancelled)	72-33-02	12
B.488648-9 (cancelled)	72-52-03	4
B.488652-60	72-32-00	10
B.488670	72-52-03	3
B.488673-5	72-31-03	13
B.488676-81	72-31-01	1
B.488682 (cancelled)	72-51-01	5
B.488685-7	72-32-00	11
B.488692	72-22-01	2
B.488695	72-22-01	1
B.492081	72-51-01	6
B.492901-2	72-32-00	12
B.492903-4	72-32-00	13
B.492906-11	72-53-00	2
B.492925	72-32-00	14
B.492926	72-32-00	15
B.492927-28	72-52-01	10
B.492950-89	72-41-01	*
B.493614	72-41-01	2
B.493627	72-41-01	5
B.493642A-N	71-51-01	1
B.493748	72-53-00	5
B.493751	72-32-00	17
B.493795-8	72-53-00	3
B.495501	72-63-01	1
B.495548	72-63-02	1
B.495644-7	72-33-02	13
B.495674	72-41-01	6
B.495681	72-33-02	10
B.495682	72-33-02	11
B.497444	72-32-00	16

* Refer to Combustion Chamber Table of Contents

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<u>Scheme</u>	<u>Ch/Sect/Sub</u>	<u>Repair No.</u>
B.497449-54	72-31-03	8
B.497459	72-34-00	2
B.497462-A	72-52-01	3
B.497463	72-51-02	4
B.497464	72-51-02	5
B.497468	(72-01-03	(2
	(72-01-03	(3
	(72-32-00	(28
	(75-01-02	(2
	(75-02-04	(2
	(75-03-01	(2
	(75-03-02	(1
B.497478	72-51-01	7
B.497490-5	72-31-01	3
B.497500	72-21-01	2
B.497538	(72-31-03	(7
	(72-33-02	(14
B.497539	72-33-02	15
B.497540	72-33-02	16
B.497541	(72-51-03	(1
	(72-52-02	(4
B.497550-89	72-41-01	*
B.497590	72-31-02	2
B.497591	72-51-03	2
B.499430-1	72-52-01	4
B.499432	72-41-01	17
B.499437	72-52-02	5
B.499439	72-52-02	6
B.499447	72-51-02	11
B.499448	72-51-02	12
B.499449	72-51-02	13
B.499462	74-21-01	1
B.499469	72-52-02	7
B.499471 (cancelled)	72-51-03	4
B.499476	72-33-02	18
B.499477	72-33-01	6
B.499480-5	72-31-01	4
B.499489	75-01-03	1
B.499494	72-33-02	19
B.499496	72-51-03	3
B.499642	74-21-01	1
B.502620-5	72-62-01	1
B.502641	72-32-00	19
B.506045	72-41-01	22
B.506054	72-33-02	22
B.506296	72-51-01	8
B.506313	72-53-00	7
B.506485	72-34-00	4
B.507088	75-11-01	1

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<u>Scheme</u>	<u>Ch/Sect/Sub</u>	<u>Repair No.</u>
B.507100	72-53-00	8
B.507159	72-51-01	10
B.507160	72-51-01	9
B.507640-2	72-41-01	20
B.507923	72-41-01	21
B.507929	72-41-01	21
B.508136-8	72-33-02	27
B.510617-8	72-33-01	4
B.510619-20	72-63-05	1
B.510768	71-20-00	1
B.511466	72-52-01	6
B.511542	72-33-02	24
B.511719	72-33-02	25
B.512154	72-33-02	26
B.512304	72-65-00	4
B.512616	72-33-02	35
B.512617	72-33-02	36
B.512623	72-51-02	8
B.512675	72-52-03	6
B.512676	72-52-02	10
B.512706-8	72-51-02	9
B.512713	72-33-02	28
B.512728	72-53-00	9
B.512815-7	72-51-04	4
B.512824	72-33-02	30
B.512846	73-12-05	1
B.512919	72-33-02	29
B.513351	72-33-02	38
B.513456	72-21-01	2
B.513459	72-33-02	31
B.513473	72-31-04	4
B.513474	72-51-02	10
B.513482	72-51-03	5
B.513483	72-51-03	6
B.513488	75-02-07	1
B.513489	72-52-03	9
B.513490	72-51-04	7
B.513507	72-34-00	5
B.513508	72-61-00	2
B.513509	72-33-02	32
B.513510	72-51-01	11
B.513544	72-61-00	3
B.513545	72-52-01	8
B.513546	72-64-00	1
B.513547	72-63-02	2
B.513548	72-52-01	7
B.513549	72-52-01	9
B.513619	72-65-00	3

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<u>Scheme</u>	<u>Ch/Sect/Sub</u>	<u>Repair No.</u>
B.513620	75-11-01	2
B.513629	72-42-01	4
B.513630	72-42-01	5
B.513631	72-65-00	2
B.513668	72-42-01	2
B.513669	72-52-03	8
B.513673	72-53-00	11
B.513674	72-53-00	10
B.513694	72-42-01	1
B.513817-18	72-33-02	33
B.513847	72-33-02	34
B.513849-52	72-33-02	37
B.513856	72-42-01	3
B.513857-58	72-33-02	39
B.513859	72-33-02	40
B.513976	72-52-03	7
B.514428	72-33-02	46
B.514429	72-33-02	47
B.514436	72-33-02	48
B.514456	72-33-02	49
B.514498	72-33-02	41
B.514517	72-33-02	42
B.514548	72-33-02	43
B.514566	(71-79-02	(1
	(72-01-03	(1
	(72-01-04	(1
	(73-13-01	(1
	(73-13-03	(1
	(75-11-01	(3
	(75-11-02	(1
	(75-01-01	(1
	(75-01-02	(1
	(75-02-01	(1
	(75-02-02	(1
	(75-02-03	(1
	(75-02-04	(1
	(75-02-05	(1
	(75-03-01	(1
	(75-05-02	(1
	(77-12-03	(1
	(79-22-02	(1
	(79-22-04	(1
B.514567	75-11-02	2
B.514577-8	72-53-00	12
B.514631	72-31-03	15
B.514646	75-11-02	3
B.514647	72-32-00	20

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<u>Scheme</u>	<u>Ch/Sect/Sub</u>	<u>Repair No.</u>
B.514656	79-11-01	1
B.514664	72-32-00	21
B.514666	72-32-00	22
B.514667	72-32-00	23
B.514668	72-32-00	24
B.514672	72-41-01	23
B.514696	72-22-01	3
B.514697	72-52-03	10
B.514698	72-61-00	4
B.514743	72-52-03	11
B.514744	72-52-03	12
B.514749	72-33-01	5
B.514784	72-32-00	26
B.514799	72-32-00	25
B.514856	72-62-02	1
B.514883-93	72-65-00	6
B.514987	72-33-02	44
B.515001	72-51-01	12
B.515007	72-32-00	27
B.515008	72-53-00	13
B.515031	72-52-01	11
B.515097	72-34-00	6
B.515216-8	72-33-02	50
B.515275	75-11-02	4
B.515309-10	79-11-01	2
B.515321	72-42-01	6
B.515392	72-65-00	5
B.515436-7	72-33-02	49
B.515456	72-33-02	48
B.515457	76-21-01	4
B.515749	79-11-01	3
B.515937	72-33-02	51
B.516017	72-51-03	7
B.516056 (cancelled)	72-52-01	12
B.516207	72-41-01	25
B.516368	71-20-00	3
B.516402A-B	72-33-02	52
B.516404	72-42-01	7
B.516405A-B	72-33-02	54
B.516413	72-33-02	53
B.516426-31	72-31-03	16
B.516644	72-33-02	55
B.516649	72-62-01	2
B.516721	72-52-01	13
B.516913	72-53-00	14
B.516914	72-33-00	7
B.517103	72-52-01	14

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<u>Scheme</u>	<u>Ch/Sect/Sub</u>	<u>Repair No.</u>
B.517456-93	72-41-01	27
B.517529	72-41-01	26
B.517613	72-41-01	8
B.517751	72-33-02	56
B.517756	72-31-04	5
B.517775	72-41-01	28
B.517804	72-33-02	57
B.517809	72-33-02	58
B.517822	72-52-01	15
B.517833-4	72-51-01	13
B.517842	72-31-04	6
B.517886	72-52-02	11
B.517938	72-53-00	15
B.518042	72-52-01	17
B.518353	72-41-01	29
B.909985	72-23-01	3
B.930265-72	72-31-03	6
B.930273-8	72-31-01	2
B.930279	72-31-02	1
B.930280	(72-31-01	(2
	(72-31-02	(1
B.930281-8	72-33-02	6
B.930289-96	72-33-01	2
B.935523	72-33-02	20
B.935525	72-31-03	11
B.935526	72-33-02	21
B.935531	72-31-03	9
B.935533	72-31-03	10
B.935534	72-32-00	18
B.935535-6	72-34-00	3
B.935539	72-31-03	12
B.935540-1	72-33-01	3
B.935542	72-41-01	12
B.935543 (cancelled)	72-31-04	2
B.935544	72-41-01	15
B.935545	72-41-01	16
B.935546	72-41-01	14
B.935547-8	72-52-03	5
B.935549	72-53-00	6
B.935583-4 (cancelled)	72-41-01	13
B.935591	72-41-01	19
B.935592	72-41-01	18

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TUBES, OIL FEED - REPAIR

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Repair No.	Title	Scheme No.
1	Repair of fretting/damage by inert gas arc welding.	B514566
2	Tube A/O, Pump to air intake case connection - Repair of damaged and/or fretted areas.	B497468
3	Tube A/O, Tube joint to turbine exhaust diffuser connection - Repair of damaged and/or fretted areas.	B497468

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TUBE A/O, OIL
REPAIR OF FRETTING/DAMAGE BY INERT GAS ARC WELDING

REPAIR B.5145661. EFFECTIVITY

IPC	Fig./Item	Part No.
72-01-03	02/240A	B.477271
	01/270A	B.477483
	05/230A	B.480905
	05/230B	B.481127
	04/070A	B.482517

2. REPAIR LIMITATIONS

Refer to Overhaul Manual 72-09-29 Repair.

3. GENERAL

Refer to Overhaul Manual 72-09-29 Repair.

4. REPAIR PROCEDUREREPAIR PROCEDURESUPPLEMENTARY INFORMATION

(1) Weld repair

Refer to Overhaul Manual
72-09-29 Repair.(2) Mark SAL B.514566
or R1 adjacent
normal assy. of
number using the
electro-chemical
marking or vibro-
percussion engraving
techniques.Refer to Overhaul Manual
72-09-00 Repair.5. MATERIAL

<u>COMPONENT</u>		<u>MATERIAL</u>	<u>RR CODE</u>
B.477271)		
B.477483)		
B.480905)	MSRR 6524	EBS
B.481127)		
B.482517)		

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Repair No.1

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6. DATA

PRESSURE TEST REQUIREMENTS:

TEST MEDIUM TO BE WATER

<u>PART NO.</u>	<u>PRESSURE TEST</u>	<u>MIN. GAUGE</u>
B.477271	NOT REQUIRED	0.027 (0,69)
B.477483	600 lbf/sq.in. (4,14 MPa) for 2 mins.	0.027 (0,69)
B.480905	NOT REQUIRED	0.027 (0,69)
B.481127	NOT REQUIRED	0.027 (0,69)
B.482517	600 lbf/sq.in. (4,14 MPa) for 2 mins.	0.027 (0,69)

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE.		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			

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TUBE A/O, PUMP TO AIR INTAKE CASE CONNECTION
REPAIR OF DAMAGED AND/OR FRETTED AREAS

REPAIR B.497468

1. EFFECTIVITY

<u>IPC</u>	<u>FIG/ITEM</u>	<u>PART NO.</u>
72-01-03	01/270A	B477483

2. REPAIR LIMITATIONS

Refer to Overhaul Manual 72-09-30 Repair.

3. GENERAL

Refer to Overhaul Manual 72-09-30 Repair.

4. REPAIR PROCEDURE

<u>REPAIR PROCEDURE</u>	<u>SUPPLEMENTARY INFORMATION</u>
(1) Repair	Refer to Overhaul Manual 72-09-30 Repair
(2) Mark SAL B497468 or R2 adjacent normal assy. of number using the electro- chemical marking technique.	Refer to Overhaul Manual 72-09-00 Repair

5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
B477483	MSRR 6524	EBS

6. DATA

PRESSURE TEST REQUIREMENTS:

<u>PART NUMBER</u>	<u>STANDARD PRESSURE TEST REQUIREMENT</u>	<u>COMMON PRESSURE TEST REQUIREMENT</u>
B477483	240 PSI FOR 1 MINUTE	USE 600 PSI FOR 2 MINUTES

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7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
--------------------	--------------------	-------------

NONE

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
B427694	UNION NUT	A/R	1
B458480	FERRULE	A/R	2
*B451821	CONNECTOR	A/R	3
*B474910	CONNECTOR	A/R	4
B435523	DOUBLE FLANGED CONNECTOR	A/R	5
B445304	TUBE JOINT	A/R	6

*ALTERNATIVES

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TUBE A/O, TUBE JOINT TO TURBINE EXHAUST
DIFFUSER CONNECTION
REPAIR OF DAMAGED AND/OR FRETTED AREAS

REPAIR B.4974681. EFFECTIVITY

<u>IPC</u>	<u>FIG/ITEM</u>	<u>PART NO.</u>
72-01-03	4/ 70A	B482517

2. REPAIR LIMITATIONS

Refer to Overhaul Manual 72-09-30 Repair.

3. GENERAL

Refer to Overhaul Manual 72-09-30 Repair.

4. REPAIR PROCEDUREREPAIR PROCEDURESUPPLEMENTARY INFORMATION

(1) Repair

Refer to Overhaul Manual
72-09-30 Repair(2) Mark SAL B497468 or R3
adjacent normal assy. of
number using the electro-
chemical marking technique.Refer to Overhaul Manual
72-09-00 Repair5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
B482517	MSRR 6524	EBS

6. DATAPRESSURE TEST REQUIREMENTS:

<u>PART NUMBER</u>	<u>STANDARD PRESSURE TEST REQUIREMENT</u>	<u>COMMON PRESSURE TEST REQUIREMENT</u>
B482517	200 PSI FOR 1 MINUTE	USE 600 PSI FOR 2 MINUTES

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Repair No.3

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7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
B440446	UNION ADPATOR	A/R	1
B481701	OIL TRANSFER ELBOW	A/R	2
B445304	TUBE JOINT	A/R	3

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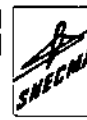
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TUBES, OIL SCAVENGE - REPAIR

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Repair No.

Title

Scheme No.

1

Repair of fretting/damage by
inert gas arc welding.

B.514566

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REPAIR

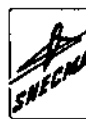
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TUBE A/O, OILREPAIR OF FRETTING/DAMAGE BY INERT GAS ARC WELDINGREPAIR B.5145661. EFFECTIVITY

IPC	Fig./Item	Part No.
72-01-04	03/110B	B.480909
	01/160A	B.481107
		B.479263
	04/090B	B.482503
	03/110A	B.482663
	01/210A	B.484010

2. REPAIR LIMITATIONS

Refer to Overhaul Manual 72-09-29 Repair.

3. GENERAL

Refer to Overhaul Manual 72-09-29 Repair.

4. REPAIR PROCEDUREREPAIR PROCEDURESUPPLEMENTARY INFORMATION

(1) Weld repair

Refer to Overhaul Manual
72-09-29 Repair.(2) Mark SAL B.514566
or R1 adjacent
normal assy. of
number using the
electro-chemical
marking or vibro-
percussion engraving
techniques.Refer to Overhaul Manual
72-09-00 Repair.5. MATERIAL

<u>COMPONENT</u>		<u>MATERIAL</u>	<u>RR CODE</u>
B.480909)		
B.481107)		
B.479263)	MSRR 6524	EBS
B.482503)		
B.482663)		
B.484010)		

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Repair No.1

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6. DATA

PRESSURE TEST REQUIREMENTS:

<u>PART NO.</u>	<u>PRESSURE TEST</u>	<u>MIN. GAUGE</u>
B.480909)	
B.481107)	
B.479263) NOT REQUIRED	0.027 (0,69)
B.482503)	
B.482663)	
B.484010)	

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE.		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			



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STANDARD PRACTICES - REPAIR

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STANDARD PRACTICES - REPAIR

1. General

- A. Repair consists of working on defective components in order to bring them up to a satisfactory standard for achieving a further overhaul life. Repair procedures may also be applied to components for reasons other than repair, e.g. removing and re-applying protective finishes to facilitate crack detection.
- B. General repair procedures are detailed subsequently in this Chapter, while all forms of finishes are detailed under their own subject number 72-09-01, 02 etc. (Ref. Repair Table of Contents). Special repair procedures, areas of finishes, dressing of damage etc. for individual components are detailed in the Chapter applicable to the assembly concerned.
- C. Any necessary work shall comply with the requirements of the relevant Inspection Report. Satisfactory completion of repair shall be inspected and signed for by a qualified inspector.
- D. The processes for carrying out certain repairs may contain Controlled Manufacturing Technique (CMT) procedures. These procedures are mandatory and variations are prohibited. All repairs so affected are identified by a CAUTION at the commencement of the repair procedure.

2. Repair Illustrations

A. Geometric Tolerances.

- (1) All geometric tolerances shown conform to the International Standards Organization (I.S.O.) Geometric Tolerance System.

B. Dimensional Tolerances.

- (1) Unless otherwise stated on a particular illustration, the following tolerances shall be observed.

- (a) Machined dimensions ± 0.010 in.
 $(\pm 0,25 \text{ mm})$
- (b) Diameter of drilled holes ... $\pm 0.010 - 0.002$ in.
 $(+ 0,25 - 0,05 \text{ mm})$
- (c) Angles ± 2 deg

- (2) All dimensions apply at an ambient temperature of 20 deg C. Due allowance shall be made when checking dimensions at an ambient temperature other than that stated.

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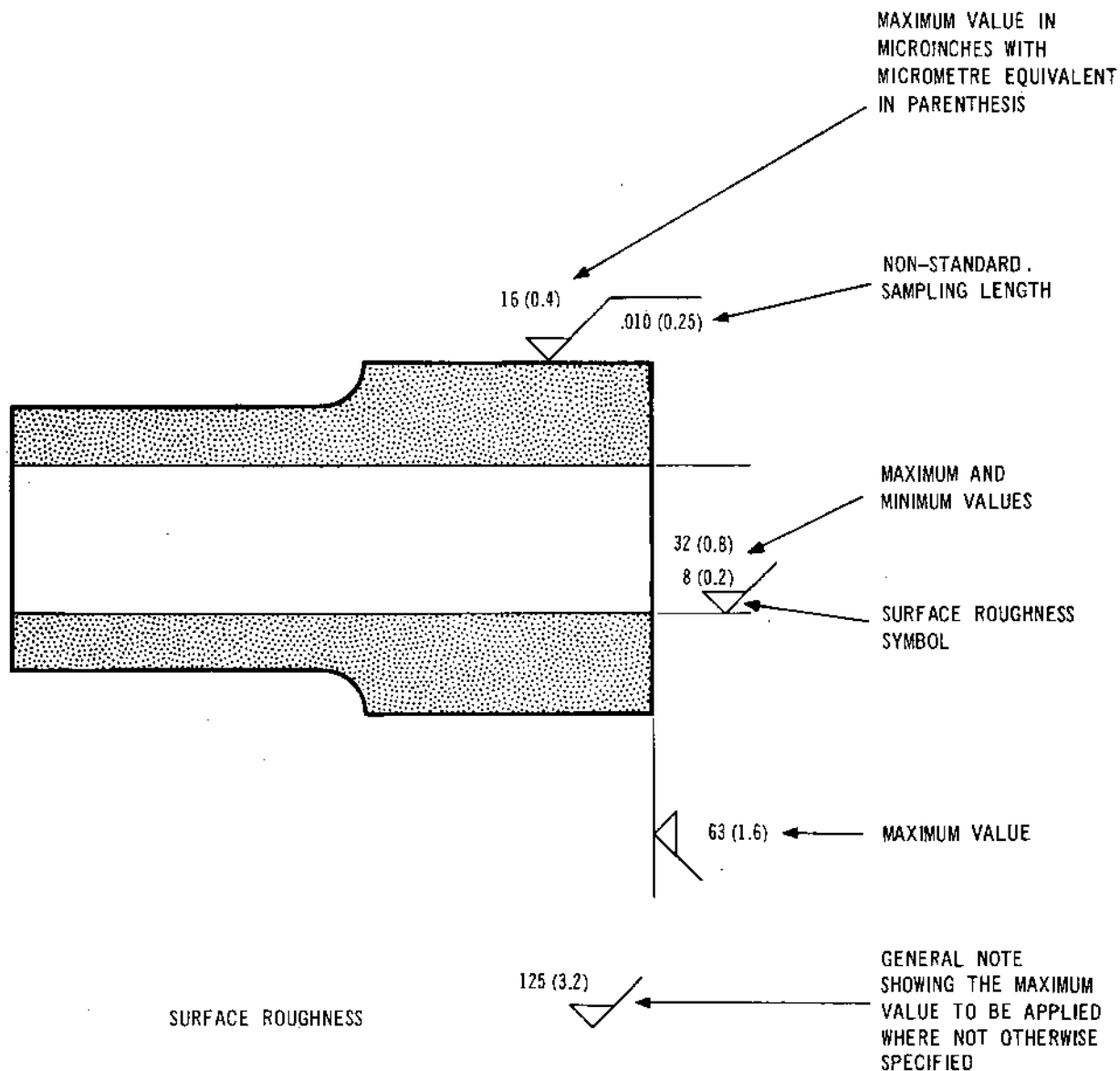
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Examples of Typical Surface Roughness Symbols and Values
Figure 401

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C. Surface Roughness.

- (1) Surface roughness is indicated by a symbol and adjacent numbers which represent the average departure from perfection of the surface over a prescribed length, usually 0.030 in. (0,8 mm). The roughness values are identical to Centre Line Average (CLA) and Arithmetical Average (AA) values. Refer to Fig.401 for examples of typical surface roughness symbols and values.
- (2) Refer to Inspection/Check for methods of inspecting for surface roughness.

3. Permanent Marking

A. General.

- (1) Permanent marking is used to mark repair scheme numbers and similar identification numbers or symbols on components. Recommended methods of marking are detailed subsequently.
- (2) Unless otherwise stated, the method used, and the size and style of the symbols should be the same as existing markings, and the markings close to the existing ones.
- (3) When a marking supersedes a previous one, the superseded one shall be cancelled by a single line-through so that it remains legible for reference purposes.
- (4) Markings shall not be applied to running, mating or highly stressed surfaces. Neither shall they be applied near component edges, corners, fillet radii or similar locations.

B. Repair Scheme Marking.

Each repair instructs the marking of the repair scheme number (e.g. SAL. B.478105) (Ref. Contents 72-51-04 Repair) close to the existing part number of the component. Where space is limited, an abbreviated Repair No. of the SAL. Scheme No. may be used as an alternative (e.g. Repair No.1 to R.1).

When the repair scheme is a collective repair (e.g. B.478108-10) each component number must be identified by a letter following the Repair No. (e.g. SAL. B.478108-10 becomes R.2A, R.2B and R.2C).

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In addition, when a repair scheme is carried out more than once on a component, it must be identified by the addition of the letter 'X' after the number or letter, for each additional application after the first (e.g. R.1X for the second application and R.2AXX for the third application on the collective repair).

C. Acid Etching.

- (1) This method consists of applying acid to the surface of the component using rubber stamps, and allowing the acid to etch the surface for a sufficient time to give legible symbols. It is suitable for case-hardened and nitrided steels, Nimonic alloy steels and corrosion-resisting steels.

WARNING: WEAR PROTECTIVE CLOTHING AND OBSERVE THE APPROPRIATE INDUSTRIAL REGULATIONS WHEN HANDLING DANGEROUS CHEMICALS.

CAUTION: DO NOT USE RUBBER STAMPS EMPLOYED WITH ETCHING SOLUTIONS FOR ANY OTHER MARKING PURPOSES.

- (2) The composition of the etching solution is dependent upon the type of steel to be marked.

- (a) For case-hardened steel the solution comprises:

Selenious acid	20 g
Copper sulphate (crystals) ...	10 g
Nitric acid (concentrated) ...	15 ml
Water	80 ml

- (b) For nitrided steels, Nimonic alloy steels and corrosion-resisting steels the solution comprises:

Selenious acid	20 g
Copper sulphate (crystals) ...	10 g
Nitric acid (concentrated) ...	25 ml
Hydrochloric acid	60 ml
Water	10 ml

- (3) Immediately after etching the markings shall be neutralized, the component thoroughly washed and then protected against corrosion by the application of an approved de-watering oil.

D. Vibro-percussion Engraving.

- (1) This method consists of marking the surface of the component with a series of small impressions using an electrically operated hammer. It is suitable for general application except in highly-stressed locations.

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- (2) The marking produced should be as light as possible, consistent with legibility. The stylus tip radius shall be 0.020 in. (0,51 mm) minimum to avoid possible reduction of fatigue strength in the component.

E. Electro-chemical Marking.

- (1) Marking by this method is applicable to all metals provided the surface is not covered by a low-conductivity layer, e.g. anodizing, etc. It consists of passing a d.c. and/or a.c. current between a pen and the component. Interposed between the two is a pad soaked in electrolyte and a stencil to produce the required symbols.
- (2) Surfaces to be marked should be free from contamination and reasonably smooth and bright, or slightly roughened as obtained by vapour blasting. Light oiling of the surface helps in preventing blurring of the symbols.
- (3) If a typed stencil is used, it should be cut to a size slightly larger than the pad. The pad should be soaked in the electrolyte and allowed to drain, then affixed, together with the stencil (with its backing paper removed), to the pen using a rubber band.
- (4) The current setting and timing device shall be set before the pen is pressed against the surface to be marked. The application pressure should be light to avoid blurring the symbols.
- (5) After marking the surplus electrolyte should be wiped up, the surface neutralized if required, and the component protected against corrosion by the application of an approved de-watering oil.
- (6) Faulty markings may be removed by abrading with a nylon pad, e.g. Scotchbrite.
- (7) Refer to Table 401 for recommended electrolytes. With the exception of EM.16, the electrolytes, together with pens, pads and stencils, are obtainable from Lectroetch Ltd., Spur Road, North Feltham, Middlesex, England. EM.16 is obtainable from Rolls-Royce Limited, Aero Division, P.O. Box 3, Filton, Bristol BS12 7QE, England.

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MATERIAL	ELECTROLYTE
Mild steel, stainless steels and copper	L.653A*
Hardened steel and black oxide on copper and steel	LNC.4
Cadmium, aluminium and bronze	LNC.5
Chromium, nickel alloys and cobalt alloys	RR.33* or EM.16*

* NOTE: These electrolytes are self inhibiting and
do not require neutralizing.

Recommended Electrolytes for Electro-chemical
Marking
Table 401

- (8) After use, pads shall be neutralized, washed in water
and dried. Different pads shall be used with
different electrolytes and, preferably, different
metals.

4. Renewing Helicoil Inserts

A. General.

- (1) The following procedure must be used when renewing
defective Helicoil screw locking inserts.
- (2) The special tools illustrated in the procedure must
be used to avoid damaging the insert and/or component.
These tools are detailed in Tables 402 and 403.
- (3) Refer to Table 406 for the Trouble Shooting Chart,
which highlights problems experienced with Helicoil
inserts and their possible causes and remedies.

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B. Remove the Defective Insert.

- (1) Apply the extraction tool as shown (Ref.Fig.402), lightly tap it with a 6 to 8 oz (170 to 230 g) hammer then rotate the tool counter-clockwise to withdraw the insert.
- (2) Scrap the extracted insert; under no circumstances shall extracted inserts be reinstalled.
- (3) Examine the tapped hole for cleanliness and freedom from damage.

SIZE	EXTRACTION TOOL		INSERTING TOOL		TANG BREAK-OFF TOOL
in. x t.p.i.	APC Part No.	RR Part No.	APC Part No.	RR Part No.	APC Part No.
O.1900-32	1227-6	HC22913	ST1062	HC22891	3581-3(-3)
O.2500-28	1227-6	HC22914	ST1088	HC22892	3581-4(-3)
O.3125-24	1227-6	HC22914	ST1089	HC22943	3581-5(-3)
O.3750-24	1227-6	HC22915	ST1090	HC25569	3581-6(-3)
O.4375-20	1227-16	*	ST1091	*	3581-7(-3)
O.5000-20	1227-16	*	ST1092	HC25606	3581-8(-3)
O.5625-18	1227-16	HC22925	*	*	1196-9(-3)
O.6250-18	1227-16	*	*	HC25607	1196-10(-3)
O.7500-16	1227-16	*	*	*	1196-12(-3)
O.8750-14	1227-16	*	*	*	*
1.0000-12	1227-16	*	*	*	*

NOTE: APC - Armstrong Patents Company Limited.
RR - Rolls-Royce Limited, Aero Division, Bristol.
* - Tools not available at time of issue.

Removal and Installation Tools for
Helicoil Inserts
Table 402

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SIZE	PROBE GAUGE	TORQUE CHECK GAUGE	ADAPTER
in. x t.p.i.	APC Part No.	RR Part No.	RR Part No.
O.1900-32	ST875	HCU5036	HC21739
O.2500-28	ST876	HCU5037	HC21740
O.3125-24	ST877	HCU5038	HC21741
O.3750-24	ST878	HCU5039	HC21742
O.4375-20	ST879	HCU5040	HC22844
O.5000-20	ST939	*	HC22845
O.5625-18	+	+	HC22846
O.6250-18	+	+	HC22680
O.7500-16	+	+	HC22681
O.8750-14	+	+	*
1.0000-12	+	+	*

NOTE: APC - Armstrong Patents Company Limited.
RR - Rolls-Royce Limited, Aero Division, Bristol.
* - Tools not available at time of issue
+ - May be visually examined for cross threading

Examination Tools for Installed
Helicoil Inserts
Table 403

C. Install the New Insert.

- (1) Select a new insert of the correct Part No. for the particular application.
- (2) Withdraw the threaded mandrel of the inserting tool and place the insert in the loading chamber (Ref.Fig.403, detail A).
- (3) Preventing the insert from moving using the thumb, screw the threaded mandrel into the insert until the driving feature engages the insert tang (Ref.detail B).

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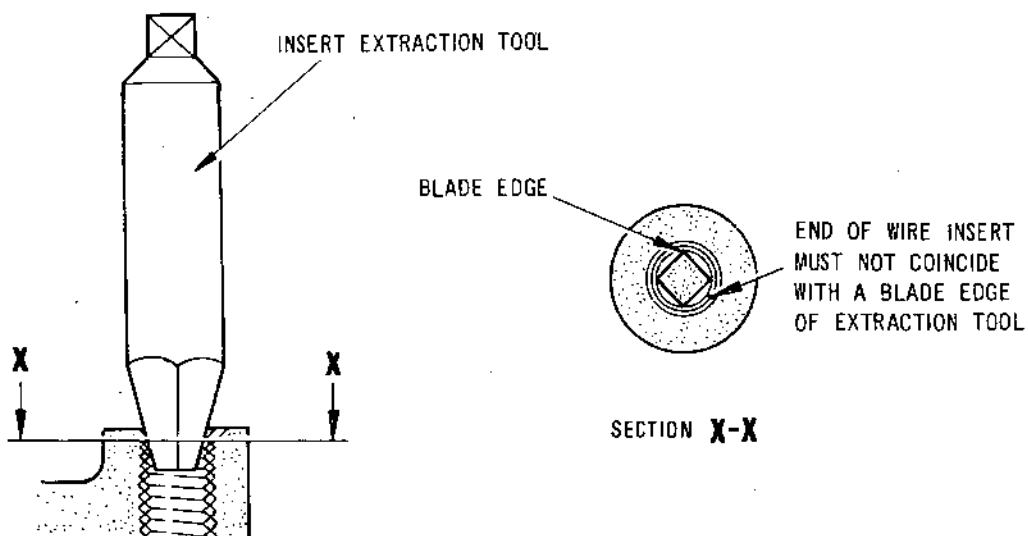
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Removing Helicoil Inserts
Figure 402

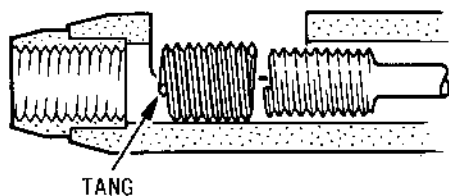
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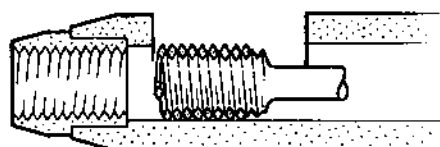
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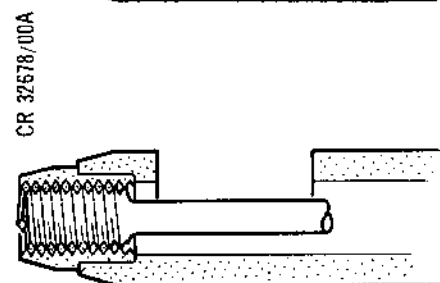
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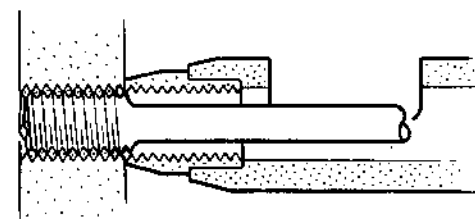
DETAIL
A



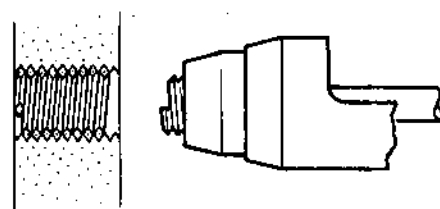
DETAIL
B



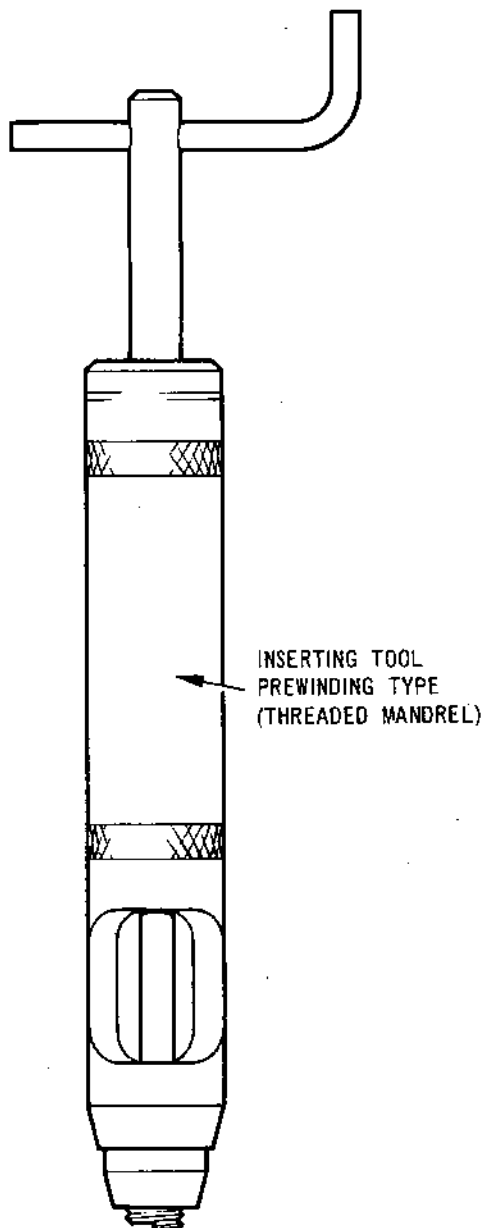
DETAIL
C



DETAIL
D



DETAIL
E



INSERTING TOOL
PREWINDING TYPE
(THREADED MANDREL)

Installing Helicoil Inserts
Figure 403

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(4) Continue turning the mandrel whilst pushing forward gently until the insert enters the thread in the tool nozzle. Wind the insert into the nozzle until it is about to emerge from the open end (Ref. detail C).

(5) In aluminium and magnesium components, apply a coating of PL32L jointing compound to the tapped hole.

NOTE: The coating of jointing compound prevents electrolytic corrosion between the insert and the component.

(6) Place the loaded tool squarely over the tapped hole in the component and screw in the mandrel carefully until the insert enters the hole. Continue screwing until the insert is at the required depth as detailed in para.4.E. (Ref. detail D).

(7) Unscrew the mandrel until it is clear of the insert (Ref. detail E).

D. Remove the Tang.

CAUTION: IF THE INSERT IS INSTALLED IN A THROUGH HOLE, TAKE APPROPRIATE PRECAUTIONS TO PREVENT THE REMOVED TANG FROM BECOMING LOST WITHIN THE ENGINE.

(1) Place the tang break-off tool into the insert and allow the punch to rest on the tang (Ref. Fig. 404).

(2) Holding the sleeve firmly, deliver a sharp blow on the end of the punch using a 6 to 8 oz (170 to 230 g) hammer.

NOTE: The tang will break off cleanly at the notch.

(3) Remove the tool and retrieve the tang immediately.

NOTE: All tangs are to be accounted for, with reference to the number of inserts installed.

E. Inspect the Installed Insert.

(1) Check the depth of the insert below the component surface (Ref. Fig. 405). Unless otherwise stated the depth shall be as shown on the illustration. Refer to Table 404 for interpretation of standard depths.

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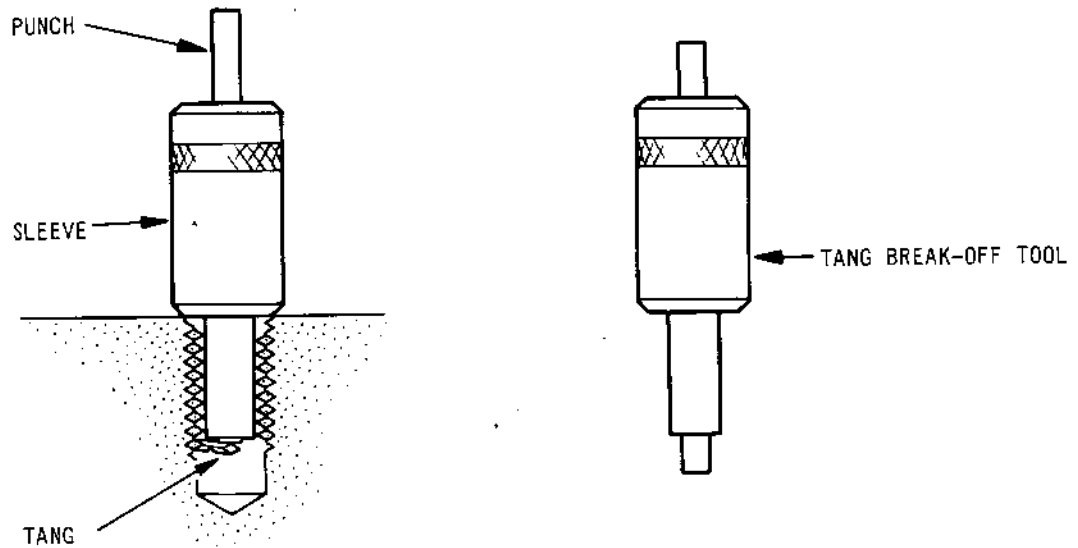
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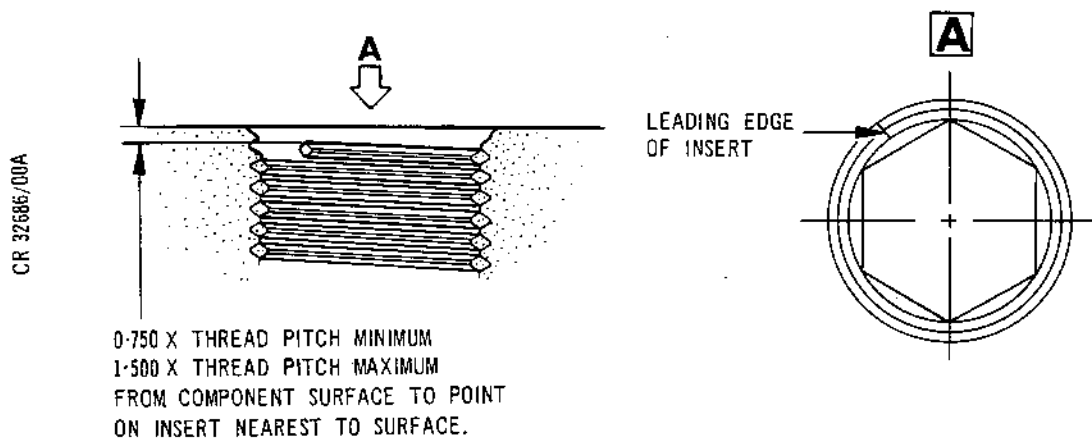


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Removing Helicoil Insert Tangs
Figure 404



Checking the Depth of Installed Helicoil Inserts
Figure 405

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SIZE	MINIMUM DEPTH (0.75 x THREAD PITCH)		MAXIMUM DEPTH (1.5 x THREAD PITCH)	
	in.	mm	in.	mm
0.1900-32	0.023	0,58	0.047	1,19
0.2500-28	0.027	0,69	0.054	1,37
0.3125-24	0.031	0,79	0.062	1,57
0.3750-24	0.031	0,79	0.062	1,57
0.4375-20	0.038	0,97	0.075	1,90
0.5000-20	0.038	0,97	0.075	1,90
0.5625-18	0.041	1,04	0.083	2,11
0.6250-18	0.041	1,04	0.083	2,11
0.7500-16	0.047	1,19	0.094	2,39
0.8750-14	0.054	1,37	0.107	2,72
1.0000-12	0.062	1,57	0.125	3,18

Interpretation of Helicoil Insert Standard Depths
Table 404

- (2) Check the insert for cross threading.
 - (a) On inserts of sizes 0.5 in. and below, install the appropriate probe gauge to the full insert depth (Ref.Fig.406).
 - (b) On inserts of sizes above 0.5 in., check for cross threading visually.
- (3) Check the insert for minimum locking (run-down) torque.
 - (a) Preset the torque-limiting driver or torque wrench to the required minimum locking torque value (Ref. Table 405).
 - (b) Assemble the driver or wrench, adapter and appropriate torque check gauge.

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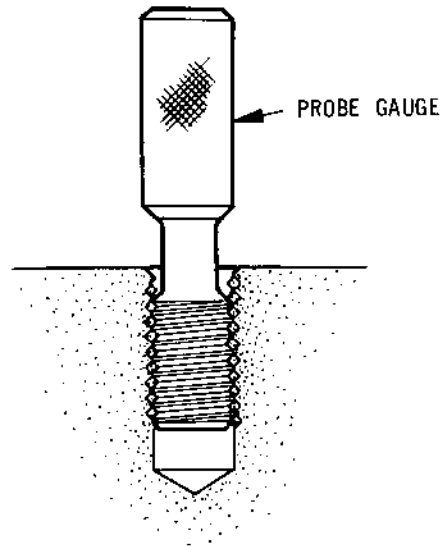
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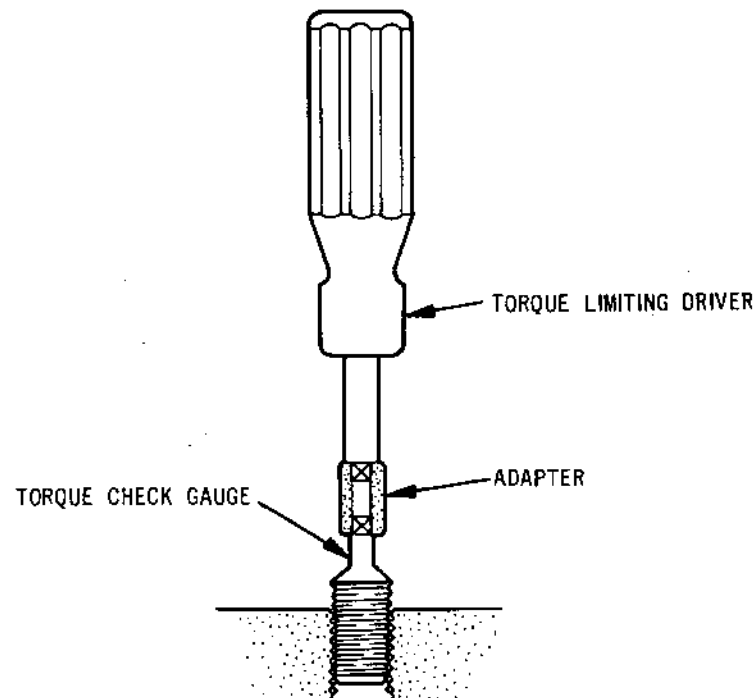


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Checking Helicoil Inserts for Cross Threading
Figure 406

CR 32681/00A



Checking Helicoil Inserts for Minimum Locking Torque
Figure 407

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- (c) Screw the gauge into the insert and ensure that the driver slips or the wrench breaks as the gauge enters the insert locking element (Ref.Fig.407).

- (4) Renew inserts which fail any of the preceding checks.

SIZE	MINIMUM LOCKING TORQUE	
	lb f in.	N.m
in. x t.p.i.		
0.1900-32	2.0	0,23
0.2500-28	3.5	0,40
0.3125-24	6.5	0,73
0.3750-24	9.5	1,07
0.4375-20	14.0	1,58
0.5000-20	18.0	2,03
0.5625-18	24.0	2,71
0.6250-18	32.0	3,62
0.7500-16	50.0	5,65
0.8750-14	70.0	7,91
1.0000-12	92.0	10,40

Minimum Locking Torque Values for Helicoil Inserts
Table 405

ITEM	DEFECT	CAUSE	REMEDY
1	Locking torque below minimum specified	(i) Undersize and/or worn bolt	Renew bolt
		(ii) Oversize tapped hole	Adopt salvage procedure
		(iii) Incorrect inserting tool	Use correct tool; renew insert
		(iv) Worn and/or damaged insert	Renew insert

Helicoil Insert Trouble Shooting Chart
Table 406 (Continued)

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ITEM	DEFECT	CAUSE	REMEDY
2	Insert partially (i) or completely extracted with bolt	Insert installed using incorrect or damaged tool	Renew tool; renew insert
		(ii) Incorrect bolt (e.g. plated)	Renew bolt; renew insert
		(iii) Seizure of bolt in insert (through overheating, wear and/or corrosion)	Renew bolt; renew insert
		(iv) Tapped hole out of position	Adopt salvage procedure
3	Insert screwed further down tapped hole when bolt installed	(i) Unclean tang break-off through incorrect depth of notch	Renew insert; reject insert batch if repeated
		(ii) Tang removed using incorrect tool	Use correct tool; renew insert
		(iii) Incorrect bolt (e.g. plated)	Renew bolt; renew insert
		(iv) Insert installed using incorrect or damaged tool	Renew tool; renew insert
4	Insert cross threaded during installation	(i) Insert installed using incorrect or damaged tool	Renew tool; renew insert
		(ii) Last coil dislodged during tang removal	Relocate last coil using a scriber of suitable shape or renew insert

Helicoil Insert Trouble Shooting Chart
Table 406 (Continued)

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ITEM	DEFECT	CAUSE	REMEDY
5	Failure of tang to break off	(i) Incorrect depth of notch	Renew insert; reject insert batch if repeated
6	Difficulty in installing probe gauge when insert is not cross threaded	(i) Undersize tapped hole	Retap hole; renew insert
		(ii) Remains of previous application of jointing compound in tapped hole (aluminium and magnesium components only)	Clean hole using a suitable solvent; renew insert
		(iii) Swarf lodged between insert and tapped hole	Clean hole; renew insert
		(iv) Damaged probe gauge	Renew gauge

Helicoil Insert Trouble Shooting Chart
Table 406 (Concluded)

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INSERT SIZE AND PART NUMBERS	ROUGHING TAP	PLUG TAP	BOTTOMING TAP	GAUGE
NO.10-32 AGS3706 AGS3731 AGS3756 AGS3781	1709503	1709523	1709543	1709563
0.250-28 AGS3707 AGS3732 AGS3757 AGS3782	1709504	1709524	1709544	1709564
0.3125-24 AGS3708 AGS3733 AGS3758 AGS3783	1709505	1709525	1709545	1709565
0.375-24 AGS3709 AGS3734 AGS3759 AGS3784	1709506	1709526	1709546	1709566
0.4375-20 AGS3710 AGS3735 AGS3760 AGS3785	1709507	1709527	1709547	1709567
0.500-20 AGS3711 AGS3736 AGS3761 AGS3786	1709508	1709528	1709548	1709568

Tools for Retapping Tapped Hole
Table 407REPAIR
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5. Renewing Self-Locking Nut and Clip Assemblies

- A. To renew self-locking nut and clip assemblies, the procedure illustrated in Fig.408 shall be used.

6. Reconditioning Cupwashers

NOTE: This procedure is only applicable if the rim of the cupwasher is unused for a sufficient length to give a minimum space of two nut slots between the new locking locations and any previous locking locations. If this condition cannot be met, the cupwasher shall be rejected.

- A. Scallop the rim of the cupwasher at previous locking locations to approximately one quarter of the cupwasher depth (Ref.Fig.409).

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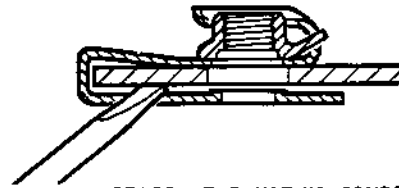
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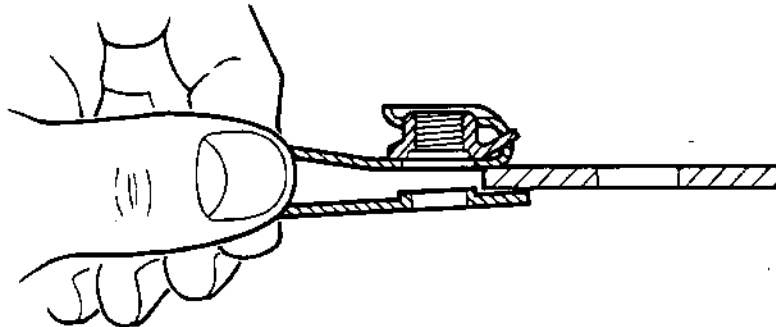
Dec 1/96



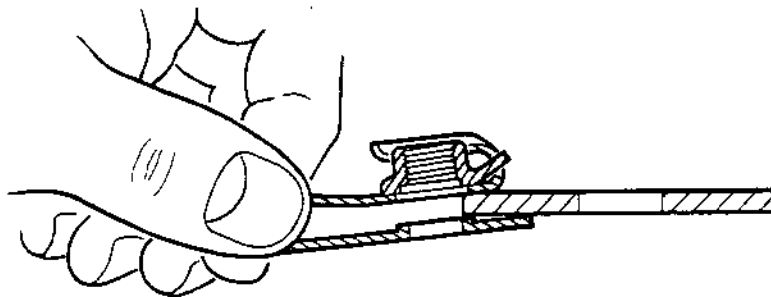
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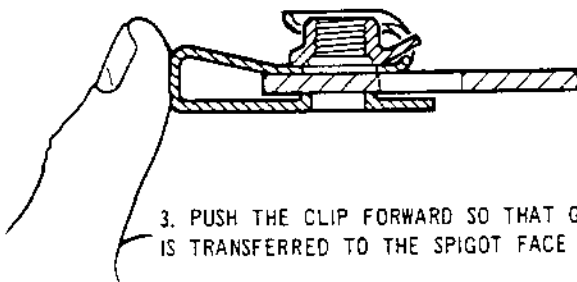
INSERT THE THIN END OF A SUITABLE LEVER BETWEEN THE MATING COMPONENT AND THE SPIGOT SIDE OF THE CLIP.
TURN THE LEVER TO LIFT THE SPIGOT CLEAR OF ITS SOCKET AND WITHDRAW THE ASSEMBLY FROM ITS MATING COMPONENT.
REMOVING THE DEFECTIVE SELF-LOCKING NUT AND CLIP ASSEMBLY



1. PUSH THE MOUTH OF THE CLIP AGAINST THE MATING COMPONENT UNTIL A POSITIVE GRIP HAS BEEN ACHIEVED



2. DEPRESS THE REAR OF THE CLIP SUFFICIENTLY TO ENSURE THAT THE LOCATING SPIGOT WILL CLEAR THE EDGE OF THE MATING COMPONENT



3. PUSH THE CLIP FORWARD SO THAT GRIP IS TRANSFERRED TO THE SPIGOT FACE



4. SLIDE THE CLIP ALONG THE MATING COMPONENT UNTIL THE LOCATING SPIGOT CORRECTLY ENGAGES IN ITS SOCKET

INSTALLING THE NEW SELF-LOCKING NUT AND CLIP ASSEMBLY

Renewing Self-locking Nut and Clip Assemblies
Figure 408

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B. Radius and dress the edges and corners of the scallop.

NOTE: Witness of the previous locking is permissible after scalloping and dressing.

7. Reconditioning Main Bearings

A. Ball Bearings.

- (1) Reconditioning is not permitted.

B. Roller Bearings.

- (1) Non-locating races may be interchanged provided that the replacement one is of the same type, manufacture, material and approximate life as the rejected one.
- (2) Rollers may be interchanged provided that:
 - (a) They are of the same type, manufacture, material and approximate life.
 - (b) They are not from a bearing which was rejected because of overheating.
 - (c) The variation in size and ovality of all the rollers in the set (including replacement ones) does not exceed 0.0001 in. (0,002 mm) when measured with an instrument having an accuracy in the order of 0.00001 in. (0,0002 mm).
- (3) After substitution of races and/or rollers the assembled bearing must comply with the limits specified in FCS.

8. Renewing Locating Pins

A. Aluminium Components.

- (1) Heat the component to 100 deg C and withdraw the pin.

CAUTION: WHEN DRILLING PINS, ENSURE THAT THE DRILL DOES NOT BREAK INTO THE COMPONENT.

- (2) If there is insufficient pin stand-out to grip, drill a suitable hole in the pin, heat the component to 100 deg C and use an extractor to withdraw the pin.

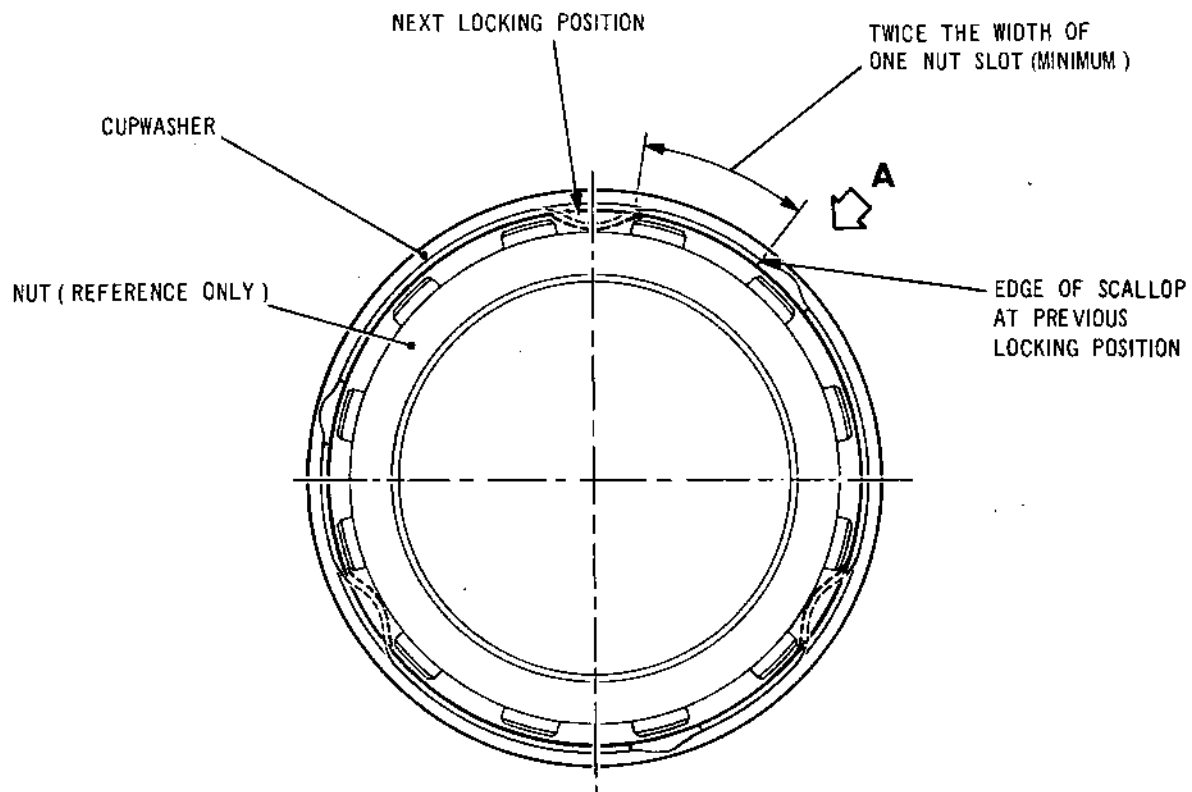


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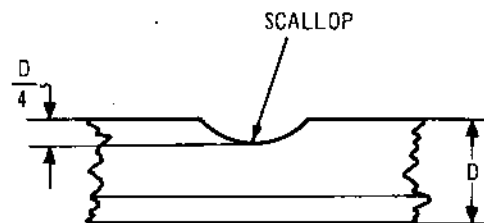
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PLAN VIEW OF TYPICAL CUPWASHER



ENLARGED VIEW AT **A**

Reconditioning Cupwashers
Figure 409

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B. Other Components.

CAUTION: WHEN DRILLING PINS, ENSURE THAT THE DRILL DOES NOT BREAK INTO THE COMPONENT.

- (1) Drill the pin to a thin shell.
- (2) Collapse and remove the pin remains, taking care not to damage the hole.

9. Renewing Self-locking Shank Nuts

A. Remove the Defective Nut.

CAUTION: WHEN DRILLING NUTS, ENSURE THAT THE DRILL DOES NOT BREAK INTO THE COMPONENT.

- (1) Drill the shank of the nut to a thin shell.
- (2) Collapse the shank and withdraw the nut, taking care not to damage the hole.

B. Examine the Nut Location.

- (1) Examine the hole and nut abutment faces for burrs and/or debris liable to prevent nut from seating correctly.
- (2) Dress burrs by light stoning and clean the hole and nut abutment faces using a clean, lint-free cloth moistened with kerosine.

C. Install the New Nut (Ref.Fig.410).

- (1) Select a new nut of the correct type and remove any preservative using a clean, lint-free cloth moistened with kerosine.
- (2) Install the nut in the component flange, ensuring that it correctly abuts the flange face.

NOTE: The design of the swaging tool shown in Fig.410, 411 and 412 is not mandatory. However, the swaging tool used must embody the same principles and the same dimensions where specified.

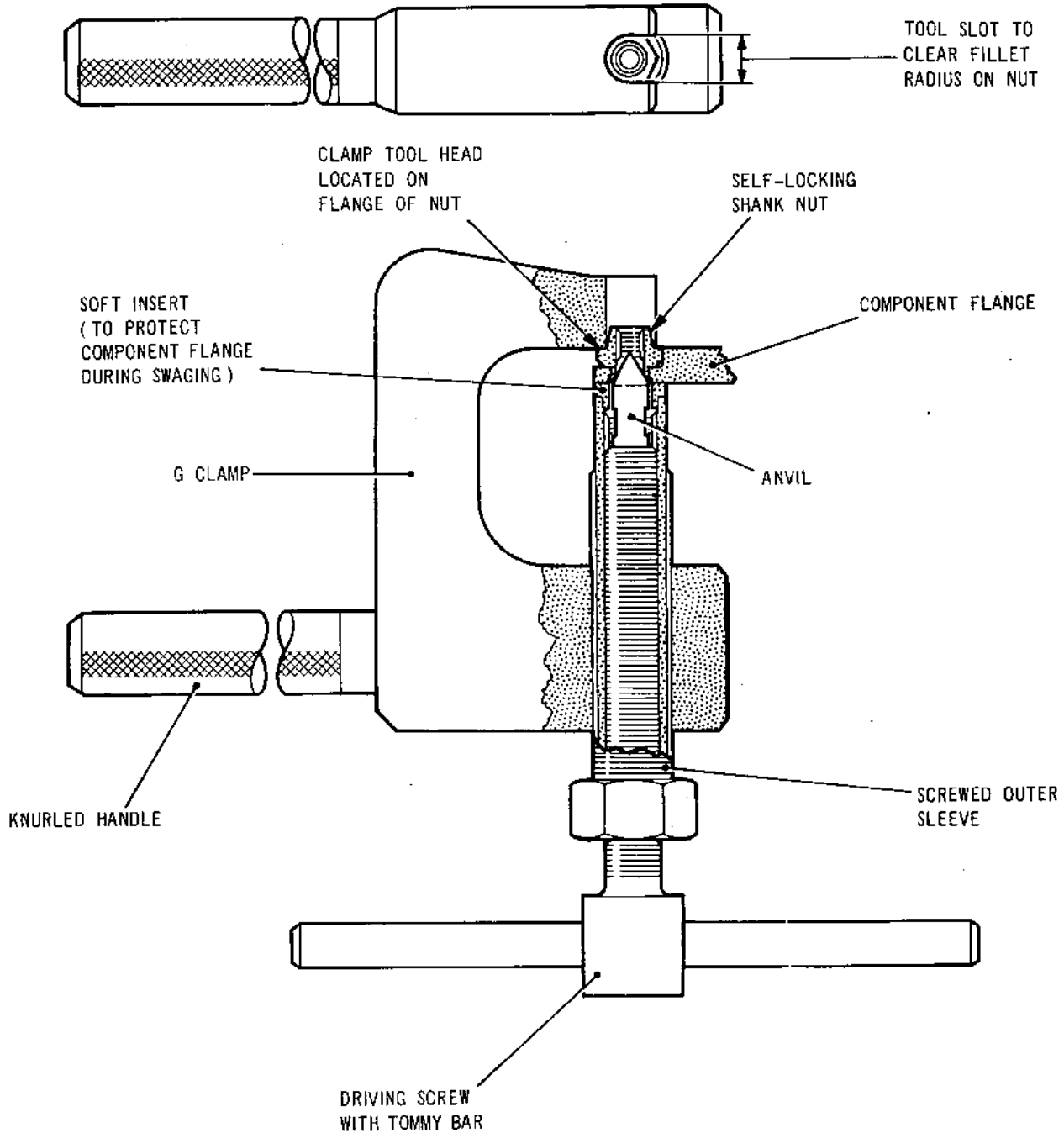


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Swaging Self-locking Shank Nuts
Figure 410

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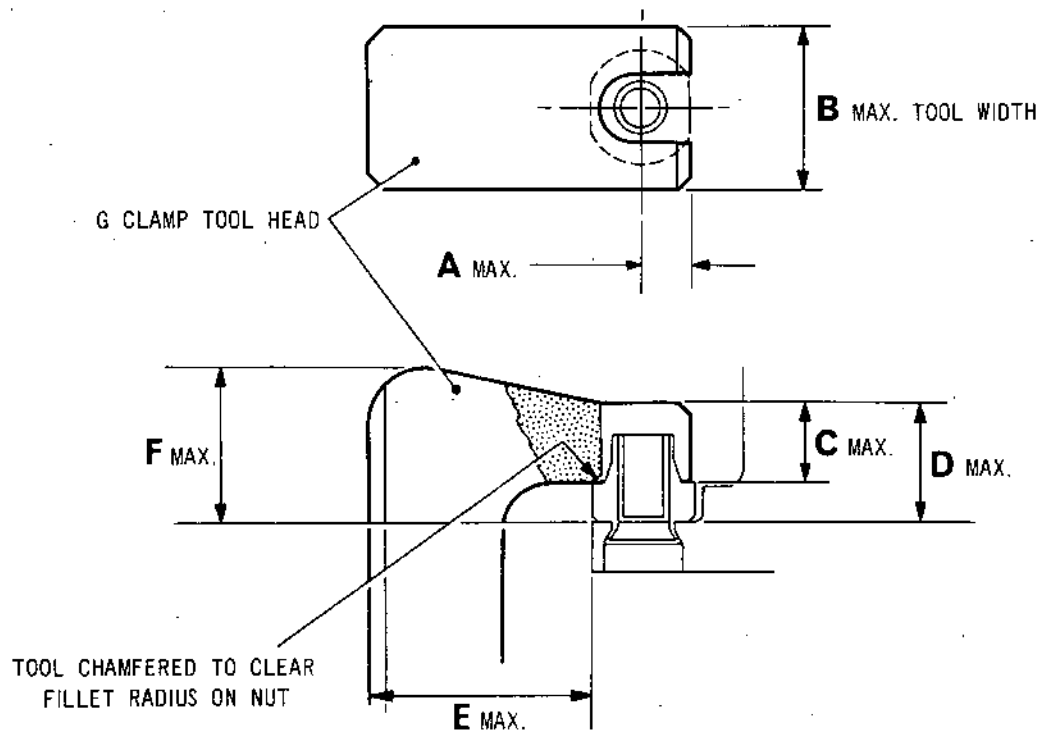
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



SIZE	A	B	C	D	E	F
0.190-32 UNF	0.197 (5,0)	0.750 (19,1)	0.630 (16,0)	0.740 (18,8)	1.614 (41,0)	0.976 (24,8)
0.2500-28 UNF	0.228 (5,8)	0.750 (19,1)	0.630 (16,0)	0.795 (20,2)	1.583 (40,2)	1.031 (26,2)
0.3125-24 UNF	0.240 (6,1)	1.000 (25,4)	0.630 (16,0)	0.827 (21,0)	1.756 (44,5)	1.063 (27,0)
0.3750-24 UNF	0.303 (7,7)	1.126 (28,6)	0.630 (16,0)	0.846 (21,5)	1.874 (47,6)	1.083 (27,5)
0.4375-20 UNF	0.342 (8,7)	1.252 (31,8)	0.630 (16,0)	0.874 (22,2)	2.000 (50,8)	1.110 (28,2)
0.500-20 UNF	0.374 (9,5)	1.252 (31,8)	0.630 (16,0)	0.909 (23,1)	1.252 (31,8)	1.146 (29,1)

Details of Self-locking Shank Nut
Swaging Tool Head
Figure 411

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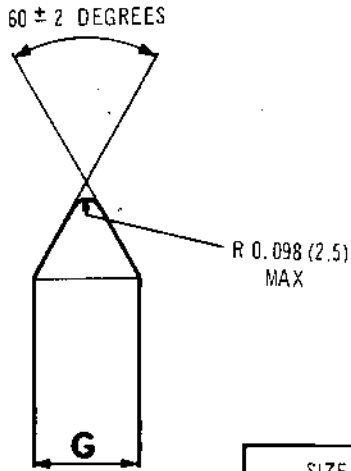
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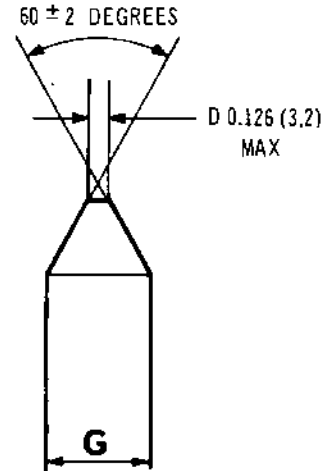
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



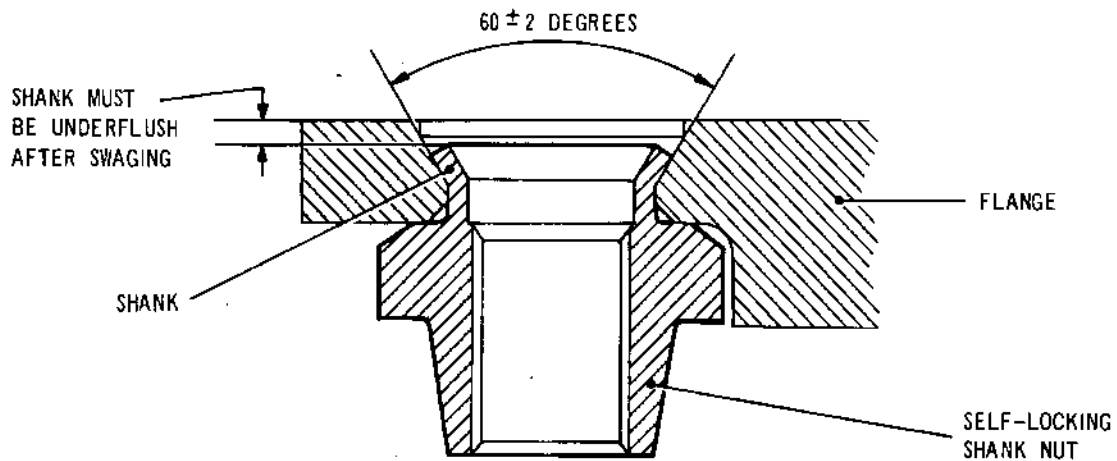
TYPE 1

SIZE	TYPE	G MAX. DIAMETER
0.190-32 UNF	1	0.311 (7.9)
0.250-28 UNF	1	0.374 (9.5)
0.3125-24 UNF	2	0.626 (15.9)
0.3750-24 UNF	2	0.626 (15.9)
0.5000-20 UNF	2	0.575 (14.6)



TYPE 2

Details of Self-locking Shank Nut
Swaging Tool Anvil
Figure 412



Inspecting Installed Self-locking Shank Nuts
Figure 413

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- (3) Select the appropriate swaging tool and install the appropriate anvil; refer to Fig.411 for details of the tool head and to Fig.412 for details of the anvil.
- (4) Unscrew the tool driving screw and outer sleeve and place the tool in position over the nut as shown.
- (5) Carefully screw in the outer sleeve until the nut is held firmly against the flange.
- (6) Carefully screw in the driving screw to swage the nut shank.
- (7) Unscrew the driving screw and outer sleeve, then remove the swaging tool.

D. Inspect the Installed Nut (Ref.Fig.413).

- (1) Ensure that the nut shank is underflush to avoid fouling the mating components.
- (2) Check the nut for security: rotation of the nut up to the trap is permissible, but there must be no detectable axial movement.

NOTE: Damage to the silver coating inside the nut shank is normal and acceptable.

- (3) Remove any loose flakes of silver coating from inside the nut shank.
- (4) Check the locking (run-down) torque (Ref.72-09-00 Inspection/Check).
- (5) Renew nuts which fail any of the preceding checks.

10. Repair Categories and Technical Acceptability

A. General.

- (1) Repairs fall into categories for purposes of technical acceptability and the following information is included for operators who wish to raise their own repairs.



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B. Category 1.

- (1) Repairs on vital parts, where a failure of that part may result in damage to the engine and thereby constitute a hazard to the airworthiness of the aircraft. This category includes all Group A parts but for the acceptability of Repairs may also include some Group B parts.
- (2) Repairs on these parts involve a detailed investigation into the design and stress parameters and may need proving by rig or engine testing. Repair proposals in this category must be referred to Rolls-Royce Ltd.

C. Category 2.

- (1) Repairs on parts, the failure of which may cause extensive secondary damage to the engine, e.g.
 - (a) Repairs on the main load carrying areas of basic structural parts, e.g. compressor casings, main bearing support structures etc.
 - (b) Repairs, particularly by welding, on parts which operate under high pressure and/or high temperature conditions where failure could result in a fire hazard, e.g. combustion casings, compressor outlet casings, exhaust system, by-pass ducts, etc., where failure could result in a fire hazard.
 - (c) Repairs using techniques which can result in a reduction of fatigue strength on highly stressed parts such as main shafts. Plating, metal spraying, electron beam and friction welding come under this heading.
- (2) Repairs in this category require the same type of investigation and proving as for category 1 and must be referred to Rolls-Royce Ltd., for agreement.

D. Category 3.

- (1) Repairs on parts, the performance of which is known to be sensitive to small changes, e.g.
 - (a) The effect which a welding repair on the combustion chamber may have on flame traverse.

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(b) The effect which repairs to rotor blades may have on performance or vibration modes.

- (2) Repairs in this category may require rig or engine testing, or evaluation in service, to ensure that in addition to the reliability of the repaired part there are no adverse secondary effects on other parts of the engine. Reference should be made to Rolls-Royce Ltd., for agreement.

E. Category 4.

- (1) Repairs which require the design and manufacture of special parts, the development of a special technique, which is basic to the design standard of the part, or where interchangeability of the design standard is affected. These will be raised by Rolls-Royce Ltd., as routine.

F. Category 5.

- (1) Standard type repairs on parts or applications not covered in categories 1, 2, 3 or 4. Such repairs include plating, welding, metal spraying etc., where techniques are established and the basis for clearance is general service experience together with the information regarding materials, welding rods, heat treatments, inspection standard etc. contained in the appropriate Overhaul Processes, comparable Repairs and manuals published by Rolls-Royce Ltd.
- (2) Where an operator wishes to raise repairs in this category the necessary procedural arrangements must be made with the appropriate Airworthiness authority. If the agreement of Rolls-Royce Ltd., to individual repairs is desired, the Companies Service Representative or Service Department should be consulted. However, Rolls-Royce Ltd., Aero Division, requests that details of these repairs be provided for information purposes.

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EPOXY MARKING ENAMEL - REPAIR

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EPOXY MARKING ENAMEL - REPAIR

1. Application of Epoxy Marking Enamel

A. General.

- (1) This enamel is used to mark identification lettering in certain locations on the engine.
- (2) Ovens used for stoving shall be adequately ventilated. Waste gases from the heating system shall be excluded from the ovens. Paints based on different resin systems shall not be stoved in the same oven without authorization from the engine manufacturer.

B. Safety Precautions.

- (1) An efficient fume extraction system shall be used where these paints are sprayed. Brushing shall only be done in a well-ventilated area.
- (2) Some of these materials have flash points below 23 deg C and are highly flammable. Materials to which this applies are identified on the manufacturer's label.
- (3) All equipment used in the facility area shall be flame-proof.

C. Materials.

- (1) Refer to Table 401 for approved materials.

MATERIAL	REF.NO.	CODE NO.	SPECIFICATION
White Epoxy Enamel Base	SL.5459	9110-X-0000)	MSRR.9064 and DTD.5555
Catalyst	CSH5538	2000-2-0538)	
Thinners	TSL5373	2000-6-0032)	

Epoxy Marking Enamel Materials
Table 401

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- (2) These materials are obtainable from: International Pinchin Johnson, Transport Division, Rotton Park Street, Ladywood, Birmingham 16, England.
- (3) The shelf life of these materials when stored in their original sealed containers is 12 months in temperate climates and six months in tropical climates.
- (4) Material exceeding this shelf life must be laboratory tested before use.

D. Preparation.

- (1) Vapour degrease the component (Ref.72-09-00 Cleaning) or locally degrease the area to be painted using a clean, lint-free cloth moistened with trichloroethane.

CAUTION: DO NOT HANDLE PREPARED SURFACES AFTER DEGREASING.

- (2) Ensure that there is a minimum time delay between degreasing and painting.
- (3) Mask off the component using a suitable stencil.

E. Application.

- (1) Prepare the enamel.
 - (a) Mix together equal volumes of base and catalyst.
 - (b) Add thinners, if necessary, up to 10 per cent of the volume and mix thoroughly.
 - (c) Allow the mixture to stand for 30 min before use.

NOTE: The pot life of the mixed material will be 8 h. Any material not used within this period shall be discarded.

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- (2) Apply one coat of the prepared enamel to the scheduled areas by brushing or spraying.
- (3) Allow to air dry at a minimum temperature of 16 deg C for 1 h minimum.
- (4) Apply a second coat of enamel if required.
- (5) Allow the final coat to air dry at a minimum temperature of 16 deg C for 4 h minimum, or stove the coating for 30 min at 125 ± 5 deg C, as specified in the relevant Repair Chapter.
- (6) Remove the stencil.

F. Inspection.

- (1) Visually inspect the coating to ensure that it is evenly applied and continuous, giving complete coverage to the scheduled areas.

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ALOCROM 1200 - REPAIR

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ALOCROM 1200 - REPAIR

1. Application of Alocrom 1200

A. General.

- (1) Alocrom 1200 is used to repair damage to the anodic coating on aluminium alloy components.
- (2) This process shall only be used to repair damage in locations which can be effectively swilled, otherwise corrosion may result.
- (3) Alocrom 1200 complies with DTD.900/4413 and is obtainable from I.C.I. Ltd. (Paint Division), Wrexham Road, Slough, Buckinghamshire, England.

B. Safety Precautions.

- (1) Operators handling the materials shall wear respirators, eye shields, P.V.C. gloves, and aprons.
- (2) If the powder comes into contact with the skin it shall be washed off with liberal quantities of clean water.
- (3) Swabs and rags shall be thoroughly washed out in clean water immediately after use. Materials soaked in the solution constitute a fire hazard if allowed to dry out.

C. Process Solution.

- (1) This is an aqueous solution, containing:

Alcrom 1200 powder 5 oz/gal (Imp.)
 (31 g/l)

Nitric acid sp.gr. 1.42 0.5 fl oz/gal (Imp.)
 (3 ml/l)

The solution shall be made up by adding the powder and nitric acid to the water and stirring thoroughly until the powder is dissolved. A small amount of insoluble residue in the solution can be ignored.

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- (2) The solution may be contained in a plastic container and is used at room temperature.
- (3) As this solution is used once only, solution control is not necessary.

D. Application.

- (1) Vapour degrease the component (Ref.72-09-00 Cleaning) or locally degrease the damaged area using a clean, lint-free cloth moistened with a group 2, 3, 4 or 5 solvent (Ref.72-09-00 - Cleaning).
- (2) Apply the solution to the damaged area using a cotton wool swab on the end of a stick.
- (3) Allow the solution to act on the surface of the component for 2-7 min, depending on the ambient temperature and the alloy being treated, until a light brown or golden iridescent film is produced.
- (4) Thoroughly wash off the solution using a plentiful supply of clean, cold running water then dry using a clean, dry air blast.
- (5) Apply approved de-watering oil as a temporary protective.

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GOLD PAINT - REPAIR

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GOLD PAINT - REPAIR

1. Application of Gold Paint

A. General.

- (1) Engine components that are coated with gold paint are listed in Table 402 and areas to be painted are detailed in the referenced Figures.
- (2) This paint is used on certain engine hot-end components to provide a thermal barrier. It is effective only whilst in good condition. Oxidation, diffusion or contamination will reduce its effectiveness.
- (3) Ovens used for stoving shall be adequately ventilated. Waste gases from the heating system shall be excluded from the ovens. Paints based on different resin systems shall not be stoved in the same oven without authorization from the engine manufacturer.
- (4) An efficient fume extraction system shall be used where these paints are sprayed.

B. Material.

- (1) Refer to Table 401 for approved material.
- (2) The shelf life of this material when stored in the original sealed container is 12 months in temperate climates and six months in tropical climates.
- (3) Material exceeding this shelf life must be laboratory tested before use.
- (4) There is no requirement for a test piece.

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MATERIAL	REF. NO.	MANUFACTURER
Liquid Bright Gold	GGE 6853-11%	Heraeus Silica and Metals Ltd., Newpark Works, Cinderhill Industrial Estate, Weston Coyney Road, Longton, Stoke-on-Trent, England. ST3 5UZ
Liquid Bright Gold	6738	Heraeus Silica and Metals Ltd.

NOTE: Liquid Bright Gold 6738 is discontinued product, existing stock may be used up. Refer para.1.B.

Gold Paint Material
Table 401

C. Preparation of Surfaces.

- (1) Examine the component and determine the area(s) to be gold painted.

NOTE: Gold paint is a high cost material. This should be considered when deciding the extent of application.

- (a) If a local application of gold paint is required carefully polish the appropriate area(s) with smooth grade emery cloth.
 - (i) If surface preparation by polishing is not practicable use masking tape to protect the paint surrounding the deficient area(s). Clean the area(s) to be painted by means of wet or dry abrasive blasting using the finest grade of grit available (Ref. 72-09-13 or 72-09-24 Repair).
 - (ii) Remove all masking tape.
 - (iii) Degrease the abraded area(s) using a clean lint free cloth moistened with a group 2 or 4 solvent (Ref.72-09-00 - Cleaning).

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(b) If the component is to be completely re-painted, carefully remove all traces of original gold paint.

(i) Clean the surface to be painted by means of wet or dry abrasive blasting using the finest grade of grit available (Ref. 72-09-13 or 72-09-24 Repair).

(ii) Vapour degrease the component (Ref.72-09-00 Cleaning).

CAUTION: DO NOT HANDLE COMPONENTS WITH BARE HANDS. GREASE DEPOSITS CAN HAVE ADVERSE EFFECT ON APPLICATION OF GOLD PAINT.

D. Application of Gold Paint.

WARNING: AVOID CONTACT BETWEEN GOLD PAINT AND BARE SKIN. PERSONAL SAFETY PRECAUTIONS MUST BE APPLIED. APPLY BARRIER CREAM TO HANDS, WEAR RUBBER OR PLASTIC GLOVES AND APRON. SAFETY SPECTACLES MUST ALSO BE WORN.

NOTE: The paint shall be used in the "as received" condition and may be applied by brushing or spraying. Brushing is recommended as spraying is not economical because of the high cost of the material.

NOTE: If brush application is used, the brush strokes for each coat should be confined to one direction. Each successive coat shall be brushed at 90 deg to the previous coat to ensure complete coverage.

(1) Apply one coat of paint and allow to air dry at room temperature for between 10 and 15 minutes.

(2) Stove the paint by heating the component to 150 ± 5 deg C for 30 minutes, or 300 ± 5 deg C for one hour.

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- (3) Remove the component from the oven and allow to cool.

CAUTION: DO NOT HANDLE COMPONENTS WITH BARE HANDS.
GREASE DEPOSITS CAN HAVE ADVERSE EFFECT ON
APPLICATION OF GOLD PAINT.

- (4) Apply and separately stove three further coats of paint observing the previously described procedure.
- (5) Finally stove the paint by heating the component to 250 ± 5 deg C for five hours, or 300 ± 5 deg C for one hour or 400 ± 5 deg C for 30 minutes.
- (6) Remove the component from the oven and allow to cool.
- (7) If necessary, wipe the painted surfaces using a clean, soft, lint-free cloth to remove dust contamination.

E. Inspection of Gold Painted Surfaces.

- (1) Inspect the component and ensure that the following requirements apply:
 - (a) Surfaces designated for gold paint are completely painted.
 - (b) The gold paint is continuous, adherent and metallic gold in appearance.
- (2) Reject the component for re-painting if painted surfaces show evidence of, cracking, flaking, loose adhesion or uneven surface finish. In some instances local application or touch-up with gold paint will be adequate to rectify deficient areas.

F. Local Touch-up with Gold Paint.

- (1) Prepare the surface (Ref.para.C.(1)(a)).
- (2) Apply gold paint (Ref.para.D.).
- (3) Inspect gold painted surfaces (Ref.para.E.).

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OVERHAULCHAP./SEC. AND
I.P.C. REF.

NOMENCLATURE

FIG. REF.

71-32-01/1-40	* Heat Shield (Left)	401
71-32-01/1-240	* Heat Shield (Right)	401
71-32-01/2-10	* Cover Rear (Left)	401
71-32-01/2-40	* Cover Rear (Right)	401
71-32-02/1-10	+ Heat Shield (Panel 10)	402
71-32-02/1-70	+ Heat Shield (Panel 9)	402
71-32-02/1-130	+ Heat Shield (Panel 8)	402
71-32-02/1-200	+ Heat Shield (Panel 7)	402
71-32-02/1-270	+ Heat Shield (Panel 6)	402
71-32-02/5-10	+ Heat Shield (Side Panel)	402
71-32-02/2-10	+ Heat Shield (Panel 5)	403
71-32-02/2-80	+ Heat Shield (Panel 4)	403
71-32-02/2-140	+ Heat Shield (Panel 3)	403
71-32-02/2-200	+ Heat Shield (Panel 2)	403
71-32-02/2-260	+ Heat Shield (Panel 1)	403
71-32-02/4-10	+ Heat Shield (Bottom Panel)	403

* Component assembled to Combustion Chamber Outer Case

+ Component assembled to Turbine Exhaust Diffuser

Components with Gold Paint Finish
Table 402

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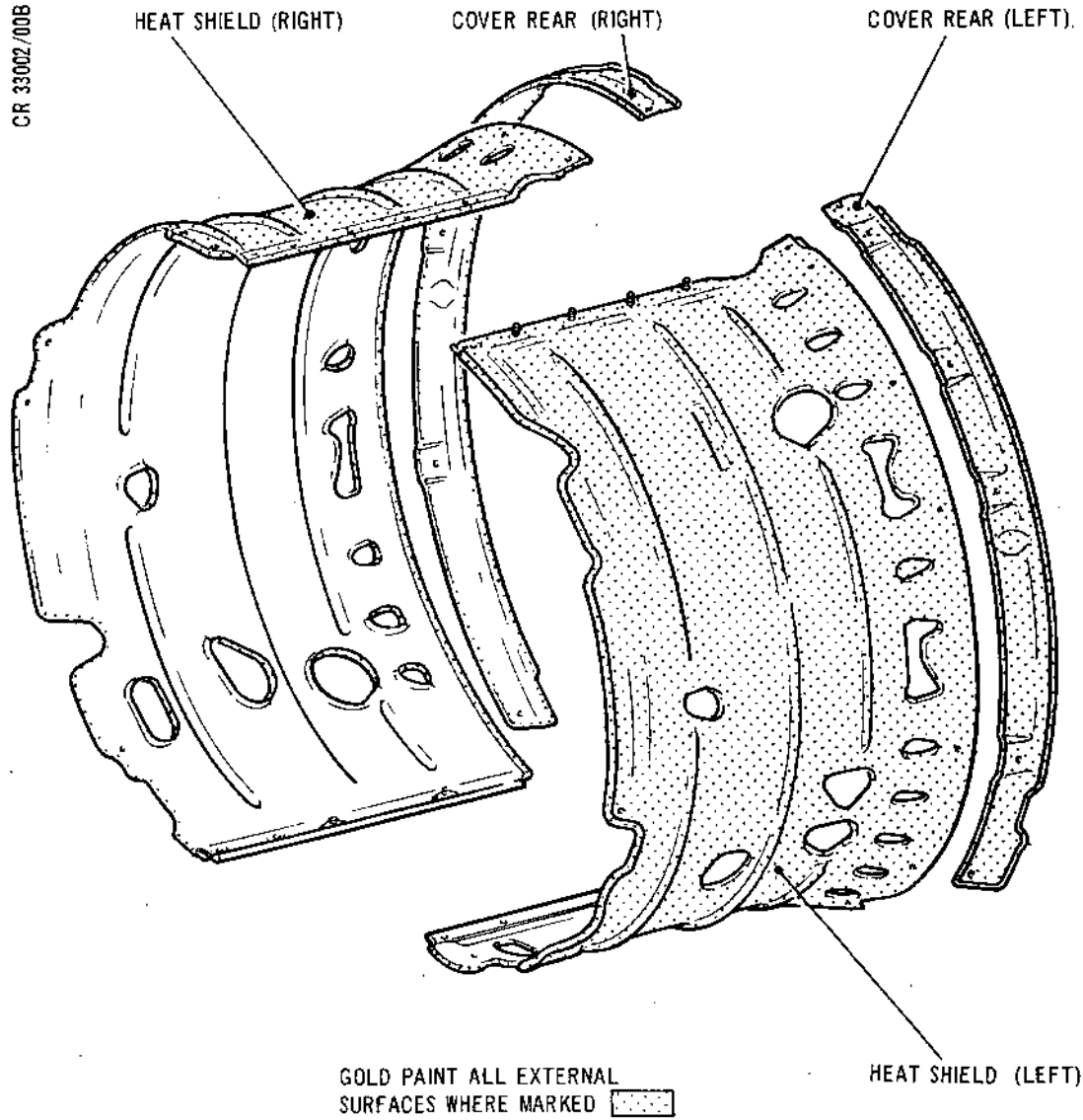


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Heat Shield Protective Finish Details
Figure 401

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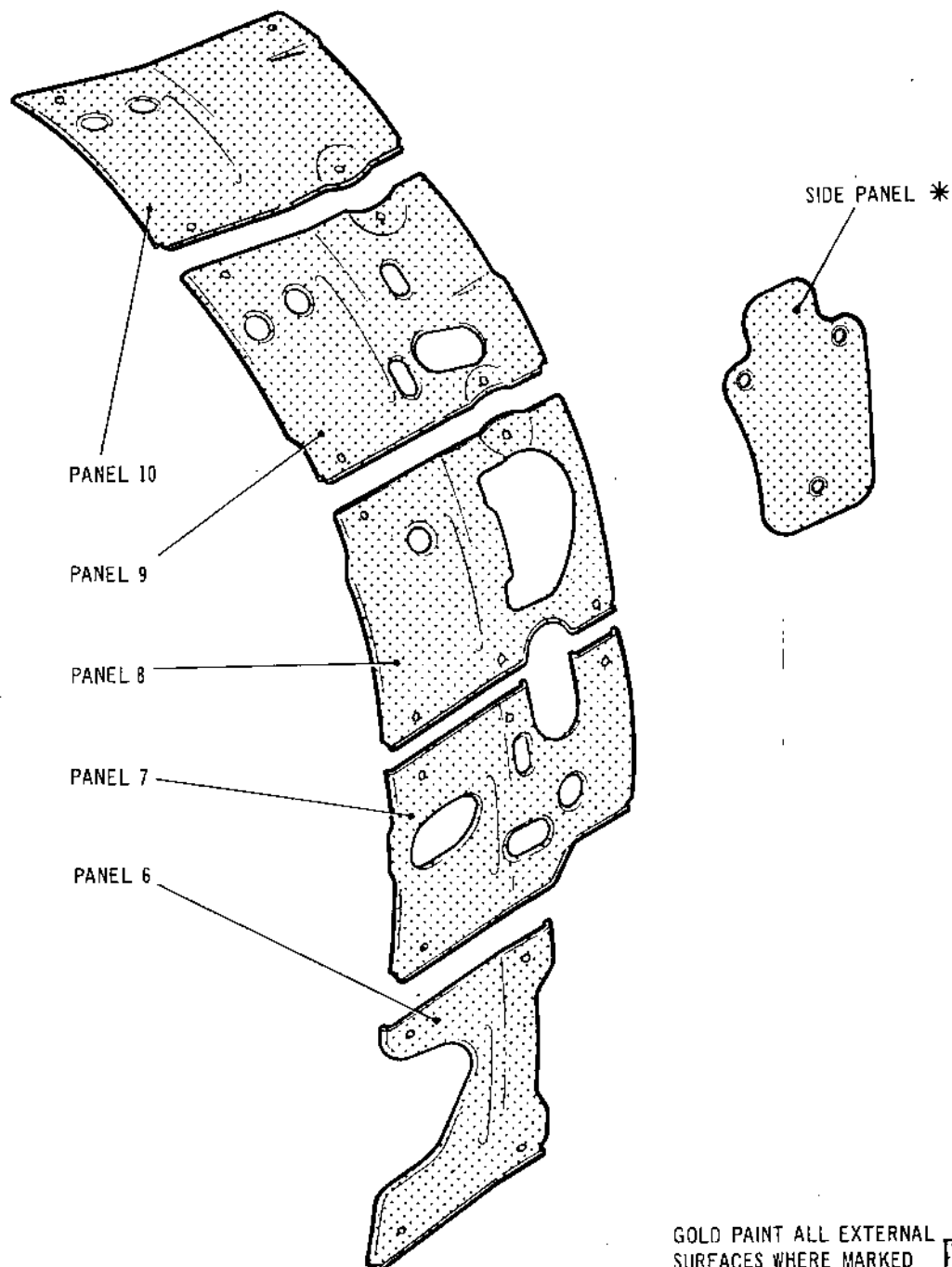


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* MATERIAL THICKNESS AT HOLE EDGES AND PERIPHERY EDGE MAY BE LEFT UNPAINTED



GOLD PAINT ALL EXTERNAL SURFACES WHERE MARKED



Heat Shield Protective Finish Details
Figure 402

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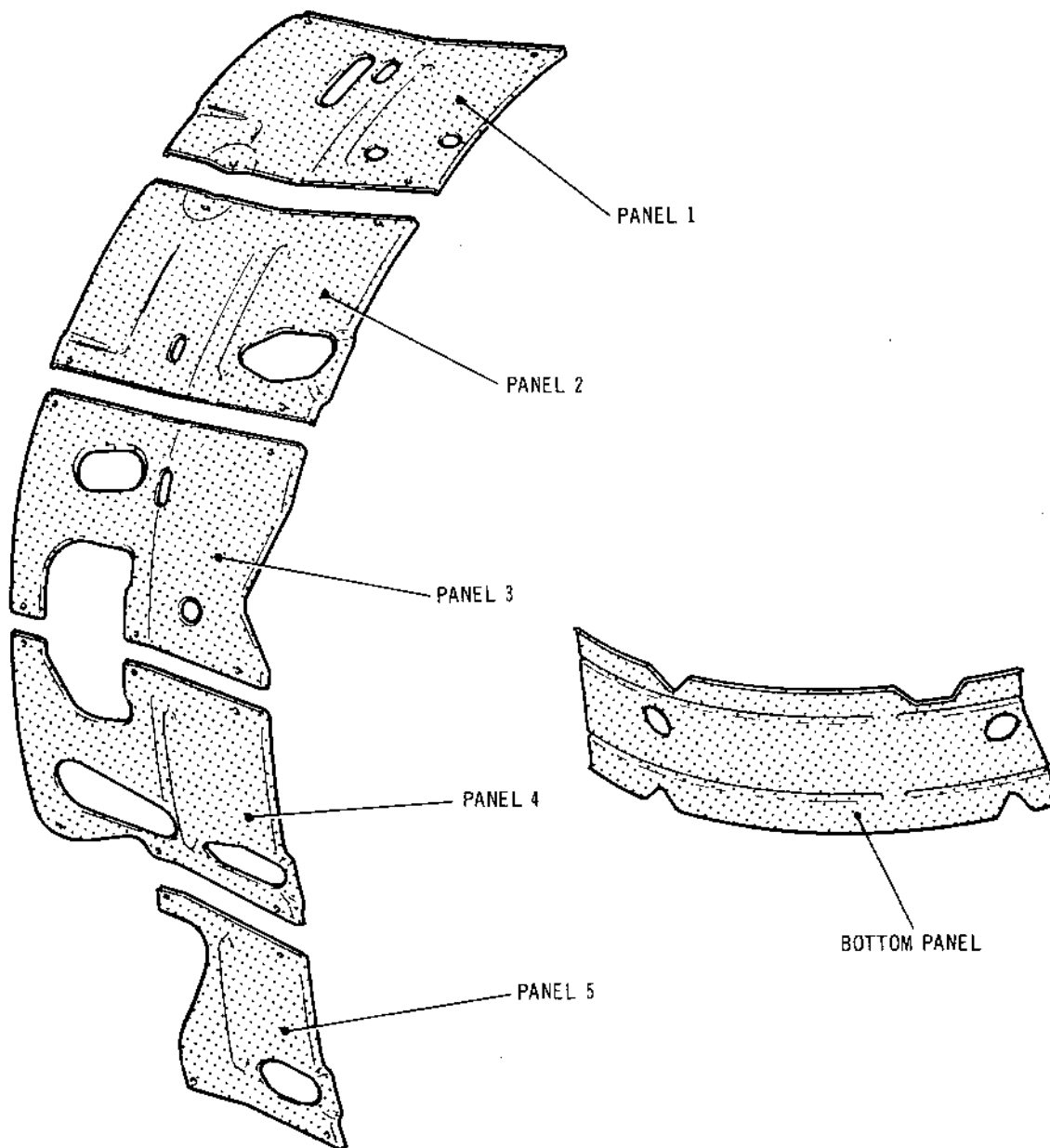
OLYMPUS 593

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OVERHAUL



CR 35202/00A



GOLD PAINT ALL EXTERNAL
SURFACES WHERE MARKED



Heat Shield Protective Finish Details
Figure 403

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HIGH HEAT RESISTING ALUMINIUM ENAMEL - REPAIR

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D. Preparation... ..	403
E. Application... ..	403
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G. Local Touch-up	404
H. Applying Flash Coat	404

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HIGH HEAT RESISTING ALUMINIUM ENAMEL - REPAIR

1. Application of High Heat Resisting Aluminium Enamel

A. General.

- (1) Engine components that are protected by aluminium enamel are listed in Table 402 and the areas to be coated are detailed in the referenced Figures.
- (2) The enamel is used to prevent oxidation and corrosion at temperatures up to 550 deg C. It is resistant to engine lubricants, fuels and hydraulic fluids.
- (3) Ovens used for stoving shall be adequately ventilated. Waste gases from the heating system shall be excluded from the ovens. Paints based on different resin systems shall not be stoved in the same oven without authorization from the engine manufacturer.
- (4) An efficient fume extraction system shall be used where these paints are sprayed.

B. Materials.

- (1) Refer to Table 401 for approved materials.
- (2) The shelf life of these materials when stored in their original sealed containers is 12 months in temperate climates and six months in tropical climates.
- (3) Material exceeding this shelf life must be laboratory tested before use.

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MATERIAL	SPECIFICATION	REF.NO.	MANUFACTURER
High Heat Resisting Aluminium Enamel (PL 101)	MSRR 9029	E.3746/R3	International Pinchin Johnson, Transport Division, Rotton Park Street, Ladywood, Birmingham 16, England.
Thinners	MSRR 9029	SV16R1	International Pinchin Johnson.
Heat Resisting Aluminium Touch-up Enamel (PL 82)	MSRR 9040	E.3892	International Pinchin Johnson.
Aluminium Flash Coat (PL 45)	MSRR 9135	CO.4921	Marston Lubricants, Naylor Street, Liverpool 3, England.

High Heat Resisting Aluminium Enamel Materials
Table 401

C. Test Piece Control.

- (1) The sequence of operations laid down in this procedure is aimed at producing a two coat enamel thickness of approximately 0.0015 in. (0,04 mm).
- (2) As a means of monitoring operators and maintaining the correct standard, a 12 x 12 in. (300 x 300 mm) piece shall be sprayed under the same conditions as the components during each working shift, to produce an average film thickness of not less than 0.001 in. (0,03 mm) and not more than 0.002 in. (0,05 mm).
- (3) The test piece shall be checked using an approved measuring instrument.

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OVERHAUL



D. Preparation.

- (1) Vapour degrease the component (Ref.72-09-00 Cleaning).
- (2) Mask off the areas not to be enamelled using jigs, plates, plugs and/or masking tape.
- (3) Abrasive blast the areas to be enamelled to provide a clean keying surface (Ref.72-09-24 Repair).
- (4) On components that require a variation in enamel thickness, mask the areas which require only one coat.

NOTE: Apply enamel process immediately after abrasive blast as surface deterioration of components will occur if left for long periods without protection.

E. Application.

- (1) Stir the enamel thoroughly until no residual aluminium adheres to the stirrer.
- (2) Check the viscosity using a British Standard 1733 Flow Cup Type B.4. The viscosity shall be between 25 and 32 seconds quoted at 20 deg C. Thin if required using the recommended thinners.
- (3) Apply one wet coat of enamel to the component and allow to air dry at room temperature for three minutes.
- (4) Carefully remove the masking from any areas which require one coat only.
- (5) Apply a second wet coat of enamel and allow to air dry at room temperature for 30 minutes.

NOTE: The air drying time immediately before stoving is essential where static ovens are used. If conveyor type ovens having a gradual temperature increase are used, the air drying time is not essential.

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OVERHAUL



SNECMA

- (6) Remove any masking tape prior to stoving.
- (7) Stove the enamel by heating the component to 190 ± 5 deg C and maintaining this temperature for two hours.
- (8) Remove the component from the oven and allow to cool.
- (9) Remove any remaining masking.

F. Inspection.

- (1) Inspect the coating for complete coverage of the scheduled areas and even application.
- (2) Ensure that there are no runs, drops, tears, blisters or other imperfections.
- (3) Measure the coating thickness using an approved measuring instrument. The average film thickness on two-coat areas shall be not less than 0.001 in. (0,03 mm) and not more than 0.002 in. (0,05 mm).

G. Local Touch-up.

- (1) Rub down the area immediately next to the damaged enamel and feather the edges using approved 240 or 320 grade abrasive paper, depending upon the roughness of the surface.
- (2) Degrease the prepared surface using a clean, lint-free cloth moistened with a group 2 or 4 solvent (Ref.72-09-00 - Cleaning). Ensure that the solvent has completely evaporated before proceeding.
- (3) Where possible the damage shall be touched up by spraying and stoving as detailed previously.
- (4) If stoving is not practicable, apply one uniform coat of Touch-up Enamel using a clean, good quality brush and allow to air dry at room temperature for one hour.

H. Applying Flash Coat.

NOTE: Flash coat is used to cover oil stains on aluminium enamelled engine run components prior to despatch.

CAUTION: DO NOT USE FLASH COAT FOR TOUCH-UP PURPOSES.

- (1) Thoroughly shake the aerosol before use.

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OLYMPUS 593

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OVERHAUL



sneema

- (2) Degrease the area to be coated using clean, lint-free cloth moistened with a group 2 or 4 solvent (Ref.72-09-00 - Cleaning).
- (3) Holding the aerosol approximately 12 in. (300 mm) from the component, apply an even coating to the surface.

CHAP./SEC. AND IPC REF.	NOMENCLATURE	FIG.REF.
**71-20-00/1-60	Mounting trunnion	401
72-31-03/3-190	Sleeve housing	402
***72-31-03/3-230	LP compressor rear rotor shaft	403
*72-31-04/1-190	Stiffening disk sub-assembly	404
72-31-04/1-210	LP compressor drive shaft front	405
72-31-04/2-120	LP compressor drive shaft rear	406
****72-33-02/1-300	HP compressor rotor disk stage 2	407
****72-33-02/1-350	HP compressor rotor disk stage 3	408
***72-33-02/1-330	HP compressor spacer ring stage 2 to 3	409
*75-01-03/1-10	Air cooling duct	410
75-01-03/1-60	Air cooling duct	411
75-01-04/1-10	Air cooling duct	412
75-01-04/1-200	Air cooling duct	413
75-02-07/1-10	Air venting duct	414
*75-02-12/1-10	Air venting duct	415
75-02-12/1-50	Air venting duct	416
* These items have areas of chromium plate finish. For application of finish, refer to 72-09-07, Repair.		
** Pre SB.71-8885-31 standard only. For trunnions to SB.71-8885-31 standard, refer to SB for application of finish.		
*** Pre SB.72-8896-347 standard only. For components to SB.72-8896-347 standard, refer to SB for application of finish.		
+ Pre SB.72-8925-358 standard only. For components to SB.72-8925-358 standard, refer to SB for application of finish.		

Components with High Heat Resisting Aluminium
Enamel Finish
Table 402

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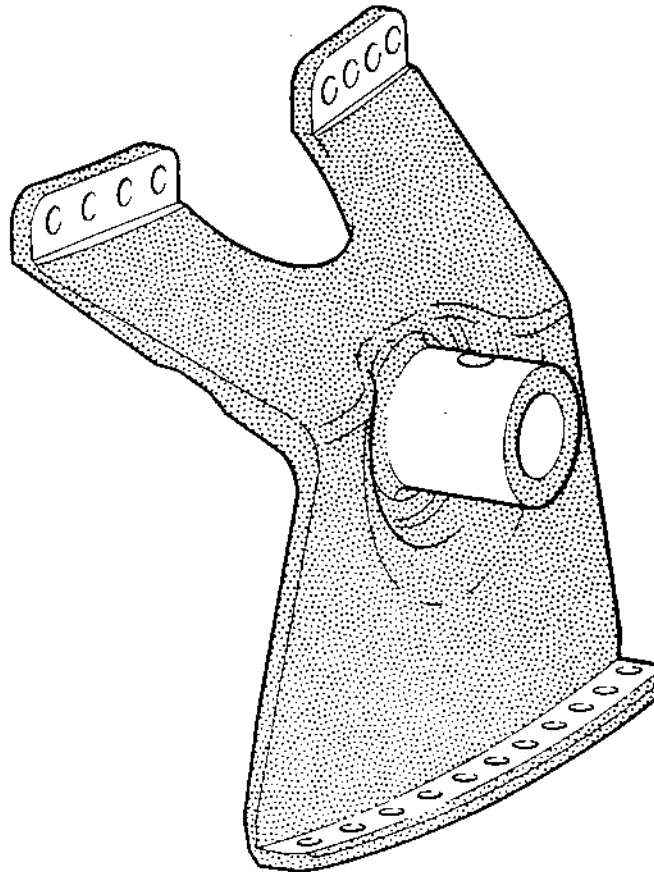


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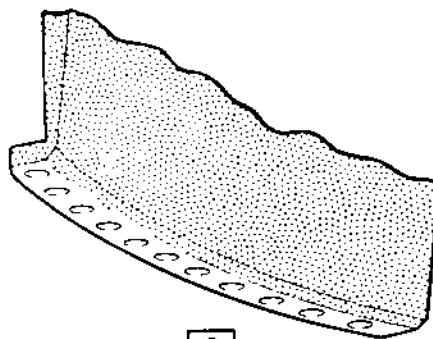


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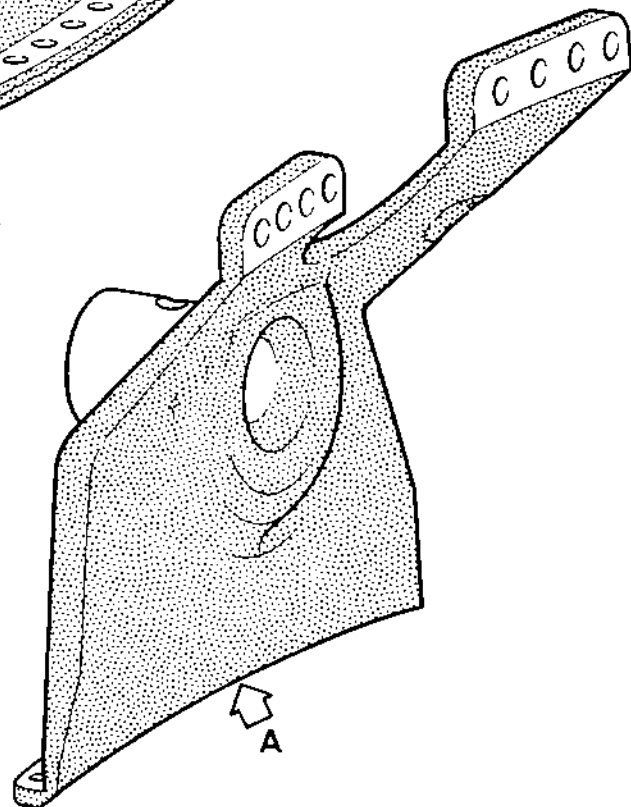


HIGH HEAT RESISTING
ALUMINIUM ENAMEL

ALL HOLES FREE OF ENAMEL



A



A

Mounting Trunnion Protective Finish Details
Figure 401

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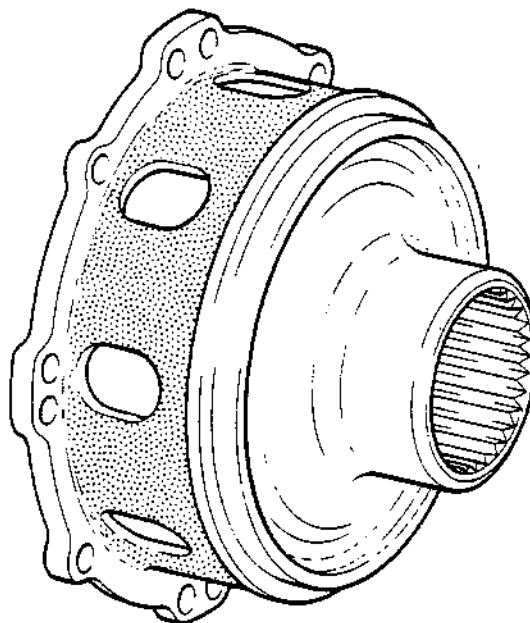
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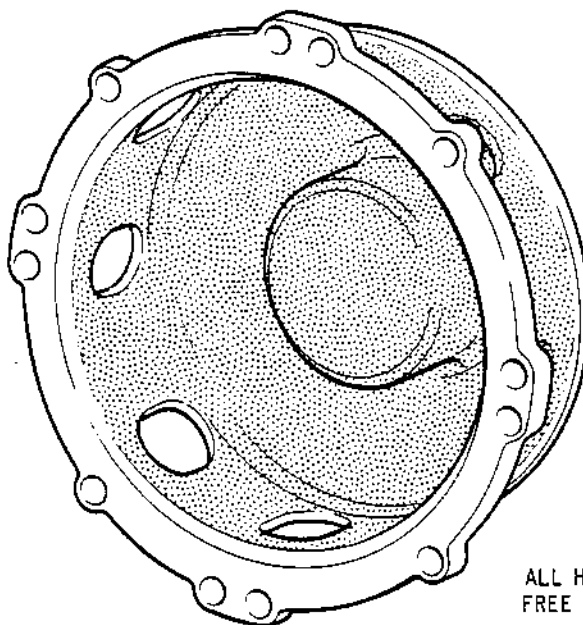
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HIGH HEAT RESISTING
ALUMINIUM ENAMEL



ALL HOLES AND SLOTS
FREE OF ENAMEL

Sleeve Housing Protective Finish Details
Figure 402

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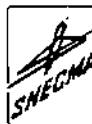
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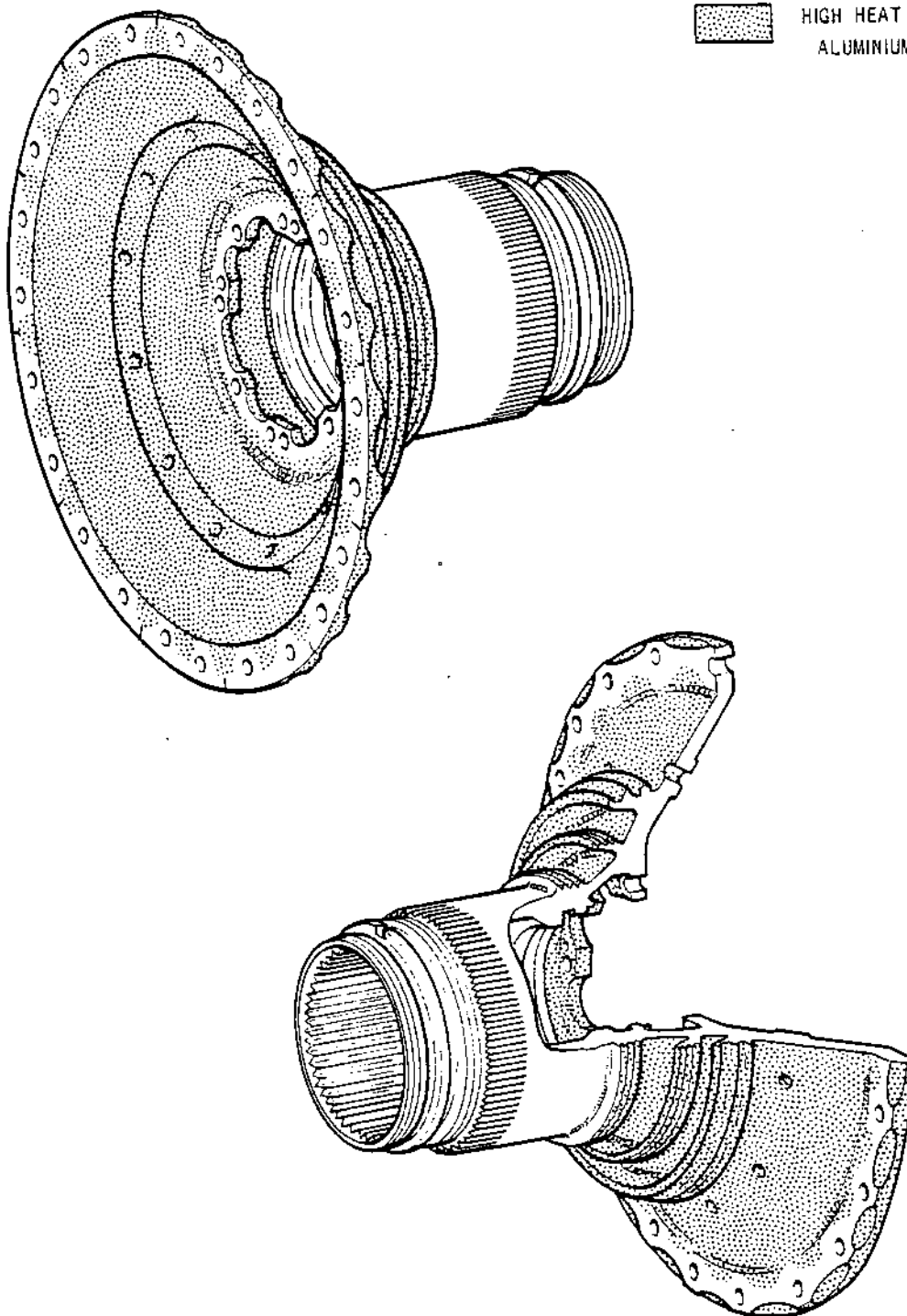
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HIGH HEAT RESISTING
ALUMINIUM ENAMEL



LP Compressor Rear Rotor Shaft Protective
Finish Details
Figure 403

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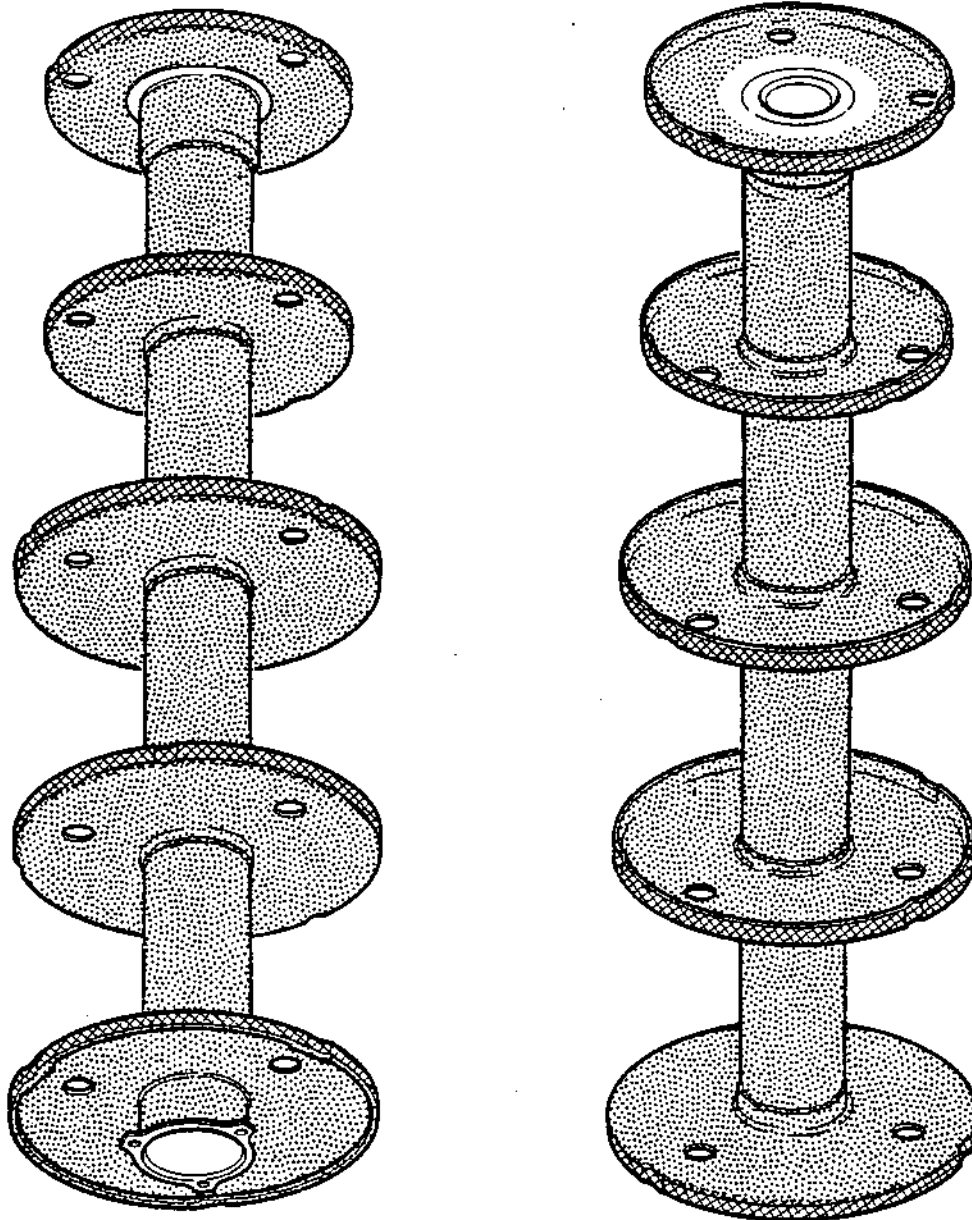
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MK. 610-14-28
OVERHAUL



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



 CHROMIUM PLATE 0.001 (0.03) THICK

 HIGH HEAT RESISTING ALUMINIUM ENAMEL

BORE OF TUBE FREE OF ENAMEL

Stiffening Disk Sub-assembly Protective
Finish Details (Sheet 1 of 2)
Figure 404

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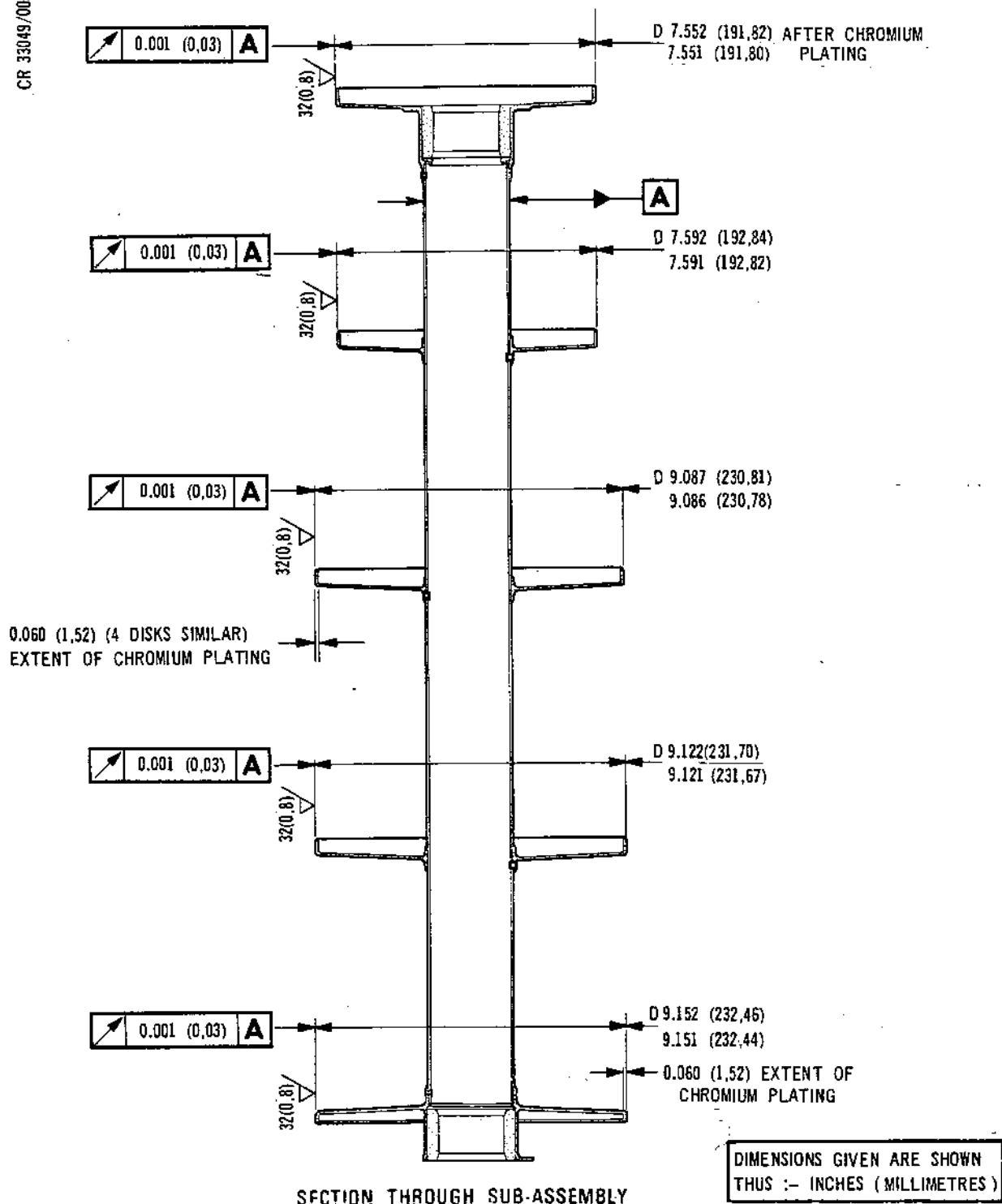
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OVERHAUL



Stiffening Disk Sub-assembly Protective
Finish Details (Sheet 2 of 2)
Figure 404

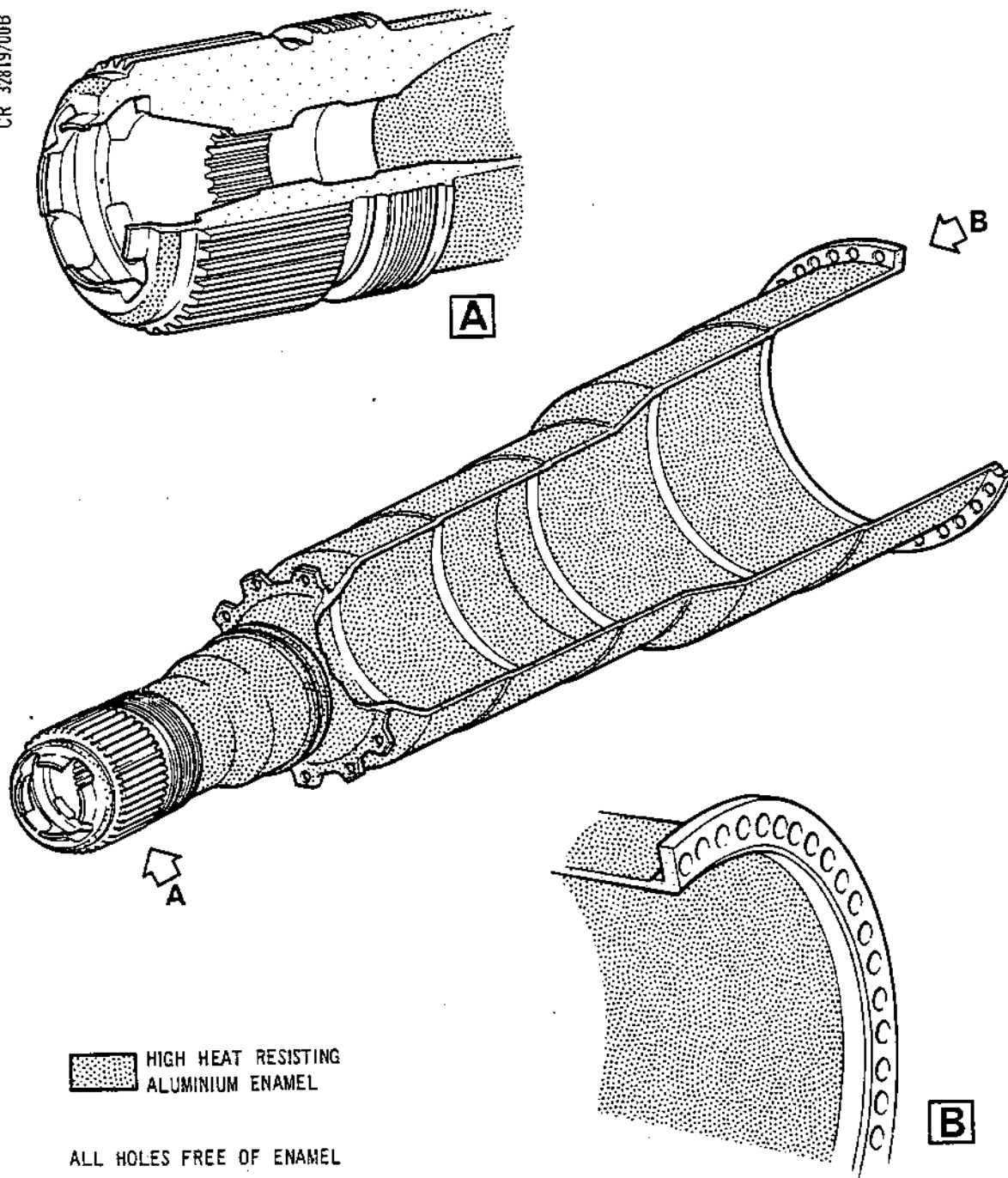
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HIGH HEAT RESISTING
ALUMINIUM ENAMEL

ALL HOLES FREE OF ENAMEL

LP Compressor Drive Shaft Front Protective
Finish Details
Figure 405

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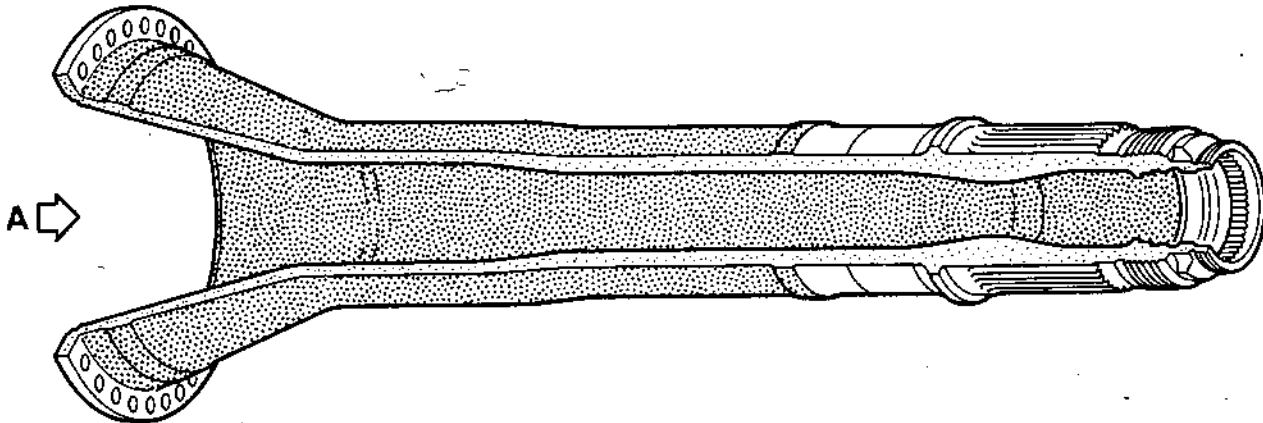


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MK.610-14-28
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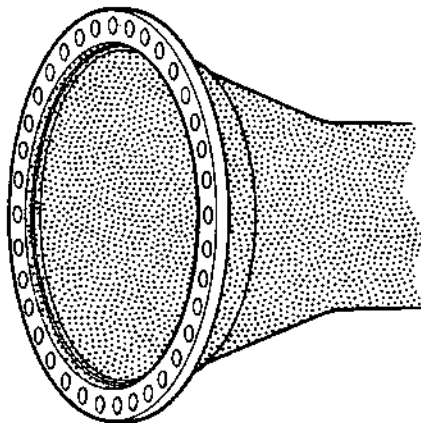


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 HIGH HEAT RESISTING
ALUMINIUM ENAMEL

ALL HOLES FREE OF ENAMEL



A

LP Compressor Drive Shaft Rear Protective
Finish Details
Figure 406

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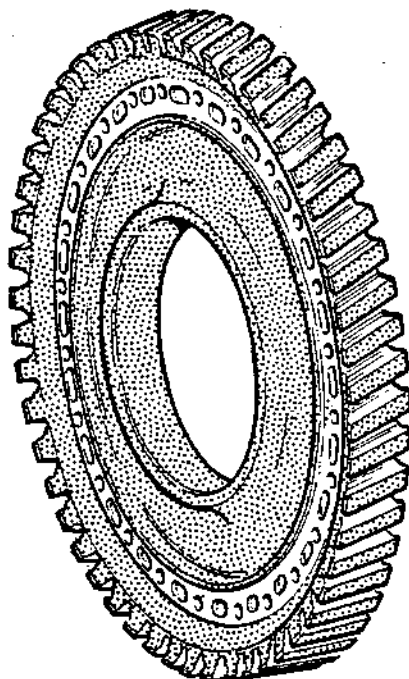
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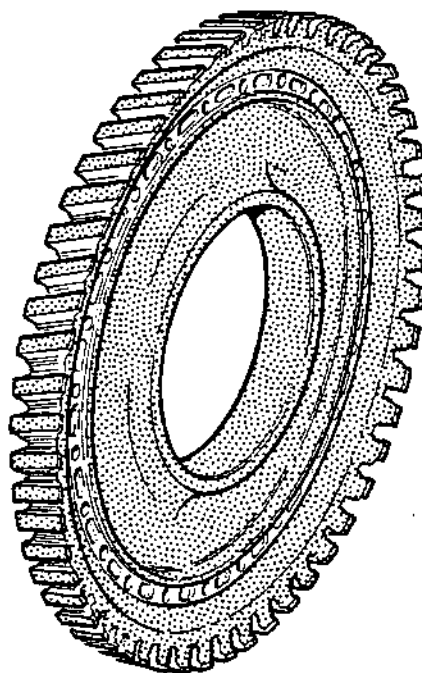
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HIGH HEAT RESISTING ALUMINIUM ENAMEL

ENAMELLING OF BLADE SLOTS OPTIONAL

ALL HOLES FREE OF ENAMEL



HP Compressor Rotor Disk Stage 2 Protective
Finish Details
Figure 407

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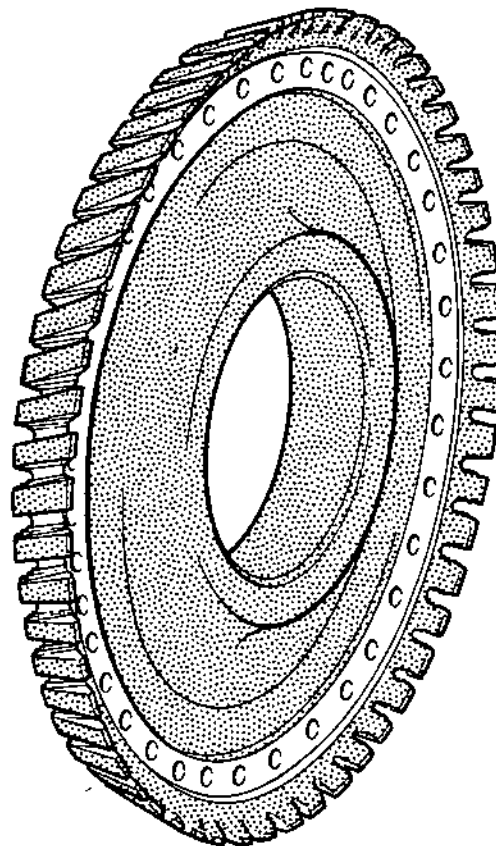
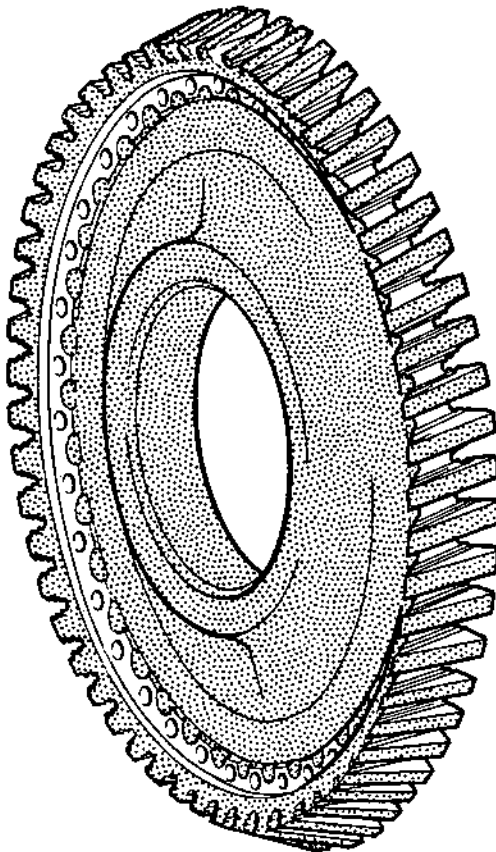
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 HIGH HEAT RESISTING
ALUMINIUM ENAMEL

ALL HOLES FREE OF ENAMEL

ENAMELLING OF BLADE SLOTS OPTIONAL

HP Compressor Rotor Disk Stage 3 Protective
Finish Details
Figure 408

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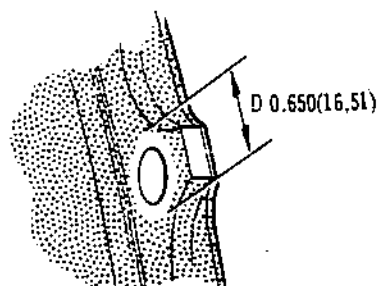
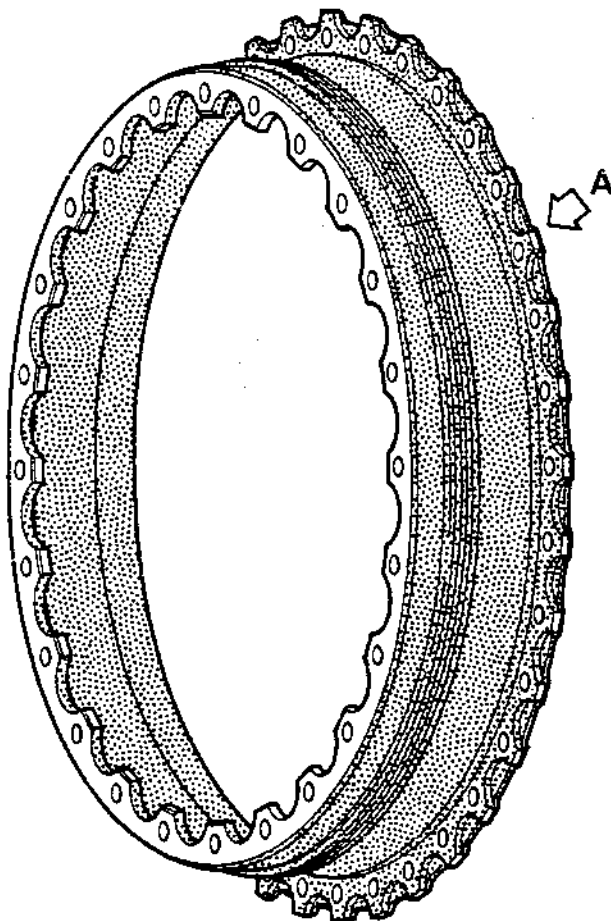
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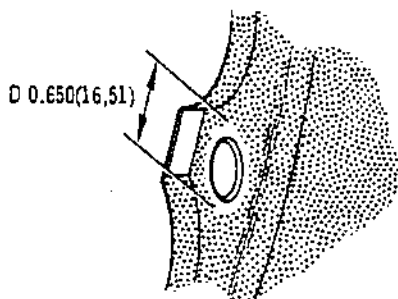


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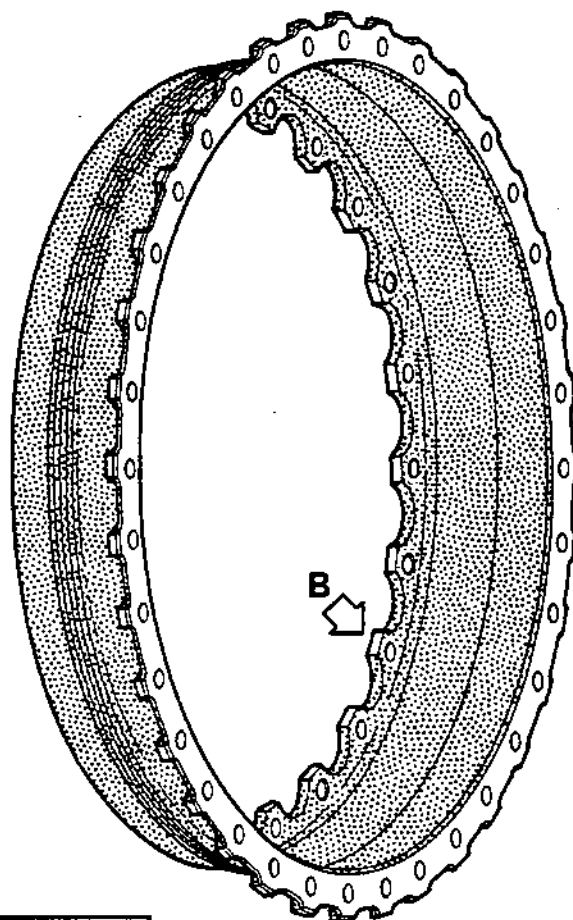


HIGH HEAT RESISTING
ALUMINIUM ENAMEL

ALL HOLES FREE OF ENAMEL



B



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

HP Compressor Spacer Ring Stage 2 to 3 Protective
Finish Details
Figure 409

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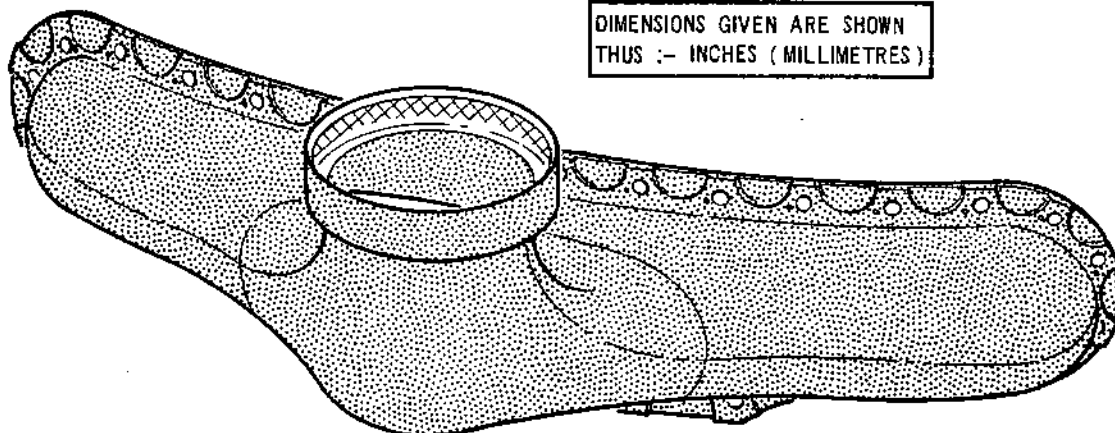
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DIMENSIONS GIVEN ARE SHOWN
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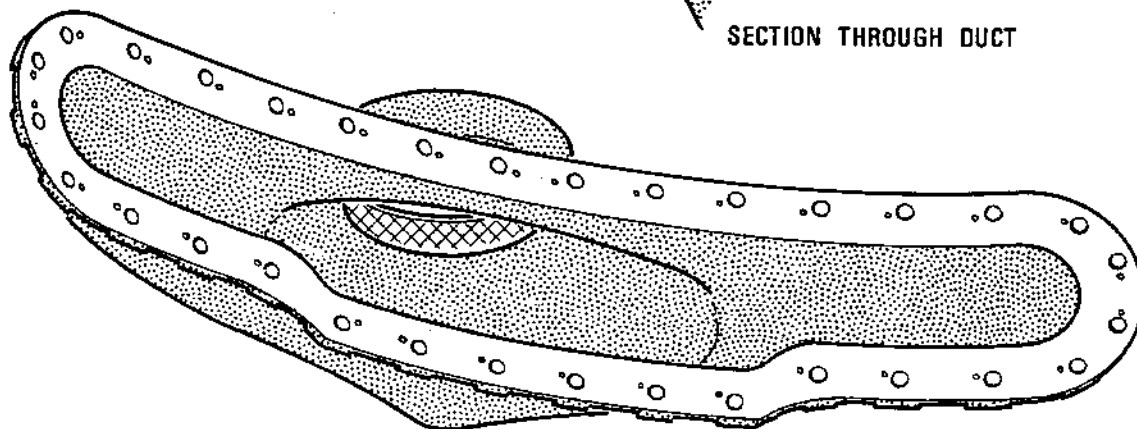
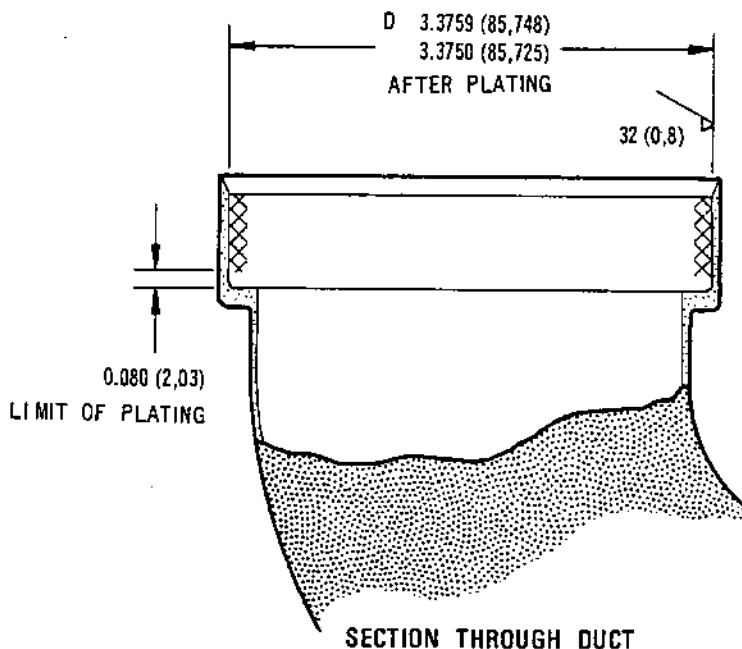


CHROMIUM PLATE
0.004 - 0.006
(0,10 - 0,15) THICKNESS



HIGH HEAT RESISTING
ALUMINIUM ENAMEL

ALL HOLES FREE OF ENAMEL



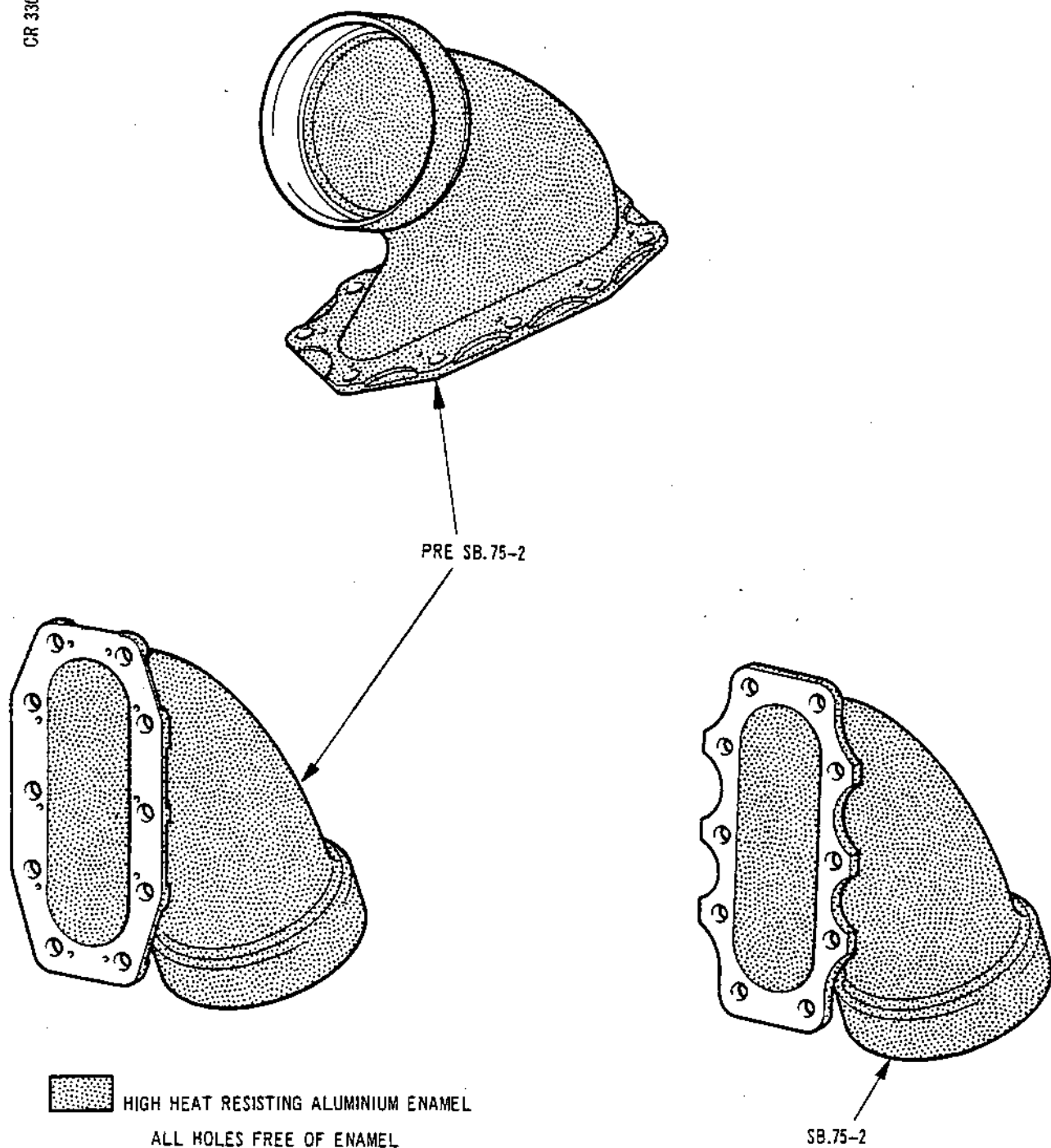
Air Cooling Duct Protective Finish Details
Figure 410

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Air Cooling Duct Protective Finish Details
Figure 411

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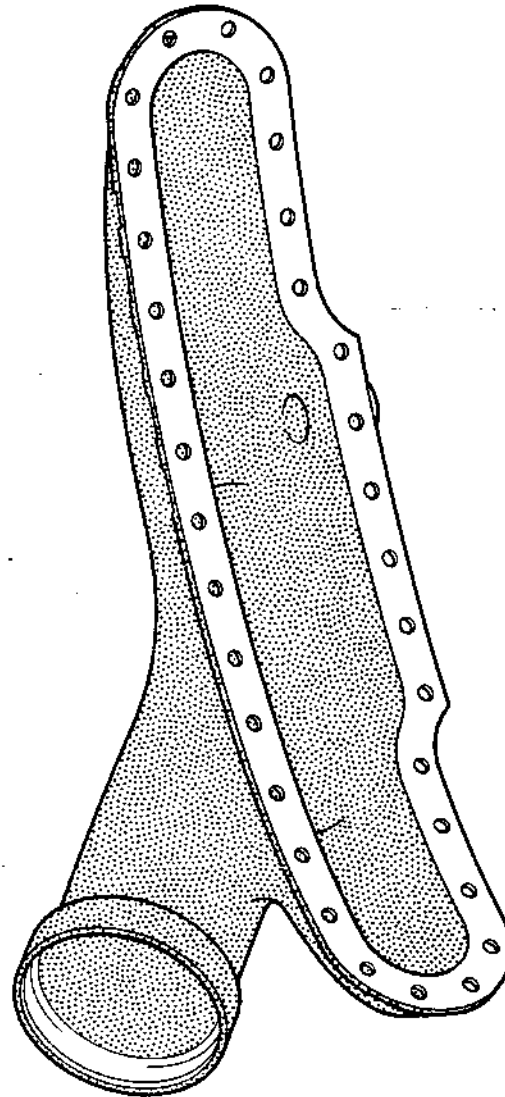
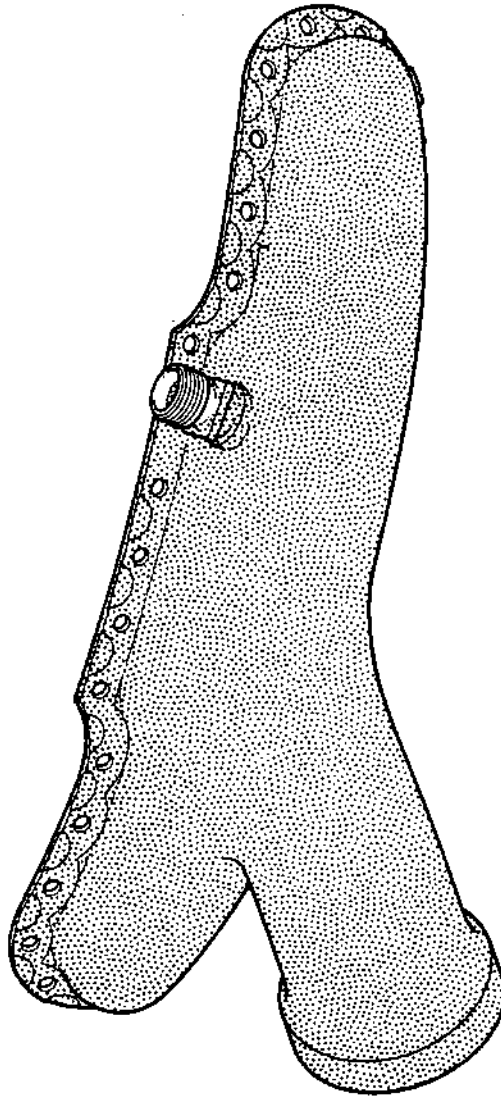



OLYMPUS 593
MK. 610-14-28
OVERHAUL



CR 33100/00A

ALL HOLES FREE OF ENAMEL



 HIGH HEAT RESISTING
ALUMINIUM ENAMEL

Air Cooling Duct Protective Finish Details
Figure 412

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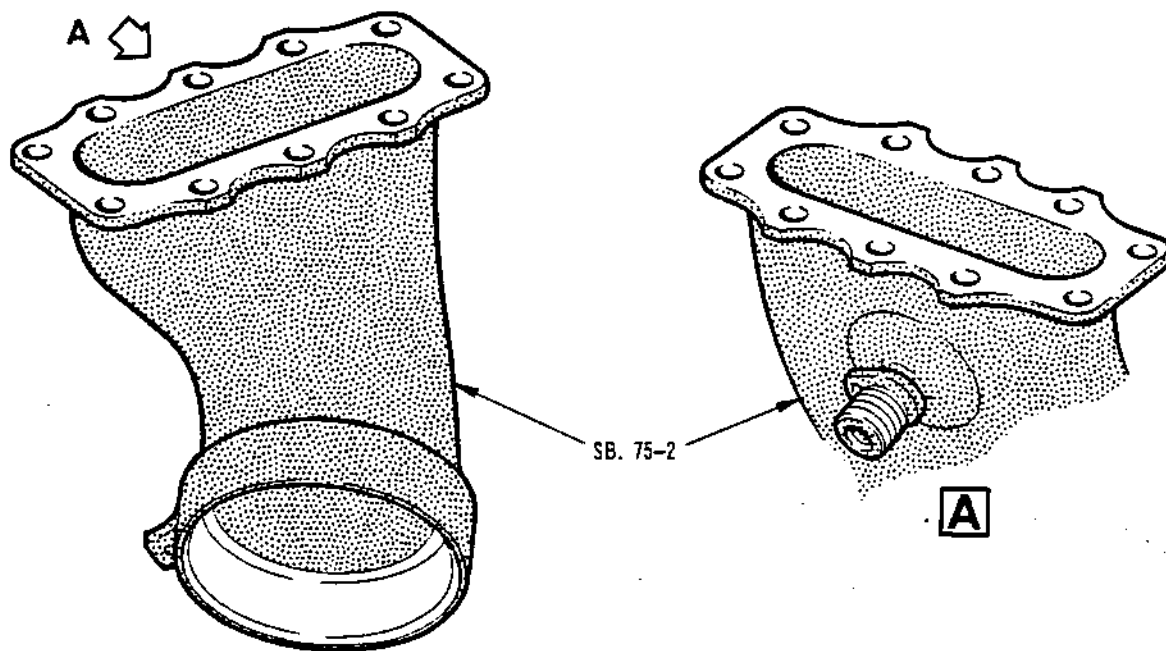
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OLYMPUS 593
MK. 610-14-28
OVERHAUL



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ALL HOLES FREE
OF ENAMEL

Air Cooling Duct Protective Finish Details
Figure 413



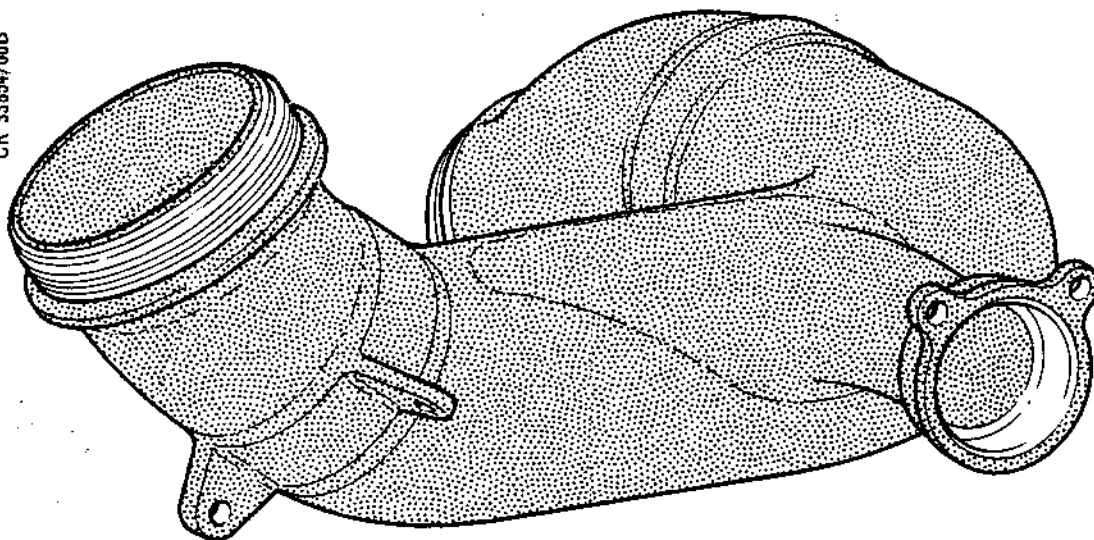
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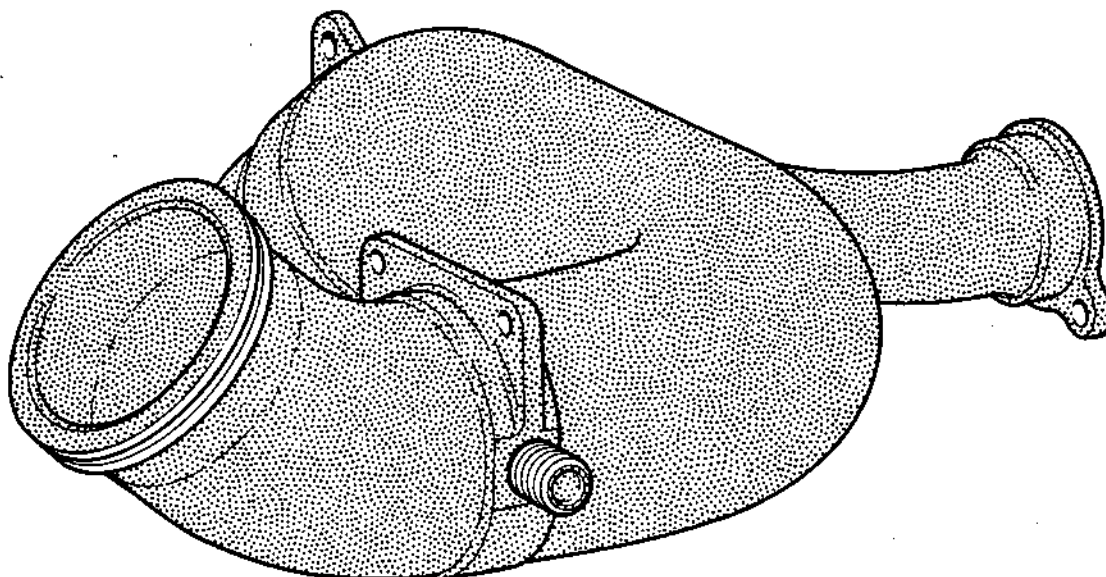
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HIGH HEAT RESISTING ALUMINIUM ENAMEL

Air Venting Duct Protective Finish Details
Figure 414

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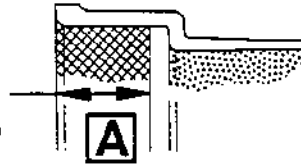
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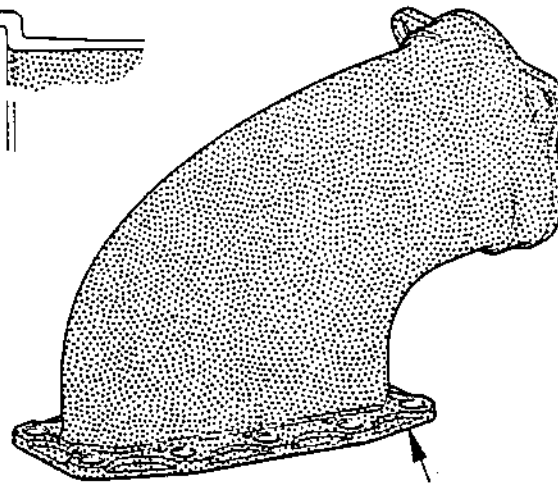
OVERHAUL



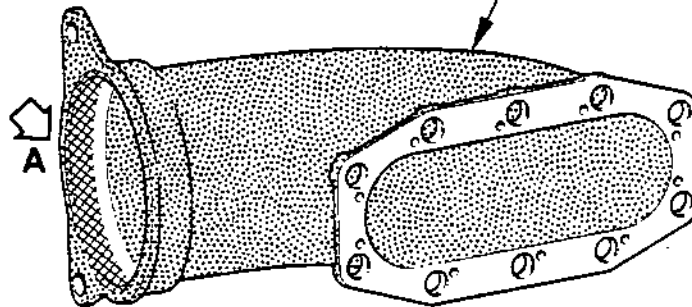
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EXTENT OF PLATING



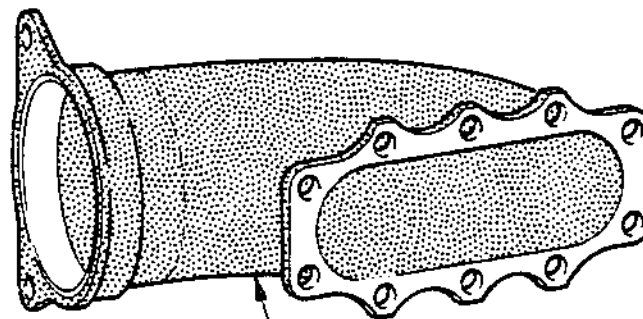
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PRE SB.75-2



A



SB.75-2

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HIGH HEAT RESISTING ALUMINIUM ENAMEL



HARD CHROMIUM PLATE 0.004(0.10)/0.006(0.15) THICK

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Air Venting Duct Protective Finish Details
Figure 415

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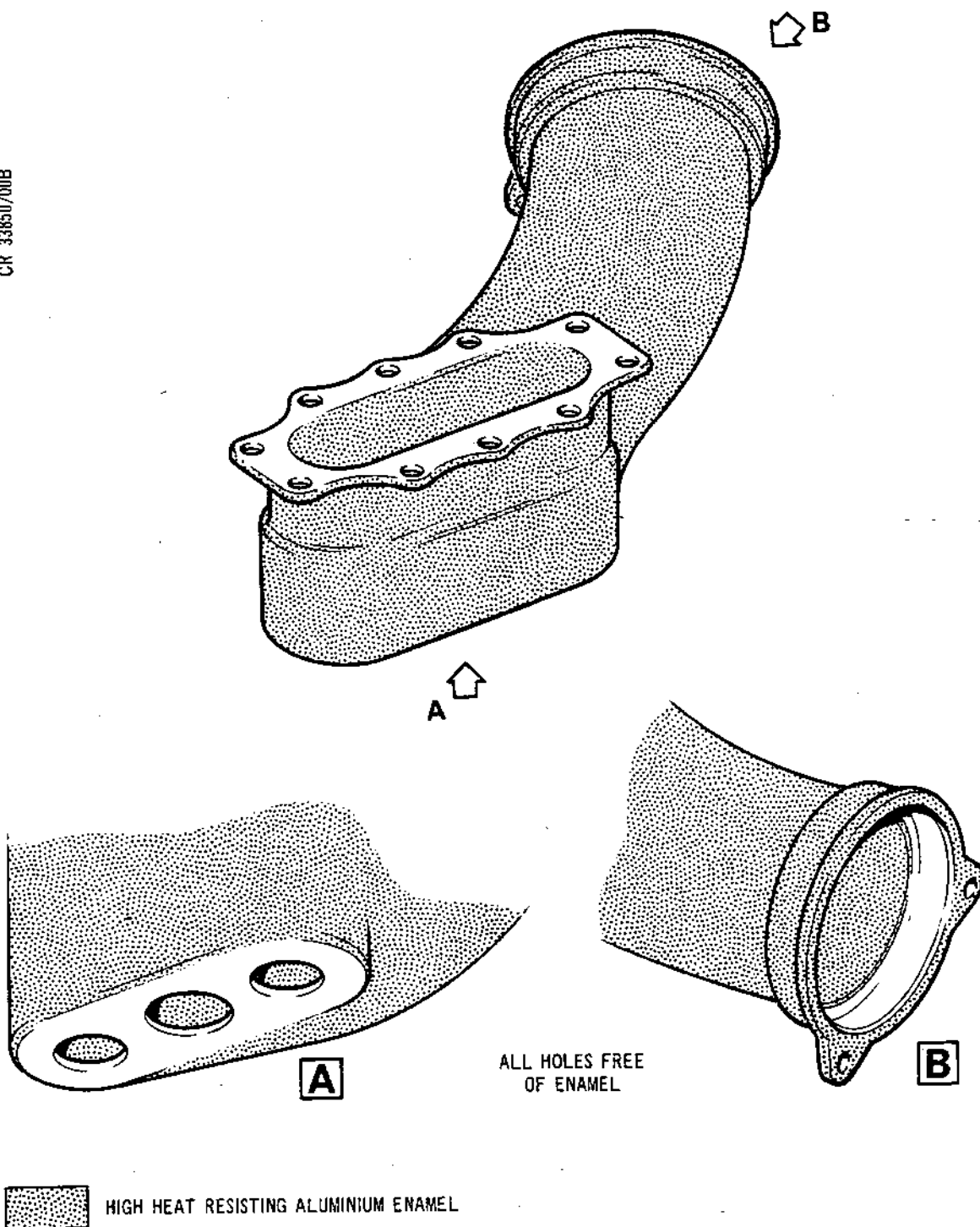


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Air Venting Duct Protective Finish Details
Figure 416

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PACK ALUMINIZING - REPAIR

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PACK ALUMINIZING - REPAIR

1. Application of Pack Aluminizing

A. General.

- (1) Pack aluminizing is a means of depositing an aluminium rich coating onto nickel and cobalt based alloys for the purpose of resisting sulphur attack and oxidation.
- (2) A test piece or pieces of the same material, or a component of the same material and preferably same type, shall be processed with each batch of components so that the coating thickness may be determined.
- (3) If 'Beta' test equipment is to be used, the test piece shall be ground finished to within 0.001 in. (0,03 mm) of flatness. Test pieces shall be identified to the batches of components they represent.

B. Materials.

(1) Stripping solution.

- (a) The solution is made up as follows:

Nitric acid (S.G.1.42)	1 volume
Water	9 volumes
Sulphamic acid ($\text{NH}_2\text{SO}_3\text{H}$)	50 g/l

- (b) A minimum of 4 ml of new solution at an operating temperature of 45 ± 5 deg C must be used per square centimetre of aluminized coating to be stripped. Discard the solution after it has been used once.

(2) Etching solution.

- (a) This solution is made up as follows:

Ferric chloride (FeCl_3)	250 to 300 g/l
Hydrochloric acid	100 to 120 g/l



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- (b) The solution must be contained in a plastic tank and operated at room temperature. During use, the solution must be agitated vigorously with compressed air, and a plastic lid assembled to the tank to prevent splashing.
- (c) The minimum immersion time is one minute, and the maximum time is five minutes.

(3) Stopping-off compound.

- (a) The following is a typical mix: the quantities may be varied proportionally as required.

Syton ZX or X30	2400 ml
Water	1400 ml
Iso-octyl alcohol	30 ml
Synperonic N	15 ml
Methyl cellulose (2 per cent w/v solution)	200 ml
Zircosil 200 mesh	18 kg

NOTE: The mixture shall be freshly prepared and kept constantly stirred, preferably mechanically, at a slow speed so that no appreciable rise in temperature occurs.

(4) Pack aluminizing powder.

- (a) The composition of the powder shall be as follows:

Aluminium powder (fine flake)	15 to 25 per cent by weight
Ammonium bromide (Labora- tory Reagent grade)	0.5 to 1 per cent by weight
Aluminium oxide (fused, 75 microns particle size)	Remainder

- (b) The ammonium bromide shall be crushed to a fine powder before mixing and then the constituents mixed mechanically and, preferably, sieved mechanically through a 60 BS mesh sieve.
- (c) After mixing, carry out the regeneration procedure as described in paragraph C.

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C. Regeneration of Aluminizing Powder.

- (1) Subject the powder to a 'dummy' aluminizing cycle.
- (2) Discard the top layer (12 to 25 mm) of used powder.
- (3) Mechanically crush the remaining used powder.
- (4) To the crushed used powder, add a quantity of mechanically mixed new powder of the following composition at the weight ratio of 90 per cent used powder: 10 per cent new powder.

Aluminium powder (fine flake)	20 to 25 per cent by weight
Ammonium bromide (Laboratory Reagent technical grade)	1.5 to 2 per cent by weight
Fused alumina - 200 mesh	Remainder

- (5) Crush the ammonium bromide to a fine powder before mixing and then mechanically mix the used and new powder and sieve as for new powder.
- (6) The aluminizing powder should be analysed for aluminium and ammonium bromide content at regular intervals.

D. Stripping Existing Coating.

- (1) Fill any cooling holes in the components with hard wax.
- (2) Mask non-aluminized surfaces with suitable masking tape.
- (3) Dry abrasive blast the aluminized surfaces using 120/220 mesh aluminium oxide abrasive grit.
- (4) Remove the masking tape.
- (5) Vapour degrease the components (Ref.72-09-00 Cleaning).
- (6) Stop-off all non-aluminized surfaces with approved wax or lacquer.
- (7) Immerse the components in the stripping solution for the minimum time necessary to strip the coating. The time should be within 1 to 4 hours.



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- (8) Rinse the components in cold water, flushing through any cooling holes, then pressure wash using an air/water gun.
- (9) Immerse the components in a one per cent ammonia neutralising solution for five minutes.
- (10) Remove wax.
 - (a) Immerse waxed components in boiling water to which has been added one per cent sodium carbonate.
 - (b) After de-waxing, swill the components in clean cold water, then dry them from an immersion in clean hot water at 80 deg C (minimum).
 - (c) If necessary, vapour degrease the components (Ref.72-09-00, Cleaning).
- (11) Fill any cooling holes with hard wax.
- (12) Re-mask the non-aluminized surfaces with suitable masking tape.
- (13) Dry abrasive blast the aluminized surfaces using 120/220 mesh aluminium oxide abrasive grit to remove aluminizing residues.
- (14) Remove the masking tape.
- (15) Remove the wax by immersion in boiling water to which has been added one per cent sodium carbonate.
- (16) Vapour degrease the components (Ref.72-09-00 Cleaning) and allow to cool to room temperature.
- (17) Mask non-aluminized surfaces with suitable masking tape.

CAUTION: KEEP TURBINE BLADE ROOT BLOCK AND ROOT PLATFORM FACES CLEAR OF ETCHING SOLUTION.
- (18) Immerse the components for two minutes in the etching solution to produce the required quality of etch to verify complete removal of the aluminizing.
- (19) Examine for the following indications:
 - (a) A slight grain etched appearance, which indicates complete and satisfactory removal of the coating.

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- (b) A dark matt surface appearance which indicates the presence of residual coating.

(20) Wash off, preferably with an air/water gun, in clean, cold, running water.

(21) Dry off following immersion in hot water.

E. Stopping-off.

- (1) Vapour degrease the components (Ref.72-09-00 Cleaning).

CAUTION: AFTER DEGREASING DO NOT HANDLE OR OTHERWISE CONTAMINATE SURFACES TO BE ALUMINIZED.

- (2) Before applying masking, blank off cooling holes and internal passages with clear self-adhesive polyester tape or pre-formed caps of low density polythene film.

- (3) Where difficulties in removing stopping-off compound are likely to occur (e.g. re-entrant angles or cast surfaces) one of the following methods of applying stopping-off compound will ease its removal.

- (a) Prior to applying the first coat of stopping-off compound, apply clear polyester tape, low density polythene caps or approved lacquer to the component or,

- (b) Dilute the stopping-off compound with a calcined alumina/water mixture as required.

- (4) Apply stopping-off compound.

- (a) Two coats of the compound are to be applied. The first coat may be either the standard mix or the diluted version.

- (b) Apply the compound by dipping, brushing or spraying and while still wet, cover it with either 60/80 mesh alumina or 30/80 mesh molochite. Allow the first coat to dry for one hour (minimum) before applying the second coat.

- (c) Apply the second coat by dipping, brushing or spraying. Allow this coat to dry at room temperature for two hours (minimum).

- (5) Inspect the component and remove any stopping-off compound from areas that are to be aluminized.



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F. Aluminizing.

CAUTION: PROTECT ALL OTHER HEAT TREATMENT WORK FROM CONTAMINATION BY ALUMINIZING POWDER. CONTAMINATION COULD PROMOTE DANGEROUS METALLURGICAL EFFECTS.

- (1) Place a 1-2 in. deep layer of aluminizing powder at the bottom of the container.
 - (2) Lightly bed the components and test pieces into the powder, ensuring that the surfaces to be aluminized will be surrounded by a minimum of $\frac{1}{2}$ in. of powder when packed.
 - (3) Add more powder around the components.
 - (4) Settle the powder by gently tapping the bottom of the container on the bench, or by other similar means, to exclude as much air as possible.
 - (5) Add more powder to ensure that the surfaces to be aluminized are covered by 0.5 to 1 in. (12 to 25 mm) after settling as detailed previously.
 - (6) If more than one layer is to be packed into the container, repeat para.1.E.(1) to (5) for each layer.
- NOTE: When deciding the number of containers to be processed in the furnace, consideration must be given to the heat capacity of the furnace.
- (7) Place the loaded containers into a retort and seal the retort.
 - (8) Purge the retort by passing argon gas at the rate of 18 cu ft/h (0.5 cu m/h) until approximately five times the volume of the retort has been displaced.
 - (9) Place the purged retort in a pre-heated furnace. Maintain the argon flow to give a light positive pressure in the retort.
 - (10) Heat the components at the temperature and for the time specified in the relevant Repair chapter.
 - (11) Withdraw the retort from the furnace and allow to cool with the argon flow maintained until the pack temperature is low enough to enable the containers to be handled.

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- (12) Remove the containers from the retort.
- (13) Discard the top layer of aluminizing powder from each container to a depth of 0.25 to 0.5 in. (6 to 12 mm).

CAUTION: HANDLE ALUMINIZED COMPONENTS CAREFULLY
TO AVOID DAMAGING ALUMINIZED SURFACES.

- (14) Carefully remove the components from the container.
- (15) Remove any powder adhering to the components using a bristle brush and/or a clean, dry air blast.
- (16) Carefully remove the stopping-off compound, tape and/or protective caps.
- (17) Wash the components in hot water and dry using a clean dry air blast.
- (18) Pack the aluminized components into a suitable transit container.
- (19) Submit the test pieces to the local controlling laboratory for coating thickness testing.

G. Quality Control of Coating Thickness.

- (1) Carry out control checks of coating thickness using 'Beta 750' particle back scatter equipment or metallographic measuring equipment.

NOTE: The diffusion zone shall not be included for measurement purposes. Refer to the relevant Repair Chapter for details of the coating thickness.

H. Post Aluminizing Heat Treatment.

- (1) Heat treat the components in an argon atmosphere for the length of time and temperature specified in the Repair Chapter.
- (2) After heat treatment maintain the argon flow and externally cool the retort by means of an air blast.
- (3) Pack the treated components into a suitable transit container.

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2. Application of Pack Aluminizing Touch-Up (Sermaloy J)

A. General.

- (1) This process facilitates the local repair of pack aluminized coatings without the need for stripping of the original coating.
- (2) Engine components for which this repair has been approved, are listed in Table 401 and the surfaces to which it applies are indicated in the Figures referred to by the Table. There is no restriction to the size of any area to which this process may be applied.
- (3) Successful application of Sermaloy J depends to a great extent on the skill of the operator. It is therefore important that application techniques are perfected on test pieces prior to treating engine parts.

B. Safety Precautions.

- (1) Sermaloy J is highly toxic if ingested.
- (2) Respirators must be worn during spraying and the spraying area must be well ventilated with a minimum exhaust rate of 150 cubic feet per minute.
- (3) Avoid contact of Sermaloy J with the skin, eyes and mucous membranes. If contact does occur, the affected area must be irrigated immediately with running water. Medical attention must be obtained if contact is severe.

C. Preparation of Components.

- (1) Vapour degrease the component with trichlorethylene BS.580 (1963) Type 2 (Ref.72-09-00, Cleaning).
- (2) Dress the area to be treated with a 5 in. (127 mm) felt bob impregnated with 150 grade aluminium oxide (Aloxite powder).

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- (3) Polish the area with a 3 in. (76 mm) diameter, Tampico treated, rotary fibre brush and Canning's Brushing Emery Compound No.797.
- (4) Subject the component to kerosine wash (Ref.72-09-00, Cleaning) then repeat the vapour degrease operation.
- (5) Swab etch the dressed surface for 10 seconds in solution E (Ref. 72-09-14, Repair).

NOTE: The swab etching operation will establish whether the surface is suitable for repair with Sermaloy J. A satisfactory surface is indicated by a faint grain etch; an unsatisfactory surface will show black or dark grey deposits.

- (6) Thoroughly wash the component with cold water and air/water blast.
- (7) Immerse the component in clean hot water then dry it with a blast of clean dry air.
- (8) Inspect the component by the fluorescent penetrant method (Ref.72-09-00, Inspection/Check).
- (9) Subject the component to kerosine wash followed by vapour degrease (Ref.72-09-00, Cleaning).
- (10) Apply paper masking tape to the areas not requiring repair and keep the paper approximately 0,050 in. (1,3 mm) away from the edge of the dressed surface.

CAUTION: WEAR CLEAN COTTON OR POLYTHENE GLOVES
WHEN CARRYING OUT ALL SUBSEQUENT OPERATIONS.
STRICT CLEANLINESS IS ESSENTIAL.

- (11) Swab degrease the area to be repaired (Ref.72-09-00, Cleaning).
- (12) Dry abrasive blast the areas to be repaired (Ref.72-09-24, Repair).
- (13) Apply a clean dry air blast to the component, then remove the masking tape.
- (14) Remove masking tape residual deposits by swab degreasing (Ref.72-09-00, Cleaning).

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D. Repair Procedure.

(1) Determine the weight of Sermaloy J to be applied.

(a) Measure the area of the surface to be repaired.

(b) From the following formula, establish the weight of Sermaloy J per sq.cm. to be applied to obtain the required coating thickness of between 0.0015 and 0.003 in.

$$\frac{\text{Thickness of coating required (inches)} \times 25}{0.0025} = \text{mg/sq.cm.}$$

e.g. Coating thickness required, 0.0015 in.

$$\frac{0.0015 \times 25}{0.0025} = 15 \text{ mg/sq.cm.}$$

(c) Multiply the total surface area to be repaired (Ref. para. (a)) by the weight per sq.cm. established in para. (b) to determine the weight of Sermaloy J to be applied to effect the repair.

(2) Weigh the component and record its weight. Strict accuracy is necessary for this operation.

(3) If Sermaloy J is to be applied by spraying (Ref. para. (4)) apply paper masking tape to the areas not requiring repair and keep the paper approximately 0.050 in. (1,3 mm) away from the edge of the dressed surface.

(4) On large repair areas, apply Sermaloy J by spraying.

WARNING: SAFETY PRECAUTIONS MUST BE STRICTLY OBSERVED.

(a) Use spraying equipment typified by a Binks Bullows L900 spray gun with a B940 jet.

(b) Operate at 35 p.s.i. with the spray gun adjusted to emit a fine spray and, with the nozzle held approximately 2 to 3 in. (50 to 75 mm) from the repair surface, spray by a series of short passes.

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- (5) On small repair areas, apply Sermaloy J with a small camel hair or squirrel hair brush.
- (6) Allow the first coat to air dry until it has a matt grey appearance, then apply a second coat and allow it to air dry.

NOTE: Normally two coats are adequate but experience with the technique may indicate that more, or less is necessary.

- (7) Remove the masking tape from the component.
- (8) Place the component in an electric oven for 15 minutes (minimum) and maintain the temperature at 80 deg C, plus or minus 10 deg C (158 to 194 deg F).
- (9) Visually inspect the repair for crazing (checking), cracking or other defects. If any defect is present, remove the coating by rinsing in cold water, then thoroughly dry it at low oven temperature and repeat the procedures of paragraphs D.(1) to (8).
- (10) After successful application of Sermaloy J, place the component in an air circulating oven for 15 minutes (minimum) and maintain the temperature at 330 deg C, plus or minus 10 deg C (608 to 644 deg F).
- (11) Visually inspect the repair for crazing (checking), cracking or other defects. If defects are present at this stage, mask the untreated areas and remove the defective coating by dry abrasive blasting (Ref.72-09-24, Repair) and repeat the process from paragraph C.(13) onwards.



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(12) Coating thickness check.

- (a) Establish the weight of Sermaloy J applied.
 - (i) Weigh the component and record its weight.
 - (ii) From the weight recorded, subtract the previously recorded weight of the component (Ref. para.D.(2)).
- (b) Calculate the thickness of the new coating from the following formula:

$$\frac{\text{Weight of Sermaloy J applied (mg)}}{\text{area covered (sq.cm.)}} \times 0.0001 = \text{coating thickness (inches)}$$

e.g. Weight of Sermaloy J applied ... 60 mg
Area covered... ... 4 sq.cm.

$$\frac{60}{4} \times 0.0001 = 0.0015 \text{ in.}$$

- (c) If test pieces have been coated, measure the coating thickness on the test pieces to supplement the weight checks.
- (13) Diffusion heat treat the component.
- (a) Place the component on a metallic tray and ensure that the coated surfaces are not in contact with the tray or retort.
 - (b) Diffusion heat treat the component (Ref. Table 401).

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- (14) Remove the resulting residues from the coated surface with a Bessmer iron rotary soft wire brush or an approved alternative.

NOTE: The brush wires should not exceed 0.003 in. (0,076 mm) in diameter and the brush speed should not exceed 1,500 r.p.m. (2000 ft.per min.).

- (15) Visually inspect the coated surface to ensure that it has a uniform appearance and is free from chipping or oxidation (green scaled appearance).

CHAP/SEC AND IPC REF.	NOMENCLATURE	FIG.REF.
72-51-02/1-40	HP turbine nozzle vane	401
*72-51-02/1-50	HP turbine nozzle vane	
*72-51-02/1-60	HP turbine nozzle vane	
72-52-01/1-80	LP turbine nozzle vane	402
**72-52-01/1-90	LP turbine nozzle vane	
**72-52-01/1-100	LP turbine nozzle vane	
**72-52-01/1-110	LP turbine nozzle vane	

NOTE: Items marked * and ** have coated surfaces similar to those indicated in Fig.401 and 402 respectively.

NOTE: Diffusion heat treat the HP and LP turbine nozzle vanes for two hours at 870 to 890 deg C (1566 to 1602 deg F) in Argon at a volume change rate of six times per hour.

Components Approved for Repair with Sermaloy J
Table 401

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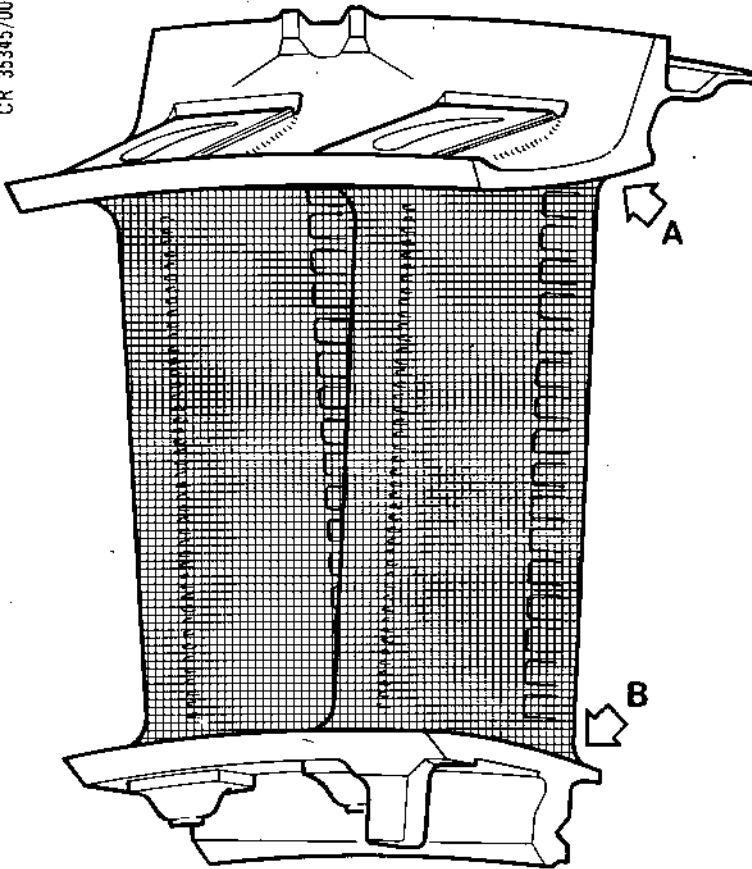


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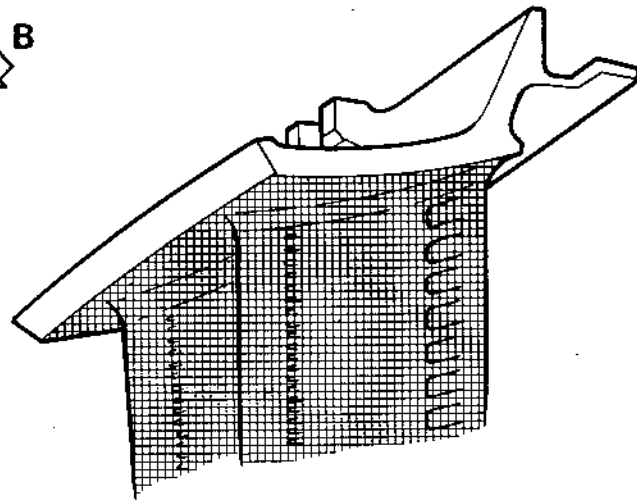
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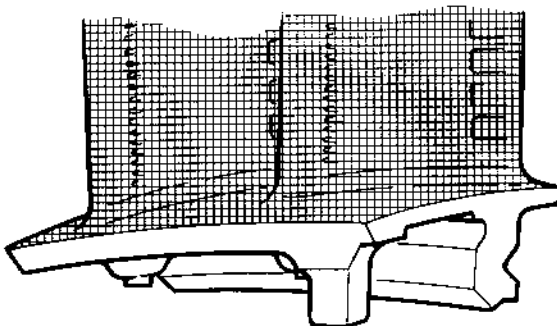
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PACK ALUMINISED SURFACES
REPAIRABLE BY COATING OF
SERMALOY J



VIEW IN DIRECTION OF ARROW A



VIEW IN DIRECTION OF ARROW B

HP Turbine Nozzle Vane Protective Coating Repair Details
Figure 401

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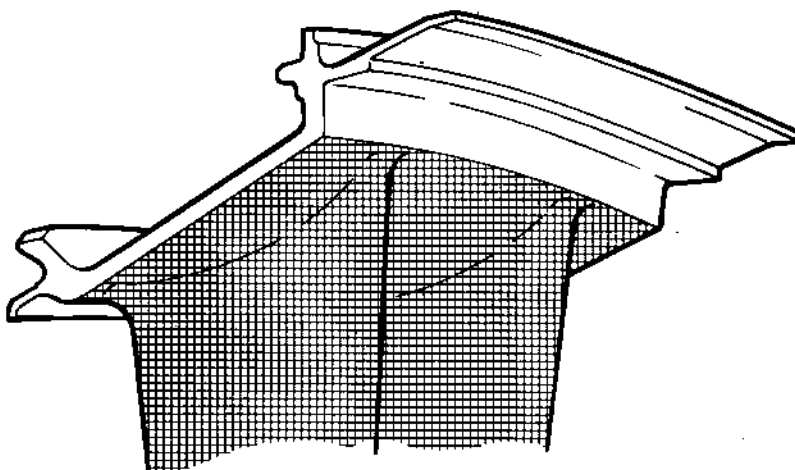
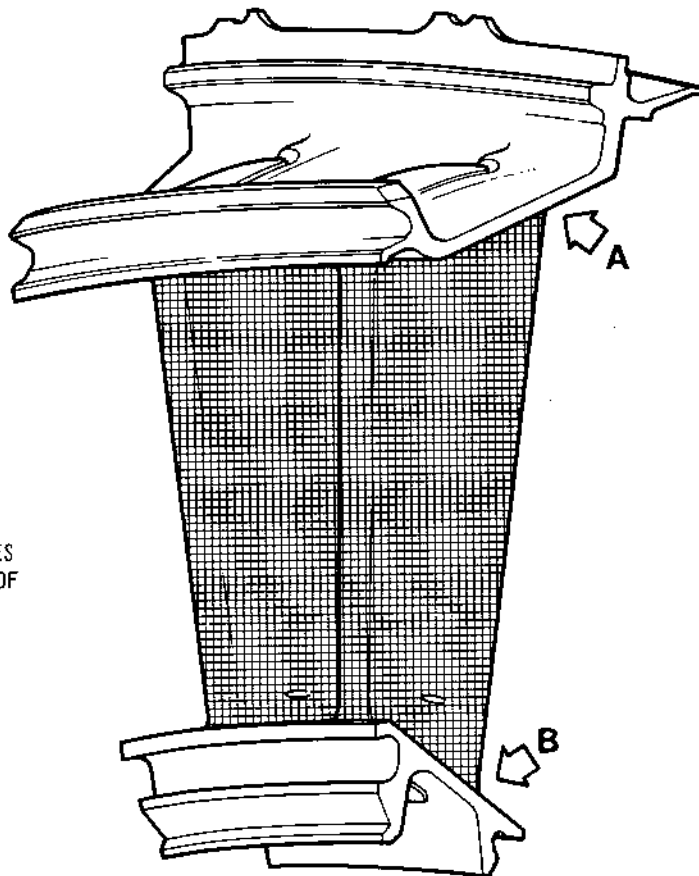
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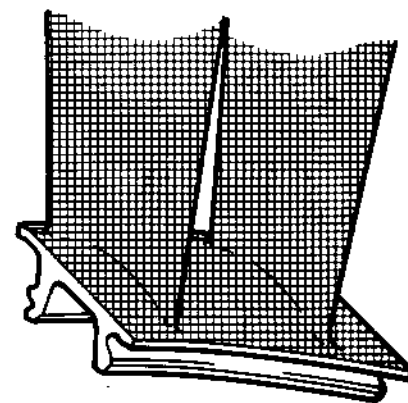
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PACK ALUMINISED SURFACES
REPAIRABLE BY COATING OF
SERMALOY J



VIEW IN DIRECTION OF ARROW A



VIEW IN DIRECTION OF ARROW B

LP Turbine Nozzle Vane Protective Coating Repair Details
Figure 402



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ABRADABLE COMPOSITE COATINGS - REPAIR

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REPAIR

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ABRADABLE COMPOSITE COATINGS - REPAIR

1. Application of Abradable Composite Coatings by Combustion Spraying

A. General.

- (1) This para. details the requirements for the application of composite powder and wire materials to produce abradable seal linings.
- (2) Use this repair method only when specifically referenced in a repair procedure. Deposition parameters for various materials are tabulated at the end of this Chapter. Additional parameters applicable to the component concerned will be detailed in the relevant Repair Chapter.
- (3) Components to which abradable coatings are applied must be dimensionally correct, the coating is not intended to compensate for dimensional inaccuracies.
- (4) Whenever possible, the application of sprayed coatings should be after the completion of all other processing and machining.

B. Safety Precautions.

- (1) Combustion spray equipment emits glare and has a high noise level, it should, therefore, be sited where personnel other than those operating the equipment are not affected. Sound-proofing and screening may be necessary to facilitate this.
- (2) Operators must wear a welders helmet, safety glasses, ear defenders, high necked dark overalls and gloves. Additional safety glasses and ear defenders must be available for use by other personnel in the spraying area.

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- (3) A fume extraction system must be provided and be in operation before the gun is lit.

WARNING: CERTAIN MATERIALS AND GASES USED DURING THE PROCESS ARE EXPLOSIVE. ENSURE HOSES AND FITTINGS ARE SERVICEABLE. DO NOT ALLOW HOSES TO TRAIL ON FLOOR.

C. Process Control.

- (1) The process is monitored by means of an indentation test using a Rockwell Superficial Hardness Tester, 15Y Scale. Hardness value limits for each type of coating are specified in the deposition parameters.
- (2) The hardness test is carried out on the component, providing the component geometry is suitable and the coating is of the required thickness for testing, if this is not possible then a test piece must be attached to the component.

D. Powder Control.

- (1) Powder must be kept in closed containers to prevent contamination by foreign matter.
- (2) Where humidity and/or temperature variations are extreme, special storage facilities will be necessary to keep the powder in a dry, free flowing condition.

CAUTION: DO NOT EXCESSIVELY MIX COMPOSITE POWDERS. DETERIORATION MAY RESULT.

- (3) Thoroughly mix powder (and sieve if necessary) immediately before use and before repacking.
- (4) The powder feed system must be cleaned out whenever powders are changed and at the end of every shift; cleanliness and freedom from moisture are essential.
- (5) Regular inspections must be made of the powder feed system and rectification carried out as necessary.

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E. Test Piece.

- (1) Each test piece must be flat and of the following minimum dimensions 1 in. x $\frac{1}{4}$ in. x 16 s.w.g. (25 x 15 x 1.6 mm).
- (2) The test piece must be attached to the component, adjacent to the area being sprayed and sprayed simultaneously to a thickness suitable for the hardness test.
- (3) It is important that the test piece is suitably marked and can be identified with the component it represents.

F. Preparation.

- (1) Machine off the old coating, pay particular attention to the dimensions quoted in the Repair Chapter.
- (2) Vapour degrease the component (Ref. 72-09-00, Cleaning) or locally degrease using a clean, lint-free cloth moistened with trichloroethane.
- (3) Mask off the areas which are not to be vapour blasted either with a suitable tape or mechanical mask.

NOTE: Time delay between blasting and spraying must not exceed two hours, during which the component must be kept in a dry clean condition.

- (4) Vapour blast (Ref. 72-09-13 Repair, Vapour Blasting) to provide a clean keying surface for the coating.
- (5) Should it be necessary to remove the masking before spraying, extreme care must be taken to avoid contaminating the areas to be sprayed, if contamination does occur, repeat the preparation procedure.

G. Pre-heating.

- (1) Certain components must be pre-heated to a specified temperature before spraying, the temperature will be specified in the relevant Repair Chapter.

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- (2) Small components may be pre-heated by the spray gun with the powder supply cut off.
- (3) Large or high density components will require pre-heating in an oven.

H. Bond Coat.

- (1) Ensure the areas that are not to be sprayed are masked off.
- (2) Immediately before spraying of the top coat apply a bond coat between 0.003-0.005 in. (0.08-0.13 mm) in thickness. Apply the bond coat specified in the relevant Repair Chapter. Should the bond coat be accompanied by the appearance of 'smoke' or 'bloom' this effect must be removed using a dry, clean air blast before spraying is continued.

J. Spraying.

- (1) Facilities should be available for the component to be rotated if necessary. Ideally both the component and the gun should be capable of being mechanically driven and controlled relative to one another during spraying.
- (2) Arrange a dry cooling air flow over the component, but not to impede the flow of the sprayed material, to ensure the temperature of the deposit and component does not exceed 170 deg C.
- (3) Angle the gun so that the direction of spray is as near as possible 90 deg to the receiving surface and never less than 50 deg.
- (4) To limit the occurrence of layering, spraying must be continuous with only the necessary pause for cooling or measurement checks.

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- (5) To ensure repeatability, spray parameters must be critically controlled and recorded.
- (6) After each component has been sprayed, the spray nozzle, powder and gas ports must be cleaned.
- (7) On completion of spraying remove all masking from the component taking great care not to damage the coating.

K. Inspection After Spraying.

- (1) Inspect the coating to ensure that there is no evidence of blistering, cracking or chipping, for uniformity of deposit and that the deposit is dimensionally correct. Faulty coatings must be completely removed by machining prior to complete reprocessing.

L. Rockwell Indentation Test.

- (1) The performance and accuracy of the equipment must be continually monitored against the standard Rockwell test block.
- (2) Set up the Rockwell tester with an indenter of 0.500 in. (12,7 mm) diameter and a major load of 33 lb (15 kg). Adjust the dashpot, for controlling the major load, to apply the load over a period of 24-25 seconds.
- (3) Prepare the surface of the coating by dressing with dry emery cloth, e.g. 120-220 grade, until smooth, take care not to smear the surface. Remove residual dust with a dry, clean air blast.
- (4) Hold the component rigid on the tester with the coated surface normal to the axis of the indenter.
- (5) Apply the minor load gradually and set the scale, with the pointer, to read zero.



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- (6) Within 10 seconds apply the major load by tripping the operating lever.
- (7) Remove the major load after 30 seconds + 1 second and read off the indentation value to the nearest full division.

NOTE: Disregard the first two readings after fitting the indenter, the indenter only seats correctly under load.

- (8) Where the hardness test is carried out on the component, indentation values must be taken at a minimum of six positions around the component, approx. 60 deg intervals, and the average recorded.
- (9) Where the hardness test is carried out on a test piece, record the average indentation values measured at three positions.

M. Finishing.

- (1) The coating must be machined by turning, with a single point tipped tool, without coolant. Adequate facilities for the extraction of dust residues must be provided.

N. Inspection after Finishing.

- (1) Inspect the coating to ensure there is no lifting, smearing, pitting or chipping of the deposit, or entrapment of debris.
- (2) Ensure the coating is dimensionally correct, faulty deposits must be completely removed, by machining, prior to complete reprocessing.

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ITEM

PARAMETERS

EQUIPMENT:

Metco 5P Thermospray
Gun fitted with 5PV
Vibrator.

Nozzle

P7B

Metering Valve

11

Carrier Plate

Air

Air Cap Setting

Cooling

Air Pressure

25 psi (172 kPa)

Gas Pressures Oxygen (Gauge)

18 psi (124 kPa)

Acetylene (Gauge)

14 psi (96 kPa)

Gas Flows

Oxygen (Metco Flowmeters)

27

Acetylene (Metco Flowmeters)

37

Powder Control Setting (Clicks)

12

Vibrator

ON

Spray Distance

12 in. (300 mm)

Powder Feed Rate

135 g/min

Powder Reference

MSRR.9507/5

Minimum deposit thickness
for testing

0.060 in. (1,5 mm)

Rockwell hardness values
(15Y scale)45 min.
80 max.

Deposition Parameters for Combustion Sprayed Metco 450
Nickel/Aluminium Composite
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ITEM	PARAMETERS
EQUIPMENT:	Metco 5P Thermospray Gun fitted with 5PV Vibrator.
Nozzle	P7B
Metering Valve	12
Carrier Plate	Oxygen
Air Cap Setting	Pinch
Air Pressure	20 psi (138 kPa)
Gas Pressure Oxygen (Gauge)	15 psi (103 kPa)
Acetylene (Gauge)	11 psi (76 kPa)
Gas Flow	
Oxygen (Metco Flowmeters)	28
Acetylene (Metco Flowmeters)	36
Powder Control Setting (Clicks)	12
Vibrator	ON
Spray Distance	8 in. (200 mm)
Powder Feed Rate	39 g/min
Powder Reference	MSRR.9507/6
Minimum deposit thickness for testing	0.060 in. (1,5 mm)
Rockwell hardness values (15Y scale)	15 min. 55 max.

Deposition Parameters for Combustion Sprayed Sherritt/
Gordon 75/25 Nickel/Graphite Composite
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CHROMIUM PLATING - REPAIR

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CHROMIUM PLATING - REPAIR

1. Application of Chromium Plating

A. General.

- (1) Chromium plating is applied as a wear resistant and anti-fretting coating to steel and heat-resistant alloy components. It may also be used to salvage components which are dimensionally incorrect through wear, etc.
- (2) Alternative solutions to those specified within this process may be used providing they are approved by the engine manufacturer.
- (3) Components to be plated are specified in the appropriate Repair Chapters. Also specified are plating areas and thicknesses, and any necessary pre-plating stress relief and post-plating de-embrittlement heat treatments.

B. Safety Precautions.

- (1) Chromic acid spray is injurious if inhaled, causing ulcers in the nose and possibly causing perforation of the nasal septum. Chromic acid salts and solutions in contact with the skin may cause sores, and ulcers may be formed if chromic acid gets into cuts and abrasions.
- (2) This process is subject to the Chromium Plating Regulations 1931 in Great Britain, and similar regulations in other countries. It is the duty of the employer to arrange for a responsible person to inspect the hands and forearms of all persons employed in the application of chromium plating twice a week and to be examined by a doctor every 14 days.
- (3) The chromium plating bath must never be used unless the fume extraction system is in operation and is fully serviceable.

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- (4) Recommended barrier cream shall be applied to the hands and forearms before starting work, and personnel shall wear the protective clothing provided.
- (5) Smoking and the consumption of food and drink in the facility area are prohibited.
- (6) Cuts and abrasions which appear to be not healing readily shall be reported without delay to the Medical Department.
- (7) Materials such as rags and sawdust which have absorbed chromic acid solution constitute a fire risk. Such materials shall be removed to a safe place for burning.

C. Process Solutions.

(1) Stripping solution 'A'.

- (a) This is an aqueous solution of 50 per cent by volume hydrochloric acid (HCl) sp.gr. 1.18, containing a suitable inhibitor such as Armohib 25.
- (b) The solution may be contained in a plastic tank incorporating a fume extraction system and shall be operated at room temperature. Components shall be immersed in the solution until stripping is complete.
- (c) Solution control shall be by discarding the solution when no longer effective.

(2) Stripping solution 'B'.

- (a) This is an aqueous solution of 10 per cent by weight sodium hydroxide (NaOH).
- (b) The solution may be contained in a mild steel tank incorporating a fume extraction system and shall be operated electrolytically at room temperature. The tank shall form one electrode and the components the other. Direct current shall be applied at 6-8 V and the components shall be treated anodically at 20-50A/sq.ft (2-6A/sq.dm) until the deposit is stripped.

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- (c) Solution control shall be by discarding the solution when no longer effective.
- (3) Stripping solution 'C'.
- (a) This is an aqueous solution of Enthone Enstrip CR.5 at a strength of 16 oz/gal (Imp.) (100 g/l).
- (b) The solution may be contained in a stainless steel tank incorporating a fume extraction system and shall be operated at 70-80 deg C. The components shall be immersed in the solution until stripping is complete.
- (c) Solution control shall be in accordance with the manufacturer's instructions.
- (4) Electrolytic alkaline cleaning solution.
- (a) This is an aqueous solution, containing:
- | | |
|-----------------------|---------------------|
| Sodium hydroxide | |
| (NaOH)... | 13-16 oz/gal (Imp.) |
| | (80-100 g/l) |
| Sodium cyanide (NaCN) | 1.2-1.6 oz/gal |
| | (Imp.) (8-10 g/l) |
- (b) The solution may be contained in a mild steel tank and shall be operated at room temperature, with the tank forming one electrode and the components forming the other electrode. Direct current shall be applied at 6-8 V and a reversing polarity unit shall be installed. Components shall be cleaned by cycling the current for 20 s cathodically and 10 s anodically, finishing anodically, for a sufficient period of time to produce a clean surface. This is usually effected in 2 min.
- (c) Solution control shall be by regular analysis and making suitable additions.

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(5) Etching solution 'A'.

- (a) This is an aqueous solution, containing:

Sulphuric acid				
(H ₂ SO ₄)	141-144 oz/gal (Imp.) (880-900 g/l)

This can be obtained as sulphuric acid sp. gr. 1.496. An alternative solution is an aqueous solution containing:

Sulphuric acid				
(H ₂ SO ₄)	83-87 oz/gal (Imp.) (520-540 g/l)

The solution may be made up by adding three parts by volume sulphuric acid (sp. gr. 1.84) to seven parts by volume water with care and constant stirring, then allowing the solution to cool to room temperature and making up any evaporation loss by adding the appropriate quantity of water.

- (b) Either solution may be contained in a lead-lined tank, fitted, if necessary, with cooling coils to maintain the solution temperature between 12 and 24 deg C. The sides of the tank may form one electrode and the components the other electrode. Direct current shall be applied at 6-8 V, and a polarity reversing unit shall be fitted. Stainless steel components shall be etched anodically for 30-60 s, or anodically for 45 s followed by 15 s cathodically. Low alloy steels shall be etched anodically for 30-60 s.
- (c) Solution control shall be by regular analysis and making suitable additions.

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(6) Etching solution 'B'.

- (a) This is an aqueous solution, containing:

Ferric chloride ($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$)	40-53 oz/gal (Imp.) (250-330 g/l)
--	-----	-----	--------------------------------------

Hydrochloric acid (HCl)	24-27 oz/gal (Imp.) (150-170 g/l)
----------------------------	-----	-----	--------------------------------------

One litre of the solution may be made up by adding 170 ml hydrochloric acid (sp. gr. 1.16) to 400 ml of water, then dissolving 330 g ferric chloride in the solution and making up to one litre with water.

- (b) The solution may be contained in a plastic tank and is used at room temperature. Components shall be immersed in the solution for $1\frac{1}{2}$ -2 min.
- (c) The solution must be regularly analysed by a laboratory and discarded on their instructions.

(7) Chromium plating solution.

- (a) This is an aqueous solution, containing:

Chromium trioxide (CrO_3)	40-48 oz/gal (Imp.) (250-300 g/l)
---	-----	-----	--------------------------------------

Sulphuric acid (H_2SO_4)	0.40-0.48 oz/gal (Imp.) (2.5-3.0 g/l)
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- (b) The solution may be contained in a lead-lined, mild steel tank and is operated at 52 ± 2 deg. C. Antimony/lead or tin/lead alloy anodes shall be used and the ratio of anode area to cathode area shall be not less than 1:4. Plating shall be carried out at 300-400 A/sq.ft (32-43 A/sq.dm) cathodic current density.
- (c) Solution control shall be by regular analysis and making suitable additions. The chromic acid and sulphuric acid contents shall be maintained within the limits specified previously and within the ratio of 90-110:1. The trivalent chromium content plus the iron content of the solution shall not exceed 1.6 oz/gal (Imp.) (10 g/l).

NOTE: Self-regulating, high speed chromium plating solutions are available principally as proprietary compounds. These shall be prepared and operated according to the manufacturers instructions.

D. Stripping Existing Plating.

- (1) Vapour degrease the component (Ref.72-09-00 Cleaning).
- (2) Immerse the component into the appropriate stripping solution. For low alloy steel components use Stripping Solution 'A' or 'B'; for stainless steel and heat-resistant alloy components use Stripping Solution 'A' or 'C'.

NOTE: If component geometry permits, the chromium plating may be removed by grinding as an alternative to chemical stripping.

- (3) Rinse in clean, cold running water and dry using a clean, dry air blast.

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- (4) Unless the component is to be re-plated immediately, apply approved de-watering oil as a temporary protective.

E. Preparation.

- (1) Stress relieve the component if required as specified in the appropriate Repair chapter.
- (2) Mount the component in a jig.
- (3) Vapour degrease the component (Ref.72-09-00 Cleaning) or locally degrease the area to be plated using a clean, lint-free cloth moistened with trichloroethane.
- (4) Mask off areas not to be plated using a suitable masking medium.
- (5) Clean the component by immersion in the Electrolytic Alkaline Cleaning Solution or by scouring the area to be plated with wet pumice powder.
- (6) Wash the component in clean, cold running water.

NOTE: Components which were cleaned with wet pumice powder do not require etching.

- (7) Etch the component. For steel components use Etching Solution 'A'; for heat-resistant alloy components use Etching Solution 'B'.

NOTE: Austenitic stainless steels may be etched in either solution.

NOTE: Steel components may also be etched anodically for 20-30 s at 6 V in a chromium plating solution, but this, preferably, should not be the bath which is to be used for the plating.

- (8) Unless the component was etched in a chromium plating solution, wash the component in clean, cold running water.

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F. Plating.

- (1) Immediately after etching transfer the component to the chromium plating bath. Allow the component to attain the solution temperature before applying the current. Plate until the required thickness of deposit is achieved.
- (2) Wash the component in a drag-out tank and then in clean, cold running water.
- (3) Dry off from immersion in clean hot water.
- (4) Remove all traces of masking and ensure that the component is in a clean condition.
- (5) Subject the component to de-embrittlement if required as specified in the appropriate Repair Chapter. Carry out the de-embrittlement as soon as possible, and not later than 16 h after plating.
- (6) Apply approved de-watering oil as a temporary protective.

NOTE: The temporary protection may be deferred until after inspection if the latter is carried out within 8 h of de-embrittlement.

G. Inspection After Plating.

- (1) Vapour degrease the component (Ref.72-09-00 Cleaning).
- (2) Visually inspect the component to ensure that the plating is free from blisters, excessive roughness, deep pitting and coarse cracking.
- (3) Check the plating thickness using appropriate approved methods.
- (4) Carry out a crack detection test if required as specified in the relevant Repair Chapter.

NOTE: When using penetrant methods of crack detection, the natural crack network of the chromium deposit shall be ignored.

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H. Finishing.

- (1) Grind the deposit if required to the dimensions specified in the appropriate Repair Chapter.
- (2) Visually re-inspect the deposit after grinding to ensure adhesion and freedom from excessive cracking.

NOTE: Even correct grinding renders the natural network of fine cracks more visible.

- (3) Apply approval de-watering oil as a temporary protective.

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SILVER PLATING - REPAIR

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SILVER PLATING - REPAIR

1. Application of Silver Plating

A. General.

- (1) Silver plating is applied as an anti-seizure and anti-fretting coating to steel and nickel alloy components.
- (2) Alternative solutions to those specified within this process may be used providing they are approved by the engine manufacturer.
- (3) Components which have a silver plated finish are listed, together with details of stripping, etching and cleaning requirements, in Table 401. Surfaces which are to be silver plated are shown in the illustrations referred to in the Table.

B. Safety Precautions.

- (1) Cyanide salts, solutions and hydrocyanic gas are deadly and extremely rapid poisons. Hydrocyanic gas is formed when cyanide comes into contact with acid, therefore it is imperative that cyanide and acids are kept apart.
- (2) Poisoning can result from swallowing cyanide, absorption through the skin and/or breathing hydrocyanic gas. Symptoms of poisoning are one or more of the following:
 - (a) Dizziness, nausea, general weakness and headache.
 - (b) Palpitations.
 - (c) Feeling of suffocation and tightness in the throat.
 - (d) Pallor, deep breathing and unconsciousness.



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- (3) Operators and other personnel in the facility area shall wear the protective clothing provided. Finger-nails shall be kept short.
- (4) Personnel shall wash thoroughly before eating, drinking or smoking. Food and drink shall not be consumed in the facility area, neither shall eating or drinking utensils be brought into the area.
- (5) Cyanide shall be stored in a secure area and shall be accessible only to authorized personnel.
- (6) Cyanide antidote shall be provided and be readily available in the facility area.

C. Process Solutions.

(1) Stripping solution 'A'.

- (a) This is an aqueous solution, containing:

*m-nitrobenzenesulphonic
acid sodium salt
(NO₂C₆H₄SO₃Na) ... 55-65 g/l

Sodium cyanide
(NaCN) ... 90-180 g/l

*NOTE: A similar proprietary compound is
Enthone Enstrip S or Alkan Alkastrip NS.

- (b) The solution may be contained in a stainless steel tank and may be used at room temperature or, for more rapid stripping, at temperatures up to 70 deg C.

- (c) Solution control shall be by regular analysis and making suitable additions.

(2) Stripping solution 'B'.

- (a) This is an aqueous solution, containing:

Potassium cyanide
(KCN) ... 100 g/l

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- (b) The solution may be contained in a mild steel tank supplied with a source of direct current and operated at a temperature of 20-25 deg C. The component shall be suspended from the anode bar and stripping may be carried out at any convenient direct current.
- (c) Solution control shall be by discarding the solution when no longer effective.
- (3) Stripping solution 'C'.
- (a) This is an aqueous solution, containing:
- Nitric acid (HNO_3)... 495 g/l
- The solution may be made up by adding one part by volume nitric acid (sp. gr. 1.42) to one part by volume water with care and constant stirring, then allowing the solution to cool to room temperature and making up any evaporation loss by adding the appropriate quantity of water.
- (b) The solution may be contained in a stainless steel, polythene or earthenware tank. Components shall be suspended from stainless steel hooks or contained in stainless steel baskets.
- (c) Solution control shall be by discarding the solution when no longer effective.
- (4) Cleaning solution 'A' (Hot Alkaline).
- (a) This is an aqueous solution, containing:
- Sodium hydroxide
(NaOH)... 20-30 g/l
- Sodium carbonate
(Na_2CO_3)... 20-30 g/l



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Trisodium phosphate
($\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$) ... 40-60 g/l

Non-ionic wetting agent ... Up to 1 g/l

- (b) The solution may be contained in a mild steel tank and is operated at temperatures up to 90 deg C.
- (c) Solution control may be by regular analysis and making suitable additions, or by discarding the solution when no longer effective.

(5) Cleaning solution 'B' (Electrolytic alkaline).

- (a) This is an aqueous solution, containing:

Sodium hydroxide
(NaOH) ... 80-120 g/l

Sodium cyanide (NaCN) ... 8-12 g/l

- (b) The solution may be contained in a mild steel tank and shall be operated at room temperature, with the tank forming one electrode and the components forming the other electrode. Direct current shall be applied at 6-8 V and a reversing polarity unit shall be installed. Components shall be cleaned by cycling the current for 20 seconds cathodically and 10 seconds anodically, finishing anodically, for a sufficient period of time to produce a clean surface. This is usually effected in 2 min.
- (c) Solution control shall be by regular analysis and making suitable additions.

(6) Etching solution 'A'.

- (a) This is an aqueous solution, containing:

Sulphuric acid
(H_2SO_4) ... 520-600 g/l

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The solution may be made up by adding three parts by volume sulphuric acid (sp. gr. 1.84) to seven parts by volume water with care and constant stirring, then allowing the solution to cool to room temperature and making up any evaporation loss by adding the appropriate quantity of water.

- (b) The solution may be contained in a lead-lined tank, fitted, if necessary, with cooling coils to maintain the solution temperature between 12 and 24 deg C. The sides of the tank may form one electrode and the components the other electrode. Direct current shall be applied at 6-8 V, and a polarity reversing unit shall be fitted. Stainless steel components shall be etched anodically for 15-60 seconds, or anodically for 45 seconds followed by 15 seconds cathodically. Low alloy steels shall be etched anodically for 15-60 seconds.
- (c) Solution control shall be by regular analysis and making suitable additions.

(7) Etching solution 'B'.

- (a) This is an aqueous solution, containing:

Ferric chloride
(FeCl₃6H₂O) ... 250-330 g/l

Hydrochloric acid
(HCl) ... 54-62 g/l

One litre of the solution may be made up by adding 170 ml hydrochloric acid (sp. gr. 1.16) to 400 ml of water, then dissolving 330 g ferric chloride in the solution and making up to one litre with water.

- (b) The solution may be contained in a plastic tank and is used at room temperature. Components shall be immersed in the solution for up to 2 min.

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- (c) The solution must be regularly analysed by a laboratory and discarded on their instructions.
- (8) Nickel strike solutions.
- (a) This is an aqueous solution, containing:
- Nickel chloride
($\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$) ... 300-400 g/l
- Hydrochloric acid
(sp. gr. 1.16) ... 25-40 g/l
- (b) The solution may be contained in rubber lined or plastic tanks and is used at room temperature. Components shall be cathodically treated for 1-2 min at 300-500 A/sq m.
- (c) Solution control shall be by regular analysis and making suitable additions.
- (9) Silver strike solution.
- (a) This is an aqueous solution, containing:
- Silver cyanide
(AgCN)... 2-4 g/l
- Potassium cyanide (KCN) ... 20-60 g/l
- The solution shall be made up by dissolving the potassium cyanide in a small quantity of water, then dissolving the silver cyanide in the solution and finally adding water to give the correct volume.
- (b) The solution may be contained in a polythene tank and is used at room temperature. The tank shall be supplied with a source of direct current at 6-8 V. Anodes shall be silver or mild steel, depending upon the silver content of the solution. Striking shall be carried out at 215-270 A/sq m, for up to 2 min. It is essential that the working voltage is supplied before components are immersed in the solution.

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- (c) Solution control shall be by regular analysis and making suitable additions.

(10) Silver plating solution.

- (a) This is an aqueous solution, containing:

Silver cyanide (AgCN) ... 50 g/l

Potassium cyanide (KCN) ... 86 g/l

Ammonium thiosulphate
($(\text{NH}_4)_2\text{S}_2\text{O}_3$) ... 1 g/l

The solution shall be made up by first dissolving the potassium cyanide in a small quantity of water, then dissolving the silver cyanide in the solution. The ammonium thiosulphate shall be dissolved separately in water and then added to the solution whilst stirring. Finally, water shall be added to make up to the correct volume.

- (b) The solution may be contained in a plastic tank and shall be provided with continuous filtration. The tank shall be supplied with a source of direct current at 6-8 V. Pure silver anodes shall be used. The bath shall be operated at 50 to 110 A/sq m for vat plating and maintained at 20-30 deg C. It is essential that the working voltage is applied before components are immersed in the solution. A daily addition of 0.1 g/l of ammonium thiosulphate shall be made before plating begins. The addition shall be dissolved in a small quantity of water before being added to the vat.

- (c) Solution control shall be by regular analysis and maintaining the silver cyanide content at 45-50 g/l and the free potassium cyanide content at 46-53 g/l.

D. Stripping Existing Plating.

- (1) Vapour degrease the component (Ref.72-09-00 Cleaning).



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- (2) Immerse the component in the appropriate stripping solution (Ref. Table 401).
- (3) Rinse in clean, cold running water and dry using a clean, dry air blast.
- (4) Stress relieve heat treat, if required, for 1 hour at $200^{\circ}\text{C} \pm 10^{\circ}\text{C}$ (Ref. Table 404).

NOTE: Heat treatment time commences when the component has reached the required temperature.

- (5) If specified in Inspection/Check, carry out crack detection procedures on the component before continuing with the plating procedure.
- (6) Unless the component is to be re-plated immediately, apply approved de-watering oil as a temporary protective.

E. Plating Procedure.

- (1) Mount the component in a jig or suspend from copper wire.
- (2) Vapour degrease the component in Triklone 'N' (Ref. 72-09-00 Cleaning).
- (3) Mask off areas not to be plated using I.C.I. Stopping-off Red Lacquer F230-2006.
- (4) Clean in the appropriate cleaning solution (Ref. Table 401).
- (5) Wash in clean, cold running water.
- (6) Etch the component in the appropriate etching solution (Ref. Table 401).
- (7) Wash in clean, cold running water.
- (8) Immerse in nickel strike solution (Ref. para.C.(8)).
- (9) Wash in clean, cold running water, then transfer direct to silver strike solution.
- (10) Immerse in silver strike solution (Ref. para.C.(9)), then transfer direct to silver plating solution (Ref. para.C.(10)).

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- (11) Remove the component from the silver plating solution when a deposit of 0.0002 in. (0,005 mm) minimum is obtained, unless otherwise specified.
- (12) Wash in clean, cold running water and dry off from immersion in clean boiling water.
- (13) Remove all traces of masking and ensure that the component is in a clean condition.
- (14) Subject the component to de-embrittlement heat treatment, if required (Ref.Table 404), as specified in para.(a). Carry out the de-embrittlement heat treatment as soon as possible, and not later than 16 hours after plating.
 - (a) De-embrittlement heat treat at 250 ± 10 deg C. for two and a half hours.

NOTE : Heat treatment time commences when the component has reached the required temperature.

- (15) If, as a result of de-embrittlement, there is oxide discolouration sufficient to interfere with subsequent inspection, remove the discolouration using a non-electrolytic cleaning solution (Ref. para.C.(4)).
- (16) Apply approved de-watering oil as a temporary protective.

NOTE : The temporary protection may be deferred until after inspection if the latter is carried out within 8 hours of de-embrittlement.

F. Inspection.

- (1) Vapour degrease the component (Ref.72-09-00 Cleaning).
- (2) Visually inspect the component to ensure that the plating is smooth, adherent and free from burns and blisters.
- (3) If instructed carry out plating thickness checks using approved equipment.
- (4) Apply approved de-watering oil as a temporary protective.

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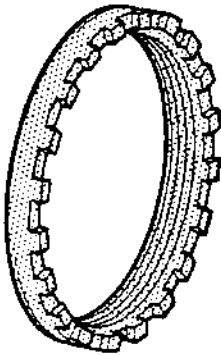
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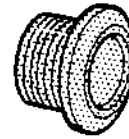
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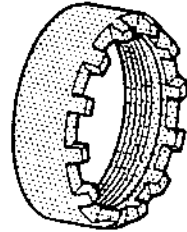
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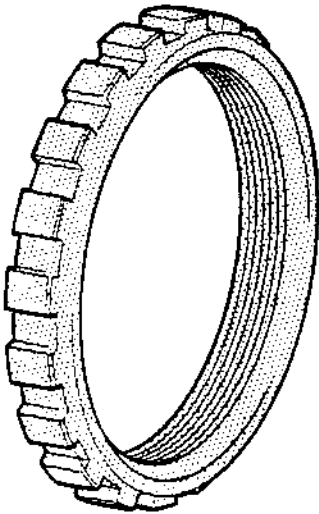
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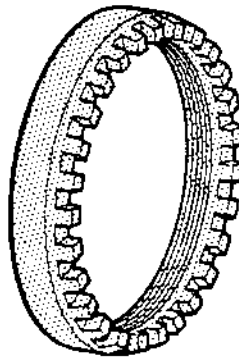
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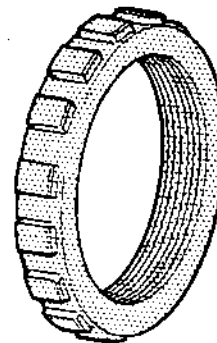
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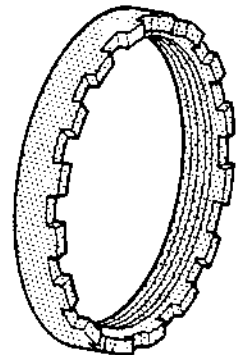
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72-52-02/1-30



72-52-02/2-10



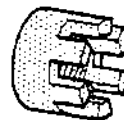
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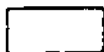
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72-63-03/1-140



73-31-05/1-40



SILVER PLATED SURFACES

Retaining Nuts - Silver Plating Details
Figure 401

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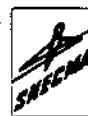
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CHAP./SEC. AND I.P.C. REF.	ITEM	FIG.REF.	STRIPPING SOLUTION	ETCHING SOLUTION	CLEANING SOLUTION
72-31-03/3-10	Retaining nut	401	C	A	A or B
72-31-03/3-50	Plain round nut	401	C	A	A or B
72-31-05/1-10	Retaining nut	401	C	B	A or B
72-31-05/1-40	Plain round nut	401	C	B	A or B
72-31-05/1-70	Retaining nut	401	C	A or B	A or B
72-41-01/2-30	Retaining nut	401	C	B	A or B
72-51-04/1-10	Plain round nut	401	C	B	A or B
72-52-02/1-130	Retaining nut	401	A or B	A	A or B
72-52-02/2-10	Retaining nut	401	A or B	A	A or B
72-61-00/1-10	Round retain- ing nut	401	C	A	A or B
72-63-03/1-140	Plain round nut	401	C	A or B	A or B

Retaining Nuts with Silver Plated Finish
Table 401

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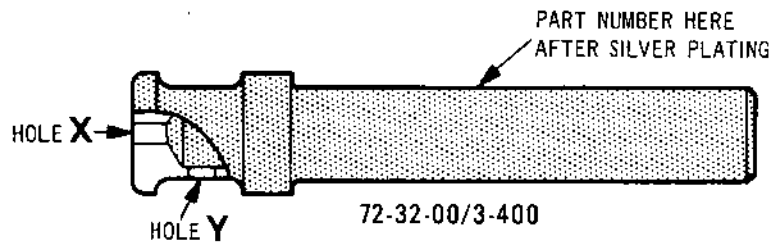
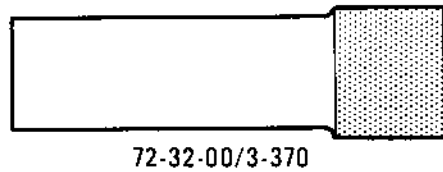
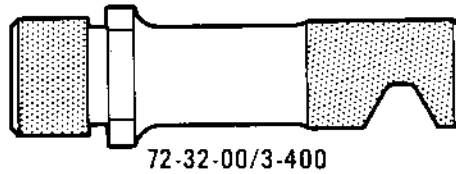
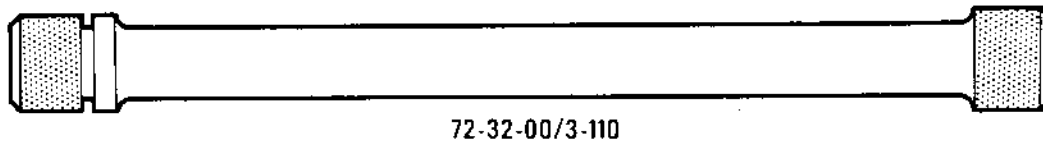
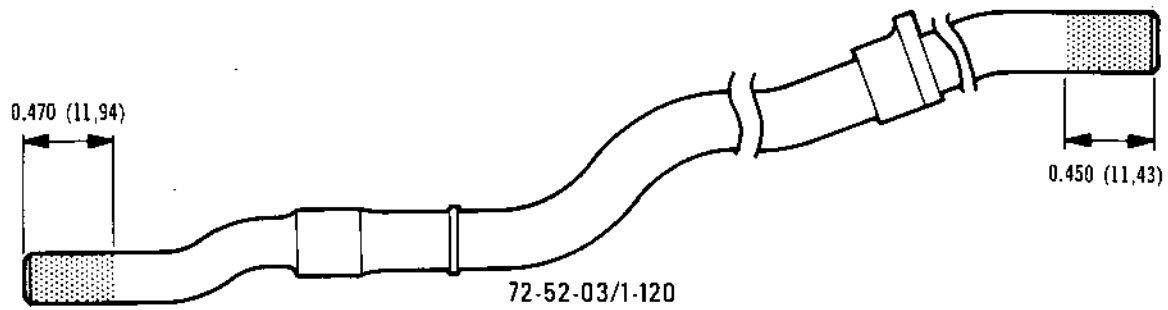


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SILVER PLATE ALL OVER
EXCEPT HOLES AT LOCATION
X AND Y

SILVER PLATE WHERE
MARKED THUS



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Internal Oil Tubes - Silver Plating Details
Figure 402

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CHAP./SEC. AND I.P.C. REF.	ITEM	FIG. REF.	STRIPPING SOLUTION	ETCHING SOLUTION	CLEANING SOLUTION	SILVER PLATING THICKNESS
72-32-00 3/110	Transfer tube	402	C	B	A or B	0.0003/ 0.0004 in. (0,0076/ 0,010 mm)
72-32-00 3/340	Transfer tube	402	C	B	A or B	0.0003/ 0.0004 in. (0,0076/ 0,010 mm)
72-32-00 3/370	Transfer tube	402	C	B	A or B	0.0003/ 0.0004 in. (0,0076/ 0,010 mm)
72-32-00 3/400	Oil feed jet tube	402	C	B	A or B	0.0003/ 0.0004 in. (0,0076/ 0,010 mm)
72-52-03 1/120	Tube	402	C	B	A or B	0.0003/ 0.0004 in. (0,0076/ 0,010 mm)

Internal Oil Tubes - Silver Plating Details
Table 402

CHAP./SEC. AND I.P.C. REF.	ITEM	FIG. REF.	STRIPPING SOLUTION	ETCHING SOLUTION	CLEANING SOLUTION
72-65-00 2/30A	Retaining ring	403	C	B	A or B
72-65-00 2/30B	Retaining ring	403	C	B	A or B
72-65-00 2/80A	Retaining ring	403	C	B	A or B
72-65-00 2/80B	Retaining ring	403	C	B	A or B

Oil Filter - Retaining Rings With Silver Plated Finish
Table 403

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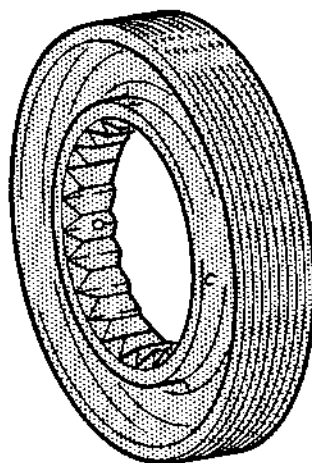
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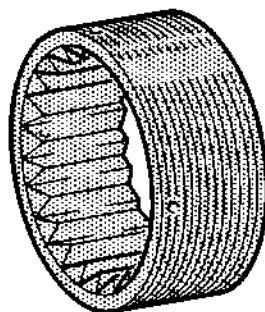
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72-65-00/2-30



72-65-00/2-80



SILVER PLATE ALL OVER
EXCEPT HOLES

Retaining Rings - Silver Plating Details
Figure 403

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CHAP./SEC. AND I.P.C. REF.	ITEM	FIG.REF.	STRESS RELIEVE HEAT TREAT	DE- EMBRITTLEMENT HEAT TREAT
72-31-03/3-10	Retaining nut	401	NO	NO
72-31-03/3-50	Plain round nut	401	YES	YES
72-31-05/1-10	Retaining nut	401	NO	NO
72-31-05/1-40	Plain round nut	401	NO	NO
72-31-05/1-70	Retaining nut	401	YES	YES
72-41-01/2-30	Retaining nut	401	NO	NO
72-51-04/1-10	Plain round nut	401	NO	NO
72-52-02/1-130	Retaining nut	401	YES	YES
72-52-02/2-10	Retaining nut	401	YES	YES
72-61-00/1-10	Round retain- nut	401	YES	YES
72-63-03/1-140	Plain round nut	401	YES	YES
72-32-00 3/110	Transfer tube	402	YES	YES
72-32-00 3/340	Transfer tube	402	YES	YES
72-32-00 3/370	Transfer tube	402	YES	YES
72-32-00 3/400	Oil feed jet tube	402	YES	YES
72-52-03 1/120	Tube	402	YES	YES
72-65-00 2/30A	Retaining ring	403	YES	YES
72-65-00 2/30B	Retaining ring	403	YES	YES
72-65-00 2/80A	Retaining ring	403	YES	YES
72-65-00 2/80B	Retaining ring	403	YES	YES

Heat Treatment
Table 404

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NICKEL PLATING - REPAIR

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NICKEL PLATING - REPAIR

1. Application of Nickel Plating

A. General.

- (1) Nickel plating is applied as a wear resistant and anti-fretting coating to steel and may also be used to salvage components which are dimensionally incorrect through wear etc.
- (2) Alternative solutions to those specified within this process may be used providing they are approved by the engine manufacturer.
- (3) Components to be plated are specified in the appropriate Repair Chapters. Also specified are plating areas and thicknesses, and any necessary pre-plating stress relief and post-plating de-embrittlement heat treatments.

B. Safety Precautions.

- (1) Cyanide salts, solutions and hydrocyanic gas are deadly and extremely rapid poisons, hydrocyanic gas is formed when cyanide comes into contact with acids therefore these should be kept apart. Poisoning may result from:
 - (a) Swallowing cyanide.
 - (b) Breathing hydrocyanic gas.
 - (c) Absorption through the skin.
 - (d) Warning signs of poisoning are, dizziness, nausea, headache, palpitations, feeling weak, suffocation, tightness of the throat, pallor, deep breathing and unconsciousness.

WARNING: AT ALL TIMES CYANIDE ANTIDOTE MUST BE READILY AVAILABLE. ALL PERSONS WORKING IN THE VICINITY MUST BE THOROUGHLY CONVERSANT WITH THE USE OF THE ANTIDOTE AND FIRST AID PROCEDURES.

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- (2) Operators must wear the protective clothing provided.
- (3) Recommended barrier cream shall be applied to the hands and forearms before starting work. Finger nails should be kept short and thorough washing performed before eating, drinking and smoking.
- (4) Smoking and the consumption of food and drink in the facility area are prohibited.
- (5) Cuts and abrasions which appear not to be healing readily must be reported without delay to the Medical Department.
- (6) Materials such as rags and sawdust which have absorbed the solutions must be placed in a container for disposal.
- (7) Cyanide should be stored in a place where it is accessible only to authorised persons.

C. Process Solutions.

- (1) Stripping solution 'A'.
 - (a) This is an aqueous solution of 141-148 oz/gal (880-920 g/l) of Sulphuric Acid (H_2SO_4). This can be obtained as sulphuric acid SG 1.496.
 - (b) The solution may be contained in a lead-lined tank and used at room temperature. The tank shall form one electrode and the component the other. Direct current shall be applied at 2-6V until the deposit is removed.
 - (c) Analyse the solution regularly and maintain proportions by addition.

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(2) Stripping solution 'B'.

(a) This is an aqueous solution containing:

Sodium cyanide (Na CN)	14.4-28.8 oz/gal (90-180 g/l)
Nitrobenzenesulphuric Acid Sodium Salt ($\text{NO}_2\text{C}_6\text{H}_4\text{SO}_3\text{Na}$)	8.8-10.4 oz/gal (55-65 g/l)

A similar proprietary compound to the above salt is Enthone "Enstrip S" or Alkan AlkaStrip NS.

(b) The solution may be contained in a mild steel tank and may be used cold or for more rapid stripping at temperatures up to 70 deg C.

(c) Analyse the solution regularly and maintain proportions by addition.

(3) Hot alkaline cleaner.

(a) This is an aqueous solution containing:

Sodium hydroxide (NaOH)	3.2-4.8 oz/gal (20-30 g/l)
Sodium carbonate (Na_2CO_3)	3.2-4.8 oz/gal (20-30 g/l)
Trisodium phosphate ($\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$)	6.4-9.6 oz/gal (40-60 g/l)
Non-ionic wetting agent	up to 1 g/l

(b) This solution may be contained in a mild steel tank and is operated at temperatures up to 90 deg C.

(c) The solution is to be analysed regularly and proportions maintained by addition, or discarded when no longer effective.

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(4) Electrolytic alkaline cleaner.

(a) This is an aqueous solution containing:

Sodium hydroxide (NaOH)	12.8-19.3 oz/gal (80-120 g/l)
Sodium cyanide (NaCN)	1.28-1.60 oz/gal (8-12 g/l)

(b) The solution may be contained in a mild steel tank and is operated at room temperature, with the sides of the tank forming one electrode and the component forming the other. Direct current shall be applied at 6-8V and a reversing polarity unit shall be fitted. Components are cleaned by cycling the current for 20 seconds cathodically and 10 seconds anodically, finishing the cycle anodically. The operation is carried out for a sufficient time (usually about two minutes) to produce a clean surface.

(c) Analyse the solution regularly and maintain proportions by addition.

(5) Etching of low alloy steels.

(a) This is an aqueous solution containing:

Hydrochloric acid (HCl)	4.8-5.8 oz/gal (30-36 g/l)
-------------------------	-------------------------------

The solution can be made up by diluting 100 ml hydrochloric acid (SG 1.16) to one litre with water.

(b) The solution may be contained in a plastic tank and is used at room temperature. Components shall be immersed in the solution for approximately 1½-2 minutes.

(c) Replace the solution on laboratory advice.

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(6) Electrolytic etching of steels.

Solution 'A'.

(a) This is an aqueous solution containing:

Sulphuric acid (H_2SO_4)	83.4-96.3 oz/gal (520-600 g/l)
------------------------------	-----------------------------------

One litre of the solution maybe made up as follows. Add 300 ml of sulphuric acid (SG 1.84) to 690 ml of water, slowly, with great care and stirring constantly. Allow to cool to room temperature and if necessary adjust to one litre by adding water.

- (b) The solution may be contained in a lead-lined tank fitted if necessary with cooling coils to maintain a temperature between 12-24 deg C. The sides of the tank may form one electrode and the component the other. Direct current shall be applied between 6-8V, a reversing polarity unit shall be fitted. Low alloy steel components shall be etched anodically for 30-60 seconds in either solution. Stainless steel components shall be etched in the solution for 30-60 seconds or anodically for 45 seconds followed by 15 seconds cathodically.
- (c) Analyse the solution regularly and maintain proportions by addition.



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(7) Etching of stainless steel and nickel base alloys.

(a) This is an aqueous solution containing:

Ferric chloride ($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$)	40.1-52.9 oz/gal (250-330 g/l)
Hydrochloric acid (HCL)	8.7-10 oz/gal (54-62 g/l)

One litre of the above solution is made up by adding 170 ml of hydrochloric acid (SG 1.16) to 400 ml of water and stirring well. Add 300g of ferric chloride and make up the solution to one litre by adding water.

(b) The solution may be contained in a plastic tank and is used at room temperature. Components shall be immersed in the solution for up to 2 minutes.

(c) Replace the solution on laboratory advice.

(8) Nickel strike.

(a) This is an aqueous solution containing:

Nickel chloride ($\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$)	48.1-64.1 oz/gal (300-400 g/l)
Hydrochloric acid (HCL)	4-6.4 oz/gal (25-40 g/l)

One litre of the solution is made up by adding 400 g of nickel chloride to 750 ml of water while stirring until dissolved. Add 110 ml of hydrochloric acid (SG 1.16) while stirring and make up to one litre with water.

(b) The solution may be contained in a rubber lined or plastic tank and is used at room temperature. Components shall be cathodically treated for 1-2 minutes at 3.23-5.38 A/sq dm (30-50 A/sq ft). It is essential that the working voltage is applied to the bath before the components to be plated are immersed in the solution.

(c) Analyse the solution regularly and maintain proportions by addition.

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(9) Nickel plating solutions.

(a) Solution 'A'.

This solution produces a soft ductile deposit of high internal stress and is an aqueous solution containing:

Nickel sulphate ($\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$)	38.4 oz/gal (250 g/l)
Boric acid (H_3BO_3)	4.8 oz/gal (30 g/l)
Nickel chloride ($\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$)	6.7 oz/gal (42 g/l)
or sodium chloride (NaCl)	3.2 oz/gal (20 g/l)

(b) Solution 'B'.

This solution produces a soft ductile deposit of low internal stress and is an aqueous solution containing:

Nickel sulphamate ($\text{Ni}(\text{SO}_3\text{NH}_2)_2 \cdot 4\text{H}_2\text{O}$)	68 oz/gal (425 g/l)
Nickel chloride ($\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$)	1.6 oz/gal (10 g/l)
Boric acid (H_3BO_3)	5.6 oz/gal (35 g/l)

- (c) The solutions may be contained in plastic or P.V.C. lined tanks continuously filtered and agitated by compressed air. Depolarised nickel anodes contained in terylene bags, or nickel pellets or squares contained in a Titanium basket, are used and plating is carried out at current densities as follows:

Solution 'A' up to 3.23 A/sq dm (30 A/sq ft)
Solution 'B' up to 6.45 A/sq dm (60 A/sq ft).

It is essential that the working voltage is applied to the bath before the components to be plated are immersed in the electrolyte.

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- (d) Freshly prepared solutions must be purified before use and at intervals on laboratory advice. Distilled or demineralized water must be used to maintain the solution volume. Analyse the solution regularly and maintain proportions by addition. Nickel salts must be dissolved in a quantity of plating solution in a separate tank, purified and then introduced into the main tank. The pH value (acid/alkaline content) must be checked daily and corrected by the addition of sulphuric or sulphamic acid or nickel carbonate.

Solution 'A'

Nickel sulphate content (as $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$)	32-40 oz/gal (200-250 g/l)
Boric acid content (H_3BO_3)	2.4-4.8 oz/gal (15-30 g/l)
Chloride content (as Cl_2)	1.4-1.9 oz/gal (9-12 g/l)
pH value (electrometric)	4.5-5.5
Temperature	40-45 deg C

Solution 'B'

Nickel content (as Ni)	10.4-12 oz/gal (65-75 g/l)
Boric acid content (H_3BO_3)	4.8-5.6 oz/gal (30-35 g/l)
Chloride content (as Cl_2)	0.32-0.64 oz/gal (2-4 g/l)
pH value (electrometric)	3.5-4.5
Temperature	45-50 deg C

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D. Stripping Existing Plating.

NOTE: If component geometry permits, the nickel plating may be removed by machining as an alternative to chemical stripping.

- (1) Vapour degrease the component (Ref.72-09-00 Cleaning).
- (2) Immerse the component into the appropriate stripping solution.
- (3) Rinse in clean, cold running water and dry using a clean, dry air blast.
- (4) Unless the component is to be re-plated immediately, apply approved de-watering oil as a temporary protective.

E. Stress Relieving and De-embrittlement.

- (1) After final machining and prior to nickel plating, steel components other than those manufactured from a fully austenitic steel shall be degreased (Ref. 72-09-00 Cleaning).

- (2) Stress relieve/de-embrittle:

Tensile Strength or Hardness

Stress Relief
Heat Treatment.

Less than 1000 MN/M² (65 ton f/
sq in.) or 302 HB or 310 HV.

Not required.

1000 MN/M² (65 ton f/sq in.) or
302 HB or 310 HV up to and
including 1390 MN/M² (90 ton
f/sq in.) or 408 HB or 432 HV.

1 hour minimum at
200 deg C \pm 10 deg C

NOTE: The heat treatment period shall commence when the components have reached the specified temperature.

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F. Preparation.

- (1) Stress relieve the component if required as specified in the appropriate Repair Chapter.
- (2) Mount the component in a jig or suitably wire with copper.
- (3) Vapour degrease the component (Ref.72-09-00 Cleaning) or locally degrease the area to be plated using a clean, lint-free cloth moistened with trichloroethane.
- (4) Mask off areas not to be plated using a suitable masking medium.
- (5) Clean the component by immersing in the hot alkaline cleaner or electrolytically in the cold alkaline cleaner.
- (6) Wash the component in clean, cold running water.
- (7) Etch the component by the method approved for the material type.
- (8) Wash the component in clean, cold running water.

G. Nickel Plating.

- (1) Immediately after etching and if instructed by the Repair Chapter immerse the component in the nickel strike solution.
- (2) Wash the component in clean, cold running water.
- (3) Quickly transfer to the nickel plating bath and continue plating in accordance with the instructions and conditions previously stated until the required thickness of deposit is obtained.
- (4) Wash the component in a drag out tank and then in clean, cold running water.
- (5) Immerse in clean hot water and dry off.

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- (6) Remove all traces of masking, jig and copper wire and ensure the component is in a clean condition.
- (7) Subject the component to de-embrittlement if required as specified in the appropriate Repair Chapter. Carry out the de-embrittlement as soon as possible and not later than 16h after plating.
- (8) Apply approved de-watering oil as temporary protective.

NOTE: The temporary protection may be deferred until after inspection if the latter is carried out within 8h of de-embrittlement.

H. Inspection After Plating.

- (1) Vapour degrease the component (Ref.72-09-00 Cleaning).
- (2) Visually inspect the component to ensure that the plating is smooth, adherent and free from burns and blisters.
- (3) Check the plating thickness using appropriate approved methods.

J. Finishing.

- (1) Grind the deposit if required to the dimensions specified in the appropriate Repair Chapter.
- (2) Carry out a crack detection test if required as specified in the appropriate Inspection/Check Chapter.
- (3) Visually re-inspect the deposit after grinding to ensure adhesion, smoothness and free from burns.
- (4) Apply approved de-watering oil as a temporary protective.



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COMBUSTION SPRAYING - REPAIR

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COMBUSTION SPRAYING - REPAIR

1. Application of Combustion Spraying

A. General.

- (1) Combustion spraying is a method of depositing unfused coatings of metal, cermet, ceramic, plastic and composite materials onto engine components. It is generally used as a heat barrier, to provide an erosion resistant surface, or to provide an abradable surface to maintain running clearances during service.
- (2) The components to be sprayed and the type of coating and areas to be covered etc. are specified in the relevant Repair Chapter. Deposition parameters for Rokide 'A' and Rokide 'Z' are tabulated in Table 402 and 403 respectively, and the specific parameters or alternatives to be used will be specified in the relevant Repair Chapter.

B. Safety Precautions.

- (1) Combustion spray equipment emits glare and has a high noise level. It should, therefore, be sited in such a position that personnel other than those operating the equipment are not continually affected. Sound proofing and screening may be necessary to facilitate this.
- (2) Operators shall wear safety glasses, ear defenders, high necked dark overalls and gloves.
- (3) Additional safety glasses and ear defenders shall be available and be worn by other personnel in the combustion spraying area.
- (4) Hoses must not be allowed to trail on the floor or be used in a damaged condition.
- (5) Certain materials emit dangerous fumes during spraying. Therefore, adequate protection must be provided for operators spraying these materials.



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C. Process Control.

- (1) Equipment settings must be adhered to and the condition of the gun must be continually monitored.
- (2) Spray materials shall be kept in a satisfactory condition. Powder must be kept dry. Wire and cord must be kept free from corrosion, moisture and mechanical damage. Rods must not be broken during handling or storage.
- (3) Powder feed systems should be regularly maintained. They should be cleaned out at the end of each shift and whenever a change of powder is to be made.
- (4) Preheating temperatures must not be such as to cause distortion of the component, or to destroy the properties of the material or any other previously applied treatments.

D. Preparation.

- (1) The component shall be vapour degreased (ref.72-09-00, Cleaning).
- (2) Areas which do not require abrasive blasting are to be masked off. Holes and passages are to be similarly protected, preferably by means of plugs.
- (3) The areas to be sprayed shall be abrasive blasted to provide a clean keying surface. After blasting the residual dust shall be removed using a clean, dry air blast.
- (4) The blasted areas shall show a roughened surface of uniform matt texture. If necessary the blasting shall be repeated until this is achieved.
- (5) If it is necessary to remove the masking, extreme care shall be taken to avoid contaminating the areas to be sprayed. If contamination does occur, the preparation procedure shall be repeated.
- (6) The areas which do not require spraying are to be masked off (if not previously masked), taking extreme care not to touch or otherwise contaminate the areas to be sprayed.

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- (7) Powders shall be thoroughly mixed and sieved if necessary, before use.

E. Pre-heating.

- (1) If required, components are to be pre-heated to a pre-determined temperature before spraying.
- (2) Small components may be pre-heated by the spray gun with the material supply cut off.
- (3) Large or high density components shall be pre-heated in a suitable oven.

F. Spraying.

- (1) Components shall be sprayed with the minimum of delay after preparation. The time lag between blasting and spraying must not exceed two hours, during which time the component must be kept in a clean, dry condition. If spraying is not commenced within this time, the preparation procedure must be repeated.
- (2) Spraying facilities must be equipped with a suitable fume extraction system.
- (3) Facilities should be available for the component to be rotated if necessary. Ideally both the component and the gun should be capable of being mechanically driven and controlled relative to one another during spraying.
- (4) On some components a bond coat may be required. This must be applied with the minimum of delay after blasting, and immediately before spraying the top coat.
- (5) The gun shall be angled so that the direction of spray is as near as possible 90 deg to the surface, and never less than 50 deg.
- (6) Cooling shall be arranged so that the flow of sprayed material is unimpeded.
- (7) To ensure repeatability, spray parameters shall be critically controlled.

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- (8) If a machining allowance is required it will be detailed in the relevant Repair chapter.

G. Inspection After Spraying.

- (1) The deposit shall be inspected dimensionally, for uniformity of deposit and to ensure that there is no evidence of blistering, lifting, cracking or chipping.
- (2) If the deposit is faulty it must be completely removed prior to re-processing.

H. Finishing.

- (1) The deposit shall be finished if required as detailed in the relevant Repair chapter.

J. Inspection After Finishing.

- (1) A visual inspection shall be carried out using magnification up to X7 where necessary. A satisfactory deposit has a matt finish in which the machining marks are clearly visible. There shall be no evidence of discolouration, cracking, plucking or polishing.

NOTE: The inspection of ground deposits is very important in order that the grinding operation may be monitored. This is necessary due to the possible rapid deterioration of the grinding wheels.

- (2) If the deposit is faulty it must be completely removed prior to re-processing.

K. Fluorescent Penetration Examination of Metal Spraying After Finishing.

- (1) It is assumed that the fluorescent penetrant examination equipment in use is capable of accommodating each of the components to be examined and that the operator is fully conversant with its operation.

WARNING: WEAR P.V.C. GLOVES TO PROTECT HANDS FROM PENETRANT FLUIDS, SKIN DISEASE MAY RESULT.

- (2) Carry out fluorescent penetrant examination.

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- (3) The approved system (S7) uses the penetrant Ardrex 985/P3.
- (4) Degreasing prior to inspection is by vapour degreasing using Triklone N only, or by swab degreasing using a group 2 or 4 solvent (Refer to 72-09-00 - Cleaning).
- (5) Degreasing after inspection is by vapour degreasing using Triklone N.
- (6) Details of the procedure are quoted in Table 401.

L. Removing Faulty Deposits.

- (1) Faulty deposits may be removed by machining or by a chemical method approved by the engine manufacturer.

M. Nozzle Type 3815/Rod Control.

- (1) Measure each rod in a new batch and establish the maximum diameter.
- (2) Drill out the nozzle to give approx. 0.0008 in (0,20mm) tolerance above the maximum rod diameter. A new nozzle is supplied undersize due to the inconsistency in shape and diameter of the rods.
- (3) Pass each rod through the gun prior to spraying, any irregular shaped rod should be rejected.

SEQUENCE	OPERATION	MIN. TIME	MAX. TIME	REMARKS
1	Where necessary clean to relevant chapter	-	-	-
2	Degrease	-	-	-
3	Apply penetrant locally, or all over as required	5 mins.	-	Component to be hot from degreasing
4	Degrease	30 s	-	-
5	Examine	-	-	View under UV light

Process S7 - Fluorescent Penetrant Examination
Table 401

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EQUIPMENT OR CONDITION		BOND COAT MSRR 9507/109	ROKIDE 'A' COAT MSRR 9507/107	
Material diameter	2 mm wire	1/8 in.wire (3,175 mm)	3/16 in.rod (4,74 mm)	1/4 in.rod (6,35 mm)
Metallisation gun type	Mk.45 or Mk.40	Mk.45 or Mk.40	Mk.45 or Mk.40	Mk.45 or Mk.40
Air nipple type	1018	Mk.45 gun: 1020 Mk.40 gun: 1020Z	3833	3838
Nozzle type	1014	1015	3815 (See Note)	3819
Mixing block type	1011	1011	1011	1092
Guide sleeves type	829	1005	Mk.45 gun: 4509 Mk.40 gun: 1006	Mk.45 gun: 4528 Mk.40 gun: 917
Feed rollers type	856	856	856	912
Fuel gases	oxygen/ acetylene	oxygen/ acetylene	oxygen/ acetylene	oxygen/ acetylene
Gas pressure, oxygen (gauge)	20 psi (138 kPa)	25 psi (172 kPa)	34 psi (235 kPa)	45 psi (310 kPa)
Gas pressure, acetylene (gauge)	15 psi (103 kPa)	15 psi (103 kPa)	20 psi (138 kPa)	17 psi (117 kPa)
Gas flow, oxygen	3.5 lit 4.0 unlit	4.5 lit 4.5 unlit	4.5 lit 5.0 unlit	5.6 lit 5.5 unlit
Gas flow, acetylene	6.5 lit 9.0 unlit	6.0 lit 8.5 unlit	7.5 lit 9.0 unlit	10.7 lit 9.2 unlit

NOTE: Refer to para.1.M.

Parameters for Application of Rokide 'A'
Table 402 (Continued)



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EQUIPMENT OR CONDITION	BOND COAT MSRR 9507/109		ROKIDE 'A' COAT MSRR 9507/107	
Nozzle air pressure	65 psi (448 kPa)	65 psi (448 kPa)	65 psi (448 kPa)	72 psi (497 kPa)
Turbine air pressure	Mk.45 gun:	Mk.45 gun:	Mk.45 gun:	Mk.45 gun:
	80 psi (554 kPa)	80 psi (554 kPa)	80 psi (554 kPa)	80 psi (554 kPa)
	Mk.40 gun:	Mk.40 gun:	Mk.40 gun:	Mk.40 gun:
	65 psi (448 kPa)	65 psi (448 kPa)	65 psi (448 kPa)	72 psi (497 kPa)
Material feed speed	36 in./min	27 in./min	4 to 5.5 in./min	4 to 5.5 in./min
Gun to work distance	5 in.	5 in.	5 in.	7 in.

Parameters for Application of Rokide 'A'
Table 402 (Concluded)

EQUIPMENT OR CONDITION	BOND COAT MSRR 9507/109		ROKIDE 'Z' COAT MSRR 9507/108
Material diameter	2 mm wire	1/8 in. (3,175 mm)	3/16 in. (4,74 mm)
Metallisation gun type	Mk.45 or Mk.40	Mk.45 or Mk.40	Mk.45 or Mk.40
Air nipple type	1018	Mk.45 gun: 1020 Mk.40 gun: 1020Z	3833
Nozzle type	1014	1015	3815

Parameters for Application of Rokide 'Z'
Table 403 (Continued)

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EQUIPMENT OR CONDITION	BOND COAT MSRR 9507/109		ROKIDE 'Z' COAT MSRR 9507/108
Mixing block type	1011	1011	1011
Guide sleeves type	829	1005	Mk.45 gun: 4509 Mk.40 gun: 1006
Feed rollers type	856	856	856
Fuel gases	oxygen/ acetylene	oxygen/ acetylene	oxygen/ acetylene
Gas pressure, oxygen (gauge)	20 psi (138 kPa)	25 psi (172 kPa)	31 psi (214 kPa)
Gas pressure, acetylene (gauge)	15 psi (103 kPa)	15 psi (103 kPa)	20 psi (138 kPa)
Gas flow, oxygen	3.5 lit 4.0 unlit	4.5 lit 4.5 unlit	5.0 lit 5.0 unlit
Gas flow, acetylene	6.5 lit 9.0 unlit	6.0 lit 8.5 unlit	9.6 lit 11.0 unlit
Nozzle air pressure	65 psi (448 kPa)	65 psi (448 kPa)	65 psi (448 kPa)
Turbine air pressure	Mk.45 gun: 80 psi (554 kPa) Mk.40 gun: 65 psi (448 kPa)	Mk.45 gun: 80 psi (554 kPa) Mk.40 gun: 65 psi (448 kPa)	Mk.45 gun: 80 psi (554 kPa) Mk.40 gun: 65 psi (448 kPa)
Material feed	36 in./min	27 in./min	2 to 3 in./min
Gun to work distance	5 in.	5 in.	Refer to relevant Chapter, Repair

Parameters for Application of Rokide 'Z'
Table 403 (Concluded)



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PLASMA SPRAYING - REPAIR

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PLASMA SPRAYING - REPAIR

I. Application of Plasma Spraying for Hard-faced Coatings

A. General.

- (1) Plasma spraying is a method of depositing metal, metal alloy, cermet, ceramic and composite powders onto engine components. It is used to provide a wear-resistant surface and/or to build-up worn components, especially bearing locations on shafts and in housings.
- (2) This repair method is only to be used when specifically referenced in a particular repair. The repair will detail all parameters, e.g. type of masking, grit blasting details, type of gun and its settings, etc., applicable to the component concerned.

B. Safety Precautions.

- (1) Plasma spray equipment emits ultra-violet light and has a high noise level. It should, therefore, be sited in such a position that personnel other than those operating the equipment are not continually affected. Sound proofing and screening may be necessary to facilitate this.
- (2) Operators shall wear a welder's helmet, safety glasses, ear defenders, high necked dark overalls and gloves.
- (3) Additional safety glasses and ear defenders shall be available and be worn by other personnel in the plasma spraying area.
- (4) Certain materials and gases are explosive. Hoses and fittings must be fully serviceable and hoses must not be allowed to trail on the floor.
- (5) A suitable fume extraction system shall be provided. This system must be operating before the gun is lit.

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C. Process Control.

- (1) Equipment settings must be continually monitored.
- (2) Electrodes shall be examined at the beginning of each shift and their arc life recorded.
- (3) The relationship of operating current/voltage to power level must be monitored at least twice during each shift. Hydrogen flow must not be varied to compensate for change of voltage.
- (4) The powder feed system shall be checked daily for wear and deterioration.
- (5) Powders must be kept in a dry condition, preferably in heated containers.
- (6) Preheating temperatures must not be such as to cause distortion of the component, or to destroy the properties of the material or any other previously applied treatments.

D. Test Piece Control.

- (1) A test piece shall be sprayed and subjected to a bend test at the beginning of each half shift and whenever electrodes, powder batches or powder types are changed.
- (2) A recording system must be maintained for tests conducted. An increase in testing frequency may be required for particular techniques at the discretion of the quality and inspection departments of the facility concerned.
- (3) The test piece shall be 18 swg mild steel sheet of minimum dimensions 2 x 3 in. (50 x 75 mm). Other materials may be used at the discretion of the controlling laboratory.
- (4) The test piece shall be prepared, preheated and sprayed under standardized conditions.

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- (5) A coating of 0.006 ± 0.001 in. ($0,15 \pm 0,025$ mm) shall be deposited on the prepared piece without overheating.
- (6) The test piece shall then be bent mechanically through 90 deg at a slow and deliberate rate round a 0.5 in. (12,5 mm) diameter mandrel. This test must be carried out with the deposit on the outside of the bend.
- (7) A satisfactory result is indicated if the deposit exhibits no evidence of lifting or spalling from the panel. A minimum amount of cracking in the bend is acceptable with certain low ductility deposits.
- (8) Assessment of deposit structure and hardness shall be made for each new batch of powder.
- (9) If the results are not satisfactory, the equipment, parameters and technique must be critically examined to correct faulty deposition. Spraying of components may be commenced only when a satisfactory bend test has been produced.

E. Preparation.

- (1) The component shall be vapour degreased (Ref.72-09-00 Cleaning) or locally degreased using a clean, lint-free cloth moistened with trichloroethane.
- (2) Areas which do not require abrasive blasting are to be masked off.
- (3) The areas to be sprayed shall be abrasive blasted to provide a clean keying surface. After blasting the residual dust shall be removed using a clean, dry air blast.
- (4) The blasted areas shall show a roughened surface of uniform matt texture. If necessary the blasting shall be repeated until this is achieved.

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- (5) If it is necessary to remove the masking, extreme care shall be taken to avoid contaminating the areas to be sprayed. If contamination does occur, the preparation procedure shall be repeated.
- (6) The areas which do not require spraying are to be masked off (if not previously masked), taking extreme care not to touch or otherwise contaminate the areas to be sprayed.
- (7) The powder shall be thoroughly mixed before use.

F. Pre-heating.

- (1) If required, components are to be pre-heated to a pre-determined temperature before spraying.
- (2) Small components may be pre-heated by the spray gun with the powder supply cut off.
- (3) Large or high density components shall be pre-heated in a suitable oven.

G. Spraying.

- (1) Components shall be sprayed with the minimum of delay after preparation. The time lag between blasting and spraying must not exceed two hours, during which time the component must be kept in a clean, dry condition. If spraying is not commenced within this time, the preparation procedure must be repeated.
- (2) Facilities should be available for the component to be rotated if necessary. Ideally both the component and the gun should be capable of being mechanically driven and controlled relative to one another during spraying.
- (3) On some components a bond coat may be required. This must be applied with the minimum of delay after blasting, and immediately before spraying the top coat.

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- (4) The gun shall be angled so that the direction of spray is as near as possible 90 deg to the surface, and never less than 50 deg.
- (5) Cooling shall be arranged so that the flow of sprayed material is unimpeded.
- (6) To ensure repeatability, spray parameters shall be critically controlled.
- (7) If a machining allowance is required it will be detailed in the relevant Repair Chapter.

H. Inspection After Spraying.

- (1) The deposit shall be inspected dimensionally, for uniformity of deposit and to ensure that there is no evidence of blistering, lifting, cracking or chipping.
- (2) If the deposit is faulty it must be completely removed prior to reprocessing.

J. Finishing.

- (1) The deposit shall be finished if required as detailed in the relevant repair.
- (2) If buffing is specified the surface should be buffed until it appears or feels smooth.

K. Inspection After Finishing.

- (1) After machining a visual inspection shall be carried out using magnification up to X7 where necessary. A satisfactory deposit has a matt finish in which the machining marks are clearly visible. There shall be no evidence of discolouration, cracking, plucking or polishing.

NOTE: The inspection of ground carbide deposits is very important in order that the grinding operation may be monitored. This is necessary due to the possible rapid deterioration of the grinding wheels.

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(2) After buffing a visual inspection shall be carried out. A satisfactory deposit shall exhibit no blistering, lifting, cracking or chipping.

(3) If the deposit is faulty it must be completely removed prior to reprocessing.

L. Fluorescent Penetration Examination of Metal Spraying After Finishing.

NOTE: This examination technique is only required to confirm suspected machining abuse, faulty deposition, or if instructed by the Repair Chapter.

(1) It is assumed that the fluorescent penetrant examination equipment in use is capable of accommodating each of the components to be examined and that the operator is fully conversant with its operation.

WARNING: WEAR P.V.C. GLOVES TO PROTECT HANDS FROM PENETRANT FLUIDS, SKIN DISEASE MAY RESULT.

(2) Carry out fluorescent penetrant examination.

(3) The approved penetrant system (S7) is detailed in Table 401.

(4) Refer to Table 402 for the Process S7.

(5) All components must be degreased using Triklone N only.

M. Removing Faulty Deposits.

(1) Faulty deposits may be removed by machining or by a chemical method approved by the engine manufacturer.

PROCESS	PENETRANT	REMOVER	DEVELOPER
S7	Ardrox 985/P3	Trichloroethylene liquid and/or vapour	-

Approved Penetrant System
Table 401



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SEQUENCE	OPERATION	MIN. TIME	MAX. TIME	REMARKS
1	Where necessary clean to relevant Chapter	-	-	-
2	Degrease	-	-	-
3	Apply penetrant locally, or all over as required	5 min.	-	Component to be hot from de- greasing
4	Degrease	30 s	-	-
5	Examine	-	-	View under UV light

Process S7 - Fluorescent Penetrant Examination
Table 402

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PLASMA WELDING - REPAIR

1. Plasma Welding for Titanium Components

A. General.

- (1) Plasma welding is a process using a high temperature stream of ionized gas as the heat source. The plasma gas torch is water cooled, with de-mineralised water, and the arc produced by the welding power supply. During welding the electric arc passes through a constricted flow of gas producing a gas jet with arc temperatures of approx. 15,000°C. A secondary shielding gas flow is provided around the plasma arc column to prevent oxidation of the molten weld metal.
- (2) Use this repair procedure only when specifically referenced. The Repair Chapter will detail all parameters, e.g. type of equipment, settings etc.

B. Safety Precautions.

- (1) The plasma welding process emits ultra violet light. It should therefore be sited in such a position that personnel other than those operating the equipment are not continually affected, screening may be necessary to facilitate this.
- (2) Operators must wear a welders helmet and high necked dark overalls. The following glass shades are recommended.

Arc Current (Amps)	BS.679 Shade No.
0-30	5 or 6
30-75	6 or 8
75-200	10
200-400	12
Above 400	14

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- (3) Swab degreasing with inflammable liquids must only be carried out in a well ventilated booth fitted with a fume extraction system, the operator must wear protective gloves.

WARNING: CERTAIN GASES USED DURING THE PROCESS ARE EXPLOSIVE. HOSES MUST BE SERVICEABLE AND NOT ALLOWED TO TRAIL ON FLOOR.

C. Types of Plasma Welding.

- (1) Transferred arc.
 - (a) Transferred arc is the term used when the arc current passes through the plasma stream from the torch electrode to an earthed workpiece.
- (2) Non-transferred arc.
 - (a) Non-transferred arc is the term used when the arc current passes through the plasma stream from the torch electrode to an earthed torch nozzle holder.
- (3) Direct current (DC) welding.
 - (a) Straight polarity welding is the term used when the workpiece is connected positive and the torch electrode connected negative.
 - (b) Reverse polarity welding is the term used when the workpiece is connected negative and the torch electrode connected positive.

D. Weld Techniques.

- (1) Keyhole welding.
 - (a) When this technique is used, a hole is produced at the leading edge of the weld pool, where the plasma jet displaces the molten metal, expelling plasma gas and arc vapour beneath the weldment. Surface tension causes the molten metal to flow in behind the keyhole to form the weld bead. This technique should not be used for components thinner than 0.080 in. (2,03 mm).

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(2) Conduction welding.

- (a) Heat from the plasma arc melts the material by conduction through the workpiece, this technique should be used on all components thinner than 0.080 in. (2,03 mm).

E. Shielding and Backing Gas Supplies.

- (1) The hydrogen content of any gas supply used during plasma welding must not exceed 8 per cent.
- (2) The selection of plasma and shielding gases is related to the material to be welded, both will be specified in the relevant Repair Chapter.
- (3) In most cases argon backing is required during welding and is most effectively applied by means of backing bars. Sufficient volume must be allowed in the backing bar channels to take the keyhole plasma gas stream which issues beneath the weldment.
- (4) Should the use of backing bars be impractical, an area behind the weld must be sealed off, except for feed and bleed orifices, then purged with argon and a continuous supply of argon allowed to flow during welding.

CAUTION: WHERE COPPER OR COPPER ALLOY BACKING BARS ARE USED AVOID CONTACT WITH THE WORKPIECE.

F. Electrodes.

- (1) Non-consumable torch electrodes, for use with DC power sources must be of thoriated tungsten containing 1 to 2½ per cent thorium.
- (2) Tungsten electrodes must be straight throughout their length and may be swaged or finished by centreless grinding. Ovality is restricted to 0.005 in. (0,13 mm) and the stipulated diameter must be within a minus tolerance of 0.005 in. (0,13 mm).

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- (3) The electrode tip geometry must conform to the equipment manufacturers recommendation.

G. Process Control.

NOTE: It is important when applying plasma weld to exclude draughts from the working area.

- (1) Components must be degreased in accordance with the Repair Chapter.
- (2) Equipment settings must be continually monitored.
- (3) A test piece which simulates the repair component geometry must be inspected, as instructed in the relevant Repair Chapter, and approved by the local controlling laboratory before the repair welding commences.
- (4) Each completed weld run must be cleaned using a rotary stainless steel wire brush.
- (5) Remove all weld bead irregularities at the completion of each weld run. Small irregularities may be removed by polishing. In the event of major irregularities within the weld bead, remove the relevant section, by grinding, and apply a new bead.

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SNECMA

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VAPOUR BLASTING - REPAIR

1. Application of Vapour Blasting

A. General.

- (1) The process is used for cleaning surfaces, as a preparation for further processing or it may also be used to introduce a compressive stress into the surface layer of metallic parts to improve fatigue strength. The abrasive medium is suspended in water, delivered to a nozzle at low pressure then accelerated by compressed air.
- (2) Use a standard vapour blast cabinet with automatic timing device.
- (3) Use this process only when specifically referenced in a Repair Chapter. Deposition parameters for various repairs are tabulated at the end of this chapter.

B. Safety Precautions.

- (1) All apparatus must be earthed to ensure dispersion of any heavy charge which might be generated during the process.
- (2) Cabinets must be fitted with explosion doors and continuous low speed air extraction.
- (3) A face mask and apron must be worn when cleaning the exhaust filters.

C. Abrasive.

- (1) Aluminium oxide grit must be lead free virgin fused alumina containing less than 5 ppm elemental lead and less than 20 ppm total lead compounds. The iron content, as acid extractable iron, must be less than 1 per cent ww.

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D. Process Control.

NOTE: It is recommended that separate blasting cabinets are used for the treatment of steels and light alloys to minimise damage to components from metallic contamination.

- (1) A sample of abrasive and water must be collected daily from the delivery nozzle with the air supply switched OFF. The sample must be allowed to settle in a graduated tube so that the proportions of grit, fines and water may be measured.
- (2) Grit content must be over 20 per cent by volume and the fines less than 10 per cent of the solid content. Add new grit in small amounts to prevent excessive surface erosion.
- (3) The component must be degreased in accordance with the Repair Chapter.
- (4) Component surface areas which do not require blasting must be protected by masks or blanks as specified in the Repair Chapter.
- (5) Before blasting any component ensure the blast intensity is correct (Ref.para.E.).
- (6) After treatment wash the component thoroughly in cold running water to remove all traces of abrasive. The component must then be immersed in hot inhibited water for a period long enough to attain the temperature of the water then allowed to dry off. Drying may be assisted by the use of a clean dry air blast.
- (7) If specified by the Repair Chapter passivate the component (Ref.para.G.).

E. Blast Intensity.

- (1) Blast intensity is monitored by using an appropriate Almen test strip (Ref.Fig.401) as specified in the tables.

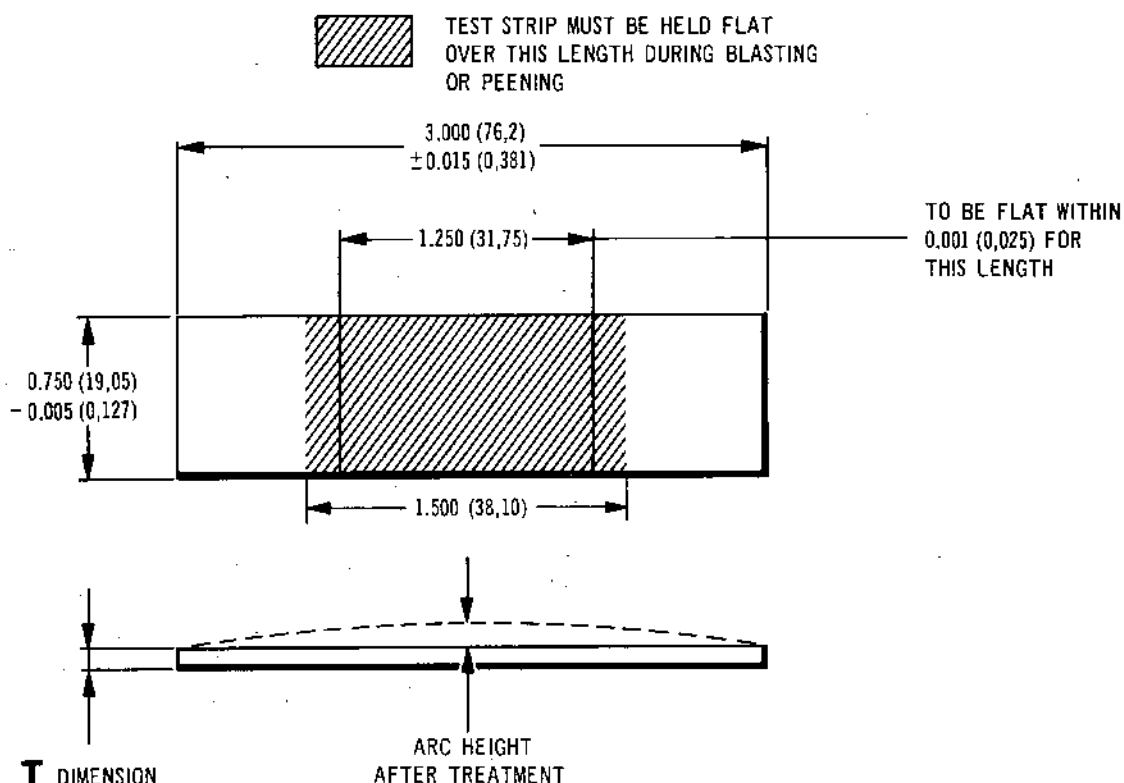
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CR 34090/00A



MATERIAL

ALMEN TEST STRIP TYPE	T DIMENSIONS
A	0.052 (1,320) - 0.002 (0,051)
C	0.0948 (2,408) - 0.002 (0,051)
N	0.031 (0,787) - 0.001 (0,025)

BRIGHT GROUND STEEL GAUGE PLATE
HARDENED 780 DEGREES C FOR 10 MINUTES
OIL QUENCHED
TEMPERED 420-430 DEGREES C FOR 30 MINUTES
AIR COOLED
HARDNESS ROCKWELL 'C' 44-50 (444-528 HV.)

SIDES AND ENDS MAY HAVE SHEAR FINISH
DE-BURR AND BREAK CORNERS

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Almen Test Strip
Figure 401



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- (2) The test strip must be held flat in a fixture and blasted, ensuring uniform coverage of the exposed surface, under the same parameters as the component it represents.
- (3) After removal from the fixture, the test strip will assume an upward curve. The amount of deflection from the flat or 'arc height' must be measured after blasting to ensure equipment settings and operation are correct.
- (4) Blast intensity must be checked at every change of equipment setting or component, and at four hourly intervals.

F. Inspection.

- (1) Visually inspect the treated areas to ensure all traces of differentiated grain or grain boundary etching are removed and the surface shows uniform matt finish.

G. Passivation Solution.

CAUTION: USE THIS SOLUTION ONLY WHEN REFERENCED IN
A REPAIR CHAPTER.

- (1) The solution, made up in the following proportions should be contained in a stainless steel or polypropylene tank and used at workshop temperature.

Nitric acid (SG 1.42)	28 per cent V/V
Water	72 per cent V/V

- (2) Fully or partially immerse components in the solution for as long as instructed by the Repair Chapter. On removal from the solution, allow the component to drain then wash thoroughly in clean running water. Dry in a warm oven or with clean warm air.
- (3) Regularly analyse the solution and maintain the proportions of water or acid by addition.

TN34180

**ATP
TEMPORARY
REVISION**

British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

Daniel Howard

For Chief Technical and Industrial Services Engineer CAA Design Approval No.DAI/8566/78

TEMPORARY REVISION NO.72-570

Insert in 72-09-13 before page 405

REASON FOR ISSUE

Alternative wet abrasive listed

ACTION

Paragraph H - delete first step and read the following:-

Blasting Medium - 320-400 mesh alumina or Garnet Grit or
Novaculite 200 wet abrasive.

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H. Parameters for Procedure A.

Blasting Medium	320-400 mesh alumina or Garnet Grit
Working Pressure	75-85 psi (517-586 kPa)
Nozzle Diameter	0.5 in. (12,7 mm)
Nozzle to Work Distance	3-4 in. (75-100 mm)
Angle of Attack	90 deg to component surface
Almen Strip Type	N
Arc Height	0.002 in. (0,0508 mm) min. 12 s blasting

Special details for blades and vanes.

When applying the above parameters to blade or vane aerofoils blast for 4 to 5 s per sq. in. Blast both convex and concave sides, from root trailing edge to tip.

J. Parameters for Procedure B (Alternative to Procedure C).

Blasting Medium	320-400 mesh alumina or Garnet Grit
Working Pressure	85-100 psi (586-689 kPa)
Nozzle Diameter	0.5 in. (12,7 mm)
Nozzle to Work Distance	4-6 in. (100-150 mm)
Angle of Attack	90 deg to component surface 60 deg minimum
Almen Strip Type	N
Arc Height	0.002 in. (0,0508 mm) min. 12 s blasting

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K. Parameters for Procedure C (Alternative to Procedure B).

Blasting Medium	120-220 mesh alumina or Garnet Grit
Working Pressure	80-100 psi (552-689 kPa) (Vacuum pick-up cabinet) 20 psi (138 kPa) (Pressure feed cabinet)
Nozzle Diameter	0.5 in. (12,7 mm)
Nozzle to Work Distance	4-6 in. (100-150 mm)
Angle of Attack	90 deg to component surface 60 deg minimum
Almen Strip Type	N
Arc Height	0.002 in. (0,0508 mm) min. 12 s blasting

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ETCHING - REPAIR

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ETCHING - REPAIR

1. Component Etching Prior to Inspection/Re-Finishing

A. General.

Etching is used to prepare the surface of highly stressed parts for inspection. The process produces an even matt surface finish which reveals inclusions and surface defects, including faults too small to be seen with the naked eye.

CAUTION: THE PROCESSES MUST BE STRICTLY CONTROLLED AND USED ONLY WHEN SPECIFICALLY REFERENCED IN A REPAIR CHAPTER.

B. Safety Precautions.

WARNING: ETCHING SOLUTIONS ARE CORROSIVE. OPERATORS MUST WEAR COMPLETE BODY PROTECTIVE CLOTHING AND FACE MASKS.

- (1) Safety notices must be displayed in conspicuous places throughout the process area.
- (2) The nearest surgery or first aid post must be made aware of the etching solution constituent acids.
- (3) Eyewash bottles should be provided and be easily accessible to the operator.
- (4) Should skin become contaminated with the etching solution, wash thoroughly in clean running water then seek medical attention.

C. Solutions.

- (1) Solutions must be made up as specified at the end of this chapter and their chemical composition monitored by the local controlling laboratory.
- (2) A fume extraction system should be provided and solution containers covered with suitable lids when not in use.



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D. Etching.

(1) Immersion etching.

- (a) Prior to etching, components must be degreased as specified in the Repair Chapter then allowed to cool to workshop temperature. Operators must avoid physical contact with the components after degreasing.
- (b) Component mating faces, and those specified in the repair, must be protected with a suitable masking compound.
- (c) When components are immersed in the etching solution, reaction does not commence immediately due to removal of natural surface oxides. This reaction time, normally less than 30 seconds, must be checked with each new make-up of solution and at intervals during its life.
- (d) Immersion time, excluding reaction time, and the relevant etching solution will be specified in the Repair Chapter.

(2) Swab etching.

- (a) Ensure that the component is at room temperature.
- (b) Swab degrease the area to be etched (Ref. 72-09-00, Cleaning).
- (c) Dry the component with a clean lint-free cloth.
- (d) Swab the area to be etched with a small wad of cotton wool soaked with the etching solution.

E. Washing.

- (1) On removal from the etching solution or after swab etching, components must be thoroughly washed, preferably with an air/water gun in clean cold running water. If necessary, brush lightly to remove smut.
- (2) After washing, components that have been immersion etched must be neutralised in accordance with the procedure of paragraph F.

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F. Neutralising.

(1) Neutralising solutions.

(a) These solutions must be contained in a PVC tank and used at room temperature. When ammonia is used, the tank shall be fitted with fume extraction.

(b) Chemical composition. Aqueous solutions containing:

Sodium Carbonate (Na_2CO_3)... 40 to 60 g/l

or

Sodium Metasilicate

($\text{Na}_2\text{SiO}_3 \cdot 5\text{H}_2\text{O}$)

... 25 to 35 g/l

or

Ammonia (NH_3)

... 9 to 18 g/l

(c) The solutions may be made up as follows:

One litre of solution may be made up by adding either 60 gms of sodium carbonate, or 35 gms of sodium metasilicate, or 50 mls of ammonia solution (SG 0.880) to 900 mls of cold water. Stir until dissolved or mixed, then make up to a volume of 1 litre with cold water.

(2) Immerse the component in the neutralising solution.

(3) Wash the component in cold water to remove all traces of the neutralising solution.

(4) Immerse the component in clean hot water at 80 deg C (minimum) then, when the component has attained the water temperature, remove it and dry it with oil-free compressed air. Cotton gloves should be worn for subsequent handling of the component.

G. Solution A.

(1) The solution must be contained in a polythene or PVC lined mild steel tank fitted with suitable fume extraction. The temperature of the solution shall not exceed 25 deg C.

(2) Chemical composition. An aqueous solution containing:

Hydrofluoric Acid (HF) ... 30 g/l

Nitric Acid (HNO_3) ... 200 g/l

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- (3) The solution may be made up as follows:

One litre of solution may be made up by carefully adding 220 mls of concentrated nitric acid (SG 1.42) to 600 mls of cold water with constant stirring. Allow to cool to room temperature, then carefully add either 135 mls (20% W/W), 80 mls (40% W/W) or 45 mls (60% W/W) of hydrofluoric acid with constant stirring and make up to a volume of 1 litre with cold water.

- (4) Components may be immersed in the solution for up to 30 seconds, or as detailed in the respective Repair Chapter, from the commencement of the reaction, which will be identified by gassing.

H. Solution B.

- (1) The solution must be contained in a stoneware or polythene tank and used at workshop temperature.
- (2) Chemical composition. An aqueous solution containing:

Ferric chloride (Fe Cl_3)	...	260-310 g/l
Hydrochloric acid (HCl)	...	40-50 g/l

- (3) The solution may be made up as follows:

Ferric chloride solution (SG 1.3)	80 per cent v.v.
Hydrochloric acid (SG 1.16)	10 per cent v.v.
Water	10 per cent v.v.

- (4) Components may be immersed in the solution for up to 60 seconds or as detailed in the respective Repair Chapter.

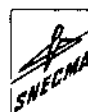
J. Solution C.

- (1) The solution must be contained in a PVC tank, fitted with a suitable fume extractor and used at a temperature not exceeding 25 deg C.
- (2) Chemical composition. An aqueous solution containing:

Ferric chloride (Fe Cl_3)	...	460 to 520 g/l
Hydrochloric acid (HCl)	...	35 to 55 g/l
Hydrofluoric acid (HF)	...	10 to 20 g/l



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- (3) The solution may be made up as follows:

One litre of solution may be made up by carefully adding 140 mls of concentrated hydrochloric acid (SG 1.14) and 20 mls of hydrofluoric acid (60% w/w) to 400 mls of cold water whilst stirring. Allow to cool to room temperature, then carefully add 840 gms of solid ferric chloride ($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$) and stir until dissolved. Make up to a volume of 1 litre with cold water whilst constantly stirring.

K. Solution D.

- (1) The solution must be contained in a stoneware or polythene tank and used at a temperature not exceeding 25 deg C.

- (2) Chemical composition. An aqueous solution containing:

Ferric chloride (Fe Cl_3)	...	200-240 g/l
Hydrochloric acid (Hcl)	...	20-30 g/l

- (3) The solution may be made up as follows:

Ferric chloride liquor				
(SG 1.3)	60 per cent v.v.
Hydrochloric acid (Hcl)				
(SG 1.16)	7 per cent v.v.
Water	33 per cent v.v.

- (4) Components to be immersed in the solution for a maximum period of 30 seconds or as detailed in the respective Repair Chapter or Service Bulletin.

L. Solution E.

- (1) The solution must be contained in a stoneware or polythene tank and used at workshop temperature.

- (2) Chemical composition. An aqueous solution containing:

Ferric chloride (Fe Cl_3)	...	250 to 300 g/l
Hydrochloric acid (Hcl)	...	100 to 120 g/l



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- (3) To make approximately 1 litre of the solution, use the following quantities:

Hydrated ferric chloride ($\text{Fe Cl}_3 \cdot 6\text{H}_2\text{O}$)	... 500 g
Commercial hydrochloric acid (SG 1.18)	... 375 ml
Water...	... 343 ml

- (4) Maintain a film of the solution on the component surface for approximately 15 seconds or as detailed in the respective Repair Chapter.

M. Solution F.

- (1) The solution must be contained in a plastic or plastic lined tank and used at a temperature of 15 to 25 deg C.
- (2) Chemical composition. An aqueous solution containing:

Ferric Chloride Liquor (SG 1.3)	... 70 per cent v.v.
Hydrochloric Acid (SG 1.16)	... 10 per cent v.v.
Hydrofluoric Acid (60 per cent W.W.)	... 10 per cent v.v.
Water...	... 10 per cent v.v.

2. Grinding Control Etching

A. General.

This etching process is used to produce a component surface finish, with minimal loss of metal, which will reveal incorrect grinding technique.

CAUTION: USE THIS PROCESS ONLY WHEN SPECIFICALLY REFERENCED.

B. Safety Precautions.

Observe the safety precautions in para.1.B.

C. Solutions.

- (1) Alkaline cleaning solution:

An aqueous solution containing either

Orthosil F2 or Metsopol ... 50 g/l

Use the solution at a temperature of 90 to 100 deg C.

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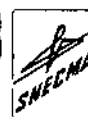
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(2) Etching solution:

Nitric acid (SG 1.42)	...	1 per cent v.v.
Water	99 per cent v.v.

(3) De-smutting solution:

Hydrochloric acid				
(SG 1.16)	2 per cent v.v.
Water	98 per cent v.v.

(4) Neutralising solution:

An aqueous solution containing either

Sodium carbonate				
(Na_2CO_3)	40-60 g/l
or				
Sodium metasilicate				
($\text{Na}_2\text{SiO}_3 \cdot 5\text{H}_2\text{O}$)	25-35 g/l

D. Etching.

Subject the component to the following procedure.

- (1) Vapour degrease (Ref.72-09-00 Cleaning) then allow to cool to workshop temperature.
- (2) Immerse for approximately 10 minutes in the alkaline cleaning solution.
- (3) Wash in cold running water.
- (4) Immerse in the etching solution for a period of 10 to 30 seconds until a satisfactory etch is obtained.
- (5) Wash in cold running water.
- (6) Immerse in the de-smutting solution for 10 to 15 seconds.
- (7) Wash and scrub with a soft bristle brush in cold running water.
- (8) Rinse in the neutralising solution.
- (9) Immerse in hot water then dry off.
- (10) Immerse in an approved de-watering oil.

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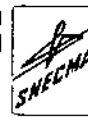
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E. Inspection.

- (1) Should the ground surface exhibit dark grey or black areas, or clearly defined white spots, reject the component.

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CONTROLLED SHOT AND GLASS BEAD PEENING - REPAIR

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CONTROLLED SHOT AND GLASS BEAD PEENING - REPAIR

1. Application

A. General.

- (1) The process is used to introduce a compressive stress into the surface layers of components to improve fatigue strength and fretting resistance, and to prevent stress corrosion cracking.
- (2) The peening medium may be spherical metal shot or spherical glass beads delivered either by controlled centrifugal force or air pressure from a nozzle.
- (3) Glass bead peening may be carried out wet or dry, but is safer when used wet. It may be used to remove iron contamination from titanium or aluminium alloy components.
- (4) Use this process only when specifically referenced in a Repair Chapter. Deposition parameters for various repairs are tabulated at the end of this chapter.

B. Safety Precautions.

- (1) Operators must avoid physical contact with powdered glass.
- (2) A face mask and apron must be worn when cleaning the exhaust filters.
- (3) All apparatus must be earthed to ensure dispersion of any heavy charge which might be generated during the process.
- (4) Cabinets must be fitted with explosion doors and continuous low speed air extraction. Dry glass bead peening must be carried out in a reduced pressure cabinet.

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C. Process Control.

CAUTION: PEENING CAUSES FLOW OF THE SURFACE LAYER.
ENSURE FLAW DETECTION IS CARRIED OUT BEFORE
PEENING.

- (1) Ensure the component is degreased in accordance with the Repair Chapter.
- (2) Component surface areas which do not require peening must be protected by masks or blanks as specified in the Repair Chapter.
- (3) Before peening any component ensure the peening intensity is correct (Ref.para.D).
- (4) Metal shot peening.
 - (a) After shot peening, use a clean dry air blast or a soft brush to remove dust and grit.
 - (b) Iron contamination may be removed by wet glass bead peening.
- (5) Glass bead peening.
 - (a) Spherical glass beads must be silicone free and to the size specified in the Repair Chapter.
 - (b) A sample of slurry must be taken daily from the delivery nozzle with the air supply switched OFF. The sample must be allowed to settle in a graduated tube so that the proportions of beads, fines and water may be measured.
 - (c) Bead content must be over 20 per cent by volume and the fines less than 10 per cent of the solid content.
 - (d) After treatment wash the component thoroughly in cold running water to remove all traces of the peening medium. The component must then be immersed in hot inhibited water for a period long enough to attain the temperature of the water then allowed to dry off. Drying may be assisted by the use of a clean dry air blast.
- (6) If specified by the Repair Chapter passivate the component (Ref.para.F).

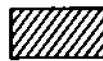


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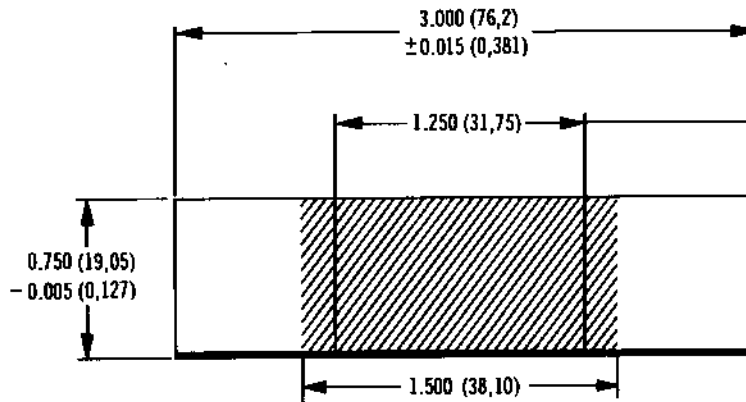
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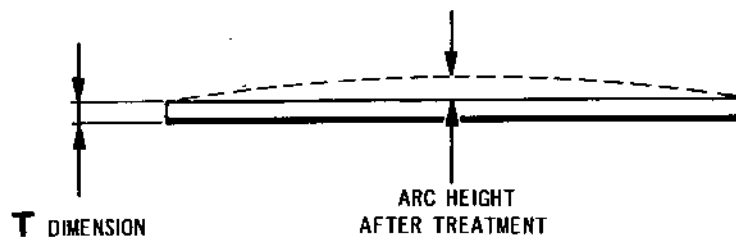
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TEST STRIP MUST BE HELD FLAT
OVER THIS LENGTH DURING BLASTING
OR PEENING



TO BE FLAT WITHIN
0.001 (0,025) FOR
THIS LENGTH



MATERIAL

BRIGHT GROUND STEEL GAUGE PLATE
HARDENED 780 DEGREES C FOR 10 MINUTES
OIL QUENCHED
TEMPERED 420-430 DEGREES C FOR 30 MINUTES
AIR COOLED
HARDNESS ROCKWELL 'C' 44-50 (444-528 HV.)

SIDES AND ENDS MAY HAVE SHEAR FINISH
DE-BURR AND BREAK CORNERS

ALMEN TEST STRIP TYPE	T DIMENSIONS
A	0.052 (1,320) - 0.002 (0,051)
C	0.0948 (2,408) - 0.002 (0,051)
N	0.031 (0,787) - 0.001 (0,025)

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Almen Test Strip
Figure 401



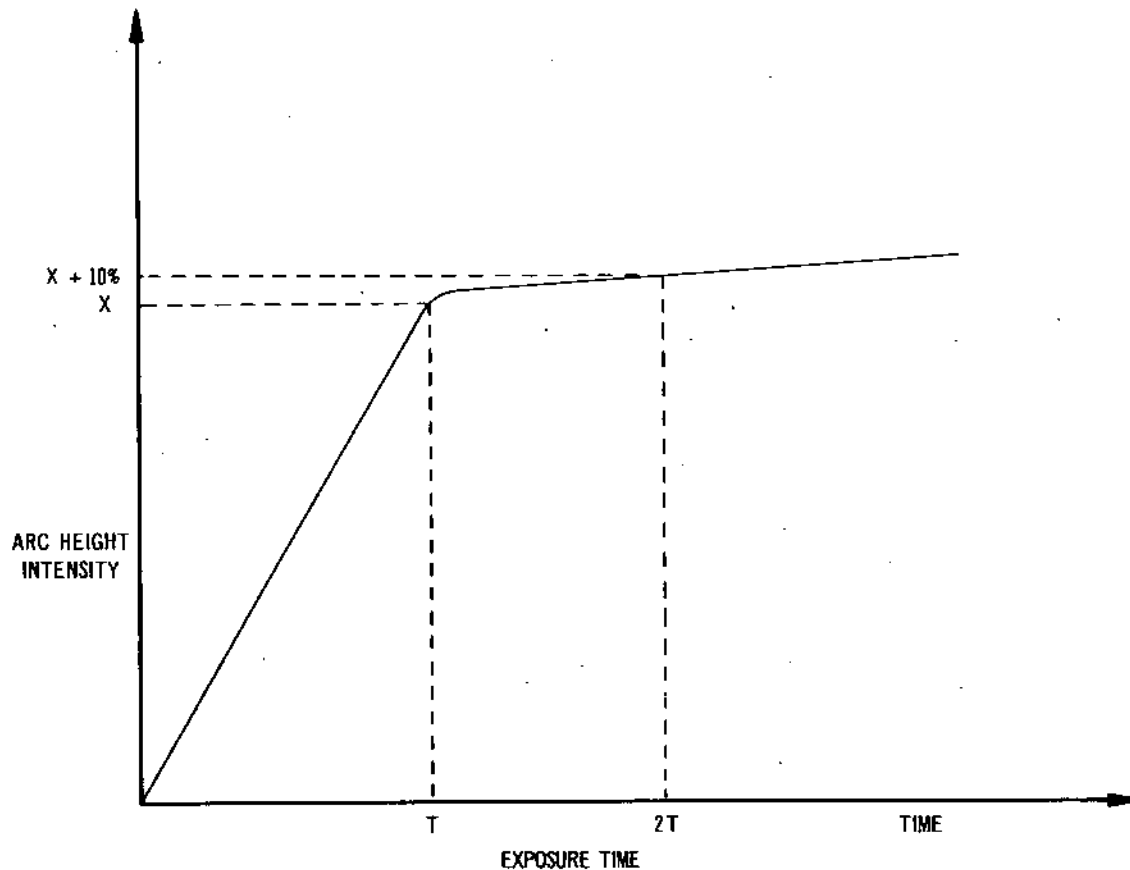
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CR 35500/00B



T = SATURATION TIME = 100 PER CENT COVERAGE
 $2T$ = SATURATION MUST NOT INCREASE BY MORE THAN
10 PER CENT WHEN EXPOSURE TIME IS DOUBLED,
I.E. 200 PER CENT COVERAGE
 X = INTENSITY REQUIRED

Exposure Time Intensity Determination Curve
Figure 402

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D. Peening Intensity.

- (1) Peening intensity is monitored by using an appropriate Almen test strip (Ref.Fig.401) as specified in the Repair Chapter.
- (2) The test strip must be held flat in a fixture and peened, ensuring uniform coverage of the exposed surface, under the same parameters as the component it represents.
- (3) After removal from the fixture, the test strip will assume an upward curve. The amount of deflection from the flat or 'arc height' must be measured after peening to ensure equipment settings and operation are correct (Ref.Figs.401 and 402).
- (4) Peening intensity may be specified in the Repair Chapter as a range of intensities. For example, an intensity of 8-12A denotes an arc height between 0.008 in. and 0.012 in. on a Almen type A test strip. Similarly, an intensity of 4-8N denotes an arc height between 0.004 in. and 0.008 in. on an Almen type N test strip.
- (5) Tests should be carried out at constant air pressure and varying times, and the results plotted as shown in Figure 402. Repeating the tests for different air pressure settings will indicate the optimum air pressure and time of exposure.
- (6) Peening intensity must be checked at every change of equipment setting or component and at four hourly intervals.

E. Inspection.

- (1) Visually inspect the treated surface using X5 magnification for uniform coverage and complete overlapping of the bead impressions.

F. Passivation Solution.

CAUTION: USE THIS SOLUTION ONLY WHEN REFERENCED IN A REPAIR CHAPTER.

- (1) The solution, made up in the following proportions should be contained in a stainless steel or polypropylene tank and used at workshop temperature.

Nitric acid (SG 1.42)	28 per cent V/V
Water	72 per cent V/V

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- (2) Fully or partially immerse components in the solution for as long as instructed by the Repair Chapter. On removal from the solution, allow the component to drain then wash thoroughly in clean running water. Dry in a warm oven or with clean warm air.
- (3) Regularly analyse the solution and maintain proportions of water and acid by addition.

G. Parameters for Procedure A (Glass Bead Peening).

Bead Size	0.006-0.010 in. (0,153-0,254 mm) dia.
Working Pressure	65-80 psi (448-551 kPa)
Nozzle Diameter	0.375 in. (9,525 mm)
Nozzle to Work Distance	4-6 in. (100-150 mm)
Angle of Attack	90 deg to component surface
Almen Strip Type	N
Arc Height	0.009 in. (0,228 mm) min. 12 s blasting

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COLD ROLL FORMING ~ REPAIR

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COLD ROLL FORMING - REPAIR

1. Application of Cold Roll Forming

A. General.

- (1) The process is used to restore, to acceptable dimensions, oil and air labyrinth seals which have been subjected to rotational rubs, resulting in unacceptable dimensional limits.
- (2) In the case of parallel or thread type seals, parallel floating rollers are used to progressively extrude the existing fin material. The rollers shim-spaced on a mandrel are held in a lathe tool post and the component rotated by the headstock.
- (3) Angled labyrinth fins are axially displaced by a single roller to increase the diametrical measurement.
- (4) Use this repair procedure only when specifically referenced in a Repair Chapter.

CAUTION: FINS MAY BE RESTORED ONCE ONLY BY THIS PROCESS. DO NOT USE THIS PROCESS ON NITRIDE OR CARBONISED SURFACES OR ON FINS PREVIOUSLY REPAIRED BY WELD DEPOSITION.

B. Process Control.

- (1) Degrease the component in accordance with the Repair Chapter.
- (2) Remove any surface treatment from the fins.
- (3) Machine the worn labyrinth fins to the dimensions quoted in the Repair Chapter and ensure all burrs are removed.
- (4) Roll the fins using the appropriate roll forming technique.

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C. Parallel Labyrinth Seals.

- (1) Interpose the largest shim between the rollers then secure the mandrel to the lathe tool post (Ref. Fig.401).

CAUTION: ENSURE ROLLERS ARE SECURED CORRECTLY AND REMAIN SO THROUGHOUT THE ENTIRE OPERATION.

- (2) Position the rollers over the fin. Select the lathe spindle speed, between 7.5 and 12 revolutions per min., and the rolling tool cross feed speed 0.002 in. (0,0508 mm) per component revolution.
- (3) Start the flow of coolant and rotate the component. Feed in the rollers, in increments, to the required depth.

NOTE: Restore each fin in excess of the required dimension and machine back to remove the sharp tip.

- (4) Repeat (2) and (3) until all fins are restored.

NOTE: Further growth can be achieved by progressively reducing the shim thickness and repeating (2) and (3).

D. Thread Type Labyrinth Seals.

- (1) Interpose the largest shim between the rollers then secure the mandrel to the lathe tool post (Ref. Fig.401).

CAUTION: ENSURE ROLLERS ARE SECURED CORRECTLY AND REMAIN SO THROUGHOUT THE ENTIRE OPERATION.

- (2) Adjust the tool angle to suit the helix angle of the seal. Engage the rollers, set to a depth of 0.002 in. (0,0508 mm), at the start of the fin.

CAUTION: ENSURE THE ROLLERS ARE FREE TO TRAVEL ALONG THE MANDREL TO ENCOMPASS THE ENTIRE LENGTH OF THE SEAL.

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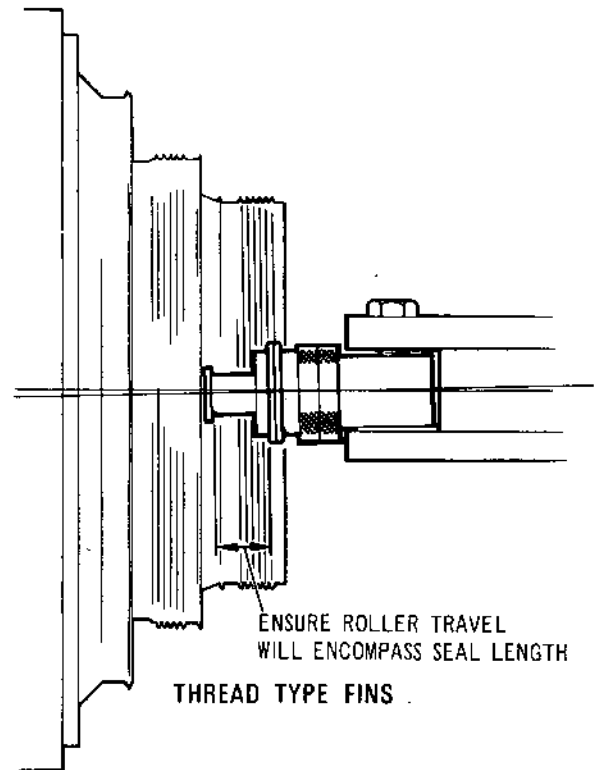
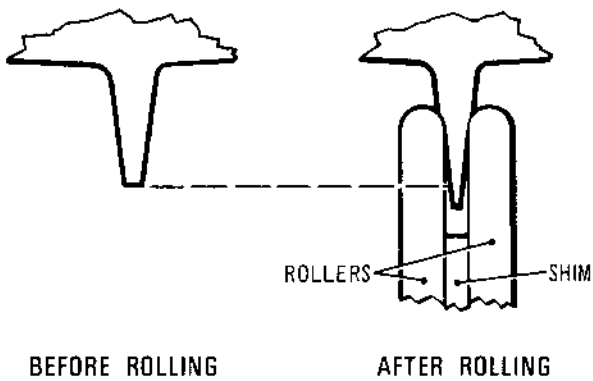
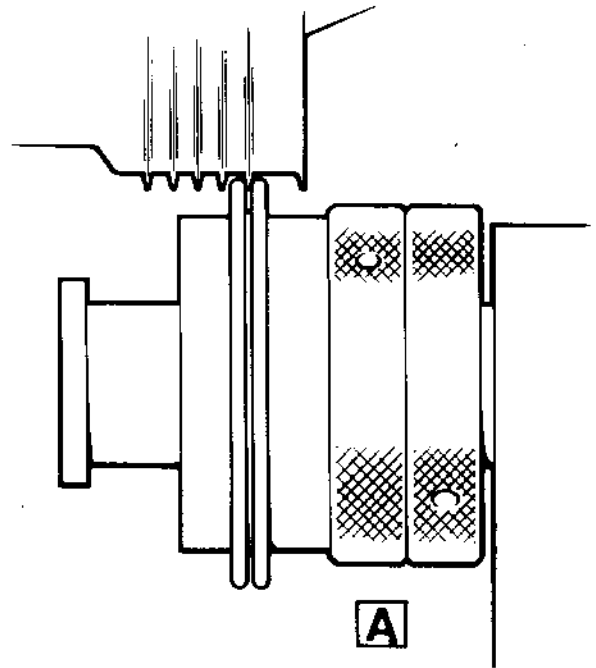
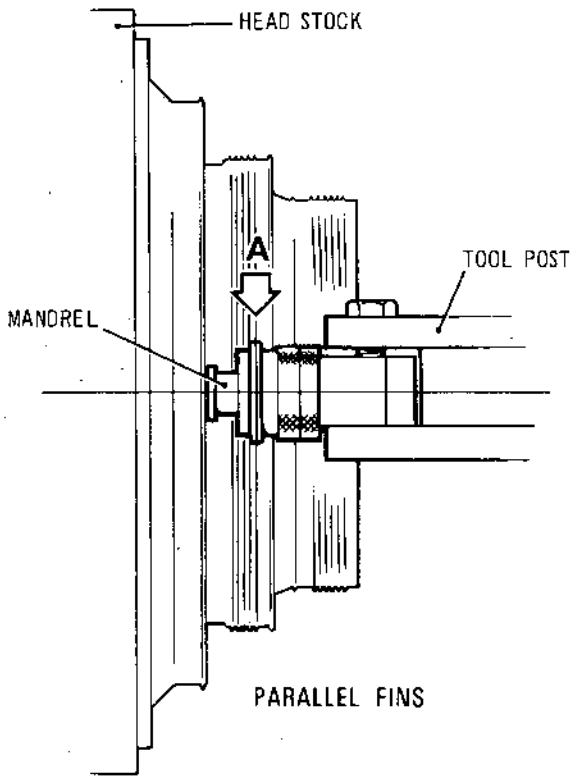


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Parallel and Thread Type Labyrinth Seals
Figure 401

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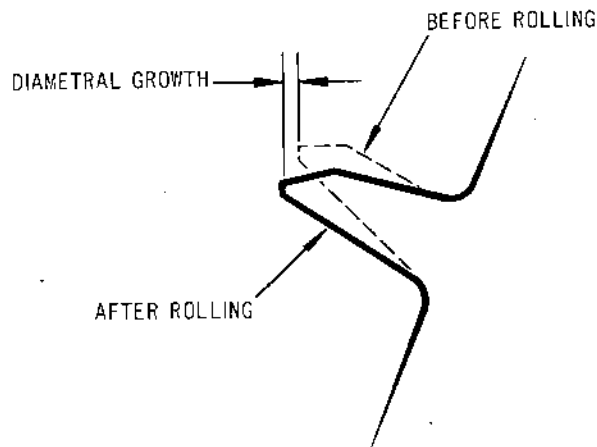
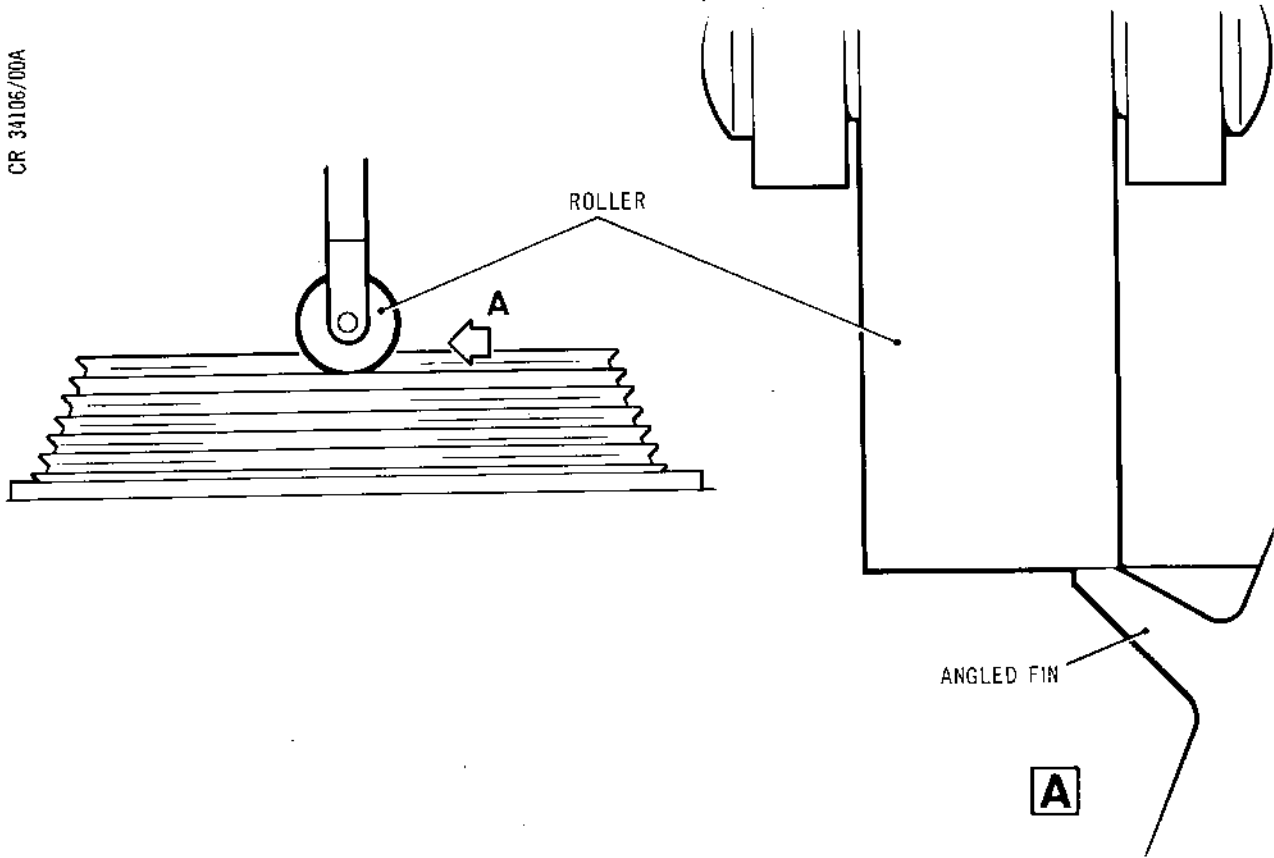


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Angled Labyrinth Seals
Figure 402

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- (3) Start the flow of coolant and rotate the lathe head-stock by hand, allowing the rollers to be drawn along the mandrel, stop the component before the rollers run off the end of the fin.
- (4) Leave the rollers at depth and reverse the rotation of the component to return the rollers to the fin start. Repeat (3) with a further feed of 0.002 in. (0,0508 mm) on the rollers.
- (5) Repeat (3) and (4) until the fin is of the required size or the rollers are at maximum depth.

NOTE: Restore each fin in excess of the required dimension and machine back to remove the sharp tip.

- (6) Repeat (3), (4) and (5) for each fin start.

NOTE: Further growth can be achieved by progressively reducing the shim thickness and repeating (3), (4) and (5).

E. Angled Labyrinth Seals.

NOTE: Angled fins need not be turned concentric before rolling.

- (1) Position the tool roller in contact with the acute side of the fin (Ref.Fig.402).
- (2) Start the flow of coolant over the work surface and rotate the component at approx. 8 rev per min.
- (3) Feed the roller in at 0.002 in. (0,0508 mm) per component revolution until the fin is of the required size.



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ELECTROLESS NICKEL PLATING - REPAIR

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ELECTROLESS NICKEL PLATING - REPAIR

1. Electroless Nickel Plating on Aluminium Alloy

A. General.

- (1) This is a plating process suitable for use on aluminium alloys as a wear resistant coating.
- (2) When using this plating process, deposition is approximately 0.0004 in. (0,010 mm) per hour. Build-up thickness should where possible be restricted to 0.004 in. (0,102 mm).
- (3) Alternative proprietary plating solutions to that specified within this process may be used providing they are approved by the engine manufacturer.
- (4) Components to be plated are specified in the appropriate Repair Chapters. Also specified are the plating areas and thicknesses and any necessary pre-plating stress relief and post-plating de-embrittlement heat treatment.

B. Safety Precautions.

- (1) Cyanide salts, solutions and hydrocyanic gas are deadly and extremely rapid poisons, hydrocyanic gas is formed when cyanide comes into contact with acids therefore these should be kept apart.

Poisoning may result from:

- (a) Swallowing cyanide.
- (b) Breathing hydrocyanic gas.
- (c) Absorption through the skin.

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- (d) Warning signs of poisoning are, dizziness, nausea, headache, palpitations, feeling weak, suffocation, tightness of the throat, pallor, deep breathing and unconsciousness.

WARNING: AT ALL TIMES CYANIDE ANTIDOTE MUST BE READILY AVAILABLE. ALL PERSONS WORKING IN THE VICINITY MUST BE THOROUGHLY CONVERSANT WITH THE USE OF THE ANTIDOTE AND FIRST AID PROCEDURES.

- (2) Operators must wear the protective clothing provided.
- (3) Recommended barrier cream shall be applied to the hands and forearms before starting work. Finger nails should be kept short and thorough washing performed before eating, drinking and smoking.
- (4) Smoking and the consumption of food and drink in the facility area are prohibited.
- (5) Cuts and abrasions which appear not to be healing readily must be reported without delay to the Medical Department.
- (6) Materials such as rags and sawdust which have absorbed the solutions must be placed in a container for disposal.
- (7) Cyanide should be stored in a place where it is accessible only to authorised persons.

C. Process Solutions.

- (1) Stripping of nickel from aluminium alloys.
 - (a) The solution is an aqueous solution containing:

Nitric acid (SG 1.42) 50% V/V

The solution may be contained in a stainless steel tank fitted with fume extraction and is used at room temperature.

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Ensure no item remains on the component to be treated that can be eroded by the solution. The time of immersion of the component in the solution varies up to 3 min dependent on the thickness of nickel to be removed and the activity of the solution. Then wash in water to remove all traces of the solution.

Replace the solution when no longer effective or on laboratory advice.

(2) Preparation of aluminium alloys.

(a) Cleaning.

Immerse the component for 30 min in a 5 per cent V/V solution of Ardrex 631 at a temperature of 20-50°C. Wash the component in water to remove all traces of solution.

(b) Etching.

The solution is an aqueous solution containing:

Nitric Acid (SG 1.42)	70% V/V
Hydrofluoric Acid (60% W/W)	10% V/V

Etch the component for a period of up to 2 min in the solution then wash in water to remove all traces of the solution.

(c) Zincating.

The solution may be made up by dissolving 80.08 oz of sodium hydroxide in one gallon of cold water and further dissolving 16.016 oz of zinc oxide while the solution is still warm or 500 g of sodium hydroxide one litre of water and 100 g of zinc oxide. Each component shall be immersed for 2 min in the solution at room temperature. When a double zincate process is required the initial zincate layer is removed by immersing the component for ½ min in a cold 50 per cent V/V aqueous solution of nitric acid (SG 1.42) followed by a water wash to remove the solution and then repeating the zincating process.



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When the zincating process is complete water wash the component and transfer to the electroless nickel plating solution.

- (d) Stripping solution (double zincate only).

The solution is an aqueous solution containing:

Nitric acid (SG 1.42) 50% V/V

The solution may be contained in a stainless steel tank fitted with fume extraction and is used at room temperature.

Strip the zincate from the component for a period of 30 secs in the solution then wash in water to remove all traces of the solution.

- (e) Regularly analyse the solutions and replace on laboratory instructions.

- (3) Electroless nickel plating.

- (a) Solution.

Are of the proprietary type as supplied by Messrs. M.L. Alkan, W. Canning, Shipley Chemical or Imasa Limited. Solutions are to be approved by and maintained by the local controlling laboratory in accordance with the manufacturers instructions.

- (b) Container.

The working solution is contained in a stainless steel tank made from material to British Standard EN58H or J and may be internally coated with polytetrafluoroethylene, PTFE. A coating thickness of 0.002 in. retards the deposition of nickel and is reasonably resistant to mechanical damage. A chemically inert coating may be used on tank sides subject to engine manufacturer approval. To aid plating and prevent damage to the tank coating plastic bags may be immersed in the solution in which to suspend the component.

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It is preferable to provide a duplicate tank and in addition a plastic storage vessel large enough for the solution. After a period of operation electroless nickel plate deposits on the tank lining and gassing occurs around the tank sides. The solution should then be transferred to a plastic storage vessel and the tank stripped of nickel using a 30% V/V nitric acid solution.

(c) Plating.

Immerse the component in the plating solution for the period of time to give the required thickness of plating. A means of mechanical agitation shall be provided, slight air agitation not sufficient to cool the plating solution is advisable. The solution is to be heated by means of an external water jacket around the tank and is to be maintained between 75 to 80 deg C. Filtration of the solution using a "non-metal" type filter is advisable as the nickel comes out of solution and floats on the surface of the solution gradually increasing in size.

(4) Masking.

- (a) Where necessary components shall be masked with a medium approved by the engine manufacturer (Turco 522 masking and 526 stop off). Use Turco 622 for removal of the masking.
- (b) Degrease the component (Ref.Repair, 72-09-00, Cleaning).
- (c) Attach aluminium wire to the component to suspend them in the tanks.

CAUTION: ONLY USE ALUMINIUM WIRE TO SUSPEND COMPONENTS IN PROCESS TANKS.

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- (d) Cover oil ducts and holes with a suitable masking tape.
- (e) Apply masking.
- (f) Before masking has hardened cut away the area to be nickel plated.
- (g) Air dry for 6 hours.

D. Stripping Existing Plating.

- (1) Vapour degrease the component (Ref.72-09-00 Cleaning).
- (2) Immerse the component into the stripping solution.
- (3) Rinse in clean cold running water and dry after immersion in hot water.
- (4) Unless the component is to be re-plated immediately apply the approved de-watering oil/lanoline or approved temporary anti-corrosive protection.

E. Preparation (Double Zincate).

- (1) Attach aluminium wire to the components.
- (2) Degrease the component (Ref.72-09-00 Cleaning).
- (3) Mask off the areas not to be plated using a suitable masking medium.
- (4) Prepare the face/area to be plated (Ref. para.C.(2)(a)).
- (5) Wash in cold running water.
- (6) Etch in the nitric/hydrofluoric acid solution.
- (7) Wash in cold running water.
- (8) Zincate dip for 2 min.
- (9) Wash in cold running water.

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- (10) Strip in nitric acid solution.
- (11) Wash in cold running water.
- (12) Zincate dip for 2 min.
- (13) Wash in cold running water.
- (14) Repeat wash in cold running water in a clean tank.

NOTE: To single zincate omit para.10, 11, 12, 13.

F. Electroless Nickel Plating.

- (1) Immediately after etching and preparation proceed with the plating.
- (2) Wash the component in clean, cold running water.
- (3) Immerse in a clean hot water preheat tank (75 to 80 deg C).
- (4) Immerse in the plating solution until the required thickness of deposit is obtained.
- (5) Wash in cold running water.
- (6) Components not requiring further wet processing shall be rinsed in clean hot water and dried.
- (7) Remove all traces of masking.
- (8) Apply the approved temporary anti-corrosive protection.

G. Inspection After Plating.

- (1) Vapour degrease the component (Ref.72-09-00 Cleaning).
- (2) Visually examine the component to ensure that the electroless nickel plate is continuous, adherent, free from blistering, flaking and excessive roughness and only those areas specified on the drawing are plated.

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- (3) Thickness checks are to be carried out on representative samples or on test pieces by an approved method and shall be carried out with each bath load.
- (4) Apply the approved dewatering oil/lanoline or approved temporary anti-corrosive protection.

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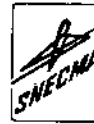
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DRY FILM LUBRICANT - REPAIR

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DRY FILM LUBRICANT - REPAIR

1. Dry Film Lubricant

A. General.

- (1) This covers the application of graphite dry film lubricant to substrate materials of steel and aluminium alloy. The lubricant is applied as a thin film and used to inhibit wear and fretting.
- (2) The compound must not be applied to components of a liquid oxygen system.
- (3) The maximum operating temperature of the dry graphite lubricant is 400 deg C in oxidising conditions and 500 deg C in non-oxidising conditions.

Graphite PL239 Vendor Code K1270 (MSRR 9276)

Thinner SV.16/R1 Vendor Code K1270

NOTE: Shelf life of compound in original sealed containers is 12 months at room temperature.

B. Safety Precautions.

- (1) The compound as supplied and when thinned contains flammable solvents. Therefore, fire precautions must be observed for the storage and usage of the compound and thinner.
- (2) The compound should only be applied in a well ventilated area preferably in a spray booth.
- (3) The Safety Officer shall be informed wherever these materials are used.

C. Stripping.

Coatings which have not been oven cured may be stripped by treatment with the appropriate thinners.

Coatings which have been oven cured may be stripped in accordance with cleaning procedures (Ref.72-09-00 Cleaning para.4.D.).

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D. Preparation of Surfaces.

- (1) Fill any holes in the component with hard wax, and using a suitable masking tape, mask the areas which are not to be abrasively blasted.
- (2) Wet abrasive blast aluminium alloy and steel using 320/400 mesh aluminium oxide grit.

NOTE: In some instances abrasive blasting is unacceptable and alternative procedures will be specified in the Repair Chapter.

- (3) Remove the masking tape.
- (4) Remove the wax by immersion in hot trichlorethylene liquid.
- (5) Vapour degrease (Ref.72-09-00 Cleaning).

NOTE: After degreasing handle the components with care in order to avoid contamination of the surfaces to be coated. If necessary the relevant surfaces should be locally degreased using a liquid degreasant and clean, dry lint free cloth (Ref.72-09-00 Cleaning). After degreasing allow the component to dry thoroughly.

- (6) Mask off the areas not to be treated using jigs, plates, plugs and/or masking tape.

E. Application of Lubricant.

- (1) Mix the lubricant thoroughly before use and use in the as received condition unless otherwise stated.
- (2) The lubricant shall be applied by spraying, brushing or dipping to achieve a dry film thickness between 0.0001 in. and 0.0003 in. (0,003 mm and 0,008 mm) unless otherwise specified.
- (3) Air dry the component for 10 min. minimum.
- (4) Remove the masking.

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- (5) Stove the component at $190 \pm 5^{\circ}\text{C}$ for 2 hours.
- (6) Burnishing of the stoved coating may be carried out using clean paper.

F. Touch-up.

- (1) Touch-up may be carried out in approved cases by applying the appropriate compound by brushing followed by air drying and if possible by oven curing.

G. Inspection.

- (1) Ensure the coating is uniform in colour, smooth, adherent and free from flaking and cracking. Faulty coatings may be touched-up or if necessary stripped off and the parts recoated.

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ANODIZING OF ALUMINIUM ALLOYS - REPAIRS

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ANODIZING OF ALUMINIUM ALLOYS - REPAIR

1. Anodic Treatment

A. General.

(1) Repair of damaged anodic films.

- (a) The controlling laboratory should be consulted prior to commencing repair of the anodic film on components which have been machined or damaged.
- (b) Two processes are recommended. The chromic acid process yields a film thickness of approximately 0.00012 in. (0,003 mm) and the sulphuric acid process yields a film thickness of between 0.0003 in. and 0,0005 in. (0,008 and 0,013 mm). Approximately half the film thickness is material growth and the remainder is penetration.
- (c) Chemical conversion solutions may be utilised to give corrosion protection to small areas of damage. These solutions produce a corrosive resistant film of minimal thickness and all cases of doubt should be referred to the Controlling Laboratory (Ref.72-09-02 Alocrom 1200).
- (d) Stripping and re-anodizing results in a size loss over the surface of 0.00012 in. (0,003 mm) maximum for chromic acid and 0.0003 in. (0,008 mm) maximum for sulphuric acid films.
- (e) It is permissible to re-anodize components (chromic acid process only) without stripping the existing anodic film by re-establishing electrical contact on the component and re-processing in accordance with the relevant procedure.
- (f) Components to which an organic finish has been applied or to which dissimilar materials are assembled, must be adequately protected before re-anodizing.

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- (g) Castings containing alloying elements such as copper, nickel and iron in excess of seven per cent (total) or more than five per cent copper, are not suitable for treatment by the chromic acid process.

B. Safety Precautions.

- (1) An effective fume extraction system.
- (2) Operators must wear the protective clothing provided.
- (3) Recommended barrier cream shall be applied to the hands and forearms before starting work. Fingernails should be kept short and thorough washing performed before eating, drinking and smoking.
- (4) Smoking and the consumption of food and drink in the work area is prohibited.
- (5) Cuts and abrasions which appear not to be healing readily must be reported without delay to the Medical Department.
- (6) Materials such as rags and sawdust which have absorbed the solutions must be placed in a container for disposal.

C. Process Solutions.

- (1) Chromic acid solution.

The solution is an aqueous solution containing:

Free Chromic Acid	30 to 50 g/l
Chloride (as NaCl)	0,2 g/l maximum
Sulphate (as Na ₂ SO ₄)	0,5 g/l maximum

To make up one litre of the solution, dissolve 40 grams of chromic acid (CrO₃) in 500 ml of water and make up to one litre by adding water. The purity of the chromic acid must not be less than 99.5 per cent CrO₃ and the water of suitable purity.

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The solution may be contained in a mild steel tank fitted with a suitable rectifier, extraction, heating and cooling coils or jackets, and solution agitation. The temperature shall normally be controlled uniformly in the range 38 deg C to 42 deg C unless otherwise stated. Agitate by clean compressed air to ensure uniformity of solution temperature.

The cathode shall be mild steel or stainless steel in the form of plates or the tank itself.

The anode:cathode area ratio is not critical but generally a ratio of 5:1 to 10:1 is suitable. Less chromic acid is consumed at the higher ratio.

Additions of chromic acid may be made provided the limits are maintained and the total chromium (estimated as CrO_3) does not exceed 100 g/l. When this chromium level is reached, the solution shall be discarded.

(2) Sulphuric acid solution.

The solution is an aqueous solution:

Sulphuric acid 90 to 400 g/l

The solution may be contained in a mild steel tank lined with lead sheet and fitted with a suitable rectifier, extraction, air agitation, heating and cooling coils or jackets. The solution temperature must be maintained within the range indicated in Figure 401.

The cathode shall be lead sheet and normally this will be the lining of the tank. Auxiliary cathode rails should be provided so that additional cathodes may be used if required.

The solution shall be analysed regularly by the local Controlling Laboratory to ensure that the electrolyte is maintained within the following:

Free Sulphuric acid 90 to 400 g/l



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The solution should be maintained within ± 10 per cent of the strength decided upon.

Chloride (as NaCl) 0,2 g/l maximum

Dissolved aluminium within the limits indicated in Figure 401.

(3) Stripping solution.

The solution is an aqueous solution containing:

Chromic Acid CrO_3 - 7,5 g/l

Phosphoric Acid H_3PO_4 - 8,0 g/l

This solution should be operated at 90 to 100 deg C and contained in a stainless steel tank fitted with fume extraction.

The maintenance of the solution shall be the responsibility of the local Controlling Laboratory who will analyse the solution weekly.

Chromic Acid CrO_3 - 7,5 to 10,0 g/l

Phosphoric Acid H_3PO_4 - 8,0 to 12,0 g/l

Chloride NaCl - 0,2 g/l max.

As a guide the solution is satisfactory if it is red in colour, as the colour changes from red the solution shall be rejected.

(4) Dichromate sealing solution.

This is an aqueous solution containing:

Potassium Dichromate 40 to 60 g/l
 $\text{K}_2\text{Cr}_2\text{O}_7$

The solution may be contained in a mild steel tank fitted with a suitable means of heating to maintain a temperature between 96 deg C and 100 deg C. The tank must have an effective fume extraction system fitted.



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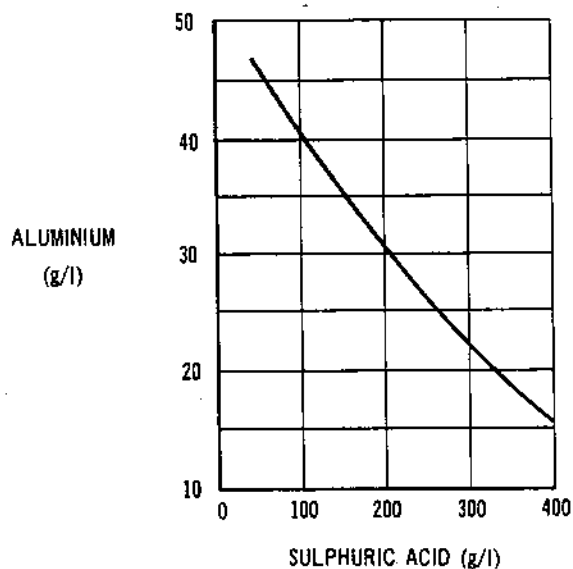
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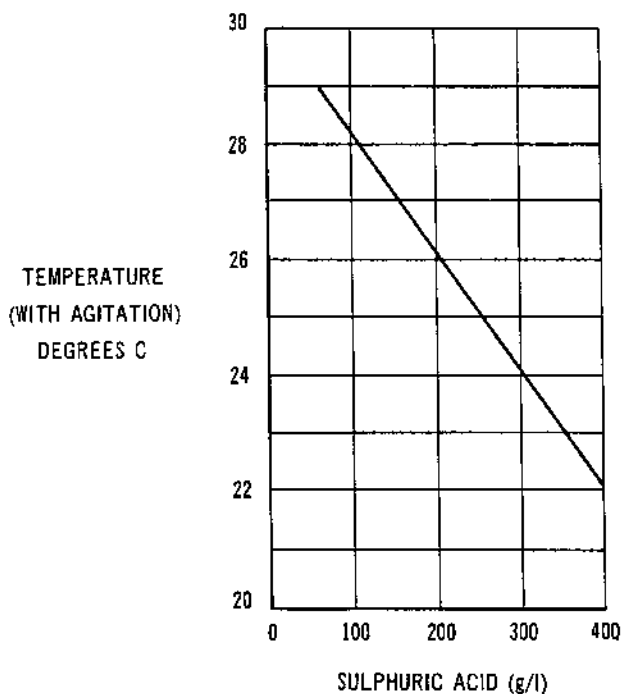


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MAXIMUM PERMISSIBLE ALUMINIUM CONTENT



MAXIMUM PERMISSIBLE TEMPERATURE

Aluminium Content and Temperature Control
Figure 401

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The solution shall be analysed and maintained with suitable additions of potassium dichromate by the local Controlling Laboratory. Alternative solutions may be used with the agreement of the Controlling Laboratory.

D. Preparation.

- (1) Wash, if necessary, in paraffin to remove general grit.
- (2) Make electrical contact using pure aluminium wire, or a clean jig, either of which must be adequate to carry the current.
- (3) Degrease the assembly (Ref.72-09-00 Cleaning).
- (4) Mask off areas not to be stripped or anodized with a stopping-off lacquer approved by the local Controlling Laboratory.

E. Stripping Anodic Film.

- (1) Carry out cleaning and preparation (ref.para.D).
- (2) Immerse the component in the stripping solution for 10 to 20 mins.
- (3) Wash thoroughly in clean, cold running water.

F. Anodizing (Chromic Acid).

- (1) Carry out cleaning and preparation (Ref.para.D).
- (2) Immerse the component in the chromic acid electrolyte, ensuring uniform temperature by agitation of electrolyte.
- (3) Connect the jig or aluminium wire securely to the anode bar.
- (4) If the component contains alloying elements approaching the maximum permissible (Ref.paragraph 1.A.(1)(g)) disregard the procedure of paragraph (5) and continue with the procedure of paragraph (6).

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- (5) Voltage control - general procedure.

NOTE: The times quoted in the following procedure are the minimum to be applied.

- (a) Raise the voltage in steps of 5 volts (maximum) to 40 volts during the first 10 minutes.
- (b) Maintain at 40 volts for 20 minutes.
- (c) Gradually raise voltage from 40 to 50 during the next five minutes and maintain at 50 volts for five minutes.
- (d) Reduce voltage to zero over the next minute.

- (6) Voltage control when alloying elements are approaching maximum permissible.

NOTE: The times quoted in the following procedure are the minimum to be applied.

- (a) With the electrolyte temperature at 25 to 35 deg C, gradually raise the voltage in steps of 5 volts (maximum) to 40 volts during the first 10 minutes.
- (b) Maintain at 40 volts for 30 minutes.
- (c) Reduce voltage to zero over the next minute.

- (7) Remove the component from the electrolyte and drain rapidly.

- (8) Wash in water.

- (9) Wash in clean, hot water (80 deg C minimum) and remove and dry with clean, dry, compressed air.

NOTE: Castings of high porosity may require prolonged immersion in clean cold water, or in hot water (80 deg C minimum) for up to 1 hour to ensure complete removal of the electrolyte. When sealing is required, the water immersion shall be at 80 deg C minimum for 30 minutes.

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G. Anodizing (Sulphuric Acid).

(1) Operating voltage.

(a) To obtain the operating voltage, suspend in the electrolyte from the anode bar, a sheet of 99% pure aluminium of such size that it requires a current density of at least 10 per cent of the normal electrical load of the bath. Adjust the temperature, the maximum value of which must be in accordance with the strength of the acid (Ref. para. C. (2)). Switch on the current and adjust the voltage to give an anode current density between 9.04 A/sq. ft to 14.77 a/sq. ft (100 to 160 A/sq. m), note the voltage. This will be the operating voltage used.

(2) Carry out cleaning and preparation (Ref. para. D).

(3) Immerse the component in the sulphuric electrolyte and position it to prevent the formation of air locks. Agitate the electrolyte to ensure uniformity of solution temperature.

(4) Connect the jig or aluminium wire securely to the anode bar.

(5) Raise the current density between 9.04 A/sq. ft to 14.77 A/sq. ft (100 to 160 A/sq. m) for a period of 20 to 30 minutes.

(6) Switch off the current.

(7) Remove the component from the electrolyte, drain quickly and wash thoroughly in clean cold running water.

(8) Seal the component if required using method (a) or (b):

(a) Immerse in clean water at 80 deg C for a minimum period of 30 minutes, remove and assist drying by using a clean, dry, air blast.

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- (b) Immerse the component in potassium dichromate sealing solution (Ref.paragraph C.(4)) for 20 minutes. Wash the component thoroughly in clean, cold running water to ensure cleanliness, immerse in boiling water then assist drying by using a clean, dry, air blast.

H. Inspection of Anodic Film.

- (1) Visually inspect the component coating which should be grey in colour, uniform and continuous, unless dichromate sealing has been carried out, when the component will have an even yellow appearance.
- (2) Low voltage electrical tests may be utilised to assess the continuity of the anodic film.
- (3) The average thickness of the coating may be determined by a laboratory approved method.
 - (a) Sulphuric acid anodic film 0.0003 in. to 0.0005 in. (0,008 mm to 0,013 mm) in thickness.
- (4) Components which have been stripped and re-anodized shall be inspected to ensure that intergranular attack has not occurred.

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TEMPORARY PROTECTION OF METAL COMPONENTS
AGAINST CORROSION

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TEMPORARY PROTECTION OF METAL PARTS AGAINST CORROSION

1. General

Temporary protection against corrosion is given to certain components during processing if, for any reason, they have to wait for a successive operation whilst they are either stripped of their normal protective finish, or have such finishes in an inferior condition.

As a general rule components made in nickel base alloys, austenitic steels and titanium, which are normally unprotected in service, need not be treated.

The danger of corrosion of any surface is dependent upon the condition of that surface and the surrounding atmosphere. Therefore, as components which have been chemically cleaned are extremely prone to corrosion and as it is usually difficult to know exactly the duration of any delay, a safe rule is to apply protection when there is to be any delay at all.

Magnesium components should never stand without protection; therefore, immediately their protection has been removed, temporary protection should be applied.

When components have been properly treated by temporary protection materials they can stand for any period up to 500 hours in normal dry storage conditions.

Alternative solutions to those specified within this process may be used providing they are approved by the engine manufacturer. Use the appropriate dewatering fluid for the type of metal or alloy to be protected.

2. Materials

A. Container.

- (1) Cold dewatering fluid should be contained in a conical tank, or in a tank with a sump and drain, water will then drain to the bottom of the tank and may be drawn off when necessary.

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B. Protective Materials.

(1) Dewatering fluids (General).

- (a) Dewatering fluids are used at room temperature and as supplied.
- (b) Components which have been treated with these fluids are covered by a film of oil and may be handled at the inspection stage without degreasing.
- (c) The dewatering fluid must be checked frequently for inorganic acidity and viscosity, the period between the checks depends upon the amount of work done.
- (d) Dewatering fluid - Ardrex 3961 - Vendor K6858.
Dewatering fluid - Rustilo DW904 - Vendor K2967
*Dewatering fluid - Rustilo DWX21 - Vendor K2967

*This will replace DW904.

(2) Lanolin/White Spirit to DEF2331-A.

- (a) Lanolin temporary protective, used as supplied, to protect the component.

NOTE: Components treated with this material should not be exposed to hot sunlight or stored near hot radiators as the protecting film will melt.

Temporary Corrosive Protection - PX1 -
Vendor K1315

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3. Processing

A. Apply the Protective.

NOTE: Components can be immersed into dewatering fluid directly following wet processing, i.e. after water washing.

- (1) Wash the component in clean kerosine or white spirit and allow to drain.
- (2) Immerse the components in a temporary protective ensuring that all surfaces are covered.

NOTE: Components of intricate shape should have their position changed several times during immersion to ensure that the protective enters all holes and cavities.

- (3) Remove the component from the protective and allow to drain.

B. Remove the Protective.

- (1) Wash the components thoroughly in either kerosine or white spirit.
- (2) Degrease if necessary (Ref.72-09-00 Cleaning).



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MACHINING OF ADJUSTING WASHERS, SHIMS ETC - REPAIR

1. General

- A. This chapter details the necessary steps of procedure to reduce the thickness of adjusting washers, shims etc., to suit assembly dimensions. In addition to the washers listed in the IPC (Illustrated Parts Catalogue) Chapter 72-00-00 this chapter includes machining details for components listed within 73-00-00, 74-00-00, 76-00-00 and 79-00-00.
- B. Figures are arranged in IPC chapter and section order, each component size referenced by IPC figure and item number.
- C. Machine only to the dimensions quoted in the tables and re-part number the component accordingly. All stages of work must be inspected and signed for by a qualified inspector.

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72-31-03	3/70	LP Thrust Bearing Adjusting Washer	401
72-31-04	2/10	LP Turbine Adjusting Washer	402
72-31-05	1/100	LP Signal Shaft Adjusting Washer	403
72-32-00	1/50	LP Driving Bevel Gear Adjusting Washer	404
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72-51-02	1/90	HP Nozzle Vane Support Cone Adjusting Washer (Pre S.B.72-86)	419
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79-11-01	1/40	Oil Tank Vent Valve Adjusting Plate	453

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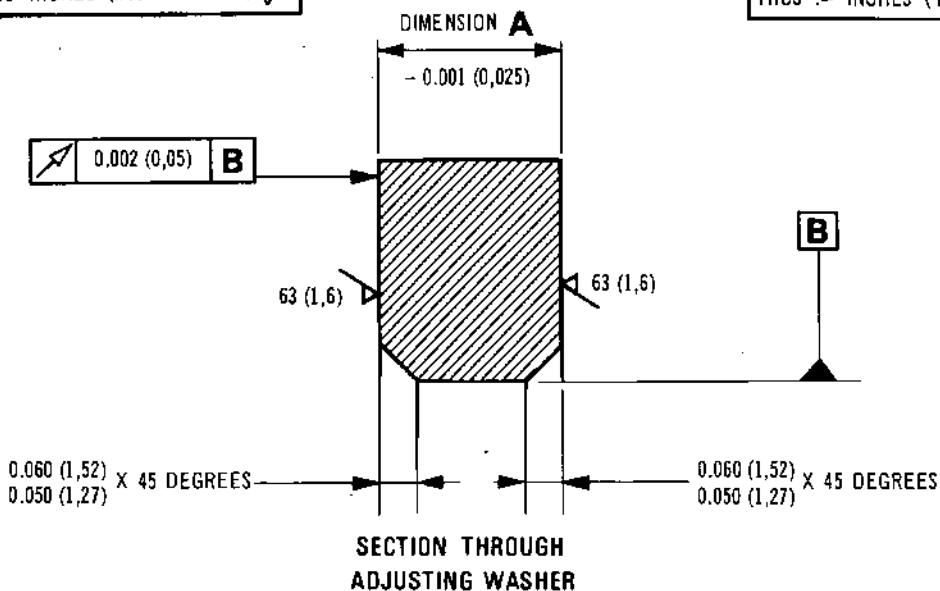
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SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

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IPC. CHAP/SECTION 72-31-03					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
3-70	0.132 (3,35)	3-105	0.160 (4,06)	3-140	0.188 (4,775)
3-75	0.136 (3,45)	3-110	0.164 (4,165)	3-145	0.192 (4,88)
3-80	0.140 (3,56)	3-115	0.168 (4,27)	3-150	0.196 (4,98)
3-85	0.144 (3,66)	3-120	0.172 (4,37)	3-155	0.200 (5,08)
3-90	0.148 (3,76)	3-125	0.176 (4,47)	3-160	0.204 (5,18)
3-95	0.152 (3,86)	3-130	0.180 (4,57)	3-165	0.208 (5,28)
3-100	0.156 (3,96)	3-135	0.184 (4,67)		

NOTE: 3-120 to 3-165 inclusive are Pre SB.72-21.

MACHINING INSTRUCTIONS

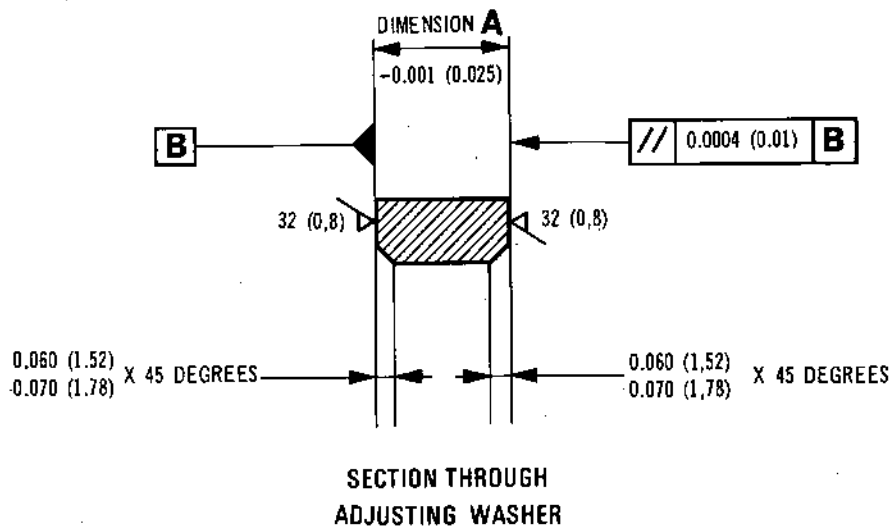
1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Subject to magnetic particle crack detection (Ref.Fig.443).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer
Figure 401

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SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC CHAP/SECTION 72-31-04					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
2-10	0.300 (7.62)	2-45	0.363 (9.22)	2-80	0.426 (10.82)
2-15	0.309 (7.85)	2-50	0.372 (9.45)	2-85	0.435 (11.05)
2-20	0.318 (8.08)	2-55	0.381 (9.68)	2-90	0.444 (11.28)
2-25	0.327 (8.305)	2-60	0.390 (9.91)	2-95	0.453 (11.51)
2-30	0.336 (8.53)	2-65	0.399 (10.13)	2-100	0.462 (11.73)
2-35	0.345 (8.76)	2-70	0.408 (10.36)	2-105	0.471 (11.96)
2-40	0.354 (8.99)	2-75	0.417 (10.59)		

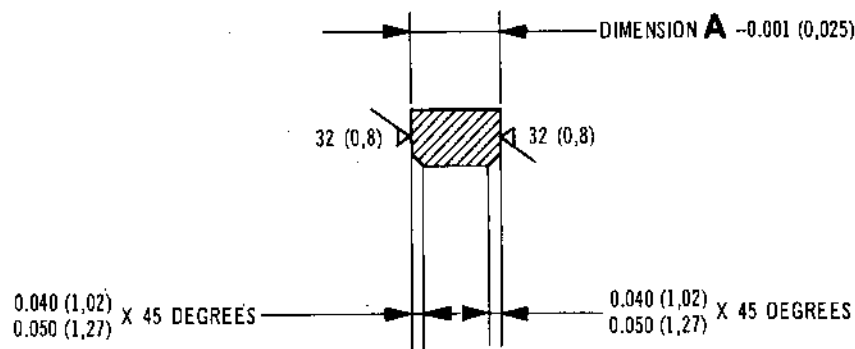
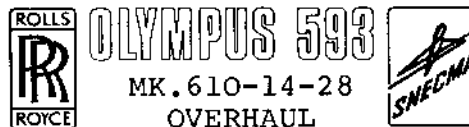
NOTE: 2-10 to 2-20 and 2-95 to 2-105 inclusive are Pre SB.72-94.

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Stress relieve by heating to 150 deg C for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.443).
8. Line through old part number.
9. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer
Figure 402

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SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-31-05							
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-100	0.134 (3,40)	1-140	0.166 (4,22)	1-180	0.198 (5,03)	1-220	0.230 (5,84)
1-105	0.138 (3,505)	1-145	0.170 (4,32)	1-185	0.202 (5,13)	1-225	0.234 (5,94)
1-110	0.142 (3,61)	1-150	0.174 (4,42)	1-190	0.206 (5,23)	1-230	0.238 (6,045)
1-115	0.146 (3,71)	1-155	0.178 (4,52)	1-195	0.210 (5,33)	1-235	0.242 (6,15)
1-120	0.150 (3,81)	1-160	0.182 (4,62)	1-200	0.214 (5,435)	1-240	0.246 (6,25)
1-125	0.154 (3,91)	1-165	0.186 (4,72)	1-205	0.218 (5,54)	1-245	0.250 (6,35)
1-130	0.158 (4,01)	1-170	0.190 (4,83)	1-210	0.222 (5,64)		
1-135	0.162 (4,11)	1-175	0.194 (4,93)	1-215	0.226 (5,74)		

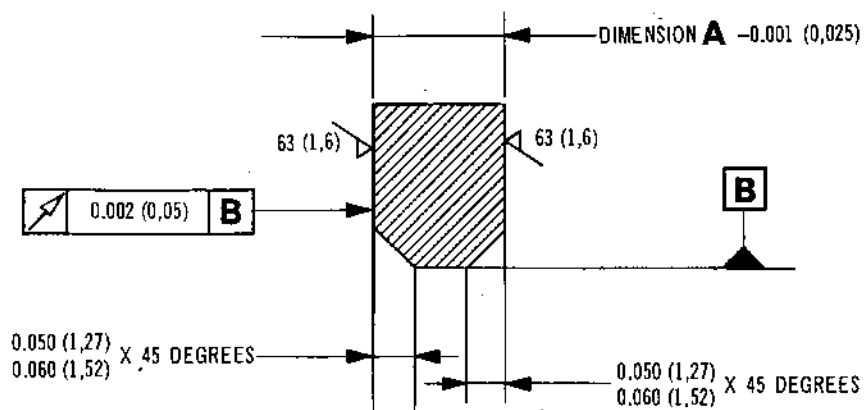
MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate to magnetic chuck, machine chamfers both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Stress relieve by heating to 150 deg C for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.443).
8. Line through old part number.
9. Re-part number (Ref.72-09-00 Repair).

Adjusting Washer
Figure 403



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SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-32-00							
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-50	0.186 (4,72)	1-75	0.196 (4,98)	1-100	0.206 (5,23)	1-125	0.216 (5,49)
1-55	0.188 (4,775)	1-80	0.198 (5,03)	1-105	0.208 (5,28)	1-130	0.218 (5,54)
1-60	0.190 (4,83)	1-85	0.200 (5,08)	1-110	0.210 (5,33)	1-135	0.220 (5,59)
1-65	0.192 (4,88)	1-90	0.202 (5,13)	1-115	0.212 (5,38)	1-140	0.222 (5,64)
1-70	0.194 (4,93)	1-95	0.204 (5,18)	1-120	0.214 (5,435)	1-145	0.224 (5,69)

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Subject to magnetic particle crack detection (Ref.Fig.443).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair, para.3.E. or D).

Adjusting Washer
Figure 404

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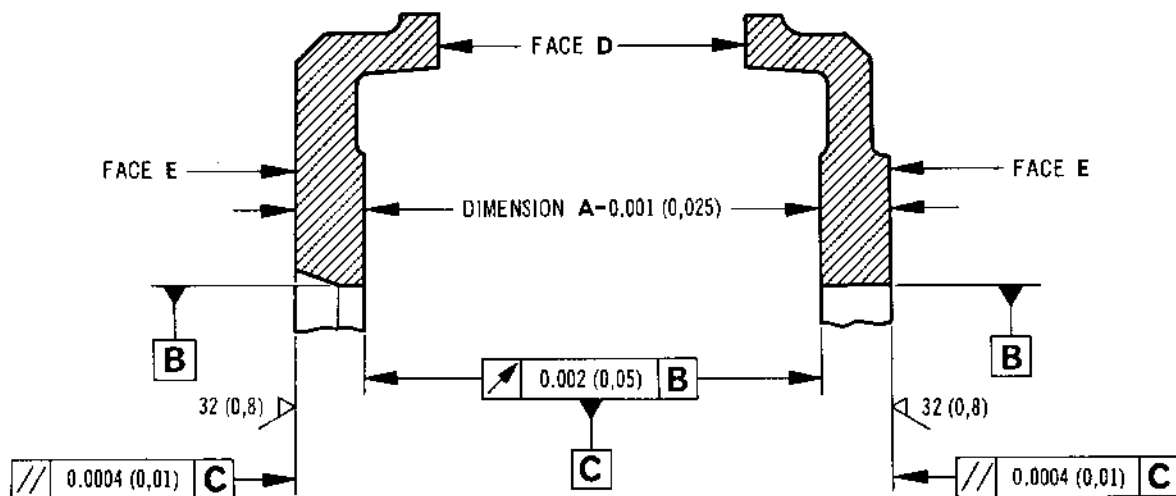


OLYMPUS 593
MK.610-14-28
OVERHAUL



CR 34246/00B

PRINTED IN ENGLAND



SB.72-8607-247
PART 1

SECTION THROUGH
OIL THROWER

PRE. SB.72-8607-247

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC CHAP/SECTION 72-32-00					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-200B/200C	0.126 (3,20)	1-215/215B	0.138 (3,505)	1-230/230B	0.150 (3,81)
1-205/205B	0.130 (3,30)	1-220/220B	0.142 (3,61)	1-235/235B	0.154 (3,91)
1-210/210B	0.134 (3,40)	1-225/225B	0.146 (3,71)	1-240/240B	0.158 (4,01)

MACHINING INSTRUCTIONS

1. Locate face D to magnetic table.
2. Finish grind face E to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg. C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.443).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair, para.3.E. or D.).

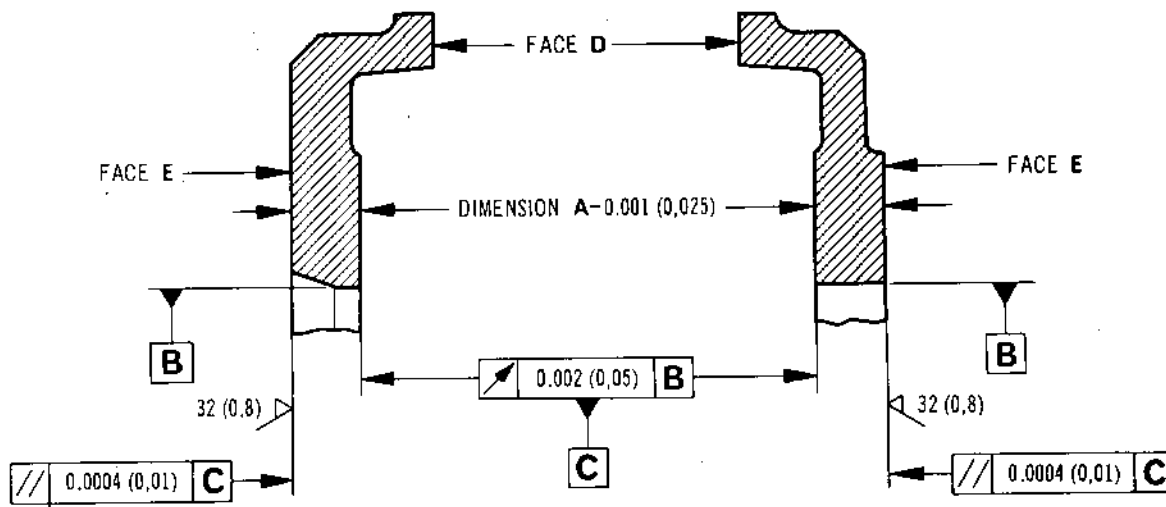
Oil Thrower SB.72-21 and SB.72-8607-247 Part 1
Figure 405

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TN1380



OLYMPUS 593

MK.610-14-28
OVERHAULSB.72-8607-247
PART 2SECTION THROUGH
OIL THROWER

PRE. SB.72-8607-247

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC CHAP/SECTION 72-32-00

IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
2-120B/120C	0.122 (3,10)	2-140/140B	0.138 (3,505)	2-160/160B	0.154 (3,91)	2-180/180B	0.170 (4,32)
2-125/125B	0.126 (3,20)	2-145/145B	0.142 (3,61)	2-165/165B	0.158 (4,01)	2-185/185B	0.174 (4,42)
2-130/130B	0.130 (3,30)	2-150/150B	0.146 (3,71)	2-170/170B	0.162 (4,11)	2-190/190B	0.178 (4,52)
2-135/135B	0.134 (3,40)	2-155/155B	0.150 (3,81)	2-175/175B	0.166 (4,22)	2-195/195B	0.182 (4,62)

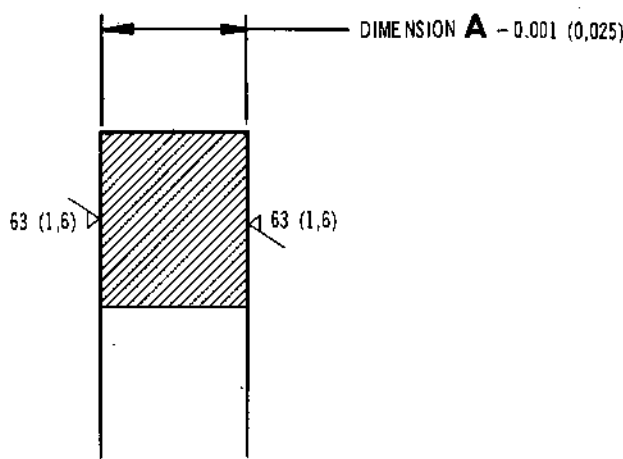
MACHINING INSTRUCTIONS

1. Locate face D to magnetic table.
2. Finish grind face E to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg. C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.443).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair, para.3.E. or D.).

Oil Thrower SB.72-29 and SB.72-8607-247 Part 2
Figure 406REPAIR
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OLYMPUS 593
MK.610-14-28
OVERHAUL



SECTION THROUGH ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

NOTE: 3-180 to 3-190 inclusive and 3-290 to 3-305
inclusive are Pre S.B.72-29.

IPC.CHAP/SECTION 72-32-00							
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
3-180	0.110 (2,79)	3-215	0.138 (3,505)	3-250	0.166 (4,22)	3-285	0.194 (4,93)
3-185	0.114 (2,895)	3-220	0.142 (3,61)	3-255	0.170 (4,32)	3-290	0.198 (5,03)
3-190	0.118 (3,00)	3-225	0.146 (3,71)	3-260	0.174 (4,42)	3-295	0.202 (5,13)
3-195	0.122 (3,10)	3-230	0.150 (3,81)	3-265	0.178 (4,52)	3-300	0.206 (5,23)
3-200	0.126 (3,20)	3-235	0.154 (3,91)	3-270	0.182 (4,62)	3-305	0.210 (5,33)
3-205	0.130 (3,30)	3-240	0.158 (4,01)	3-275	0.186 (4,72)		
3-210	0.134 (3,40)	3-245	0.162 (4,11)	3-280	0.190 (4,83)		

MACHINING INSTRUCTIONS

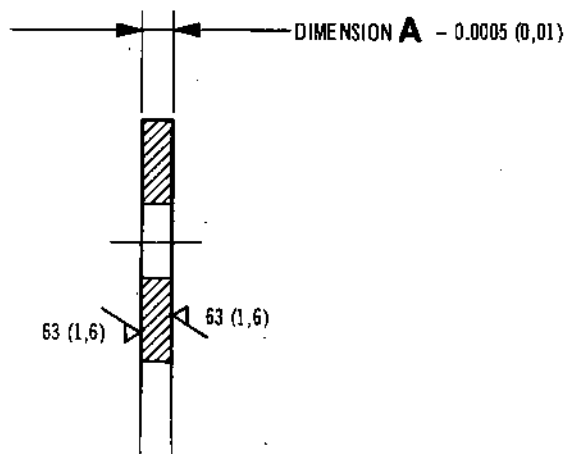
1. Locate in soft jawed chuck.
2. Finish turn to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Subject to magnetic particle crack detection (Ref.Fig.443).
6. Line through old part number.
7. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer
Figure 407

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OVERHAUL



SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC CHAP/SECTION 72-32-00					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
5-110	0.0670 (1,70)	5-135	0.0745 (1,89)	5-160	0.0820 (2,08)
5-115	0.0685 (1,74)	5-140	0.0760 (1,93)	5-165	0.0835 (2,12)
5-120	0.0700 (1,78)	5-145	0.0775 (1,97)	5-170	0.0850 (2,16)
5-125	0.0715 (1,82)	5-150	0.0790 (2,01)	5-175	0.0865 (2,20)
5-130	0.0730 (1,85)	5-155	0.0805 (2,04)	5-180	0.0880 (2,235)

MACHINING INSTRUCTIONS

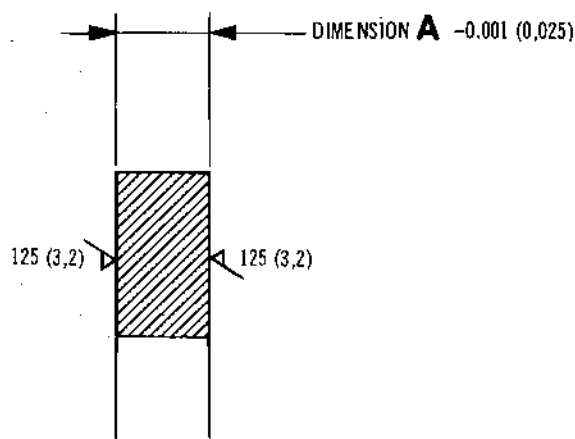
1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Subject to magnetic particle crack detection (Ref.Fig.444).
6. Label the component with the appropriate part number.

Adjusting Washer
Figure 408

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OVERHAUL



SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SECTION THROUGH
ADJUSTING WASHER

IPC. CHAP/SECTION 72-32-00			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
7-70	0.050 (1,27)	7-90	0.090 (2,29)
7-75	0.060 (1,52)	7-95	0.100 (2,54)
7-80	0.070 (1,78)	7-100	0.110 (2,79)
7-85	0.080 (2,03)		

MACHINING INSTRUCTIONS

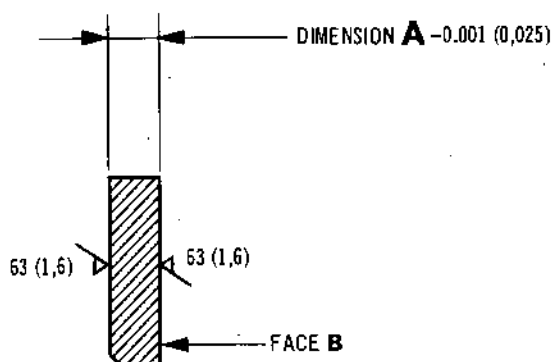
1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Subject to magnetic particle crack detection (Ref.Fig.444).
6. Line through old part number.
7. Re-part number (Ref.72-09-00 Repair, para.3.E or D).

Adjusting Ring
Figure 409

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OLYMPUS 593

MK.610-14-28
OVERHAULSECTION THROUGH
ADJUSTING SHIM

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-32-00					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
7-180	0.070 (1,78)	7-200	0.090 (2,29)	7-220	0.110 (2,79)
7-185	0.075 (1,905)	7-205	0.095 (2,41)	7-225	0.115 (2,92)
7-190	0.080 (2,03)	7-210	0.100 (2,54)	7-230	0.120 (3,05)
7-195	0.085 (2,16)	7-215	0.105 (2,67)	7-235	0.125 (3,175)

MACHINING INSTRUCTIONS

1. Locate chamfered side to magnetic table.
2. Finish grind face B to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.444).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair).

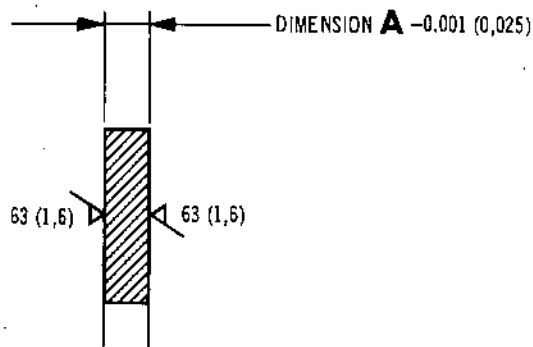
Adjusting Shim
Figure 410

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SECTION THROUGH
ADJUSTING PLATE

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

IPC CHAP/SECTION 72-32-00			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
8-40	0.094(2,39)	8-65	0.109 (2,77)
8-45	0.097 (2,46)	8-70	0.112 (2,84)
8-50	0.100 (2,54)	8-75	0.115 (2,92)
8-55	0.103 (2,62)	8-80	0.118 (3,00)
8-60	0.106 (2,69)	8-85	0.121 (3,07)

MACHINING INSTRUCTIONS

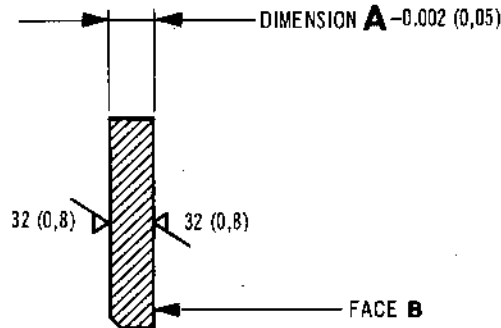
1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.444).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair, para.3.E. or D).

Adjusting Plate
Figure 411

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OLYMPUS 593

MK. 610-14-28
OVERHAULSECTION THROUGH
ADJUSTING PLATE

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC CHAP/SECTION 72-32-00			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
8-150	0.080 (2,03)	8-165	0.098 (2,49)
8-155	0.086 (2,18)	8-170	0.104 (2,64)
8-160	0.092 (2,34)		

MACHINING INSTRUCTIONS

1. Locate chamfered side to magnetic table.
2. Finish grind face B to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.444).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair, para.3.E. or D).

Adjusting Plate
Figure 412

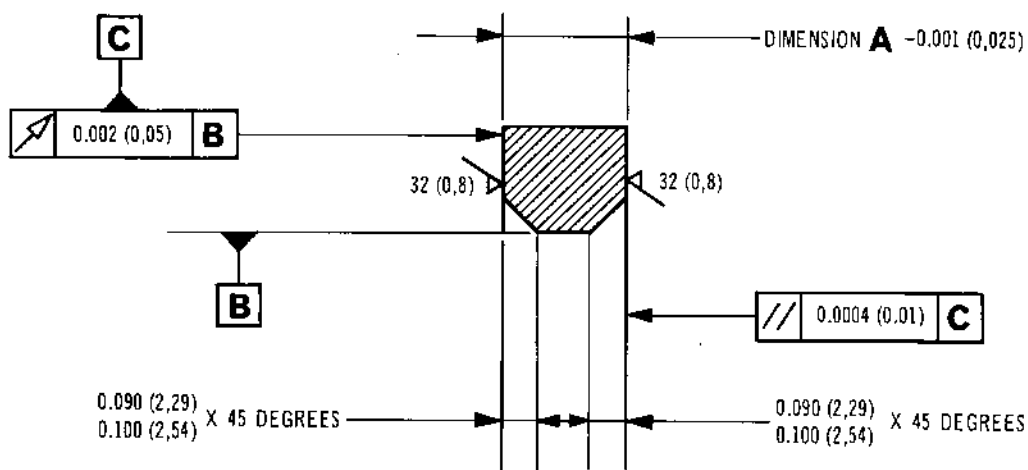
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CR 34212/00A



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OVERHAUL



SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-33-02							
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-10	0.237 (6,02)	1-50	0.265 (6,73)	1-85	0.293 (7,44)	1-120	0.321 (8,15)
1-15	0.241 (6,12)	1-55	0.269 (6,83)	1-90	0.297 (7,54)	1-125	0.325 (8,255)
1-20	0.245 (6,22)	1-60	0.273 (6,93)	1-95	0.301 (7,645)	1-130	0.329 (8,36)
1-30	0.249 (6,32)	1-65	0.277 (7,035)	1-100	0.305 (7,75)	1-135	0.333 (8,46)
1-35	0.253 (6,43)	1-70	0.281 (7,14)	1-105	0.309 (7,85)	1-140	0.337 (8,56)
1-40	0.257 (6,53)	1-75	0.285 (7,24)	1-110	0.313 (7,95)	1-145	0.341 (8,66)
1-45	0.261 (6,63)	1-80	0.289 (7,34)	1-115	0.317 (8,05)	1-150	0.345 (8,76)

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Subject to magnetic particle crack detection (Ref.Fig.444).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair, para.3.E. or D).

NOTE: 1-10 to 1-20 inclusive are to SB.72-29. 1-110 to 1-150 inclusive are Pre SB.72-29.

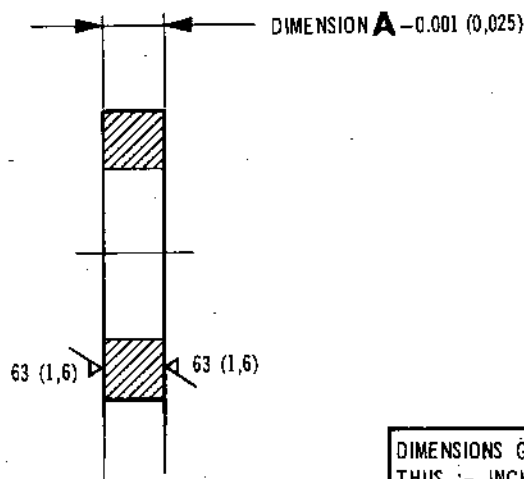
Adjusting Washer
Figure 413

REPAIR
72-09-21

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MK. 610-14-28
OVERHAUL



SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SECTION THROUGH
ADJUSTING RING

IPC. CHAP/SECTION 72-34-00					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
2-120	0.062 (1,57)	2-155	0.090 (2,29)	2-190	0.118 (3,00)
2-125	0.066 (1,68)	2-160	0.094 (2,39)	2-195	0.122 (3,10)
2-130	0.070 (1,78)	2-165	0.098 (2,49)	2-200	0.126 (3,20)
2-135	0.074 (1,88)	2-170	0.102 (2,59)	2-205	0.130 (3,30)
2-140	0.078 (1,98)	2-175	0.106 (2,69)	2-210	0.134 (3,40)
2-145	0.082 (2,08)	2-180	0.110 (2,79)		
2-150	0.086 (2,18)	2-185	0.114 (2,895)		

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Subject to magnetic particle crack detection (Ref.Fig.445).
6. Line through old part number.
7. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

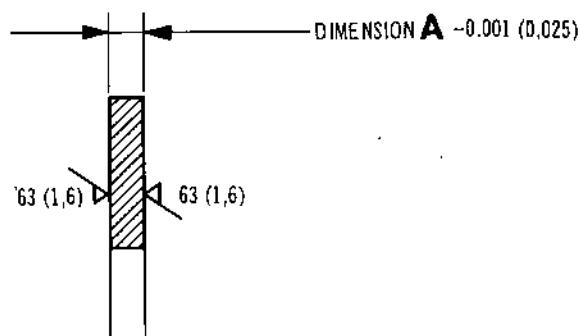
Adjusting Ring
Figure 414



OLYMPUS 593

MK.610-14-28

OVERHAUL



SECTION THROUGH
ADJUSTING RING

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC CHAP/SECTION 72-34-00							
IPC REF NUMBER	DIMENSION A	IPC REF NUMBER	DIMENSION A	IPC REF NUMBER	DIMENSION A	IPC REF NUMBER	DIMENSION A
2-220	0.036 (0,91)	2-250	0.060 (1,52)	2-280	0.084 (2,13)	2-310	0.108 (2,74)
2-225	0.040 (1,02)	2-255	0.064 (1,625)	2-285	0.088 (2,235)	2-315	0.112 (2,84)
2-230	0.044 (1,12)	2-260	0.068 (1,73)	2-290	0.092 (2,34)	2-320	0.116 (2,95)
2-235	0.048 (1,22)	2-265	0.072 (1,83)	2-295	0.096 (2,44)	2-325	0.120 (3,05)
2-240	0.052 (1,32)	2-270	0.076 (1,93)	2-300	0.100 (2,54)	2-330	0.124 (3,15)
2-245	0.056 (1,42)	2-275	0.080 (2,03)	2-305	0.104 (2,64)		

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.445).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair, para.3.E. or D).

Adjusting Ring
Figure 415



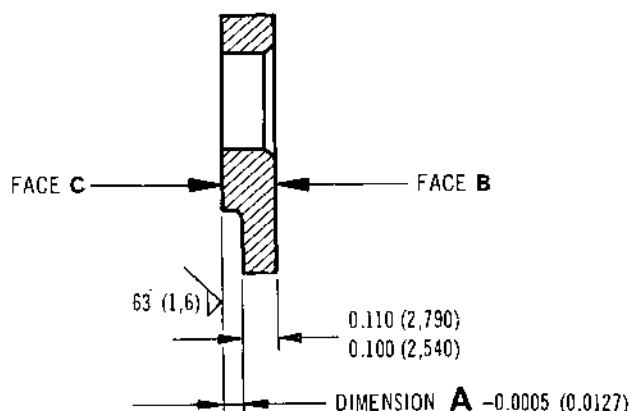
OLYMPUS 593

MK.610-14-28

OVERHAUL



CR 34257/00B



SECTION THROUGH
RETAINING RING

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-51-01			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
4-340/341	0.040 (1.02)	4-360/361	0.044 (1.12)
4-345/346	0.041 (1.04)	4-365/366	0.045 (1.14)
4-350/351	0.042 (1.07)	4-370	0.046 (1.17)
4-355/356	0.043 (1.09)		

MACHINING INSTRUCTIONS

1. Locate face B to magnetic table.
2. Finish grind face C to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Subject to magnetic particle crack detection (Ref.Fig.445).
6. Line through old part number.
7. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

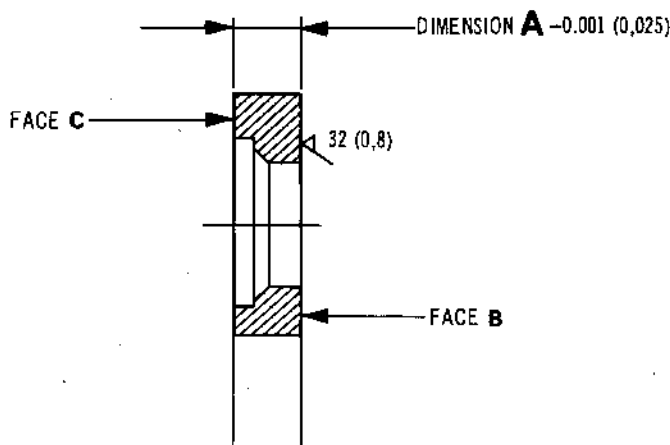
Retaining Ring
Figure 416

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72-09-21
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OLYMPUS 593

MK.610-14-28
OVERHAUL



SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-51-01							
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
5-100	0.115 (2,92)	5-125	0.135 (3,43)	5-150	0.155 (3,94)	5-175	0.175 (4,445)
5-105	0.119 (3,02)	5-130	0.139 (3,53)	5-155	0.159 (4,04)	5-180	0.179 (4,55)
5-110	0.123 (3,12)	5-135	0.143 (3,63)	5-160	0.163 (4,14)	5-185	0.183 (4,65)
5-115	0.127 (3,225)	5-140	0.147 (3,73)	5-165	0.167 (4,24)		
5-120	0.131 (3,33)	5-145	0.151 (3,835)	5-170	0.171 (4,34)		

MACHINING INSTRUCTIONS

1. Locate face C to magnetic table.
2. Finish grind face B to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Subject to magnetic particle crack detection (Ref.Fig.445).
6. Line through old part number.
7. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

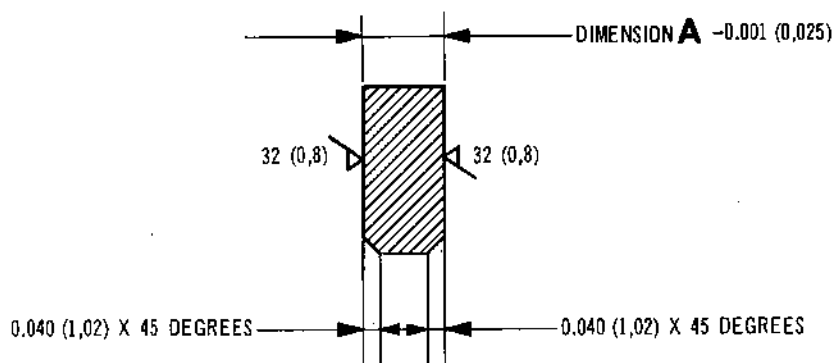
Adjusting Washer (SB.72-86)
Figure 417

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SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-51-01							
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
5-200	0.165 (4,19)	5-230	0.189 (4,80)	5-260	0.213 (5,41)	5-290	0.237 (6,02)
5-205	0.169 (4,29)	5-235	0.193 (4,90)	5-265	0.217 (5,51)	5-295	0.241 (6,12)
5-210	0.173 (4,39)	5-240	0.197 (5,00)	5-270	0.221 (5,61)	5-300	0.245 (6,22)
5-215	0.177 (4,495)	5-245	0.201 (5,105)	5-275	0.225 (5,715)	5-305	0.249 (6,32)
5-220	0.181 (4,60)	5-250	0.205 (5,21)	5-280	0.229 (5,82)	5-310	0.253 (6,43)
5-225	0.185 (4,70)	5-255	0.209 (5,31)	5-285	0.233 (5,92)		

MACHINING INSTRUCTIONS

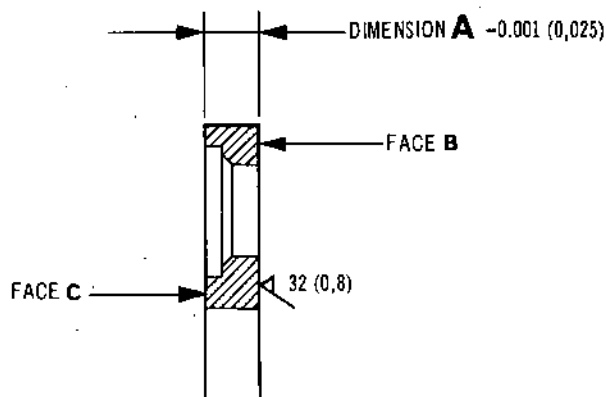
1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Finish grind chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Subject to magnetic particle crack detection (Ref.Fig.445).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer (SB.72-86)
Figure 418

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SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-51-02					
IPC. REF NUMBER	DIMENSION A	IPC. REF NUMBER	DIMENSION A	IPC. REF NUMBER	DIMENSION A
1-90	0.110 (2,79)	1-110	0.146 (3,71)	1-130	0.182 (4,62)
1-95	0.119 (3,02)	1-115	0.155 (3,94)	1-135	0.191 (4,85)
1-100	0.128 (3,25)	1-120	0.164 (4,165)		
1-105	0.137 (3,48)	1-125	0.173 (4,39)		

MACHINING INSTRUCTIONS

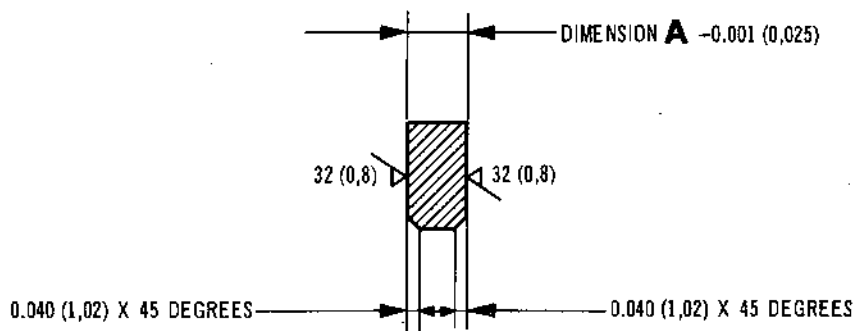
1. Locate face C to magnetic table.
2. Finish grind face B to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Subject to magnetic particle crack detection (Ref.Fig.445).
6. Line through old part number.
7. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer (Pre SB.72-86)
Figure 419

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MK.610-14-28
OVERHAULSECTION THROUGH
ADJUSTING WASHERSURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-51-02					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-250	0.155 (3,94)	1-275	0.200 (5,08)	1-300	0.245 (6,22)
1-255	0.164 (4,165)	1-280	0.209 (5,31)	1-305	0.254 (6,45)
1-260	0.173 (4,39)	1-285	0.218 (5,54)	1-310	0.263 (6,68)
1-265	0.182 (4,62)	1-290	0.227 (5,765)	1-315	0.272 (6,91)
1-270	0.191 (4,85)	1-295	0.236 (5,99)		

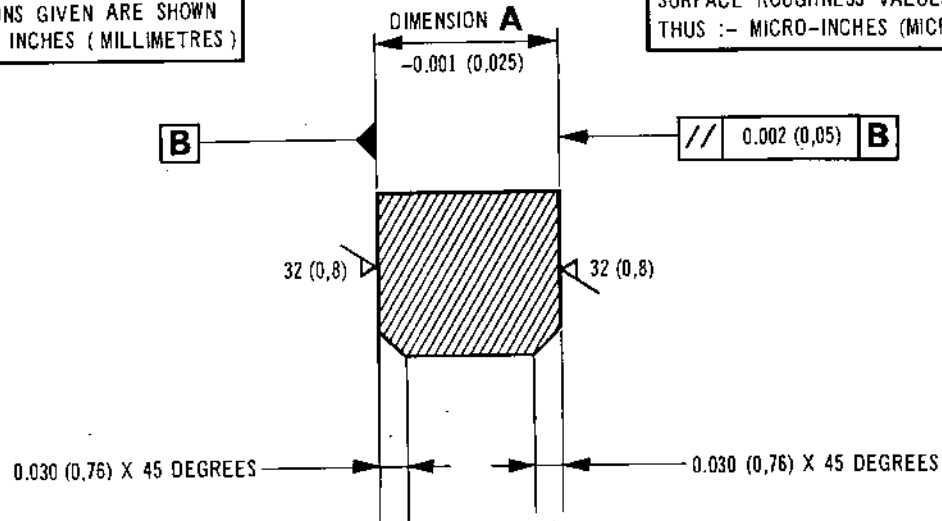
MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Finish grind chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Subject to magnetic particle crack detection (Ref.Fig.445).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer (Pre SB.72-86)
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OVERHAUL

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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓SECTION THROUGH
ADJUSTING WASHER

IPC CHAP/SECTION 72-51-04					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-35	0.251 (6,375)	1-60	0.305 (7,75)	1-90	0.359 (9,12)
1-38	0.260 (6,60)	1-65	0.314 (7,975)	1-95	0.368 (9,35)
1-40	0.269 (6,83)	1-70	0.323 (8,20)	1-100	0.377 (9,575)
1-45	0.278 (7,06)	1-75	0.332 (8,43)	1-105	0.386 (9,80)
1-50	0.287 (7,28)	1-80	0.341 (8,66)	1-110	0.395 (10,03)
1-55	0.296 (7,52)	1-85	0.350 (8,89)	1-115	0.404 (10,26)

MACHINING INSTRUCTIONS

1. Locate in soft jawed chuck, turn equal amounts from both sides to within +0.010 in. (0,254 mm) of required size.
2. Machine chamfers both sides of bore.
3. Finish grind an equal amount from both sides to achieve required dimension A.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Stress relieve by heating to 150 deg C for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.445).
8. Line through old part number.
9. Re-part number (Ref.72-09-00 Repair, para.3.E or D).

Adjusting Washer
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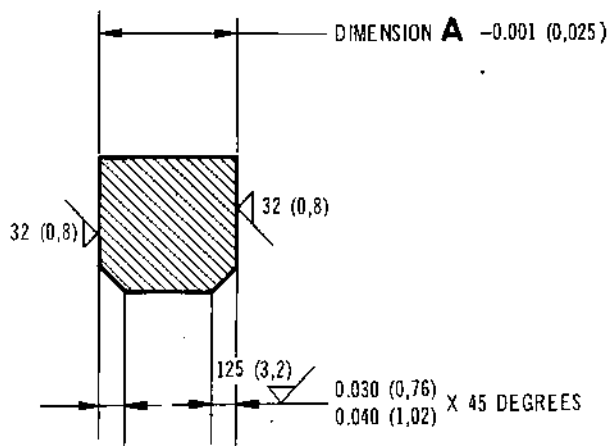
CR 34281/00A



OLYMPUS 593

MK. 610-14-28

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SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC.CHAP/SECTION 72-61-00					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-210	0.117 (2,97)	1-235	0.132 (3,35)	1-260	0.147 (3,73)
1-215	0.120 (3,05)	1-240	0.135 (3,43)	1-265	0.150 (3,81)
1-220	0.123 (3,12)	1-245	0.138 (3,505)	1-270	0.153 (3,89)
1-225	0.126 (3,2)	1-250	0.141 (3,58)	1-275	0.156 (3,96)
1-230	0.129 (3,28)	1-255	0.144 (3,66)		

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate to magnetic chuck, machine chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Stress relieve by heating to 150 deg C for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.446).
8. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
9. Line through old part number.
10. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

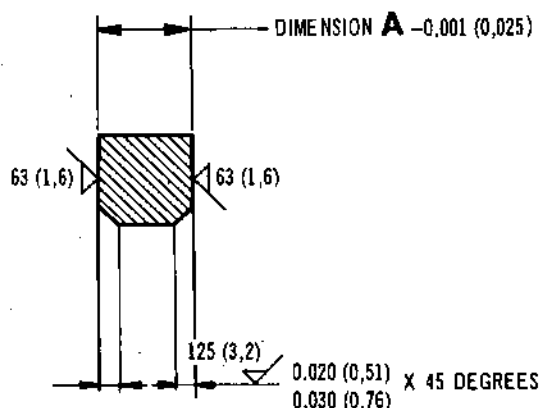
Adjusting Washer
Figure 422

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SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-61-00					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-410	0.112 (2,84)	1-430	0.120 (3,05)	1-450	0.128 (3,25)
1-415	0.114 (2,895)	1-435	0.122 (3,1)	1-455	0.130 (3,3)
1-420	0.116 (2,95)	1-440	0.124 (3,15)	1-460	0.132 (3,35)
1-425	0.118 (3,0)	1-445	0.126 (3,2)		

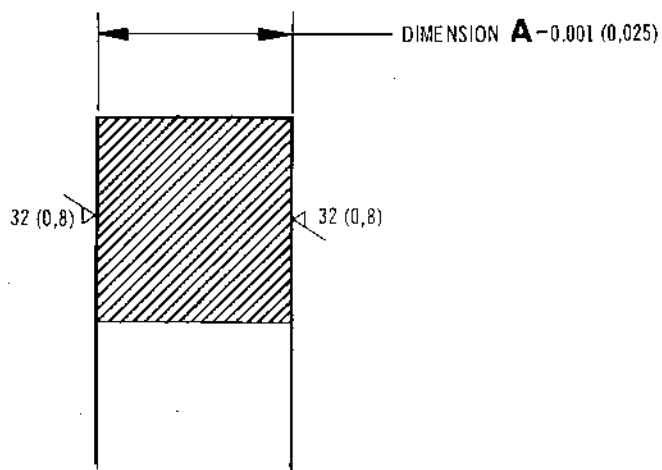
MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Stress relieve by heating to 150 deg.C. for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.446).
8. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
9. Line through old part number.
10. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer
Figure 423



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SECTION THROUGH ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC.CHAP/SECTION 72-61-00					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-470	0.174 (4,42)	1-500	0.192 (4,88)	1-530	0.210 (5,33)
1-475	0.177 (4,495)	1-505	0.195 (4,95)	1-535	0.213 (5,41)
1-480	0.180 (4,57)	1-510	0.198 (5,03)	1-540	0.216 (5,49)
1-485	0.183 (4,65)	1-515	0.201 (5,105)	1-545	0.219 (5,56)
1-490	0.186 (4,72)	1-520	0.204 (5,18)	1-550	0.222 (5,64)
1-495	0.189 (4,80)	1-525	0.207 (5,26)		

MACHINING INSTRUCTIONS

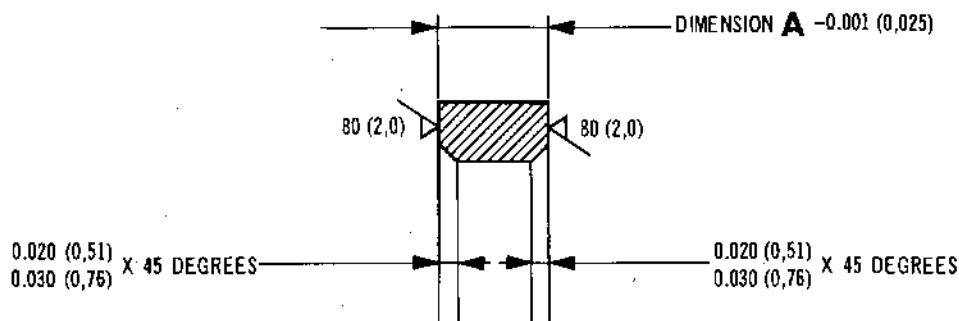
1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Subject to magnetic particle crack detection (Ref.Fig.446).
6. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer
Figure 424



OLYMPUS 593

MK.610-14-28
OVERHAUL



SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-61-00							
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
2-30	0.119 (3.02)	2-55	0.129 (3.28)	2-80	0.139 (3.53)	2-105	0.149 (3.78)
2-35	0.121 (3.07)	2-60	0.131 (3.33)	2-85	0.141 (3.58)	2-110	0.151 (3.835)
2-40	0.123 (3.12)	2-65	0.133 (3.38)	2-90	0.143 (3.63)	2-115	0.153 (3.89)
2-45	0.125 (3.175)	2-70	0.135 (3.43)	2-95	0.145 (3.68)		
2-50	0.127 (3.225)	2-75	0.137 (3.48)	2-100	0.147 (3.73)		

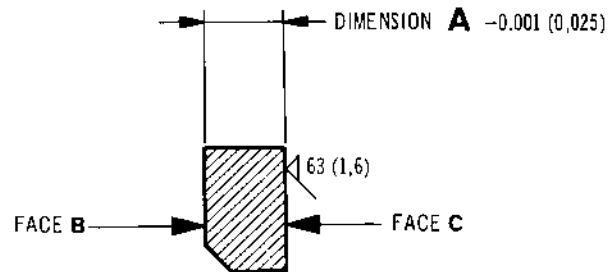
MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Subject to magnetic particle crack detection (Ref.Fig.446).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer
Figure 425

**OLYMPUS 593**MK.610-14-28
OVERHAUL

CR 34248/00A

SECTION THROUGH
ADJUSTING SHIMSURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-62-01					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-10	0.065 (1,65)	1-30	0.085 (2,16)	1-50	0.105 (2,67)
1-15	0.070 (1,78)	1-35	0.090 (2,29)	1-55	0.110 (2,79)
1-20	0.075 (1,905)	1-40	0.095 (2,41)	1-60	0.115 (2,92)
1-25	0.080 (2,03)	1-45	0.100 (2,54)	1-65	0.120 (3,05)

MACHINING INSTRUCTIONS

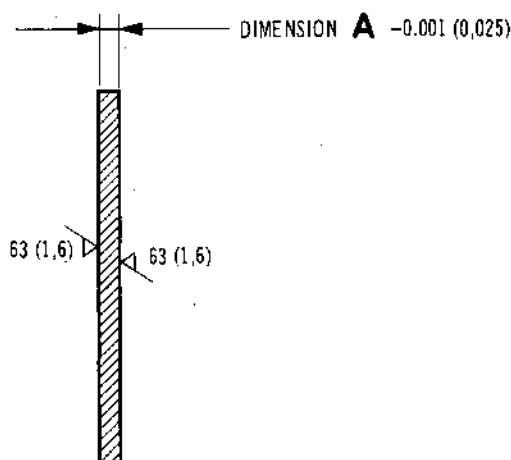
1. Locate face B to magnetic table.
2. Finish grind face C to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Subject to magnetic particle crack detection (Ref.Fig.446).
6. Line through old part number.
7. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Shim
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SECTION THROUGH ADJUSTING SHIM

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC.CHAP/SECTION 72-62-D1			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-140	0.055 (1,40)	1-165	0.080 (2,03)
1-145	0.060 (1,52)	1-170	0.085 (2,16)
1-150	0.065 (1,65)	1-175	0.090 (2,29)
1-155	0.070 (1,78)	1-180	0.095 (2,41)
1-160	0.075 (1,905)	1-185	0.100 (2,54)

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.446).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Shim
Figure 427

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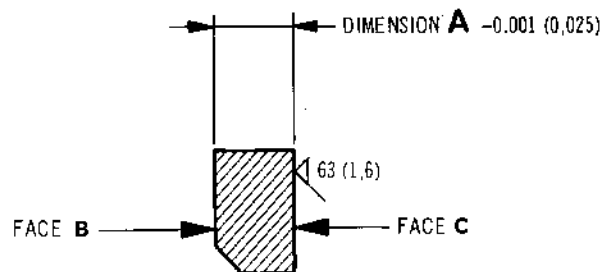


OLYMPUS 593

MK.610-14-28
OVERHAUL



CR 34250/00A



SECTION THROUGH
ADJUSTING SHIM

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-62-01					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-220	0.065 (1,65)	1-240	0.085 (2,16)	1-260	0.105 (2,67)
1-225	0.070 (1,78)	1-245	0.090 (2,29)	1-265	0.110 (2,79)
1-230	0.075 (1,905)	1-250	0.095 (2,41)	1-270	0.115 (2,92)
1-235	0.080 (2,03)	1-255	0.100 (2,54)	1-275	0.120 (3,05)

MACHINING INSTRUCTIONS

1. Locate face B to magnetic table.
2. Finish grind face C to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.446).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Shim
Figure 428

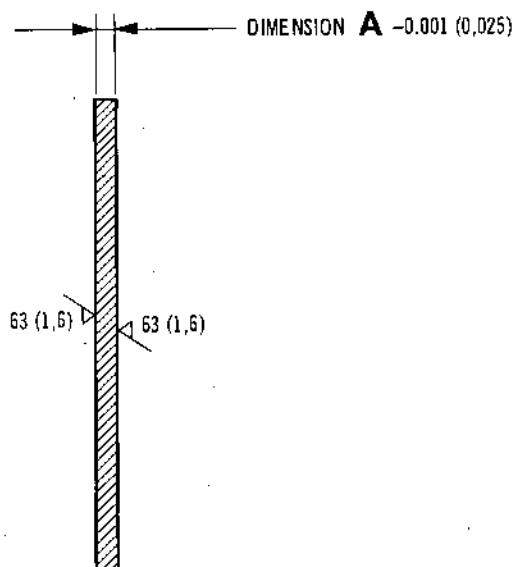
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SECTION THROUGH ADJUSTING SHIM

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-62-01			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-320	0.055 (1,40)	1-340	0.075 (1,905)
1-325	0.060 (1,52)	1-345	0.080 (2,03)
1-330	0.065 (1,65)	1-350	0.085 (2,16)
1-335	0.070 (1,78)	1-355	0.090 (2,29)

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.447).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Shim
Figure 429

REPAIR
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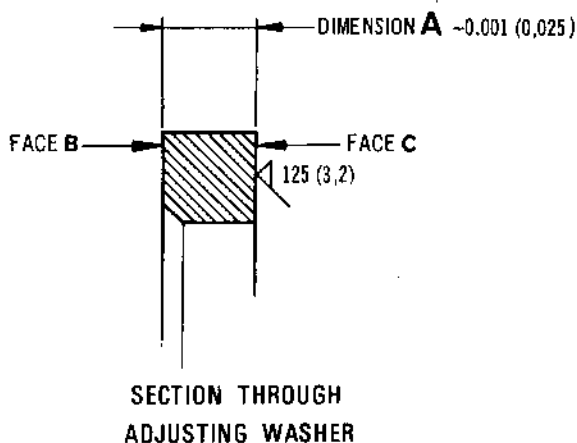
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OVERHAUL



CR 34345/00A



SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-62-02					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-40	0.105 (2,67)	1-65	0.120 (3,05)	1-90	0.135 (3,43)
1-45	0.108 (2,74)	1-70	0.123 (3,12)	1-95	0.138 (3,505)
1-50	0.111 (2,82)	1-75	0.126 (3,20)	1-100	0.141 (3,58)
1-55	0.114 (2,895)	1-80	0.129 (3,28)	1-105	0.144 (3,66)
1-60	0.117 (2,97)	1-85	0.132 (3,35)	1-110	0.147 (3,73)

MACHINING INSTRUCTIONS

1. Locate face B to magnetic table.
2. Finish grind face C to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.447).
7. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
8. Label the component with the appropriate part number.

Adjusting Washer (Pre SB.72-90)
Figure 430 (Sheet 1)

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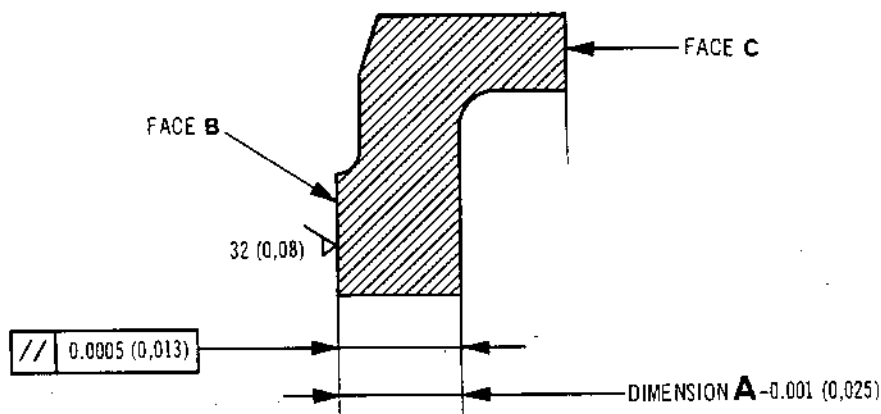
OLYMPUS 593

MK.610-14-28 *sneema*
OVERHAUL

CR 34195/00A

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓



SECTION THROUGH
ADJUSTING WASHER

IPC. CHAP/SECTION 72-62-02					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-40 B	0.181 (4,60)	1-75 B	0.195 (4,95)	1-110 B	0.209 (5,31)
1-45 B	0.183 (4,65)	1-80 B	0.197 (5,00)	1-111	0.211 (5,36)
1-50 B	0.185 (4,70)	1-85 B	0.199 (5,05)	1-112	0.213 (5,41)
1-55 B	0.187 (4,75)	1-90 B	0.201 (5,105)	1-113	0.215 (5,46)
1-60 B	0.189 (4,80)	1-95 B	0.203 (5,16)	1-114	0.217 (5,51)
1-65 B	0.191 (4,85)	1-100 B	0.205 (5,21)		
1-70 B	0.193 (4,90)	1-105 B	0.207 (5,26)		

MACHINING INSTRUCTIONS

1. Locate face C to magnetic table.
2. Finish grind face B to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref. 72-09-00 Repair).
5. Subject to magnetic particle crack detection (Ref. Fig.447).
6. Line through old part number.
7. Re-part number (Ref. 72-09-00 Repair).

Adjusting Washer (S.B.72-90, Pre S.B.72-383)
Figure 430 (Sheet 2)

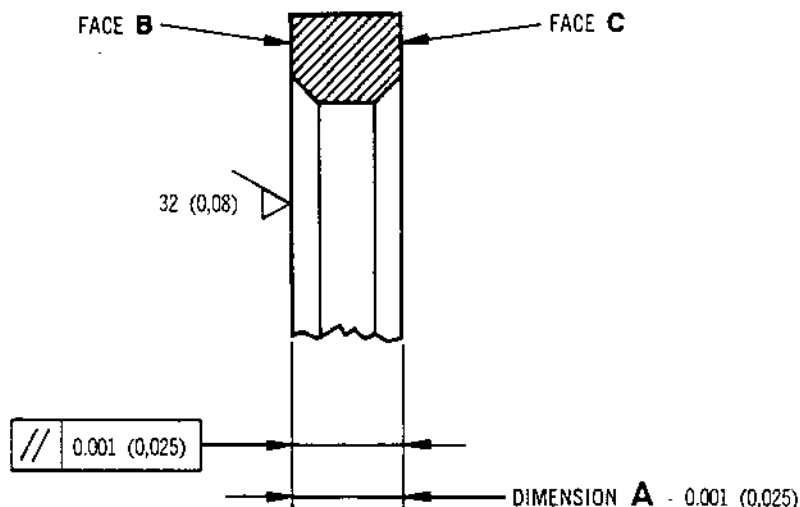
REPAIR

72-09-21

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Jan 31/94

**OLYMPUS 593**MK.610-14-28 *sneema*
OVERHAUL

CR 36400 /00A

SECTION THROUGH
ADJUSTING WASHERSURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-62-02			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-40	0.159 (4,04)	1-70	0.177 (4,50)
1-45	0.162 (4,11)	1-75	0.180 (4,57)
1-50	0.165 (4,19)	1-80	0.183 (4,65)
1-55	0.168 (4,27)	1-85	0.186 (4,72)
1-60	0.171 (4,34)	1-90	0.189 (4,80)
1-65	0.174 (4,42)	1-95	0.192 (4,88)

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind to achieve required dimension 'A'.
3. Dimensionally inspect depth of remaining chamfer.
4. If necessary mount on lathe and reproduce chamfer.
5. Remove sharp edges.
6. Inspect surface finish (Ref. 72-09-00 Repair).
7. Subject to magnetic particle crack detection (Ref. TSD594, 0P201).
8. Re-partnumber (Ref. 72-09-00 Repair para.3.D.).

Adjusting Washer (S.B.72-383)
Figure 430 (Sheet 3)

REPAIR

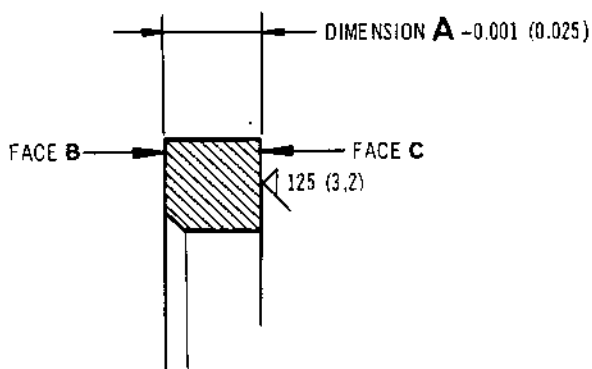
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OLYMPUS 593

MK.610-14-28 *sneema*
OVERHAUL

CR 34284/00B

SECTION THROUGH
ADJUSTING WASHERSURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-62-02					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-270 A	0.103 (2,62)	1-295 A	0.118 (3,00)	1-320 A	0.133 (3,38)
1-275 A	0.106 (2,69)	1-300 A	0.121 (3,07)	1-325 A	0.136 (3,45)
1-280 A	0.109 (2,77)	1-305 A	0.124 (3,15)	1-330 A	0.139 (3,53)
1-285 A	0.112 (2,84)	1-310 A	0.127 (3,225)	1-335 A	0.142 (3,61)
1-290 A	0.115 (2,92)	1-315 A	0.130 (3,30)		

MACHINING INSTRUCTIONS

1. Locate face B to magnetic table.
2. Finish grind face C to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.447).
7. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
8. Label the component with the appropriate part number.

Adjusting Washer Pre SB.72-7510-166
Figure 431 (Sheet 1 of 2)

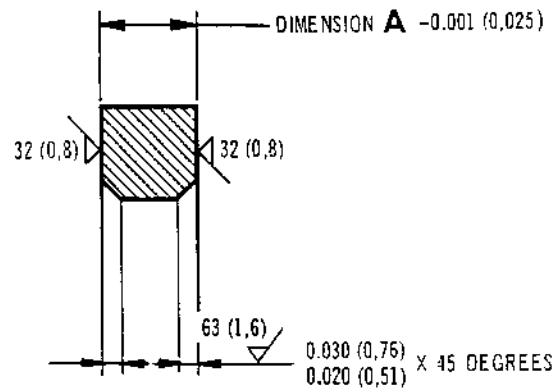
REPAIR

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**OLYMPUS 593****MK.610-14-28 SNECMA
OVERHAUL**

CR 35693/00A

**SECTION THROUGH
ADJUSTING WASHER****SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓****DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)**

IPC. CHAP/SECTION 72-62-02					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-270B	0.103 (2,62)	1-305B	0.124 (3,15)	1-337A	0.145 (3,69)
1-275B	0.106 (2,69)	1-310B	0.127 (3,225)	1-339A	0.148 (3,76)
1-280B	0.109 (2,77)	1-315B	0.130 (3,30)	1-341A	0.151 (3,84)
1-285B	0.112 (2,84)	1-320B	0.133 (3,38)		
1-290B	0.115 (2,92)	1-325B	0.136 (3,45)		
1-295B	0.118 (3,00)	1-330B	0.139 (3,53)		
1-300B	0.121 (3,07)	1-335B	0.142 (3,61)		

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Stress relieve by heating to 150 deg C for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.447).
8. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
9. Label the component with the appropriate part number.

**Adjusting Washer SB.72-8651-246
Figure 431 (Sheet 2 of 2)****REPAIR****72-09-21****Page 436B
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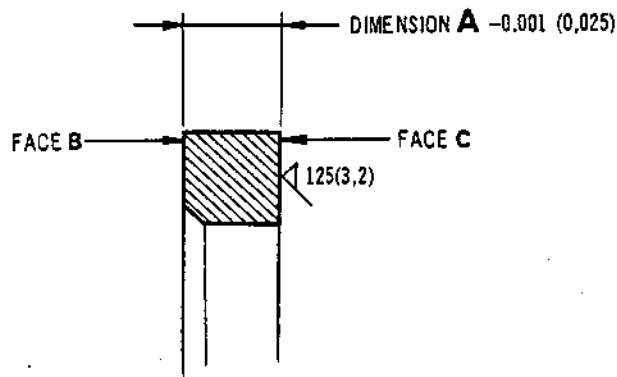
OLYMPUS 593

MK.610-14-28

OVERHAUL



CR 34331/00A



SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-62-04					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-50	0.103 (2,62)	1-75	0.118 (3,00)	1-100	0.133 (3,38)
1-55	0.106 (2,69)	1-80	0.121 (3,07)	1-105	0.136 (3,45)
1-60	0.109 (2,77)	1-85	0.124 (3,15)	1-110	0.139 (3,53)
1-65	0.112 (2,84)	1-90	0.127 (3,225)	1-115	0.142 (3,61)
1-70	0.115 (2,92)	1-95	0.130 (3,30)	1-120	0.145 (3,68)

MACHINING INSTRUCTIONS

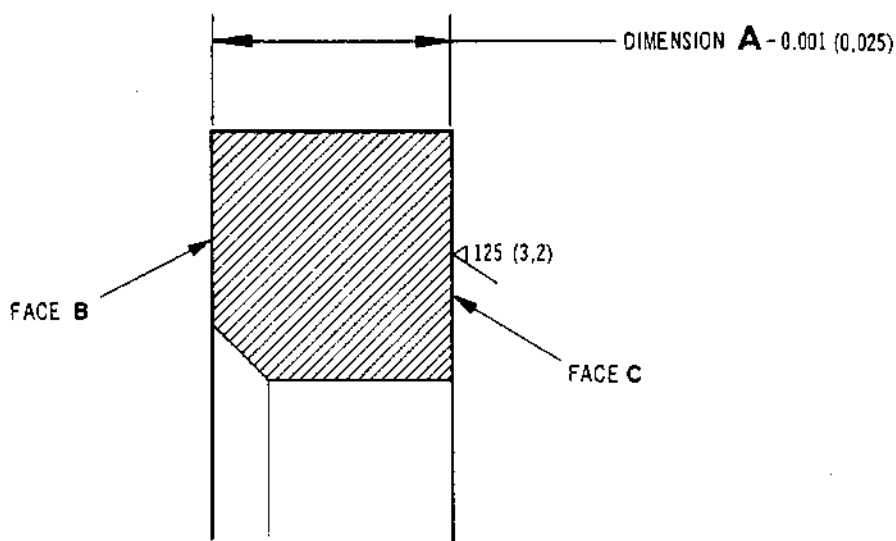
1. Locate face B to magnetic table.
2. Finish grind face C to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.447).
7. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
8. Label the component with the appropriate part number.

Adjusting Washer
Figure 432

CR 34258/008



OLYMPUS 593

MK.610-14-28
OVERHAUL

SECTION THROUGH ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-62-04					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-290 A	0.106 (2.69)	1-320 A	0.124 (3.15)	1-350 A	0.142 (3.60)
1-295 A	0.109 (2.77)	1-325 A	0.127 (3.225)	1-355 A	0.145 (3.68)
1-300 A	0.112 (2.84)	1-330 A	0.130 (3.30)	1-360 A	0.148 (3.76)
1-305 A	0.115 (2.92)	1-335 A	0.133 (3.38)	1-365 A	0.151 (3.835)
1-310 A	0.118 (3.00)	1-340 A	0.136 (3.45)		
1-315 A	0.121 (3.07)	1-345 A	0.139 (3.53)		

MACHINING INSTRUCTIONS

1. Locate face B to magnetic chuck.
2. Finish grind face C to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.447).
7. Label the component with the appropriate part number.

Adjusting Washer Pre SB.72-7510-166
Figure 433 (Sheet 1 of 2)

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TN33977

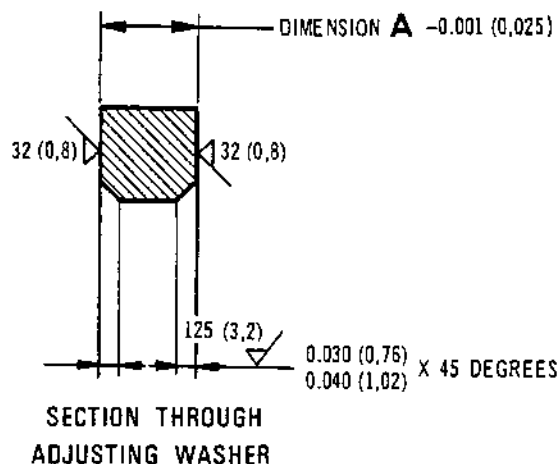
**OLYMPUS 593**

MK.610-14-28

OVERHAUL



CR 34285/00A



SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-62-04							
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-290B	0.106 (2,69)	1-310B	0.118 (3,0)	1-330B	0.130 (3,3)	1-350B	0.142 (3,61)
1-295B	0.109 (2,77)	1-315B	0.121 (3,07)	1-335B	0.133 (3,38)	1-355B	0.145 (3,68)
1-300B	0.112 (2,84)	1-320B	0.124 (3,15)	1-340B	0.136 (3,45)	1-360B	0.148 (3,76)
1-305B	0.115 (2,92)	1-325B	0.127 (3,225)	1-345B	0.139 (3,53)	1-365B	0.151 (3,835)

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Stress relieve by heating to 150 deg C for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.447).
8. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
9. Label the component with the appropriate part number.

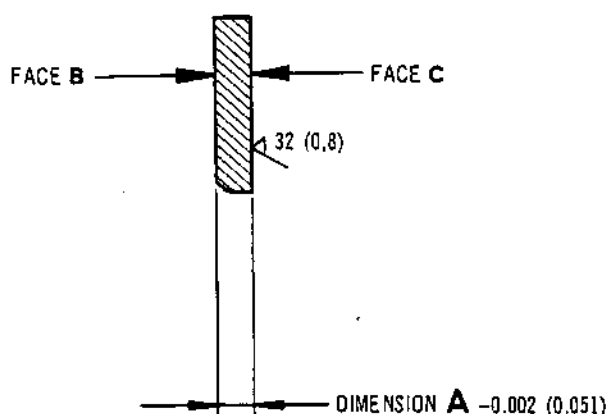
Adjusting Washer SB.72-8651-246
Figure 433 (Sheet 2 of 2)

REPAIR
72-09-21

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OLYMPUS 593
MK.610-14-28
OVERHAUL



SECTION THROUGH
ADJUSTING PLATE

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-63-01			
IPC. REF NUMBER	DIMENSION A	IPC. REF NUMBER	DIMENSION A
1-20	0.079 (2,01)	1-35	0.097 (2,46)
1-25	0.085 (2,16)	1-40	0.103 (2,62)
1-30	0.091 (2,31)	1-45	0.109 (2,77)

MACHINING INSTRUCTIONS

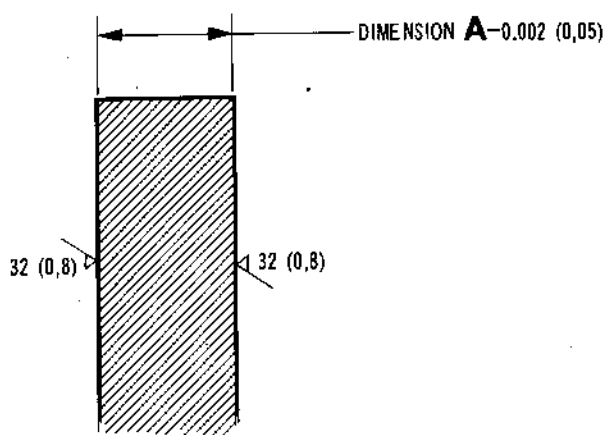
1. Locate face B to magnetic table.
2. Finish grind face C to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.447).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Plate
Figure 434



OLYMPUS 593

MK.610-14-28
OVERHAUL



SECTION THROUGH ADJUSTING PLATE

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN .
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-63-01			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-120	0.130 (3,30)	1-135	0.115 (2,92)
1-125	0.125 (3,175)	1-140	0.110 (2,79)
1-130	0.120 (3,05)	1-145	0.105 (2,67)

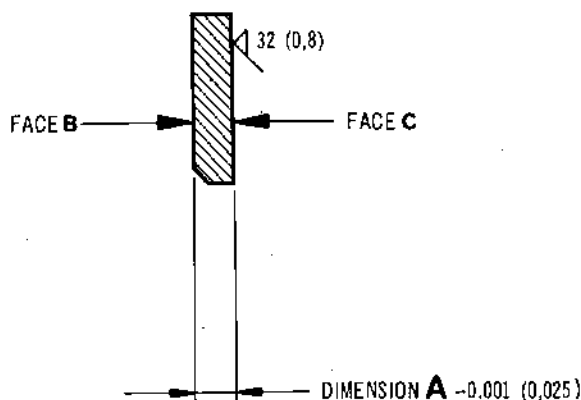
MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.448).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Plate
Figure 435

**OLYMPUS 593**MK.610-14-28
OVERHAUL

CR 34261/00A

SECTION THROUGH
ADJUSTING PLATESURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC.CHAP/SECTION 72-63-01			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-160	0.092 (2,34)	1-185	0.122 (3,10)
1-165	0.098 (2,49)	1-190	0.128 (3,25)
1-170	0.104 (2,64)	1-195	0.134 (3,40)
1-175	0.110 (2,79)	1-200	0.140 (3,56)
1-180	0.116 (2,95)	1-205	0.146 (3,71)

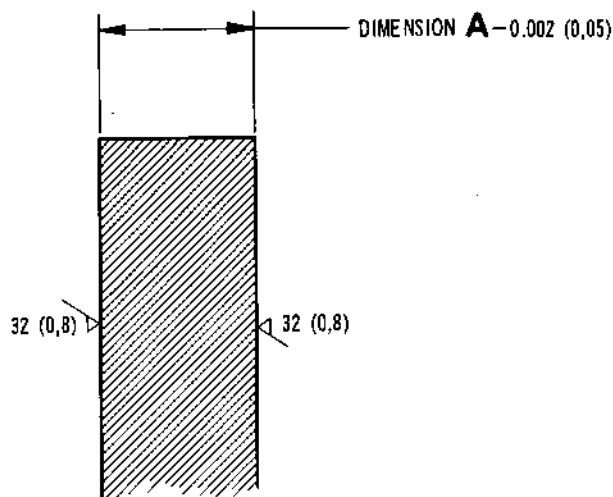
MACHINING INSTRUCTIONS

1. Locate face B to magnetic table.
2. Finish grind face C to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.448).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Plate
Figure 436



OLYMPUS 593
MK.610-14-28
OVERHAUL



SECTION THROUGH ADJUSTING SHIM

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC.CHAP/SECTION 72-63-01			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-250	0.100 (2,54)	1-275	0.125 (3,175)
1-255	0.105 (2,67)	1-280	0.130 (3,30)
1-260	0.110 (2,79)	1-285	0.135 (3,43)
1-265	0.115 (2,92)	1-290	0.140 (3,56)
1-270	0.120 (3,05)	1-295	0.145 (3,68)

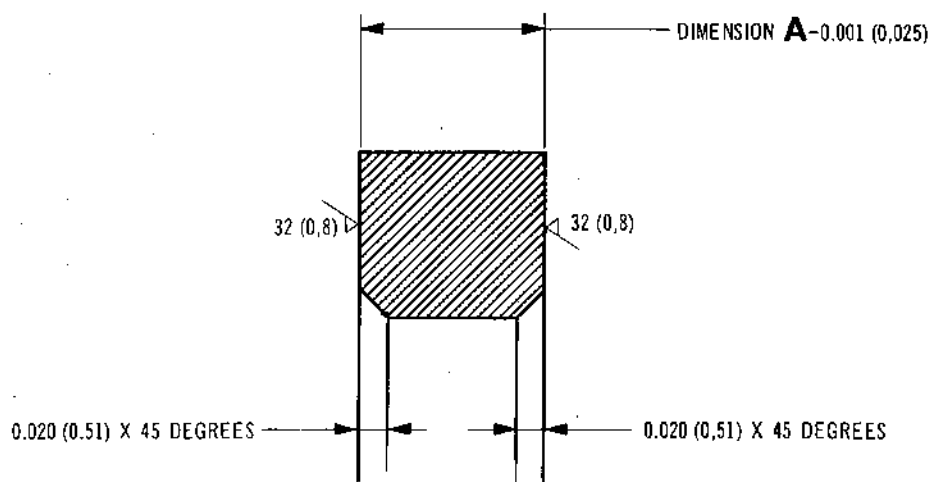
MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref.Fig.448).
7. Line through old part number.
8. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Shim
Figure 437



OLYMPUS 593
MK.610-14-28
OVERHAUL



SECTION THROUGH ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-63-02					
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-100	0.148 (3,76)	1-125	0.163 (4,14)	1-150	0.178 (4,52)
1-105	0.151 (3,835)	1-130	0.166 (4,22)	1-155	0.181 (4,60)
1-110	0.154 (3,91)	1-135	0.169 (4,29)	1-160	0.184 (4,67)
1-115	0.157 (3,99)	1-140	0.172 (4,37)	1-165	0.187 (4,75)
1-120	0.160 (4,06)	1-145	0.175 (4,45)	1-170	0.190 (4,83)

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfers both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish.
6. Stress relieve by heating to 150 deg C for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.448).
8. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
9. Line through old part number.
10. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer
Figure 438



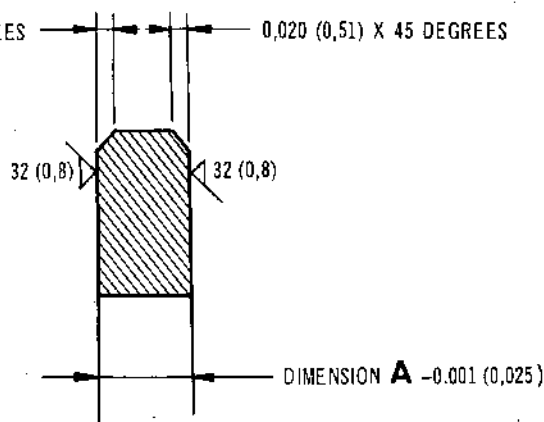
OLYMPUS 593

MK.610-14-28
OVERHAUL



CR 34287/00A

0.020 (0,51) X 45 DEGREES



SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/ SECTION 72-63-02							
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-180	0.152 (3,86)	1-200	0.160 (4,06)	1-220	0.168 (4,27)	1-240	0.176 (4,47)
1-185	0.154 (3,91)	1-205	0.162 (4,11)	1-225	0.170 (4,32)	1-245	0.178 (4,52)
1-190	0.156 (3,96)	1-210	0.164 (4,165)	1-230	0.172 (4,37)	1-250	0.180 (4,57)
1-195	0.158 (4,01)	1-215	0.166 (4,22)	1-235	0.174 (4,42)	1-255	0.182 (4,62)

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfers both sides of outside diameter.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Stress relieve by heating to 150 deg C for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.448).
8. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
9. Line through old part number.
10. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer
Figure 439

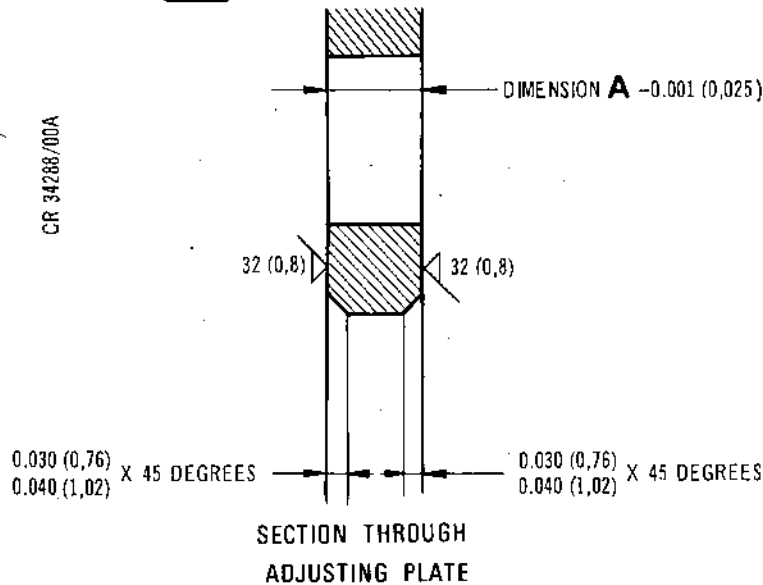
**OLYMPUS 593**

MK.610-14-28

OVERHAUL



CR 34288/00A



SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC CHAP/SECTION 72-63-02			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-440	0.121 (3,07)	1-465	0.131 (3,33)
1-445	0.123 (3,12)	1-470	0.133 (3,38)
1-450	0.125 (3,175)	1-475	0.135 (3,43)
1-455	0.127 (3,225)	1-480	0.137 (3,48)
1-460	0.129 (3,28)	1-485	0.139 (3,53)

MACHINING INSTRUCTIONS

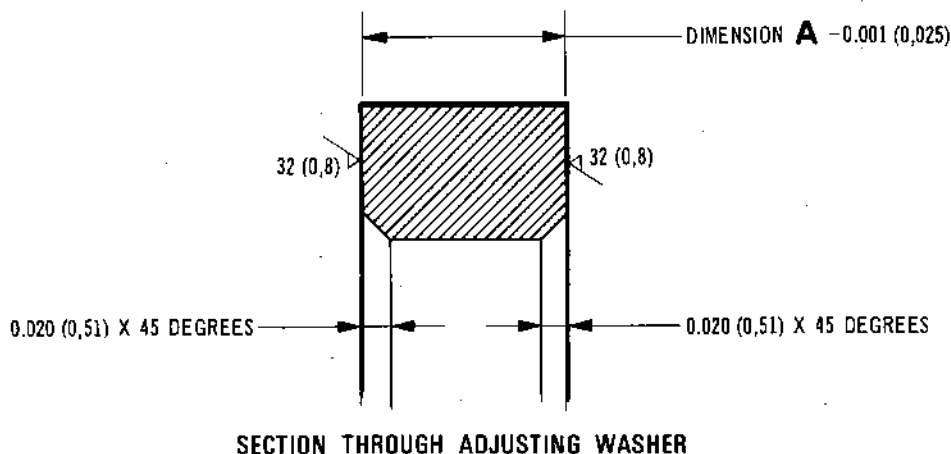
1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Stress relieve by heating to 150 deg C for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.448).
8. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
9. Line through old part number.
10. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Plate
Figure 440

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OVERHAUL



SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-63-02							
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-520	0.117 (2,97)	1-540	0.129 (3,28)	1-560	0.141 (3,58)	1-580	0.153 (3,89)
1-525	0.120 (3,05)	1-545	0.132 (3,35)	1-565	0.144 (3,66)	1-585	0.156 (3,96)
1-530	0.123 (3,12)	1-550	0.135 (3,43)	1-570	0.147 (3,73)	1-590	0.159 (4,04)
1-535	0.126 (3,20)	1-555	0.138 (3,505)	1-575	0.150 (3,81)	1-595	0.162 (4,11)

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate to magnetic chuck, machine chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Stress relieve by heating to 150 deg.C. for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.449).
8. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
9. Line through old part number.
10. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer
Figure 441

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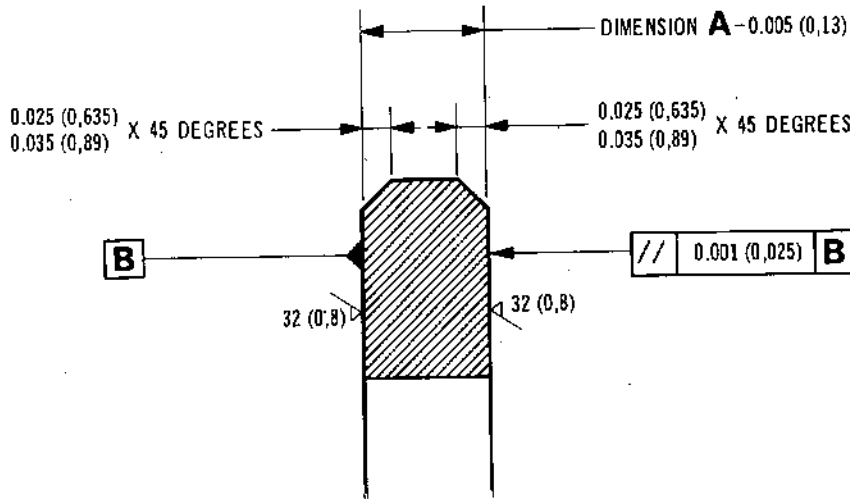


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CR 34290/00A



SECTION THROUGH ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 72-63-05			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-40	0.085 (2,16)	1-50	0.135 (3,43)
1-45	0.110 (2,79)	1-55	0.160 (4,06)

MACHINING INSTRUCTIONS

1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfer both sides of outside diameter.
4. Remove sharp edges.
5. Inspect surface finish (Ref.72-09-00 Repair).
6. Stress relieve by heating to 150 deg.C. for one hour, cool in air.
7. Subject to magnetic particle crack detection (Ref.Fig.449).
8. Etch, then inspect for grinding burns (Ref.72-09-14 Repair).
9. Line through old part number.
10. Re-part number (Ref.72-09-00 Repair para.3.E. or D.).

Adjusting Washer
Figure 442

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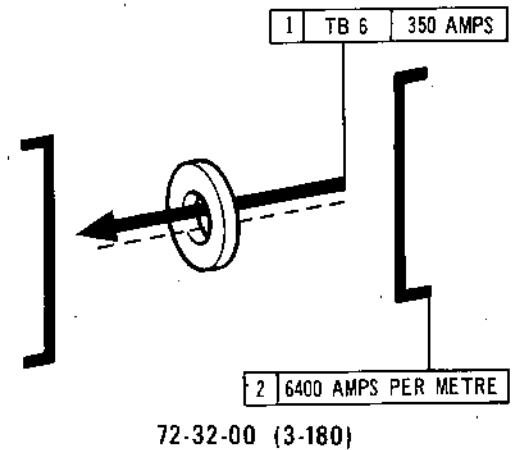
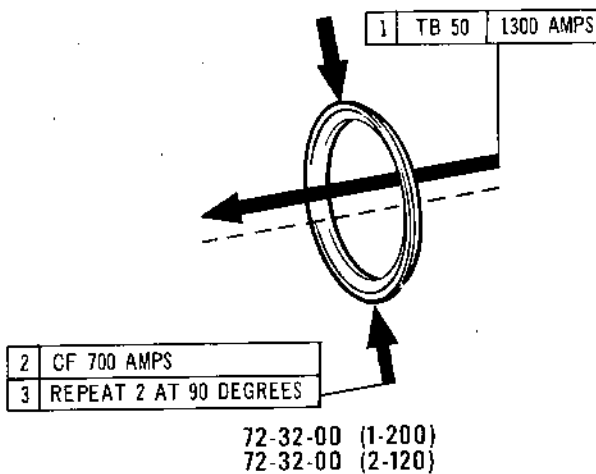
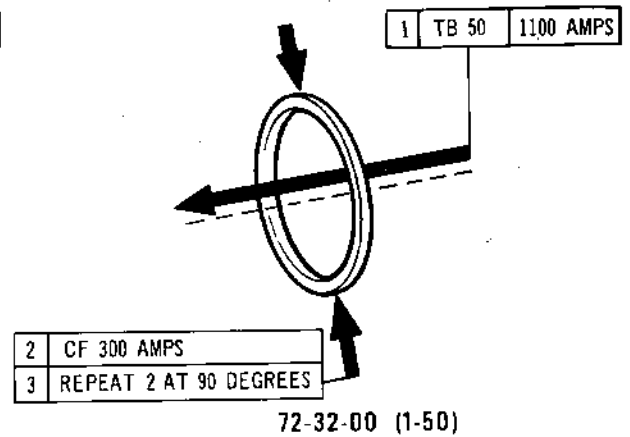
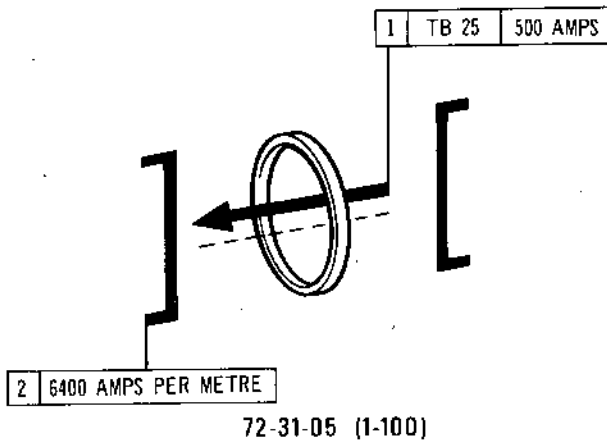
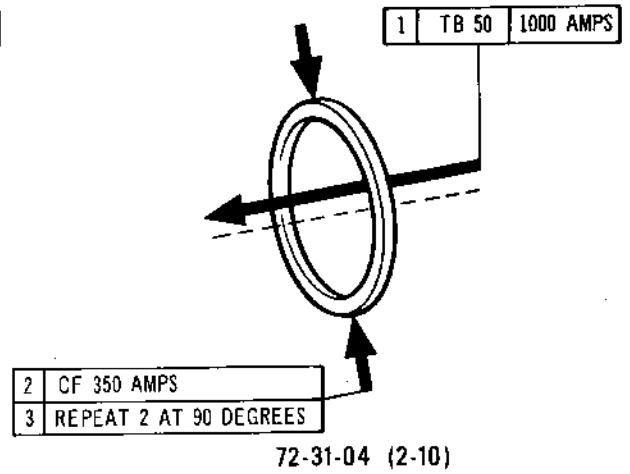
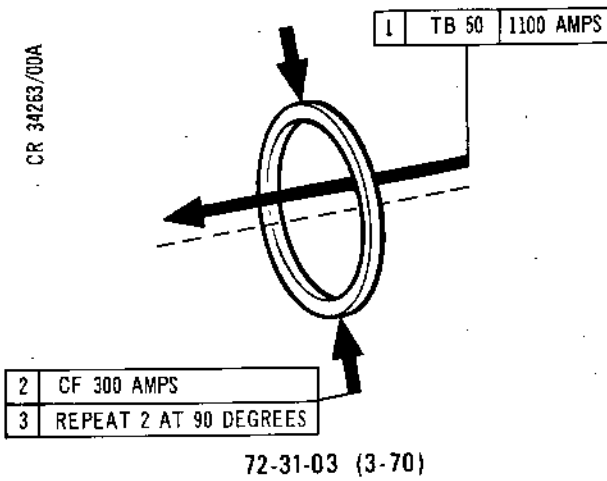


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CR 34253/00A



Crack Detection Diagrams
Figure 443

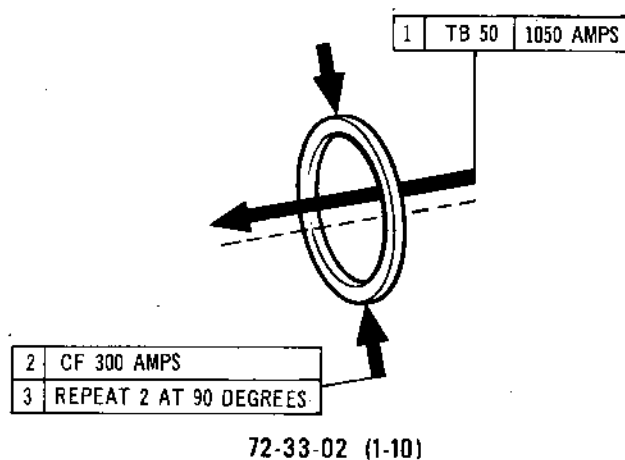
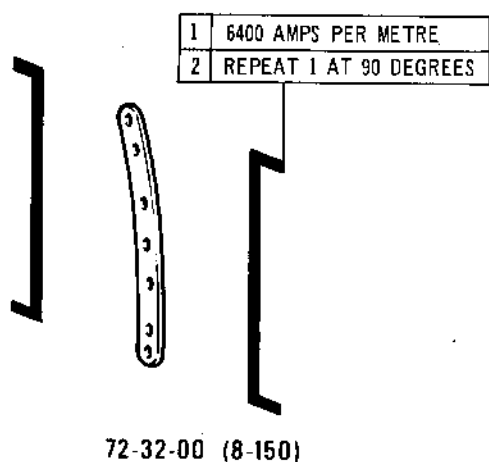
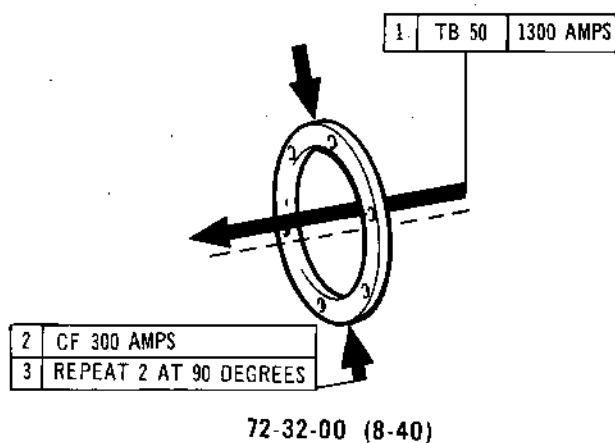
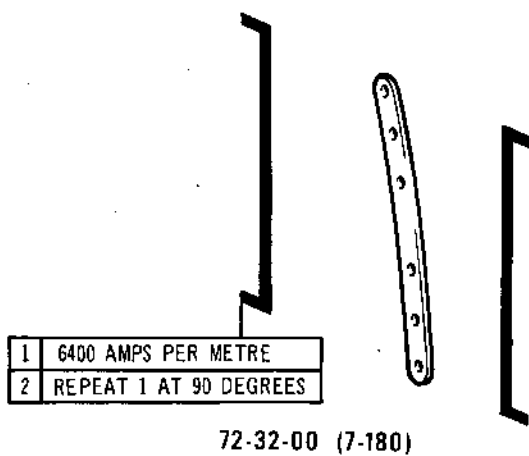
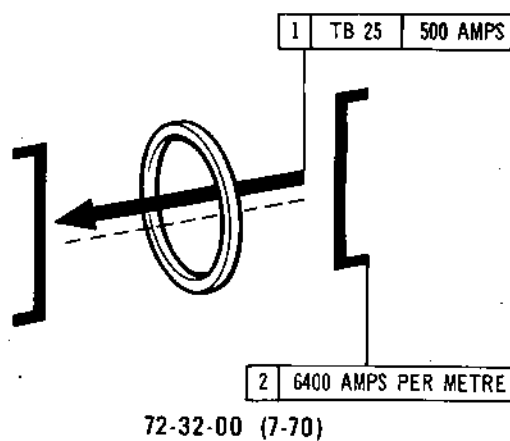
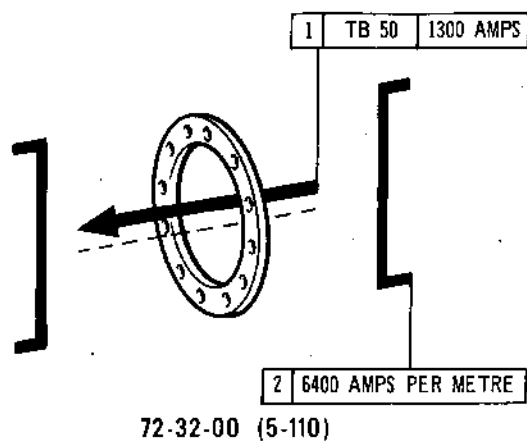


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MK. 610-14-28
OVERHAUL



CR 34264/00A



Crack Detection Diagrams
Figure 444

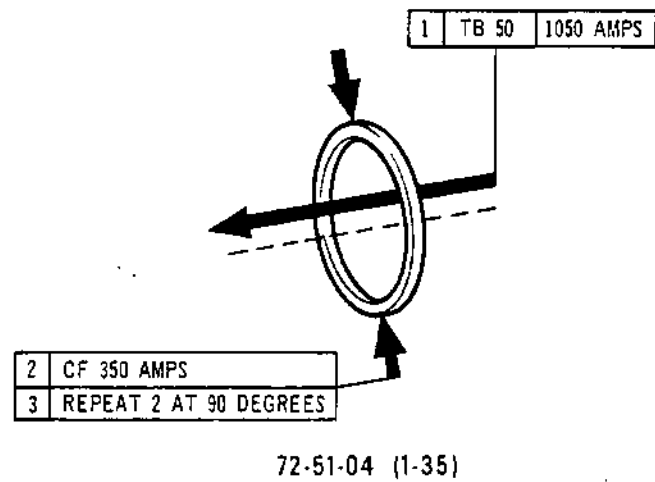
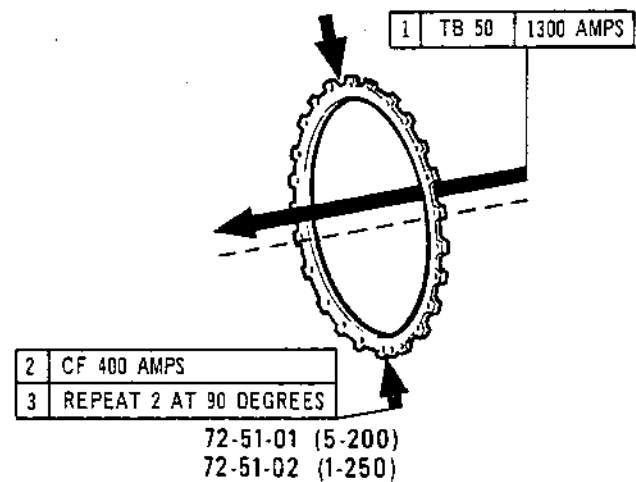
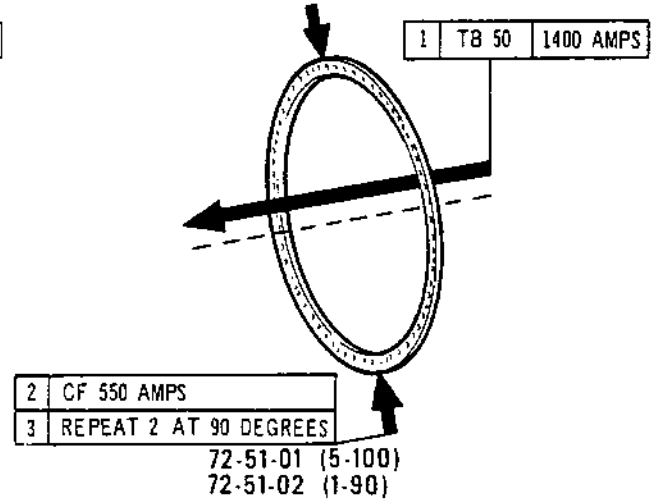
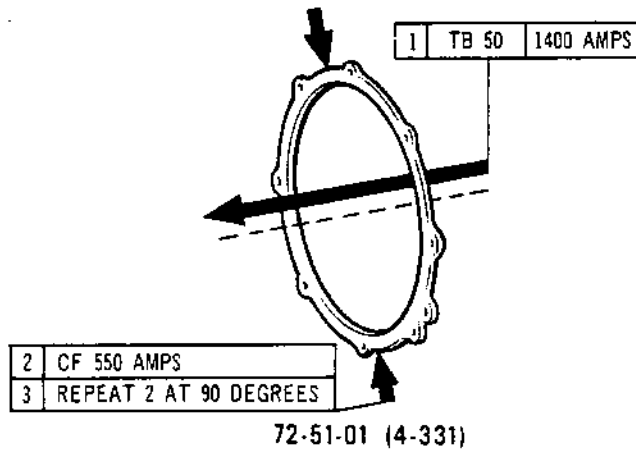
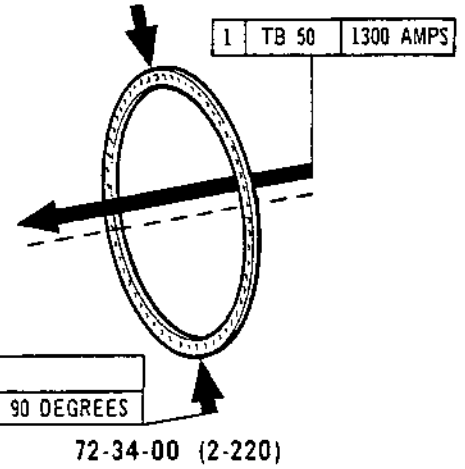
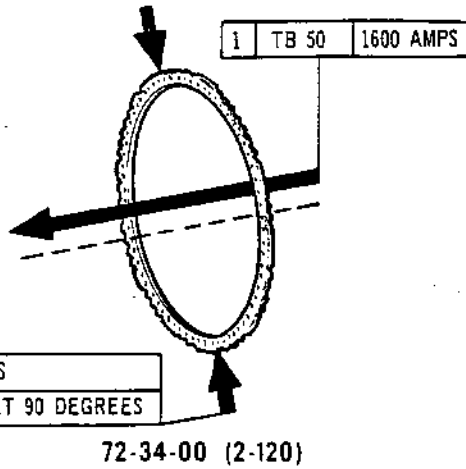
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CR 34265/80B



Crack Detection Diagrams
Figure 445

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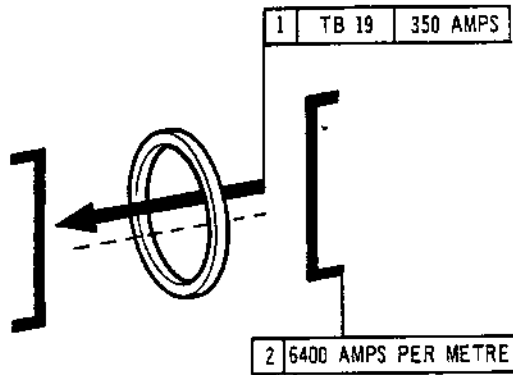


OLYMPUS 593

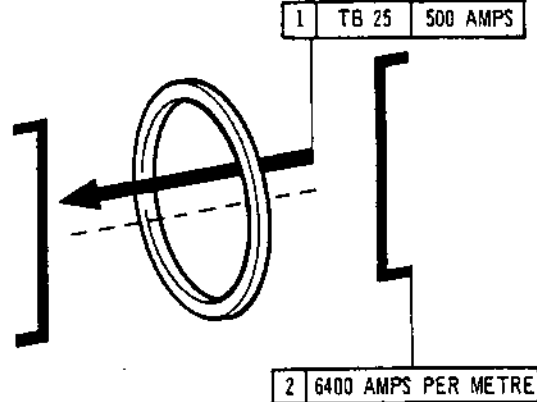
MK. 610-14-28
OVERHAUL



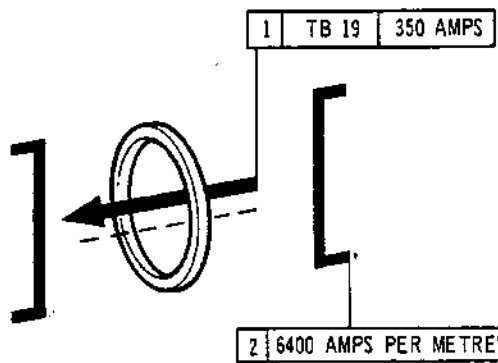
CR 34265/00A



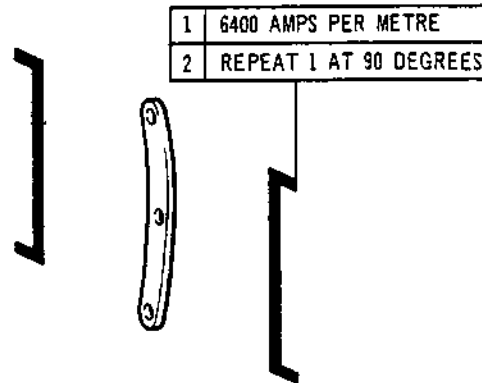
72-61-00 (1-210)



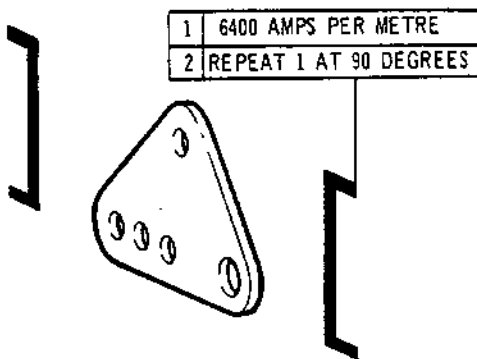
72-61-00 (1-410)
72-61-00 (1-470)



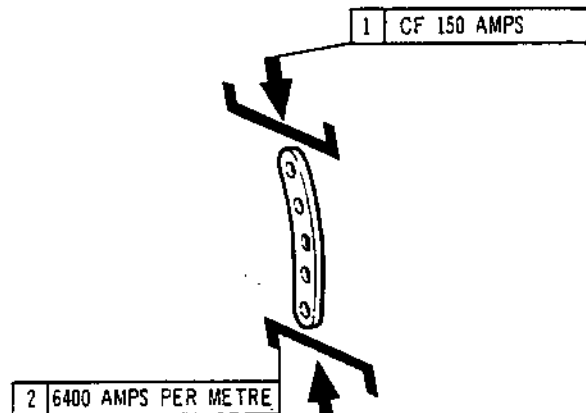
72-61-00 (2-30)



72-62-01 (1-10)



72-62-01 (1-140)



72-62-01 (1-220)

Crack Detection Diagrams
Figure 446



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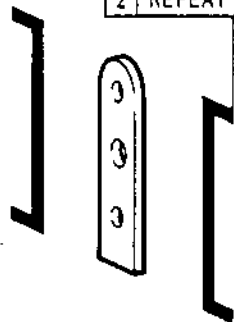
MK.610-14-28

OVERHAUL



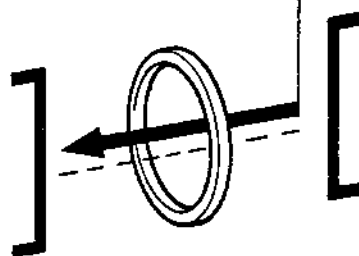
CR 34267/00B

- | | |
|---|------------------------|
| 1 | 6400 AMPS PER METRE |
| 2 | REPEAT 1 AT 90 DEGREES |



72-62-01 (1-320)

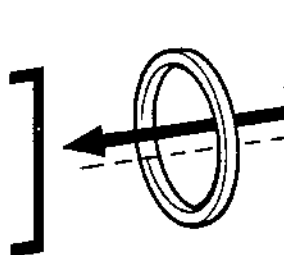
- | | | |
|---|-------|----------|
| 1 | TB 25 | 700 AMPS |
|---|-------|----------|



- | | |
|---|---------------------|
| 2 | 6400 AMPS PER METRE |
|---|---------------------|

72-62-02 (1-40)
(1-40B)

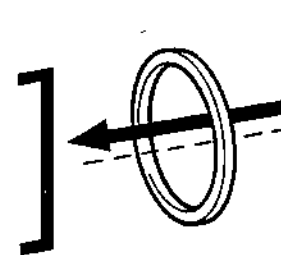
- | | | |
|---|-------|----------|
| 1 | TB 19 | 400 AMPS |
|---|-------|----------|



- | | |
|---|---------------------|
| 2 | 6400 AMPS PER METRE |
|---|---------------------|

72-62-02 (1-270)

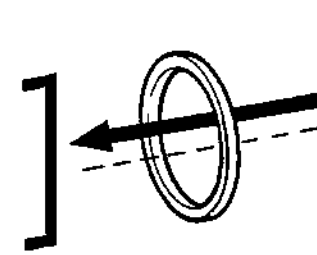
- | | | |
|---|-------|----------|
| 1 | TB 19 | 400 AMPS |
|---|-------|----------|



- | | |
|---|---------------------|
| 2 | 6400 AMPS PER METRE |
|---|---------------------|

72-62-04 (1-50)

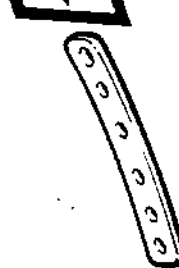
- | | | |
|---|-------|----------|
| 1 | TB 25 | 550 AMPS |
|---|-------|----------|



- | | |
|---|---------------------|
| 2 | 6400 AMPS PER METRE |
|---|---------------------|

72-62-04 (1-290)
(1-290B)

- | | |
|---|-------------|
| 1 | CF 300 AMPS |
|---|-------------|



- | | |
|---|---------------------|
| 2 | 6400 AMPS PER METRE |
|---|---------------------|

72-63-01 (1-20)

Crack Detection Diagrams
Figure 447

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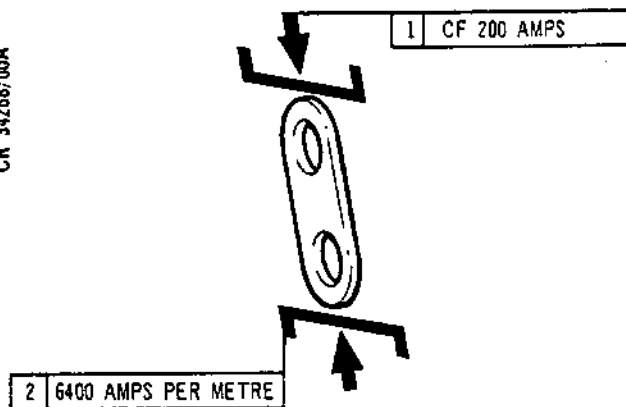
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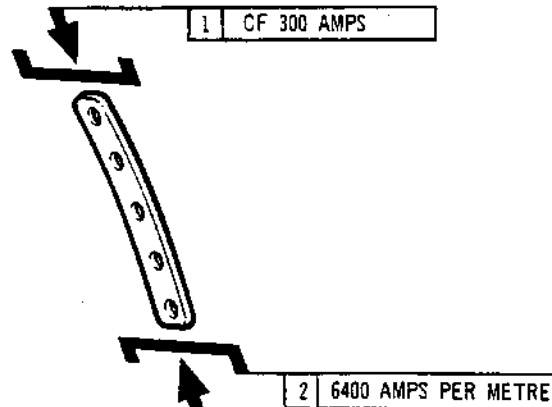


OLYMPUS 593

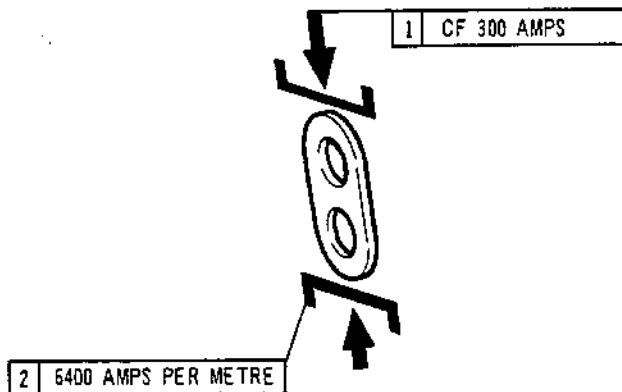
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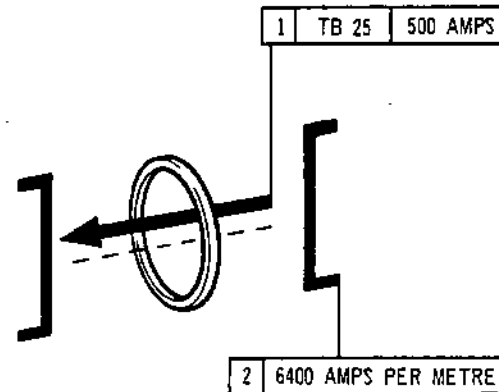
72-63-01 (1-120)



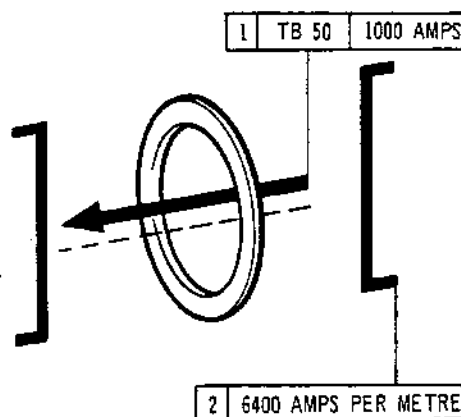
72-63-01 (1-160)



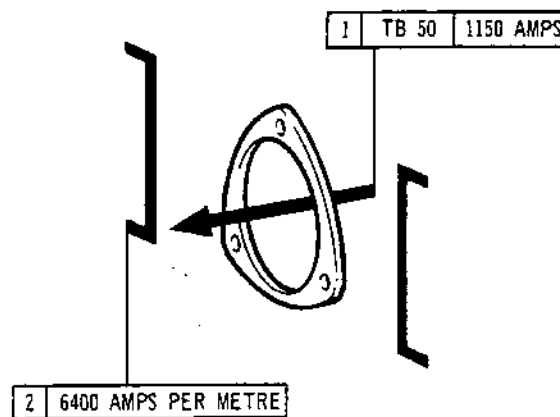
72-63-01 (1-250)



72-63-02 (1-100)



72-63-02 (1-180)



72-63-02 (1-440)

Crack Detection Diagrams
Figure 448

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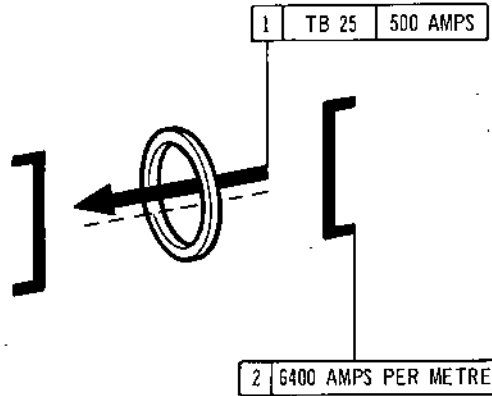


OLYMPUS 593

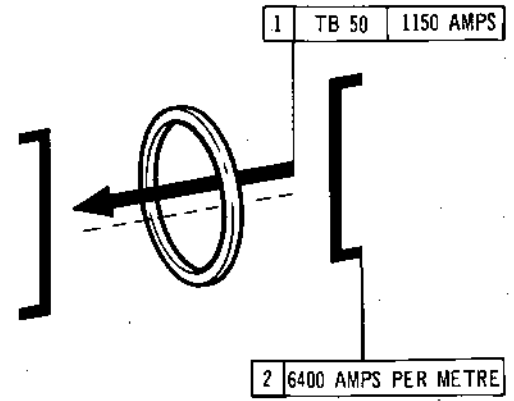
MK.610-14-28
OVERHAUL



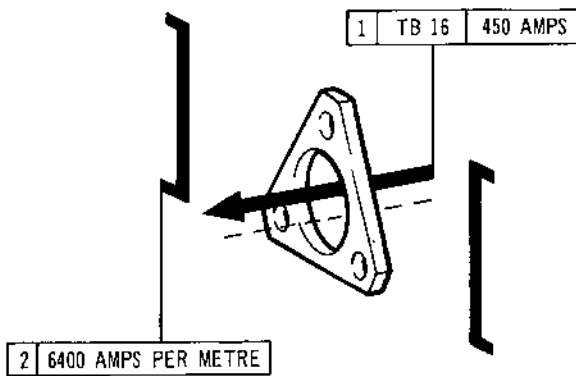
CR 34269/00A



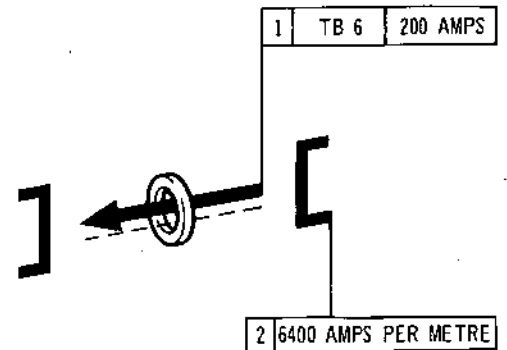
72-63-02 (1-520)



72-63-05 (1-40)



73-12-07 (1-30)

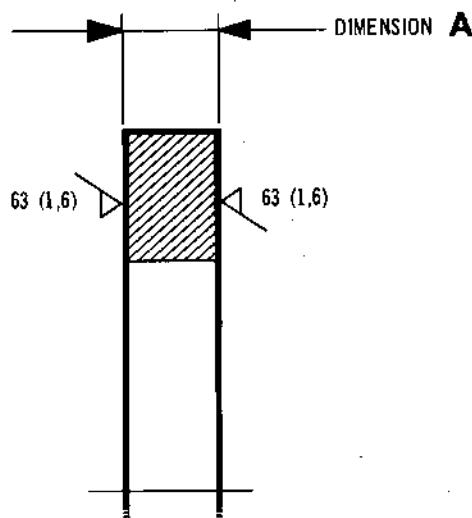


76-21-02 (1-200)

Crack Detection Diagrams
Figure 449



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OVERHAUL

SECTION THROUGH ADJUSTING WASHER

IPC. CHAP/SECTION 73-12-07 (1-30)

SURFACE ROUGHNESS VALUES ARE SHOWN THUS :- MICRO-INCHES (MICROMETRES) ✓
--

MACHINING INSTRUCTIONS

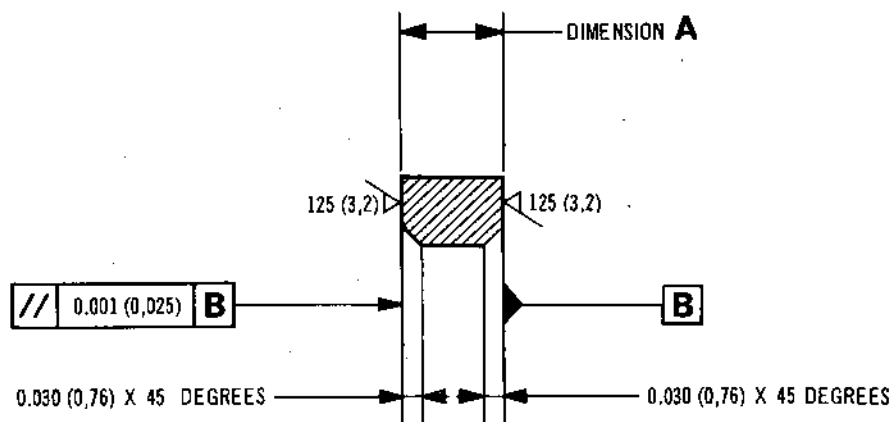
1. Locate to magnetic table.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref. 72-09-00 Repair).
5. Stress relieve by heating to 150 deg C for one hour, cool in air.
6. Subject to magnetic particle crack detection (Ref. Fig.449).

Adjusting Washer
Figure 450
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SECTION THROUGH
SPACING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 74-21-02 (1-20)			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-20	0.080 (2,03)	1-35	0.170 (4,32)
1-25	0.110 (2,79)	1-40	0.200 (5,08)
1-30	0.140 (3,56)	1-45	0.230 (5,84)

MACHINING INSTRUCTIONS

1. Locate to magnetic chuck.
2. Finish grind an equal amount from both sides to achieve required dimension A.
3. Locate in soft jawed chuck, machine chamfer both sides of bore.
4. Remove sharp edges.
5. Inspect surface finish (Ref. 72-09-00 Repair).
6. Subject to fluorescent dye penetrant inspection F1A/S3 (Ref. 72-09-00 Inspection/Check).
7. Line through old part number.
8. Re-part number (Ref. 72-09-00 Repair para.3.E. or D.).

Spacing Washer Pre S.B.74-1
Figure 451 (Sheet 1)

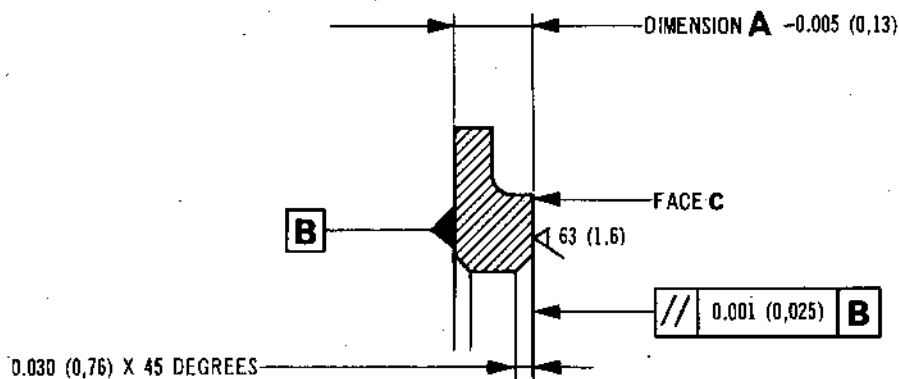
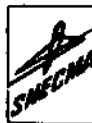
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OVERHAULSECTION THROUGH
SPACING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC. CHAP/SECTION 74-21-02			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-20B	0.090 (2,29)	1-40B	0.210 (5,33)
1-25B	0.120 (3,05)	1-45B	0.240 (6,10)
1-30B	0.150 (3,81)	1-50A	0.270 (6,86)
1-35B	0.180 (4,57)	1-55A	0.300 (7,62)

MACHINING INSTRUCTIONS

1. Locate in soft jawed chuck.
2. Finish turn face C to achieve required dimension A.
3. Machine chamfer.
4. Remove sharp edges.
5. Inspect surface finish (Ref. 72-09-00 Repair).
6. Subject to fluorescent dye penetrant inspection FlA/S3, (Ref. 72-09-00 Inspection/Check).

Spacing Washer S.B.74-1
Figure 451 (Sheet 2)

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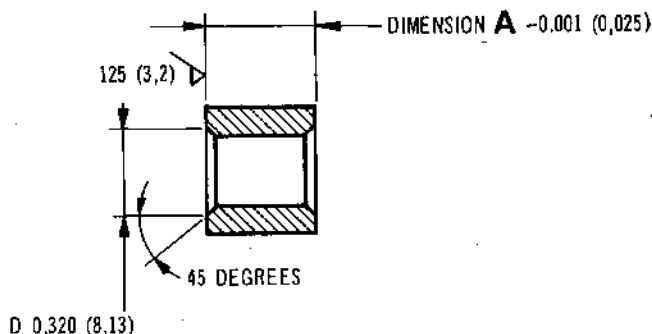
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SECTION THROUGH
ADJUSTING WASHER

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IPC CHAP/SECTION 76-21-02			
IPC. REF. NUMBER	DIMENSION A	IPC. REF. NUMBER	DIMENSION A
1-200	0.095 (2,41)	1-405	0.300 (7,62)
1-255	0.150 (3,81)	1-455	0.350 (8,89)
1-305	0.200 (5,08)	1-475	0.370 (9,4)
1-355	0.250 (6,35)		

NOTE: This table shows min, max and some of the intermediate sizes of adjusting washer available, the part number reduces by one, for every 0.005 in. (0,127 mm) reduction in washer thickness.

MACHINING INSTRUCTIONS

1. Finish turn to achieve required dimension A.
2. Machine chamfer.
3. Remove sharp edges.
4. Inspect surface finish (Ref. 72-09-00 Repair).
5. Subject to magnetic particle crack detection (Ref. Fig.449).
6. Label the component with the appropriate part number.

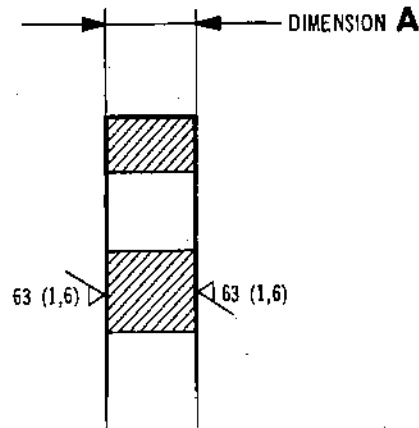
Adjusting Washer
Figure 452



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CR 34324/00A



SECTION THROUGH
ADJUSTING WASHER
IPC. CHAP/SECTION 79-11-01 (1-40)

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

MACHINING INSTRUCTIONS

1. Locate in soft jawed chuck.
2. Finish turn to achieve required dimension A.
3. Remove sharp edges.
4. Inspect surface finish (Ref.72-09-00 Repair).
5. Subject to fluorescent dye penetrant inspection F2 (Ref.72-09-00 Inspection/Check).

Adjusting Washer
Figure 453

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RECTIFICATION OF MINOR DAMAGE - REPAIR

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3. Rectification of Damage	403
A. Procedures for Rectification of Surface Damage ...	403
B. Procedure for Rectification of Elongated Bolt-Holes	403
4. Procedure on Completion of Rectification	404

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REPAIR

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RECTIFICATION OF MINOR DAMAGE - REPAIR

1. General

This procedure details the rectification of minor damage to surfaces or bolt-holes of components that have been rejected by Inspection/Check as 'Accept after Repair'.

2. Identification of Type of Damage

- A. Table 401 defines the inspection terminology used to identify the type of damage sustained by the component.
- B. Determine the rectification to be carried out for the type of damage sustained as detailed in para.3.

TERM	MEANING
Bend	Distortion at the edge of sheet material in a direction normal to the surface
Brinelling	Surface indentation of ball or roller track bearing surfaces, usually caused by repeated shock loading by the balls or rollers
Burr	Lip formed around a defect by displaced metal
Crack	Metal parted without deformation, usually caused by fatigue
Dent	Smooth depression in sheet material
Erosion	Progressive removal of the surface, caused by impact of fine abrasive particles
Flaking	Partial or complete removal of surface coating
Fretting	Wear caused by unintentional movement between abutting faces

Inspection Terminology
Table 401 (Continued)

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TERM	MEANING
Gouge	Long, heavy depression with material removed, caused by impact with a foreign object
Inclusion	Foreign matter embodied in the base material during manufacture
Nick	Sharp surface indentation caused by impact with a foreign object
Peeling	Partial or complete separation of surface layer
Pick-up	Transfer of metal to a bearing surface, usually caused by insufficient lubrication
Pitting	Surface depression, usually caused by corrosion, chipping or electrical discharge
Plucking	Transfer of metal from a bearing surface, usually caused by insufficient lubrication
Puncture	Hole in sheet material or tube, caused by impact with a foreign object or by fretting
Score	Deep scratch
Scratch	Light, narrow, shallow mark with material displaced, caused by impact with a foreign object.
Scuff	Mark caused by sliding contact between smooth surfaces
Spalling	Sharply roughened area of progressive chipping on ball or roller track bearing surfaces, caused by loading of cracks or inclusions.
Tear	Metal parted and deformed, usually caused by impact with a foreign object at the edge of the component

Inspection Terminology
Table 401 (Concluded)

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3. Rectification of Damage

A. Procedures for Rectification of Surface Damage.

- (1) Refer to Table 402 for the rectification required for the type of damage, and rectify in accordance with the following.

Rectification A - Remove damage by stoning and/or light hand polishing.

Rectification B - Remove high spots by stoning and/or light hand polishing.

Rectification C - Relieve by light blending, stoning and/or light hand polishing.

B. Procedure for Rectification of Elongated Bolt-holes.

- (1) Remove sharp corners, and, where a chamfer has been removed, restore the chamfer by stoning and hand polishing.

RECTIFICATION REQUIRED (REF.PARA.3.)

TYPE OF DAMAGE (REF. TABLE 401)	DAMAGE ABOVE NORMAL SURFACE CONTOUR	DAMAGE BELOW NORMAL SURFACE CONTOUR
------------------------------------	--	--

Burr	A	-
Erosion	-	C
Fretting	B	C
Gouge	B	C
Nick	B	C
Pick-up	B	-
Pitting	-	C
Plucking	-	C
Score	B	C
Scratch	B	C
Scuff	-	C

Rectification of Damage
Table 402

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C. Hand Tools.

CAUTION: LOAD/PRESSURE APPLIED WHEN USING THE FOLLOWING EQUIPMENT MUST NOT BE SUFFICIENTLY GREAT SO AS TO PRODUCE SMOKING AND/OR AN UNPLEASANT ODOUR FROM THE ADHESIVE AGENT IN THE ABRASIVE WHEEL.

(1) The definition of the term "hand tools only" is deemed to imply that the following may be used:

(a) GUN - USHIO AIR TOOL COMPANY LTD.

Type MSG-3BSN
65000 R.P.M.
(6 bar air pressure)

(b) WHEEL - MASTER ABRASIVE

Type A120HFX

4. Procedure on Completion of Rectification

- A. On completion of the rectification, refer to the relevant Fits and Clearances Chapter to ensure no dimension has been violated, then refer to the relevant Repair Chapter, and, if required, apply local touch up procedures on finishes.
- B. When rectification is complete, having dressed the component, carried out any protective finish required, and having confirmed that no dimension or other mandatory requirement has been violated, return the component to Inspection/Check for final clearance.

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ELECTRICAL DISCHARGE MACHINING - REPAIR

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ELECTRICAL DISCHARGE MACHINING - REPAIR

1. Application of Electrical Discharge Machining

A. General.

- (1) Electrical discharge machining (EDM), sometimes referred to as spark erosion, is a method of material removal and may be used on all electrically conductive materials. Metal is eroded as a result of energy released by a continuous succession of spark discharges between a preformed electrode and the workpiece whilst both are immersed in a heated dielectric liquid.
- (2) Roughing out operations, precise drilling of holes or complex shaping may be carried out at greater speed and economy than conventional machining. Stress and distortion, usually encountered when performing similar operations by conventional machining are also eliminated. There is however, a disadvantage in that EDM produces a contaminated surface layer of material which is non-structural and whose properties are dissimilar to those of the parent material. Abrasive blasting or other processing may be necessary to remove this surface layer from the machined surface.

B. Safety Precautions.

- (1) Both operator and supervisor must be fully conversant with the use of carbon dioxide fire extinguishers and observe strict fire precautions in the vicinity of EDM machines at all times.
- (2) Dielectric liquids are flammable and the operating temperatures must be strictly observed. A thermostat control must be fitted to the work tank which will automatically switch OFF the heater should the temperature of the dielectric approach 15 deg C of its flash point.



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- (3) Minimum levels of dielectric above the spark gap must be maintained and the electrical supply must be switched OFF before any adjustment is made to electrode or workpiece.
- (4) Regular maintenance of equipment and cleaning of dielectric filter elements are essential to prevent dielectric spillage.
- (5) In the event of fire, the electrical supply to the machine and, if incorporated, fume extractor must be switched OFF, and the fire extinguished with a carbon dioxide fire extinguisher.
- (6) Whenever the machine is not in use, the dielectric liquid must be drained from the work tank into the machine tank or a covered container.

C. Dielectric Liquids.

- (1) Dielectric liquids must be non-toxic, resist fuming and act as an insulator until the spark is initiated, and then act as a good conductor, reverting to insulator when electrical discharge is complete. The liquid must also flush eroded particles from the spark gap.
- (2) Preferred dielectrics are listed in Table 401, and the minimum heights of the dielectric above the spark gap are listed in Table 402.

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DIELECTRIC	FLASH POINT	OPERATING TEMPERATURE
Mineral Seal Oil	130 deg C (265 deg F)	55 deg C (131 deg F)
Odourless Kerosene	60 deg C (140 deg F)	45 deg C (113 deg F)
High Flash Kerosene	60 deg C (140 deg F)	45 deg C (113 deg F)
White Spirit BS245 Grade 115	48 deg C (120 deg F)	33 deg C (91 deg F)

Preferred Dielectric Liquids
Table 401

WORKING AMPERAGE	MINIMUM HEIGHT ABOVE SPARK GAP
100 - 200	4.0 in. (100 mm)
50 - 100	3.0 in. (75 mm)
25 - 50	2.5 in. (63 mm)
10 - 25	2.0 in. (50 mm)
0 - 5	1.0 in. (25 mm)

Minimum Height of Dielectric
Above Spark Gap
Table 402

D. Electrodes.

- (1) The main electrode materials in general use are, copper, graphite, brass, thoriated tungsten and copper/tungsten alloy.

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- (2) Copper/tungsten alloy electrodes must always be used when high accuracy and good surface finish are required, whilst thoriated tungsten, in wire form, is commonly used for drilling blade cooling holes. The other three materials are generally used for roughing operations when a high metal removal rate is required, but with the attendant disadvantage of high electrode wear and a rough surface finish.

E. Process Control.

- (1) Each component will be the subject of specific equipment settings, the settings will be tabulated in the relevant Repair Chapter.
- (2) In cases involving highly stressed or critical components, it is recommended that a test piece is machined to determine electrode size and spark gap allowance. The spark gap which is dependent on the power setting, can vary between 0.0004 in. and 0.012 in. (0,01 and 0,31 mm).
- (3) When components require a post EDM process (i.e. abrasive blasting), to remove contaminated surface layers, the method and parameters will be specified in the relevant Repair Chapter.

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DRY ABRASIVE BLASTING - REPAIR

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DRY ABRASIVE BLASTING - REPAIR

1. Application of Dry Abrasive Blasting

A. General.

- (1) The dry abrasive blasting process is used for cleaning surfaces, as a preparation for further processing, or it may also be used on metallic parts to improve fatigue strength by producing a uniform matt, non-directional surface texture.
- (2) A standard abrasive blast cabinet with automatic timing device must be used.
- (3) This process must only be used when specifically referenced in a Repair Chapter or in a Service Bulletin. Operating parameters for the normal blasting procedure are tabulated in para.H.

NOTE: Dry abrasive blasting is not recommended for titanium or magnesium alloys. If this process is used, the fine metallic powder produced must be scrubbed through a cyclone water system, e.g. Sturtevant equipment, and precautions taken against fire hazards in the cabinet.

B. Safety Precautions.

- (1) All apparatus must be earthed to ensure dispersion of any heavy charge which might be generated during the process.
- (2) Cabinets must be fitted with explosion doors and continuous low speed air extraction.
- (3) A face mask and rubber protective gloves must be worn by the operator during blasting and when cleaning the exhaust filters.

C. Abrasive.

- (1) Aluminium oxide grit must be lead free virgin fused alumina containing less than 5 ppm elemental lead and less than 20 ppm total lead compounds. The iron content, as acid extractable iron, must be less than 1 per cent ww.

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D. Process Control.

NOTE: It is recommended that separate blasting cabinets are used for the treatment of steels and light alloys to minimise damage to components from metallic contamination.

- (1) Examine the abrasive and ensure that it is not contaminated by excess metallic iron or lead (Ref. para.C.).
- (2) The component must be dry and free from grease, or degreased in accordance with the Repair Chapter or Service Bulletin.
- (3) Component surface areas which do not require blasting must be protected by suitable masks or blanks, or as specified in the Repair Chapter or Service Bulletin.
- (4) Before blasting any component ensure the blast intensity is correct (Ref. para.E.).
- (5) Place and secure the component in the appropriate blast cabinet for steels or light alloys and, ensure that the nozzle size is correct and the cabinet filled with correct grit type and size.
- (6) Operate the machine at the correct air pressure and holding the nozzle the correct distance from the surface to be treated, blast the component as required to remove all traces of scale or stains, and/or to produce an even coloured uniform matt surface.
- (7) After blasting, all traces of dust or grit must be removed from the surface by means of a soft brush or a clean dry air blast. In certain cases, e.g. prior to bonding, a vacuum assisted brush should be used to ensure complete removal of particles.
- (8) The handling of treated areas of components must be reduced to a minimum. It may be necessary to use rubber gloves and store small items in polythene bags to prevent contamination.

NOTE: Steel and light alloy parts not requiring immediate further processing or final protection treatment should be dipped in a temporary protective (Ref.Repair 72-09-20).

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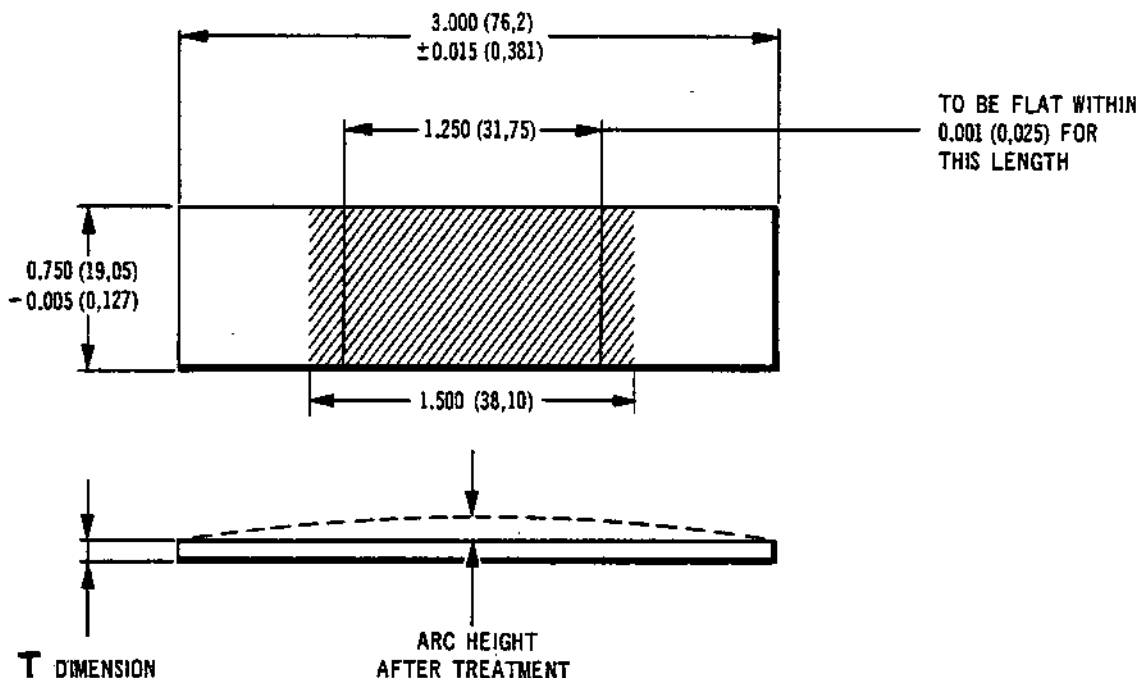
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CR 34090/00A



TEST STRIP MUST BE HELD FLAT
OVER THIS LENGTH DURING BLASTING
OR PEENING



MATERIAL

ALMEN TEST STRIP TYPE	T DIMENSIONS
A	0.052 (1,320) - 0.002 (0,051)
C	0.0948 (2,408) - 0.002 (0,051)
N	0.031 (0,787) - 0.001 (0,025)

BRIGHT GROUND STEEL GAUGE PLATE
HARDENED 780 DEGREES C FOR 10 MINUTES
OIL QUENCHED
TEMPERED 420-430 DEGREES C FOR 30 MINUTES
AIR COOLED
HARDNESS ROCKWELL 'C' 44-50 (444-528 HV.)

SIDES AND ENDS MAY HAVE SHEAR FINISH
DE-BURR AND BREAK CORNERS

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Almen Test Strip
Figure 401

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- (9) If specified by the Repair Chapter or Service Bulletin, passivate stainless steels and nickel base alloy component (Ref.para.G.).

E. Blast Intensity.

NOTE: The blast intensity check is not normally required when dry abrasive blasting is used for cleaning, but must be carried out when blasting is used to improve the fatigue strength of a component.

- (1) Blast intensity is monitored by using an appropriate Almen test strip (Ref.Fig.401) as specified in para.H.
- (2) The test strip must be held flat in a fixture and blasted, ensuring uniform coverage of the exposed surface, under the same parameters as the component it represents.
- (3) After removal from the fixture, the test strip will assume an upward curve. The amount of deflection from the flat or 'arc height' must be measured after blasting to ensure equipment settings and operation are correct.
- (4) Blast intensity must be checked at every change of equipment setting or component, and daily during continuous operation.

F. Inspection.

- (1) Visually inspect the treated areas to ensure the surface shows uniform matt finish.

G. Passivation Solution.

CAUTION: USE THIS SOLUTION ONLY WHEN REFERENCED IN A REPAIR CHAPTER OR SERVICE BULLETIN.

- (1) The solution, made up in the following proportions should be contained in a stainless steel or polypropylene tank and used at workshop temperature.

Nitric acid (SG 1.42)	30 per cent V/V
Water	70 per cent V/V

- (2) Fully or partially immerse components in the solution for as long as instructed by the Repair Chapter or Service Bulletin. On removal from the solution, allow the component to drain then wash thoroughly in clean running water. Dry in a warm oven (max. temp.100 deg C) or from immersion in boiling water. Clean, dry compressed air may be used to assist drying.

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- (3) Regularly analyse the solution and maintain the proportions of water or acid by addition.

H. Parameters for Normal Dry Abrasive Blasting.

Blasting Medium	120-220 mesh Bauxilite (Aluminium oxide) grit
Working Pressure	20-30 psi (138-207 kPa)
Nozzle Diameter	0.375 in. (9,5 mm)
Nozzle to Work Distance	5-8 in. (125-200 mm)
Angle of Attack	90 deg. to component surface
*Almen Strip Type	N
*Arc Height	0.002-0.005 in. (0,0508-0,130 mm) after 12 s uniform blast
*Required only when checking the blast intensity.	

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REMOVAL OF COMBUSTION/PLASMA/DETONATION COATINGS - REPAIR

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REMOVAL OF COMBUSTION/PLASMA/DETONATION COATINGS

1. Removing Coatings

A. General.

- (1) This standard practice details the chemical and mechanical methods for stripping combustion, plasma flame and detonation deposited coatings from engine parts.
- (2) The compatibility of the method of stripping and the engine part base material has been taken into account.
- (3) On certain steel base materials where hydrogen is evolved during the coating removal process, stress relief and de-embrittlement is required.

B. Safety Precautions.

- (1) Under certain circumstances some of the chemicals and processes referred to in this standard practice may be hazardous to health and/or safety. Before carrying out any of the detailed processes initially, those responsible shall consult their supervision in regard to the safe working practices to be adopted. Nothing in this standard practice shall relieve an operator of his responsibility in respect of the provisions of safe working methods and the safety of his operators.

C. Condition of Parts.

- (1) Parts must be free from oil, grease or any other contaminant, particularly in the area of the coating to be removed.
- (2) Parts shall be degreased to the relevant specification prior to removal of coating.
- (3) Parts which cannot be cleaned as in para.(2), e.g. painted parts, shall be completely stripped of paint if required to allow process to be carried out. This shall be carried out to the relevant specification or mechanically.

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D. Stress Relief.

- (1) When instructed in the repair, heat treat to stress relieve the component as follows:
 - (a) Heat treat to the temperature quoted for the required amount of time.
 - (b) The heat treatment controlled time shall commence when the parts have reached the specified temperature.

E. Tooling.

- (1) Parts which are in a condition ready for coating removal, excepting blasting to process K, shall be held by tooling or in a wire basket or by a hook.
- (2) Where electrolytic stripping is employed (process E and F) the parts shall be wired up in anodic polarity.
- (3) Tooling or masks shall be chosen which are not attacked by the stripping solution or which alternatively may be masked off prior to stripping.

F. Masking.

- (1) Stopping off is required where there is a possibility of attack to an area other than where the coating is to be stripped.
- (2) Masking may be carried out using suitable wax, tapes, plugs and lacquers. Contact the controlling laboratory when advice is needed.

G. Washing and Drying.

- (1) Parts which have been chemically processed to strip coating shall be thoroughly water washed/water air blasted and bristle brushed as required to remove any remaining loose coating deposits and to wash away any chemical substances.
- (2) All masking and tooling shall be removed.

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- (3) Parts shall be hot water washed and dried off from immersion in clean hot water at 80°C minimum.

H. De-embrittlement (When Required).

- (1) Parts that have been subjected to stress relief shall be given a de-embrittlement heat treatment not more than 16 hours after processing, and preferably as soon as possible.
- (2) Heat treat to the temperature quoted in the repair for the required amount of time.
- (3) The heat treatment controlled time shall commence when the parts have reached the specific temperature.

J. Inspection.

- (1) Parts if necessary shall be degreased to the relevant specification (not aluminium components).
- (2) Parts shall be inspected to ensure the coating has been completely removed.
- (3) If coating is still in evidence the parts must be recycled. The advice of the local controlling laboratory should be sought before proceeding.
- (4) Parts shall be examined for incidental damage which has been incurred during process.

K. Corrosion Prevention.

- (1) After processing (including heat treatment when required) all parts shall be temporarily protected against corrosion to the relevant specification. This operation may be deferred until after inspection if the latter falls within 8 hours of the processing (including heat treatment where relevant).



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L. Processes.

(1) Process A - Nitric Acid.

(a) Composition of solution.

- (i) The stripping solution is of the following composition:

Nitric Acid 400-450 g/l and is made up of:

Nitric Acid (SG 1.42)	43 vols
Water	57 vols

- (ii) The solution shall be contained in a stainless steel or P.V.C. tank fitted with extraction, and heating coil if required.
- (iii) The tank shall normally be operated at room temperature. Heated solutions may be used at the discretion of the local controlling laboratory.

(b) Stripping.

- (i) The coated area of the component shall be immersed in the solution, and stripping is complete when gassing ceases.

(c) Control.

- (i) The solution shall be analysed and maintained by suitable additions of nitric acid.
- (ii) Alternatively the solution may be discarded when it is no longer effective.
- (iii) Alternative strengths of acid may be used with the authority of the controlling laboratory.

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(2) Process B - Sodium Hydroxide/Gluconate.

(a) Composition of solution.

(i) Ardrox 185

200-300 g/l (aqueous solution). This is made by one thorough mixing of 300 grammes of Ardrox 185 in one litre of water.

(b) Stripping.

(i) The coated area of the component shall be immersed in solution and stripping is complete when gassing ceases.

(c) Neutralise.

(i) Neutralising shall be carried out only when specified by the controlling laboratory.

(ii) The process of neutralising the components consists of immersing them for a minimum time of one minute in the solution prepared and operated in accordance with process C.

(iii) On removal from the neutralising solution the components shall be water washed to remove all traces of treatment solution.

(d) Control.

(i) The solution shall be analysed and controlled by suitable additions of sodium hydroxide/sodium gluconate.

(ii) Alternative proprietary approved solutions or "in house" solutions containing the specified ratios of sodium hydroxide/sodium gluconate may be used with the permission of the controlling laboratory.

(e) Limitations.

(i) Removal of metal/plasma/detonation sprayed deposits.

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- (f) Proprietary solutions.
- (i) Ardrox 185 Alkaline Deruster Salts from Ardrox Ltd., Bourne End, Bucks.
- (3) Process C - Neutralising Solution.
- (a) Composition of solution.
- (i) Chromic Acid (CrO_3)
- 80-100 g/l (aqueous solution). The solution is made up by thoroughly mixing 100 grammes of chromic acid in one litre of water.
- (b) Operation.
- (i) The solution is operated at 60°C - 65°C and may be contained in a P.V.C. tank.
- (c) Control.
- (i) The concentration of chromic acid, expressed as CrO_3 , shall be maintained at 80-100 g/l.
- (4) Process D - Meta Nitro Benzene Sulphonic Acid Sodium Salt.
- (a) Composition of solution.
- (i) The stripping solution is of the following composition:
- Nitro benzene sulphonic acid:
- | | |
|----------------|------------|
| Sodium salt | 55-65 g/l |
| Sodium cyanide | 90-180 g/l |
- (ii) The solution shall be contained in a mild steel tank. Other materials may be used with the authority of the controlling laboratory.

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- (iii) The solution shall normally be operated cold but may be heated up to 70°C for more rapid stripping. Consult local controlling laboratory for advice.

NOTE: Heating shortens bath life and increases the probability of base material attack.

(b) Stripping.

- (i) The coated area of the component shall be immersed in the solution.
- (ii) Stripping is not accompanied by any vigorous action, so components being stripped must be examined periodically for progress of stripping.
- (iii) Some metal/plasma/detonation coatings may take up to 24 hours to strip and this may be related to coating thickness.

(c) Control.

- (i) The solution shall be analysed and maintained by regular additions until the stripping rate becomes excessively slow (i.e. below 0.7 microns/hr of nickel from test plate plated to the relevant specification). On no account must the sodium cyanide level fall below 40 g/l or base material attack may occur.

(d) Proprietary solutions.

- (i) The basic constituent in powder form is available as Metex Strip Aid from Macdermid (U.K.) Ltd. or Enstrip S from Silvercrown P.E. Ltd.

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(5) Process E - Electrolytic Sulphuric Acid.

(a) Composition of solution.

- (i) The stripping solution is of the following composition:

Sulphuric acid 168-188 g/l
and is made up of:

Sulphuric acid (SG 1.84) 10 vols
Water 90 vols

- (ii) The acid must be added to the water very slowly and cautiously with stirring to disperse the heat evolved during mixing.
- (iii) The solution may be contained in a lead lined or plastic tank using lead plate cathodes.
- (iv) The tank should be operated at room temperature and be fitted with extraction.
- (v) If the solution is likely to exceed 40°C in use then lead cooling coils should be fitted to the tank.

(b) Stripping.

- (i) The component whose coating is to be stripped shall be made the anode.
- (ii) The stripping current (D.C.) shall be up to 0.6 A/sq. inch (1000 A/sq. metre) at between 6 to 8 volts.

(c) Control.

- (i) The solution shall be analysed and maintained by additions.

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(6) Process F - Electrolytic Rochelle/Carbonate.

(a) Composition of solution.

- (i) The stripping solution is aqueous and contains:

Sodium Carbonate	200 g/l
Rochelle Salt (Sodium Potassium Tartrate)	50 g/l

If Rochelle salt is not available, the solution may be made up as follows:

Sodium Carbonate	230 g/l
Tartaric Acid	30 g/l

- (ii) The solution may be contained in a lead lined mild steel tank, or in a plastic lined mild steel tank provided with lead cathodes.
- (iii) The tank shall be provided with heating and cooling coils to maintain an operating temperature of 40° - 60°C.
- (iv) The solution shall be mechanically agitated. Air agitation shall not be employed.

(b) Masking of components.

- (i) Certain Nickel or Cobalt based alloys are susceptible to attack in this solution. Advice on the desirability of masking uncoated areas of particular components, and on the choice of masking agent, should be obtained from the local controlling laboratory.

(c) Operative procedure.

- (i) Components shall be processed anodically at a maximum current density of 0.6 A/in² (1000 A/m²) based on the area of coating to be removed.

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- (ii) The voltage applied in the process shall not exceed 6.5 volts.
- (iii) Process time will depend upon the type, thickness and condition of the coating being stripped. Approximate stripping times should be determined practically for individual components or coatings, as a guide to operators.
- (d) Control.
 - (i) The solution is operated without analytical control and shall be discarded when no longer effective. The definition of "no longer effective" shall be agreed between shop supervision and the local controlling laboratory.
- (7) Process G - Kolene.
 - (a) Solution.
 - (i) Kolene K1/M3 is a proprietary material marketed by Cassel Heat Treatment Services of the Mond Division of Imperial Chemical Industries and is operated as a molten caustic bath containing a minimum of 8% sodium nitrate (NaNO_3).
 - (b) Operation.
 - (i) Details of the necessary equipment and operating instructions are obtainable from Imperial Chemical Industries Ltd. In all respects the manufacturers instructions regarding installation, operation and safety precautions shall be observed.
 - (ii) The bath shall be operated at a temperature of 450°C - 470°C .

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(c) Control.

- (i) During use the sodium nitrate content will tend to fall but additions of Kolene salts made to replace losses by drag out should normally replace this. The bath should be analysed for sodium nitrate and maintained by suitable additions.

(d) Neutralise.

- (i) Neutralise using process H, plus water wash (Ref.para.1.G.(1)).

(e) Limitations.

- (i) Not satisfactory for cooling passages less than 1,25 mm diameter or other inaccessible locations where salt entrapment may occur.

(f) Degraded coatings.

- (i) If coatings have only been degraded by the above sequence, the operation shall be completed by grit blasting in accordance with process K.

(g) Kolene supply.

- (i) The Kolene 1 salt bath material is available from; Kolene Corporation, Detroit, Michigan, and its approved subsidiaries.

(8) Process H - Neutralising Solution.

(a) Solution.

- (i) Typically this is an aqueous solution containing:

Sulphuric Acid (H_2SO_4) 184 g/l

1 litre of the solution may be made up as follows:

Add 100 ml Sulphuric Acid (SG 1.84) to 500 ml water, slowly stirring, cool to room temperature and make up to 1 litre with water.

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(b) Operation.

- (i) The solution shall be contained in a rubber lined steel or polythene tank and used cold.
- (ii) The components shall be immersed in the solution for a minimum period of two minutes or until effervescence ceases, whichever is the longer period. The components shall then be allowed to drain over the tank.
- (iii) The solution shall be used until neutralised, as indicated by a blue litmus test. It shall then be discarded and replaced by a fresh solution.

(9) Process J - Alkaline Permanganate.

(a) Composition of solution.

- (i) This is an aqueous solution containing:

Sodium Hydroxide (NaOH)	80-120 g/l
Potassium Permanganate (KMnO ₄)	30-60 g/l

One litre of solution may be made up as follows: to 750 mls of water add 100 grammes of Sodium Hydroxide with caution, stir to dissolve and allow to cool to room temperature. Add 60 grammes of Potassium Permanganate, stir to dissolve and make up to one litre with water.

(b) Operation.

- (i) It is recommended that the solution is contained in a suitable austenitic stainless steel tank fitted with extraction unit and air agitation facility. The operating temperature is 95 deg C plus/minus 5 deg C.

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(c) Control.

- (i) The solution may be controlled by analysis and additions, or discarded when no longer effective.

(d) Neutralise.

- (i) 10% chromic acid or 30% nitric acid plus water wash (Ref.para.1.G.(1)).

(e) Limitations.

- (i) The above method only degrades the coating. Immersion times vary between 12 and 60 hours depending on activity of solution and coating density. The operation shall be completed by grit blasting in accordance with process K.

(f) Heat treated coatings.

- (i) Where coating has been succeeded by heat treatment in an oxidising atmosphere the above stripping method should be preceded either by sodium hydroxide/gluconate immersion to the appropriate specification or grit blasting as in process K.

(10) Process K - Dry Non-Metallic Abrasive Blasting.

(a) Control.

- (i) General requirements as 72-09-24, Repair.

(b) Parameters.

- (i) Use a 16/24 (700/1000 microns) aluminium grit where feasible (see limitations) at 30 p.s.i. with a pressure type machine or 75 p.s.i. with vacuum type equipment. Optimum nozzle work piece distance of 3 inches. Other sizes of grit may be used with permission of the controlling laboratory.

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- (ii) Where grit contamination of surfaces is a problem components may be water washed as required (Ref.para.1.G.(1)).
- (c) Limitations.
 - (i) Excessive distortion may occur on thin walled components. In such cases, bracing jigs shall be used, or smaller size alumina grit and/or corresponding lower working pressures.
 - (ii) The equipment used should be specifically retained for stripping since rapid grit contamination will occur. Alternatively the grit supply in the cabinet shall be discarded on completion of a stripping programme.

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DETONATION FLAME DEPOSITION - REPAIR

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DETONATION FLAME DEPOSITION

1. Applying Coating

A. General.

- (1) Detonation flame deposition is a proprietary process of Union Carbide Ltd., to whom components should be despatched. This standard practice describes the preparation of the component prior to despatch and inspection on return.

B. Safety Precautions.

- (1) Under certain circumstances some of the chemicals and processes referred to in this standard practice may be hazardous to health and/or safety. Before putting this process into operation for the first time, those responsible shall consult their supervision and local controlling laboratory in regard to the safe working practices to be adopted. Nothing in this standard practice shall relieve an operator of his responsibility in respect of the provision of safe working methods and the safety of his operators.

C. Corrosion Protection.

- (1) It should be noted that most metallic surfaces are susceptible to corrosion, particularly after operations which leave the metal dry and exposed to atmospheric conditions. It is therefore, of the utmost importance that suitable protection requirements be considered in relation to the planning and/or manufacture of metallic parts at all stages. The foregoing instruction is not necessarily satisfied by the provisions of any specific clause which may appear elsewhere in this standard practice.

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D. Condition of Components.

- (1) Whenever possible the application of detonation coatings shall be after the application of all other processing. Components for spraying shall be in a scale and rust free condition.
- (2) It is essential that parts despatched for processing, particularly close tolerance parts, shall be dimensionally accurate in accordance with drawing requirements. The coatings are not intended to compensate for dimensional inaccuracies and failure to observe this precaution may result in finished parts which are either oversize or on which the coating could be completely removed by finishing.
- (3) Parts shall be temporarily protected against corrosion, in accordance with the relevant specification, prior to despatch to Union Carbide Ltd. There must be no evidence of any previously applied coatings on the area to be processed by Union Carbide Ltd. unless prior agreement between the operator and Union Carbide Ltd. has been established with regard to the stripping of such surfaces.

E. Inspection on Receipt.

- (1) The deposit shall be inspected to ensure conformity to drawing, uniformity of deposit and that there is no evidence of blistering, lifting, cracking or chipping.
- (2) Any faulty deposit is to be completely removed prior to re-processing.

F. Finishing.

- (1) Finish the component as specified in the repair.
- (2) Brushing is used to smooth or bed-down the coating and the surface should be brushed until it appears or feels smooth. Brushing is not to be used on parts with close tolerance dimensions.

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(3) Ground coating, when finished, must not appear polished or glazed. Such an appearance will be accompanied by heat chequering or grinding cracks.

(4) Finishing methods.

NOTE: The following information is given as a guide to grinding, lapping and brush finishing techniques, but further details may be obtained from Rolls-Royce controlling laboratory or from Union Carbide Ltd.

(a) Grinding.

- (i) Diamond wheel grinding is the principal method used to produce dimensionally precise coatings. The use of improper grinding techniques can cause heat chequering, particle pull-out, chipping and consequent failure of otherwise flawless coatings.
- (ii) The diamond wheel must comply with the following specification:

100 concentration.
Resinoid bond.
- (iii) The grinding machine spindle must run true, the back-up plate must be square to the spindle and all jibs and ways must be tight and true.
- (iv) The diamond wheel shall be balanced on its own mount and must be allowed no more than 0.0002 in. (0,005 mm) run-out.
- (v) The peripheral wheel speed shall be from 5000 to 6500 surface feet per minute (25 to 32 metres per second).
- (vi) Flood coolant shall be used, consisting of water plus 1% to 2% water-soluble oil of neutral pH. The coolant shall be directed at the point of contact of the wheel and the work piece, and shall be filtered during use.



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- (vii) Before grinding each part, the wheel shall be cleaned with a silicon carbide stick.
 - (viii) Correct feeds must be maintained. Minimum in-feed per pass 0.0005 in. (0,013 mm) and maximum cross-feed per pass or revolution 0.080 in. (2,0 mm).
 - (ix) The wheel shall always be maintained in a free-cutting condition.
 - (x) Aluminium oxide wheels must not be used on coatings. Silicon carbide wheels may be used when recommended by Union Carbide Ltd.
- (b) Lapping.
- (i) A hard serrated lap shall be used made from GM Mechanite or similar material.
 - (ii) Approved diamond abrasive must be used, and this shall be firmly embedded in the lap.
 - (iii) A thin lubricant shall be used, such as mineral spirit.
 - (iv) The lapping pressure shall be 20-25 lbs/sq.inch (1.4 to 1.75 kgf/cm²) wherever possible.
 - (v) Lapping speeds shall be 100-300 surface feet per minute (50-150 cm per second).
 - (vi) The lap shall be recharged when the lapping time increases by 50% or more.
- (c) Non-precision wet brush finishing.
- (i) Brush finish techniques may be used to produce a smooth modular surface on a component.
 - (ii) Parts shall first be sanded with 220 grit silicon carbide paper.

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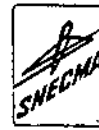
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- (iii) The brush finishing operation is then carried out by means of a soft cotton string rotary brush running at 4000 to 6000 surface feet per minute (20 to 30 metres per sec) and a medium of silicon carbide slurry. The slurry is composed of 20% by weight of 240 grit silicon carbide in water, with the addition of a small amount of rust inhibitor.
 - (iv) The finished surface should have a modular "orange peel" texture, free from any sharp protrusion.
- (d) Non-precision sanding/diamond finishing.
- (i) Non-precision techniques may be used to remove the sharp particle peaks from the as coated surface.
 - (ii) The precise technique is dependant upon part geometry, coating type and thickness.
 - (iii) The technique can be accomplished either manually or by machine. Hand finishing requires the use of silicon carbide paper of 180, 220, 320 and 400 mesh grit or 408M Cratex stick. Machine finishing employs the use of 15 micron, 220 or 100 mesh diamond impregnated cloth mounted on a flexible rotary pad, lubricated with water. A 408M Cratex wheel can also be used in conjunction with 6 or 14 micron diamond paste.
 - (iv) The finished surface of the coating should exhibit a truncated appearance, whilst still retaining evidence of the as coated surface.

G. Inspection After Finishing.

- (1) After finishing, a visual inspection shall be carried out using magnification up to X7 where necessary. There must be no evidence of discolouration, cracking, plucking or polishing.

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- (2) Penetrant inspection to the relevant specification may be required on certain critical parts and shall be carried out as instructed by the local controlling laboratory or quality control.
- (3) The inspection of ground carbide deposits is very important in order that the grinding operation may be monitored. This is necessary due to the possible rapid deterioration of the grinding wheels.
- (4) Any faulty deposits shall be completely removed prior to re-preparation and re-application of the deposit (Ref.para.1.D.3.).

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REMOVAL OF METAL SPATTER FROM
HP TURBINE ROTOR BLADES - REPAIR

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REMOVAL OF METAL SPATTER FROM HP
TURBINE ROTOR BLADES

1. Removing Spatter

A. General.

- (1) This standard practice details the method for removing metal spatter from HP turbine rotor blades.

B. Safety Precautions.

- (1) Under certain circumstances some of the processes referred to in this standard practice may be hazardous to health and/or safety. Before carrying out any of the detailed processes initially, those responsible shall consult their supervision in regard to the safe working practices to be adopted. Nothing in this standard practice shall relieve an operator of his responsibility in respect of the provisions of safe working methods and the safety of his operators.

C. Removal Procedure.

- (1) Mask the blade fir tree roots and dry abrasive blast the aerofoil to remove spatter. Refer to Chapter 72-09-24, Repair, for blasting procedure.
- (2) Inspect to ensure satisfactory blasting has been carried out, and spatter removal has been achieved.
- (3) Heat treat the blades to 580°C plus/minus 10°C for 1 hour. Cool in air.
- (4) Inspect aerofoils for loss of pack aluminising. Blue-purple colour indicates loss of coating. Straw-gold colour indicates presence of aluminising.

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WELD REPAIR OF PD21 MATERIAL - REPAIR

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WELD REPAIR OF PD21 MATERIAL

1. Welding

A. General.

- (1) This standard practice details the method for weld repairing components manufactured from PD21 material.
- (2) PD21 is a complex high temperature nickel base super alloy used in the "as-cast" condition. The micro-structure in this condition makes the alloy essentially unweldable due to heat affected zone cracking which extends into the parent and weld metal. These cracks are initiated at, and propagated along coarse complex carbide microstructural features. The method detailed in this standard practice aims to improve weldability by refining these microstructural features by heat treatment, thereby reducing the susceptibility to cracking and reducing the potential crack propagation path when cracking does occur.

B. Safety Precautions.

- (1) Under certain circumstances, some of the processes referred to in this standard practice may be hazardous to health and/or safety. Before carrying out any of the detailed processes initially, those responsible shall consult their supervision in regard to the safe working practices to be adopted. Nothing in this standard practice shall relieve an operator of his responsibility in respect of the provisions of safe working methods and the safety of his operators.

C. Repair Welding.

- (1) It has been found necessary to carry out extensive welder training to develop the technique necessary for PD21. This consists of minimising the heat input and thereby the heat affected zone. This can lead to "lack-of-fusion" type defects so that a delicate balance has to be achieved. This training phase is supported by full non-destructive examination of test welds and finally by sectioning and metallurgical assessment.

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(2) Due to the difficulty in welding, it is necessary, to scrupulously follow the following standardised welding procedure:

- (a) Inspect to establish crack lengths.
- (b) Notch to remove cracks using simple carbide burr.
- (c) Condition heat treat 1120°C for 18 hours in a vacuum, followed by inert gas quench.
- (d) Critical penetrant examination to ensure complete removal of crack.
- (e) Re-notch if necessary.
- (f) T.I.G. weld repair by trained welder using INCO 625 filler and the following parameters.
 - (i) D.C. welding equipment.
 - (ii) 0.433 in (11.00 mm) torch size (water cooled).
 - (iii) 0.630 in (16.0 mm) tungsten electrode (thoriated).
 - (iv) 45-65 amp current range.
 - (v) Argon purging gas.
 - (vi) Gas flow:
torch 12-15 cu ft/hr (6-8 litres/min).
backing 3 cu ft/hr (1.5 litres/min),
(100% of backing gas to pass through chills).
 - (vii) Use gas lens.
 - (viii) Welding carried out at room temperature.
- (g) NDT - penetrant and X-Ray.
- (h) Re-notch any welding cracks. If these extend into the parent material, repeat the conditioning heat treatment.
- (j) Repeat full NDT.

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INERT GAS ARC WELDING OF
FRETTED/DAMAGED TUBES - REPAIR

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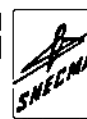
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INERT GAS ARC WELDING OF FRETTED/DAMAGED TUBES - REPAIR

1. Weld Repair

A. Repair Limitations.

- (1) Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.
- (2) Direct welding of fretting/damage is limited to maximum depth of 50% of the gauge thickness of the individual tube (for minimum gauge thickness of tube, refer to para.6 of individual repair).
- (3) Maximum size of repairable fret/damage mark to be contained within an envelope 0.350 x 0.350 (8,90 x 8,90) (Refer to Fig.401).
- (4) This repair does not cover welding of fittings, which must be replaced to the appropriate repair instructions.

B. General (Unless Otherwise Specified).

- (1) Drawing practice and tolerance interpretation to ISO1101 (JES160).
- (2) Dimensions in Inches (Millimeters).
- (3) Tolerances on machined dimensions plus/minus 0.010 (0,25).
- (4) Tolerances on angles plus/minus 2 degrees.
- (5) Break sharp edges 0.004 to 0.020 (0,1 to 0,5).
- (6) Surface texture interpretation to ISO1302 (JES137).
- (7) Surface texture to be 125 (3,2) Microinches (Micrometers).
- (8) Welding symbols to ISO2553 (JES139).
- (9) 3rd Angle Projection.

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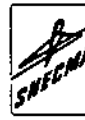
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C. Repair Procedure.

Repair Procedure

Supplementary Information

- | | |
|---|---|
| (1) Clean fretted/damaged areas and prepare for welding. | Refer TSD 594 OP.409. |
| (2) Degrease areas to be welded immediately prior to welding. | Refer TSD 594 OP.101. |
| (3) Build up fretted/damaged area by inert gas arc welding. Apply sufficient weld metal to restore outer diameter of tube. Group 1 weld classification. | Refer TSD 594 OP.409.
Use filler rods to OMat 306. |
| (4) Radiographically inspect weld for defects. | Refer TSD 594 OP.409
Appendix 2. |
| (5) Dress weld to restore diameter, adjacent parent material is not to be impaired. Maintain surface finish. | Note: Use adjacent undressed areas as a guide for surface finish. |
| (6) Polish tube diameter to remove discolouration. | |
| (7) Locally inspect repair area for cracks. | Refer TSD 594 OP.210. |
| (8) Visually inspect on completion of repair. | Refer TSD 594 OP.409
Appendix 2. |
| (9) Pressure test tube if required. | Refer to Para.6 of individual repair. |
| (10) Vapour degrease tube. | Refer TSD 594 OP.101. |

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- (11) Re-lubricate threads
using engine oil
(where applicable).
- (12) Fit blanks as
required.

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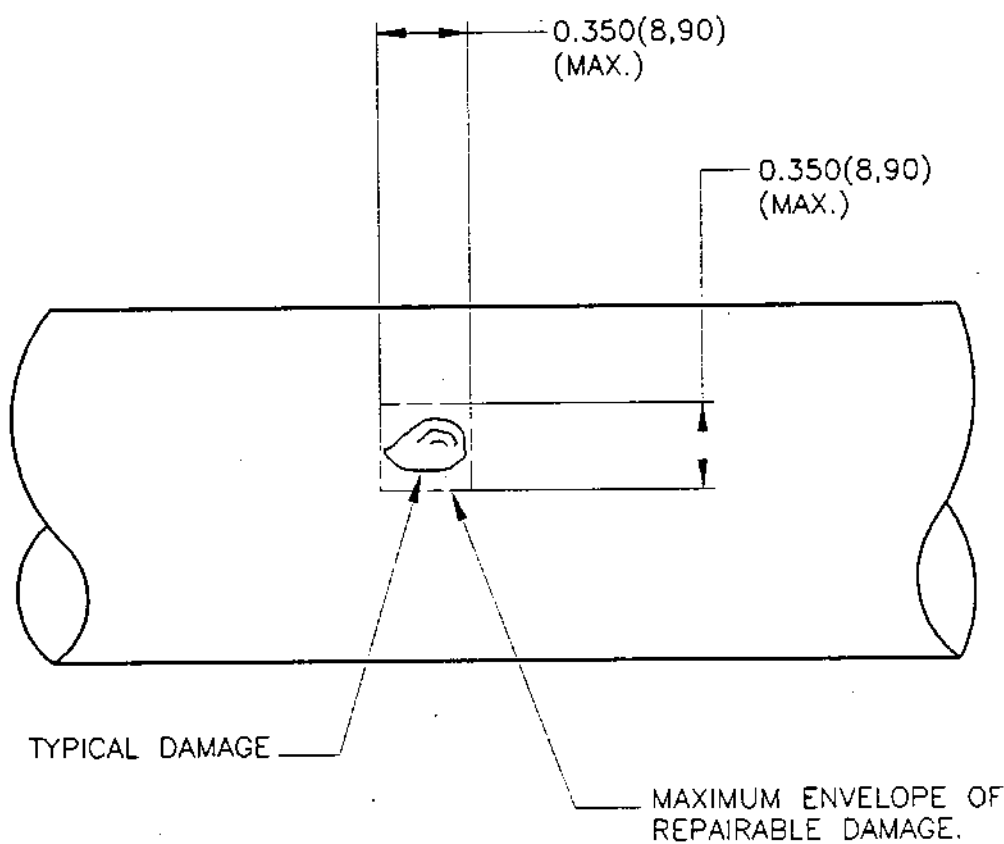
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TYPICAL TUBE REPAIR
FIG.401



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DAMAGED AND/OR FRETTED TUBES - REPAIRTABLE OF CONTENTS

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DAMAGED AND/OR FRETTED TUBES - REPAIR

1. Repair

A. Repair Limitations.

(1) The repair of damage to tubes by fretting of clips or other forms of damage is covered by this repair. The tubes may be repaired according to the following basic requirements.

- (a) Where edge of fretted area is not less than 1.650 in. (41,90 mm) from commencement of a bend or curve, use of a "tube joint" will normally be sufficient. The standard length to be used is L20 i.e. 2.000 in. (50,80 mm) at clip positions (Ref. Details C, D, E, F, G and H, Figs.402 and 403).
- (b) Where edge of fretted area is less than 1.650 in. (41,90 mm) from commencement of a bend or curve, this will require a new section of tube with bend (or bends) produced from tube as specified on relevant standard tube assy. drawing and formed in accordance with master tube gauge and may also require new end/intermediate fitting(s) due to loss of autogenous lip (Ref. Details B, J, K and L, Figs.401, 403 and 404).
- (c) A repair weld line must not occur in area which will be covered by a clip (Ref. Details E and F, Fig.402).
- (d) An L5 tube joint may be used for other types of damage or joint where practicable (Ref. Details J and K, Figs.403 and 404).
- (e) This repair covers range of tubes 0.025/0.031 in. (0,67/0,79 mm), 0.032/0.044 in. (0,81/1,12 mm) and 0.064/0.068 in. (1,63/1,73 mm) gauge.

B. General (Unless Otherwise Stated).

- (1) Drawing practice and tolerance interpretation to ISO 1101 (JES 160).
- (2) Dimensions in Inches (Millimeters).
- (3) Tolerances on machined dimensions plus/minus 0.010 (0,25).

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- (4) Tolerances on angles plus/minus 2 degrees.
- (5) Break sharp edges 0.004 to 0.020 (0,1 to 0,5).
- (6) Welding symbols to ISO 2553 (JES 139).
- (7) Surface texture interpretation to ISO 1302 (JES 137).
- (8) Surface texture to be 63 (1,6) Microinches (Micrometers).

C. Re-Use of Fittings.

- (1) To reduce cost, serviceable fittings removed during repair should be re-used wherever possible (e.g. nuts, ferrules, end fittings, junctions, tee-pieces, seal carriers etc.).
- (2) When re-using fittings the original autogenous lips provided for new manufacture (Ref. Detail A, Fig.401) are replaced by suitable tube joints (Ref. Detail B, Fig.401).
- (3) Diameter 'D' and tube ends to be dressed to provide a fit of 0.000 to 0.004 in. (0,00 to 0,10 mm) clearance in the lip of the selected tube joint. End faces of fittings to be trimmed square within 0.0015 in. (0,038 mm) of axis (applicable to all re-used welded fittings (Ref. Detail B, Fig.401)).
- (4) For 0.312 to 1.250 in. (7,94 to 31,75 mm) diameter tube select from range B445301-10. For 1.500 and 1.750 in. (38,1 and 44,45 mm) diameter tube select from B497486 or B497487. For 2.250 and 3.096 in. (57,15 and 78,64 mm) diameter tube select from B514649 or B514650.
- (5) When re-use is not possible a new fitting of the same part number is required.
- (6) In all cases the assembly must conform to the master tube gauge form.

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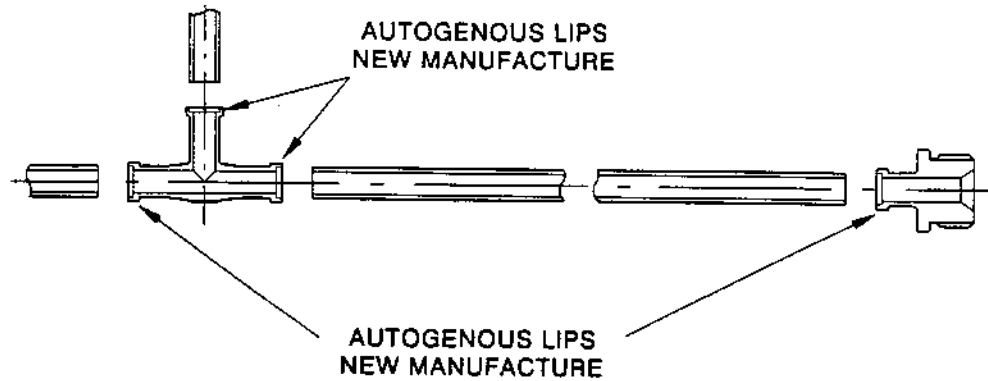


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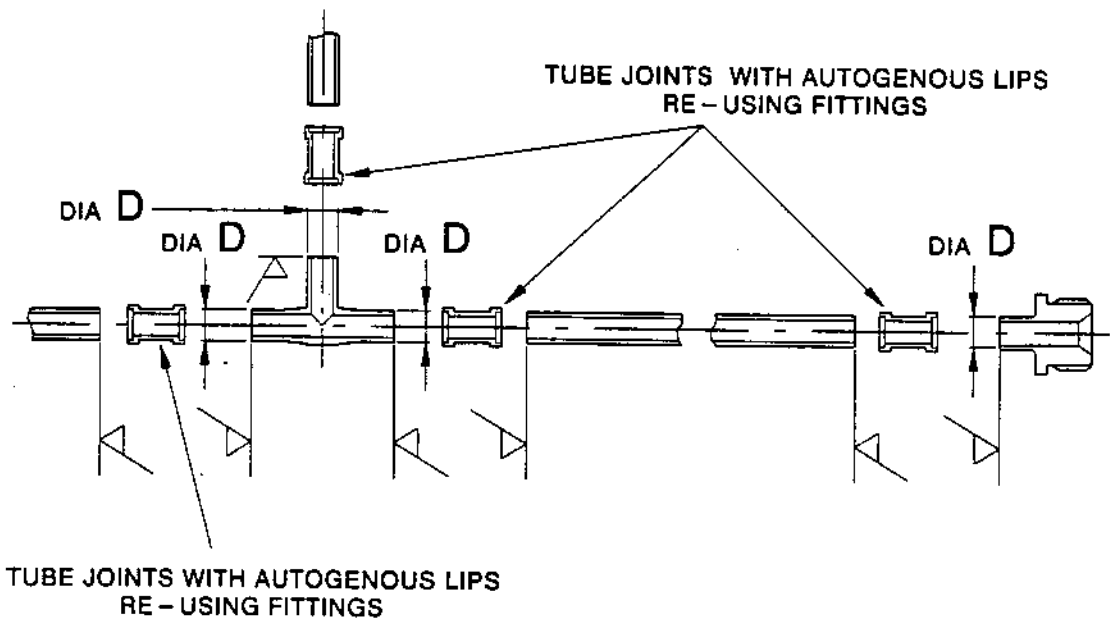


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DETAIL A



DETAIL B

Autogenous Lips - New and Re-Use
Figure 401

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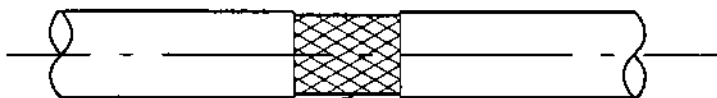
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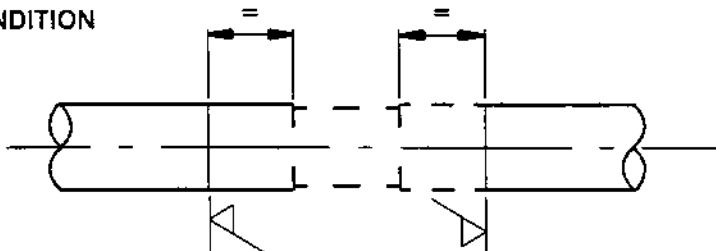
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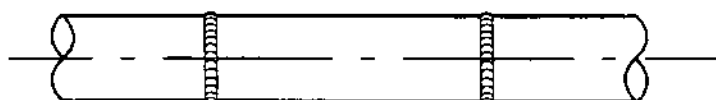


TYPICAL KNITMESH
FRET CONDITION



DAMAGED AREA REMOVED

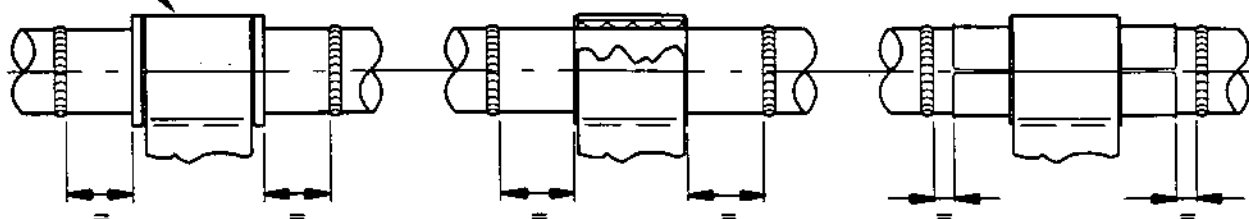
DETAIL C



L20 TUBE JOINT WELDED IN

DETAIL D

DIFFERENT CLIPPING
MEDIUMS



PREFERRED REPAIRED CONDITION

DETAIL E



THESE CONDITIONS WILL NOT BE ACCEPTABLE,
IRRESPECTIVE OF TUBE FORM

DETAIL F

Repair to Straight Section at Clip Positions

Figure 402

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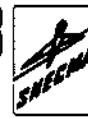
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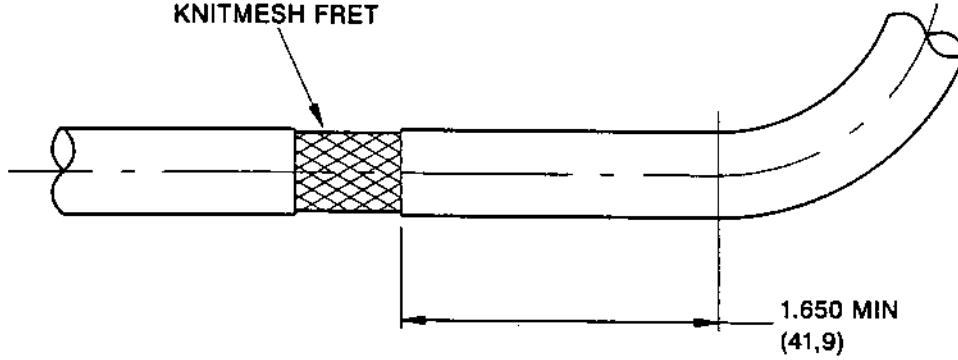
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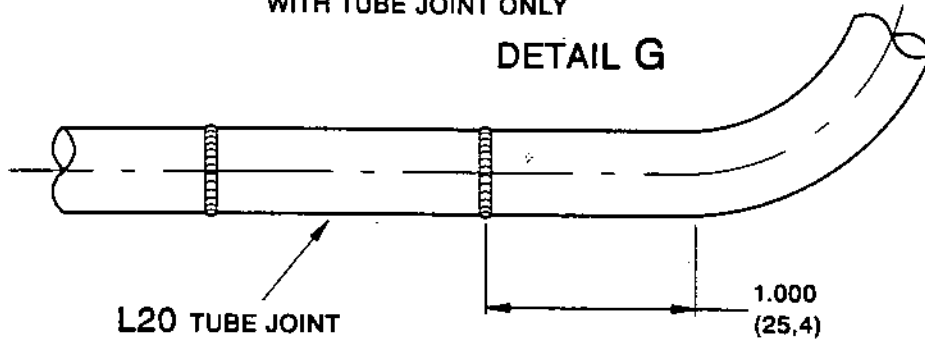
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KNITMESH FRET



WHERE BENDS ARE INVOLVED THIS IS THE
MIN DIMENSION CONDITION FOR REPAIR
WITH TUBE JOINT ONLY

DETAIL G

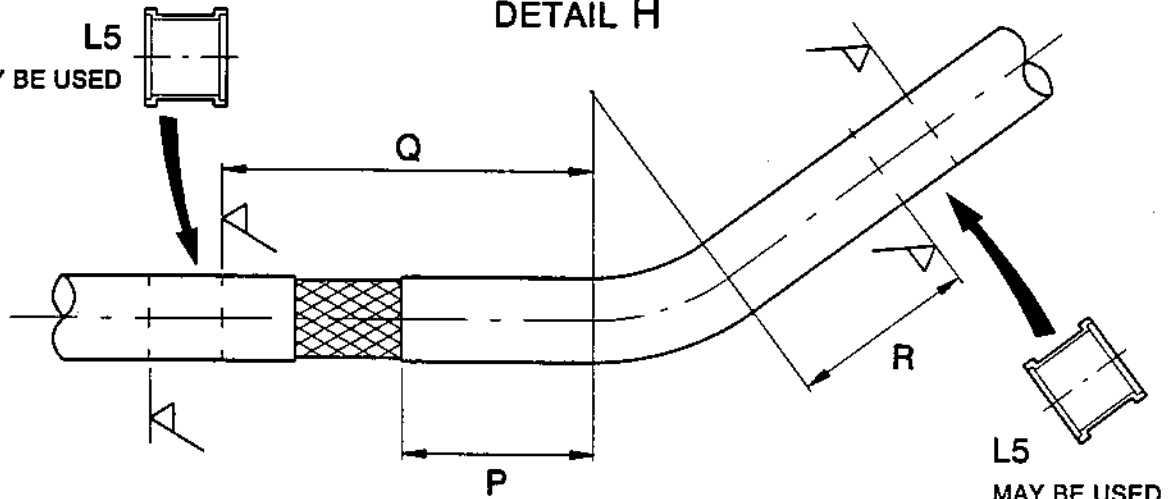


L20 TUBE JOINT

MIN DIMENSION TO A WELD JOINT

DETAIL H

L5
MAY BE USED



L5
MAY BE USED

WHERE DIMENSION P IS LESS THAN 1.650 (41,9) A COMPLETE BEND
WITH 2.250 (57,15) STRAIGHT SECTION AT Q AND 1.000 (25,4) AT R
WILL BE REQUIRED PLUS TWO TUBE JOINTS

DETAIL J

DIMENSIONS GIVEN ARE SHOWN
THUS : - INCHES (MILLIMETRES)

Repairs Adjacent Bends
Figure 403

REPAIR

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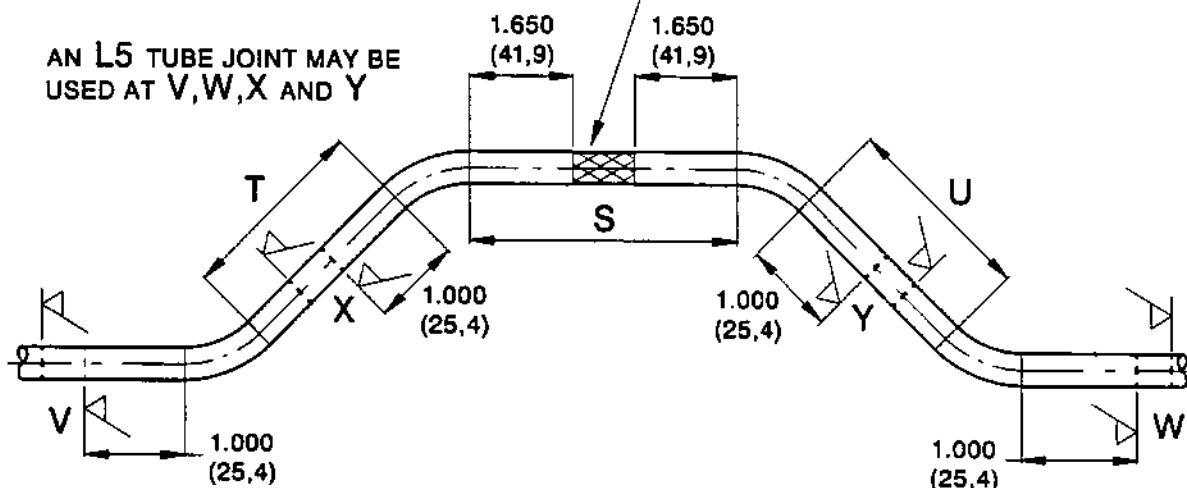
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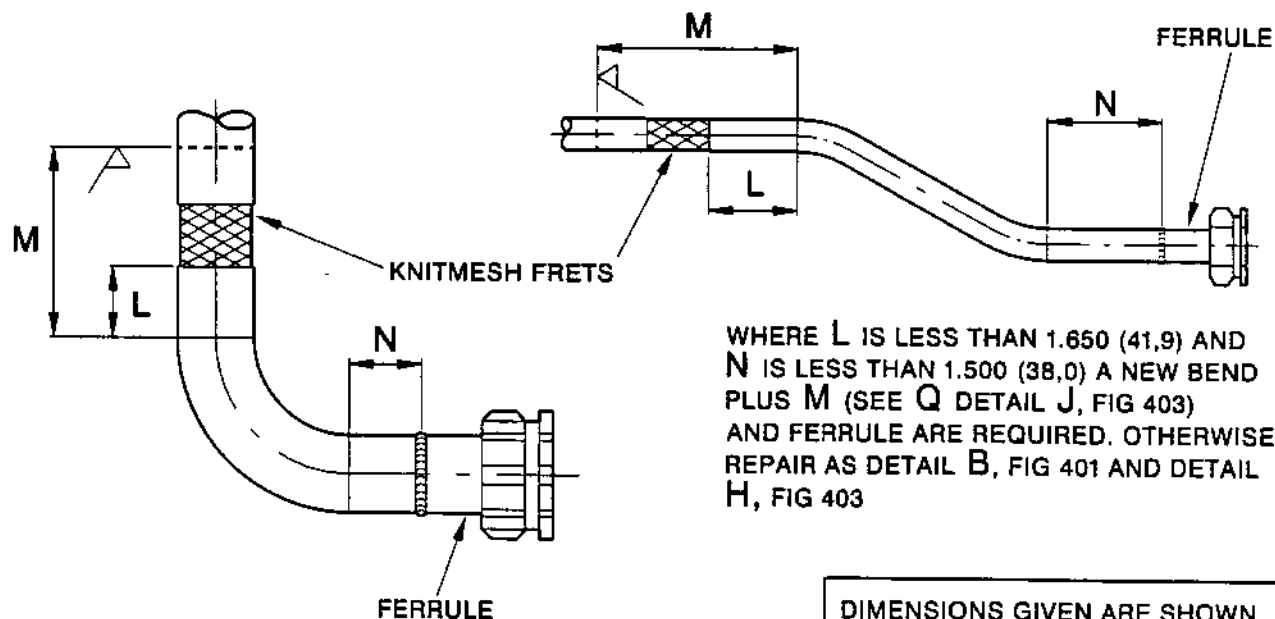


KNITMESH FRET



IF FRETTING IS IN AN AREA SHOWN ABOVE AND DIMENSION S IS LESS THAN 4.000 (101,6) AND DIMENSIONS T AND U ARE LESS THAN 2.500 (63,5) RENEWAL OF THE WHOLE SECTION FROM V TO W WILL BE REQUIRED (BECAUSE DIMENSIONS 1.650 (41,9) AND 1.000 (25,4) ARE NOT ATTAINED) IF DIMENSION T EXCEEDS 2.500 (63,5) THE CUT WILL BE AT X AND W OR CONVERSELY FOR U, CUT AT Y AND V. WHEN T AND U BOTH EXCEED 2.500 (63,5) CUT WILL BE AT X AND Y

DETAIL K



WHERE L IS LESS THAN 1.650 (41,9) AND N IS LESS THAN 1.500 (38,0) A NEW BEND PLUS M (SEE Q DETAIL J, FIG 403) AND FERRULE ARE REQUIRED. OTHERWISE REPAIR AS DETAIL B, FIG 401 AND DETAIL H, FIG 403

DETAIL L

Repairs Adjacent Multiple Bends and Adjacent Bends and Fittings
Figure 404

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

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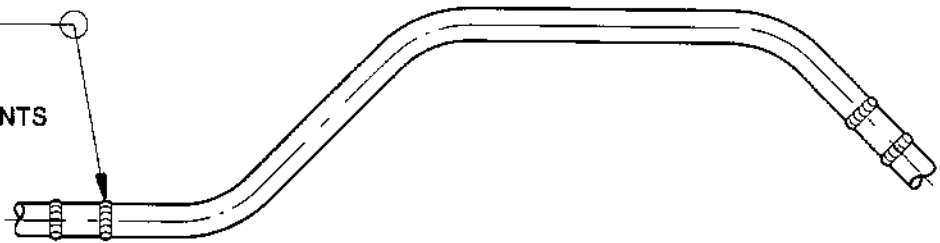
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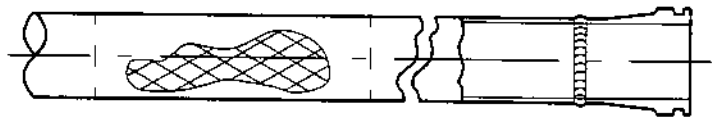


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AP1
FOR ALL
WELD JOINTS

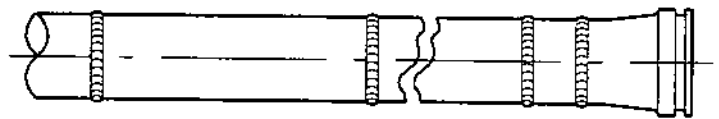


DETAIL M



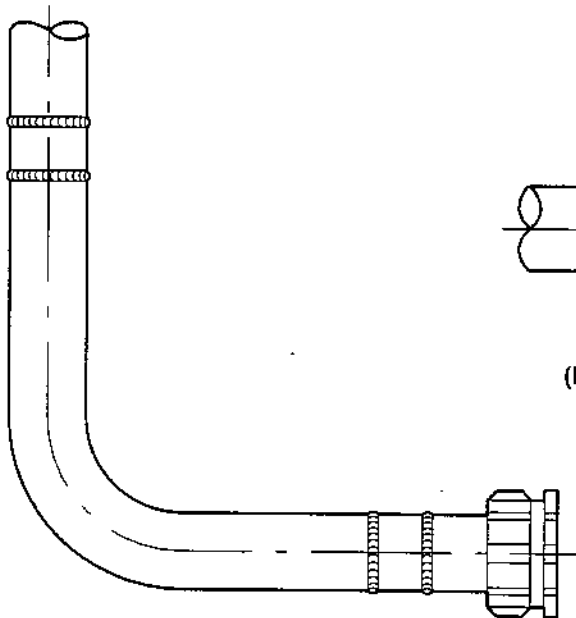
TYPICAL EXAMPLE OF EXTENSIVE
DAMAGE TO A COOLING AIR PIPE

DETAIL N



REPAIRED WITH AN L25 PIPE JOINT
(FITTING RE-USED WITH AN L5 PIPE JOINT)

DETAIL P



REPAIRED USING TWO L5 PIPE JOINTS

DETAIL R

Typical Examples of Final Repaired Condition
Figure 405

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D. Repair Procedure.

(1) Preparation.

NOTE: Refer to relevant cleaning section of Overhaul Manual for tube, prior to repair, for general condition of tube.

- (a) Cut out defective section(s) as shown (Ref. Details C, J, K and L, Figs.402, 403 and 404). Cut-out to be so sized as to conform with intended tube joint length to be used, plus bend(s) when required. Trim ends of tube square to within 0.0015 in. (0,038 mm) of axis.

(2) Inspect.

- (a) Test for cracks (Refer to TSD 594 Op.210).

(3) Weld.

NOTE: Use relevant tube joints (Refer to Fig.402) and any tube bend sections required.

- (a) Mechanised Argon Arc Weld to complete the assembly to master tube gauge form (Refer to Figs.402, 403 and 405, Details D, H, M, N, P and R and TSD 594 Op.409).

- (b) Polish repaired area.

(4) Inspect.

- (a) Test for cracks (Refer to TSD 594 Op.210).
- (b) X-Ray (Refer to TSD 594 Op.221 and 409, Appendix 2).

(5) Final Inspection.

NOTE: Refer to relevant cleaning section of Overhaul Manual for tube, after repair, for general condition of pipe.

- (a) Pressure test to the requirements detailed in relevant repair section.

(6) Identification.

- (a) Mark repair identity as detailed in relevant repair section.

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LP AND HP COMPRESSOR ROTOR BLADES - REPAIR BY IN-SITU BLENDING

1. General

The instructions given in this chapter deal with the in-situ blending and polishing of damaged Stage 1-7 LP and HP Compressor Rotor Blades.

In-situ blending and polishing of the Stage 1 LP compressor rotor blades can be carried out using standard hand tools.

In-situ blending and polishing of Stage 2 to 7 LP compressor rotor blades and Stage 1 to 7 HP compressor rotor blades is achieved through the inspection ports on the LP and HP Compressor Casings using the blade blending kit (Tool Item No.3146).

It is recommended that two skilled operatives be used to assess the extent of blending required before using the procedures contained in this chapter. It is recommended that the Blade Training Aid (Tool Item No.3169) is used to maintain operatives blending proficiency, using scrapped blades.

The debris produced by this process will not normally be harmful to the engine. However, if large pieces of blade become detached during the procedure, contact the Olympus 593 Project Office, Rolls-Royce plc, Filton, Bristol.

2. Tools and Equipment

Blade Blending Kit (Tool Item No.3146) S3S.20282000
Comprising:

Blending Tool	5.08036.002
Boroscope	6.04044.072
Power Unit	5.00024.95
Power Unit Supply Cable (13 A Plug)...	72325.178
Power Unit Supply Cable (16 A Plug)...	72325.179
Tool Set (Box 1) (Ref. Table 801)	5.00301.123
Tool Set (Box 2) (Ref. Table 801)	5.00301.223
Tool Set Measurement (Box 3)	5.00301.134

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LPC STAGE	LENGTH (MM)	CARBIDE ROUNDED CONE FORM 1	CARBIDE BALL FORM 3	DIAMOND ROUNDED CONE FORM 10	DIAMOND BALL FORM 8	POLISHER DIAMOND BALL FORM 4
7LE	45	5.00345.001	5.00345.003	5.00345.010	5.00345.008	5.00345.004
3LE, 4TE	50	5.00350.001	5.00350.003	5.00350.010	5.00150.008	5.00350.004
1TE, 2LE, 2TE, 3LE, 5TE	55	5.00355.001	5.00355.003	5.00355.010	5.00355.008	5.00355.004
3TE	60	5.00360.001	5.00360.003	5.00360.010	5.00360.008	5.00360.004
1TE, 6LE	65	5.00365.001	5.00365.003	5.00365.010	5.00365.008	5.00365.004

HPC STAGE	LENGTH (MM)	CARBIDE ROUNDED CONE FORM 1	CARBIDE BALL FORM 3	DIAMOND ROUNDED CONE FORM 10	DIAMOND BALL FORM 8	POLISHER DIAMOND BALL FORM 4
5TE, 6LE	20	5.00320.001	5.00320.003	5.00320.010	5.00120.008	5.00320.004
4LE, 5TE, 7TE, (LPC5LE)	25	5.00325.001	5.00325.003	5.00325.010	5.00125.008	5.00325.004
1TE, 2LE, 2TE, 3LE, 3TE, 4LE, 5LE (LPC5LE)	30	5.00330.001	5.00330.003	5.00330.010	5.00330.008	5.00330.004
1TE, 3TE, 4TE, (LPC3LE) 4LE, 4TE, 5TE, 6TE, 7LE, 7TE	35	5.00335.001	5.00335.003	5.00335.010	5.00335.008	5.00335.004
2LE	40	5.00340.001	5.00340.003	5.00340.010	5.00340.008	5.00340.004

Tool Selection
Figure 401

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Blade Blending Training Aid (Tool Item No.3169) S3S.20592000

Adaptor and Immobiliser (Tool Item No.3147) ... S3S.20255000

Equipment Reference Manuals:

General Operating and Troubleshooting ... GA-T023

Olympus Mk.593-610 Specific BB-T023-5

3. Blade Blending Training Aid

A. General

- (1) This equipment provides a means of maintaining proficiency in the techniques necessary to perform in-situ blade blending.
- (2) The equipment comprises a box housing a simulation of a 3 blade section (stages 2, 3 and 4) of the HP compressor rotor. These stages provide blade samples of varying section and both materials used in the compressor (titanium and nimonic 90).
- (3) The rotor block is fitted with a tilt mechanism enabling the rotor blades to be moved relative to the stator vanes. This enables the user to achieve the optimum position for the selected blend.
- (4) Calibration blades are included in a separate compartment, and provide engraved damage marks equivalent to the maximum allowable per zone, per stage.

B. Equipment Operation

- (1) Load calibration blade(s) into position and tighten clamp block to secure.
- (2) Close box and place in a position to best suit the operator.
- (3) Assess damage using blending tool fitted with comparator head.
- (4) Remove calibration blade(s).



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- (5) Load 'scrap' blade(s) into position, and tighten clamp block to secure.
- (6) Assess damage using blending tool fitted with comparator head.
- (7) Record details of damage.
- (8) Replace with cutting tools and blend defect until removed.
- (9) Replace cutting tool with comparator head and reassess size of blended defect.
- (10) Open box, remove blade and review acceptability of blend against criteria as detailed in repair procedure.

4. Terminology for Damage

A. Apply the following definitions to the terms used to describe damage to the LP and HP compressor rotor blades:

- (1) Bend. A sharp deviation from original line or plane (associated terms, crease, fold, kink, lean).
- (2) Crack. Visible partial separation of material which may progress to a complete break (a break is defined as a separation by force into two or more pieces).
- (3) Curl. Tips of blades or vanes curled over due to rubbing.
- (4) Dent. An indentation usually caused by impact of an object; parent metal is displaced, seldom separated.
- (5) Nick. A sharp surface indentation.
- (6) Score. Deep scratch.
- (7) Scratch. Light, narrow, shallow mark; material is not removed.
- (8) Tear. Separation by pulling apart.

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5. Repair Limitations

- A. In-situ Blending and polishing repairs are only possible on the blade areas given in Table 401 and to the limits given in Figures 409, 410, 411, 412, 413, 414, 415, 416, 417, 418 and 419.

Blade	Area	Repair Possible
LP Stage 1	Leading Edge Trailing Edge	HAND TOOLS ONLY HAND TOOLS ONLY
LP Stage 2	Leading Edge Trailing Edge	YES YES
LP Stage 3	Leading Edge Trailing Edge	YES YES
LP Stage 4	Leading Edge Trailing Edge	YES YES
LP Stage 5	Leading Edge Trailing Edge	YES YES
LP Stage 6	Leading Edge Trailing Edge	YES YES
LP Stage 7	Leading Edge Trailing Edge	YES YES
HP Stage 1	Leading Edge Trailing Edge	NO YES
HP Stage 2	Leading Edge Trailing Edge	YES YES
HP Stage 3	Leading Edge Trailing Edge	YES YES
HP Stage 4	Leading Edge Trailing Edge	YES YES
HP Stage 5	Leading Edge Trailing Edge	YES YES

Table 401 - LP and HP Compressor Rotor Blade Repair Areas
Continued

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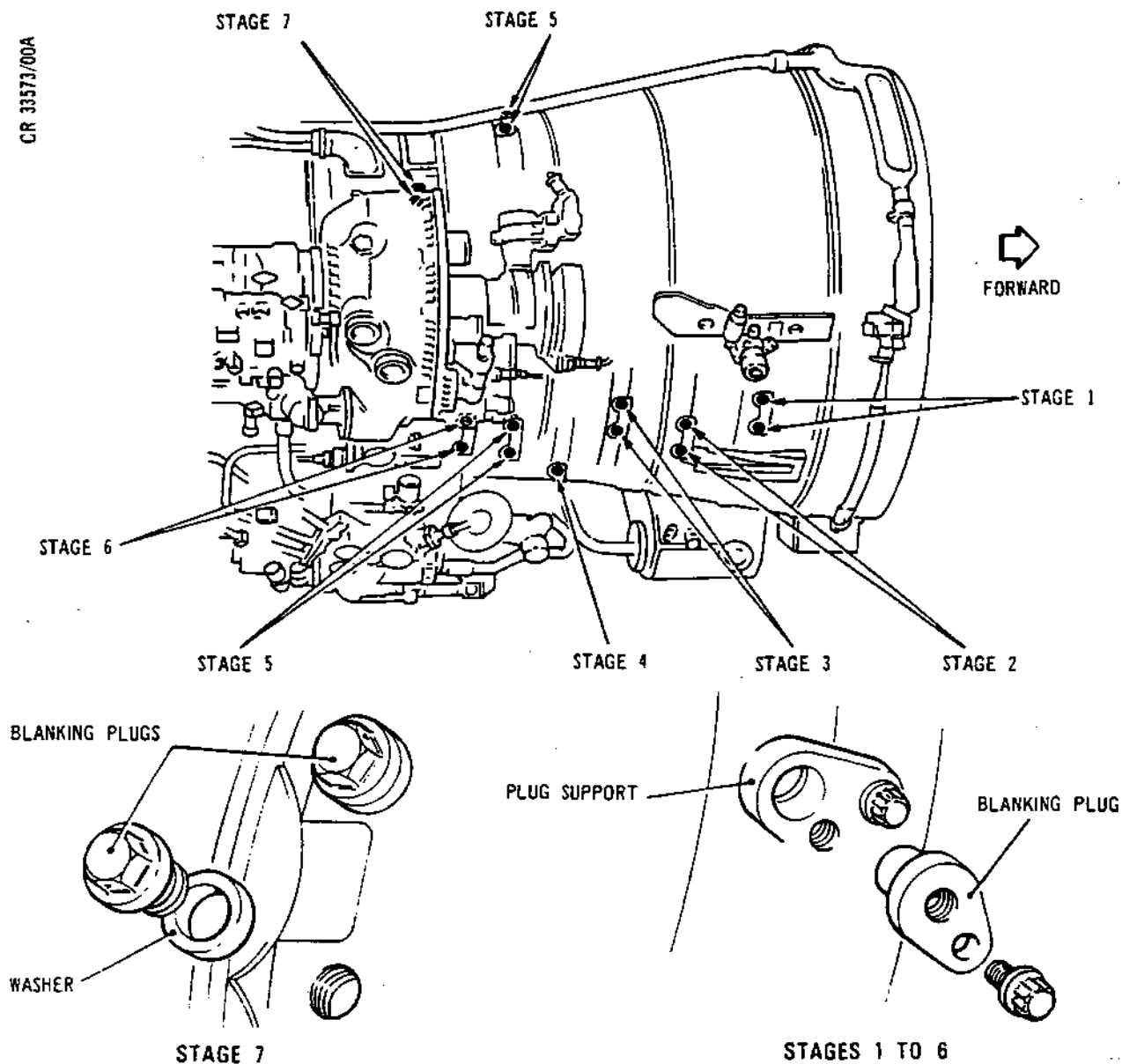
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LP Compressor Casing - Right-Hand Side Inspection Port Locations
Figure 402

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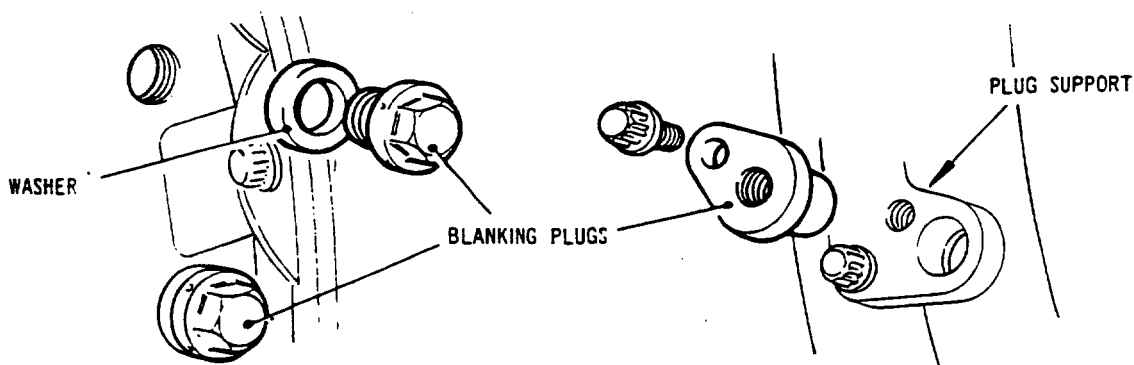
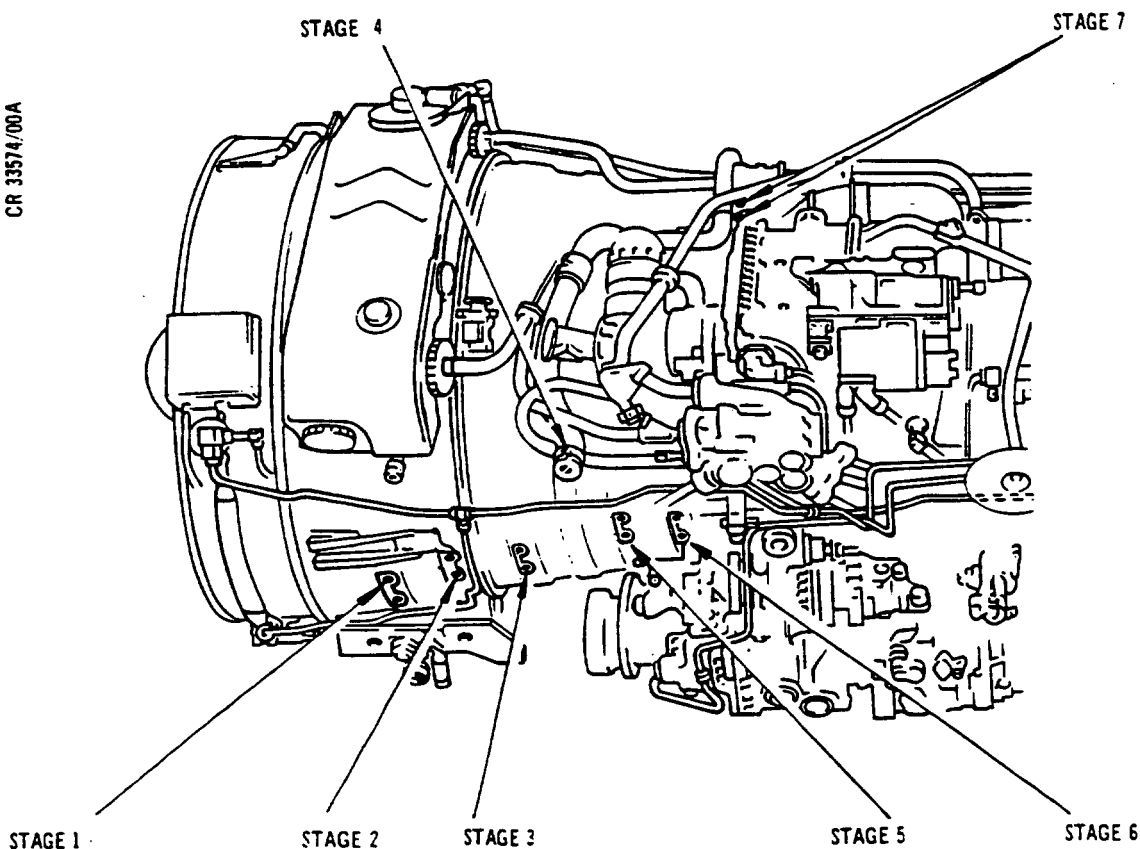


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STAGE 7

STAGES 1 TO 6

LP Compressor Casing - Left-Hand Side Inspection Port Locations
Figure 403

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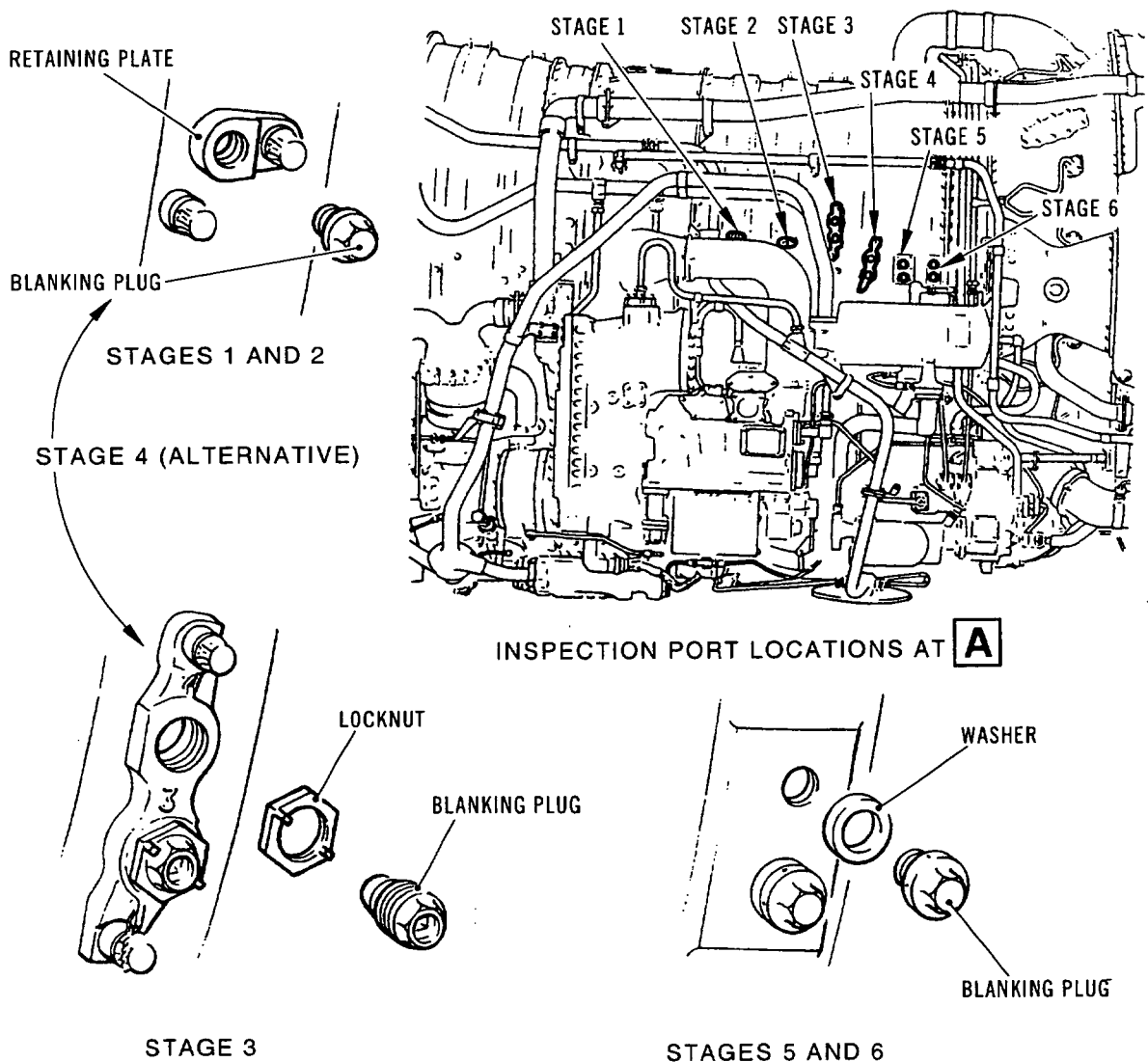
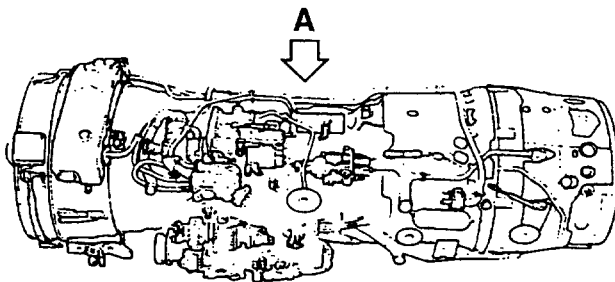
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HP Compressor Casing - Left-Hand Side Inspection Port Locations
Figure 404 (Sheet 1 of 2)

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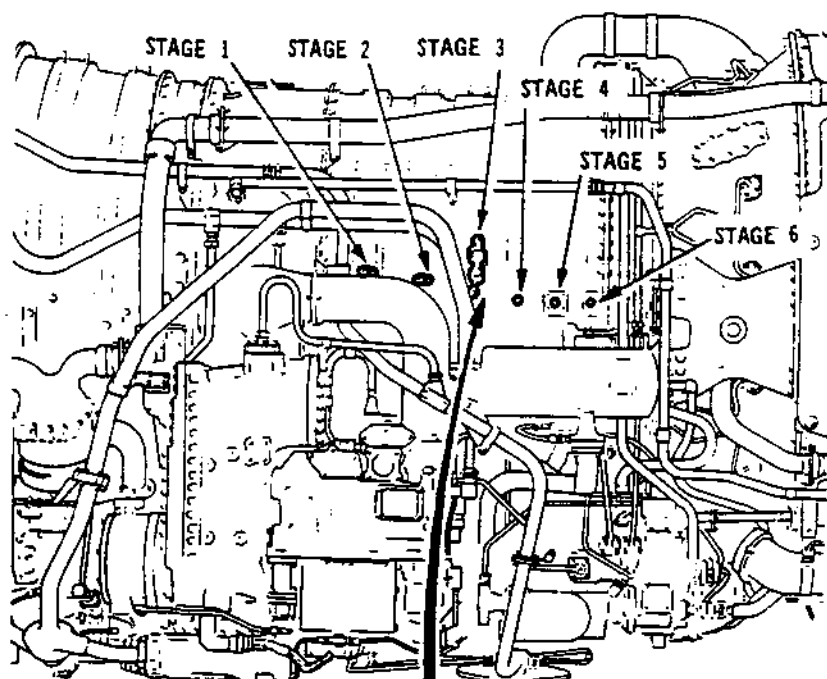


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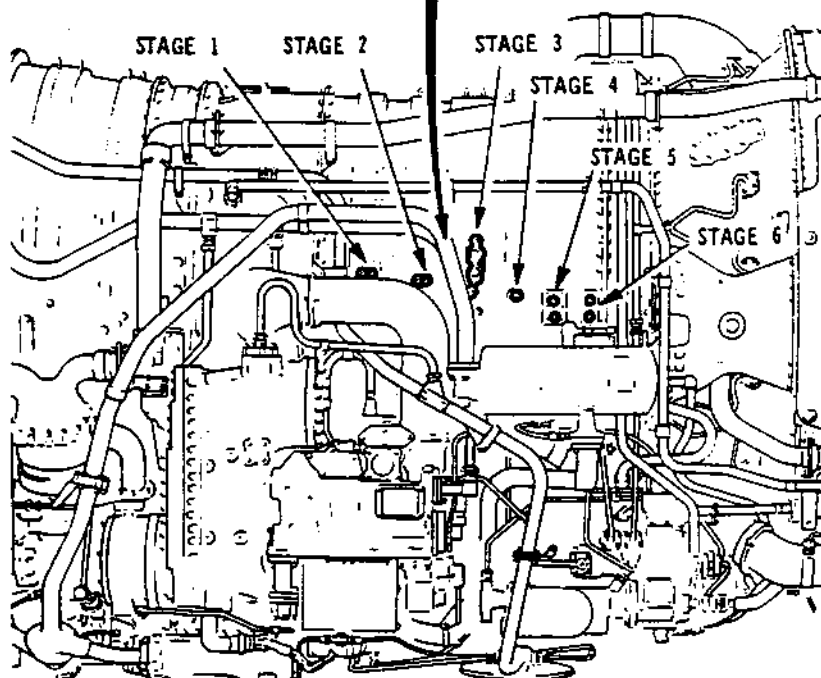


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ALTERNATIVE INSPECTION PORT LOCATIONS AT



HP Compressor Casing - Left-Hand Side Inspection Port Locations
Figure 404 (Sheet 2 of 2)

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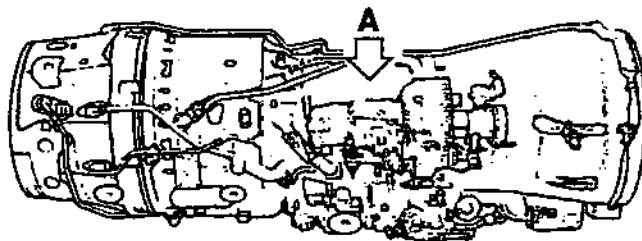
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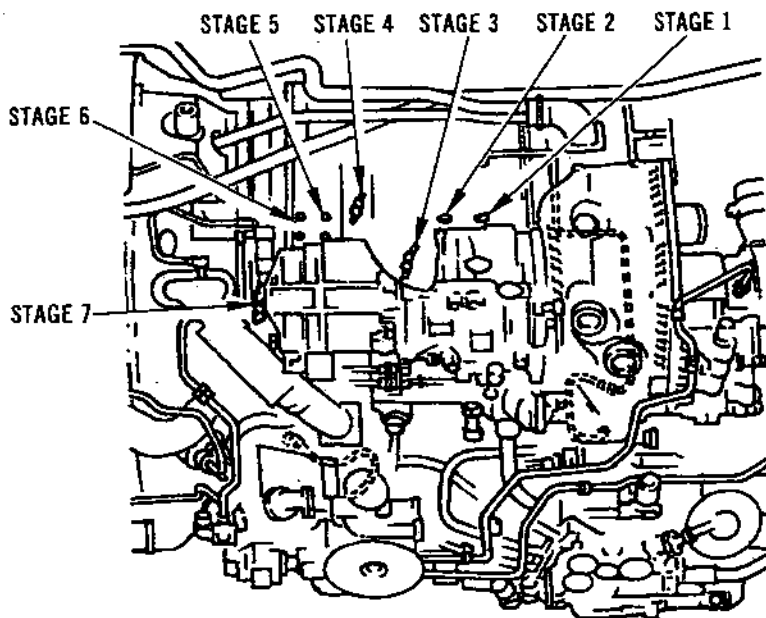


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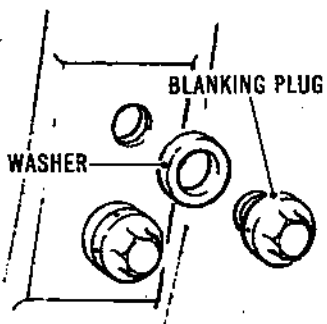
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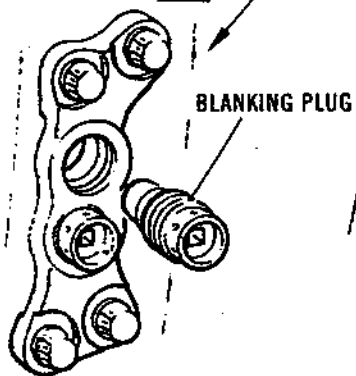
FORWARD



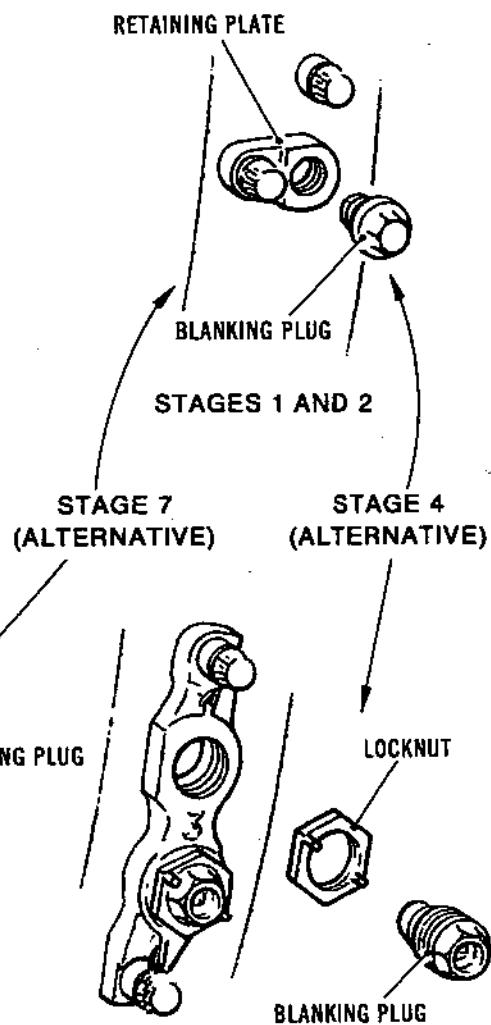
INSPECTION PORT LOCATIONS AT **A**



STAGES 5 AND 6



STAGE 3



HP Compressor Casing - Right-Hand Side Inspection Port Locations
Figure 405 (Sheet 1 of 2)

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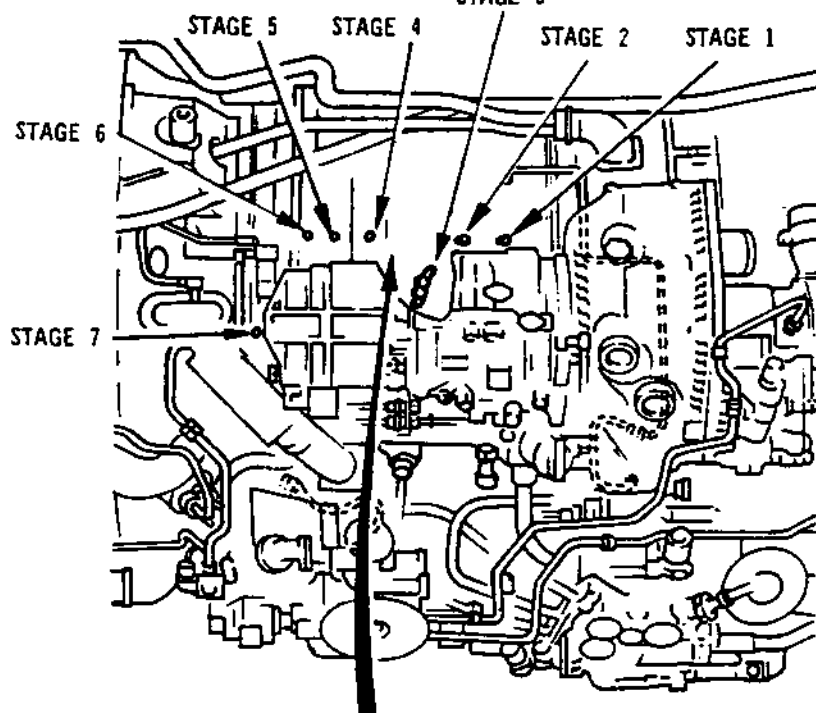


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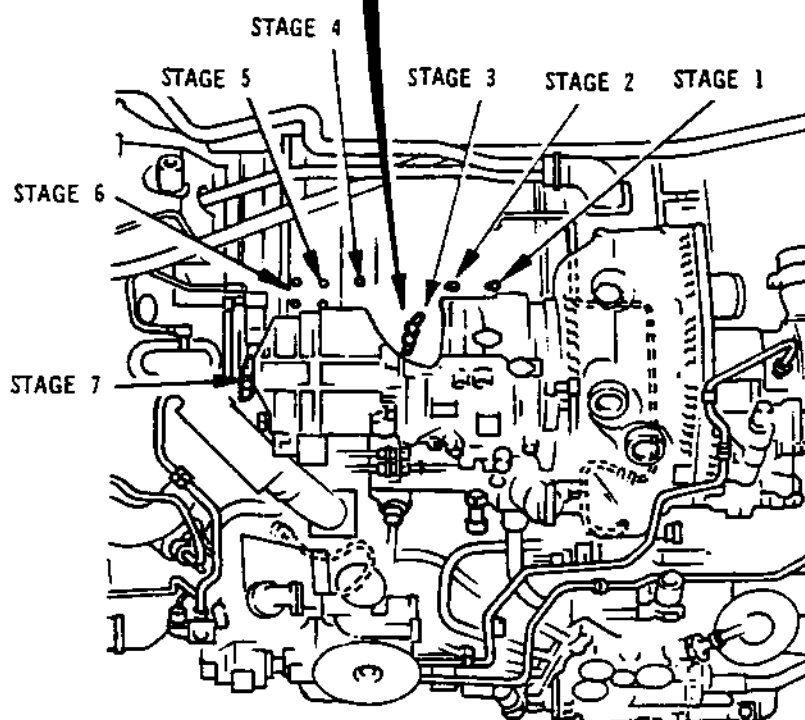
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STAGE 3



ALTERNATIVE INSPECTION PORT LOCATIONS AT



HP Compressor Casing - Right-Hand Side Inspection Port Locations
Figure 405 (Sheet 2 of 2)

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Blade	Area	Repair Possible
HP Stage 6	Leading Edge	YES
	Trailing Edge	NO
HP Stage 7	Leading Edge	NO
	Trailing Edge	YES

Table 401 - LP and HP Compressor Rotor Blade Repair Areas
Concluded

- B. Blades with dents, which deform the opposite surface of the blade, are not acceptable for blending; reject blades with this form of damage.
- C. Blends must exceed the depth of damage by 20 per cent.
- D. Blends must not run out into Zone X.
- E. Only blends to rectify minor damage to a maximum depth of 0.010 in. (0,25 mm) are allowed in Zone X.
- F. Due to limited access through the inspection ports on LP compressor Stages 2-7 and HP compressor Stages 1 to 7, it is not possible to carry out blending to the tip of the blades. Damage should therefore be assessed prior to commencing any repair, to ensure that tool access is sufficient to allow full blend radii to be achieved without creating a 'hooked' aerofoil (Ref. Fig.419).

6. Prepare Engine for Repair

- A. Install LP/HP compressor turning Equipment (Ref. 72-09-01 Engine Turning).
- B. Remove or loosen engine-dressing items as necessary to gain access to the blanking plugs on the LP or HP compressor casing as required.
- C. Remove the appropriate blanking plug from the LP or HP compressor casing (Ref. Fig. 402, 403, 404 and 405).

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7. In-Situ Blade Blending Procedures

- A. In-situ blending of Stage 1 LP Compressor Rotor Blades using standard hand-tools (Ref. Fig. 409).

CAUTION 1: DO NOT BLEND CRACKS.

CAUTION 2: IF MECHANICAL BLENDING METHODS ARE USED, ENSURE THAT BLADES ARE NOT OVERHEATED.

- (1) Assess the extent and depth of the damaged blade using the comparator (Ref. Fig.406).

NOTE: This procedure should be carried out by two separate skilled operatives to ensure an accurate assessment.

- (2) Carry out a dye penetrant inspection of all damaged areas before and after blending. (Ref. 72-09-00 Inspection/Check).
- (3) For blends carried out on edge only, the depths D and E must not exceed 0.600 in. (15,0 mm) and 0.250 in. (6,0 mm) respectively.
- (4) For blends carried out on both edges, the depths D and E must not exceed 0.300 in. (8,0 mm) and 0.120 in. (3,0 mm) respectively.
- (5) If blends interfere, metal must be removed to produce a coupled blend.
- (6) A maximum of two blends or one coupled blend per zone is permitted.
- (7) Torn, rough or scored edges must be blended to a depth 20 per cent greater than the damage depth.
- (8) Blends must be smoothly profiled into the aerofoil shape. Leading and trailing edges should be blended into a radius and should not leave a knife-edge.
- (9) Defective areas and blends to be polished to produce a good surface finish.

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- B. In-situ blending of Stage 2-7 LP Rotor Blades and Stage 1-7 HP Rotor Blades using Blade Blending Kit (Tool Item No.3146) (Ref. Figs. 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418 and 419).

(1) General tool selection and operation

- (a) Select the appropriate cutter according to which stage and area of blade requires blending (Ref. Fig. 401)

NOTE: The tools are listed as a guide only, operators may choose to use a different length cutter or polisher to that specified for a certain stage.

- (b) Information regarding the sizes and type of blade material are given in Table 402 - LP and HP Compressor Rotor Blade Information, to further assist in the cutter selection.

- (c) The blade blending kit may be used on its own or in conjunction with a CCD camera attachment and TV monitor.

DESCRIPTION	MATERIAL	QTY	MAX WIDTH		AEROFOIL LENGTH	
			*INCH	MM	INCH	MM
LP STAGE 1	TITANIUM	19	6.50	165,0	15.00	381,0
LP STAGE 2	TITANIUM	25	4.70	120,0	13.00	330,0
LP STAGE 3	TITANIUM	33	3.30	83,0	11.00	279,0
LP STAGE 4	TITANIUM	34	3.20	81,0	10.00	254,0
LP STAGE 5	TITANIUM	33	3.20	81,0	9.00	229,0
LP STAGE 6	TITANIUM	29	3.40	87,0	8.00	203,0
LP STAGE 7	TITANIUM	33	2.90	73,0	7.50	191,0

*ROUNDED FIGURES

Table 402 - LP and HP Compressor Rotor
Blade Information (Continued)

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DESCRIPTION	MATERIAL	QTY	MAX WIDTH		AEROFOIL LENGTH	
			*INCH	MM	INCH	MM
HP STAGE 1	TITANIUM	34	3.50	88,0	7.00	178,00
HP STAGE 2	TITANIUM	54	2.40	60,0	6.50	165,00
HP STAGE 3	TITANIUM	55	2.00	51,0	5.00	127,00
HP STAGE 4	NIMONIC	69	1.90	47,0	4.00	102,00
HP STAGE 5	NIMONIC	81	1.80	45,0	3.50	89,00
HP STAGE 6	NIMONIC	83	1.80	45,0	3.00	76,00
HP STAGE 7	NIMONIC	105	1.50	38,0	2.50	64,00

*ROUNDED FIGURES

Table 402 - LP and HP Compressor Rotor
Blade Information (Concluded)

- (d) The comparator is installed in the tool head and used in place of a cutter to inspect and assess the extent of the damaged blades (Ref. Fig.406).
- (e) It is recommended that a large diameter boroscope is used periodically instead of the blending kit boroscope for inspection of the blend, this will enable a clearer view of the blend.
- (2) Procedure (Ref. Figs. 406, 407 and 408)

CAUTION: THE LP/HP COMPRESSOR ROTOR MUST BE LOCKED BEFORE ATTEMPTING ANY MEASUREMENT OR REPAIRS.

- (a) Lock the LP/HP compressor rotor in the required position using the adaptor and immobiliser (Tool Item No.3147). Due to the geometry of the blades, it may be necessary to unlock, rotate and re-lock the rotor to obtain the optimum position for blending (Ref. Fig.407).

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- (b) Assess the extent and depth of the damaged blade using the comparator (Ref. Fig.406).

NOTE: This procedure should be carried out by two separate skilled operatives to ensure an accurate assessment.

- (c) Assess the suitability for repair in accordance with paras. 7 and 8.

CAUTION: THE CUTTER IS LOCATED IN THE HEAD USING A TWIN SCREW THREAD. BEFORE USING THE BLADE BLENDING TOOL, ENSURE THAT THE CUTTER IS LOCATED CORRECTLY IN THE HEAD. THERE SHOULD BE NO GAP BETWEEN THE CUTTER SHANK AND THE TOOL HEAD.

CAUTION: BEFORE USE, ENSURE THAT THE DIRECTION OF CUTTER ROTATION IS CORRECT. WHEN VIEWED FROM ABOVE, THE TOOL MUST ROTATE ANTI-CLOCKWISE.

CAUTION: BEFORE USE, ENSURE THAT THE BOROSCOPE, IS CORRECTLY LOCKED IN THE TOOL.

- (d) Select and install the appropriate cutter in the tool head (Ref. Para. 6.B.(1)).

- (e) Straighten the tool head and insert the blending scope through the inspection port.

CAUTION: DO NOT SWITCH THE CUTTER ON BEFORE ARTICULATING THE TOOL HEAD. THIS WILL RESULT IN THE DISENGAGEMENT OF THE CUTTER DRIVE BELT.

- (f) Articulate the tool head through approximately 90 degrees, visually check the cutter position in relation to the blade, then switch on and select a high-speed setting.

NOTE: The operating range of the tool is between 80 - 100 degrees. The tool will not operate when the tool head is articulated outside of this range.

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CAUTION: DURING BLENDING OPERATIONS, CARE MUST BE TAKEN TO AVOID TOOL HEAD AND SHANK CONTACT WITH ADJACENT BLADES.

(g) Carry out roughing cuts to remove damage.

NOTE: If too much pressure is applied to the tool, the cutter may stop due to belt slippage. If this happens carefully release the pressure and resume cutting.

(h) Switch off the cutter, articulate the tool head straight and withdraw the blending scope from the engine.

(i) Remove the cutter from the tool head. Select and install a radius cutter (Ref. Para. 6.B.(1)).

(j) Straighten the tool head and insert the blending scope through the inspection port.

CAUTION: DO NOT SWITCH THE CUTTER ON BEFORE ARTICULATING THE TOOL HEAD. THIS WILL RESULT IN THE LOSS OF THE CUTTER DRIVE BELT.

(k) Articulate the tool head through approximately 90 degrees, visually check the cutter position in relation to the blade, then switch on and select a high-speed setting.

NOTE: The operating range of the tool is between 80 - 100 degrees. The tool will not operate when the tool head is articulated outside of this range.

CAUTION: DURING BLENDING OPERATIONS, CARE MUST BE TAKEN TO AVOID TOOL HEAD AND SHANK CONTACT WITH ADJACENT BLADES.

(l) Carry out radius cutting.

NOTE: If too much pressure is applied to the tool, the cutter may stop due to belt slippage. If this happens carefully release the pressure and resume cutting.

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- (m) Switch off the cutter, articulate the tool head straight and withdraw the blending scope from the engine.
- (n) Remove the cutter from the tool head. Select and install a polisher (Ref. Para. 6.B.(1)).
- (o) Straighten the tool head and insert the blending scope through the inspection port.

CAUTION: DO NOT SWITCH THE CUTTER ON BEFORE ARTICULATING THE TOOL HEAD. THIS WILL RESULT IN THE LOSS OF THE CUTTER DRIVE BELT.

- (p) Articulate the tool head through approximately 90 degrees, visually check the cutter position in relation to the blade, then switch on and select a high-speed setting.

NOTE: The operating range of the tool is between 80 - 100 degrees. The tool will not operate when the tool head is articulated outside of this range.

CAUTION: DURING BLENDING OPERATIONS, CARE MUST BE TAKEN TO AVOID TOOL HEAD AND SHANK CONTACT WITH ADJACENT BLADES.

- (q) Carry out finish polishing.

NOTE: If too much pressure is applied to the tool, the cutter may stop due to belt slippage. If this happens carefully release the pressure and resume polishing.

- (r) Switch off the polisher, articulate the tool head straight and withdraw the blending scope from the engine.
- (s) Remove the polisher from the tool head; install comparator.
- (t) Inspect and measure the blend using the comparator (Ref. Fig. 406).
- (u) Record details of the repair.

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- (3) Remove in-situ blade blending equipment.
 - (a) On completion of in-situ blade blending repair, remove blending tool from engine.
 - (b) Ensure that the power supply is switched off, then disconnect the power unit.
 - (c) Dismantle in-situ blade blending equipment and stow in appropriate storage containers.
 - (d) Remove the LP and/or HP compressor turning equipment (Ref. 72-09-01 Hand Turning).
- (4) Blending repair limits (Ref. Figs. 409, 410, 411, 412, 413, 414, 415, 416, 417, 418 and 419)
 - (a) Blend torn, rough or scored edges to depth 20 per cent greater than the depth of damage measured using the comparator (Ref. Fig.406) provided that specified limits are not exceeded.
 - (b) If blends interfere, metal must be removed to produce a coupled blend.

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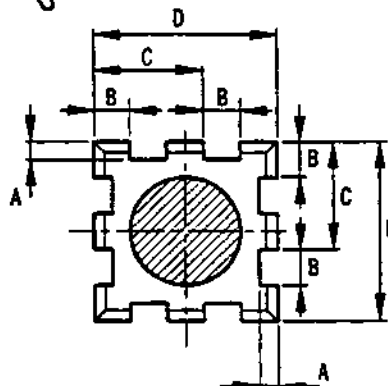
BLENDING SCOPE

TOOL HEAD

COMPARATOR

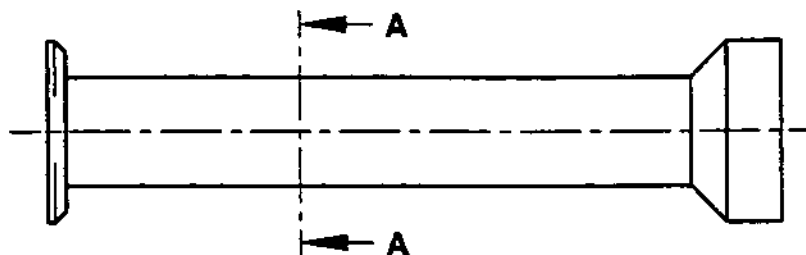
LP COMPRESSOR BLADE

VIEW OF TOOL AND BLADE
DAMAGE ENLARGED FOR CLARITY



SECTION A - A

A	0.020 (0.50)
B	0.040 (1.00)
C	0.120 (3.00)
D	0.200 (5.00)



VIEW OF THE COMPARATOR
ENLARGED FOR CLARITY

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Measurement and assessment of Damaged Blades
Figure 406

BS0001535/1

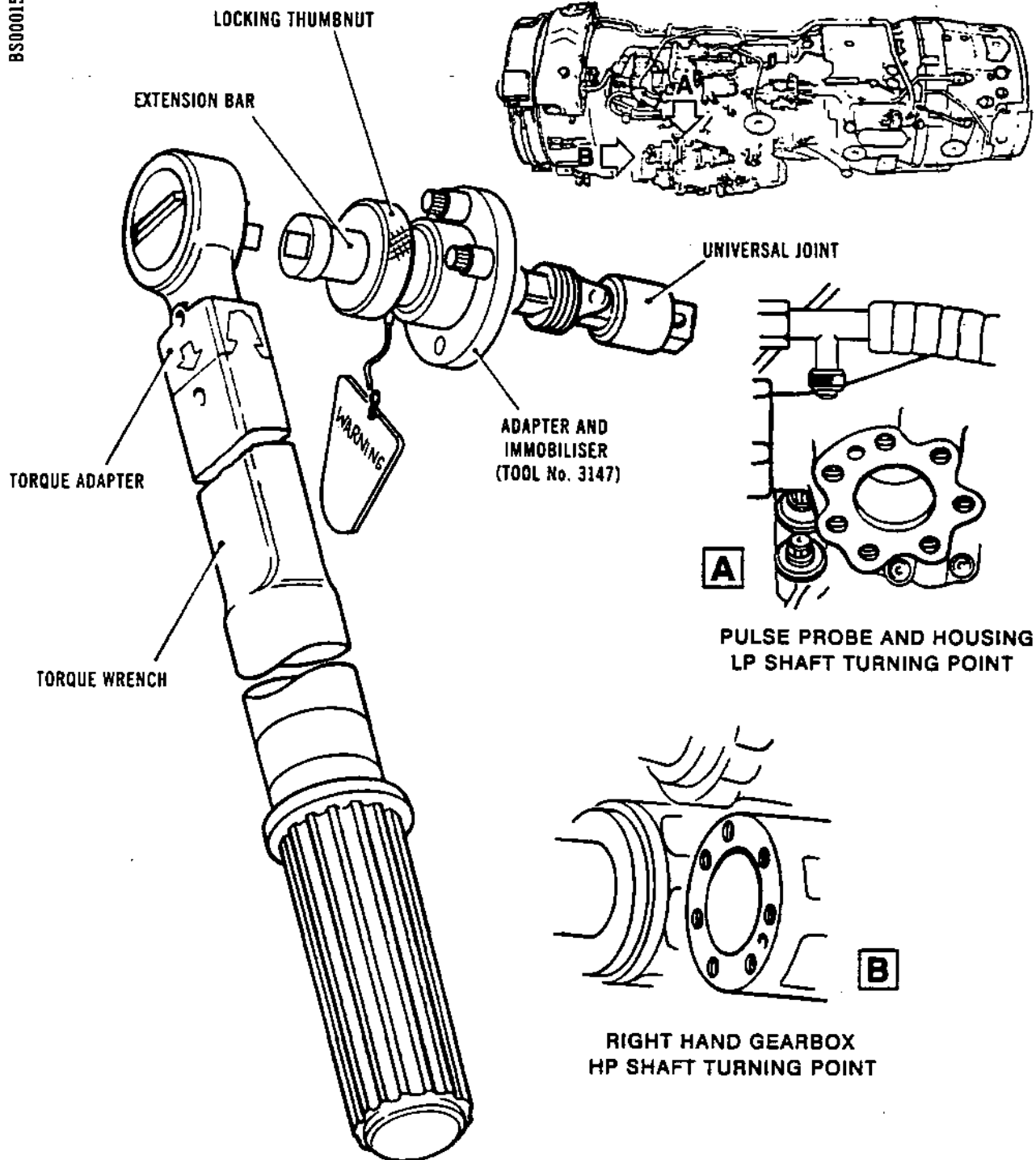


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Locking the LP and HP Compressor Rotor
Figure 407

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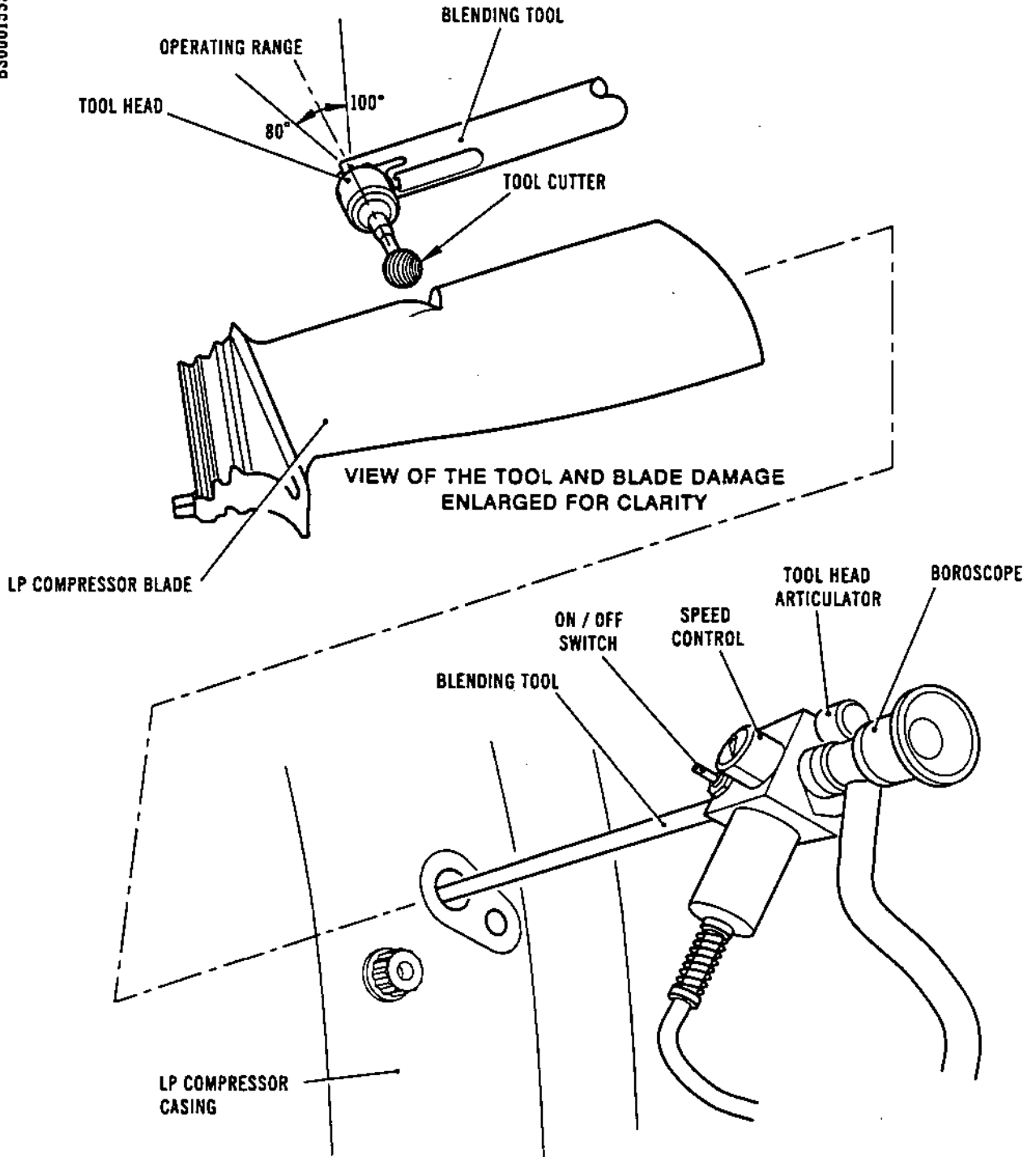


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In-Situ Blade Blending Tool
Figure 408

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- (c) Blends must be smoothly profiled into the aerofoil shape. Leading and trailing edges should be blended into a radius and should not leave a knife-edge.
- (d) Polish all blends and defective areas to achieve a good surface finish with no machining marks.
- (e) Remove only the minimum amount of material consistent with specified requirements and dimensions.
- (f) In Zone X, the maximum blend depth is limited to 0.010 in. (0.25 mm) maximum.
- (g) For opposing blends the chordal width must not be reduced by more than A, B or C, as applicable.
- (h) The blending and polishing of marks is acceptable only in a radial direction, from root to tip. Some residual post blending MINOR marking around the blend is acceptable.

8. Assessment of Amount of Blending per Blade (All Stages)

A. General

- (1) Blades may be blended in several positions provided that the total extent of blending is not more than the equivalent of two blends in the maximum zone Z.
- (2) The depth of blending is controlled by the zonal location of the damage.
- (3) The maximum permissible number of blended blades per stage, when blended to maximum limits is identified as L on the illustrations.
- (4) Where blades are not blended to the permissible maximum, this number (Ref. Para C.) may be increased, provided that the aggregate of the blending does not exceed L.

B. Permissible blending is controlled by depths. Example for LP Compressor Stage 1 blade.

- (1) 0.600 in. (15,24 mm) depth x two blends = 1.200 in. (30,48 mm) total = maximum blended blade.

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- (2) This maximum may be obtained as defined in (a), (b) or (c), or by any combination of depths the total of which does not exceed 1.200 in. (30,48 mm).
 - (a) 0.300 in. (7,62 mm) depth x four blends.
 - (b) 0.150 in. (3,81 mm) depth x eight blends.
 - (c) 0.100 in. (2,54 mm) depth x twelve blends.
- C. Permissible blending is controlled by depths. Example for HP Compressor Stage 1 blade.
 - (1) 0.150 in. (3,81 mm) depth x two blends = 0.300 in. (7,62 mm) total = maximum blended blade.
 - (2) This maximum may be obtained as defined in (a), (b) or (c), or by any combination of depths the total of which does not exceed 0.300 in. (7,62 mm).
 - (a) 0.100 in. (2,54 mm) depth x three blends.
 - (b) 0.075 in. (1,90 mm) depth x four blends.
- D. One coupled blend = two blends.
- E. Dimension D blend = one blend.
- F. Dimension E blend = half blend (depth assessed as RADIUS divided by 2).
- 9. Assessment of Blending Equivalent to L Number of Blended Blades Per Stage
 - A. Example for LP Compressor Stage 1 blade.
 - (1) L = three blades x 1.200 in. (30,48 mm) depth = 3.600 in. (91.44 mm) aggregate depth.
 - (2) This aggregate may be obtained as defined in (a), (b) or (c), or by any aggregate of blended blades which does not exceed 3.600 in. (91,44 mm).
 - (a) 0.900 in. (22,86 mm) depth x four blades.
 - (b) 0.600 in. (15,24 mm) depth x six blades.
 - (c) 0.300 in. (7,62 mm) depth x twelve blades.

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B. Example for HP Compressor Stage 1 blade.

- (1) L = three blades x 0.300 in. (7,62 mm) depth = 0.900 in. (22,86 mm) aggregate depth.
- (2) This aggregate may be obtained as defined in (a) or (b), or by any aggregate of blended blades which does not exceed 0.900 in. (22,86 mm).
 - (a) 0.180 in. (4,57 mm) depth x five blades.
 - (b) 0.150 in. (3,81 mm) depth x six blades.

10. Install Blanking Plugs and Engine-Dressing Items.

- A. Assemble all blanking plugs removed to gain access to the LP and/or HP compressor rotor blades (Ref. 72-09-03 Inspection/Check).
- B. Assemble and secure all engine-dressing items removed or loosened to gain access to the LP and/or HP compressor case blanking plugs.

11. Conclusion

- A. Ensure repair details are recorded.
- B. A post repair inspection should be carried out after 10 flight hours and then again at the next S inspection at 230 hrs. (Ref. 72-09-03 - Inspection/Check).
- C. Rolls Royce Limited/SNECMA reserve the right to amend all or part of the acceptance standards stated in this repair procedure, as engine operational experience, with damaged blades, is gained.

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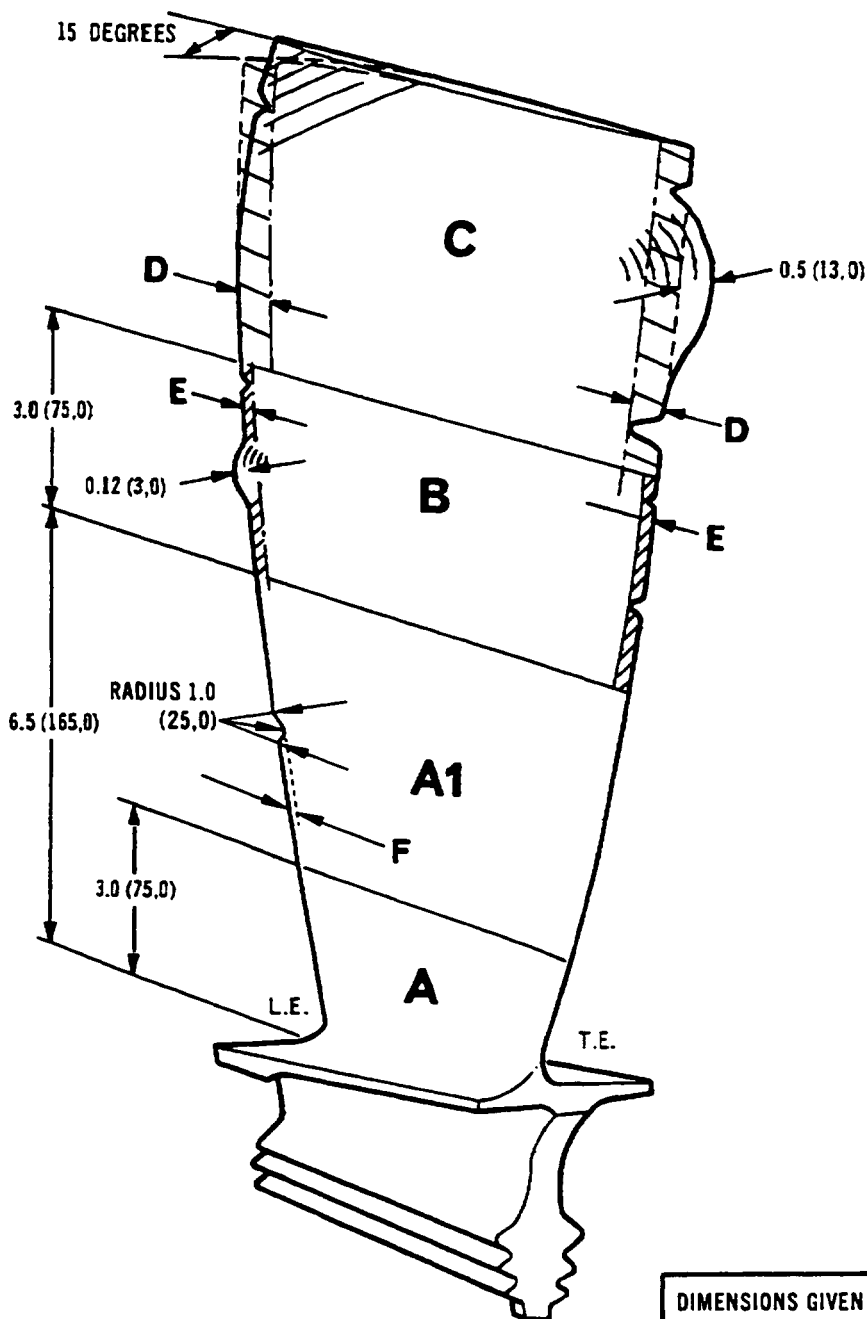


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Stage 1 LP Rotor Blade - In-Situ Blending Standard
Figure 409

BS00015354/1

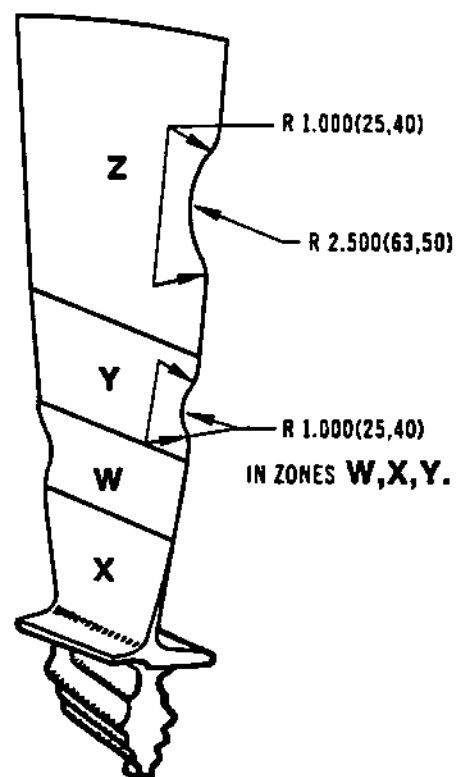
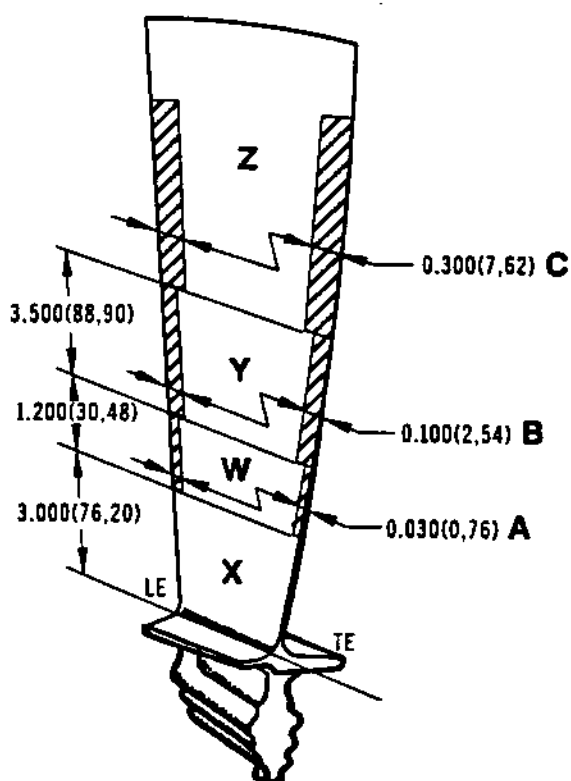


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IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX., PERMITTED.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 4.

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Stage 2 LP Rotor Blade - In-Situ Blending Standard
Figure 410

REPAIR

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BS00015355/1



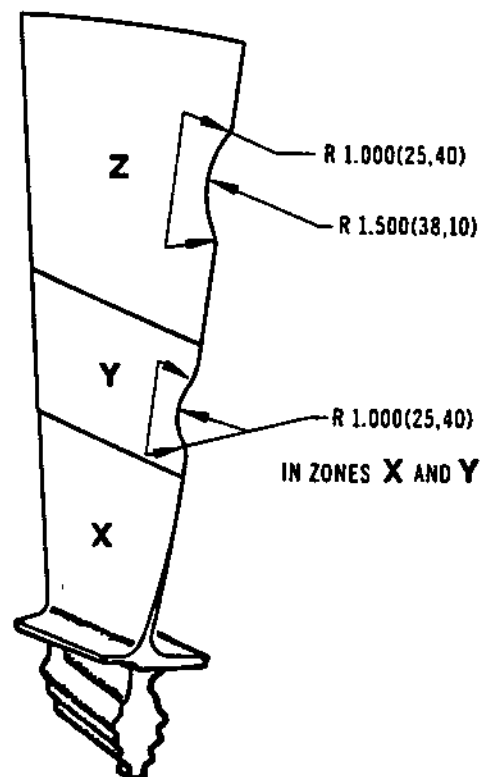
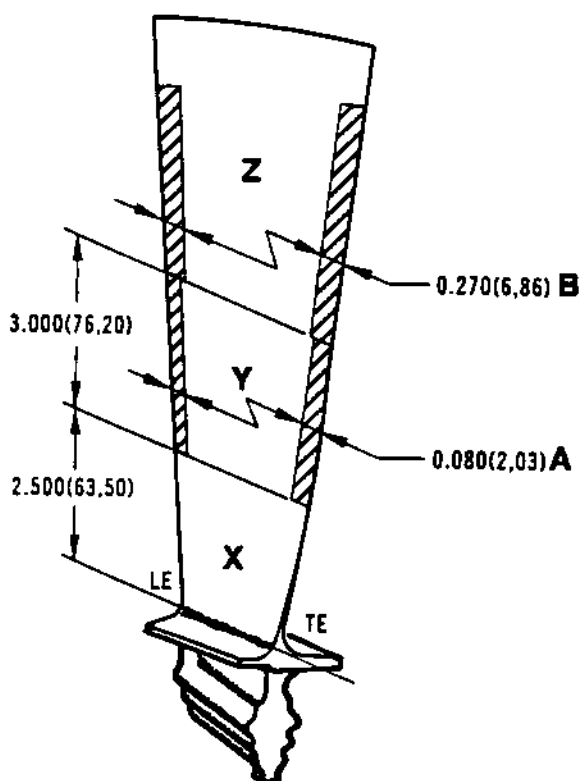
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RADII TO BLEND SMOOTHLY INTO AEROFOIL SHAPE.



IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX., PERMITTED.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 4.

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Stage 3 LP Rotor Blade - In-Situ Blending Standard
Figure 411

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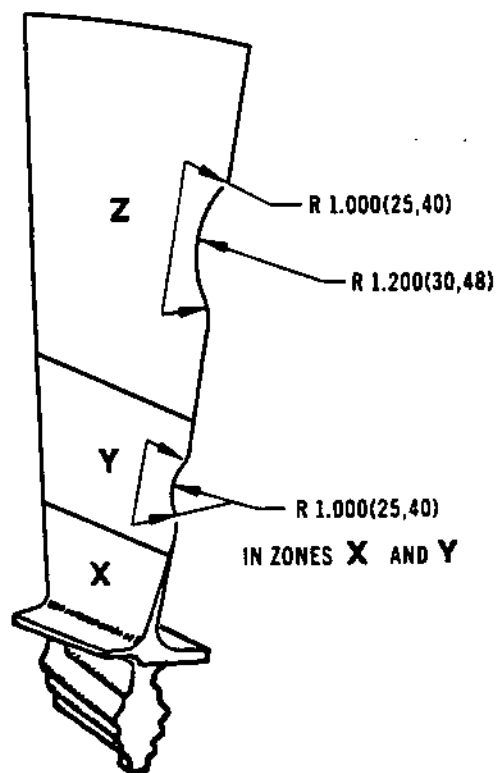
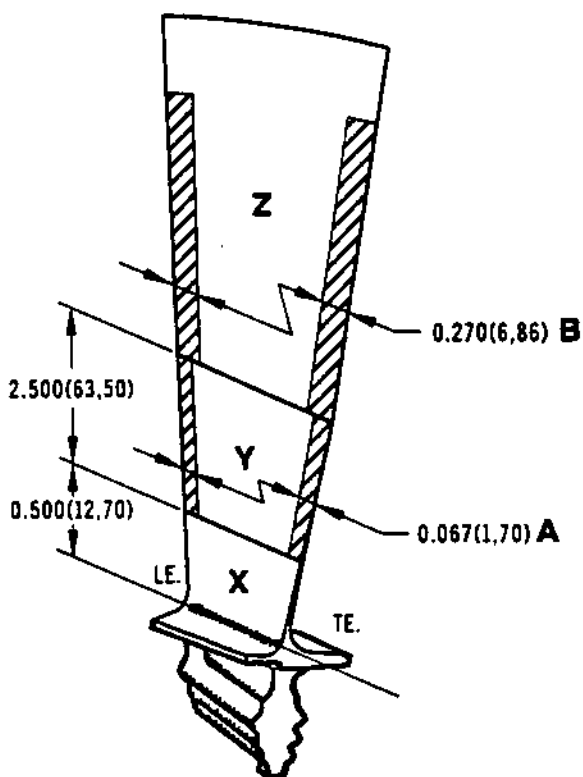
OLYMPUS 593



MK.610-14-28
OVERHAUL

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RADI TO BLEND SMOOTHLY INTO AEROFOIL SHAPE.



IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX., PERMITTED.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 4.

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Stage 4 LP Rotor Blade - In-Situ Blending Standard
Figure 412

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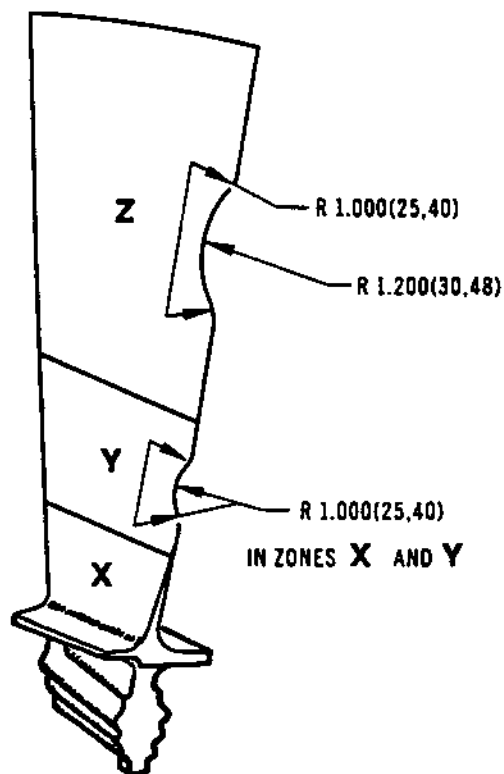
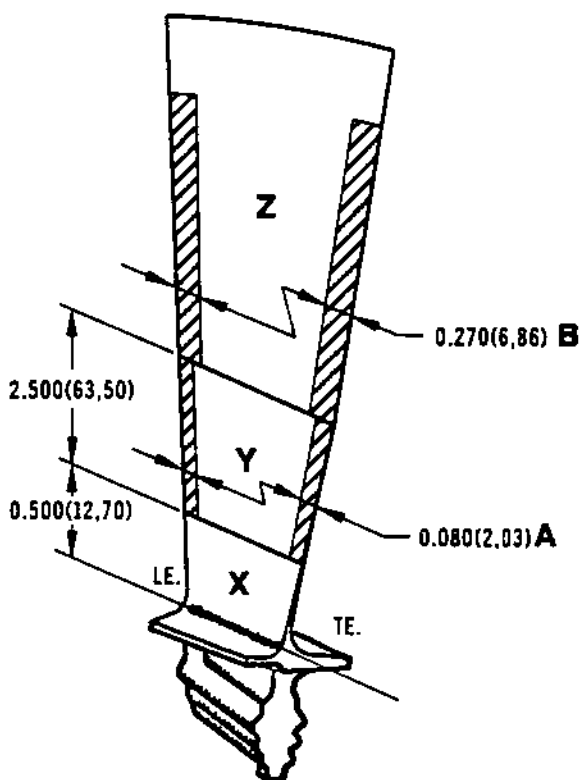


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RADI TO BLEND SMOOTHLY INTO AEROFOIL SHAPE.



BS00015358/1



IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX., PERMITTED.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 4.

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Stage 5 LP Rotor Blade - In-Situ Blending Standard
Figure 413

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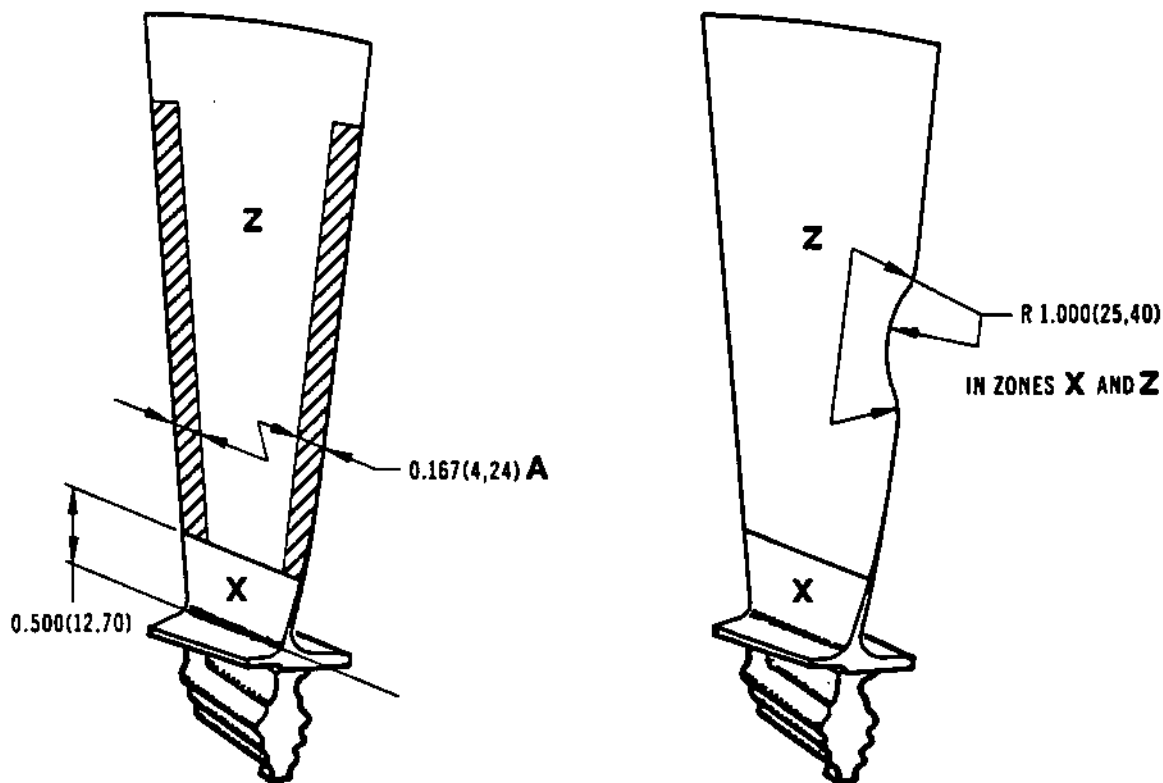


MK. 610-14-28

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RADI TO BLEND SMOOTHLY INTO AEROFOIL SHAPE.



IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX., PERMITTED.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 4.

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Stage 6 and 7 LP Rotor Blade - In-Situ Blending Standard
Figure 414

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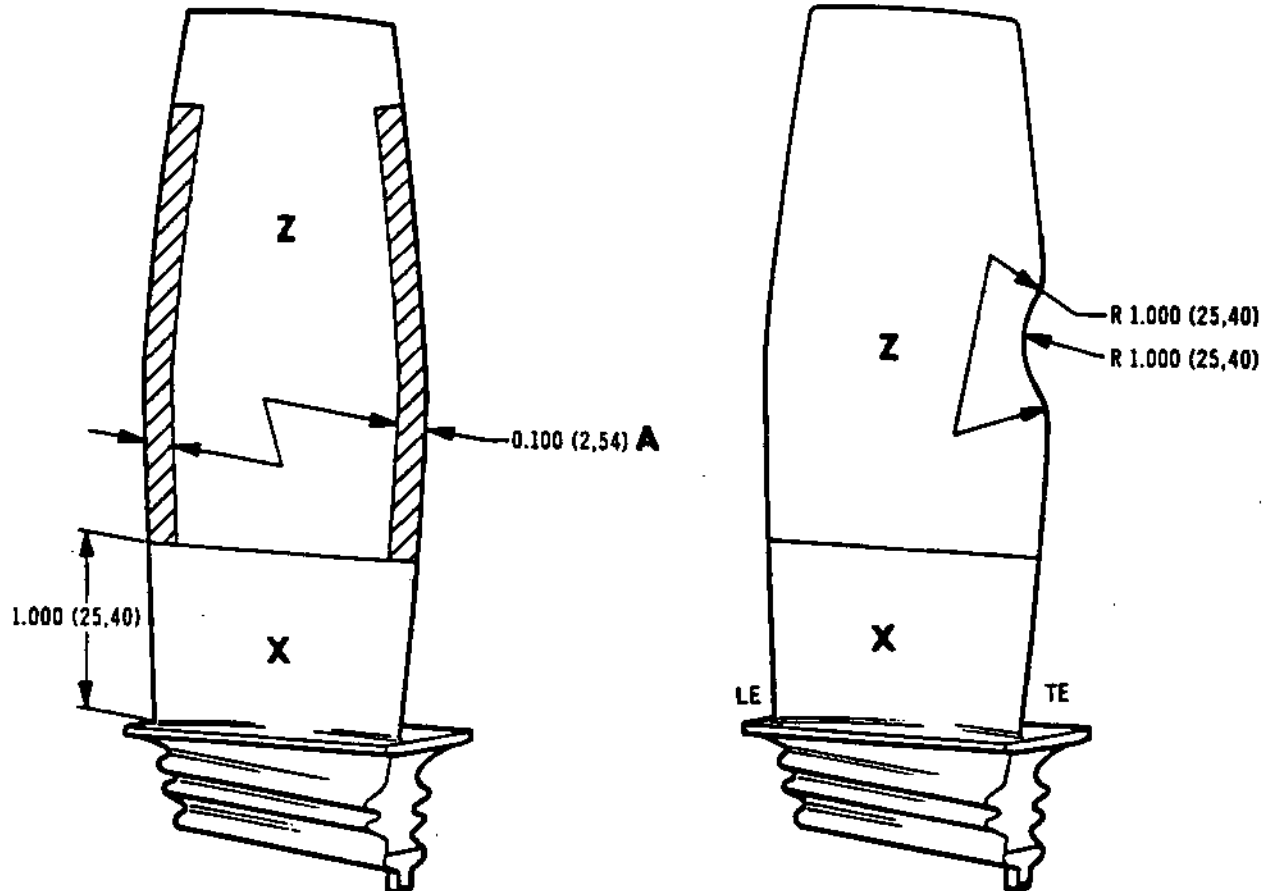
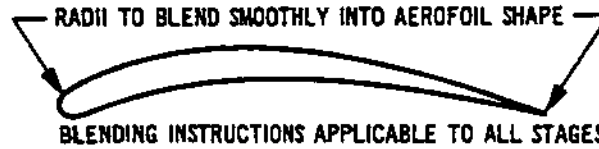


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IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX. PERMITTED WITH BLEND RADI
AS FOR ZONE Z.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 3.

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Stage 1 HP Rotor Blade - In-Situ Blending Standard
Figure 415

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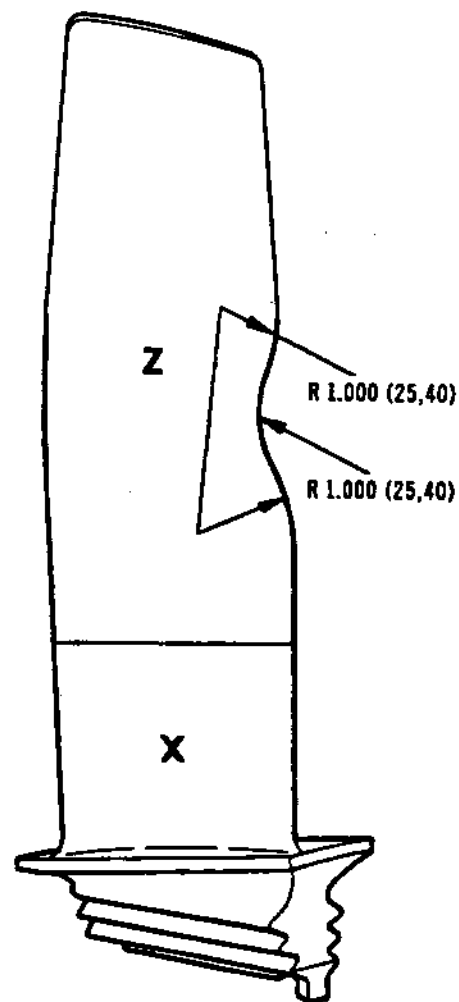
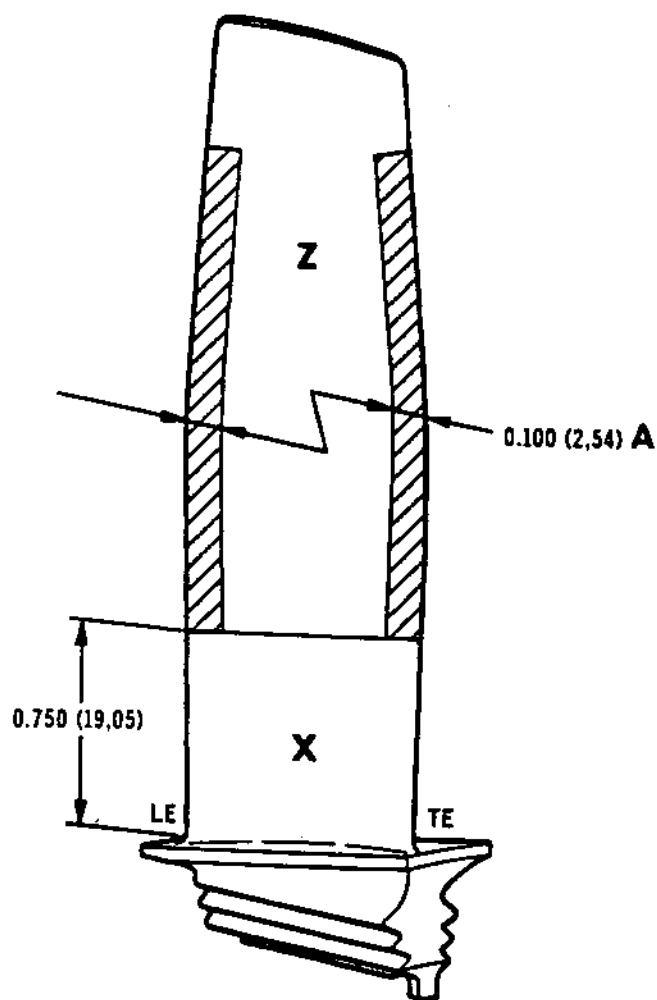


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IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX. PERMITTED WITH BLEND RADI AS FOR ZONE Z.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 5.

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Stage 2 HP Rotor Blade - In-Situ Blending Standard
Figure 416



OLYMPUS 593

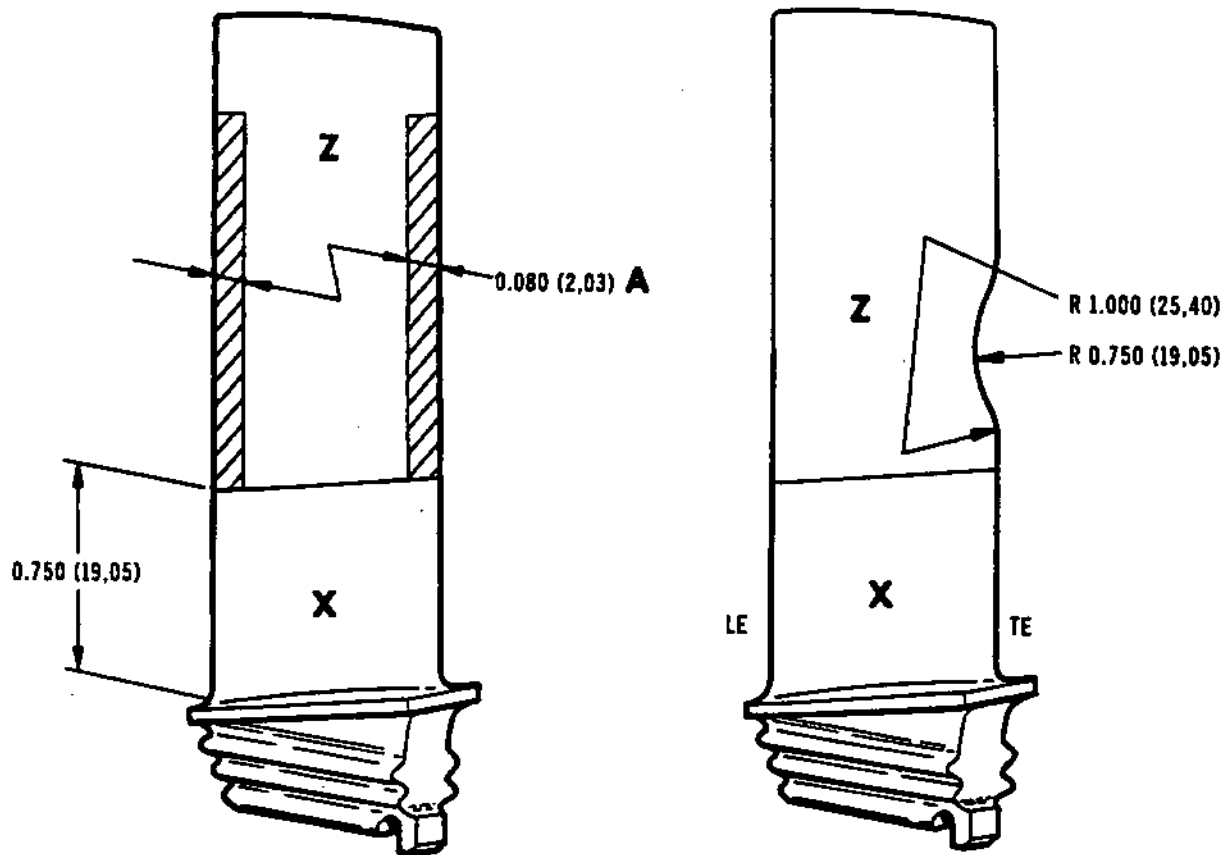


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8S00015363/1

RADI TO BLEND SMOOTHLY INTO AEROFOIL SHAPE
BLENDING INSTRUCTIONS APPLICABLE TO ALL STAGES



IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX.,
PERMITTED WITH BLEND RADI AS FOR ZONE Z.

L - MAXIMUM NUMBER OF BLADES BLENDED TO
MAXIMUM = 5 FOR STAGE 3.
7 FOR STAGE 4.

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Stage 3 and 4 HP Rotor Blade - In-Situ Blending Standard
Figure 417

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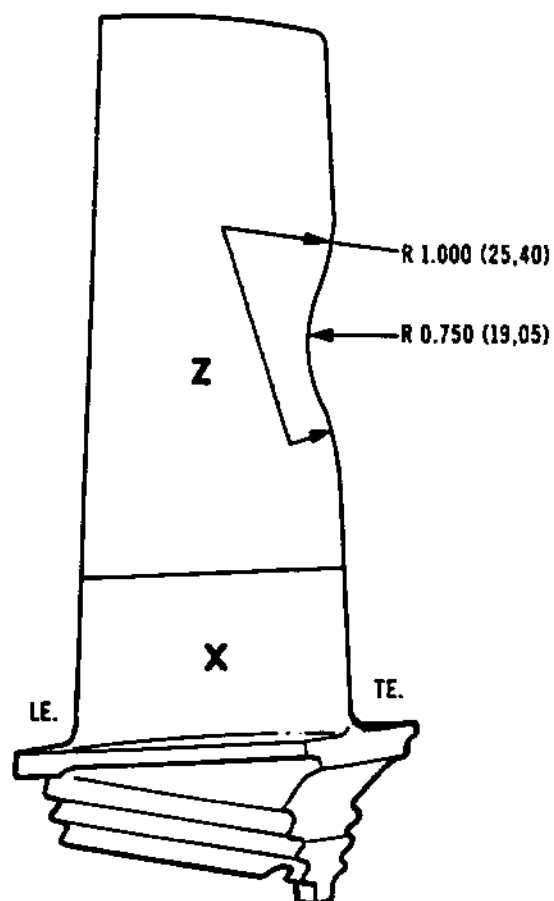
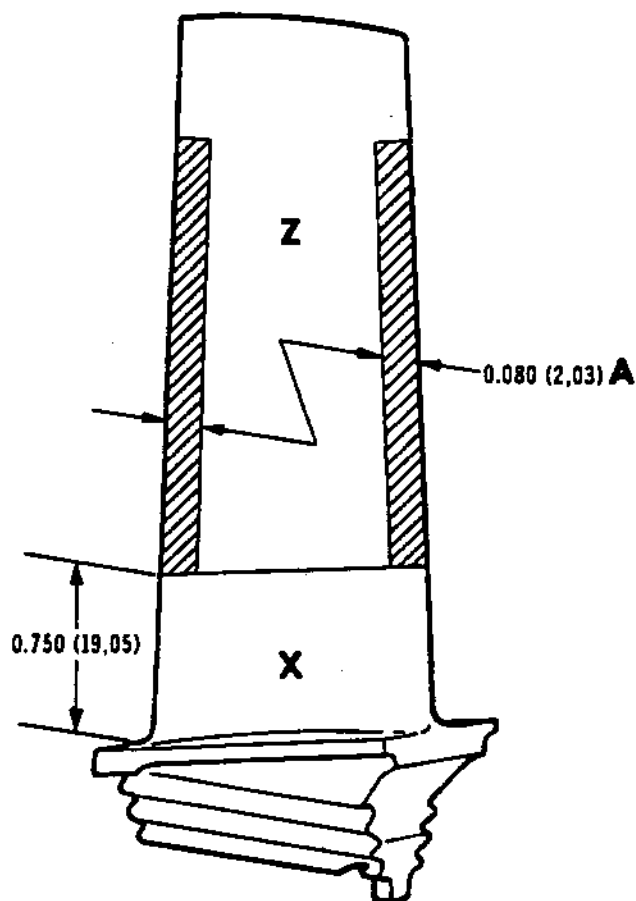
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IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX., PERMITTED WITH BLEND RADII AS FOR ZONE Z.

L - MAXIMUM NUMBER OF BLADES BLENDED TO
 MAXIMUM = 8 FOR STAGE 5.
 8 FOR STAGE 6.
 10 FOR STAGE 7.

DIMENSIONS GIVEN ARE SHOWN
 THUS :- INCHES (MILLIMETRES)

Stage 5, 6 and 7 HP Rotor Blade - In-Situ Blending Standard
 Figure 418

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DOTTED LINE SHOWS REQUIRED
TIP BLEND LINE WHICH IS NOT
POSSIBLE TO OBTAIN WITH
IN-SITU BLENDING EQUIPMENT.

NORMAL RADIUSSED
BLEND

HOOKED
AEROFOIL

NOT ACCEPTABLE

ACCEPTABLE

Hooked Blades
Figure 419

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AIR INTAKE FAIRING - REPAIR

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Repair No.	Title	Scheme No.
1	Removing Dents from Outer Skin	SAL.B.478064
2	Removal and Replacement of Damaged Inner Skin	SAL.B.497500
3	Repair of Brackets in Webs by Welding	SAL.B.513456

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72-21-01
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MK.610-14-28

OVERHAUL



AIR INTAKE FAIRING - REPAIR
REMOVING DENTS FROM OUTER SKIN

Applicable to:

Fairing B.458651

Authority:

Modification No. OL.8423C

1. Introduction

- A. This Repair describes the procedure for repairing air intake fairings on which the outer skin is dented in excess of the acceptance standards specified in 72-20-00 Inspection/Check.
- B. Dimensions are shown thus on the illustration:
INCHES (MILLIMETRES).

2. Summary of Operations

- A. Ensure that the radius of sharp dents is not less than that specified on the view SECTION AA. Fairings which do not conform with this requirement must not be repaired by this scheme.
- B. Restore soft dents in the specified central area (Ref.Fig.401) to the original profile. Do not locally reduce material thickness to less than 0.020 in. (0,5 mm).
- C. Test for cracks by the fluorescent penetrant process specified for this component in 72-20-00 Inspection/Check.
- D. Identify repair. Mark the repair scheme number SAL B.478064 close to the standard part number on the fairing.

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Repair No.1
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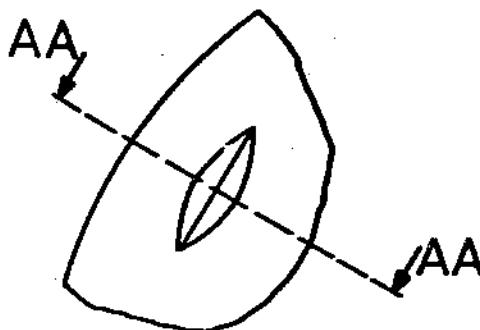
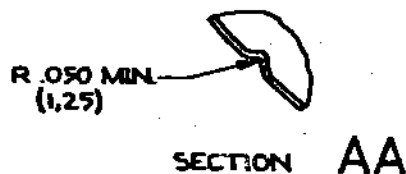
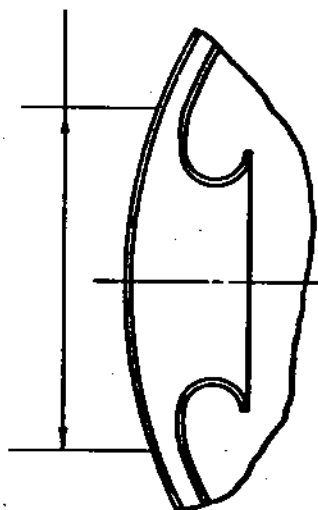
3. Special Tools, Fixtures and Equipment

A. Not required.

4. Replacement Parts

A. Not required.

D 4.000 (101,600) RESTORE DENTED LOCATIONS
TO ORIGINAL PROFILE IN THIS AREA ONLY



TN3384

Air Intake Fairing Repair Details
Figure 401

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AIR INTAKE FAIRING - REPAIR
PROVISION FOR REMOVAL AND REPLACEMENT
OF DAMAGED FAIRING INNER SKIN

MODIFICATION NO. OL.8699C AND OL.8760

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-21-01	1 10A	B.458651

2. Introduction

A. General.

- (1) This repair describes the procedure to remove a damaged inner skin on an air intake fairing and replace it.
- (2) Refer to Chapter 72-09-00, Repair, for all standard practices applicable to this repair procedure.
- (3) Dimensions are shown thus, INCHES (MILLIMETERS) in tables and illustrations.
- (4) Remove sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.
- (5) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (6) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (7) Surface texture to be 125 microinches (3,2 micro-meters) unless otherwise stated.
- (8) All tools referred to by item number in procedural steps are detailed in para.4.
- (9) Protect the component against corrosion after each operation and place in a container for protection against damage during transit between operations.

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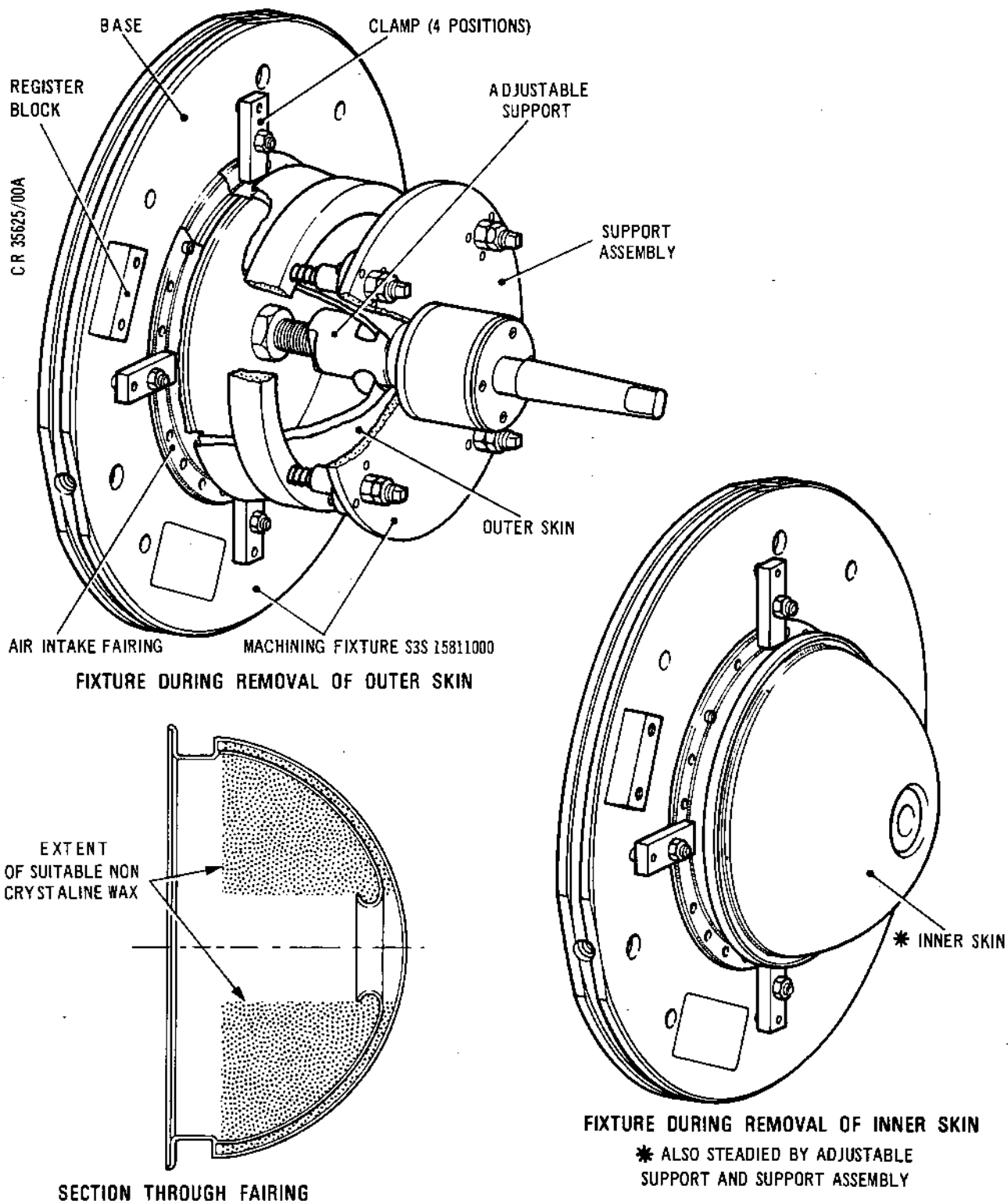
TN34819

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OVERHAUL



Machining Fixture
Figure 401

IN36621

REPAIR
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Repair No.2
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3. Instructions

A. Remove Inner and Outer Skins.

- (1) Fill air intake fairing with non-crystalline wax to the extent shown at Fig.401.
- (2) Locate air intake fairing to the base of holding fixture ref. tool item 1 (Ref.Fig.401) ensuring that when the adjustable support is supporting the inner skin, the fairing support ring is seated on the fixture baseplate completely.
- (3) Measure dimension X (Ref.Fig.402) and record, noting this dimension is original.
- (4) Locate air intake fairing/fixture base assy. to a center lathe and clock true. Locate fixture support assy. to tailstock of lathe and adjust to support outer skin, (Ref.Fig.401).
- (5) Locate parting off tool ref. tool item 2 to tool post of lathe. Place 0.787 in. (20,0 mm) slip gauge against fixture register block (Ref.Fig.401) and set parting tool adjacent.
- (6) Turn to remove outer skin producing 1.380/1.370 in. (35,052/34,798 mm) dimension shown at Fig.403. Special care must be taken as the outer skin is to be re-used.
- (7) Carefully remove the fixture support assy. and outer skin.
- (8) Remove all non-crystalline wax from outside the inner skin.
- (9) Measure dimension Y (Ref.Fig.402) and record, noting this dimension is original.
- (10) Re-locate fixture support assy. to tailstock of lathe and adjust to support inner skin (Ref.Fig.401).

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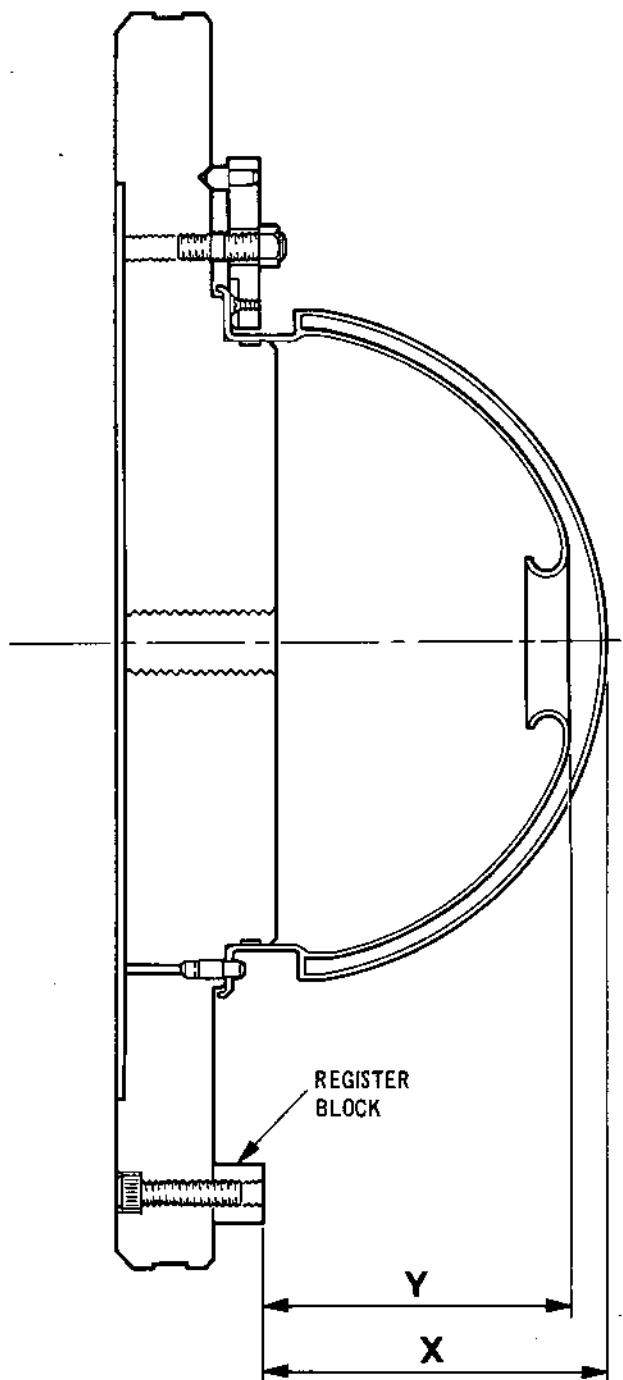
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CR 35671/00A



IN36623

Dimension Details
Figure 402

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FAIRING OUTER SKIN

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

0.060 (1,524)
0.050 (1,270)
CUT WIDTH CONTAINED
WITHIN THIS DIMENSION

1.380 (35,052)
1.370 (34,798)
AFTER TRIMMING

SUPPORT
RING

REF ONLY 0.315 (8,001)
0.305 (7,747)

0.020 (0,508)
0.015 (0,381)

0.030 (0,762)

R 0.010 (0,254)
MAX

12 DEGREES

0.020 (0,508)
0.015 (0,381)

0.030 (0,762)

D 10.490 (266,446)
D 10.480 (266,192)

Machining Details
Figure 403

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- (11) Place 0.787 in. (20,0 mm) slip gauge against fixture register block (Ref.Fig.401) and re-set parting tool adjacent.
- (12) Turn to remove inner skin producing 1.380/1.370 in. (35,052/34,798 mm) dimension shown at Fig.403. Special care must be taken as the fairing support ring is to be re-used.
- (13) Remove fixture support assy. and fixture/support ring assy. from machine, then remove support ring from fixture.
- (14) Remove any burrs produced on the outer skin and support ring.
- (15) View the outer skin and support ring for satisfactory removal (Ref.Fig.403), then identify as set.
- (16) Test the outer skin and support ring for cracks using the fluorescent dye penetrant process specified for this component in 72-21-01, Inspection/Check.

B. Machine Fairing Support Ring.

- (1) Locate support ring to base of fixture ref. tool item 1, (Ref.Fig.401), and locate support ring/fixture assy. to a centre lathe and clock true.
- (2) Turn to produce the location lips for inner and outer skins as shown at Fig.403. Use form tool ref. tool item 3 when turning the outer skin location lip.
- (3) Remove the fixture/component assy. from the lathe and the support ring from the fixture.
- (4) Remove any burrs produced from the support ring.
- (5) Inspect the support ring to ensure the dimensions shown at Fig.403 have been produced.

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- (6) Test the support ring for cracks using the fluorescent dye penetrant process specified for this component in 72-21-01, Inspection/Check.

C. Replace Inner Skin.

- (1) Locate the outer skin, removed at para.3.A.(6), to the support ring (Ref.Fig.404). Ensure there is complete seating and alignment. Dress to achieve if necessary using conventional hand tools.
- (2) Measure dimension X (Ref.Fig.402) and record, noting this dimension is post machined.
- (3) Withdraw from stores replacement inner skin B.497500 PMY1.
- (4) Locate replacement inner skin to support ring (Ref. Fig.404). Ensure there is complete seating and alignment. Dress to achieve if necessary using conventional hand tools.
- (5) Measure dimension Y (Ref.Fig.402) and record, noting this dimension is post machined.
- (6) Subtract the original Y dimension (recorded at para.3.A.(9)), from the original X dimension (recorded at para.3.A.(3)), and record as dimension Z.
- (7) Subtract the post machined Y dimension (recorded at para.3.C.(5)), from the post machined X dimension (recorded at para.3.C.(2)), and record as dimension W.
- (8) Subtract dimension W from dimension Z and record as dimension T.
- (9) Locate replacement inner skin on surface table and measure overall height, and record as dimension S.
- (10) Subtract dimension T from dimension S and record as dimension R.

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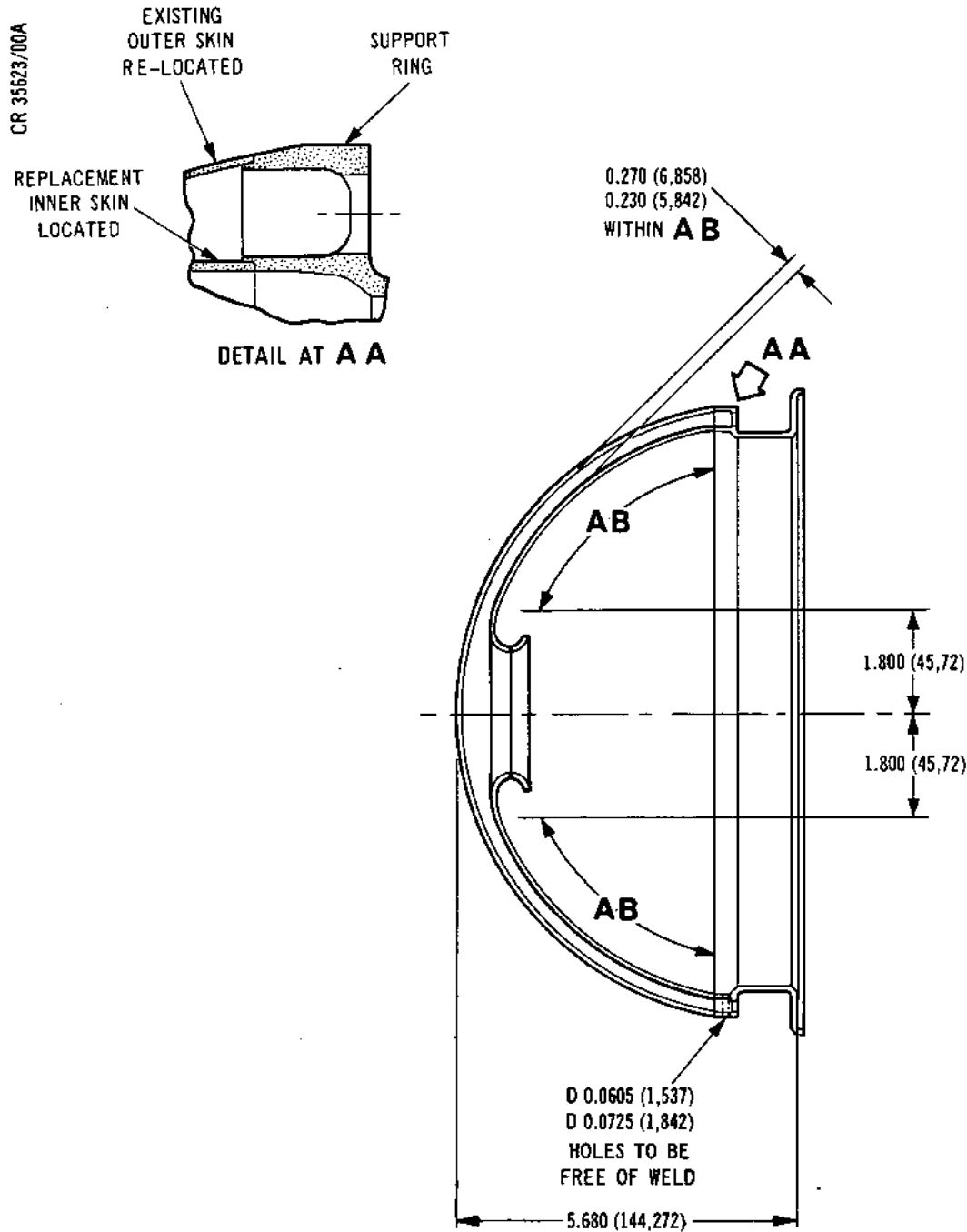
- (11) Locate replacement inner skin to machining fixture ref. tool item 4 (Ref.Fig.405).
- (12) Fill inner skin with non-crystalline wax to the extent shown at Fig.405.
- (13) Locate the replacement inner skin/fixture assy. to a centre lathe and clock true.
- (14) Machine the replacement inner skin to an overall height recorded as dimension R (Ref.para.3.C.(10)).
- (15) Remove fixture/component assy. from machine and component from fixture.
- (16) Remove all traces of non-crystalline wax from replacement inner skin.
- (17) Remove all burrs from replacement inner skin.
- (18) Test the replacement inner skin for cracks using the fluorescent dye penetrant process specified for this component in 72-21-01, Inspection/Check.
- (19) Locate the existing outer skin and the replacement inner skin to the location lips on the fairing support ring.
- (20) Inspect to ensure the 0.270/0.230 in. (6,858/5,842 mm) gap exists between the inner and outer skins as shown on Fig.404.
- (21) Polish the mating surfaces of the support ring and the replacement inner skin and locally degrease with Genklene.
- (22) Using welding fixture ref. tool item 5 (Ref.Fig.406), assemble the replacement inner skin to the support ring. Form the mating ends to ensure correct alignment, using conventional forming tools (Ref.Fig.404).

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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Air Intake Fairing
Figure 404

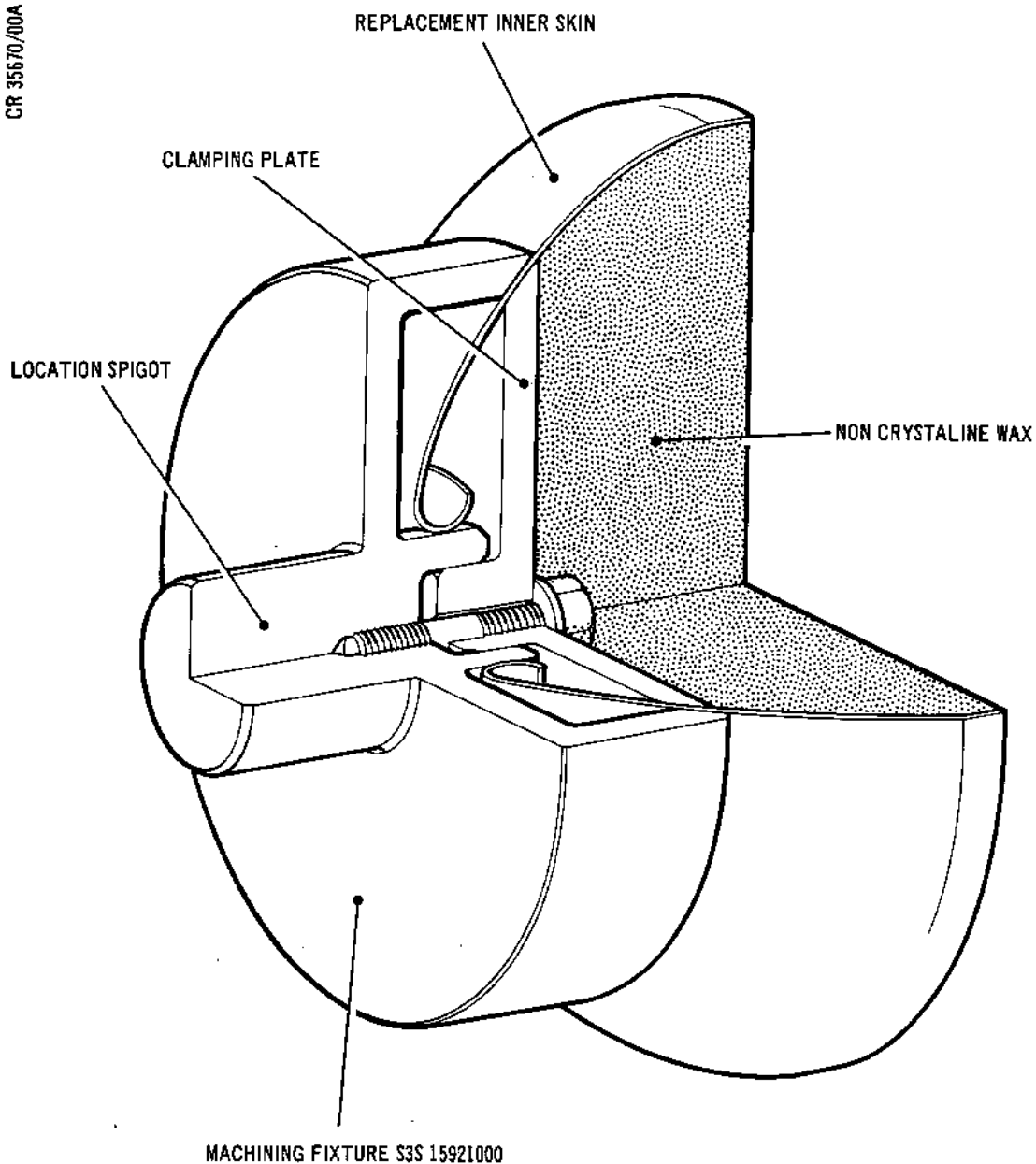
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Machining Fixture
Figure 405

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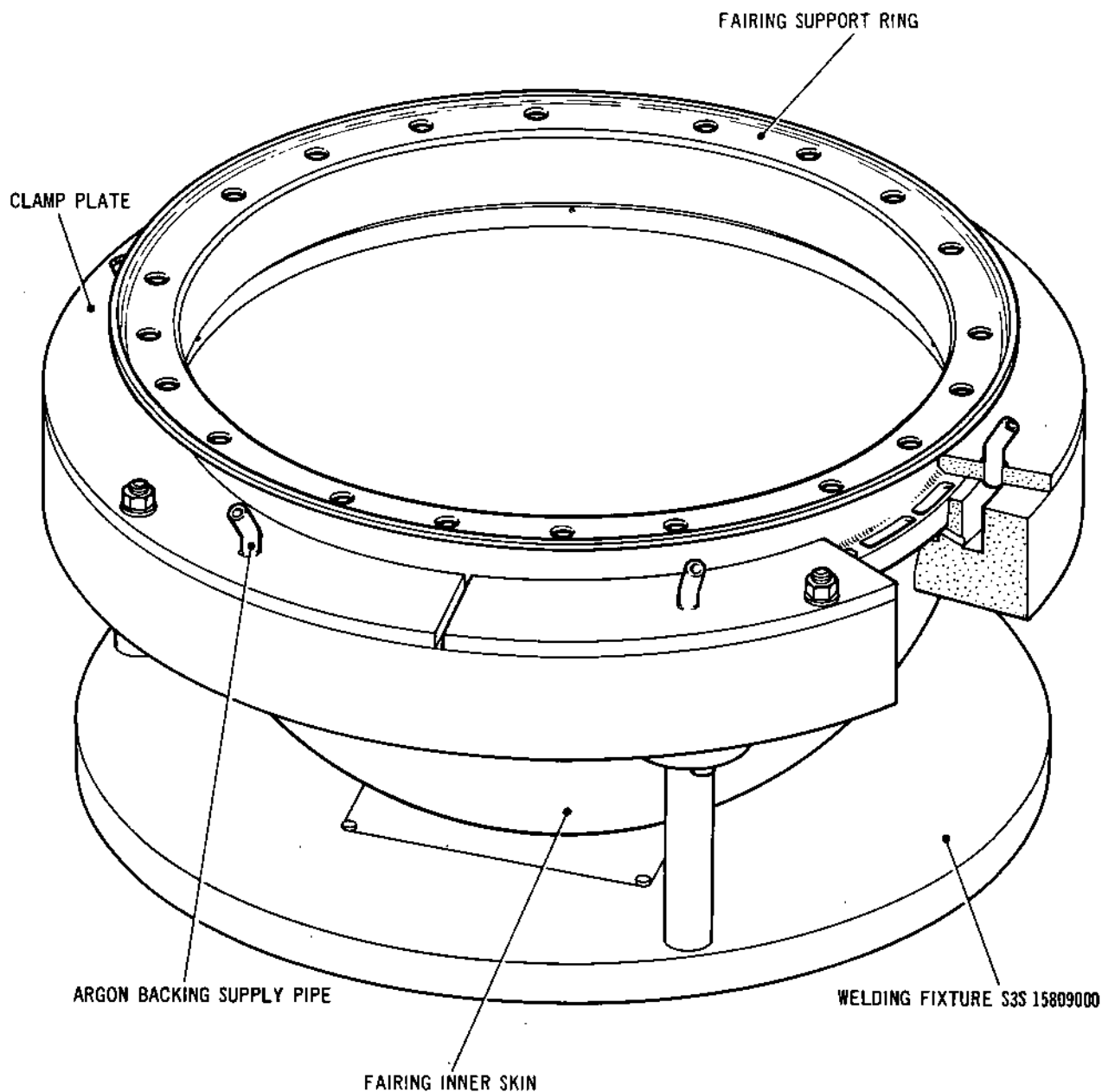
MK.610-14-28

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CR 35627/00A

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TN36641

Welding Fixture
Figure 406

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- (23) Tackweld, diametrically opposite, the replacement inner skin to the support ring; refer to para.6, process A, for welding data.
- (24) Remove the replacement inner skin/support ring assy. from the fixture.
- (25) Check for correct alignment. If non-alignment exists, then the mating ends must be formed using conventional hand tools to remove any discrepancy. If this is not possible then the tackwelds must be broken to separate the inner skin from the support ring, then after suitable dressing and cleaning the tackwelding procedure repeated.
- (26) Re-locate replacement inner skin/support ring assy. to fixture ref. tool item 5 (Ref.Fig.406), and auto-weld the replacement inner skin to the support ring; refer to para.6, process A, for welding data.

NOTE: Record the final welding parameters used, for use when welding the outer skin in position (Ref.para.D.6).

- (27) Remove the replacement inner skin/support ring assy. from the fixture.
- (28) Check the correct amount of weld protrusion has been achieved. There must be complete penetration, but it must be kept to a minimum. If the weld protrusion is unsatisfactory, and cannot be corrected by a weld re-run then the two parts must be separated by cutting and machining, as detailed previously, and the whole procedure repeated.

NOTE: If a weld re-run is necessary, the fact should be recorded and adjustments made to the welding parameters to ensure it is not necessary when welding the outer skin in position.

- (29) Test the welded area for cracks using the fluorescent dye penetrant process specified for this component in 72-21-01, Inspection/Check.
- (30) Carry out a non-destructive radiological (X-Ray) examination of the welded area.

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D. Replace Outer Skin.

- (1) Polish the mating surfaces of the existing outer skin and the support ring and locally degrease with Genklene.
- (2) Using welding fixture ref. tool item 6 (Ref.Fig.407), assemble the existing outer skin to the support ring. Form the mating ends to ensure correct alignment, using conventional forming tools (Ref.Fig.404).
- (3) Tackweld, diametrically opposite, the existing outer skin to the support ring; refer to para.6, process A, for welding data.
- (4) Remove the air intake fairing from the fixture.
- (5) Check for correct alignment. If non-alignment exists, then the mating ends must be formed using conventional hand tools to remove any discrepancy. If this is not possible then the tackwelds must be broken to separate the outer skin from the support ring, then after suitable dressing and cleaning the tackwelding procedure repeated.
- (6) Re-locate the air intake fairing to fixture ref. tool item 6 (Ref.Fig.407). Autoweld the existing outer skin to the support ring using the same welding parameters used to weld the inner skin in position. Allowance must be made for the increased diameter.
- (7) Remove the air intake fairing from the fixture.
- (8) Inspect to ensure the 0.270/0.230 in. (6,858/5,842 mm) gap exists between the inner and outer skins as shown on Fig.404.
- (9) Test the welded area for cracks using the fluorescent dye penetrant process specified for this component in 72-21-01, Inspection/Check.
- (10) Carry out a non-destructive radiological (X-Ray) examination of the welded area.

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**E. Heat Treat.**

- (1) Heat the air intake fairing, in a vacuum, to 650°C plus/minus 10°C for 30 min. to 1 hour. Cool in argon.

F. Inspect and Identify.

- (1) Test the air intake fairing for cracks using the fluorescent dye penetrant process specified for this component in 72-21-01, Inspection/Check.
- (2) Using the electro-chemical marking or vibro percussion engraving technique, ref.Chapter 72-09-00, Repair, mark on SAL.B.497500 or R2 adjacent the existing part number.
- (3) Finally inspect the air intake fairing to ensure the repair has been carried out satisfactorily and that the air intake fairing is in a serviceable condition.
- (4) Place the air intake fairing in a container and store as required.

4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>	<u>Fig.No.</u>
Holding Fixture	1	S3S.15811000	1	401
Parting Off Tool	A/R	S3S.15933000	2	-
Form Tool	A/R	S3S.15932000	3	-
Holding Fixture	1	S3S.15921000	4	405
Welding Fixture	1	S3S.15809000	5	406
Welding Fixture	1	S3S.15810000	6	407

5. Replacement Parts

<u>Description</u>	<u>Quantity</u>	<u>Part No.</u>
Inner Skin	1	B.49750OPMY1

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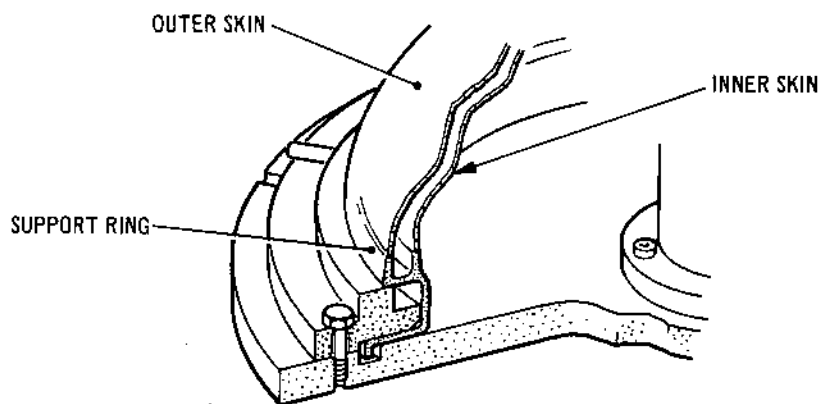
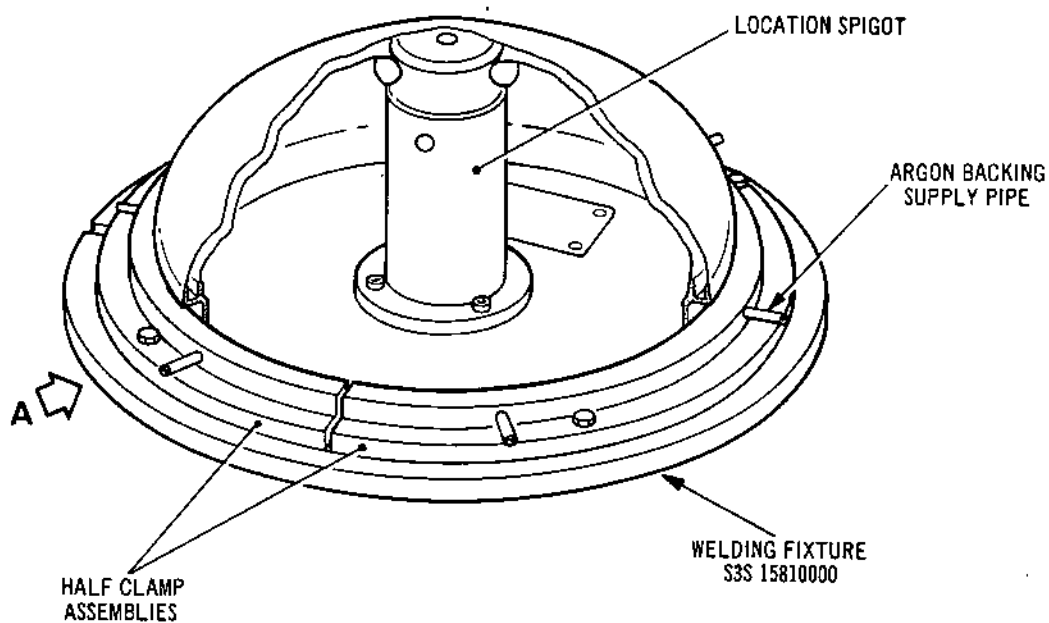
MK.610-14-28

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SECTION AT A

Welding Fixture
Figure 407

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SEE TR

6. Welding Data

A. Process A.

- (1) Method of Welding:
Automatic circumferential T.I.G.
- (2) Welding Equipment:
SAF type COX3.
- (3) Torch:
SAF type 200.
- (4) Nozzle:
0.433 in. (11 mm) dia.
- (5) Electrode:
Tungsten, 0.09375 in. (2,387 mm) dia.
- (6) Filler Rod:
MSRR 9500/72.
- (7) Current:
25 amps.
- (8) Argon Flow Rate:
20 cu ft/hr (10 litres/min).

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ATP TEMPORARY REVISION

British airways

OLYMPUS 593 ENGINE

OVERHAUL MANUAL

This Temporary Revision complies with BCAR's Chapter A6-2 and TSS No.0-2

P. Munn

for Chief Engineer (Technical & Quality Services) CAA Design Approval No. DA1/8566/78

TEMPORARY REVISION 72-594

Insert 72-21-01 after page 416 Repair No.2

REASON FOR ISSUE

Olympus Repair Scheme BOR 31.

ACTION

TITLE: Weld repair of cracked air intake fairing anti-icing exhaust port struts.

APPLICATION: Air intake fairing Pt. No. B458651 IPC Ref 72.21.01-1.10A.

INSTRUCTIONS: (Refer to Sketch on Sheet 2)

N.B. This Repair must only be used once for a maximum of six cracked struts per fairing

1. a) Crack detect fairing using dye penetrant method.
- b) Rout out cracks using a small rotary routing cutter.
- c) Thoroughly clean area to be welded with genklene.
- d) Weld cracks using argon arc process.
 - i) Filler Rod - MSRR 9500/72
 - ii) Current - 25 amps
 - iii) Argon flow rate - 20 cu. ft/HR.
- e) Check weld for satisfactory penetration.

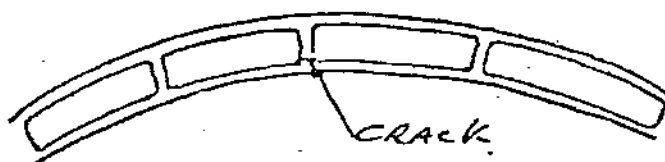
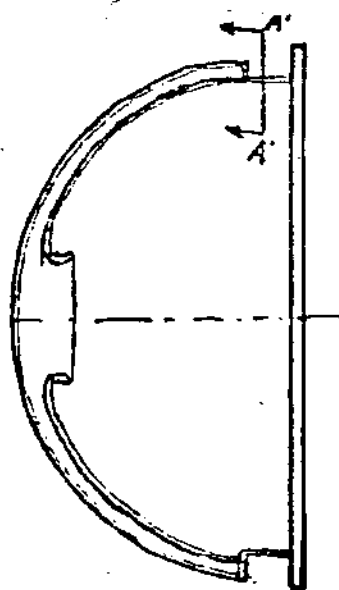
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TR 72-594
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AUG/88 (EPO 702/MD)

ACTION (Cont'd)

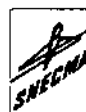
INSTRUCTION Cont'd

- f) Carry out post weld heat treatment for 1 hr at $650^{\circ}\text{C} \pm 10^{\circ}\text{C}$ and cool in argon.
- g) Crack detect fairing using dye penetrant method.
- h) Using vibro percussion engraving technique add this repair number adjacent to the existing part number.



ENLARGED VIEW AT
SECTION A'-A'

FIGURE 1

**OLYMPUS 593**MK.610-14-28
OVERHAUL

AIR INTAKE FAIRING - REPAIR
PROVISION FOR REPAIR OF CRACKS IN SUPPORT
WEBS BY WELDING

REPAIR NO.B513456

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-21-01	1 10A	B458651

2. Introduction

A. General.

- (1) This repair describes the procedure for the repair of cracks in the support webs of the Air Intake Fairing.
- (2) Dimensions are shown thus, INCHES (MILLIMETRES), in tables and illustrations.
- (3) Refer to Chapter 72-09-00, Repair, for all standard practices applicable to this repair procedure.
- (4) Remove all sharp edges 0.004 to 0.020 in. (0,10 to 0,50 mm) unless otherwise stated.
- (5) Tolerances on machined dimensions are plus/minus 0.010 in (0,25 mm) unless otherwise stated.

B. Repair Limitations.

- (1) Compliance with all aspects of these repairs should be achieved without deviation. Where a need to deviate is considered necessary, agreement should first be sought from the Repair Authority.
- (2) Any number of cracked supporting webs may be repaired by welding. When repairing all 20 webs, or a large number of webs grouped together, it is important to stagger the repair welds until all defective webs are repaired to minimise the stress of displacement of inner to outer skin.

3. Instructions

A. Preparation.

- (1) Remove damper spring, if fitted, and retain.

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- (2) Using rotary burr hand tools only, blend to remove damage. Removing the minimum amount of material, produce a smooth, continuous profile.
- (3) Refer to TSD 594-409, Supplement 12, and TSD 594-101. Thoroughly clean and prepare for welding.

NOTE: Do not use any cleaning materials containing aluminium oxide.

B. Weld.

- (1) Refer to TSD 594-409 (including Supplement 12). Build up defective areas (group 1 weld) using argon arc and filler rods to Omat 3/55, MSRR 9500/72.
- (2) Referring to Figure 401, dress back to original profile without impairing parent material.

NOTE: Remove all sharp edges 0.015 in. (0,38 mm) radius, refer Fig.401.

C. Heat Treat.

- (1) Heat treat to 650°C plus/minus 10°C for 1 hour and cool in argon.

D. Inspect.

- (1) Refer to TSD 594-409, SB 72-8704 and Chapter 72-21-01, Inspect/Check. Carry out X-ray, eddy current and fluorescent dye penetrant crack detection tests at each web location.
- (2) No cracks are permitted.
- (3) Visually inspect for distortion (refer to Figure 401).

E. Reassemble.

- (1) Refer to SB 72-8746-284. Refit existing damper spring or replace if necessary (see para.5., Replacement Parts, of this instruction).

F. Identify.

- (1) Mark the component SAL B513456 adjacent to the existing part number using vibro-percussion engraving marking as specified in Chapter 72-09-00, Repair.

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4. Special Tools, Fixtures and Equipment

None.

5. Replacement Parts

<u>Part Number</u>	<u>Description</u>	<u>Qty</u>
B499094	Spring, Damper	1

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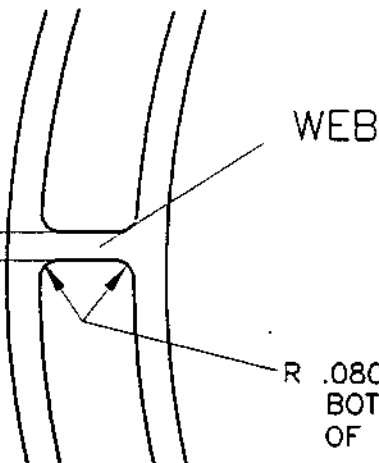


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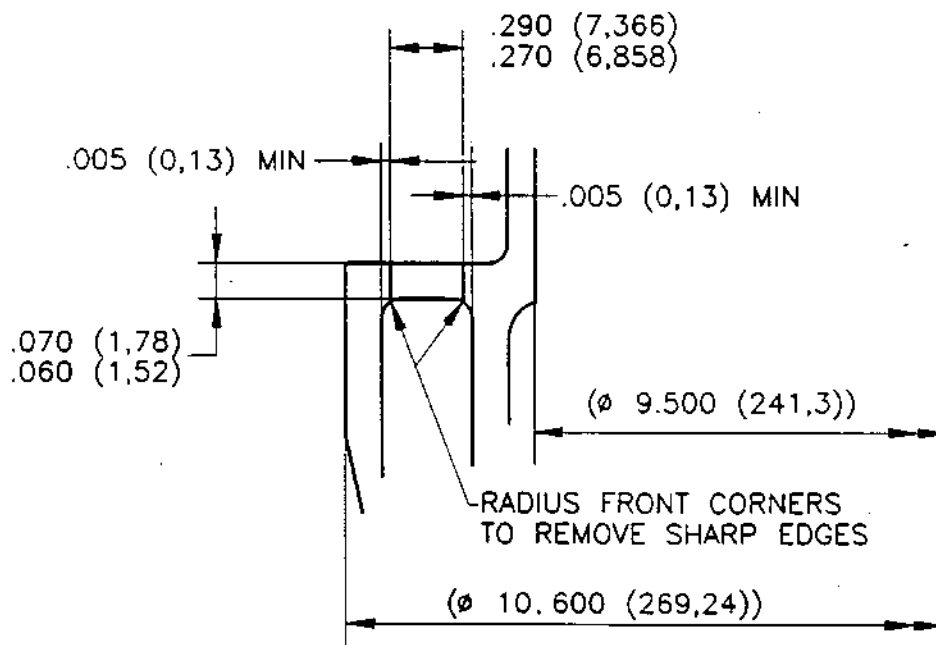


DRESS WELD BUILD UP
REMOVING THE MINIMUM
AMOUNT OF MATERIAL
UNTIL EDGES CLEAN UP.
DO NOT REDUCE BELOW
.140 (3,556)



NOTE: ENSURE ALL DRESSING IS
SMOOTHLY CONTOURED
REMOVE SHARP EDGES
.015 (0,38)
R .010 (0,25)

VIEW ON ARROW A



DIMENSIONS GIVEN ARE SHOWN
THUS:- INCHES (MILLIMETRES)

SECTION THROUGH SLOT SHOWING WEB

Air Intake Fairing
Figure 401

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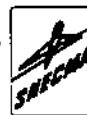
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AIR INTAKE CASE - REPAIR

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Repair No.	Title	Scheme No.
1	Case Repaired by Welding	SAL.B.488695
2	Replacement of Damaged Vane and Vane End	SAL.B.488692
3	Provision for the removal of cracking from the vane and outer platform by blending/ polishing	SAL.B.514696

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REPAIR

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AIR INTAKE CASE - REPAIR
CASE REPAIRED BY WELDING

MODIFICATION NO. OL.8423C

Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-22-01	3 10C	B.925639
		B.925638
		B.925952 B.925641
		B.925642 B.925941
		B.925943 B.925947
	10F	B.930636 B.930638
		B.930641
		B.925953 B.925942
		B.925944 B.930637
		B.930639

1. Introduction

- A. This Repair describes the procedure for repairing air intake cases which are damaged in excess of the acceptance standards specified in 72-20-00 Inspection/Check. Each location which may be repaired is identified (Ref.Fig.401) by a letter; this letter must be marked, with the repair scheme number, when the location has been repaired.
- B. Refer to 72-09-00 Repair for all standard practices and tolerancing applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

2. Repair Limitations

- A. Cracks which originate at, or cut across the vane stiffening webs must not be repaired by this scheme. Reject the case for repair by vane replacement.
- B. Location A.
 - (1) Weld repair all cracks and tears up to a maximum of four defects per vane and a maximum total length of 8.000 in. (203,200 mm) of repair weld per vane.
 - (2) Weld build-up sharp dents to a maximum depth of 0.125 in. (3,175 mm) and restore profile.

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- (3) Manipulate any distortion of the leading or trailing edges to within the specified acceptance standard.
- (4) Weld repair gouges up to a maximum size of 0.5 in. (12,70 mm) x 0.25 in. (6,350 mm) and a maximum of four gouges per vane to restore profile.
- (5) Repair all nicks, scores and scratches, which are over half the material thickness in depth, by welding and restore profile.
- (6) Repair all piercing by welding and restore profile.
- (7) No repair weld to be within 1.000 in. (25,4 mm) of vane end fabrication welds.

C. Location B.

- (1) Weld repair all cracks and tears up to a maximum of four defects per intervane space and a maximum total length of 8.000 in. (203,200 mm) of repair weld per intervane space.
- (2) Manipulate dents to within the specified acceptance standard.
- (3) Repair gouges by welding up to a maximum size of 0.5 in. (12,70 mm) x 0.25 in. (6,350 mm) and a maximum of four gouges per intervane space.
- (4) Repair all nicks, scores and scratches, which are over half the material thickness in depth, by welding and restore profile.
- (5) Repair all piercing by welding and restore profile.
- (6) No repair weld to be within 1.000 in. (25,4 mm) of vane end fabrication welds.

D. Location C.

- (1) Weld repair all cracks and tears up to a maximum of four defects per intervane space and a maximum total length of 8.000 in. (203,200 mm) of repair weld per intervane space.

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- (2) Manipulate dents to within the specified acceptance standard.
- (3) Repair gouges by welding up to a maximum size of 0.5 in. (12,70 mm) x 0.25 in. (6,350 mm) and a maximum of four gouges per intervane space.
- (4) Repair all nicks, scores and scratches, which are over half the material thickness in depth, by welding and restore profile.
- (5) Repair all piercing by welding and restore profile.
- (6) No repair weld to be within 1.000 in. (25,4 mm) of vane end fabrication welds.

3. Summary of Operations

A. Prepare Location A.

- (1) Vee-groove cracks for their full length and clean out dents.
- (2) Test for cracks by the fluorescent penetrant process specified for this component in 72-20-00 Inspection/Check.
- (3) Prepare areas for welding by abrading with Scotch-brite and swabbing with acetone.
- (4) Clean the inner surface of vanes in areas to be welded.
- (5) Blank off vane ends with tape to ensure retention of inert gas during welding.

B. Prepare Locations B and C.

- (1) Dress as required to remove dents.
- (2) Dress to restore profile around pierced sections.
- (3) Vee-groove cracks for their full length and clean out dents.

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- (4) Test for cracks by the fluorescent penetrant method specified for this component in 72-20-00 Inspection/Check.
 - (5) Prepare areas for welding by abrading with Scotchbrite and swabbing with acetone.
 - (6) Clean the underside of areas to be welded.
- C. Inspect the case and pass for welding.
 - D. Plasma arc weld to build up the defective locations; use filler rods to specification MS 950/72.
 - E. Dress repairs at location A to restore the vane profile.
 - F. Dress welds at locations B and C flush with the material surface on both sides; use a non-abrasive cutter.
 - G. Repeat the test for cracks.
 - H. Inspect the case and identify areas to be examined by X-ray.
 - J. Examine by X-ray the areas identified by the inspection authority.
 - K. Heat Treat Case.
 - (1) Heat the case to 475 deg C (plus/minus 5 deg C) and soak at this temperature for four hours.
 - (2) Cool the case in air.
 - L. Repeat the test for cracks.
 - M. Inspect the case to verify that all repairs are satisfactory.
 - N. Identify Repairs.
 - (1) Mark the repair scheme number followed by the identification letters (Ref.Fig.401) of each repaired location i.e. SAL B.488695A/B/C.

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(2) Lightly mark the letter W close to each end of all repair welds.

P. Finally inspect the air intake case.

4. Special Tools, Fixtures and Equipment

A. Not required.

5. Replacement Parts

A. Not required.

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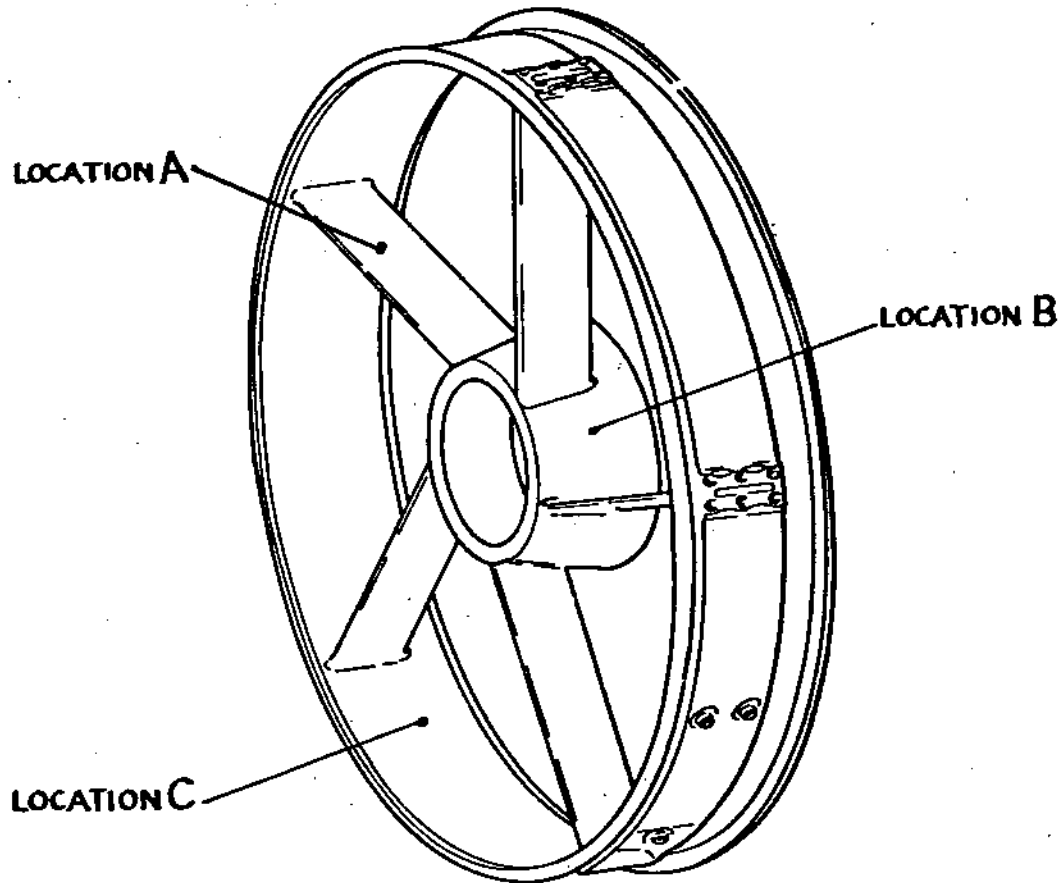
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Air Intake Case Repair Location Identification
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CASE ASSY AIR INTAKEPROVISION FOR THE REMOVAL AND REPLACEMENT
OF DAMAGED VANE(S) AND VANE END(S).REPAIR NO. B4886921. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-22-01	3 10E	B925941
		B925942
		B925943
	3 10F	B925944
	3 10E	B925945
	3 10F	B925946
	3 10E	B925947
	3 10F	B925948
	3 10E	B925952
	3 10F	B925953
	3 10E	B930636
	3 10F	B930637
	3 10E	B930638
	3 10F	B930639
	3 10E	B930640
		B930641
	3 10F	B930642

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

Vanes must only be removed singly or in non adjacent pairs and must be replaced before removal of other vanes.

3. GENERALUNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

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4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- 1) Visually inspect air intake case to ascertain position and part number of defective vane(s). Refer fig.401
- 2) Remove and discard 18 off self locking shank nuts from rear flange of inner case. Refer fig.402
Refer Overhaul Manual
Chapter 72-09-00 Repair
- 3) Install air intake case in clamping and welding fixture. Ref para.7. TOOLS, item 1.
- 4) Cut through defective vane close to existing inner case /vane weld line. Use conventional hand tools. Refer fig.403
- 5) Install clamping and welding fixture/air intake case on bed of jig boring machine. Secure with vane end positioned relative to machine spindle.
- 6) Machine out defective vane end to existing weld lines producing required aperture in air intake outer case. Use suitable drill and milling cutter. Refer figs.403 and 404
- 7) Remove and discard defective vane sub unit.
- 8) Remove clamping and welding fixture/air intake case from jig borer.
NOTE: Do not remove air intake case from clamping and welding fixture.
- 9) Dress corners of machined aperture in air intake outer case to produce 90 degree angles. Remove burrs and sharp edges from machined area using conventional hand tools. Refer fig.404

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- 10) Machine or hand dress back vane stub to existing inner case/vane weld line. Remove burrs and sharp edges using conventional hand tools. Refer fig.403
- 11) Dimensionally inspect machined aperture in outer case to ensure that required dimensions have been achieved. Ref figs.403 and 404
- 12) Crack detect areas surrounding outer case machined aperture and vane stub. Refer Overhaul Manual Chapter 72-20-00 Inspection/Check
- 13) Withdraw new restrictor plate, vane and vane end, as required from stores. Ref para.8. REPLACEMENT PARTS, items 6-10.
NOTE: Restrictor plate item 9, is fitted in vanes 1 and 5. Restrictor plate item 10, is fitted in vane 2. Vanes 3 and 4 have no restrictor plate fitted.
- 14) Assemble appropriate restrictor plate to vane and resistance spot weld in position (vanes 1, 2 and 5 only). Use four spot welds each side of vanes 1 and 5, five spot welds each side of vane 2. Refer figs.407 and 408
Refer para.6.A. DATA.
Refer TSD 594 OP.403.
- 15) Locate vane in filing/tack welding fixture and dress the outer end of the vane to size. Refer para.7. TOOLS, item 2.
- 16) Locate vane end to the table of a milling machine, and machine to produce dimensions specified. Refer figs.405 and 406
- 17) Chamfer the mating surfaces of the vane and vane end to 60/62 degrees. Polish the mating surfaces using clean fine grade abrasive matt and locally degrease with approved solvent. Take care not to touch prepared surfaces prior to welding. Refer fig.415
Refer TSD 594 OP.101 and 409
OMat 583

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- 18) Using welding fixture assemble the replacement vane to the replacement vane end. Form the mating ends to ensure correct alignment using conventional hand tools. Ensure any mismatch does not exceed the limits shown in figure 416. Refer fig.416
- 19) Starting at the mid point of the concave and convex sides and alternating from side to side in a diagonally opposite sequence tackweld the replacement vane to the replacement vane end. Refer fig.405
Use the T.I.G welding technique detailed in TSD 594 OP.409 in conjunction with data specified in para.6.B. DATA, process B1.
Alternatively, use the plasma welding technique detailed in Overhaul manual, Chapter 72-09-12 Repair in conjunction with data specified in para.6.B. DATA, process B2.
- 20) Remove the replacement vane/vane end assy from the fixture.
- 21) Check to ensure no excessive mismatch exists. If excessive mismatch does exist, then the mating ends must be formed using conventional hand tools to remove any discrepancy. If this is not possible then the tackwelds must be broken to separate the vane and vane end, then after suitable dressing and cleaning the tackweld procedure repeated.
- 22) Weld the replacement vane to the vane end, by joining two tacks at the mid point of the convex side, followed by two tacks at the mid point of the concave side, then alternate from side to side in a diagonally opposite sequence, joining two tacks each time. Refer fig.405
Use the T.I.G welding technique detailed in TSD 594 OP.409 in conjunction with data specified in para.6.B. DATA, process B1.
Alternatively, use the plasma welding technique detailed in the Overhaul Manual, Chapter 72-09-12 Repair in conjunction with data specified in para. 6.B. DATA, process B2.

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- 23) Check for suitable weld penetration. If the weld penetration is unsatisfactory and can not be corrected by a weld re-run then the two parts must be separated, and the whole procedure repeated.
- 24) Visually inspect vane sub unit to ensure acceptable welding.
- 25) Crack detect welded areas of vane sub unit. Refer Overhaul Manual Chapter 72-20-00 Inspection/Check
- 26) Carry out radiological examination of vane sub unit. Refer TSD 594 OP.409. Refer Appendix A.
- 27) Locate the vane sub unit in the filing/tackwelding fixture, and dress the inner end of the vane to length. Ref para.7. TOOLS, item 2.
- 28) Chamfer the mating surfaces of the vane sub unit and the vane stub on the inner case to 60/62 degrees. Polish the mating surfaces using clean fine grade abrasive matt and locally degrease with approved solvent. Take care not to touch prepared surfaces prior to welding. Refer fig.415. Refer TSD 594 OP.101 and 409. Use OMat 583
- 29) Set vane sub unit in position in air intake case and in fixture adjusting bracket. Refer para.7. TOOLS, item 1.
- 30) Adjust position of vane sub unit relative to air intake case; use adjusting screws on adjusting bracket of fixture. Form the mating ends to ensure correct alignment using conventional hand tools. Refer fig.416 Refer para.7. TOOLS, item 1.
Ensure any mismatch does not exceed the limits detailed in figure 416.

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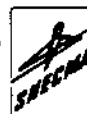
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- 31) Starting at the mid point of the concave and convex sides and alternating from side to side in a diagonally opposite sequence tackweld the vane sub unit to the vane stub on inner case.

Refer fig.407

Use the T.I.G welding technique detailed in TSD 594 OP.409 in conjunction with data specified in para.6.B. DATA, process B1. Alternatively use the plasma welding technique detailed in Overhaul Manual, Chapter 72-09-12 Repair in conjunction with data specified in para. 6.B. DATA, process B2.

- 32) Check to ensure no excessive mismatch exists. If excessive mismatch does exist, then the mating ends must be formed using conventional hand tools to remove any discrepancy. If this is not possible then the tackwelds must be broken to separate the vane and vane end, then after suitable dressing and cleaning the tackweld procedure repeated.

- 33) Weld vane sub unit to the vane stub, by joining two tacks at the mid point of the convex side, followed by two tacks at the mid point of the concave side, then alternate from side to side in a diagonally opposite sequence, joining two tacks each time.

Refer fig.407

Use the T.I.G welding technique detailed in TSD 594 OP.409 in conjunction with data specified in para. 6.B. DATA, process B1. Alternatively, use the plasma welding technique detailed in Overhaul Manual, Chapter 72-09-12 Repair in conjunction with data specified in para. 6.B. DATA, process B2.

- 34) Check for suitable weld penetration. If the weld penetration is unsatisfactory and can not be corrected by a weld re-run then the two parts must be separated, and the whole procedure repeated.

- 35) Dress vane end to match casing using conventional hand tools. Ensure any mismatch does not exceed the stated limits.

Refer fig.416

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- 36) Polish the mating surfaces using clean fine grade abrasive matt and locally degrease with approved solvent. Secure impingement blocks in position on fixture. Refer TSD 594 OP.101 and 409 OMat 583
- NOTE: The impingement blocks are manufactured from commercially pure titanium and are installed to protect the fixture from damage during the electron beam welding operation.
- 37) Electron beam weld vane sub unit to outer case front and rear flanges. Refer fig.407 Refer TSD 594 OP.414 in conjunction with para.6.C DATA, processes C1-C3.
- 38) Visually inspect welds including weld run in and run out areas. If required, to fill cavities, locally weld using filler rod. Refer TSD 594 OP.409 using OMat 3/55.
- 39) Crack detect welded areas of air intake case. Refer Overhaul Manual Chapter 72-20-00 Inspection/Check
- 40) Carry out radiological examination of welded areas. Refer TSD 594 OP.409 Refer Appendix A.
- 41) Welds marked 'BY' and electron beam weld penetration are to be dressed by scurf mopping with aluminium oxide to 0.010 (0,25) MAX. standout. Parent material not to be impaired. Refer figs.405 and 407
- 42) Install air intake case in heat treatment fixture and place in a suitable furnace. Refer para.7. TOOLS, item 3.
- 43) Heat treat to $4750^{\circ}\text{C} \pm 50^{\circ}\text{C}$ ($8870^{\circ}\text{F} \pm 90^{\circ}\text{F}$). Soak at this temperature for 4 hours. Air cool.
- 44) Remove air intake case from fixture.

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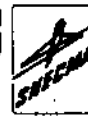
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- 45) Machine outer face of vane to obtain the dimensions detailed. Refer figs.411, 413 and 414
- 46) Drill and tap six holes in each replacement vane end for inserts. Refer figs.410 and 412
- 47) Fit new screw thread inserts, drill six holes dia. 0.091/0.092 (2,31/2,34) and fit locking pins in each replacement vane end. Refer Overhaul Manual Chapter 72-09-00 Repair Refer fig.410 and 412. Refer para.8.B. REPLACEMENT PARTS, items 12 and 13.
- 48) Fit wire thread inserts Refer Overhaul Manual Chapter 72-09-00 Repair Refer fig.412. Refer para.8.B. REPLACEMENT PARTS, item 11.
- 49) Crack detect all over. Refer Overhaul Manual section 72-20-00 Inspection/Check
- 50) Embody service bulletin SB. 0L. 593-72-8080 part 2 if required. Refer para.7. TOOLS, items 4 and 5.
- 51) Fit new self locking shank nuts in rear flange of inner case. Ref overhaul manual section Chapter 72-09-00 Repair Refer figs.401 and 402 Refer para.8.B. REPLACEMENT PARTS, item 14.
- 52) Carry out final visual inspection of the air intake case to ensure satisfactory completion of repair and that case is in a serviceable condition.
- 53) Mark Repair Instruction number RI 8488692 or R2 adjacent to the normal 'assy.of' no. using the electro-chemical marking technique. Refer Overhaul Manual Chapter 72-09-00 Repair

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5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
CASE, ASSEMBLY, AIR INTAKE	TITANIUM ALLOY MSRR 8605	TBC
PLATE, RESTRICTOR	TITANIUM ALLOY MSRR 8606	TAU

6. DATA**A. Resistance spot welding parameters.**

Component: Vane x restrictor plate.
Material specification: MSRR 8605 and MSRR 8606.
Slug size: 0.125/0.175 (3,18/4,45).
0.150/0.200 (3,81/5,08).
Electrode tip size (top): 0.325 (8,26).
Electrode tip size (bottom): 0.250 (6,35).
Machine: Phillips 'E'.
Machine settings: (applicable to Phillips 'E' machine only).
Transformer current: 100 Amps
Step x step current: Manual.
Squeeze : 44
Weld heat : 12
Hold times (cycles): 12
Off time : 0
Meter balance : 50
Heat : 55
12 psi (84 kPa)

B. Process B1.

Component : Vane x vane end.
Vane x vane stub.
Material specification : MSRR 8605.
Type of weld : Plasma (manual).
Machine : Researcher Mk.11
Torch : WP3 water cooled
Current : 15/20 Amps
Electrode (-ve) : 0.096 (2,44) tungsten
30° inc. Set back 0
Filler wire : 18 swg 0Mat 3/55.
Plasma gas (argon) : 5 on 1/8-12-G-5/8 flowmeter tube
Backing gas (argon) : 12 cu ft/h (5,66 l/min).
(encase components in plastic bag)
Shield gas (argon plus : 15 cu ft/h at 30 psi line pressure
5% hydrogen) (7 l/min at 207 kPa)
Tip size : 0.031 (0,79) standard

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**B. Process B2.**

Component : Vane x vane end.
Vane x vane stub.
Material specification : MSRR 8605.
Type of weld : T.I.G (enclosed argon atmosphere)
Machine : Hobart Cyberwave 300F
Current : 60 to 80 Amps
Filler wire : 18 swg OMat 3/55.

C. Process C1

Component : Vane end x outer case
Material specification : MSRR 8605 0.250/0.450 (6,35/11,43)
thick
Type of weld : Electron beam linear
Sequence (tackweld -
cosmetic run) : Weld
Machine and gun system : Sciaky vickers 11-8-10, 10 kW gun
Filament type : 0.028 (0,71) diameter filament.
Button cathode.
Working height : 7.874 (200,0) from chamber roof
Focus position : N/A
Focus setting (ref) : 060 (dial setting)
Voltage : 145 kV
Beam current : 67 mA
Weld speed : 60 ins/min (1524,0 mm/min)
Weld speed setting
(ref) : 400
Circular deflection -
diameter : N/A
Circular deflection -
frequency : N/A
Fade in : 0.5 seconds
Weld time : N/A
Overlap : N/A
Fade out : 0.5 seconds
Pulse : N/A
Vacuum ,m : Not less than 4×10^{-4} mm Hg
Filler wire and feed
rate : N/A
Movement detail : Weld towards fixture base plate
Additional parameters : Use 21.00 (533,4) packing under
rotary tilt table, e.g 12.00 (304,8)
packer plus 1,00 (25,4) plate
and 8.00 (203,2) R.S.J.

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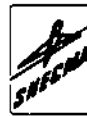
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C. Process C2

Component : Vane end x front flange
Material specification : MSRR 8605 0.250 (6,35) thick
Type of weld : Electron beam partial circumferential
Sequence (tack-weld-cosmetic run) : Seal - weld - optional cosmetic
Machine and gun system : Sciaky vickers 11-8-10, 10 Kw gun
Filament type : 0.028 (0,71) diameter filament.
Button cathode.
Working height : 7.874 (200,00) from chamber roof
Focus position : Above surface
Focus setting (ref) : Seal and weld 050 (dial setting)
Cosmetic (optional) - 000 (dial setting)
Voltage : 120 kV
Beam current : Seal 5 mA; weld 50 mA; cosmetic (optional) 10 mA
Weld speed : 60 ins/min (1524,00 mm/min)
Weld speed setting (ref) : 035
Circular deflection - diameter : N/A
Circular deflection - frequency : N/A
Fade in : 1.0 seconds
Weld time : 5.0 seconds
Overlap : N/A
Fade out : 2.0 seconds
Pulse : N/A
Vacuum : Not less than 4×10^{-4} mm Hg
Filler wire and feed rate : N/A
Movement detail : Weld joint furthest from fixture base plate
Additional parameters : Use 21.00 (533,4) packing under rotary tilt table.

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**C. Process C3**

Component : Vane end x rear flange
Material specification : MSRR 8605 0.450 (11,43) thick
Type of weld : Electron beam partial circumferential
Sequence (tack-weld-cosmetic run) : Seal - weld - optional cosmetic
Machine and gun system : Sciaky vickers 11-8-10, 10 kW gun
Filament type : 0.028 (0,71) diameter filament.
Button cathode.
Working height : 7.874 (200,00) from chamber roof
Focus position : Above surface
Focus setting (ref) : Seal and weld 050 (dial setting)
Cosmetic (optional) - 000 (dial setting)
Voltage : 145 kV
Beam current : Seal 5 mA; weld 65 mA; cosmetic (optional) 10 mA
Weld speed : 60 ins/min (1524,0 mm/min)
Weld speed setting (ref) : 035
Circular deflection - diameter : N/A
Circular deflection - frequency : N/A
Fade in : 1.0 seconds
Weld time : 5.0 seconds
Overlap : N/A
Fade out : 2.0 seconds
Pulse : N/A
Vacuum : Not less than 4×10^{-4} mm Hg
Filler wire and feed rate : N/A
Movement detail : Weld joint nearest from fixture base plate
Additional parameters : Use 21.00 (533,4) packing under rotary tilt table.

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7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
S3S15706000	Fixture, clamping and welding.	1
S3S15868000	Fixture, filing and tackwelding.	2
S3S15869000	Fixture, heat treatment.	3
S3S15438000	Milling cutter.	4
S3S15439000	Milling cutter.	5

NOTE: Items 4 and 5 are only required if service bulletin
SB 0L.593-72-8080 is to be embodied.

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
B488485 B488486 or B488487 or B488488 or	VANE (POSITION 1,2,4 and 5).		6
B493059 B493060 or B493061 or B493062 or	VANE (POSITION 3)		7
B903846 B916271 or	END, VANE		8
B488489	PLATE, RESTRICTOR (VANES 1 AND 5)		9
B488490 (VANE 2)	PLATE, RESTRICTOR		10
AGS3707	INSERT, SCREW THREAD		11
B477455	INSERT, SCREW THREAD		12
B158252	PIN, LOCKING		13
AS27860	NUT, SELF LOCKING SHANK		14

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APPENDIX ARADIOGRAPHIC INSPECTION OF E.B.W WELDS.

1. Defects shall be assessed to the following standard.

<u>ITEM</u>	<u>DEFECT</u>	<u>ASSESSMENT</u>
1.1	Cracks	Not acceptable
1.2	Lack of penetration	Not acceptable
1.3	Lack of fusion	Not acceptable
1.4	Undercutting-sharp edged	Not acceptable
1.5	Inclusions	Not acceptable
1.6	Weld concavity	Refer fig.417
1.7	Porosity	Refer paras.2 and 3
1.8	Edge of weld concavity	Refer fig.417
1.9	Cavitation	Not acceptable

2. Randomly dispersed porosity.

- 2.1. Acceptable pores must be of a spherical nature; sharp, irregular pores are not acceptable.

- 2.2. The number and spacing of maximum diameter randomly dispersed pores in any 6.000 (150,00) length of weld shall be as shown in table 1.

A larger number of smaller diameter pores are acceptable provided the spacing ratio is maintained and the total area does not exceed the equivalent standard.

MATERIAL THICKNESS (refer para.2.5)	MAX DIA OF PORES (D)	MAX No OF PORES (N)	MIN DISTANCE BETWEEN PORES
Under and including 0.060 (1,50)	0.012 (0,30)	12	10 x D
Over 0.060 (1,50) to 0.120 (3,00)	0.024 (0,60)	12	6 x D
Over 0.120 (3,00) to 0.240 (6,00)	0.040 (1,00)	10	5 x D
Over 0.240 (6,00) to 0.480 (12,00)	0.040 (1,00)	10	3 x D

TABLE 1

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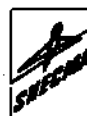
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- 2.3. For welds less than 6.000 (150,00) in length, the number of pores (N) acceptable shall be proportional to the length (L) of the weld ie.

$$\frac{N \times L}{6} \text{ ins} \quad \text{OR} \quad \frac{N \times L}{150} \text{ mm}$$

- 2.4. The sum of the diameters of all pores (including chain porosity) in any 2.000 (50,00) length of weld shall not exceed 0.240 (6,00).
- 2.5. Acceptance levels should be based on material thickness at the time of welding, taking into account any further machining of the welded joints, since this may bring their assessment into a lower material thickness range.
3. Porosity forming a chain on thickness's over 0.060 (1,50).
- NOTE: Chain porosity on thickness's up to and including 0.060 (1,50) is not acceptable.
- 3.1. Acceptable pores must be of a spherical nature; sharp, irregular pores are not acceptable.
- 3.2. Chain porosity less than 0.010 (0,25) diameter is acceptable provided there is a minimum of 0.010 (0,25) between individual pores and 0.050 (1,25) between parallel lines of porosity. The sum of the diameters of the pores in any 1.000 (25,40) length of weld must not exceed 0.240 (6,00).

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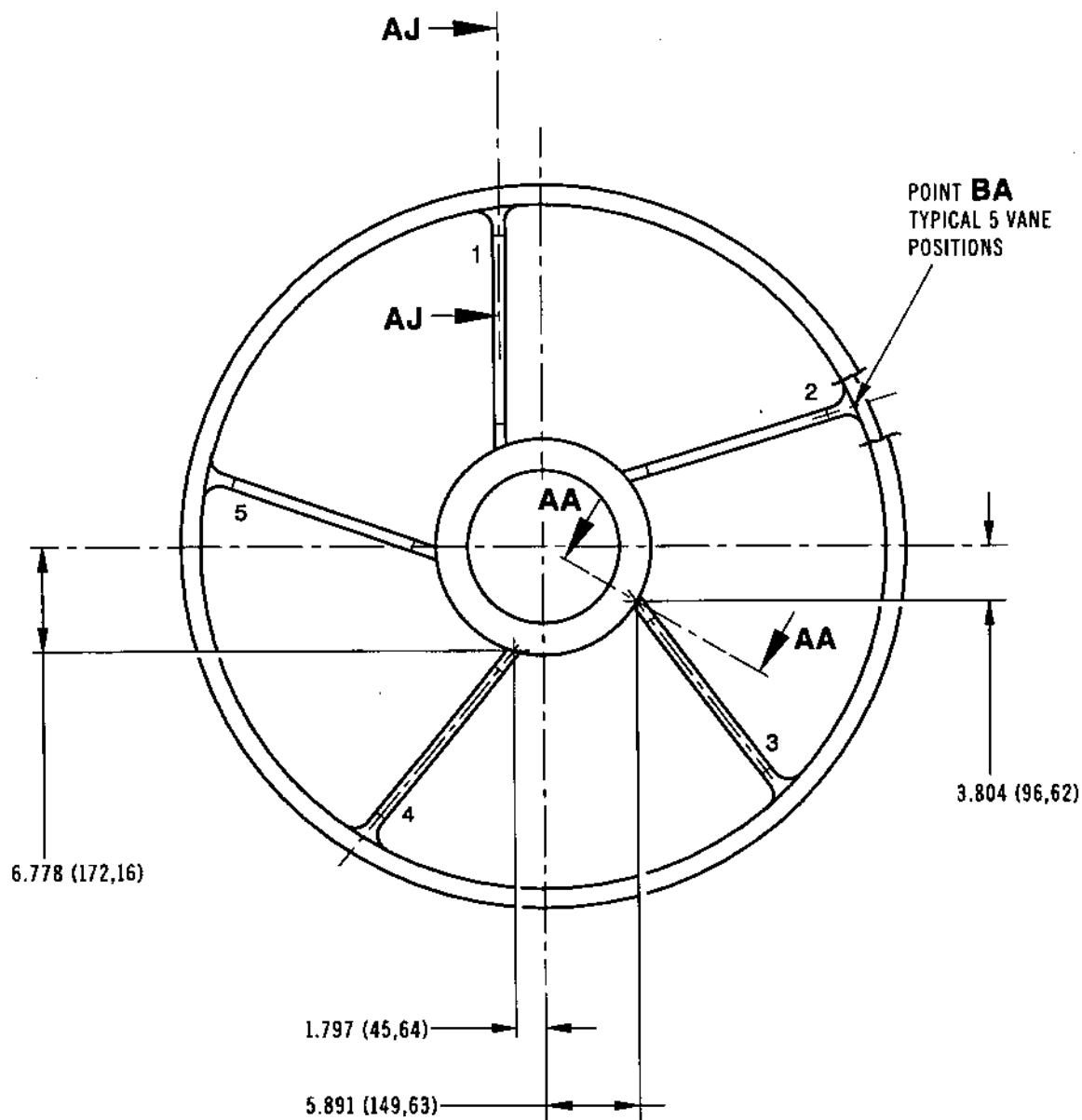
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sneema



VIEW LOOKING FORWARD ON REAR FLANGE
VANES NUMBERED 1-5 IN A CLOCKWISE DIRECTION

Figure 401

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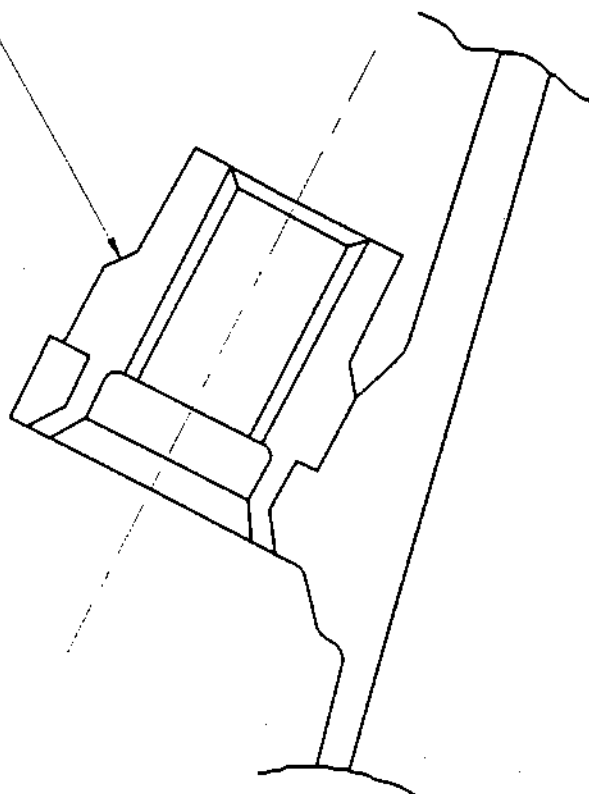
MK.610-14-28

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ITEM 14 (18 OFF)



SECTION AA
FIG.402

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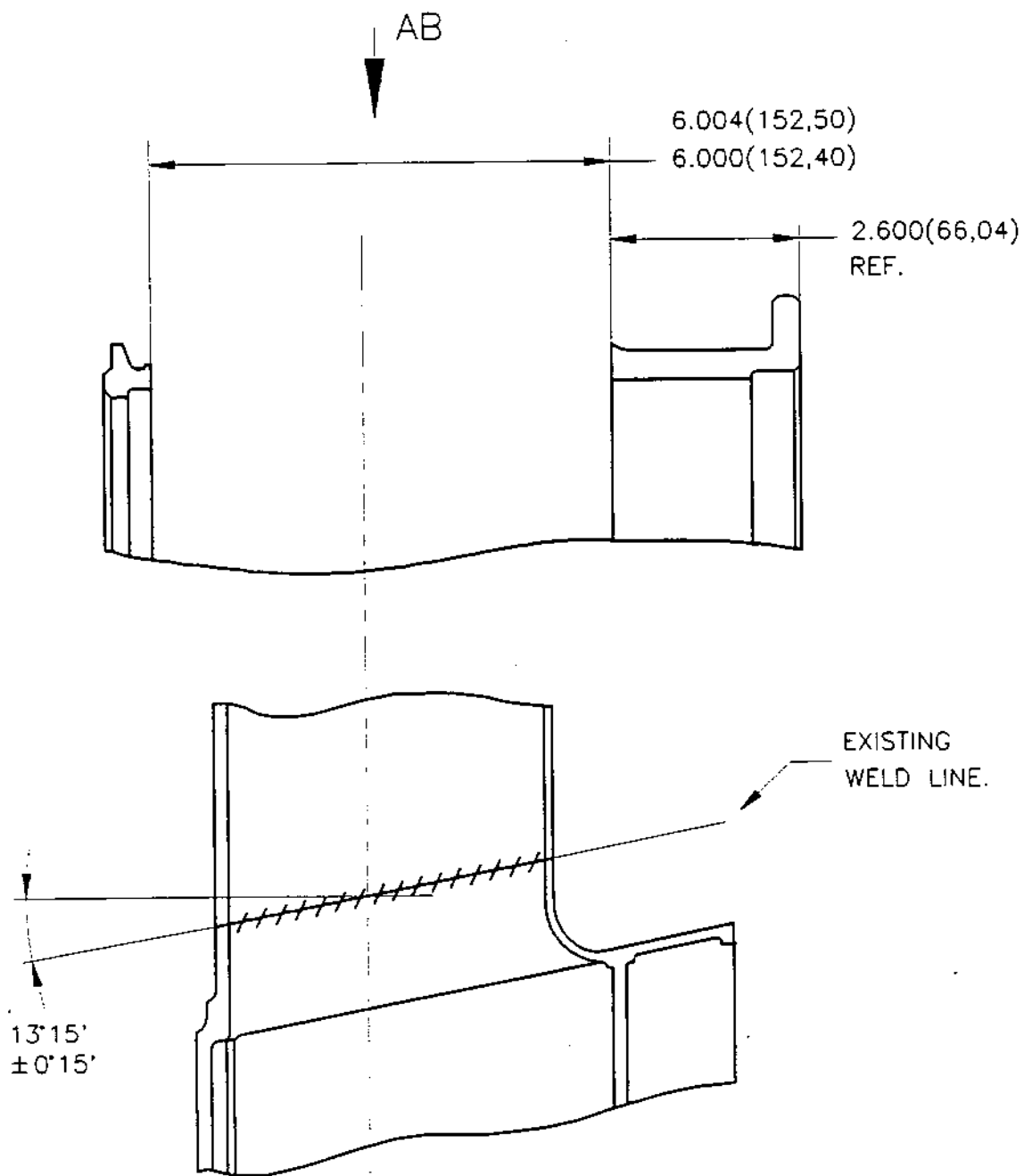
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SECTION THROUGH UNIT SHOWING
VANE CUT OFF POSITION.
FIG.403

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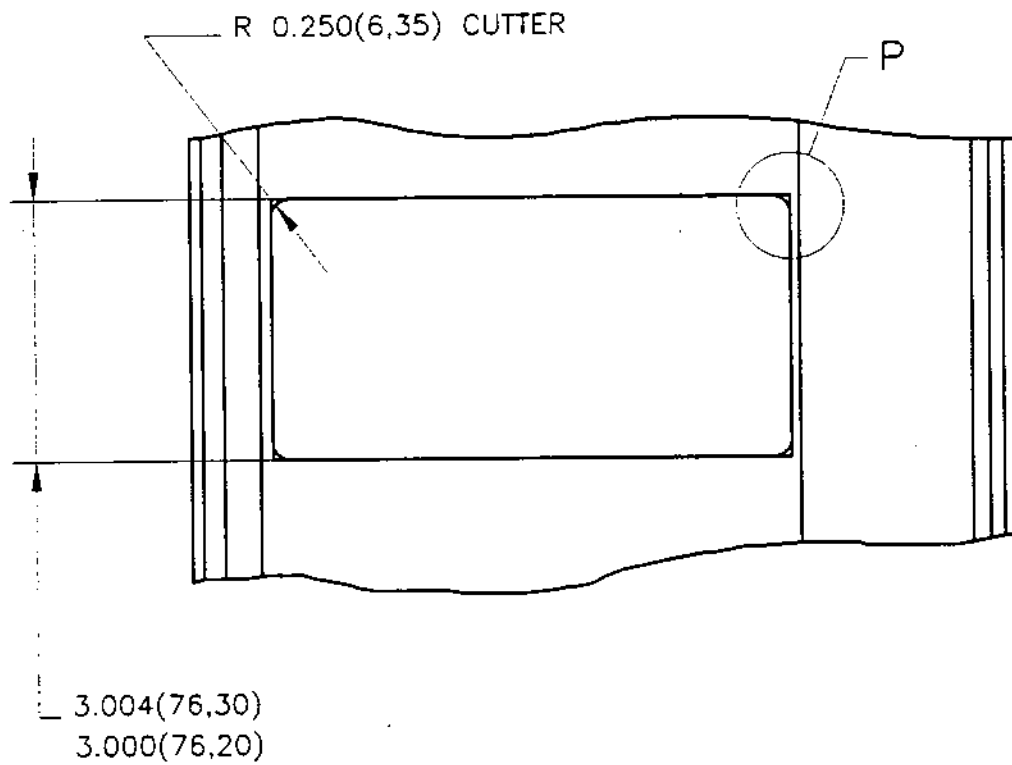
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VIEW  AB

CORNERS TO BE
FINISHED SQUARE
BY HAND AT P

FIG.404

REPAIR

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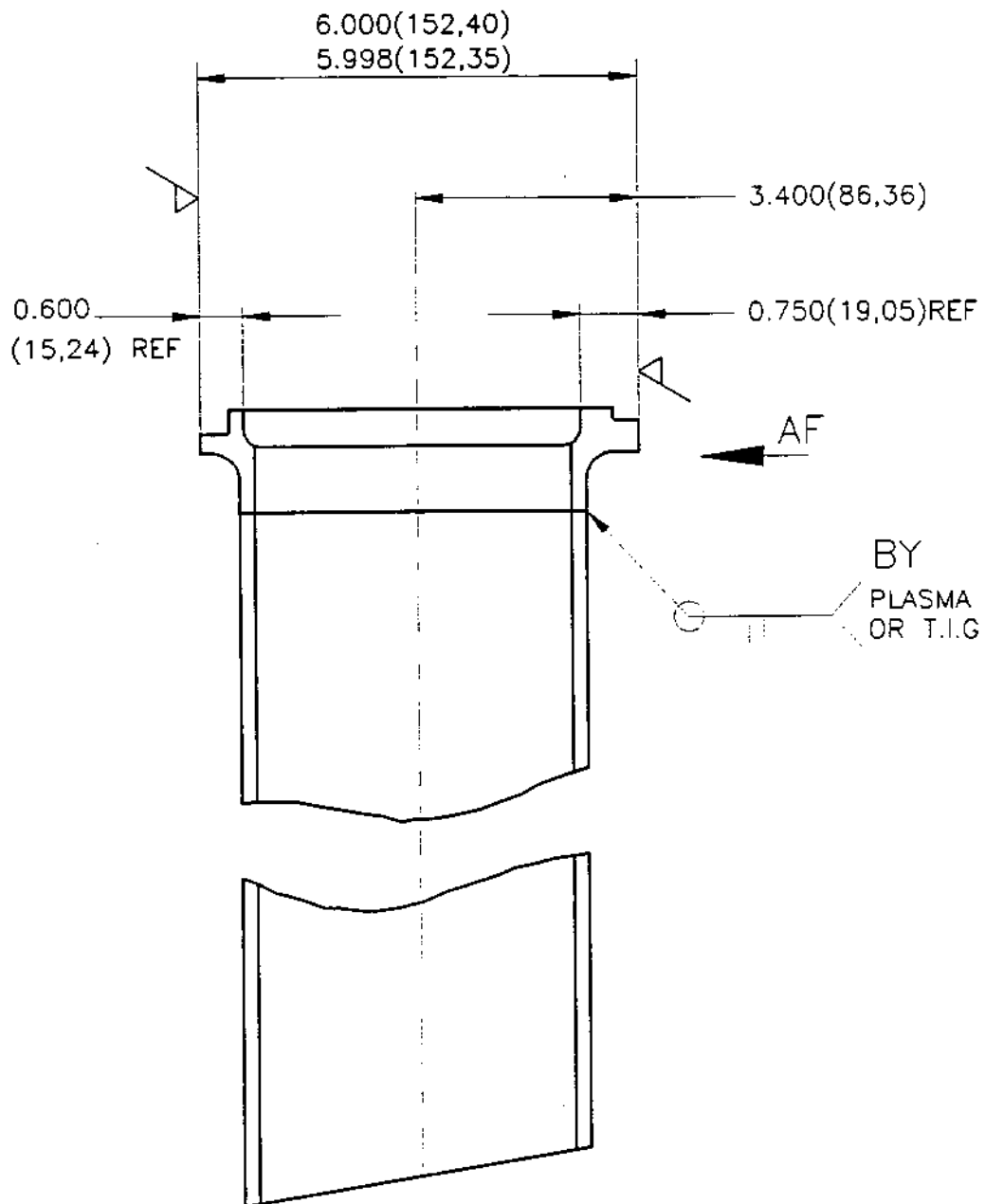
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VANE SUB-UNIT SHOWING
PRE-WELD MACHINING DIMENSIONS.
FIG.405

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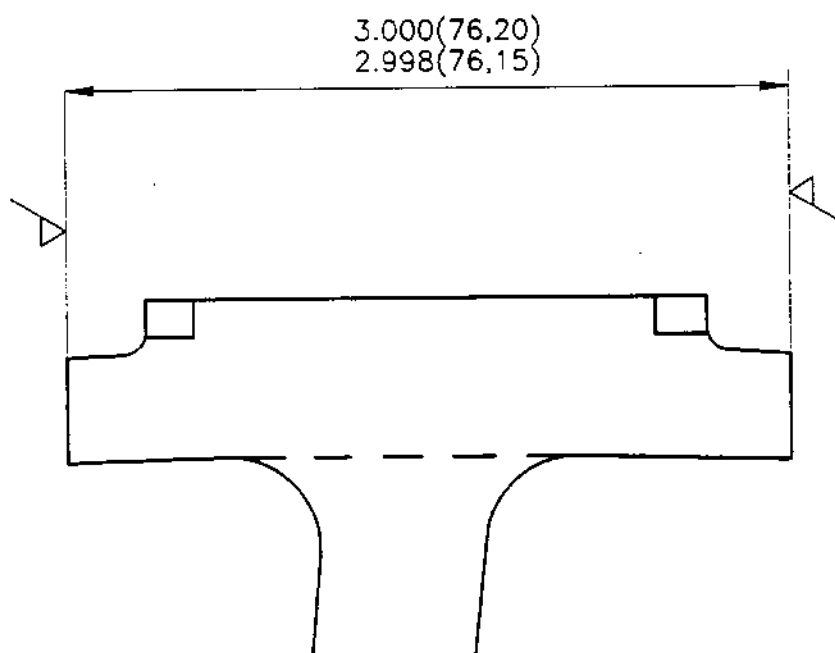
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VIEW —▶ AF

FIG.406

REPAIR

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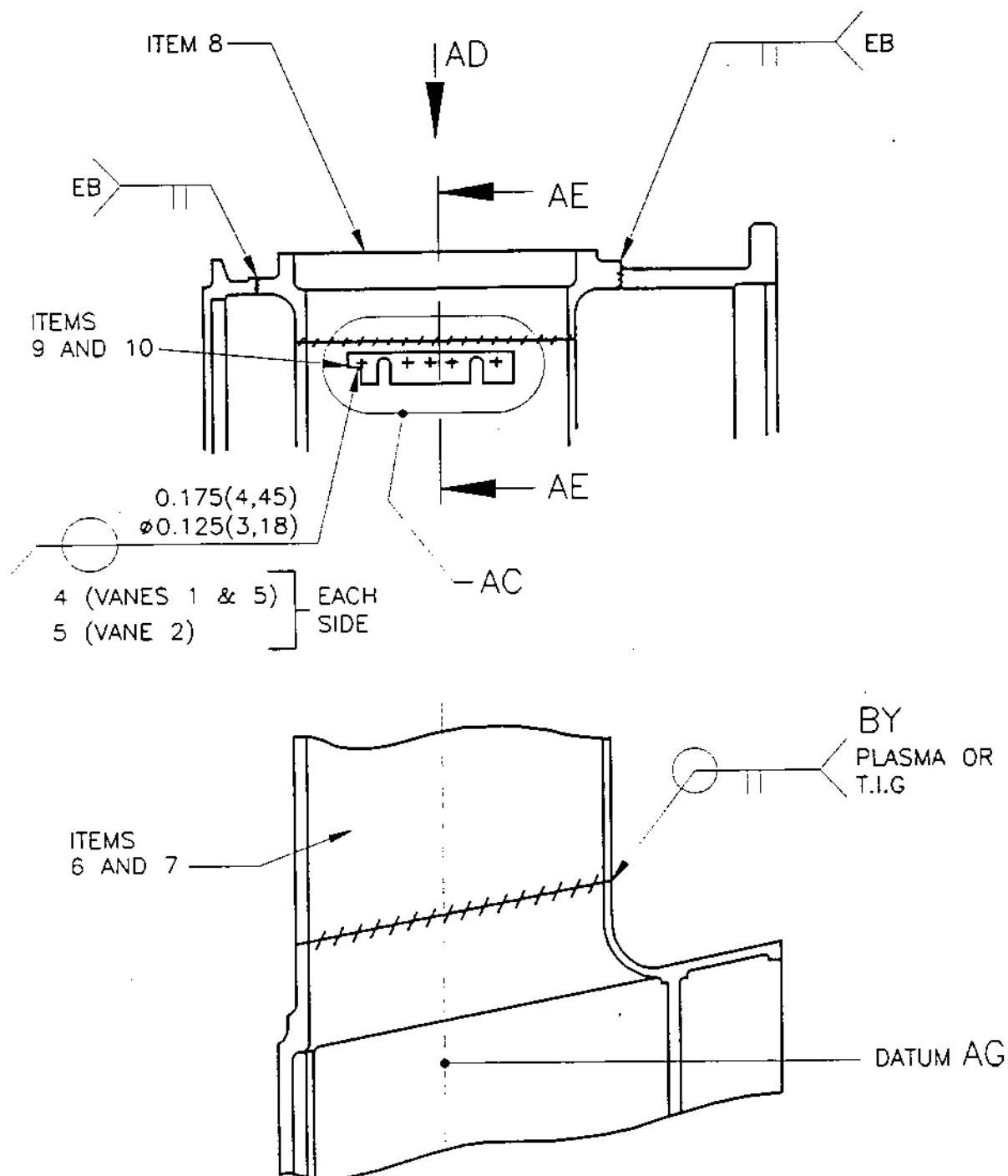
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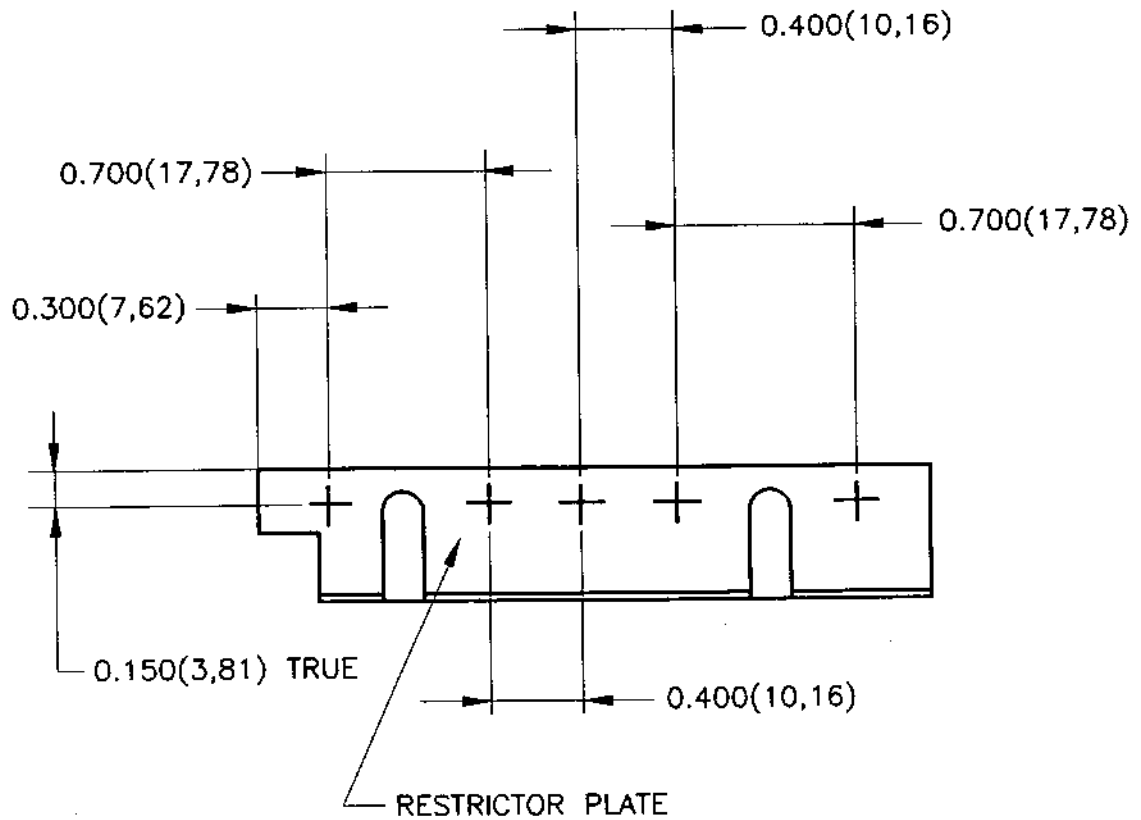


SECTION THROUGH UNIT
SHOWING VANE IN POSITION.
FIG.407

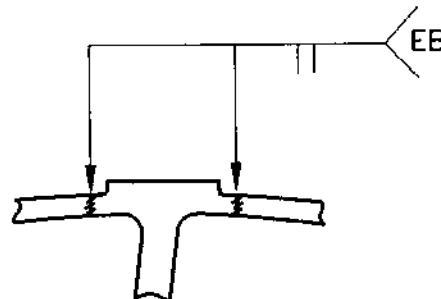
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DETAIL AC
SHOWING SPOT WELD POSITIONS.
FIG.408



SECTION AE
FIG.409

BS00029723/1



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sneema

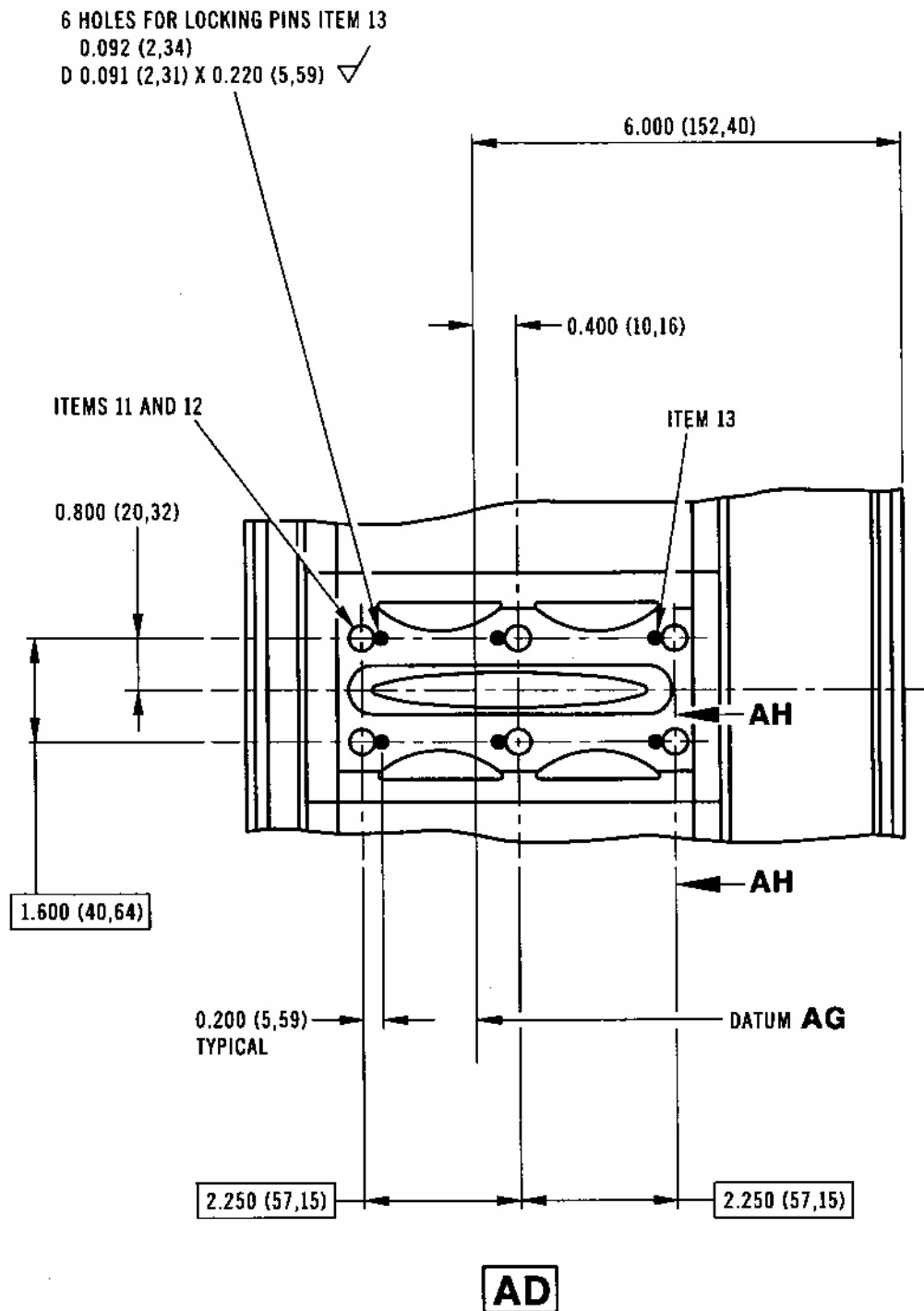


Figure 410

REPAIR

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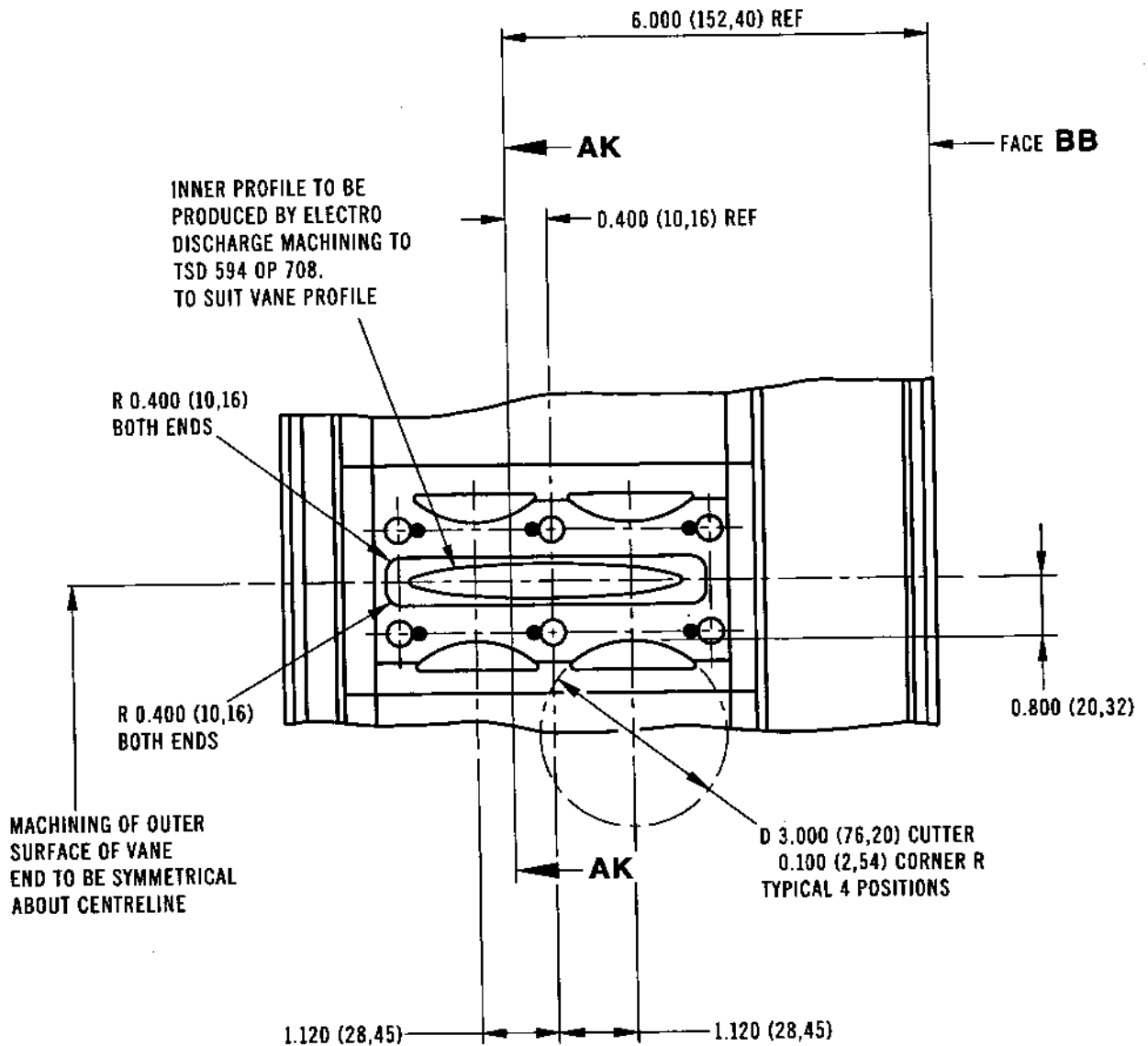


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sneema



REPEAT VIEW **AD**

Figure 411



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ASSEMBLE INSERT ITEM 11
1 TO 1½ TURNS BELOW
SURFACE.REMOVE TANG

R 0.040(1,02)
MAX.

120°

Ø0.322(8,18)

0.350(8,89)
MIN. THREAD

INSERT ITEM 12
TO BE FLUSH
WITH THIS FACE.

0.500(12,70)
DRILL DEPTH

⊕ Ø0.012(0,30)

6 HOLES Ø0.4375(11,113) 20 UNF 3B ✓
0.3834(9,738)
MINOR DIA Ø0.3916(9,947) ✓
FOR Ø0.250(6,35) 28 UNF INSERT

SECTION AH
FIG.412

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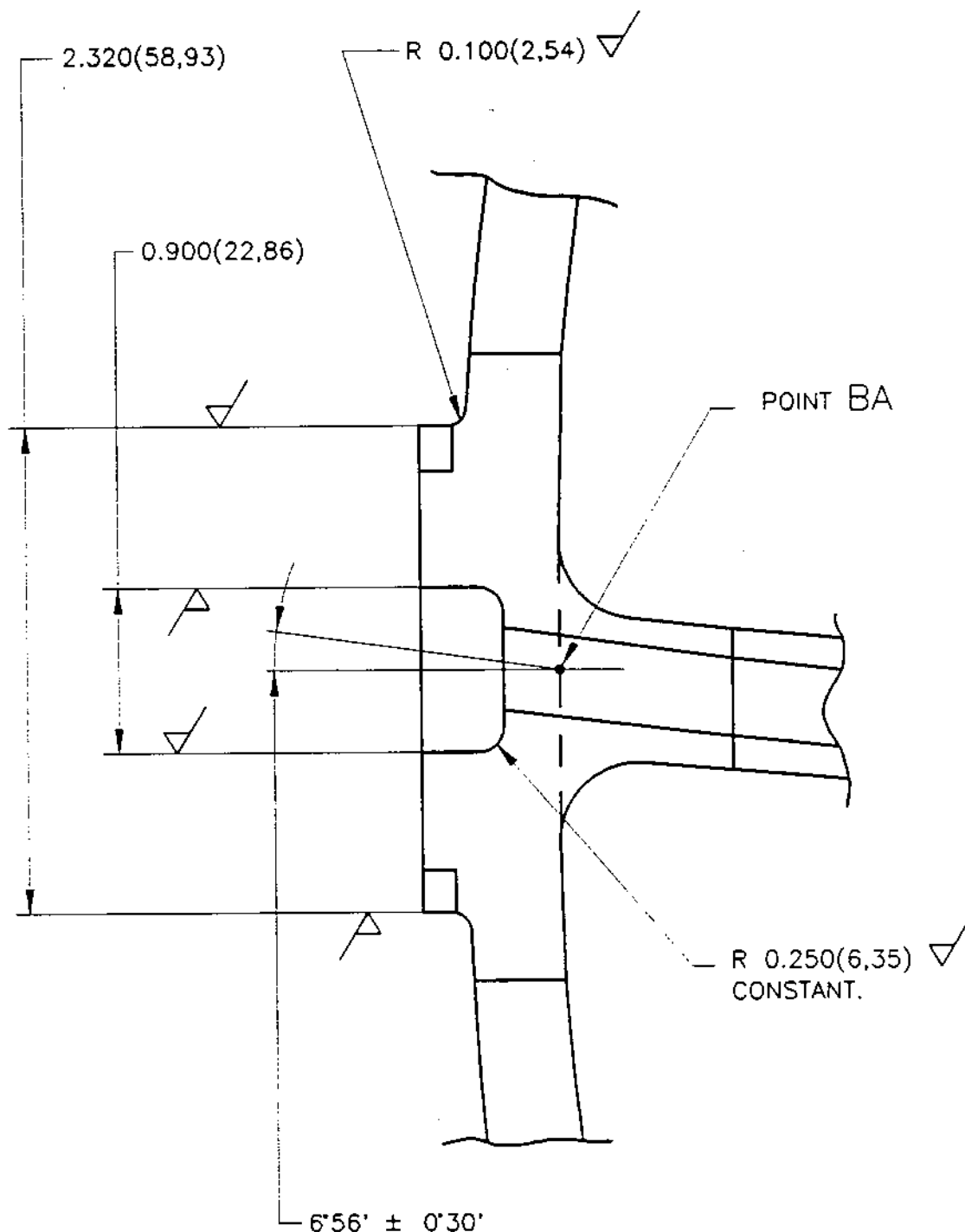
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SECTION AK
FIG. 413

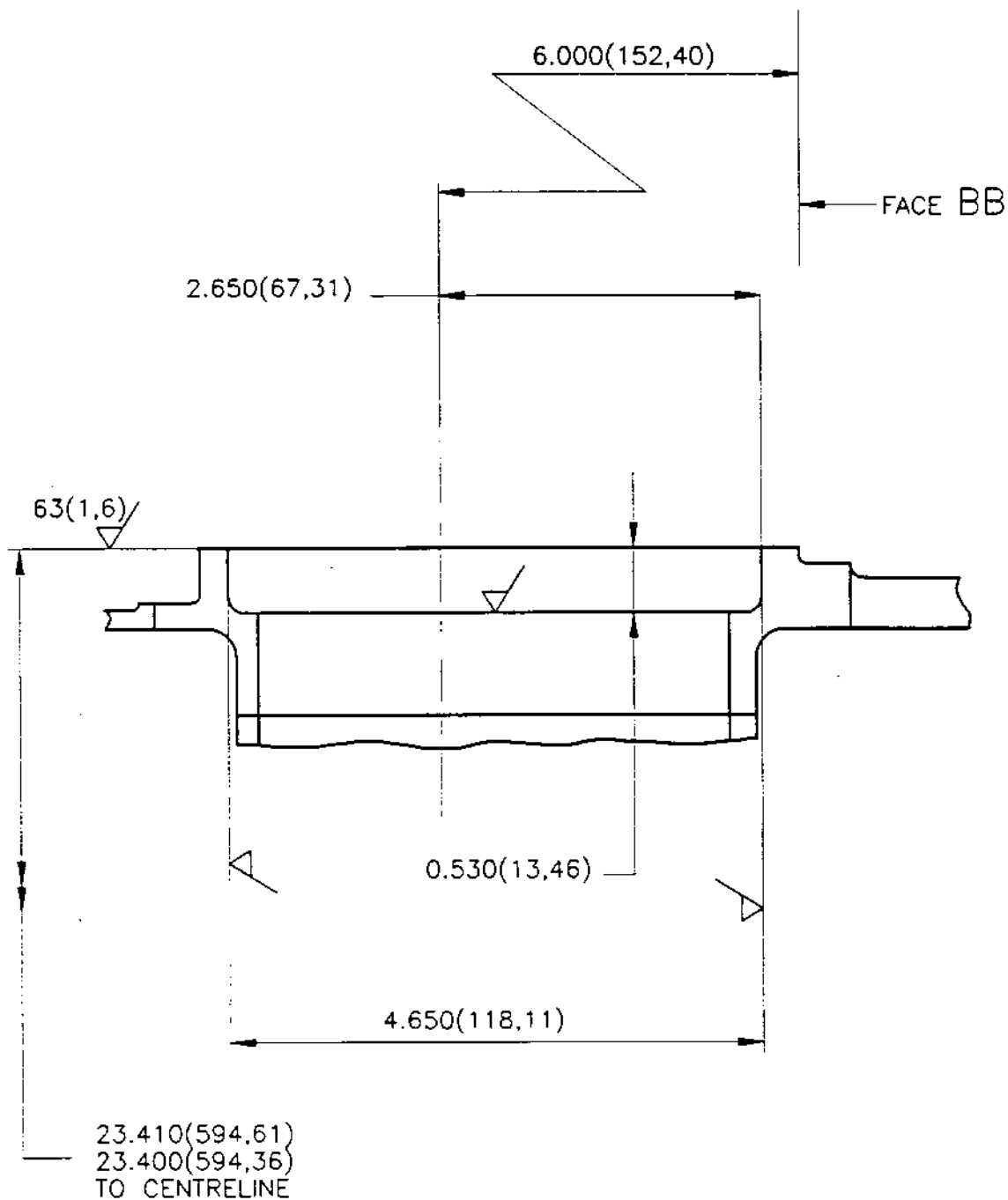
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SECTION AJ
(ALL VANE ENDS SIMILAR)
FIG.414

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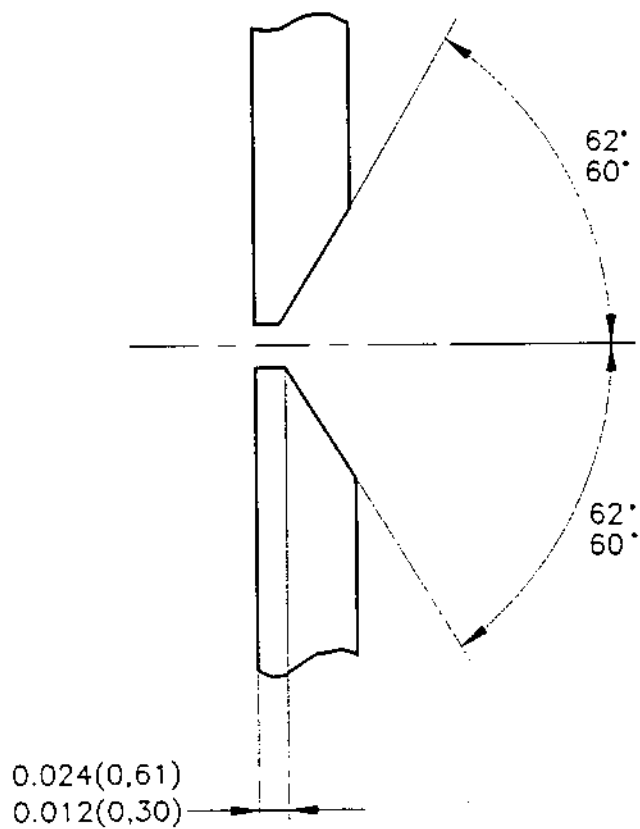
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TIG OR PLASMA WELD
PREPARATION
FIG.415

REPAIR

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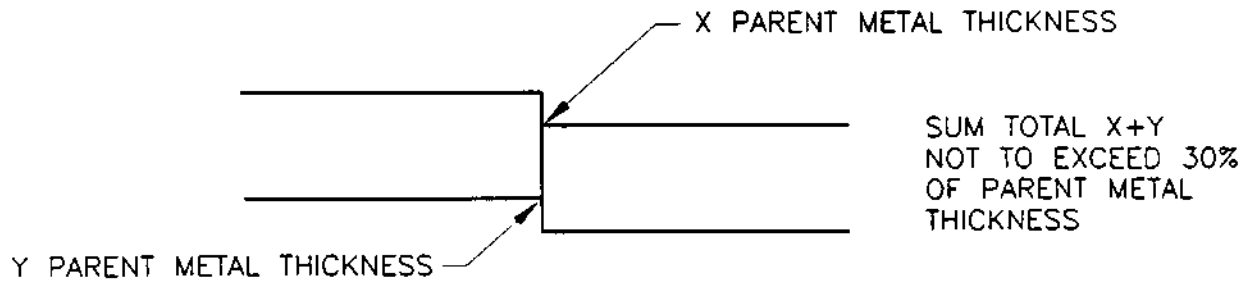
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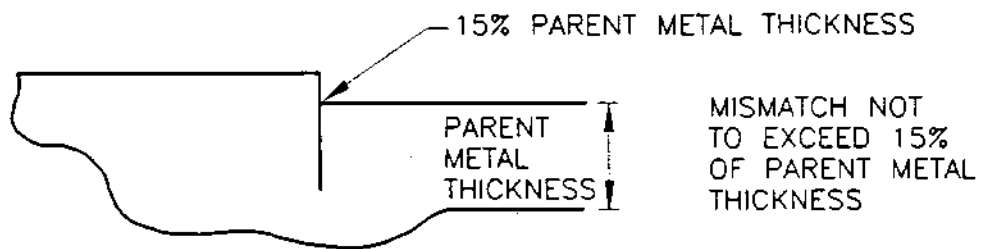
Jan 4/93



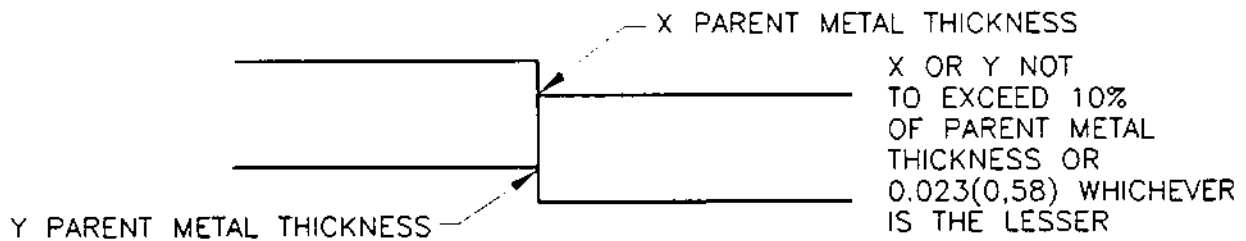
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DOUBLE STEP—MANUAL AND MECHANISED WELD JOINTS
(T.I.G. OR PLASMA WELDS)



STEP CONDITION WHEN ONLY ONE SIDE CAN BE INSPECTED
(T.I.G. OR PLASMA WELDS)



DOUBLE STEP JOINTS
(ELECTRON BEAM WELDS)

FIG.416

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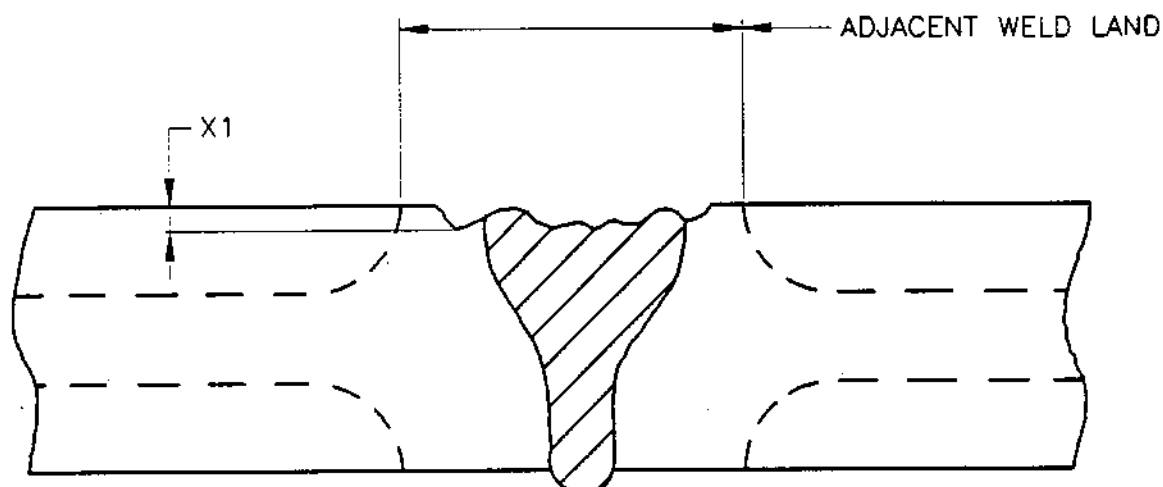
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	JOINT THICKNESS	
	UP TO 0.098(2,5)	OVER 0.098(2,5)
DIMENSION X1 - NON-ROTATING PARTS	15% 't' MAX	10% 't' MAX

CONTROLLING DIMENSION FOR WELD CONCAVITY
AND PARENT METAL THINNING
FIG.417

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CASE, ASSEMBLY, AIR INTAKE

PROVISION FOR THE REMOVAL OF CRACKING FROM THE
VANE END OUTER PLATFORM BY BLENDING/POLISHING

REPAIR NO. B514696

1. EFFECTIVITY

IPC	Fig./Item	Part No.
72-22-01	4 /10A	B925924
	4 /10B	B925925
	4 /10C	B925639
	4 /10D	B925638
	4 /10E	B925952
	4 /10F	B925953

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

This Repair Instruction may be embodied any number of times provided that the minimum residual wall thickness dimensions stated in figs. 402 to 405 are maintained.

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)
Dimensions in Inches (Millimetres)
Tolerances on machined dimensions plus/minus 0.010 (0,25)
Tolerance on angles plus/minus 2 degrees
Break sharp edges 0.004 to 0.020 (0,1 to 0,5)
Surface texture interpretation to ISO1302 (JES137)
Surface texture to be 125 (3,2) Microinches (Micrometres)
Welding symbols to ISO2553 (JES139)
3rd Angle Projection

4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- 1) Using hand tools only (no power tools permitted), carefully blend to remove cracking. Remove the minimum amount of material necessary. Polish to restore surface finish.

Refer figs 401 to 405.
Refer para.2. REPAIR LIMITATIONS.
Refer para.6. DATA.

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CAUTION: If during metal removal, blending or polishing, the material exhibits discolouration due to local overheating, the component must be referred to the local controlling laboratory for assessment by etching and metallurgical examination.

- 2) Dimensionally inspect to ensure minimum wall sections have been maintained at stations A to E. Refer fig.401 to 404.

NOTE: At points between stations, minimum wall sections may vary proportionately to the adjacent station limitations, relative to the axial distance from them.

- 3) Locally etch repaired area(s). Refer Overhaul Manual Chapter 72-09-14 Repair Solution A.
- 4) Locally crack detect repaired area(s). Refer TSD 594 OP 210.
- 5) Mask areas of vane end outer platform not requiring vapour blasting. Use masking tape OMat 230 and/or mechanical blanking plates.
- 6) Locally vapour blast etched area(s). Refer Overhaul Manual Chapter 72-09-13 Repair Procedure B.
- 7) Remove masking.
- 8) Mark Repair Instruction number RI B514696 or R3 on component adjacent to normal 'assy of' no. using the vibro-percussion engraving technique. Refer Overhaul Manual Chapter 72-09-00 Repair.

5. MATERIAL

COMPONENT	MATERIAL	RR CODE
CASE, ASSEMBLY, AIR INTAKE	TITANIUM ALLOY MSRR 8605	TBC

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6. DATA

The definition of the term HAND TOOLS ONLY is deemed to imply that the following may be used:-

GUN - USHIO AIR TOOL COMPANY Ltd

TYPE MSG-3BSN 65000 R.P.M (6 BAR AIR PRESSURE).

WHEEL - MASTER ABRASIVE

TYPE A120 HFX.

NOTE: Load/pressure applied when using the above equipment should not be sufficiently great so as to produce smoking and/or an unpleasant odour from the adhesive agent in the abrasive wheel.

7. TOOLS

TOOL NUMBER	DESCRIPTION	ITEM
-------------	-------------	------

NONE.

8. REPLACEMENT PARTS

PART NUMBER	DESCRIPTION	ITEM
-------------	-------------	------

NONE.

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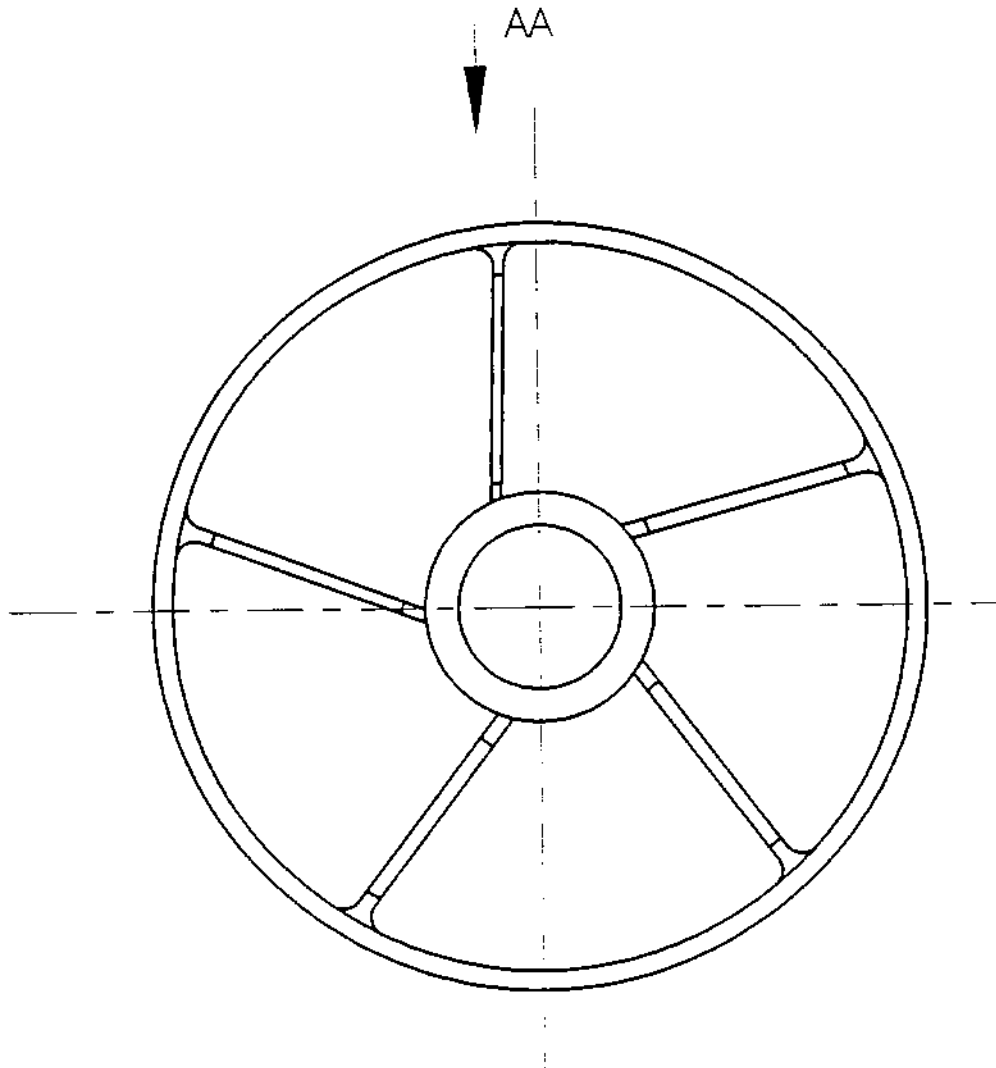
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VIEW LOOKING FORWARD ON REAR FLANGE.
FIG 401.

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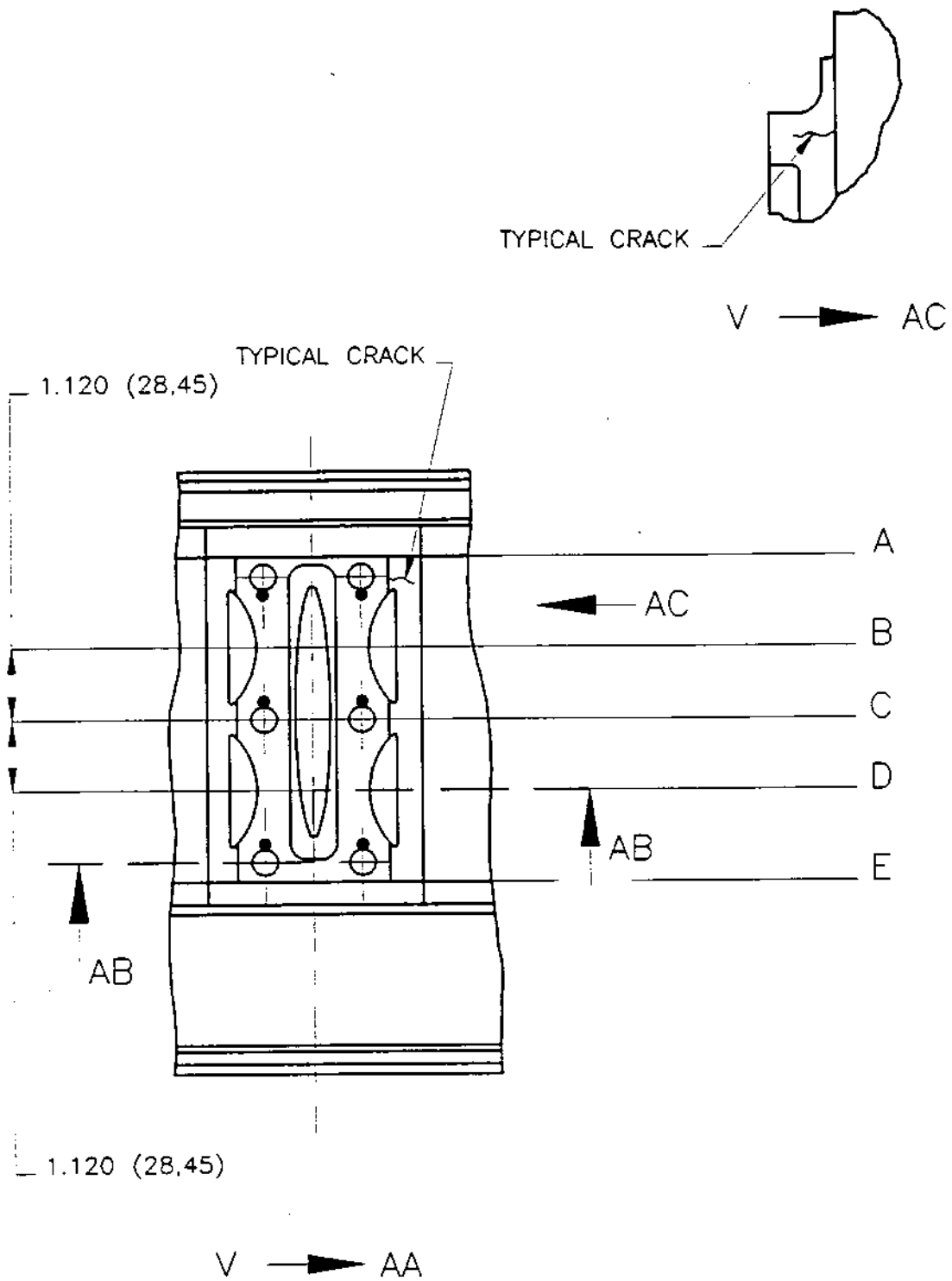
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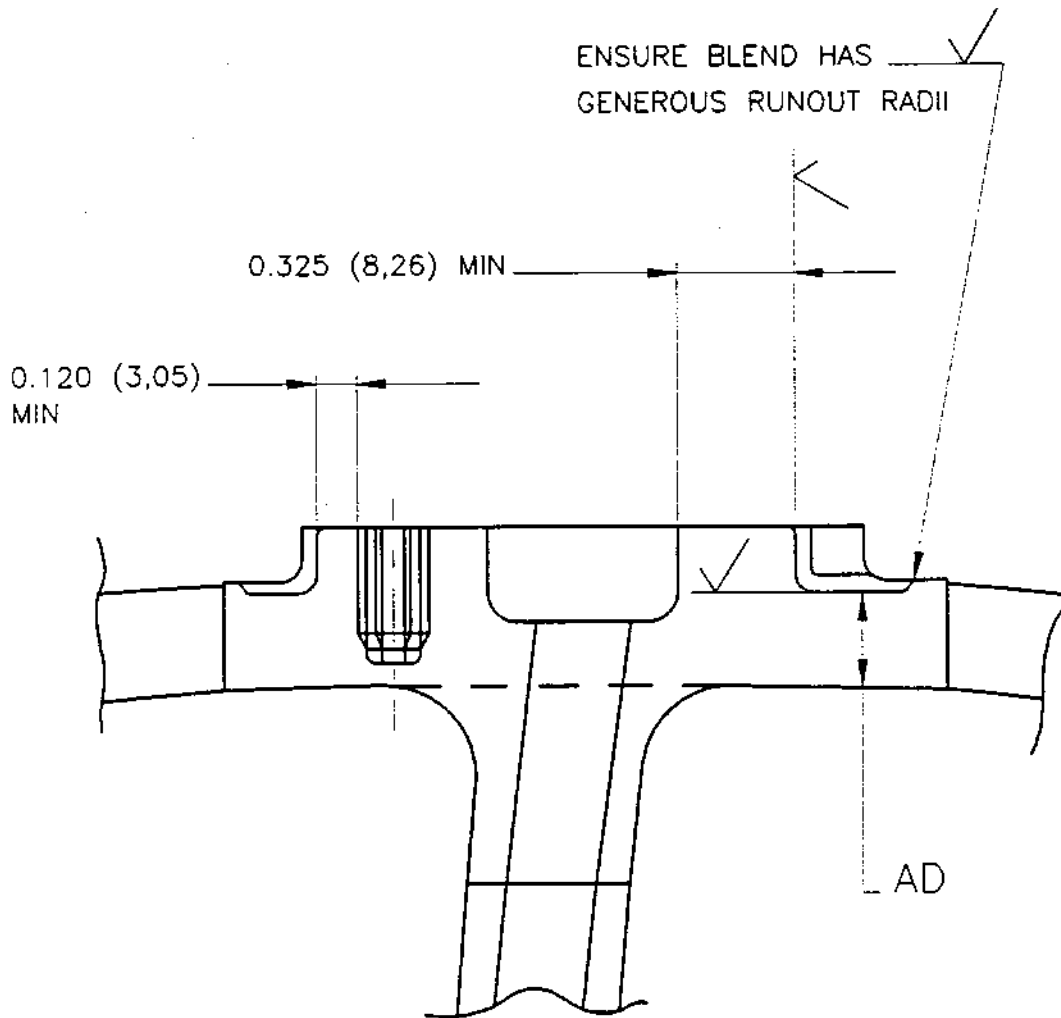


SHOWING B903846 STANDARD OF VANE END.
FIG 402

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STATION (REF FIG 402)	DIMENSION AD MIN
A	0.215 (5,46)
B	0.271 (6,88)
C	0.314 (7,98)
D	0.357 (9,07)
E	0.415 (10,54)

SECTION AB SHOWING TYPICAL BLENDS
FIG 403.



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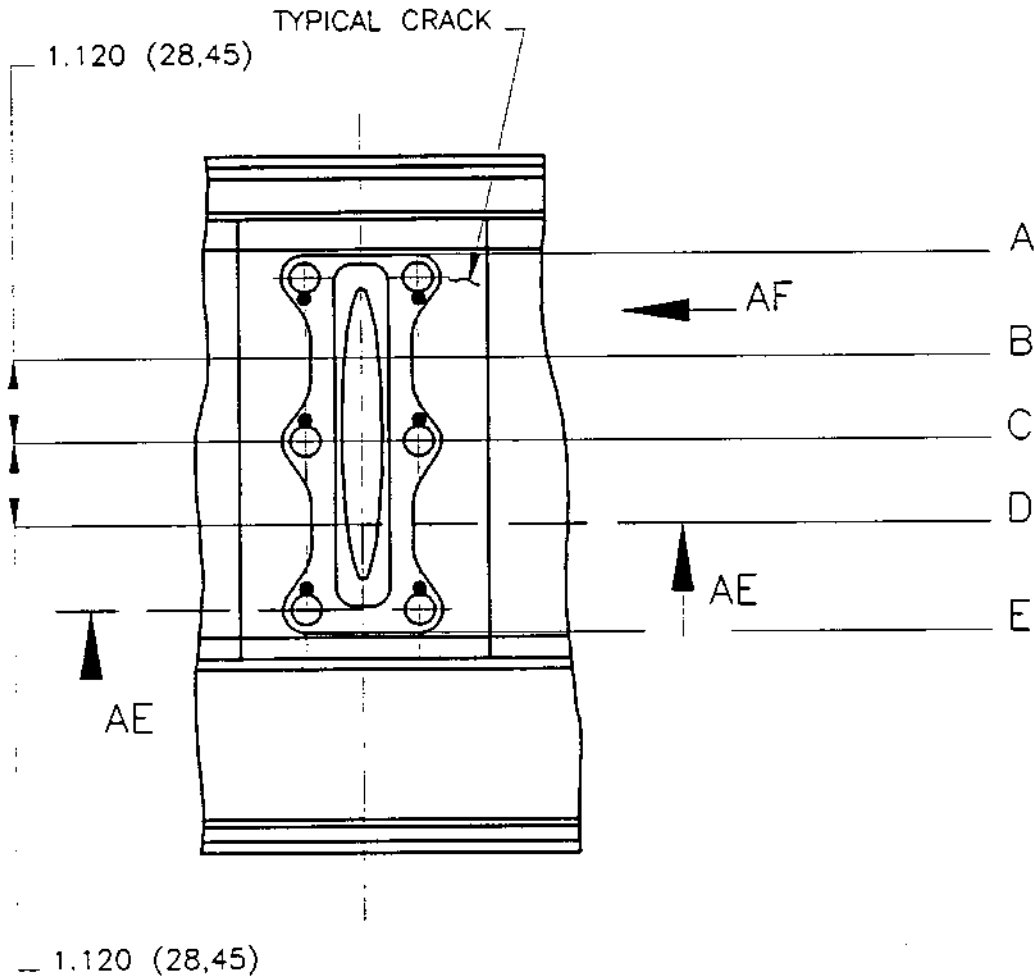
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TYPICAL CRACK

V → AF



REPEAT V → AA

SHOWING B916271 STANDARD OF VANE END.

FIG 404

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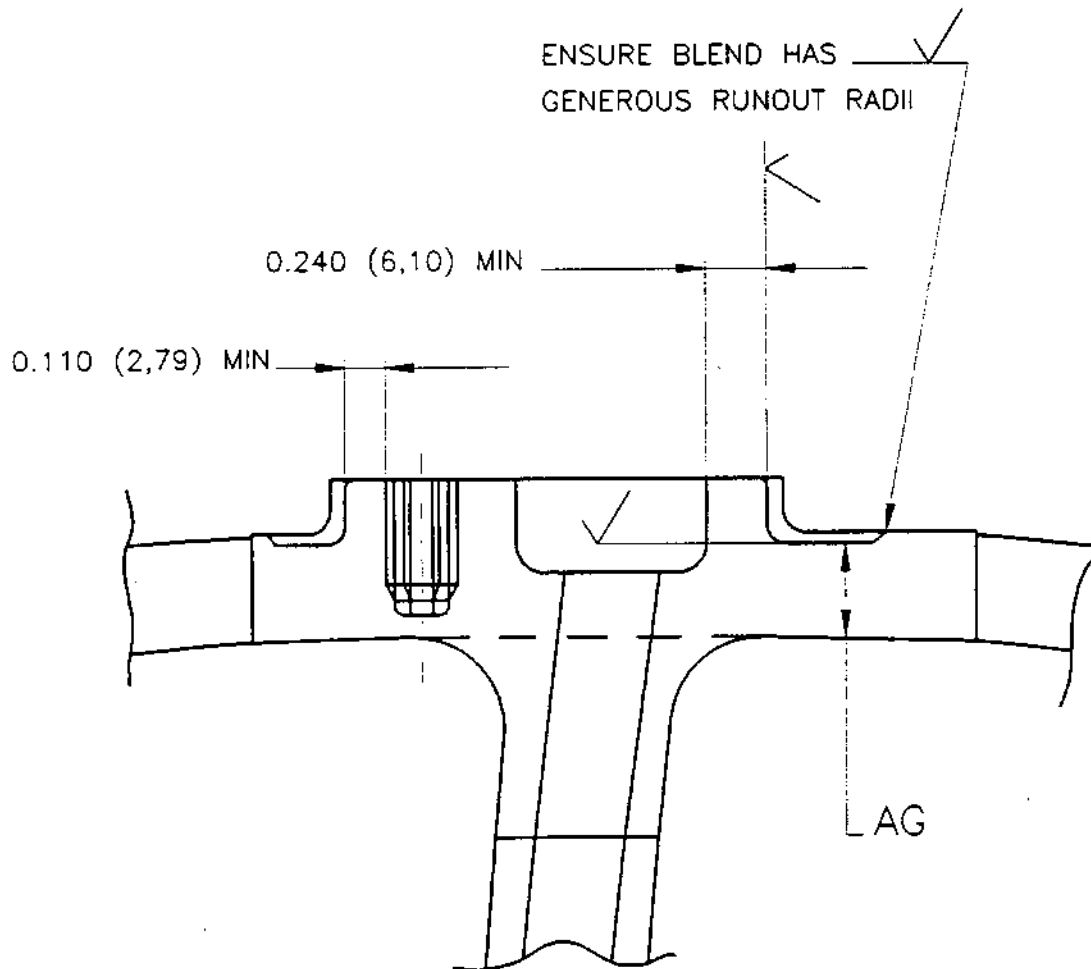
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OVERHAUL



STATION (REF FIG 404)	DIMENSION AG MIN
A	0.215 (5,46)
B	0.271 (6,88)
C	0.314 (7,98)
D	0.357 (9,07)
E	0.415 (10,54)

SECTION AE SHOWING TYPICAL BLENDS
FIG 405

British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

Temporary Revision No. 72-533

Insert in 72-22-01 at rear of repair section in RST No. order.

REASON FOR ISSUE:

To introduce a repair to restore seal clamp dimensions (MRA 101)

ACTION

B.E.O.L.

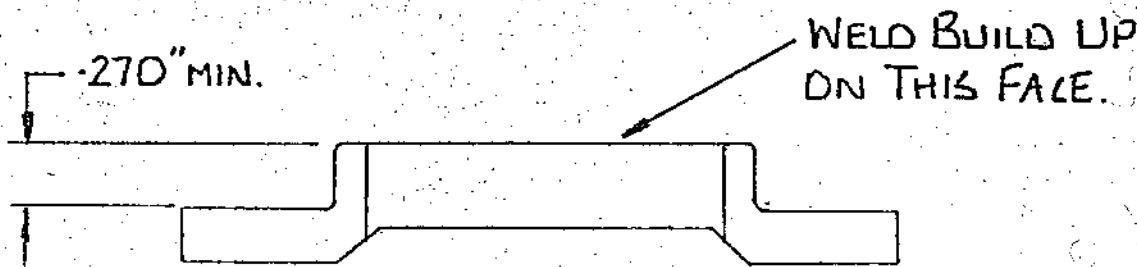
RST 4018 SEAL CLAMPS:-
WELD BUILD UP CONTACT FACE

PROCEDURE

In order to restore seal clamps that fail to meet the required 'nip check' it is permissible to repair as follows:-

1. Build up contact face by Argon Arc weld using Jethete M.190 filler rod (MSRR 9500/10) weld to T.S.D. 594-409.
2. Heat treat at $650^{\circ}\text{C} \pm 10^{\circ}\text{C}$ for 30 minutes, air cool.
3. Machine to restore the 0.27" dimension.
4. Hand dress to blend in with existing inside and outside form.
5. Inspect to the M1 or F1 process as per overhaul manual.

NOTE: The above is in accordance with Oly/Sedp/291 and Oly/Sedp/475.



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RST 4018
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LP COMPRESSOR FRONT BEARING SUPPORT - REPAIR

TABLE OF CONTENTS

Repair No.	Title	Scheme No.
1	No.1 Bearing Housing Seal Land Repaired by Application of Abradable Coating	SAL.B.470383
2	Labyrinth Housing Seal Land Repaired by Application of Abradable Coating	SAL.B.470384
3	No.1 Bearing Housing Repaired by Fitting Replacement Labyrinth Housing	SAL.B.909985

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LP COMPRESSOR FRONT BEARING SUPPORT - REPAIR
NO.1 BEARING HOUSING SEAL LAND REPAIRED
BY APPLICATION OF ABRADABLE COATING

Applicable to: Bearing Housings B.925463, B.925464
Authority: Modification No. OL.8360C

1. Introduction

- A. This Repair describes the procedure for restoring the No.1 bearing housing labyrinth ring seal land, in order to maintain the standard fin/ring clearances of labyrinth No.1. The defective location is first built up with an abradable coating then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the spraying processes applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

2. Repair Limitations

- A. There is no restriction on the number of times this repair may be applied, provided that specified dimensions are maintained.
- B. Verify that there is adequate material at the defective location to permit machining to the dimensions before spraying (Ref.para.3.B.).

3. Summary of Operations

- A. Set the housing true (Ref.Fig.401).
- B. Machine the seal land to the specified dimensions (Ref.Fig.403).
- C. Crack test the housing with fluorescent-penetrant.

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- D. Apply Abradable Coating (Ref.Fig.404).
- (1) Combustion spray the prepared seal land with a bond coating of Metco 450NS, 0.003 in./0.005 in. (0,076 mm/0,127 mm) in thickness.
 - (2) Flame spray Sherritt-Gordon 75/25 Nickel/Graphite abradable coating or Metco 313NS 0.030 in. (0,762 mm) in thickness over the bond coating.
- E. Finish machine the seal land (Ref.Fig.402).
- F. Visually inspect the repair for integrity of the sprayed coating and continuity of sprayed edges.
- G. Mark the coating identification symbols, Sherritt-Gordon and or Metco and as applicable, using the electro-chemical or vibro-percussion marking technique detailed in 72-09-00 Repair.
- H. Identify repair. Mark the repair scheme number SAL B.470383 close to the standard part number on the housing.

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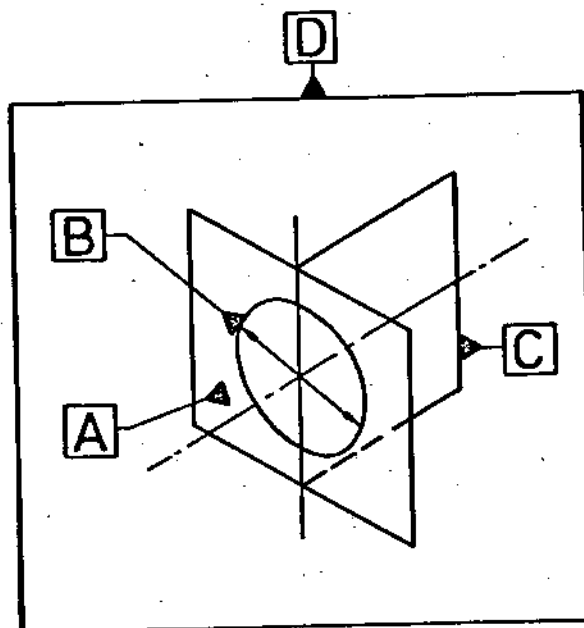


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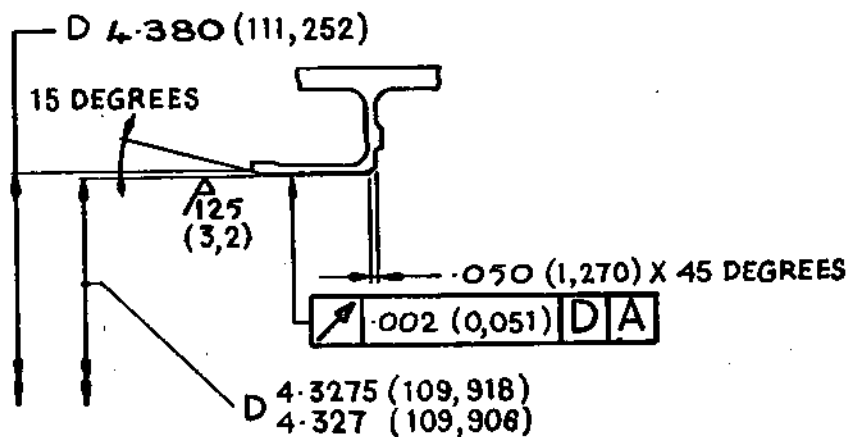
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I.S.O. Collective Datum
Figure 401



Standard Dimensions
Figure 402

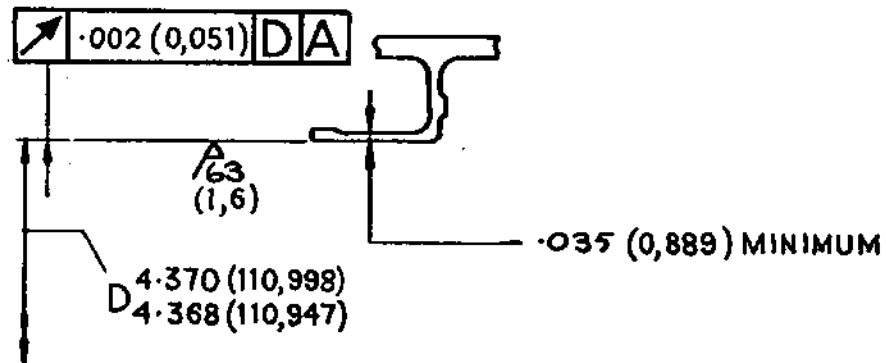
TN16296

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Machining Dimensions Before Spraying
Figure 403



OVERSPRAY PERMITTED
ON CHAMFER AND END
FACE ONLY. THIS IS TO
BE REMOVED.

Spraying Detail
Figure 404

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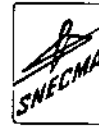
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MK.610-14-28

OVERHAUL



LP COMPRESSOR FRONT BEARING SUPPORT - REPAIR
LABYRINTH HOUSING SEAL LAND REPAIRED
BY APPLICATION OF ABRADABLE COATING

Applicable to: Labyrinth Housings B.454520, B.484244

Authority: Modification No. OL.8360C

1. Introduction

- A. This Repair describes the procedure for restoring the labyrinth housing seal land, in order to maintain the standard fin/housing clearances of labyrinth No.2. The defective location is first built up with an abradable coating then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the spraying processes applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

2. Repair Limitations

- A. There is no restriction on the number of times this repair may be applied, provided that specified dimensions are maintained.
- B. Verify that there is adequate material at the defective location to permit machining to the dimensions before spraying (Ref.para.3.B.).

3. Summary of Operations

- A. Set the labyrinth housing true on datum diameter B and flange face A (Ref.Fig.402).
- B. Machine the seal land to the specified dimensions (Ref.Fig.402).
- C. Crack test the labyrinth housing with fluorescent-penetrant.

REPAIR

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Repair No.2

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MK.610-14-28 *sneema*
OVERHAUL

- D. Apply Abradable Coating (Ref.Fig.402).
- (1) Combustion spray the prepared seal land with a bond coating of Metco 450NS, 0.003 in./0.004 in. (0,076 mm/0,102 mm) in thickness.
 - (2) Flame spray Sherritt-Gordon 75/25 Nickel/Graphite abradable coating or Metco 313NS 0.030 in. (0,762 mm) in thickness over the bond coating.
- E. Finish machine the seal land (Ref.Fig.401).
- F. Visually inspect the repair for integrity of the sprayed coating and continuity of sprayed edges.
- G. Mark the coating identification symbols, Sherritt-Gordon and or Metco and as applicable, using the electro-chemical or vibro-percussion marking technique detailed in 72-09-00 Repair.
- H. Identify repair. Mark the repair scheme number SAL B.470384 close to the standard part number on the labyrinth ring.

REPAIR

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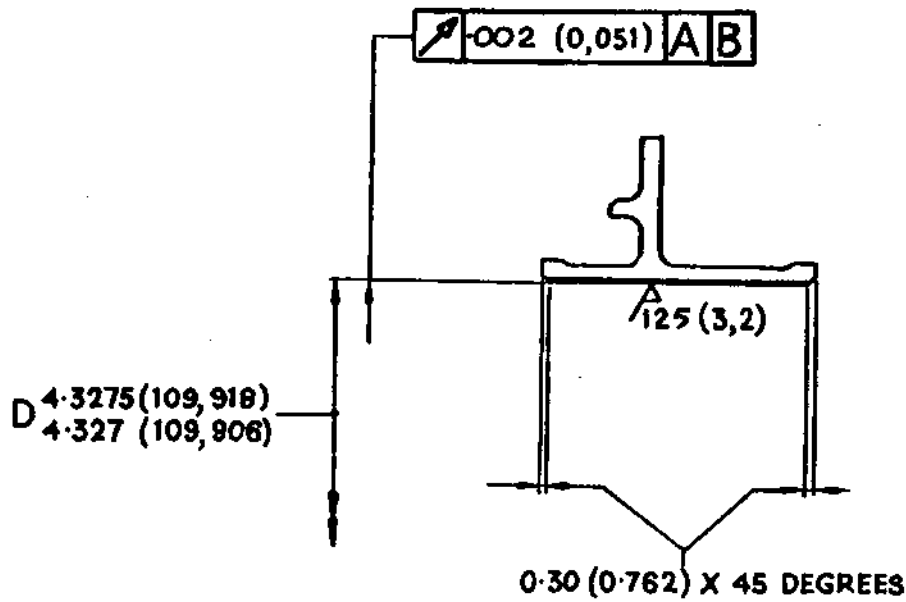
Repair No.2

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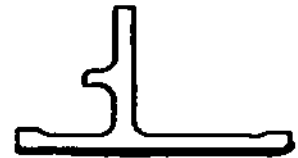
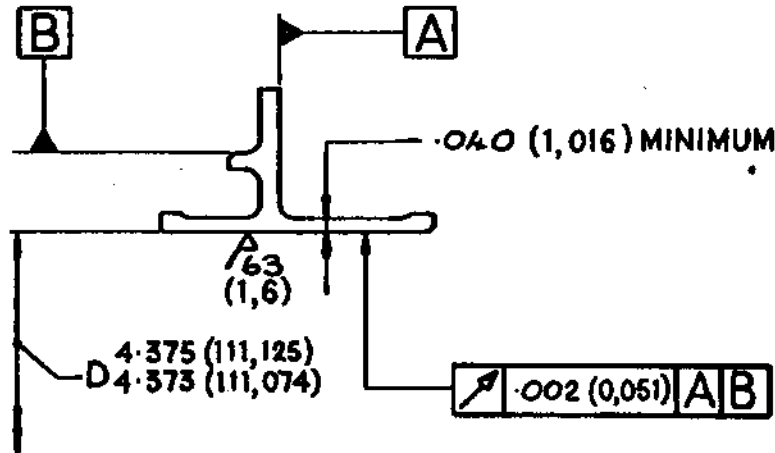
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Standard Dimensions
Figure 401



OVERSPRAY PERMITTED
ON CHAMFERS AND END
FACES ONLY. THIS IS TO
BE REMOVED.

Machining Dimensions Before Spraying and Spraying Detail
Figure 402

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LP COMPRESSOR FRONT BEARING SUPPORT - REPAIR
NO.1 BEARING HOUSING REPAIRED BY FITTING REPLACEMENT
LABYRINTH HOUSING

Applicable to:

Bearing Housings B.925465,
B.925466

Authority:

Modification No. OL.8420C

1. Introduction

- A. This Repair describes the procedure for fitting a replacement labyrinth housing to the No.1 bearing housing, in order to maintain the standard fin/housing clearances of labyrinth No.1.
- B. Refer to Chapter 72-09-00, Repair for all standard practices and tolerancing applicable to this repair procedure.
- C. Dimensions are shown thus on illustrations: INCHES (MILLIMETRES).
- D. Maching surface texture, unless otherwise stated, to be 125 MICROINCHES (3,2 MICROMETRES).

2. Summary of Operations

- A. Prepare Housing for Repair.
 - (1) Remove and discard the nine shank nuts from the housing flange; the procedure is described in 72-09-00, Repair.
 - (2) Extract and discard the thirty-one wire-thread inserts from the flange; the procedure is described in 72-09-00, Repair.
- B. Remove Defective Labyrinth Housing.
 - (1) Mount the bearing housing by its large flange face on the faceplate of a centre-lathe; set true on the internal diameter (Ref.Fig.401).

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- (2) Cut off the defective labyrinth and dress back to the specified dimension (Ref.Fig.401).
- (3) Remove all burrs and sharp edges.
- (4) Inspect the component for satisfactory completion of all previous operations.
- (5) Test the housing for cracks by the magnetic particle crack detection method Ref.72-23-01, Inspection/Check. Data specific to this Repair is given on the diagram (Ref.Fig.402).

C. Fit Replacement Labyrinth Housing.

- (1) Manufacture test pieces for setting the electron beam welding equipment; use material to Rolls-Royce specification MSRR 6503.
- (2) Locate the test pieces in the fixture (item 2); electron beam weld the test pieces and submit with the essential welding data, to the controlling laboratory for approval.
- (3) Examine the replacement component and ensure that it is undamaged.
- (4) Locate the bearing housing, with its smaller diameter uppermost, in the fixture (item 2); position the E.B.W. shield in the housing under the area to be welded.
- (5) Electron beam weld the labyrinth housing to the bearing housing (Ref.Fig.402).
- (6) Inspect the repair to ensure that the assembly is satisfactory. Examine the repair weld by the radiographic (X-ray) method and repeat the test for cracks.
- (7) Heat treat the unit.
 - (a) Heat the unit to 650°C (plus/minus 10°C) and soak at this temperature for one hour.
 - (b) Air cool the unit.
- (6) Repeat the test for cracks.

D. Finish Machine Housing.

- (1) Remount the housing by its large flange face on the centre-lathe faceplate; set true on the internal diameter (Ref.Fig.401).

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- (2) Turn the bore of the new labyrinth housing to 4.305 in./4.315 in. (109,35 mm/109,60 mm) diameter.

NOTE: This leaves an allowance for final grinding.

- (3) Mount the housing by its large flange face on the faceplate of an internal grinder; set true on the internal diameter (Ref.Fig.401).

- (4) Finish grind the bore and chamfer the labyrinth housing to the specified dimensions (Ref.Fig.403).

- (5) Remove all burrs and sharp edges.

- (6) Inspect for satisfactory completion of previous operations.

- (7) Repeat the test for cracks.

E. Assemble the new wire-thread inserts to the housing flange; ensure that the inserts are 1 to 1½ turns below the surface of the flange. The correct installation procedure is described in 72-09-00, Repair.

F. Assemble the new shank nuts to the housing flange; use the swaging tool (Item 1). The correct installation procedure is described in 72-09-00, Repair.

G. Inspect for correct fitting of wire-thread inserts and shank nuts; ensure that all wire-thread insert tangs have been removed.

H. Identify repair. Mark the repair scheme number SAL B.909985 close to the standard part number on the component.

3. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Swaging Tool	1	S3S12440000	1
Welding Fixture	1	S3S12797000	2

4. Replacement Parts

<u>Description</u>	<u>Quantity</u>	<u>Part No.</u>
Labyrinth Housing	1	B.484062
Wire-thread Inserts	31	AGS.3707
Shank Nuts	9	AS.27857

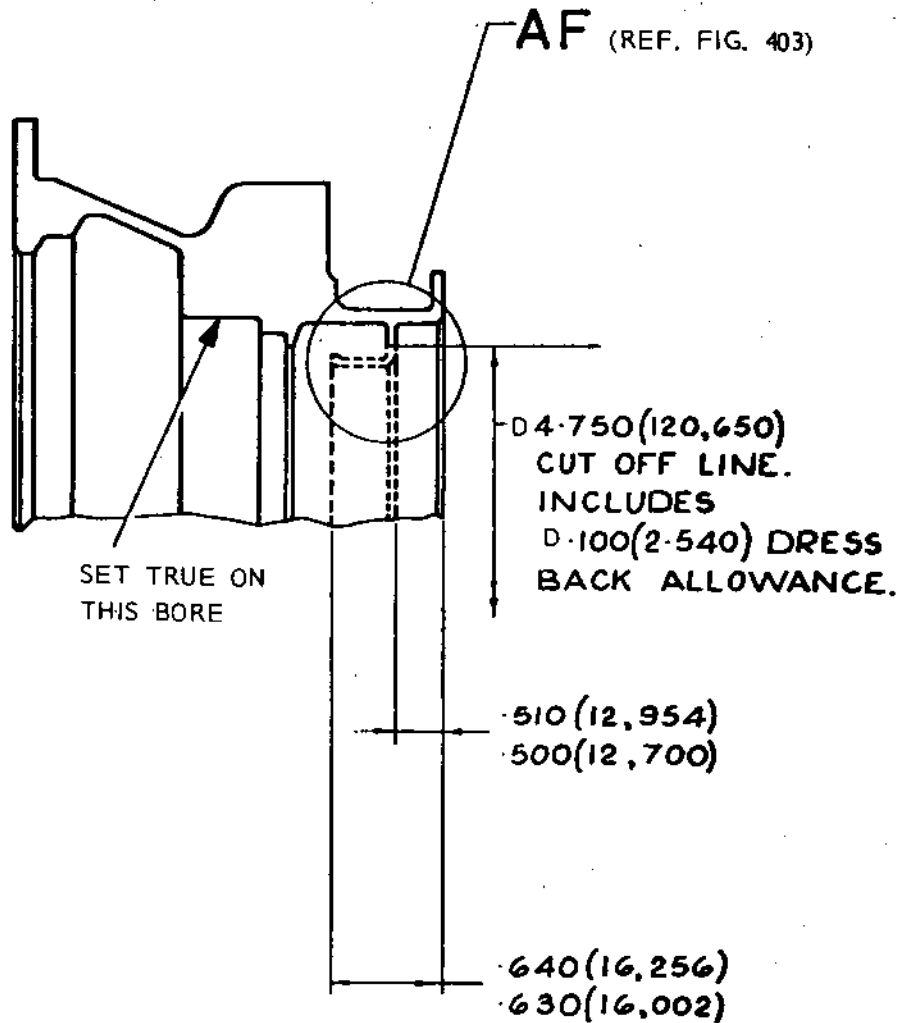
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Machining Dimensions for Removal of Worn Labyrinth Housing
Figure 401

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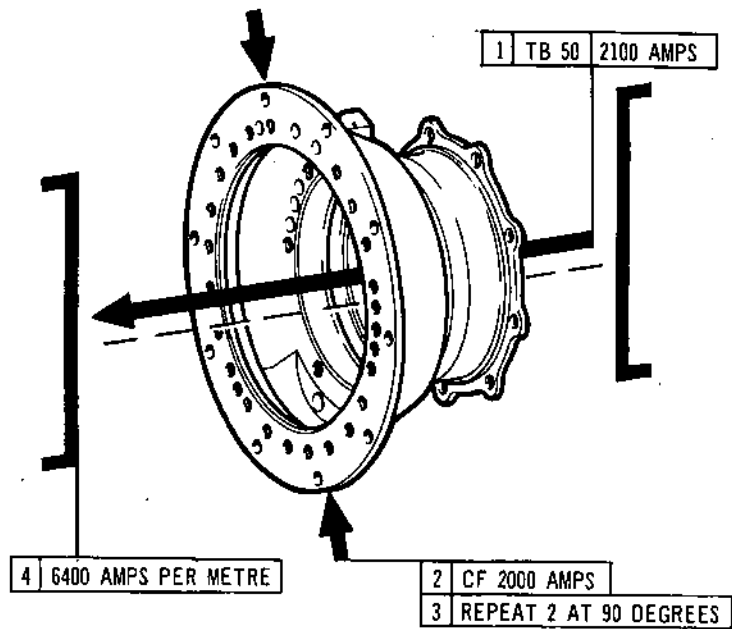
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Crack Testing Data
Figure 402

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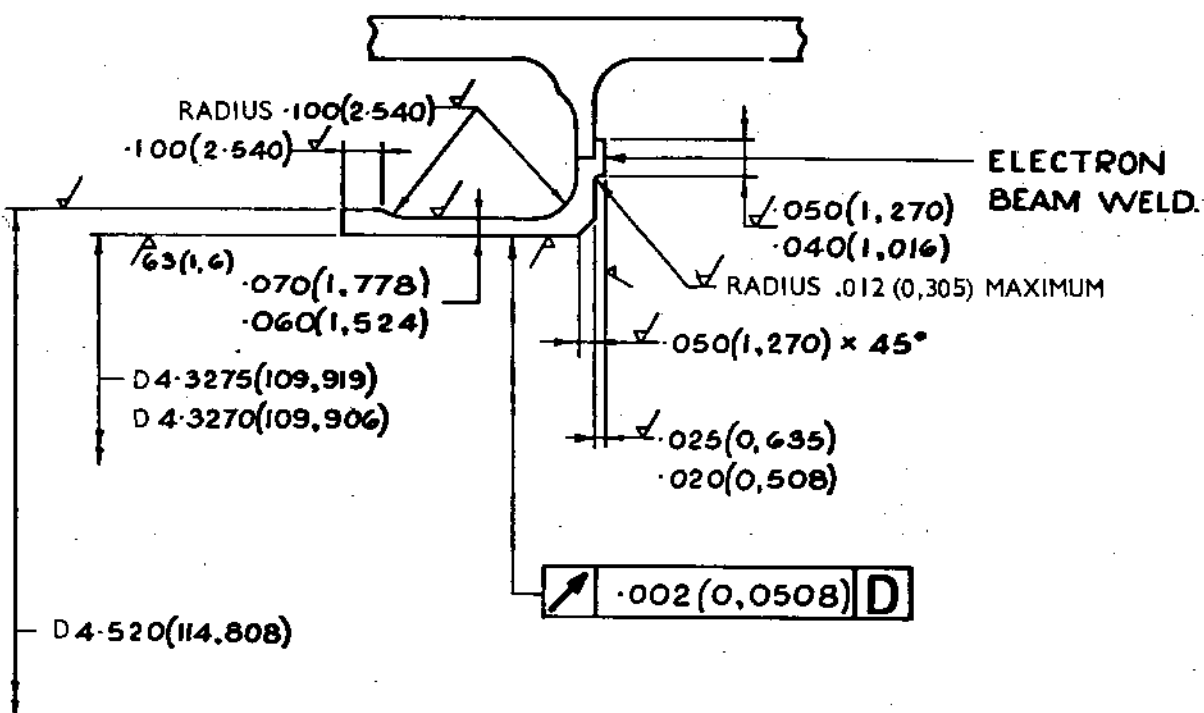
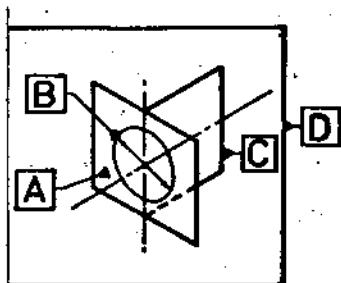
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VIEW AF (REF. FIG. 401)

Final Machining Dimensions
Figure 403

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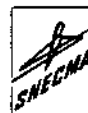
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LP COMPRESSOR CASE AND VANES - REPAIR

TABLE OF CONTENTS

Repair No.	Title	Scheme No.
1	Vane Fixing Rings (All Stages) Repaired by Fitting Replacement Labyrinth Rings	SAL B.488676-81
2	Blending and Polishing Damaged Stator Vanes with Control on Number of Blended Vanes per Stage	SAL B.930273-8 and SAL B.930280
3	LP Compressor Vanes, Stages 1-6 Repaired by Restoring Inner Abutment Faces by the Applica- tion of Detonation Flame Deposition	SAL B.497490-5
4	LP Compressor Vanes, Stages 1-6 Restoration of Inner Abutment Faces by Welding and the Appli- cation of Detonation Flame Deposition	SAL B.499480-5

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OVERHAUL

LP COMPRESSOR CASE AND VANES - REPAIR
VANE FIXING RINGS (ALL STAGES) REPAIRED
BY FITTING REPLACEMENT LABYRINTH RINGS

MODIFICATION NO. 0L.8423C

Printed in England

Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Stage</u>	<u>Part No.</u>
72-31-01	1 180A	1	B.469065
	1 180B		B.922950
	1 180D		B.518055, B.518056, B.518057
	1A 370A	2	B.469067, B.444501
	1A 370B		B.922951
	1A 370C		B.935406, B.935411
	1A 370D	3	B.518059, B.518060
	2 190A		B.469069, B.444502
	2 190B		B.922952
	2 190C		B.935408, B.935414
	2 190D		B.518063, B.518064
	2A 390A	4	B.923708
	2A 390B		B.922953
	2A 390C		B.925245
	2A 390D		B.925414
	2A 390E		B.935416, B.935742, B.935743, B.935744
	2A 390F	5	B.518067, B.518068, B.518069, B.518070
	3 190A		B.923708, B.923706
	3 190B		B.922953
	3 190C		B.925245
	3 190D		B.935418, B.935745, B.935746, B.935747, B.935748, B.935749
	3 190E		B.518072, B.518073, B.518074, B.518075, B.518076, B.518077
	3A 390A	6	B.923955
	3A 390B		B.925245
	3A 390C		B.935418, B.935750, B.935751, B.935752
	3A 390D		B.518072, B.518078, B.518079, B.518080

NOTE: Labyrinth rings are part of the vane fixing ring
assy of, and as such are included in that assy of.

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1. Introduction

- A. This Repair describes the procedure for fitting standard replacement labyrinth rings to the vane fixing rings in order to maintain the standard labyrinth ring/fin clearances.
- B. Refer to Chapter 72-09-00, Repair for all standard practices and tolerancing applicable to this repair procedure.
- C. Dimensions are shown thus on Figure 401 and in Table 401: INCHES (MILLIMETRES).

2. Summary of Operations

A. Remove the Defective Labyrinth Ring.

- (1) Remove the nuts, bolts and retaining plates from the assembly; retain these items for the re-assembly procedure.
- (2) Remove the defective labyrinth ring; use the extractors (items 1-7). Take care to avoid damage or distortion to the fixing ring; discard the labyrinth ring.
- (3) Inspect the bore B of the stator fixing ring against the appropriate dimensions (Ref.Fig.401 and Table 401).
- (4) Crack test the stator fixing ring by the fluorescent penetrant process specified for this component in 72-31-01, Inspection/Check.

B. Fit Replacement Labyrinth Ring.

NOTE: Use the correct setting tool (Ref.para.3).

- (1) Select the correct labyrinth ring for the stage to be repaired.
- (2) Heat the stator fixing ring to 220 deg C.
- (3) Assemble the new labyrinth ring to the stator fixing ring.

NOTE: Maintain the setting dimension C specified for the stage (Ref.Fig.401 and Table 401).

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- (4) Allow the assembly to cool.
 - (5) Re-assemble the bolts, nuts and retaining plates. Use lubricant B (Ref.72-09-00 Assembly Table 501) on the threads and torque-tighten to between 85 and 95 lbf in. (9,6 and 10,7 N.m).
 - (6) Inspect the assembly to verify that the labyrinth ring has been fitted correctly.
 - (7) Repeat the test for cracks.
- C. Identify repair (Ref. Table 401). Mark the appropriate repair scheme number close to the standard number on the assembly.

STAGE	REPAIR SCHEME NUMBER	DIAMETER B (REF.FIG.401)	ASSEMBLE WITH LABY- RINTH RING	DIMENSION C (REF.FIG.401)
1	SAL B.488676	13.3670 (339,522) 13.3644 (339,456)	B.469066	0.225 (5,715) 0.222 (5,639)
2	SAL B.488677	14.9490 (379,705) 14.9496 (379,639)	B.469068	0.165 (4,191) 0.163 (4,140)
3	SAL B.488678	16.8890 (428,981) 16.8866 (428,920)	B.469070	0.255 (6,477) 0.252 (6,401)
4	SAL B.488679)))			
5	SAL B.488680)))	17.1090 (434,569) 17.1066 (434,508)	B.469072	0.287 (7,290) 0.284 (7,214)
6	SAL B.488681)			

Table 401

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3. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Extractor	1	S3S.15386000	1
Extractor	1	S3S.15387000	2
Extractor	1	S3S.15388000	3
Extractor	1	S3S.15389000	4
Extractor	1	S3S.15390000	5
Extractor	1	S3S.15391000	6
Extractor	1	S3S.15392000	7
Setting Tool	1	S3S.12991000	8
Setting Tool	1	S3S.12992000	9
Setting Tool	1	S3S.12993000	10

A. SAL B.488676/77. Use item 8.

B. SAL B.488678. Use item 9.

C. SAL B.488679/81. Use item 10.

4. Replacement Parts

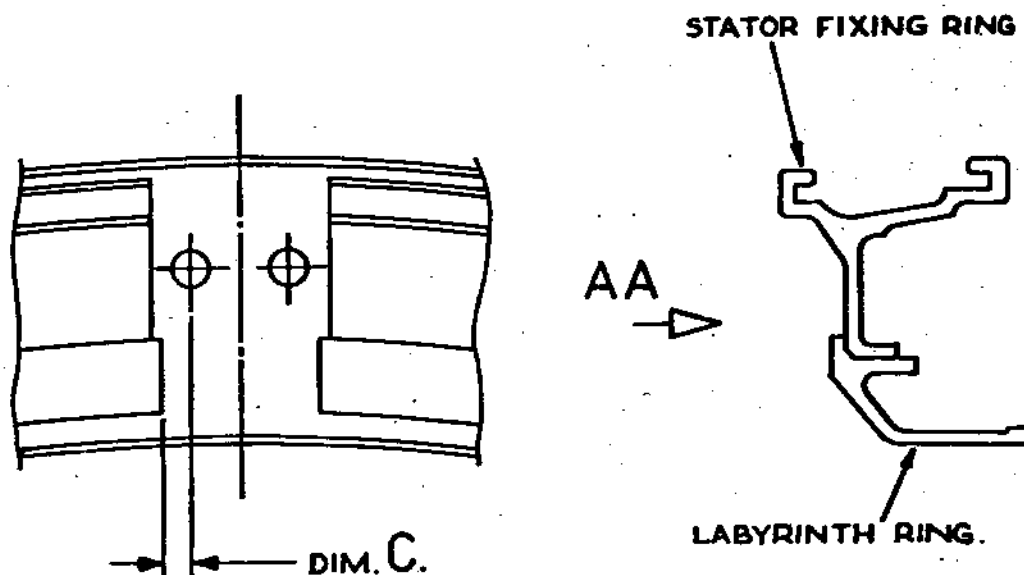
<u>Description</u>	<u>Quantity</u>	<u>Part No.</u>
Labyrinth Ring	1 per assembly	Ref. Table 401



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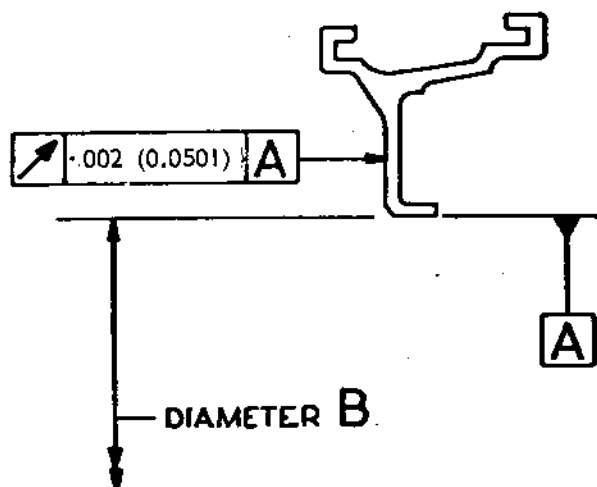
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VIEW ON ARROW AA

ASSEMBLY OF STATOR RINGS.



SECTION THROUGH STATOR FIXING RING.

Stator Vane Inner Fixing Ring/Labyrinth Ring Assembly
Figure 401

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**OLYMPUS 593**MK.610-14-28
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LP COMPRESSOR CASE AND VANES - REPAIR
BLENDING AND POLISHING DAMAGED STATOR VANES WITH
CONTROL ON NUMBER OF BLENDED VANES PER STAGE
(SCHEME NO. B.930280 AND B.930273-8 APPLICABLE TO
ALL STAGES

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Stage</u>	<u>Part numbers up to and including Mod. No.</u>
72-31-01	01 100, 110, 120	1	OL.8218
	01 290, 300, 310	2	OL.8218
	02 100, 110, 120, 130	3	OL.8218
	02 300, 310, 320, 330	4	OL.8218
	03 100, 110, 120, 130	5	OL.8218
	03 300, 310, 320, 330	6	OL.8218

2. Authority: Modification No. OL.8462C

3. Introduction

- A. The text and Fig.401 of this Repair defines the blending procedure (SAL B.930280) applicable to all LP compressor stator vanes and must be read in conjunction with the specific data for each stage of vanes given in Table 401 and Fig.402.
- B. Refer to 72-09-00 Repair for all standard practices applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

NOTE: Blended vanes must be reassembled spaced evenly around the stage.

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4. Instructions

A. General.

- (1) Test vanes for cracks, before and after blending, by the fluorescent dye process specified for the vanes in 72-31-01 Inspection/Check; reject cracked vanes.
- (2) Vanes with dents which deform the opposite surface of the vane are not acceptable for blending; reject vanes with this form of damage.
- (3) A blend in one zone can run out into the adjacent zone even if it infringes the blend limit for that zone, except at zone X on stages 1 and 2.

B. Procedure.

- (1) Crack test vanes to determine full extent of damage. Refer to the fluorescent dye process specified for the blades in 72-33-01 Inspection/Check.
- (2) Dress to remove damage.

CAUTION: IF MECHANICAL BLENDING METHODS ARE USED,
ENSURE THAT VANES ARE NOT OVERHEATED.

- (a) Polish acceptable surface dents (Ref. para.4.(2)) to remove burrs.
- (b) Blend torn, rough or scored edges to a depth 20 per cent greater than the depth of damage, provided that specified limits are not exceeded.
- (c) If adjacent blends interfere, remove material from between them to produce a coupled blend.
- (d) Profile edge blends smoothly into the aerofoil shape (Ref.Fig.401).
- (e) Polish blends and defective areas.

TN17957

British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

TEMPORARY REVISION No. 72-514

Insert in 72-31-01 Repair 2 before page 403

REASON FOR ISSUE:

To discontinue on British Airways engines only, the post dressing procedures on L.P. compressor vanes stages 1, 2, 3 and 6. as quoted in the Rolls-Royce repair procedure No.2. (MRA 70).

ACTION

Delete paragraphs B(5) Etch the vanes and B(7) Vapour blasting.

NOTE: Only applicable to British Airways engines.



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- (f) Remove only the minimum amount of material consistent with specified requirements and dimensions.
- (g) In zone X, blending is permitted only as defined in (i) and (ii).
- (i) Blend light nicking of the edges.
- (ii) Polish out light surface scratches.
- (h) For opposing blends the chordal width must not be reduced by more than dimension D or E, as applicable.
- (j) Blending and polishing marks must be only in a radial direction, from root to tip.
- (k) Blend and polish to a surface finish of 32 MICROINCHES (0,8 MICROMETRES).
- (3) Clean vanes by the process specified for the vanes in 72-31-01 Cleaning.
- (4) Vapour degrease the vanes.
- CAUTION: OBSERVE THE RESTRICTION ON THE PERIOD OF IMMERSION FOR TITANIUM COMPONENTS (REF. 72-09-00 CLEANING).
- (5) Etch the vanes (Ref.72-09-14 Repair).
- (a) Use Solution A.
- (b) Mask the vane roots and other areas not to be etched, with I.C.I. Stopping-Off Red Lacquer F230-2006.
- (c) Etch the vanes for the minimum time required to achieve the desired surface for inspection, up to a maximum period of 20 seconds after the onset of gassing.



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- (d) Remove the masking lacquer by swabbing with trichloroethane to the approved specification (Ref.72-09-00 Cleaning).
- (6) Repeat the test for cracks.
- (7) Vapour blast blended vanes (Ref.72-09-13 Repair).
 - (a) Apply masking tape to the vane roots and other areas which are not to be blasted.
 - (b) Vapour blast vanes to the Parameters for Procedure A and Special Details for Blades and Vanes specified in the vapour blasting procedure.
 - (c) Remove masking tape from the vanes.
- 5. Assessment of Amount of Blending per Vane (All Stages)
 - A. Vanes may be blended in several positions provided that the total extent of blending is not more than the equivalent of two blends to the maximum in zone Z.
 - B. Depth of blending is controlled by zones.
 - C. The maximum permissible number of blended vanes per stage, when blended to maximum limits, is identified as L (Ref. Table 401).
 - D. Where vanes are not blended to the permissible maximum, this number (Ref. para. (C)) may be increased, provided that the aggregate of the blending does not exceed L.
 - E. Permissible blending is controlled by depths; example for stage 1 vane:
 - (1) 0.250 in. (6,35 mm) depth x two blends = 0.500 in. (12,70 mm) total = maximum blended vane.
 - (2) This maximum may be obtained as defined in (a), (b) or (c), or by any combination of depths the total of which does not exceed 0.500 in. (12,70 mm).
 - (a) 0.125 in. (3,175 mm) depth x four blends.
 - (b) 0.100 in. (2,54 mm) depth x five blends.
 - (c) 0.050 in. (1,27 mm) depth x ten blends.

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F. One coupled blend = two blends.

6. Assessment of Blending Equivalent to L Number of Blended Vanes per Stage

A. Example for stage 1 vane:

- (1) L = four vanes x 0.500 in. (12,70 mm) depth = 2.000 in. (50,80 mm) aggregate depth.
- (2) This aggregate may be obtained as defined in (a), (b) or (c), or by any aggregate of blended vanes which does not exceed 2.000 in. (50,80 mm).
 - (a) 0.400 in. (10,16 mm) depth x five vanes.
 - (b) 0.200 in. (5,08 mm) depth x ten vanes.
 - (c) 0.150 in. (3,81 mm) depth x thirteen vanes.

7. Identify Repair (Ref. Table 401)

A. Mark the repair scheme number, appropriate to the stage of vanes, close to the standard part number on the vanes (Ref.72-09-00 Repair).

NOTE: Do not mark the number of this scheme SAL B.930280 on the vanes.

8. Special Tools, Fixtures and Equipment

A. Not required.

9. Replacement Parts

A. Not required.

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‡ C = LENGTH OF AEROFOIL BETWEEN A AND B

STAGE/ SCHEME 'SAL' NO.	A	B	C ‡	REF.FIG.402		J DIA.		L
				D MAX.	E MAX.	MAX.	Y (ZONE) Z	
STAGE 1 B.930273	1.000 (25,40)	2.500 (63,50)		0.250 (6,35)	0.120 (3,05)	0.100 (2,54)	0.200 (5,08)	4
STAGE 2 B.930274	1.000 (25,40)	1.000 (25,40)		0.250 (6,35)	0.120 (3,05)	0.100 (2,54)	0.200 (5,08)	4
STAGE 3 B.930275	4.000 (101,60)	3.000 (76,20)		0.150 (3,81)	0.070 (1,78)	0.100 (2,54)	0.120 (3,05)	5
STAGE 4 B.930276	4.500 (114,30)	2.500 (63,50)		0.150 (3,81)	0.070 (1,78)	0.100 (2,54)	0.120 (3,05)	6
STAGE 5 B.930277	4.000 (101,60)	2.000 (50,80)		0.150 (3,81)	0.070 (1,78)	0.100 (2,54)	0.120 (3,05)	6
STAGE 6 B.930278	3.500 (88,90)	2.000 (50,80)		0.150 (3,81)	0.070 (1,78)	0.100 (2,54)	0.120 (3,05)	6

Table 401

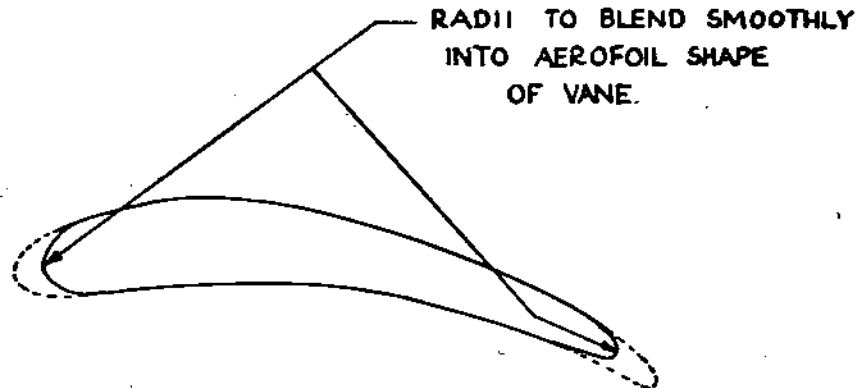
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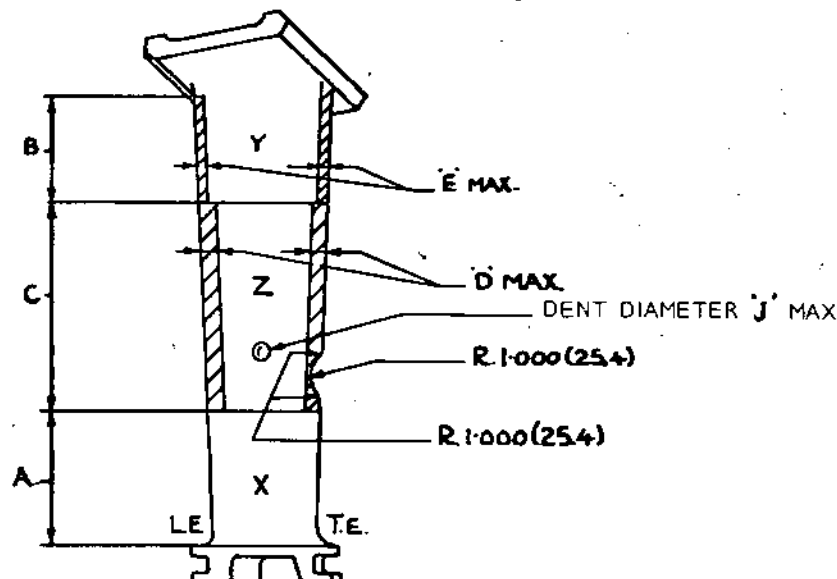
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DEFECTS IN ZONE Y ADJACENT TO VANE PLATFORM MUST BLEND SMOOTHLY INTO FILLET RADIUS (ALL STAGES)

Figure 401



THIS SCHEME MUST BE READ IN CONJUNCTION WITH SAL B.930280 (REF.PARA.3.A) AND TABLE 401.

AT LEAST 0.100 (2,54) MUST EXIST BETWEEN ADJACENT DENTS.

LIGHT EDGE NICKING IN ZONE X TO BE BLENDED, PROVIDED THE DEPTH OF BLEND DOES NOT EXCEED 0.010 (0,25) MAXIMUM BLEND.

RADII TO BE AS FOR ZONE Z.

L - MAXIMUM NUMBER OF VANES BLENDED TO MAXIMUM (REF. TABLE 401).

Stage 1 to 6 LP Compressor Vanes - Blending Data
Figure 402

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STAGE 1-6 LP COMPRESSOR VANES - REPAIR
RESTORATION OF INNER ABUTMENT FACES BY THE APPLICATION OF
DETONATION FLAME DEPOSITION

MODIFICATION NO. OL.8742

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-01		<u>Stage 1</u>
	1 100A	B.914530
	1 100B	B.926400
	1 100C	B.926499, B.926513
	1 100D	B.930444, B.930447
	1 110A	B.914531
	1 110B	B.923072
	1 110C	B.926500
	1 110D	B.930445
	1 120A	B.914532
	1 120B	B.926501
	1 120C	B.930446
		<u>Stage 2</u>
	1 290A	B.914533
	1 290B	B.926441
	1 290C	B.927272
	1 290D	B.930448, B.930496
	1 300A	B.914534
	1 300B	B.923073
	1 300C	B.927270
	1 300D	B.930450, B.930497
	1 310A	B.914535
	1 310B	B.927271
	1 310C	B.930449, B.930498

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**OLYMPUS 593**MK.610-14-28
OVERHAULI.P.C. Fig./ItemPart No.Stage 3

2	100A	B.913491, B.913672, B.913862, B.913864
2	100B	B.923635
2	100C	B.930451, B.930502, B.930503
2	110A	B.913863, B.914179, B.914300, B.914302
2	110B	B.923647
2	110C	B.930452, B.930509, B.930508
2	120A	B.913492, B.913673, B.913865, B.914181, B.923357, B.923358
2	120B	B.923639
2	120C	B.930453, B.930504, B.930505, B.930512, B.930513
2	130A	B.914178, B.914180, B.914299, B.914301
2	130B	B.923643
2	130C	B.930454, B.930506, B.930507

Stage 4

2	300B	B.923602
2	300C	B.930455
2	310B	B.923605
2	310C	B.930456
2	320B	B.923603
2	320C	B.930457
2	330B	B.923604
2	330C	B.930458

Stage 5

3	100A	B.913518, B.913519, B.913654, B.913655
3	100B	B.923576
3	100C	B.930459, B.930528, B.930529
3	110A	B.914196, B.914198, B.914307, B.914309
3	110B	B.923623
3	110C	B.930460, B.930533, B.930534

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I.P.C. Fig./Item

Part No.

Stage 5 (Cont'd.)

3	120A	B.913520, B.913521, B.913656, B.913657, B.923361, B.923362
3	120B	B.923627
3	120C	B.930461, B.930531, B.930532, B.930537, B.930538
3	130A	B.914197, B.914199, B.914308, B.914310
3	130B	B.923631
3	130C	B.930462, B.930535, B.930536

Stage 6

3	300A	B.913528, B.913529, B.918420, B.918424, B.918729, B.918733
3	300B	B.923571
3	300C	B.930463, B.930467, B.930468
3	310A	B.914879, B.914885, B.918421, B.918425, B.918730, B.918734
3	310B	B.926332
3	310C	B.930464, B.930471, B.930472
3	320A	B.914881, B.914887, B.918422, B.918426, B.918735, B.918731
3	320B	B.926336
3	320C	B.930465, B.930475
3	330A	B.914883, B.914889, B.918423 B.918427, B.918732, B.918736
3	330B	B.926340
3	330C	B.930466, B.930479, B.930480

2. Introduction

A. General.

- (1) This repair describes the procedure to restore the inner abutment faces by machining after removal of the existing flame deposition coating and then re-coating.

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- (2) Dimensions are shown thus, INCHES (MILLIMETRES) in tables and illustrations.
- (3) Refer to Chapter 72-09-00 Repair for all standard practices applicable to this repair procedure.
- (4) Remove all sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.
- (5) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (6) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (7) Place the component in a suitable container for protection against damage during transit between operations.
- (8) All tools referred to by item number in procedural steps are detailed in para.4.

3. Instructions

A. Remove Flame Deposition Coating.

- (1) Remove the flame deposition coating from the inner abutment faces (Ref.Fig.401), following the procedure detailed in 72-09-25, Repair, using process F.
- (2) Inspect the inner abutment faces to ensure complete removal of flame deposition coating.

B. Grind Inner Abutment Face (Convex Side).

- (1) Locate the vane to its relevant fixture (Ref. Table 401 and Fig.402).

TN1003



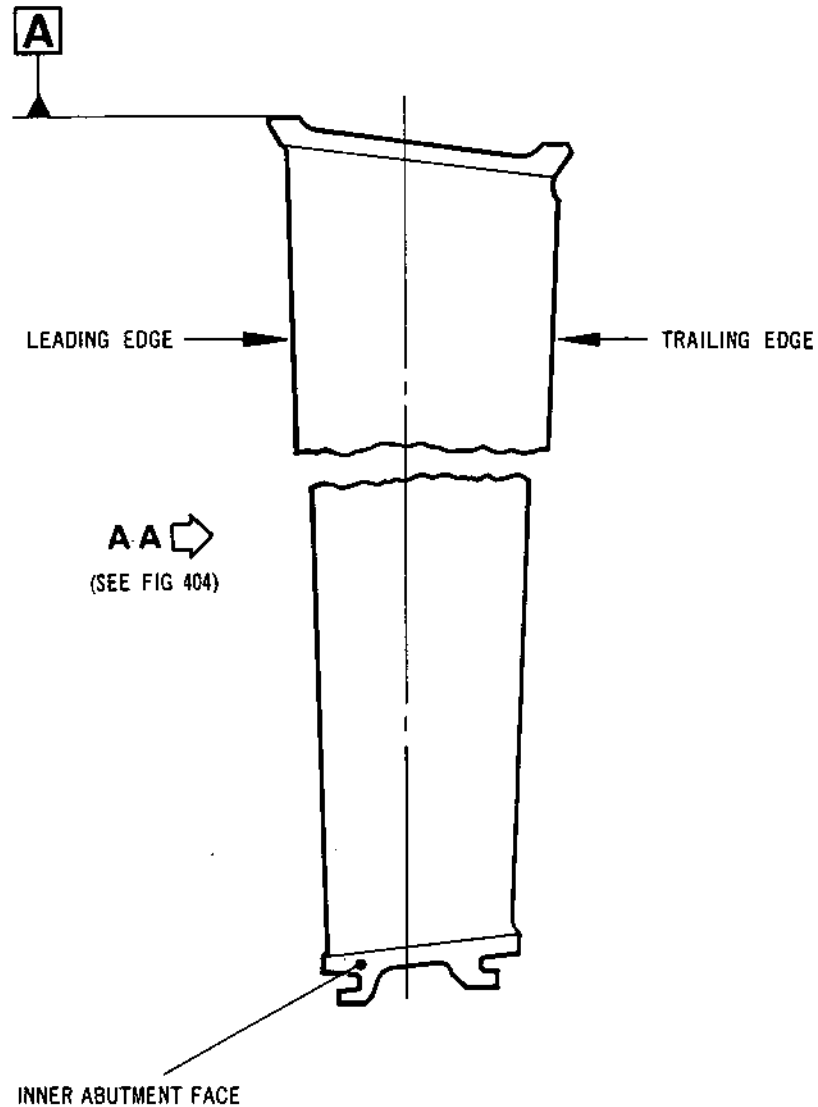
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LP Compressor Vane
Figure 401

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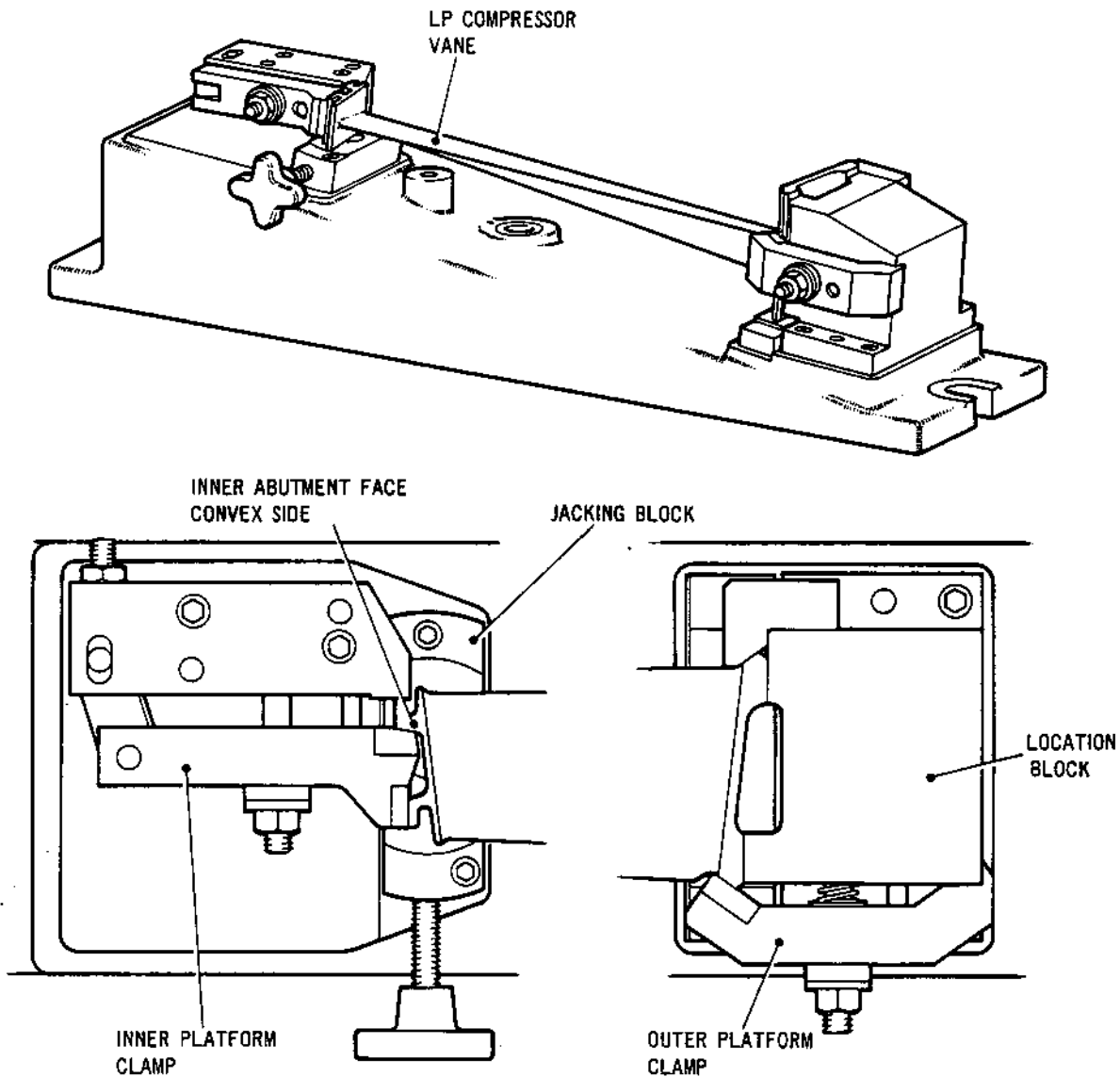


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CR 35611/00A



Typical Fixture for Grinding Inner Abutment
Face - Convex Side
Figure 402

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TN1005



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VANE STAGE	FIXTURE
1	Tool item 1
2	Tool item 2
3	Tool item 3
4	Tool item 4
5	Tool item 5
6	Tool item 6

Grinding Fixtures - Vane Convex Side
Table 401

- (2) Locate the vane/fixture assy. to a grinding machine and grind the inner abutment face, convex side, to the machining dimensions shown in Figures 404 and 405.
- (3) Remove the vane/fixture assy. from the machine, and the vane from the fixture.
- (4) Remove all burrs produced during grinding of inner abutment face.
- (5) Inspect inner abutment face to ensure it has cleaned up.

C. Grind Inner Abutment Face (Concave Side).

- (1) Locate the vane to its relevant fixture (Ref. Table 402 and Fig.403).

VANE STAGE	FIXTURE
1	Tool item 7
2	Tool item 8
3	Tool item 9
4	Tool item 10
5	Tool item 11
6	Tool item 12

Grinding Fixtures - Vane Concave Side
Table 402

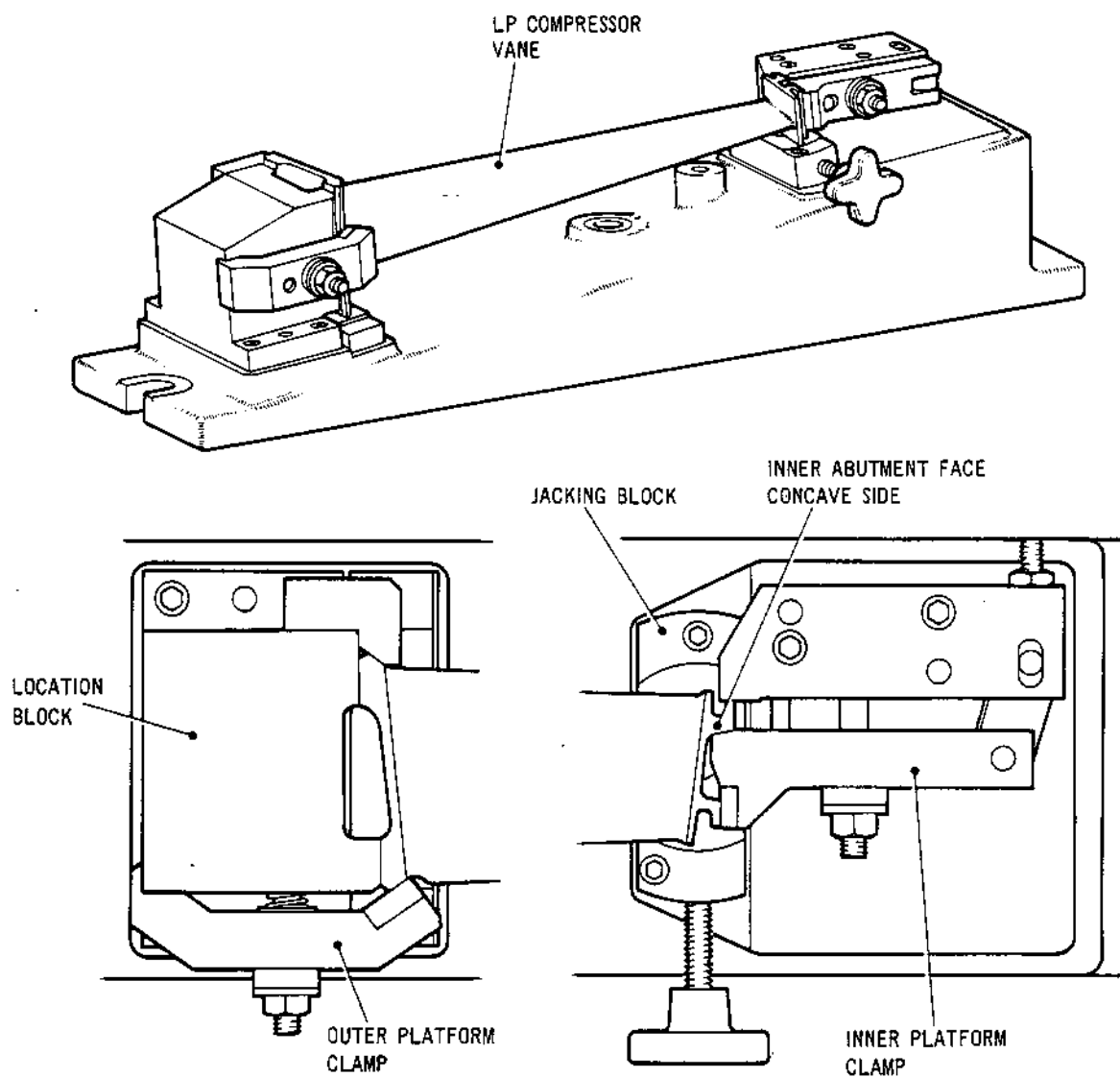


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CR-35612/00A



Typical Fixture for Grinding Inner Abutment
Face - Concave Side
Figure 403

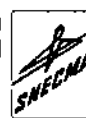
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- (2) Locate the vane/fixture assy. to a grinding machine and grind the inner abutment face, concave side, to the machining dimensions shown in Figures 404 and 405.
- (3) Remove the vane/fixture assy. from the machine, and the vane from the fixture.
- (4) Remove all burrs produced during grinding of inner abutment face.
- (5) Inspect inner abutment face to ensure it has cleaned up.

D. Inspect.

- (1) Locate vane in relevant fixture (Ref. Table 403) as shown in Fig.406.
- (2) Check all dimensions shown on Fig.404 and 405.

VANE STAGE	FIXTURE
1	Tool item 13
2	Tool item 14
3	Tool item 15
4	Tool item 16
5	Tool item 17
6	Tool item 18

Inspection Fixtures
Table 403

- (3) Test the vane for cracks using the fluorescent dye penetrant process specified for this component in 72-31-01 Inspection/Check.

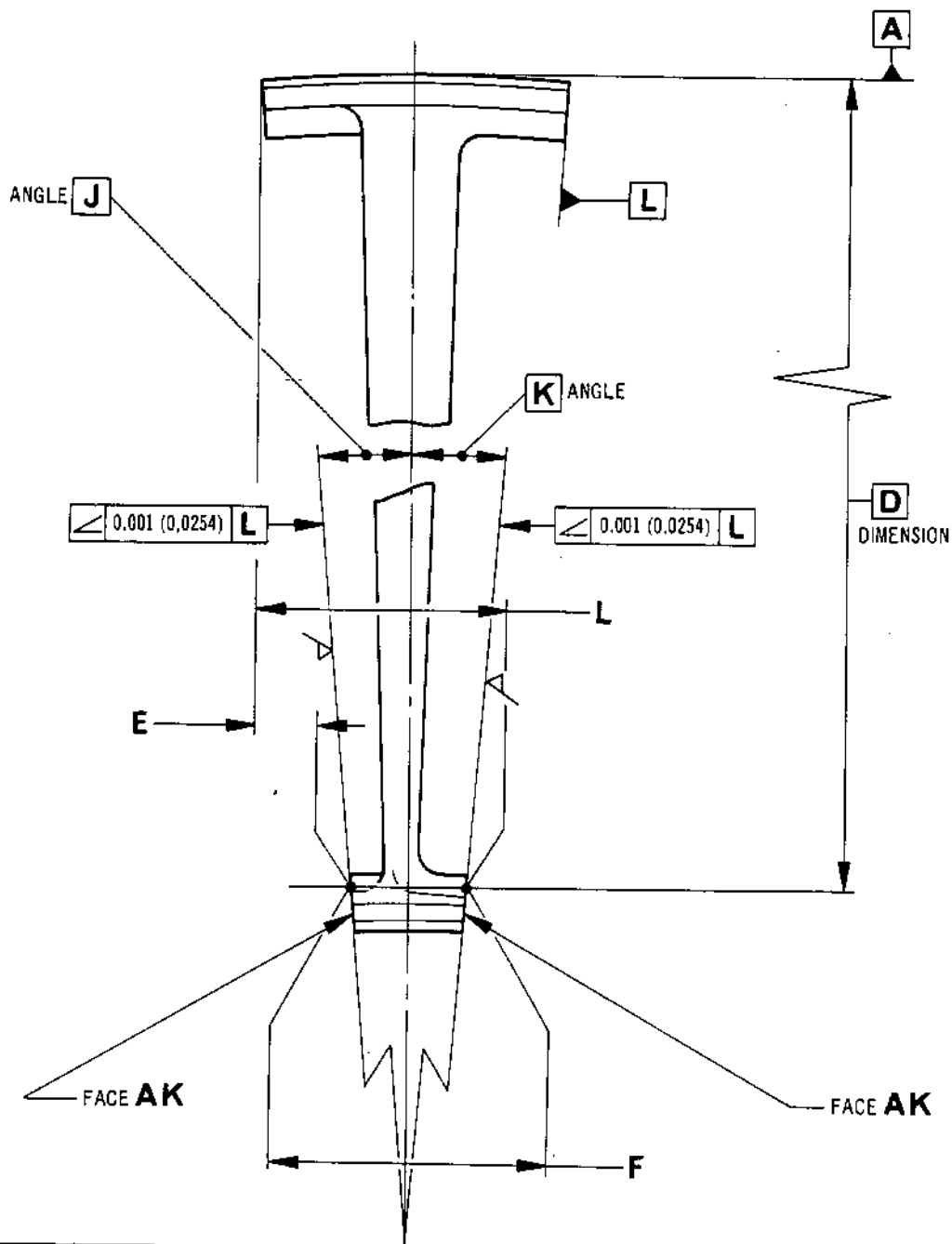


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CR 35616/00A



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

VIEW IN DIRECTION OF ARROW A A
(SEE FIG 401)

Machining Dimensions
Figure 404

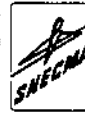
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CR 35617/00B

SCHEME No.	VANE STAGE	DIMENSION				ANGLE
		D	E	F	L	J AND K
B 497490	1	14.260 (362,204)	1.140 (28,96) 1.114 (28,30)	1.284 (32,61) 1.270 (32,26)	2.424 (61,57) 2.384 (60,55)	4 DEGREES 29 MINUTES
B 497491	2	12.580 (319,532)	0.998 (25,35) 0.982 (24,94)	1.390 (35,31) 1.376 (34,95)	2.388 (60,66) 2.358 (59,89)	4 DEGREES 29 MINUTES
B 497492	3	10.930 (277,622)	0.659 (16,74) 0.635 (16,13)	1.086 (27,58) 1.072 (27,23)	1.745 (44,32) 1.707 (43,36)	3 DEGREES 20 MINUTES
B 497493	4	9.880 (250,952)	0.575 (14,61) 0.553 (14,05)	1.104 (28,04) 1.090 (27,69)	1.679 (42,65) 1.643 (41,73)	3 DEGREES 20 MINUTES
B 497494	5	9.000 (228,6)	0.447 (11,35) 0.427 (10,85)	0.900 (22,86) 0.886 (22,50)	1.347 (34,21) 1.313 (33,35)	2 DEGREES 43 MINUTES
B 497495	6	8.160 (207,264)	0.409 (10,39) 0.389 (9,88)	0.901 (22,86) 0.889 (22,58)	1.310 (33,27) 1.278 (32,46)	2 DEGREES 44 MINUTES

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Dimension Chart
Figure 405

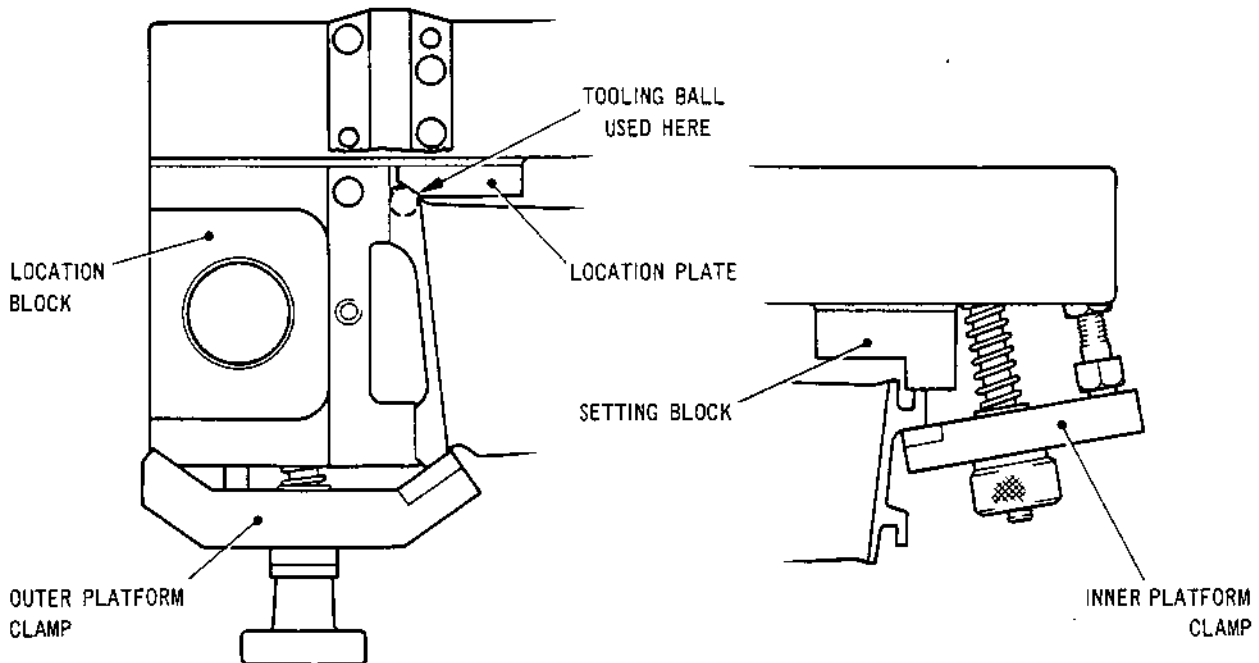
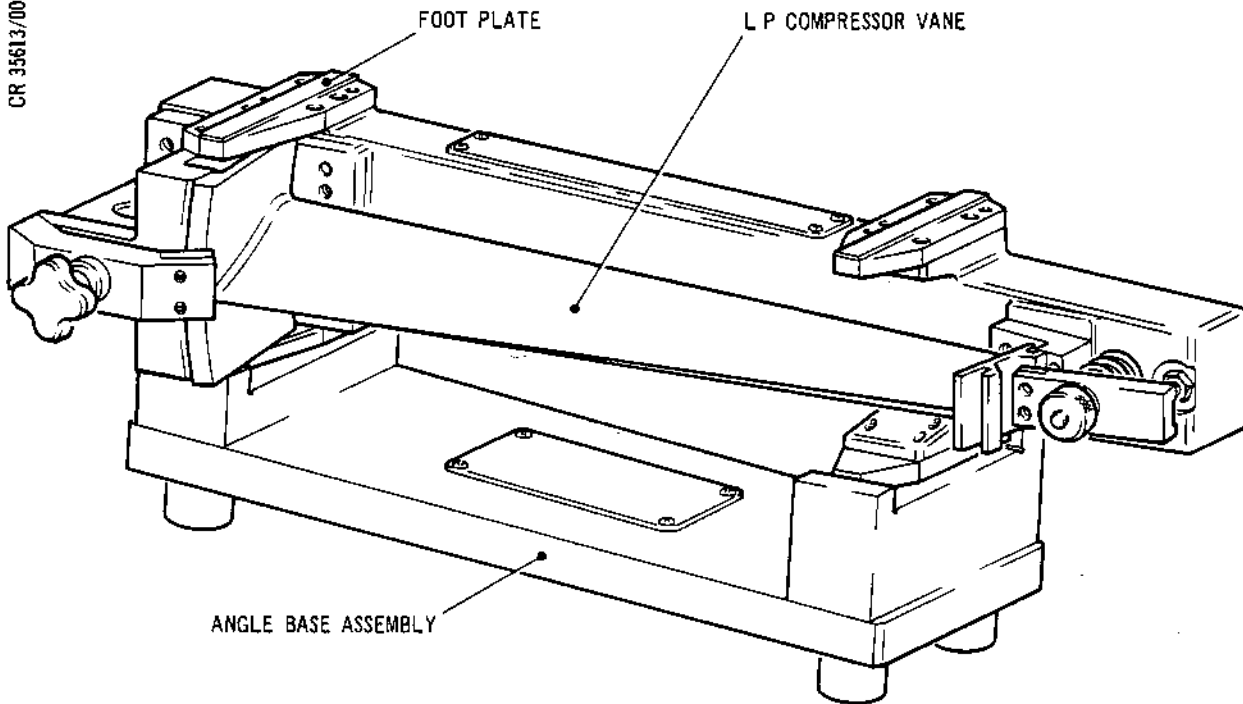
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CR 35613/00A



TN4045

Typical Fixture for Inspection
Figure 406

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E. Detonation Flame Spray.

- (1) Detonation flame spray the inner abutment faces AK (Ref.Fig.404) using LWIN40, 0.008/0.010 in. (0,20/0,25 mm) thick, following the procedure detailed in 72-09-26. No flame deposition at AJ, and overspray only permissible where shown (Ref.Fig.407).

NOTE: The inner abutment faces will not be machined after spraying.

- (2) Inspect to ensure complete coverage of coating to the correct thickness.

F. Produce Radii.

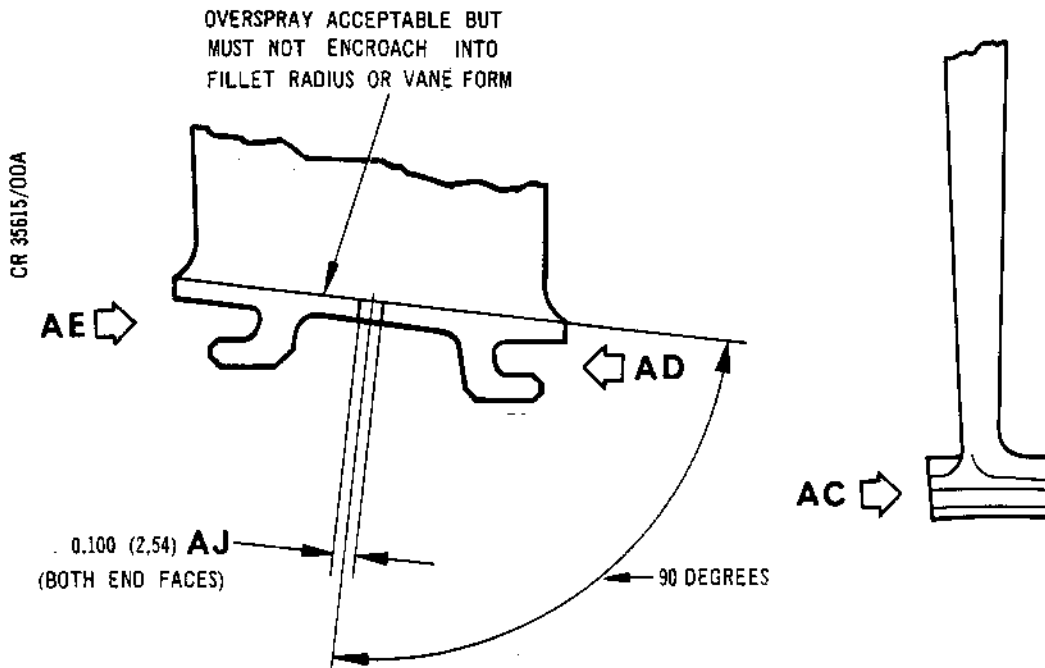
- (1) Using standard hand tools produce radii AG as shown on Fig.407.

G. Inspect and Identify.

- (1) Test the vane for cracks using the fluorescent dye penetrant process specified for this component in 72-31-01 Inspection/Check.
- (2) Using the vibro-percussion engraving technique, Ref.72-09-00, Repair, mark SAL. B.497490-5 or R3 adjacent the existing part number.
- (3) Finally inspect the vane to ensure the repair has been carried out satisfactorily and that the vane is in a serviceable condition.

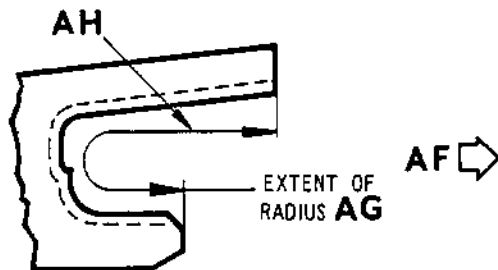


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VIEW IN DIRECTION OF ARROW AC

NO OVERSPRAY PERMISSIBLE
WITHIN AH BOTH SIDES



VIEW IN DIRECTION OF ARROW AF

R 0.030 (0,762)
R 0.020 (0,508)

AG



VIEW IN DIRECTION OF ARROW AD, AE SIMILAR

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Spraying and Radiusing
Figure 407

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4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Fig.No.</u>	<u>Item No.</u>
Grinding Fixture	1	S3S.15816000	402	1
Grinding Fixture	1	S3S.15819000	402	2
Grinding Fixture	1	S3S.15822000	402	3
Grinding Fixture	1	S3S.15825000	402	4
Grinding Fixture	1	S3S.15828000	402	5
Grinding Fixture	1	S3S.15831000	402	6
Grinding Fixture	1	S3S.15817000	403	7
Grinding Fixture	1	S3S.15820000	403	8
Grinding Fixture	1	S3S.15823000	403	9
Grinding Fixture	1	S3S.15826000	403	10
Grinding Fixture	1	S3S.15829000	403	11
Grinding Fixture	1	S3S.15832000	403	12
Inspection Fixture	1	S3S.15818000	406	13
Inspection Fixture	1	S3S.15821000	406	14
Inspection Fixture	1	S3S.15824000	406	15
Inspection Fixture	1	S3S.15827000	406	16
Inspection Fixture	1	S3S.15830000	406	17
Inspection Fixture	1	S3S.15833000	406	18

5. Replacement Parts

A. Not Required.

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LP COMPRESSOR VANES STAGES 1 TO 6 - RESTORATION OF INNER ABUTMENT FACES BY WELDING AND DETONATION FLAME DEPOSITION

MODIFICATION NO. OL.8792C

1. Effectivity

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
<u>Stage 1</u>		
72-31-01	1 100C	B.926513, B926499
	1 100D	B.930444, B930447
	1 110C	B.926500
	1 110D	B.930445
	1 120B	B.926501
	1 120C	B.930446
<u>Stage 2</u>		
	1 290A	B.914533
	1 290B	B.926441
	1 290C	B.927269, B.927272
	1 290D	B.930448, B.930496, B936861
	1 300A	B.914534
	1 300B	B.923073
	1 300C	B.927270
	1 300D	B.930450, B.930497
	1 310A	B.914535
	1 310B	B.927271
	1 310C	B.930449, B.930498
<u>Stage 3</u>		
	2 100A	B.913491, B.913672, B.913862, B.913864
	2 100B	B.923635
	2 100C	B.930451, B.930502, B.930503,
	2 110A	B.913863, B.914179, B.914300, B.914302
	2 110B	B.923647
	2 110C	B.930452, B.930508, B.930509
	2 120A	B.913492, B.913673, B.913865, B.914181, B.923357, B.923358
	2 120B	B.923639
	2 120C	B.930453, B.930504, B.930505, B.930512, B.930513
	2 130A	B.914178, B.914180, B.914299, B.914301
	2 130B	B.923643
	2 130C	B.930454, B.930506, B.930507

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IPC Fig./Item

Part No.

Stage 4

2	300B	B.923602
2	300C	B.930455
2	310B	B.923605
2	310C	B.930456
2	320B	B.923603
2	320C	B.930457
2	330B	B.923604
2	330C	B.930458

Stage 5

3	100A	B.913518, B.913519, B.913654, B.913655
3	100B	B.923576
3	100C	B.930459, B.930528, B.930529
3	110A	B.914196, B.914198, B.914307, B.914309
3	110B	B.923623
3	110C	B.930460, B.930533, B.930534
3	120A	B.913520, B.913521, B.913656, B.913657, B.923361, B.923362
3	120B	B.923627
3	120C	B.930461, B.930531, B.930532, B.930537, B.930538
3	130A	B.914197, B.914199, B.914308, B.914310
3	130B	B.923631
3	130C	B.930462, B.930535, B.930536

Stage 6

3	300A	B.913528, B.913529, B.918420, B.918424, B.918729, B.918733
3	300B	B.923571
3	300C	B.930463, B.930467, B.930468
3	310A	B.914879, B.914885, B.918421, B.918425, B.918730, B.918734
3	310B	B.926332
3	310C	B.930464, B.930471, B.930472
3	320A	B.914881, B.914887, B.918422, B.918426, B.918731, B.918735
3	320B	B.926336
3	320C	B.930465, B.930475, B.930476
3	330A	B.914883, B.914889, B.918423 B.918427, B.918732, B.918736
3	330B	B.926340
3	330C	B.930466, B.930479, B.930480

REPAIR

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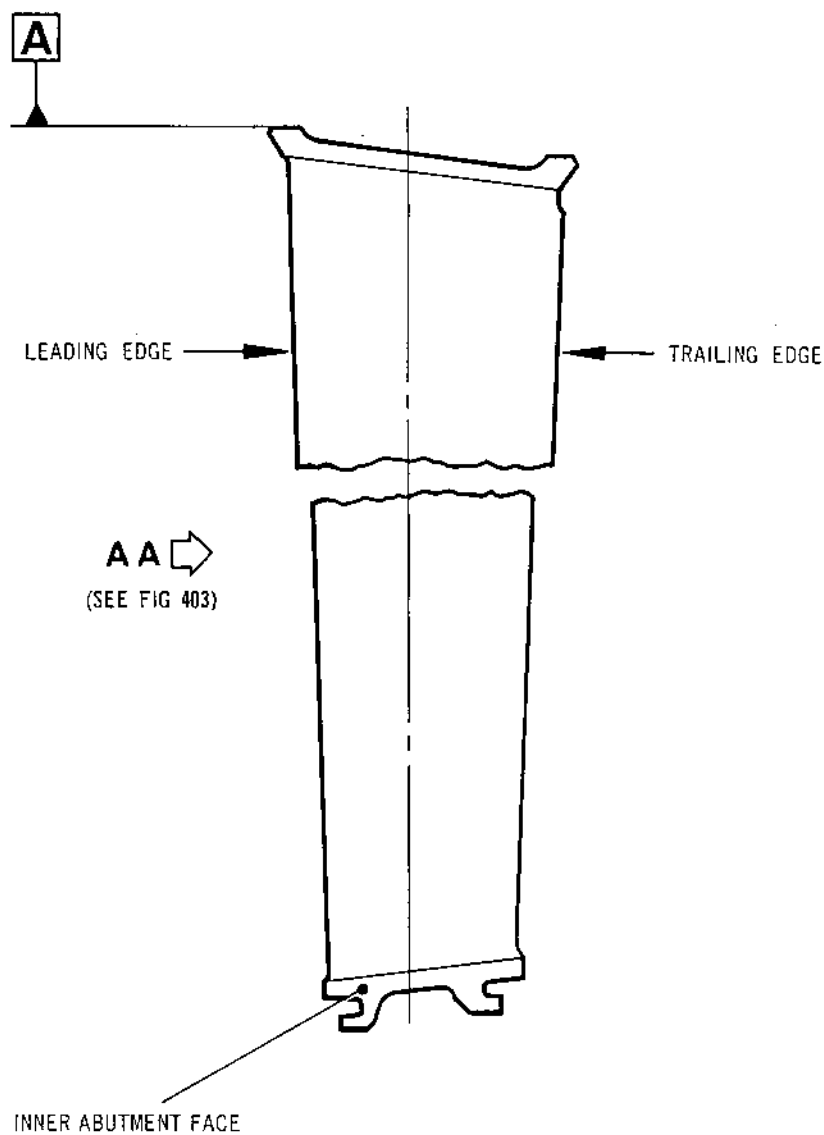
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LP Compressor Vane
Figure 401



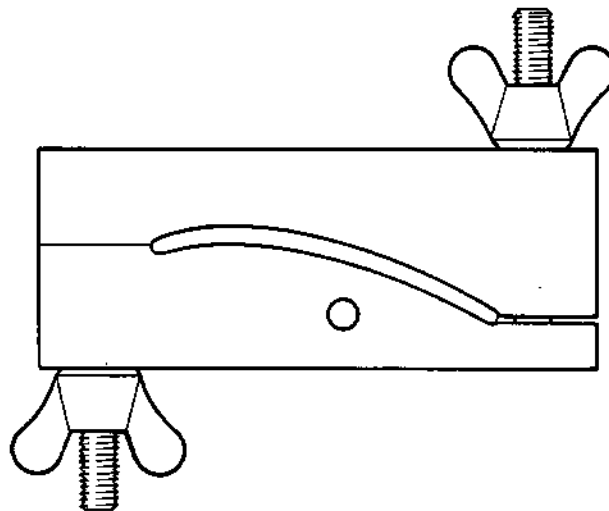
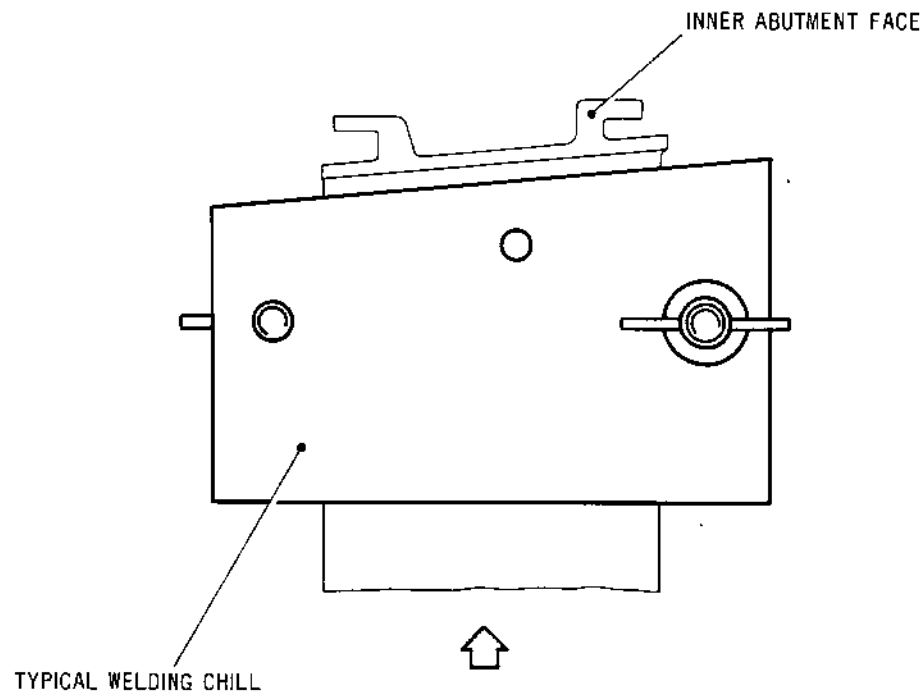
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VIEW IN DIRECTION OF ARROW

Welding Chills
Figure 402

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2. Introduction

A. General.

- (1) This repair describes the procedure for restoring the inner abutment faces by weld build-up and the application of a flame deposition coating.
- (2) Dimensions are shown thus, INCHES (MILLIMETRES) in tables and illustrations.
- (3) Refer to Chapter 72-09-00, Repair for all standard practices applicable to this repair procedures.
- (4) Remove all sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.
- (5) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (6) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (7) Place the component in a suitable container for protection against damage using transit between operations.
- (8) All tools referred to by item number in procedural steps are detailed in para.4.

B. Repair Limitations.

- (1) If wear of the inner abutment faces encroaches on the aerofoil fillet radii, do not attempt to repair vanes using this process.

3. Instructions

A. Remove Flame Deposition Coating.

- (1) Remove any flame deposition coating from the inner abutment faces (Ref.Fig.401), following the procedure detailed in Chapter 72-09-25, Repair, using process F.



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B. Inspect.

- (1) Inspect the inner abutment faces to ensure complete removal of flame deposition coating.
- (2) Inspect the vanes for cracks using the fluorescent dye penetrant process detailed for this component in Chapter 72-31-01, Inspection/Check.

C. Mark Out.

- (1) Indicate the areas to be welded using temporary marking (Ref.72-09-00, Assembly).

D. Weld (Convex Side).

- (1) Clamp the appropriate welding chill to the vane (Ref. Table 401 and Figure 402).

Vane Stage	Welding Chill
1	Tool item 1
2	Tool item 2
3	Tool item 3
4	Tool item 4
5	Tool item 5
6	Tool item 6

Welding Chills
Table 401

- (2) Build up the worn convex inner abutment face by tungsten inert gas (TIG) arc welding using filler rod MSRR 9500/73. The area must be built up sufficiently to allow for final machining.

- (3) Remove the chill.

E. Inspect.

- (1) Inspect the welded area to ensure satisfactory completion of the previous operation.
- (2) Inspect the vane for cracks using the fluorescent dye penetrant process detailed for this component in Chapter 72-31-01, Inspection/Check.

REPAIR

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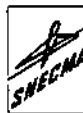
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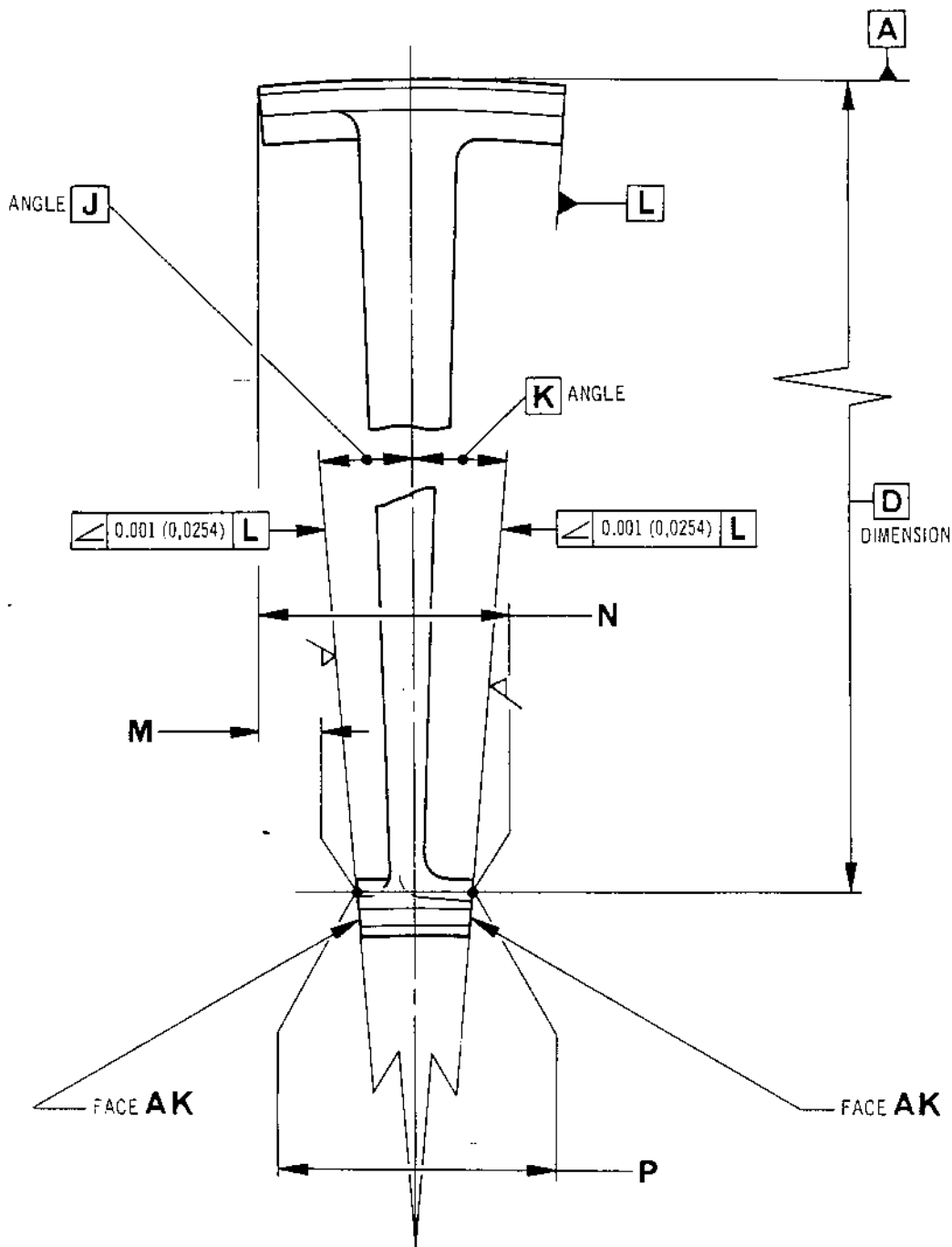
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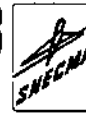


DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

VIEW IN DIRECTION OF ARROW AA
(SEE FIG 401)

Machining Dimensions
Figure 403

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CR 35875/00B

SCHEME No.	VANE STAGE	DIMENSION				ANGLE
		D	M	P	N	J AND K
B 499480	1	14.260 (362,20)	1.140 (28,96) 1.114 (28,30)	1.284 (32,61) 1.270 (32,26)	2.424 (61,57) 2.384 (60,55)	4 DEGREES 29 MINUTES
B 499481	2	12.580 (319,53)	0.998 (25,35) 0.982 (24,94)	1.390 (35,31) 1.376 (34,95)	2.388 (60,66) 2.358 (59,89)	4 DEGREES 29 MINUTES
B 499482	3	10.930 (277,62)	0.659 (16,74) 0.635 (16,13)	1.086 (27,58) 1.072 (27,23)	1.745 (44,32) 1.707 (43,36)	3 DEGREES 20 MINUTES
B 499483	4	9.880 (250,95)	0.575 (14,61) 0.553 (14,05)	1.104 (28,04) 1.090 (27,69)	1.679 (42,65) 1.643 (41,73)	3 DEGREES 20 MINUTES
B 499484	5	9.000 (228,60)	0.447 (11,35) 0.427 (10,85)	0.900 (22,86) 0.886 (22,50)	1.347 (34,21) 1.313 (33,35)	2 DEGREES 43 MINUTES
B 499485	6	8.160 (207,26)	0.409 (10,39) 0.389 (9,88)	0.901 (22,86) 0.889 (22,58)	1.310 (33,27) 1.278 (32,46)	2 DEGREES 44 MINUTES

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Dimension Chart
Figure 404

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F. Grind Inner Abutment Face (Convex Side).

- (1) Locate the vane to the appropriate fixture
(Ref. Table 402 and Chapter 72-31-01, Repair No.3).

Vane Stage	Fixture
1	Tool item 7
2	Tool item 8
3	Tool item 9
4	Tool item 10
5	Tool item 11
6	Tool item 12

Grinding Fixtures - Convex Side
Table 402

- (2) Locate the vane/fixture assembly to a grinding machine, and grind the inner abutment face to the machining dimensions shown in Figures 403 and 404.
- (3) Remove all burrs produced by the grinding operation.

G. Inspect.

- (1) Inspect for the satisfactory completion of the grinding operation.

H. Weld (Concave Side).

- (1) Clamp the appropriate welding chill to the vane
(Ref. Table 401 and Figure 402).
- (2) Build up the worn concave inner abutment face by tungsten inert gas (TIG) arc welding using filler rod MSRR 9500/73. The area must be built up sufficiently to allow for final machining.
- (3) Remove the chill.

J. Inspect.

- (1) Inspect the welded area to ensure satisfactory completion of the previous operation.



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- (2) Inspect the vane for cracks using the fluorescent dye penetrant process detailed for this component in Chapter 72-31-01, Inspection/Check.

K. Grind Inner Abutment Face (Concave Side).

- (1) Locate the vane to the appropriate fixture (Ref. Table 403 and Chapter 72-31-01, Repair No.3).

Vane Stage	Fixture
1	Tool item 13
2	Tool item 14
3	Tool item 15
4	Tool item 16
5	Tool item 17
6	Tool item 18

Grinding Fixtures - Concave Side
Table 403

- (2) Locate the vane/fixture assembly to a grinding machine, and grind the inner abutment face to the machining dimensions shown in Figures 403 and 404.
- (3) Remove burrs and dress flush any weld overspill from the existing surfaces using conventional tools.

L. Inspect.

- (1) Inspect for the satisfactory completion of the grinding operation.



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- (2) Check the dimensions (Ref.Fig.403 and 404) using the appropriate inspection fixture (Ref. Table 404 and Chapter 72-31-01, Repair No.3).

Vane Stage	Fixture
1	Tool item 19
2	Tool item 20
3	Tool item 21
4	Tool item 22
5	Tool item 23
6	Tool item 24

Inspection Fixtures
Table 404

- (3) Etch inspect the vane using the procedure detailed in Chapter 72-09-14, Repair. Use solution A.
- (4) Inspect the vane for cracks using the fluorescent dye penetrant process detailed for this component in Chapter 72-31-01, Inspection/Check.

M. Vapour Peen.

- (1) Peen the vane using the wet glass bead peening process detailed in Chapter 72-09-15, Repair.

N. Detonation Flame Spray.

- (1) Detonation flame spray the inner abutment faces 0.010/0.008 in. (0,25/0,20 mm) thick, using LWIN40 coating. Refer to 72-09-26 for flame deposition procedure. Flame deposition is not permissible at AJ, and overspray is only permissible where shown (Ref.Fig.405).

P. Produce Radii.

- (1) Produce radii (AG) on abutment faces as detailed in Chapter 72-31-01, Repair No.3.

Q. Inspect.

- (1) Inspect for the satisfactory completion of the previous operations.

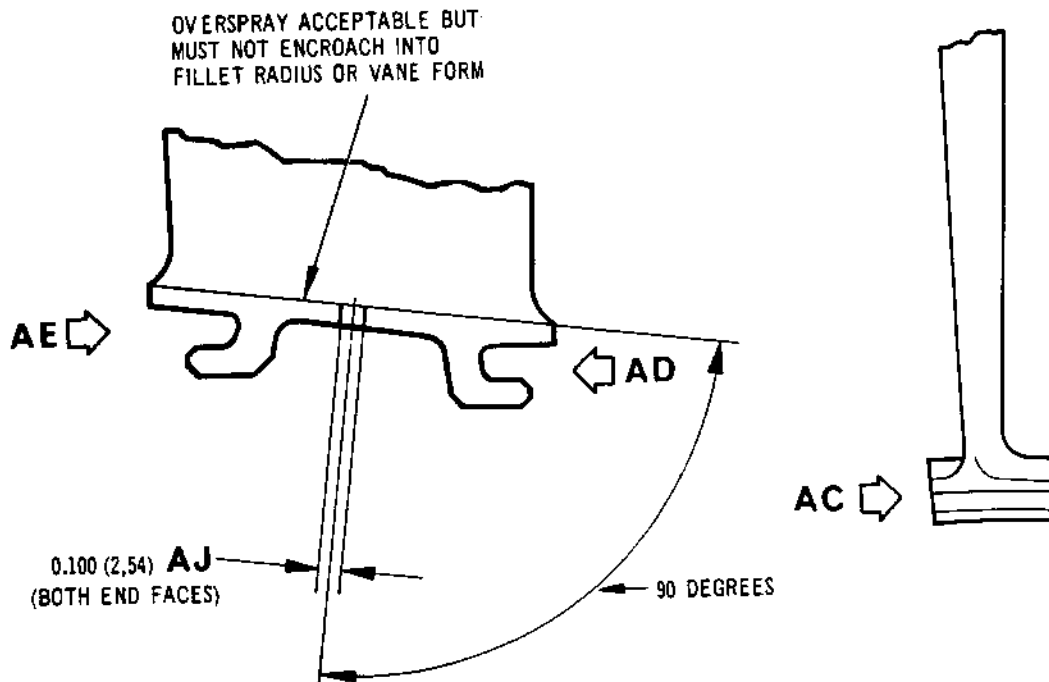


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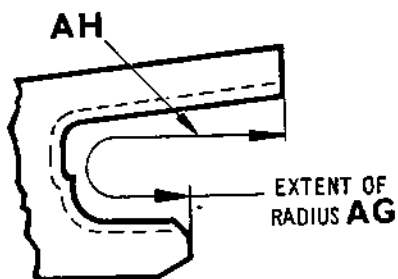


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VIEW IN DIRECTION OF ARROW AC

NO OVERSPRAY PERMISSIBLE
WITHIN **AH** BOTH SIDES



VIEW IN DIRECTION OF ARROW AF

R 0.030 (0,762)
R 0.020 (0,508)

AG

AF →



VIEW IN DIRECTION OF ARROW AD, AE SIMILAR

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Spraying and Radiusing
Figure 405

REPAIR
72-31-01
Repair No.4
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- (2) Inspect the vane for cracks using the fluorescent dye penetrant process detailed for this component in Chapter 72-31-01, Inspection/Check.

R. Identify.

- (1) Mark SAL B.499480-5 or R4 adjacent to the existing part number using vibro-percussion engraving (Ref.72-09-00, Repair).

S. Final Inspection.

- (1) Finally inspect the vane to ensure that the repair has been carried out satisfactorily and that the vane is in a serviceable condition. Use inspection fixtures ref. tool items 19 to 24.

4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Qty.</u>	<u>Tool No.</u>	<u>Item No.</u>
Welding Chill	1	S3S 13570000	1
Welding Chill	1	S3S 13571000	2
Welding Chill	1	S3S 13572000	3
Welding Chill	1	S3S 13573000	4
Welding Chill	1	S3S 13574000	5
Welding Chill	1	S3S 13575000	6
Grinding Fixture	1	S3S 15816000	7*
Grinding Fixture	1	S3S 15819000	8*
Grinding Fixture	1	S3S 15822000	9*
Grinding Fixture	1	S3S 15825000	10*
Grinding Fixture	1	S3S 15828000	11*
Grinding Fixture	1	S3S 15831000	12*
Grinding Fixture	1	S3S 15817000	13*
Grinding Fixture	1	S3S 15820000	14*
Grinding Fixture	1	S3S 15823000	15*
Grinding Fixture	1	S3S 15826000	16*
Grinding Fixture	1	S3S 15829000	17*
Grinding Fixture	1	S3S 15832000	18*
Inspection Fixture	1	S3S 15818000	19*
Inspection Fixture	1	S3S 15821000	20*
Inspection Fixture	1	S3S 15824000	21*
Inspection Fixture	1	S3S 15827000	22*
Inspection Fixture	1	S3S 15830000	23*
Inspection Fixture	1	S3S 15833000	24*

* Refer to Chapter 72-31-01, Repair No.3.

5. Replacement Parts

A. Not required.

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OLYMPUS 593 OVERHAUL MANUAL

Temporary Revision No. 72-581
Insert in 72-31-01 at rear of repair section

REASON FOR ISSUE:

To re-issue BEOL repair RST 4026 previously issued as TR.72-542 and to add repair reference issued by LHR (Ref TIS CONC 417)

ACTION

Reference Bracket Pt. No.B480808.

- A. Repair Scheme 71-41431 - To repair a broken lug. Drawing required: 4BA82041.
- B. BEOL Repair RST 4026. Bracket; Plate Mounting. To repair or replace a lug by welding.

This Repair Scheme is in two parts:-

PART 1: Covers a cracked lug which may be welded and dressed back to original contours.

PART 2: Covers the replacement of a broken lug.

PART 1

1. Cold straighten lug to original position by using new mounting assembly and Fig. 1. to obtain shape.
2. Clean and prepare crack area for welding in accordance with TSD.594/407.
3. Argon arc weld crack using filler rod MSRR.9500/2 as per TSD.594/407.
4. Crack detect as per Standard Practices Manual 72-20-10.
5. Dress lug back to original contours as per Fig. 1.
6. Visually inspect.
7. Vibro engrave RST 4026/1 adjacent to Part Number.

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TR.NO. 72-581 (cont'd)

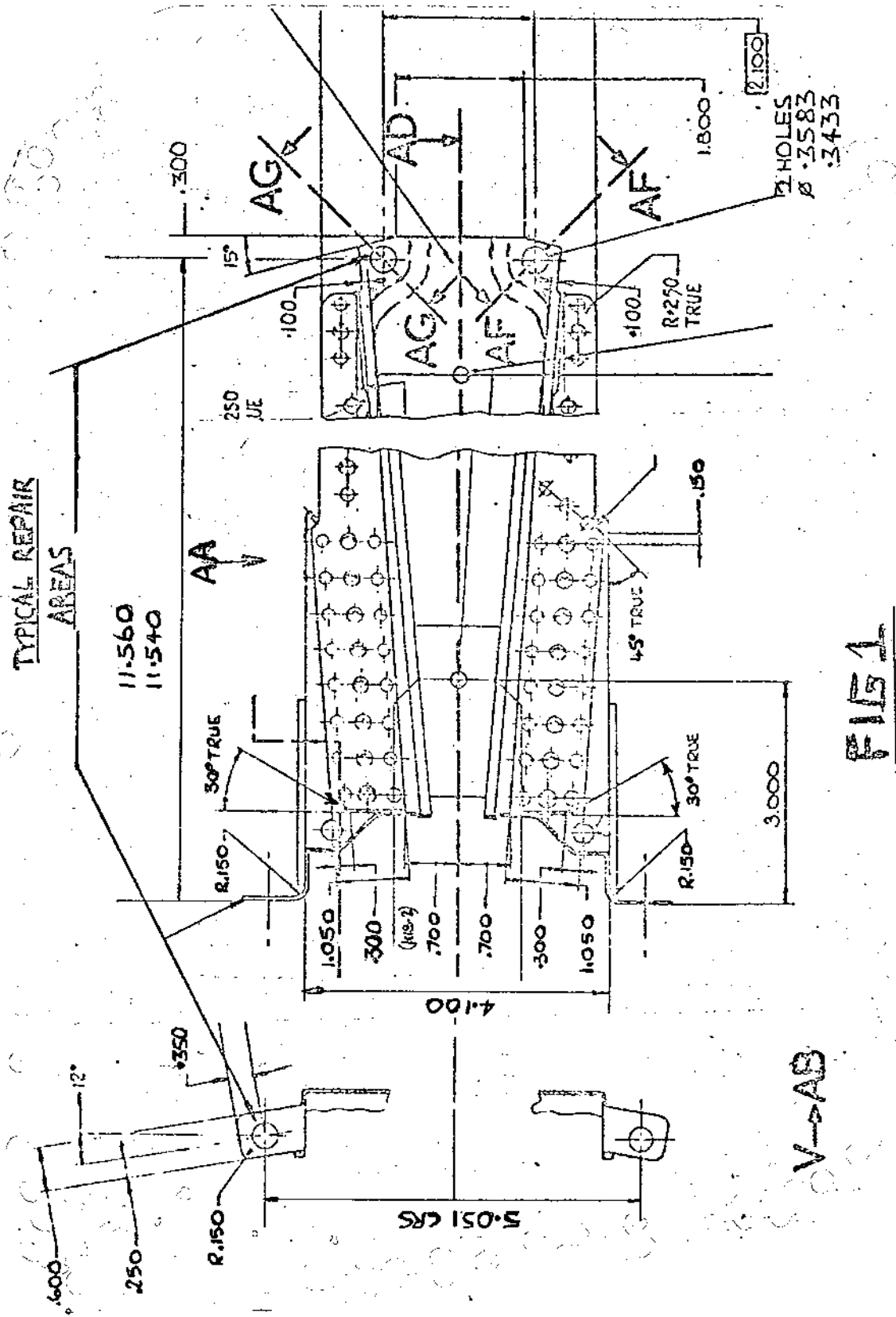
PART 2

1. Hand dress repair area to remove sharp edges.
2. Manufacture a suitable lug, using MSRR.6523 sht. - 0.033/0.039" thick, as per Fig. 2, or new bracket assembly.
3. Prepare surfaces for welding as per TSD.594, Op. 407.
4. Argon arc tack weld lug into position, in two places, as shown in Fig. 2, using filler rod MSRR.9500/2, as per TSD.594, Op. 407.
5. Resistance weld lug in three places, as shown in Fig. 2. as per TSD.594, Op. 403.
6. Crack detect as per TSD.594, Op. 203.
7. Drill hole and hand dress lug to conform to shape of Fig. 1. dimensions.
8. Visually inspect.
9. Vibro engrave RST 4026/2 adjacent to Part Number.

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TR.NO. 72-581 (cont'd)



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72-31-01
TR. Page 3 of 4

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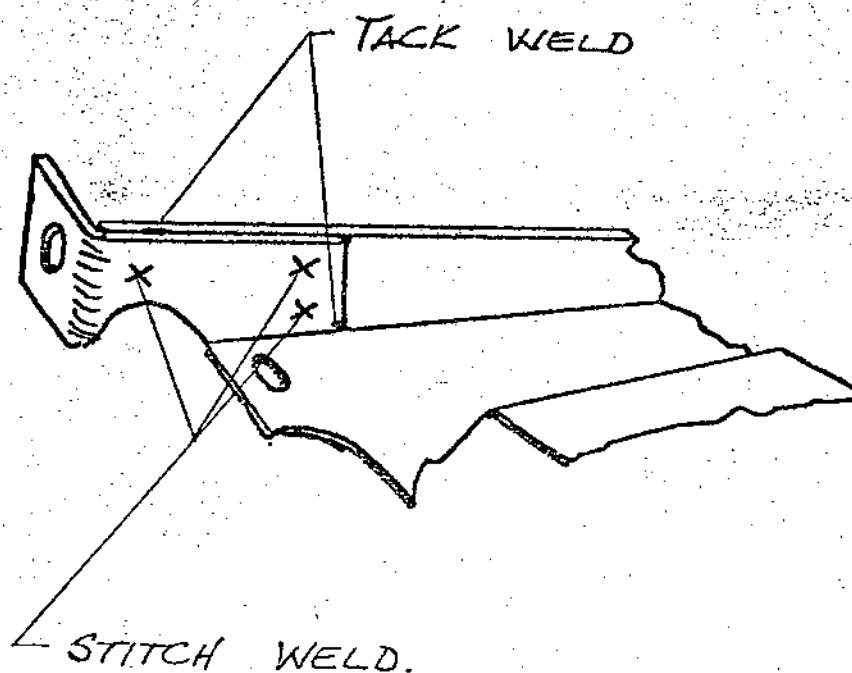


FIG. 2.



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LP COMPRESSOR EXIT GUIDE CASE AND VANES - REPAIR

TABLE OF CONTENTS

Repair No.	Title	Scheme No.
1	Blending and Polishing Damaged Vanes with Control on Number of Blended Vanes	SAL.B.930279-80
2	Exit Guide Vane Case. Restoration of Dovetail Slot by Welding.	SAL.B.497590

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REPAIR

72-31-02

Contents 1

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**OLYMPUS 593**MK.610-14-28
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LP COMPRESSOR EXIT GUIDE CASE AND VANES - REPAIR
BLENDING AND POLISHING DAMAGED VANES WITH
CONTROL ON NUMBER OF BLENDED VANES
(SCHEME NO. B.930279-80 - EXIT GUIDE VANES)

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Stage</u>	<u>Part Numbers up to and including Mod.No.</u>
72-31-02	01 90, 100, 110, 120	E.G.V.	OL.8462

2. Authority: Modification No. OL.8462C.

3. Introduction

- A. The text and Fig.401 of this Repair defines the blending procedure (SAL B.930280) applicable to all LP compressor exit guide vanes and must be read in conjunction with the specific data given on Fig.402.
- B. Refer to 72-09-00 Repair for all standard practices applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

NOTE: Blended vanes must be reassembled spaced evenly around the stage.

4. Instructions

A. General.

- (1) Test the vanes for cracks, before and after blending, by the fluorescent dye process specified for the vanes in 72-31-02 Inspection/Check; reject cracked vanes.
- (2) Vanes with dents which deform the opposite surface of the vane are not acceptable for blending; reject vanes with this form of damage.

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Repair No.1

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- (3) A blend in zone Z must not run out into zone X.

B. Procedure.

- (1) Crack test vanes to determine full extent of damage. Refer to the fluorescent dye process specified for the vanes in 72-31-02 Inspection/Check.
- (2) Dress to remove damage.

CAUTION: IF MECHANICAL BLENDING METHODS ARE USED,
ENSURE THAT VANES ARE NOT OVERHEATED.

- (a) Polish acceptable surface dents (Ref. para.4.(2)) to remove burrs.
- (b) Blend torn, rough or scored edges to a depth 20 per cent greater than the depth of damage, provided that specified limits are not exceeded.
- (c) If adjacent blends interfere, remove material from between them to produce a coupled blend.
- (d) Profile edge blends smoothly into the aerofoil shape (Ref.Fig.401).
- (e) Polish blends and defective areas.
- (f) Remove only the minimum amount of material consistent with specified requirements and dimensions.
- (g) In zone X, blending is permitted only as defined in (i) and (ii).
- (i) Blend light nicking of the edges.
- (ii) Polish out light surface scratches.
- (h) For opposing blends the chordal width must not be reduced by more than dimension D.
- (j) Blending and polishing marks must be only in a radial direction, from root to tip.

TN15801

British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

TEMPORARY REVISION No. 72-515

Insert in 72-31-02 Repair 1 before page 403

REASON FOR ISSUE:

To discontinue on British Airways engines only, the post dressing procedures on L.P. compressor exit guide vanes as quoted in the Rolls-Royce repair procedure No.1. (MRA 71).

ACTION

Delete paragraphs B(5) Etch the vanes and B(7) Vapour blasting.

NOTE: Only applicable to British Airways engines.



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snecma

SEE TR

(k) Blend and polish to a surface finish of 32 MICROINCHES (0,8 MICROMETRES).

(3) Clean vanes by the process specified for the blades in 72-31-02 Cleaning.

(4) Vapour degrease the vanes (Ref.72-09-00 - Cleaning).

CAUTION: OBSERVE THE RESTRICTION ON THE PERIOD OF IMMERSION FOR TITANIUM COMPONENTS (REF.72-09-00, CLEANING).

(5) Etch the vanes (Ref.72-09-14 Repair).

(a) Use solution A.

(b) Mask the vane roots and other areas not to be etched, with I.C.I. Stopping-off Red Lacquer F230-2006.

(c) Etch the vanes for the minimum time required to achieve the desired surface for inspection, up to a maximum period of 20 seconds after the onset of gassing.

(d) Remove the masking lacquer by vapour degreasing to the approved specification (Ref.72-09-00 Cleaning).

(6) Repeat the test for cracks.

(7) Vapour blast blended vanes (Ref.72-09-00 - Cleaning).

(a) Apply masking tape to the vane roots and other areas which are not to be blasted.

(b) Vapour blast vanes to the Parameters for Procedure A and Special Details for Blades and Vanes specified in the vapour blasting procedure.

(c) Remove masking tape from the vanes.



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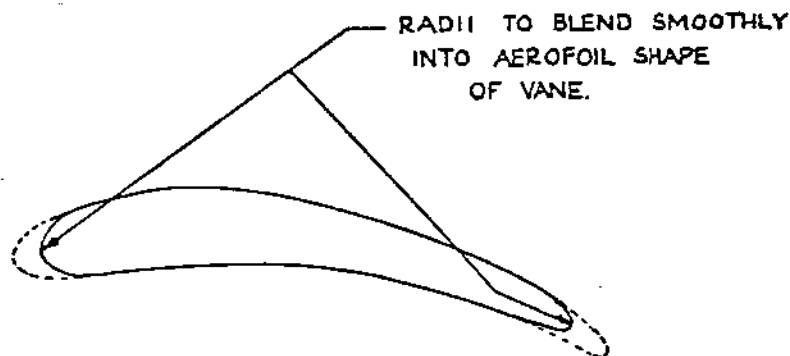
5. Assessment of Amount of Blending for Vane

- A. Vanes may be blended in several positions provided that the total extent of blending is not more than the equivalent of two blends to the maximum in zone 2.
- B. Depth of blending is controlled by zones.
- C. The maximum permissible number of blended vanes, when blended to maximum limits, is identified as L on Fig.402.
- D. Where vanes are not blended to the permissible maximum, this number (Ref.para.(C)) may be increased, provided that the aggregate of the blending does not exceed L.
- E. Permissible blending is controlled by depths, e.g.:
 - (1) 0.020 in. (0,51 mm) depth x two blends =
0.040 in. (0,102 mm) total = maximum blended vane.
 - (2) This maximum may be obtained as defined in (a), (b) or (c), or by any combination of depths the total of which does not exceed 0.040 in. (0,102 mm).
 - (a) 0.015 in. (0,38 mm) depth x two blends plus one
0.010 in. (0,254 mm) depth blend.
 - (b) 0.010 in. (0,254 mm) depth x two blends plus one
0.020 in. (0,51 mm) depth blend.
 - (c) 0.010 in. (0,254 mm) depth x four blends.
- B. One coupled blend = two blends.

6. Assessment of Blending Equivalent to L Number of Blended Vanes

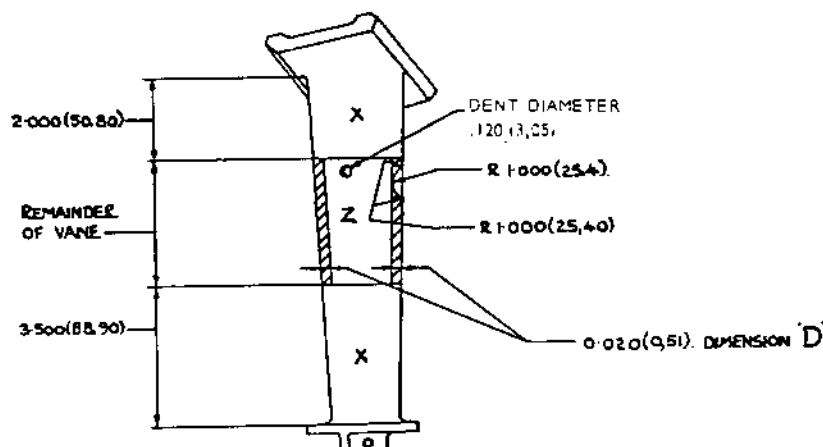
A. Example:

- (1) L = five vanes x 0.040 in. (0,102 mm) depth =
0.200 in. (0,510 mm) aggregate depth.



DEFECTS IN ZONE X ADJACENT TO VANE PLATFORM MUST BLEND SMOOTHLY INTO FILLET RADIUS.

Figure 401



THIS SCHEME MUST BE READ IN CONJUNCTION WITH SAL B.930280 (REF.PARA.3.A).

L - MAXIMUM NUMBER OF VANES BLENDED TO MAXIMUM = 5.

AT LEAST 0.100 (2,54) MUST EXIST BETWEEN ADJACENT DENTS.

LIGHT EDGE NICKING IN ZONE X TO BE BLENDED, PROVIDED THE DEPTH OF BLEND DOES NOT EXCEED 0.010 (0,25) MAX.

BLEND RADII TO BE AS FOR ZONE Z.

LP Compressor Exit Guide Vanes - Blending Data
Figure 402



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(2) This aggregate may be obtained as defined in (a), (b) or (c), or by any aggregate of blended vanes which does not exceed 0.2000in. (0,510 mm).

(a) 0.033 in. (0,838 mm) depth x six vanes.

(b) 0.025 in. (0,635 mm) depth x eight vanes.

(c) 0.020 in. (0,508 mm) depth x ten vanes.

7. Identify Repair

A. Mark the repair scheme number SAL B.930279 close to the standard part number on the exit guide vanes (Ref. 72-09-00, Repair).

NOTE : Do not mark the number of this scheme SAL B.930280 on the vanes.

8. Special Tools, Fixtures and Equipment

A. Not required.

9. Replacement Parts

A. Not required.



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EXIT GUIDE VANE CASE - REPAIR
RESTORATION OF DOVETAIL SLOT BY WELDING

MODIFICATION NO. OL.8744C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-02	1 150A	B.916419

2. Introduction

A. General.

- (1) This repair describes the procedure to restore the exit guide vane case dovetail slot to a serviceable condition by welding.
- (2) Dimensions are shown thus, INCHES (MILLIMETERS) in tables and illustrations.
- (3) Refer to Chapter 72-09-00, Repair, for all standard practices applicable to this repair procedure.
- (4) Remove sharp edges 0.004 to 0.020 in. (0,10 to 0,81 mm) unless otherwise stated.
- (5) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (6) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (7) Surface texture is to be 63 microinches (1,6 micrometers) unless otherwise stated.
- (8) All tools referred to by item number in procedural steps are detailed in para.4.
- (9) Protect the component against corrosion after each operation and place in a container for protection against damage during transit between operations.

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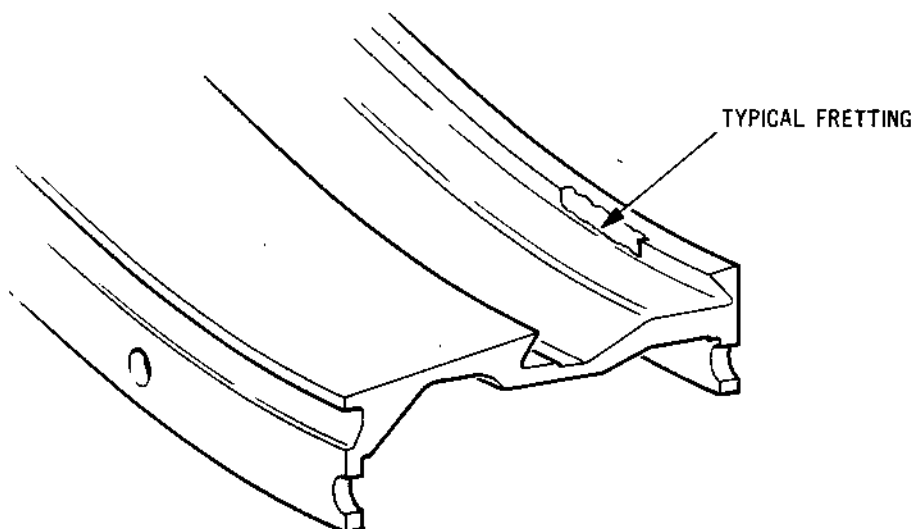
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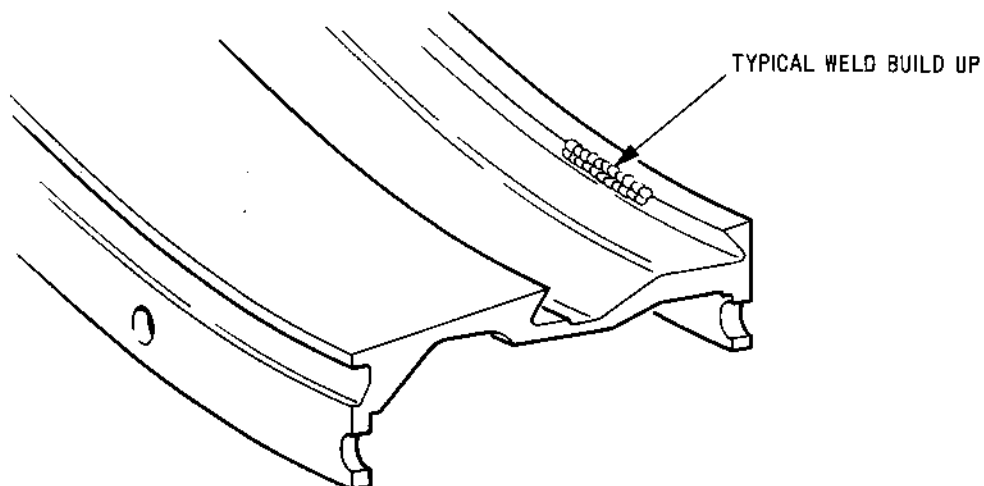
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DEFECTIVE AREA



REPAIRED AREA

Typical Repair of Dovetail Slot
Figure 401

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B. Repair Limitations.

- (1) Welding must be confined to two exit guide vane positions.

3. Instructions

A. Weld.

- (1) Assemble the two halves of the exit guide vane case together using slave bolts.
- (2) Build up the defective area(s) (Ref.Fig.401) by inert gas arc welding, using filler rod MSRR 9500/10. The area must be built up sufficient to allow for final machining. The component material specification is MSRR 6503.
- (3) Check to ensure satisfactory welding.
- (4) Crack test the casing using the magnetic particle detection method detailed for this component in Chapter 72-31-02, Inspection/Check.

B. Heat Treat.

- (1) Install the casing to a furnace and heat treat to 650°C plus/minus 5°C for 1 hour. Cool in air.

C. Inspect.

- (1) Install the case in restraining ring ref. tool item 1 (Ref.Fig.402).
- (2) Measuring the datum A bore (Ref.Fig.403) check the casing for ovality. A maximum of 0.012 (0,30 mm) ovality is acceptable.
- (3) Crack test the casing using the magnetic particle detection method detailed for this component in Chapter 72-31-02, Inspection/Check.

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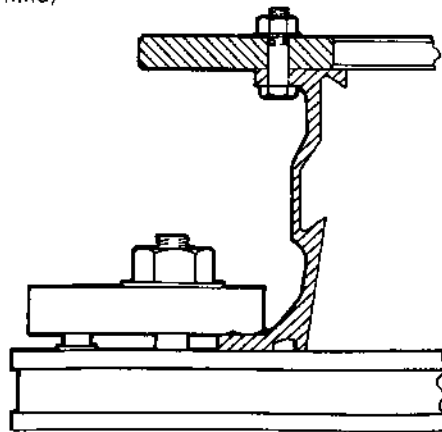
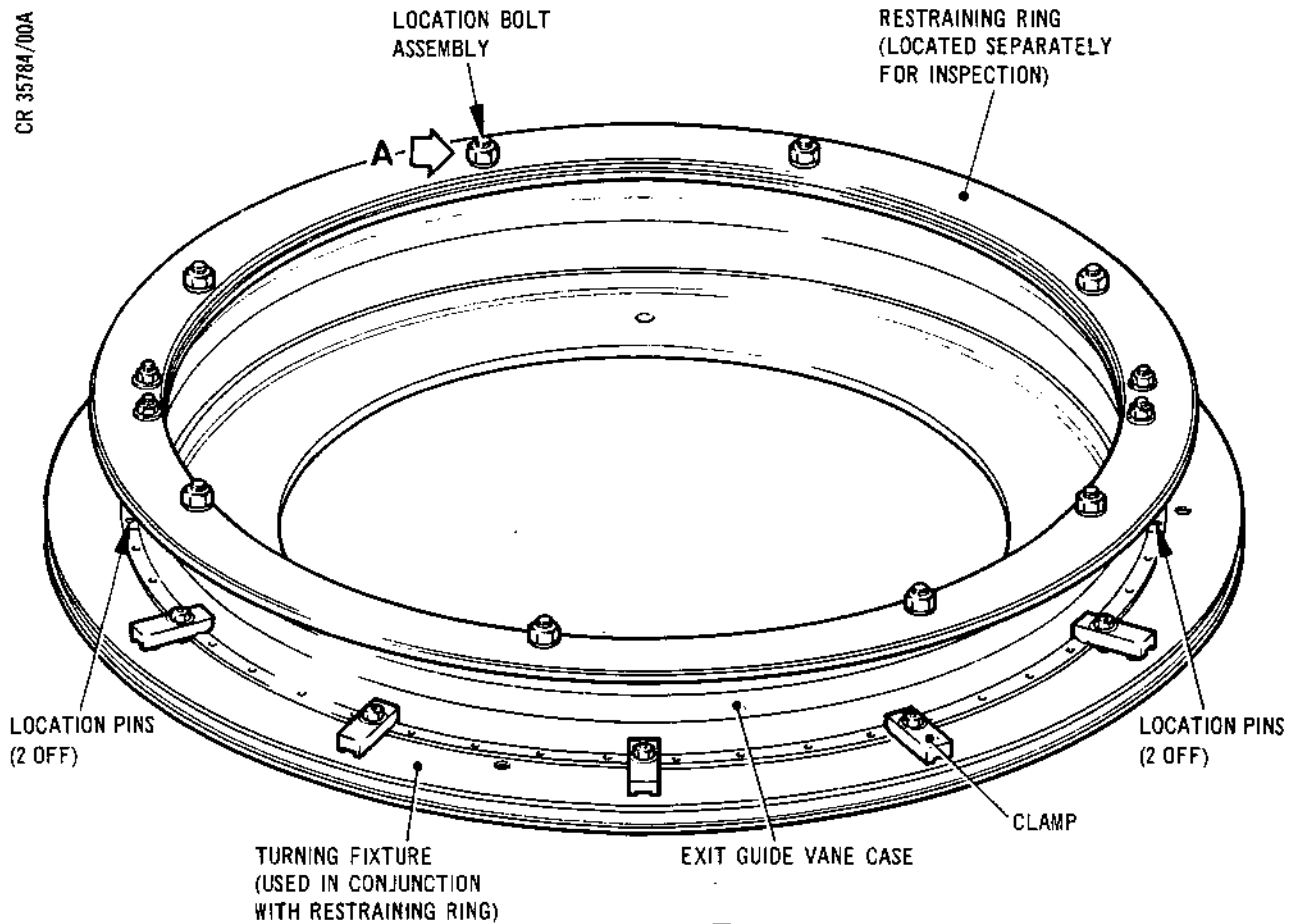
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SECTION AT A

Restraining Ring Ref. Tool Item 1
and Turning Fixture Ref. Tool Item 2
Figure 402

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Repair No.2

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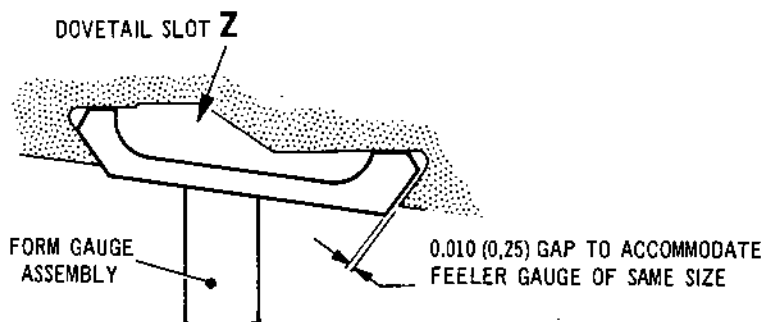
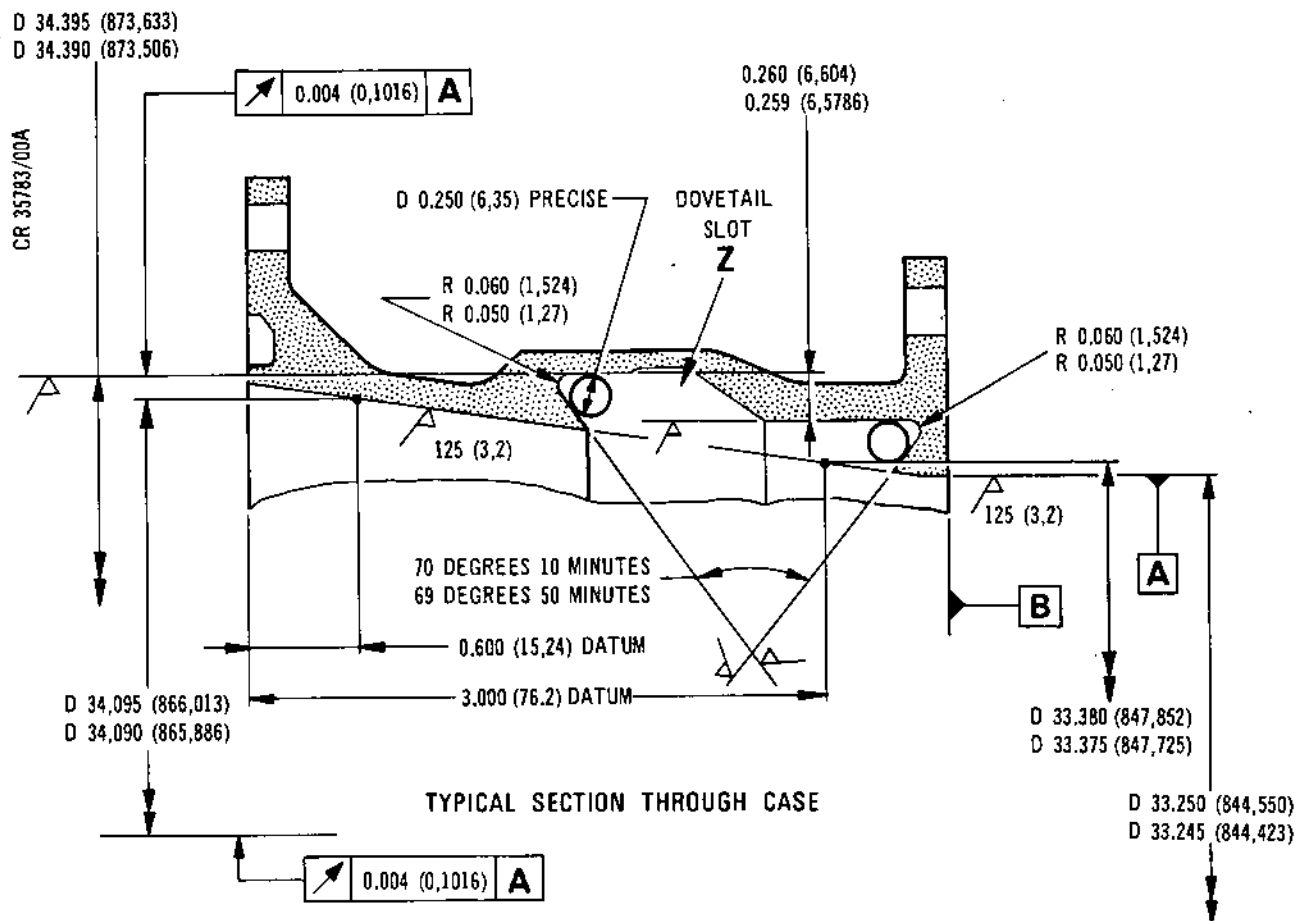
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DETAIL OF GAUGE ASSEMBLY LOCATED IN DOVETAIL SLOT

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

Machining Details and Form Gauge Ref. Tool Item 3
Figure 403

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Repair No.2
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D. Machine.

- (1) Locate casing/restraining ring assy. to fixture ref. tool item 2 and locate whole assy. to a centre lathe (Ref.Fig.402).
- (2) Machine the welded area flush with existing contours using either form tool ref. tool item 3 or form tool ref. tool item 4, maintaining the dimensions shown at Fig.403.
- (3) Check for satisfactory machining.
- (4) Crack test the casing using the magnetic particle detection method detailed for this component in Chapter 72-31-02, Inspection/Check.

E. Inspect.

- (1) Split the casing into two halves by removing slave bolts.
- (2) Inspect the dovetail slot using form gauge ref. tool item 5, in conjunction with a 0.010 in. (0,25 mm) feeler gauge as shown at Fig.403.

F. Identify.

- (1) Mark the number SAL.B.497590 or R2 adjacent the existing assy. number, using the electro-chemical or vibro-percussion marking technique detailed in Chapter 72-09-00, Repair.

G. Finally Inspect.

- (1) Finally inspect the casing to ensure the repair has been carried out satisfactorily and that the chamber is in a serviceable condition.

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- (2) Generally clean the chamber to remove grease and foreign bodies, then place the casing in a protective container and store as required.

4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>	<u>Fig.No.</u>
Restraining Ring	1	S3S.15949000	1	402
Turning Fixture	1	S3S.15897000	2	402
Form Tool	1	S3S.15898000	3	-
Form Tool	1	S3S.15899000	4	-
Form Gauge	1	S3S.15900000	5	403

5. Replacement Parts

None Required.

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REPAIR
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OLYMPUS 593 OVERHAUL MANUAL

Temporary Revision No. 72-536

Insert in 72-31-02 at rear of repair section in RST No. order

REASON FOR ISSUE:

To introduce a repair for a cracked bracket in the L.P. compressor exit case, rear flange attaching parts (MRA 105)

ACTION

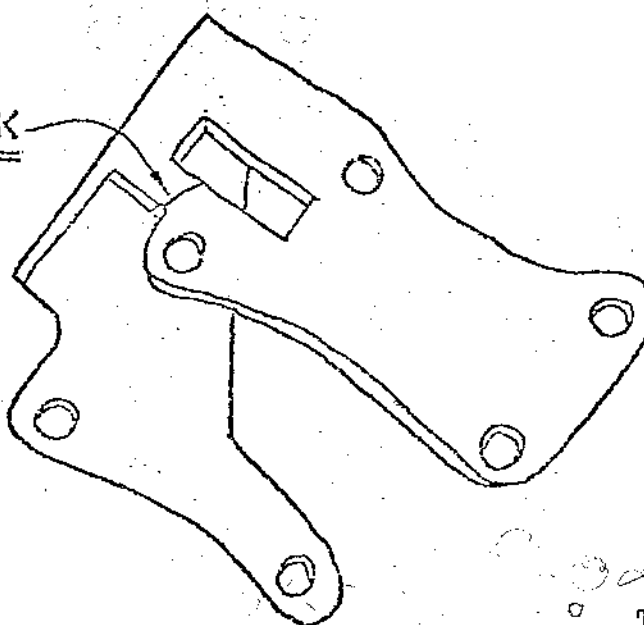
B.E.O.L. REPAIR

RST 4019 L.P. COMPRESSOR EXIT CASE -
REAR FLANGE ATTACHING PARTS: ARGON ARC
WELD CRACKED BRACKET.

PROCEDURE:-

1. Clean and prepare crack area for welding in accordance with T.S.D. 594/Op. 407.
2. Argon Arc weld crack using filler rod MSRR 9500/2 as per T.S.D. 594/Op. 407.
3. Crack detect as per standard practices manual 70-20-10.
4. Hand dress back to original contours.
5. Visually Inspect.
6. Vibro engrave RST 4019 adjacent to part number.

TYPICAL CRACK



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Repair No.	Title	Scheme No.
1	Rotor Shaft Rear Labyrinth Fins Repaired by Roll Forming	SAL.B.478082-5
2	Rotor Shaft Front Labyrinth Fins Repaired by Roll Forming	SAL.B.478067-8
3	Rotor Shaft Front Roller Bearing Location Restored by Plasma Flame Spraying	SAL.B.478122
4	Stage 1-2, 2-3 and 3-4 Spacer Ring Labyrinth Fins Repaired by Roll Forming	SAL.B.488596-8
5	Stage 4-5, 5-6 and 6-7 Spacer Ring Labyrinth Fins Repaired by Roll Forming	SAL.B.488599
6	Blending and Polishing Damaged Blades with Control on Number of Blended Blades per Stage	SAL.B.930265-72
7	LP Compressor Rotor Disk Stages 1-7 Repair by Blending Light Impact and Other Damage	SAL.B.497538
8	Spacer Rings Stages 1/2, 2/3, 3/4, 4/5, 5/6 and 6/7, Repaired by Restoring Labyrinth Fins by Plasma Welding	SAL.B.497449-54
9	Rotor Shaft Rear Thrust Bearing Location Restored by Plasma Flame Spraying	SAL.B.935531
10	LP Compressor Rotor Disks Stages 1 to 7 Repair by Blending Handling and other Damage to Bore and Faces	SAL.B.935533
11	LP Compressor Rotor Blades Stage 1 Repaired by Blending and Polishing Damage	SAL.B.935525
12	LP Compressor Rotor - Rear Rotor Shaft Assembly - Removal of Corrosion by Machining and Grit Blasting	SAL.B.935539

REPAIR

72-31-03

Contents 1

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OLYMPUS 593



MK.610-14-28 *sneema*
OVERHAUL

Repair No.	Title	Scheme No.
13	Rotor Shaft Front Labyrinth Fins Restored by TIG Welding	B.488673-5
14	Rotor Shaft Rear Labyrinth Fins Restored by TIG Welding	B.488624-6
15	Ring Spacer, Stages 1-2, 2-3, 3-4, 4-5, 5-6, 6-7 (L.P.C.) Provision for the blending of scoring and/or gouging on the bolt locating diameter	B.514631
16	Ring, Spacer, (LPC) Stages 1-2 to 6-7. Re-building of labyrinth fins by mechanised TIG welding	B.516426-31

REPAIR

72-31-03

Contents 2

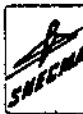
Jun 30/95



OLYMPUS 593

MK.610-14-28

OVERHAUL



LP COMPRESSOR ROTOR - REPAIR
ROTOR SHAFT REAR - LABYRINTH
FINS REPAIRED BY ROLL FORMING

Applicable to:

Rotor Shaft B.922515

Authority:

Modification No.OL.8324C

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1. Introduction

- A. This Repair describes the procedure for restoring defective labyrinth fins on the LP compressor rotor shaft rear, in order to maintain the standard fin/housing clearances of labyrinth No.3, No.4 and No.5. The diameter of each fin is first increased by roll forming then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, the application of high heat resisting stoving enamel, tolerancing and the roll forming technique applicable to this repair procedure.
- C. Dimensions are shown thus in Tables and on illustrations: INCHES (MILLIMETRES).
- D. Protect the component against corrosion after each operation, and place in a container for protection against damage during transit between operations (Ref.72-09-20 Repair).

2. Repair Limitations

- A. Provided that specified dimensions can be maintained, fins may be repaired as follows:

Labyrinth No.3	Twice only
Labyrinth No.4 and No.5	Once only
- B. Fins which have previously been repaired by welding must not be restored by roll forming.
- C. Verify that there is adequate material at each defective location to permit machining to the dimensions before roll forming (Ref.para.3.B).

3. Summary of Operations

- A. Secure the shaft to the centre-lathe face-plate and set true on datum diameter A (Ref.Fig.401).

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**OLYMPUS 593**

MK.610-14-28

OVERHAUL



- B. Clean up defective fins; remove only the minimum amount of material to achieve the specified dimensions (Ref. Table 401 and Fig.402). A localised "witness", not exceeding 0.003 in. (0,076 mm) is acceptable on each fin.
- C. Carefully remove any burrs.
- D. Apply the roll forming technique to increase the diameter of defective fins to the roll forming dimensions (Ref.Table 402 and Fig.403).
- E. Remove any folds by careful blending (Ref.Fig.404).
- F. Crack test the shaft by the process specified for this component in 72-31-03, Inspection/Check.
- G. Finish machine the fins (Ref.Fig.401); a maximum of 1.000 in. (25,4 mm) of the circumference which has not cleaned up is acceptable on each fin.
- H. Polish the fins to remove sharp edges.
- J. Repeat the test for cracks (para.F).
- K. Mask all threads and vapour blast the areas identified AH (Ref.Fig.405); use aluminium oxide grit mesh 280/500. Repair masking.
- L. Apply high heat resisting stoving enamel to the vapour blasted areas identified AH (Ref.Fig.405).
- M. Identify repair (Ref.Table 401). Mark the appropriate repair scheme number close to the standard part number on the rotor shaft.

4. Special Tools, Fixtures and Equipment

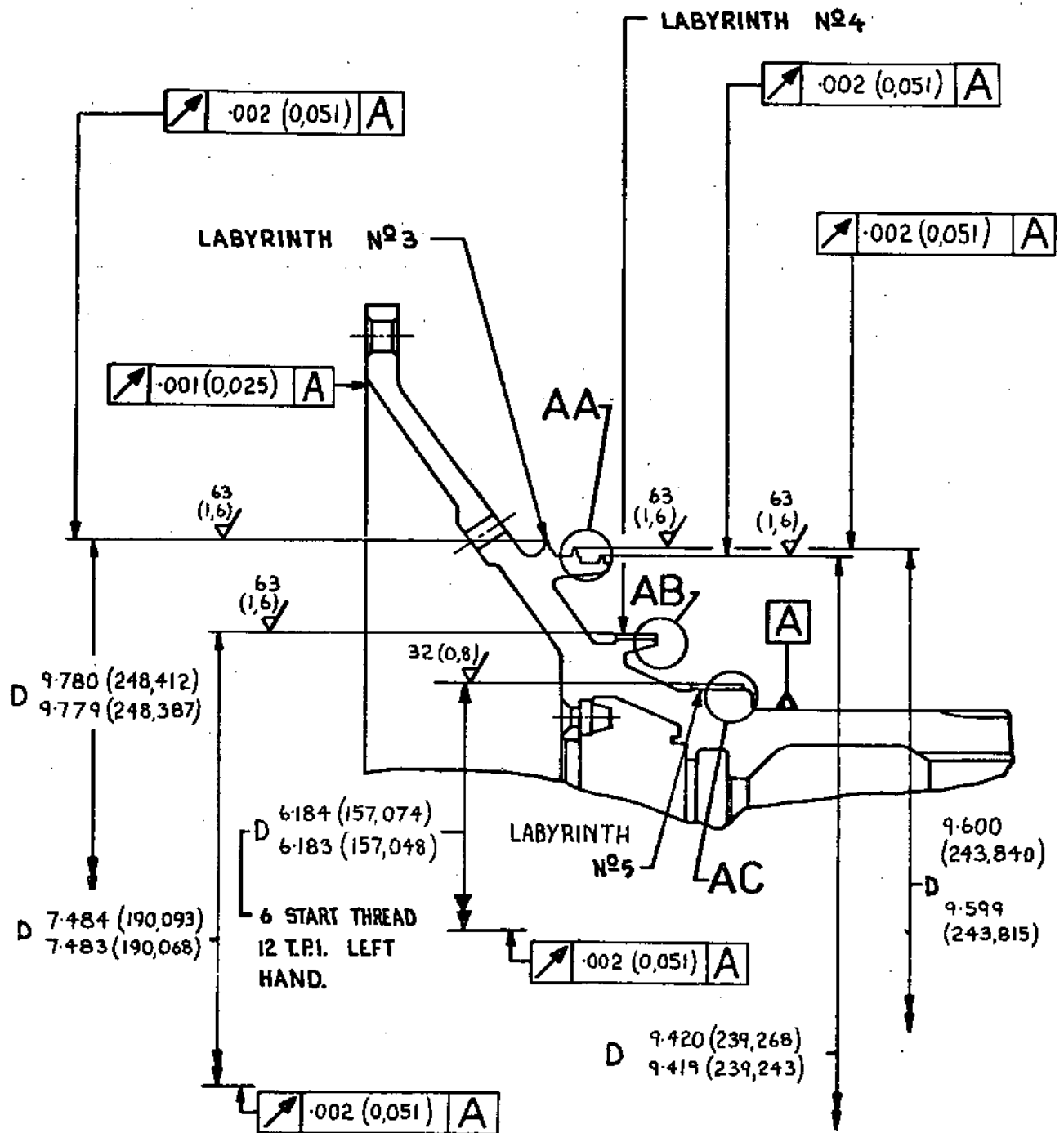
<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Tool Holder	1	S3S12358000	1
Roller Assy.	1	S3S15864000	2
Rollers	2	S3S12379000-82000	3

5. Replacement Parts

- A. Not required.

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IN8886



Standard Dimensions
Figure 401

REPAIR

72-31-03

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OVERHAUL

MINIMUM MACHINED RADII (REF.FIG.402)						
REPAIR SCHEME NO	LABY- RINTH NO	A	B	C	D	E
1ST REPAIR SAL B.478082	3	4.883 (124,028)	4.793 (121,742)	4.703 (119,456)	-	-
2ND REPAIR SAL B.478083	3	4.875 (123,825)	4.785 (121,539)	4.695 (119,253)	-	-
SAL B.478084	4	-	-	-	3.734 (94,844)	-
SAL B.478085	5	-	-	-	-	3.086 (78,384)

Machining Dimensions Before Roll Forming
Table 401

TN8890

REPAIR
72-31-03
Repair No.1
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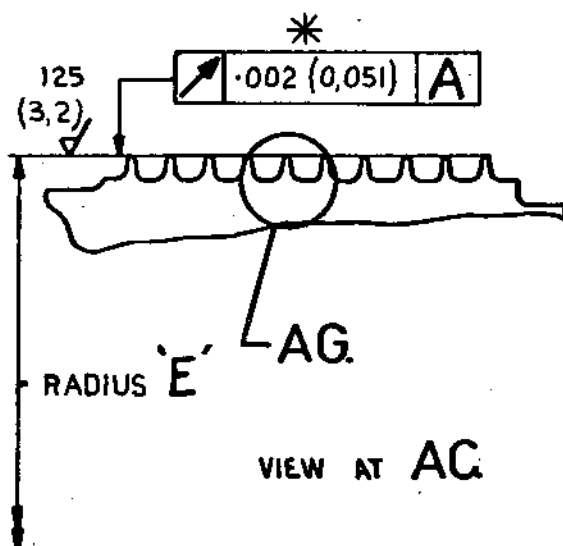
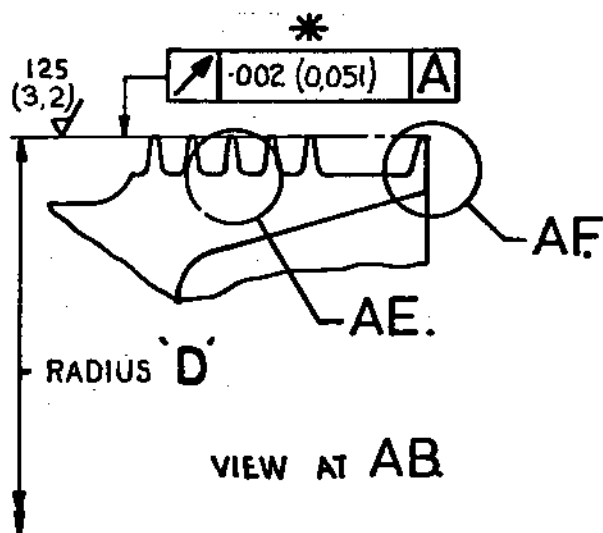
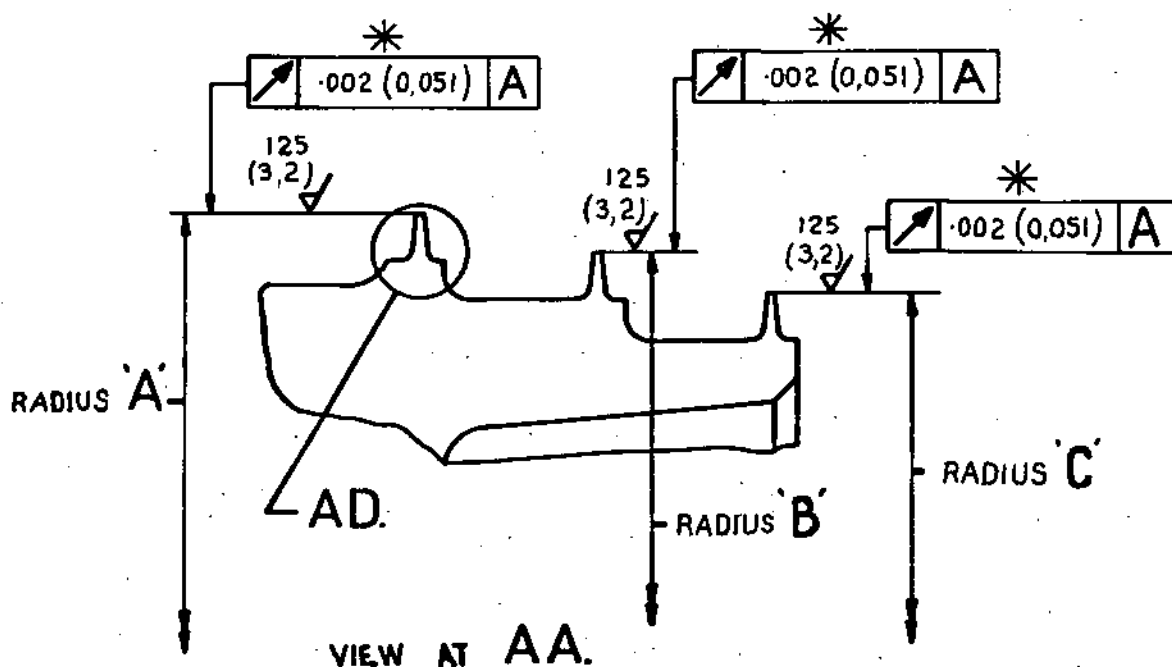
OLYMPUS 593

MK.610-14-28

OVERHAUL



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* .003 (0,076) LOCAL WITNESS IS IN ADDITION TO THESE TOLERANCES.

Machining Dimensions Before Roll Forming
Figure 402

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MK.610-14-28
OVERHAUL



MAXIMUM ROLLED RADII (REF.FIG.403)						
REPAIR SCHEME NO	LABY- RINTH NO	F	G	H	J	K
1ST REPAIR SAL B.478082	3	4.893 (124,282)	4.803 (121,996)	4.713 (119,710)	-	-
2ND REPAIR SAL B.478083	3	4.893 (124,282)	4.803 (121,996)	4.713 (119,710)	-	-
SAL B.478084	4	-	-	-	3.745 (95,123)	-
SAL B.478085	5	-	-	-	-	3.095 (78,613)

Roll Forming Dimensions
Table 402

TN47335

REPAIR
72-31-03
Repair No.1
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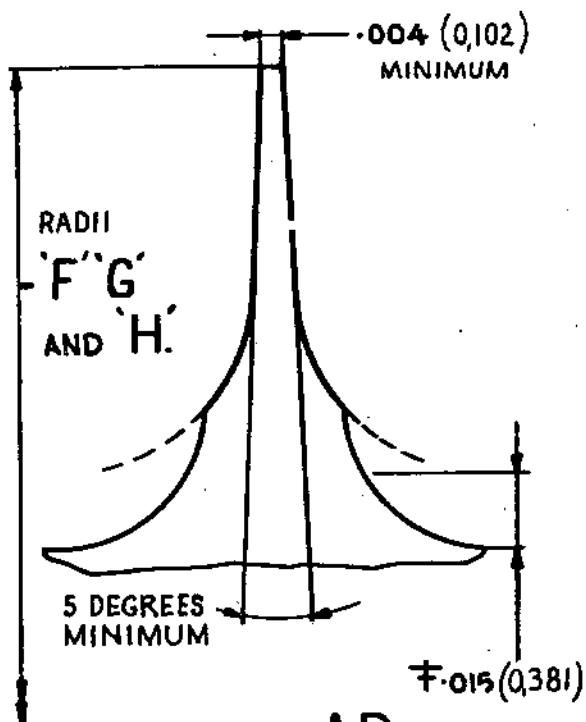
OLYMPUS 593

MK.610-14-28

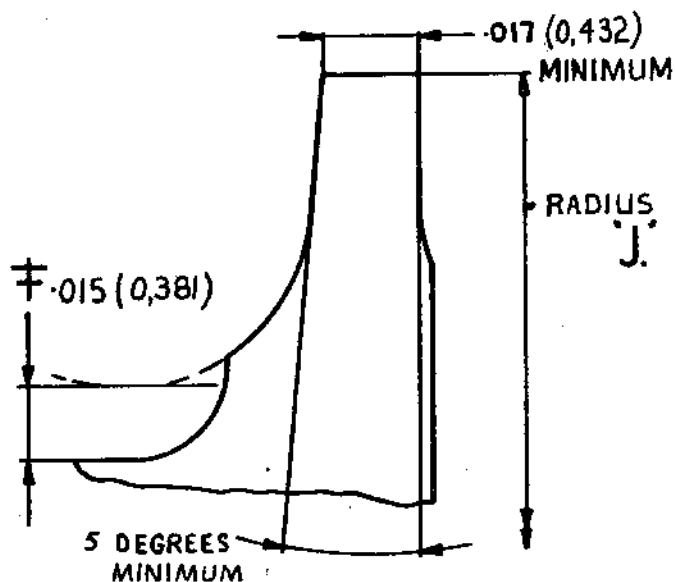
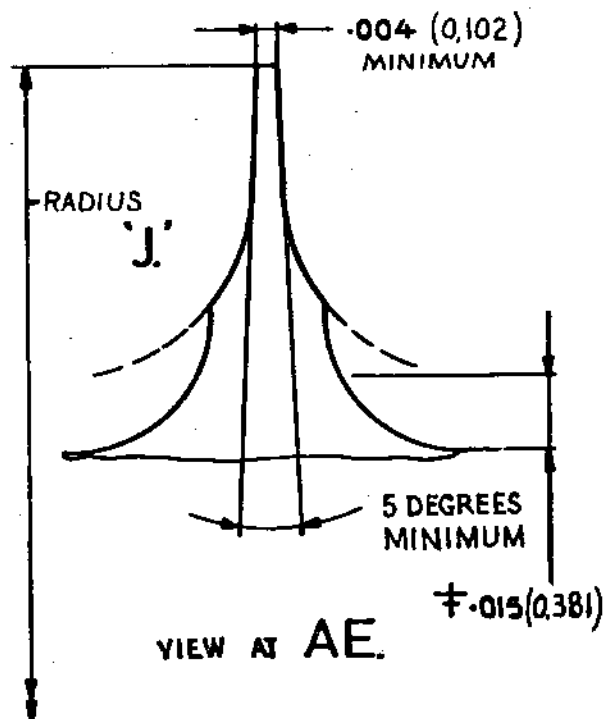
OVERHAUL



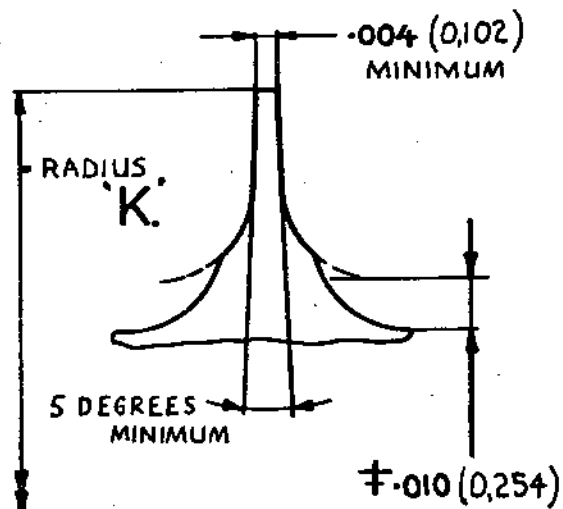
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VIEW AT AD
APPLICABLE TO ALL THREE FINS



VIEW AT AF



VIEW AT AG

± ROLLING TOOL NOT TO ENCROACH WITHIN
DIMENSION SHOWN.

Roll Forming Dimensions
Figure 403

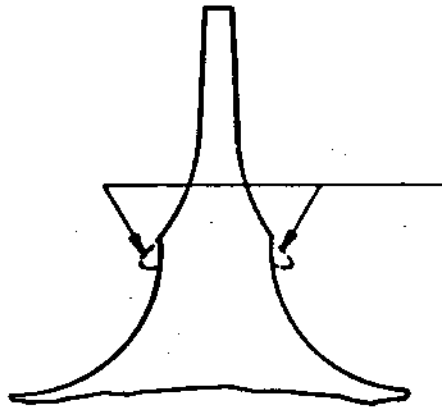
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REPAIR
72-31-03
Repair No.1
Page 407
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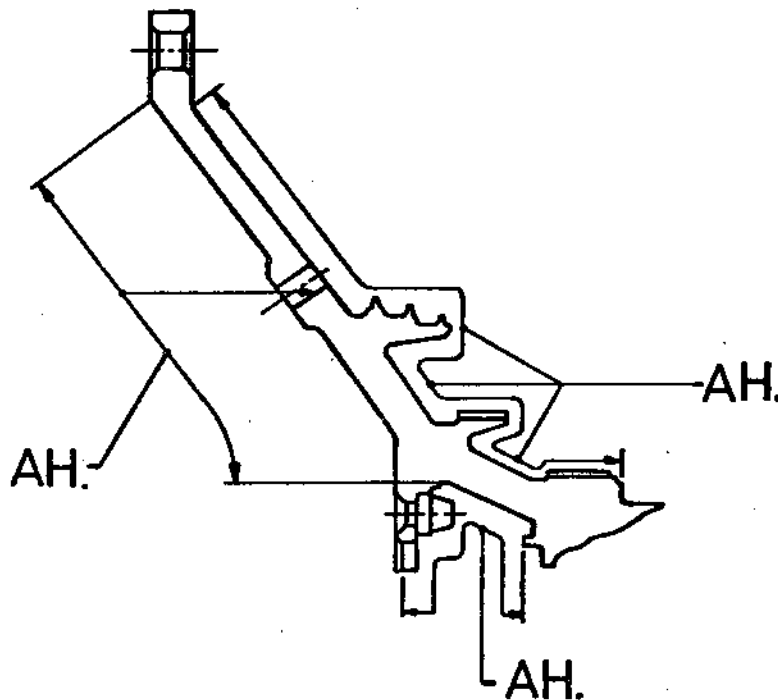
OLYMPUS 593

MK.610-14-28
OVERHAUL



FOLDS TO BE REMOVED
BY BLENDING INTO
EXISTING PROFILE.
NO UNDER CUTTING
PERMISSIBLE.

Fold Blending Detail
Figure 404



Areas to be Enamelled
Figure 405

TN47336

REPAIR

72-31-03

Repair No.1

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

LP COMPRESSOR ROTOR - REPAIR
ROTOR SHAFT FRONT - LABYRINTH
FINS REPAIRED BY ROLL FORMING

MODIFICATION NO. OL.8329CEffectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	1 90A	B.916195
	90B	B.922809
	90C	B.925001
	90D	B.930060
		B.930062
		B.930063

1. Introduction

- A. This Repair describes the procedure for restoring defective labyrinth fins on the LP compressor rotor shaft front, in order to maintain the standard fin/housing clearances of labyrinth No.1 and No.2. The diameter of each fin is first increased by roll forming then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the roll forming technique applicable to this repair procedure.
- C. Dimensions are shown thus in Tables and on illustrations:
INCHES (MILLIMETRES).

2. Repair Limitations

- A. This Repair may be applied once only.
- B. Fins which have previously been repaired by welding must not be restored by roll forming.
- C. Verify that there is adequate material at each defective location to permit machining to the dimensions before roll forming (Ref.para.3.B).

3. Summary of Operations

- A. Secure the shaft to the centre-lathe faceplate and set true on datum diameter A (Ref.Fig.401).

REPAIR
72-31-03

Repair No.2
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**OLYMPUS 593**

MK.610-14-28

OVERHAUL



- B. Clean up defective fins; remove only the minimum amount of material to achieve the specified dimensions (Ref. Table 401 and Fig.402). A localised "witness", not exceeding 0.003 in. (0,076 mm) in depth, is acceptable on each fin.
- C. Carefully remove any burrs.
- D. Apply the roll forming technique to increase the diameter of defective fins to the specified dimensions (Ref. Fig.403).
- E. Remove any folds by careful blending (Ref.Fig.404).
- F. Crack test the rotor shaft with fluorescent-penetrant.
- G. Finish machine the fins (Ref. Table 401 and Fig.401); a maximum of 1.000 in. (25,4 mm) of the circumference which has not cleaned up is acceptable on each fin.
- H. Polish fins to remove sharp edges.
- J. Chemically etch the rotor shaft using solution A, and etching technique, (Ref.72-09-14 Repair) and repeat the test for cracks (para.F).
- K. Vapour blast the rotor shaft; use grit mesh 280/500.
- L. Identify repair (Ref.Table 401). Mark the appropriate repair scheme number close to the standard part number on the rotor shaft.

REPAIR SCHEME NO.	DIMENSIONS BEFORE ROLL FORMING (REF.FIG.402)		STANDARD DIMENSIONS (REF.FIG.401)
	MINIMUM MACHINED RADIUS X	MINIMUM MACHINED RADIUS Y	DIAMETER Z
SAL B.478067	2.149 (54,585)	-	4.3095 (109,461) 4.3085 (109,436)
SAL B.478068	-	2.147 (54,534)	4.3095 (109,461) 4.3085 (109,436)

Machining Dimensions
Table 401

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72-31-03

Repair No.2
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FN32570



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MK.610-14-28
OVERHAUL



4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Tool Holder	1	S3S.12358000	1
Rolling Tool	1	S3S.12363000	2
Roller	2	S3S.12382000	3
Shims	4	S3S.12375-78000	4

5. Replacement Parts

A. Not required.

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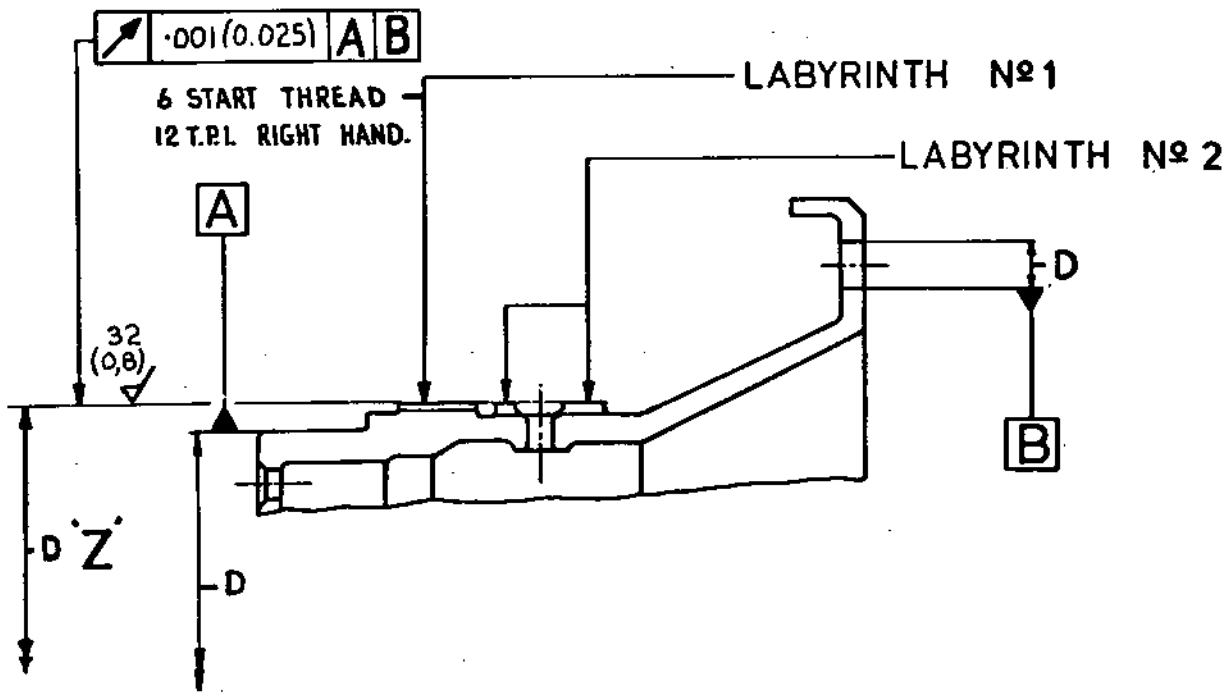
TN1647

REPAIR
72-31-03
Repair No.2
Page 403
Jan 9/76

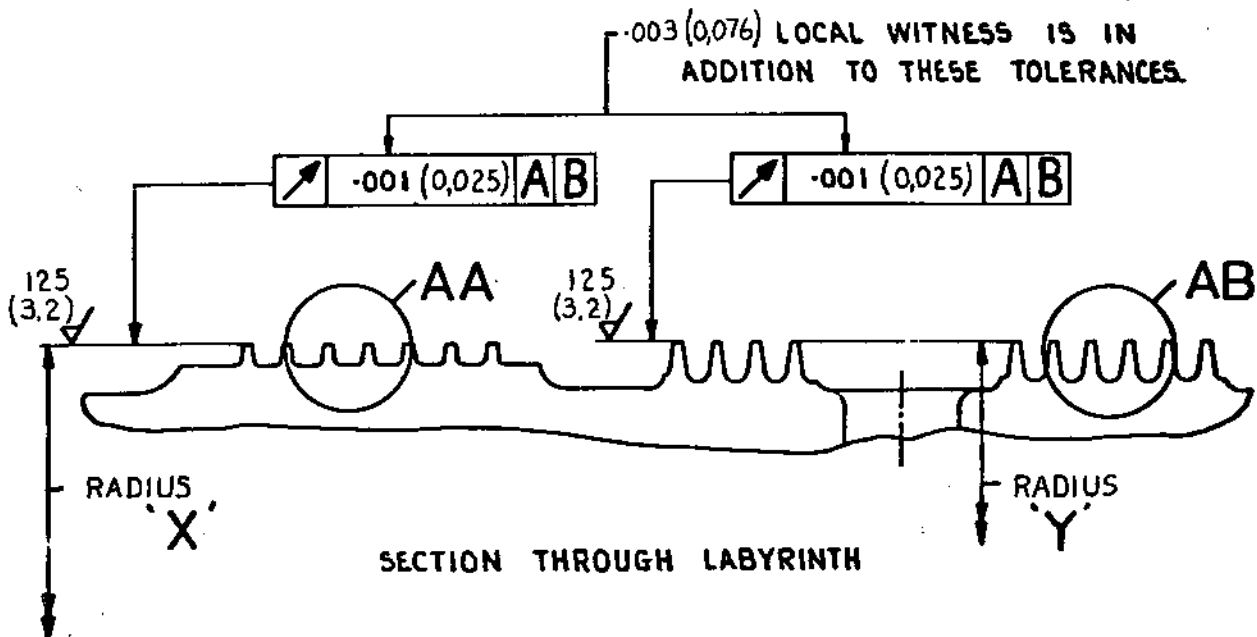


OLYMPUS 593

MK.610-14-28
OVERHAUL



Standard Dimensions
Figure 401



Machining Dimensions Before Roll Forming
Figure 402

TN32571

REPAIR
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Repair No.2
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Jan 9/76

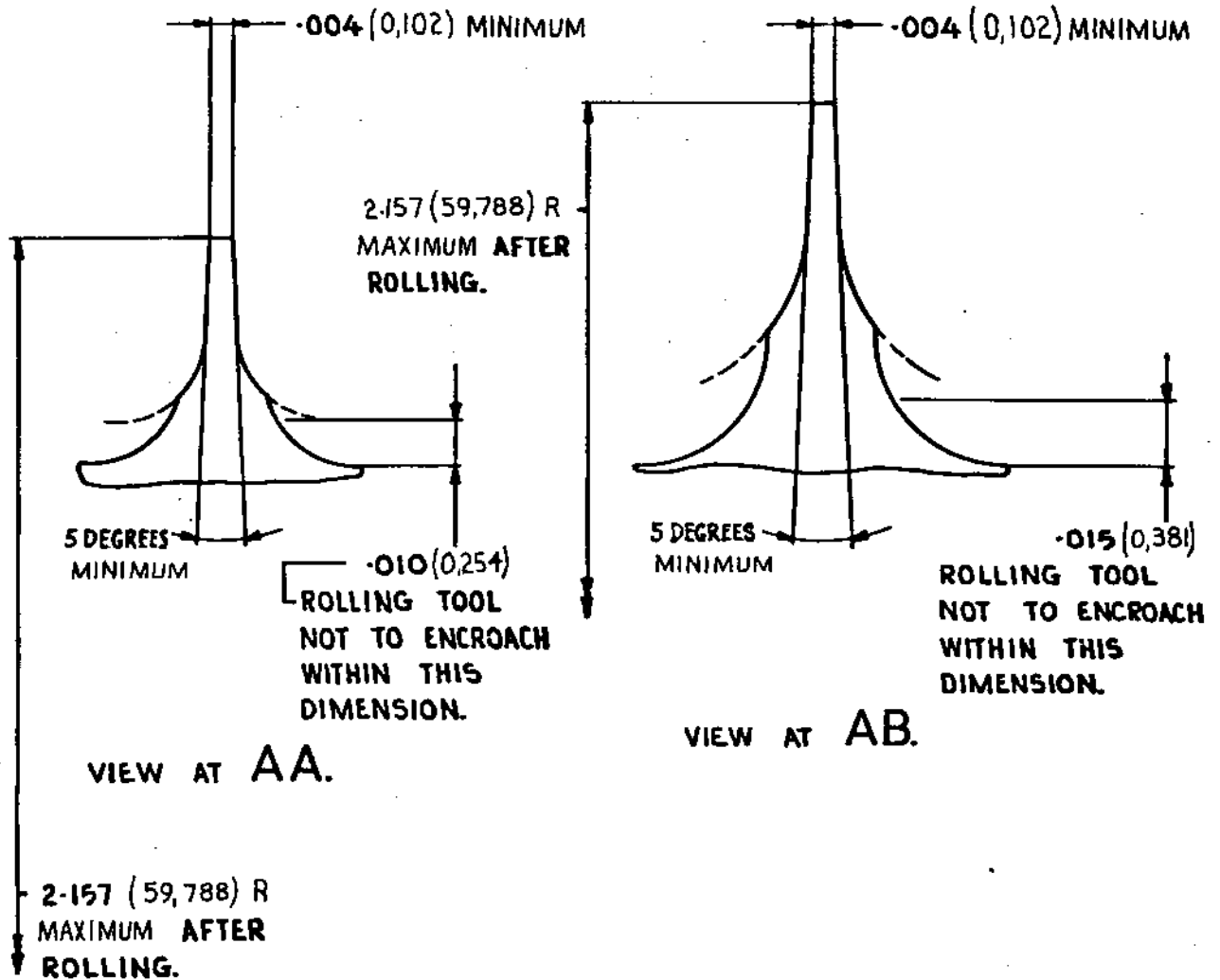


OLYMPUS 593

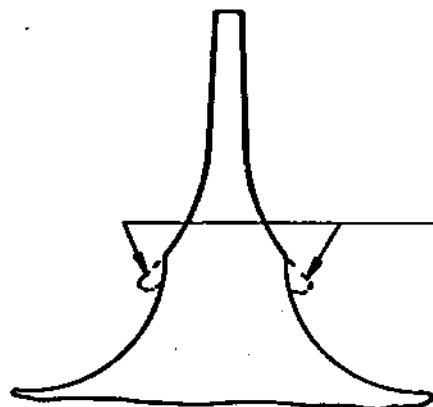
MK. 610-14-28
OVERHAUL



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Roll Forming Dimensions
Figure 403



FOLDS TO BE REMOVED
BY BLENDING INTO EXISTING
PROFILE.
NO UNDER CUTTING
PERMISSIBLE.

Fold Blending Detail
Figure 404

TN32574



OLYMPUS 593

MK.610-14-28

OVERHAUL



LP COMPRESSOR ROTOR - REPAIR
ROTOR SHAFT FRONT ROLLER
BEARING LOCATION RESTORED
BY PLASMA FLAME SPRAYING

MODIFICATION NO. OL.8329C

Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	1 90A	B.916195
	90B	B.922809
	90C	B.925001
	90D	B.930060
		B.930062
		B.930063

1. Introduction

- A. This Repair describes the procedure for restoring a defective roller bearing location on the LP compressor rotor shaft front. The location is first machined undersize then built up by plasma spraying then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the spraying process applicable to this repair procedure.
- C. Dimensions are shown thus on illustrations:
INCHES (MILLIMETRES).

2. Repair Limitations

- A. Successive repairs may be applied at the bearing location, within the limits specified (Ref. para. 3.B.).

3. Summary of Operations

- A. Set the rotor shaft true on datum diameter A and face B (Ref. Fig. 401).
- B. Machine the defective location to the dimensions before spraying; in order to permit successive repairs, remove only the minimum amount of material necessary within the limits specified (Ref. Fig. 402).
- C. Test the rotor shaft for cracks with fluorescent-penetrant.

REPAIR

72-31-03

Repair No. 3

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MK.610-14-28

OVERHAUL



- D. Plasma flame spray the prepared location with Metco 450 powder (Ref.Fig.403); ensure that the deposit is sufficient to permit final machining to standard dimensions.
- E. Finish grind the bearing location and chamfer to standard dimensions (Ref.Fig.401).
- F. Identify repair. Mark the repair scheme number SAL B.478122 close to the standard part number on the rotor shaft.

TN16083

REPAIR

72-31-03

Repair No.3

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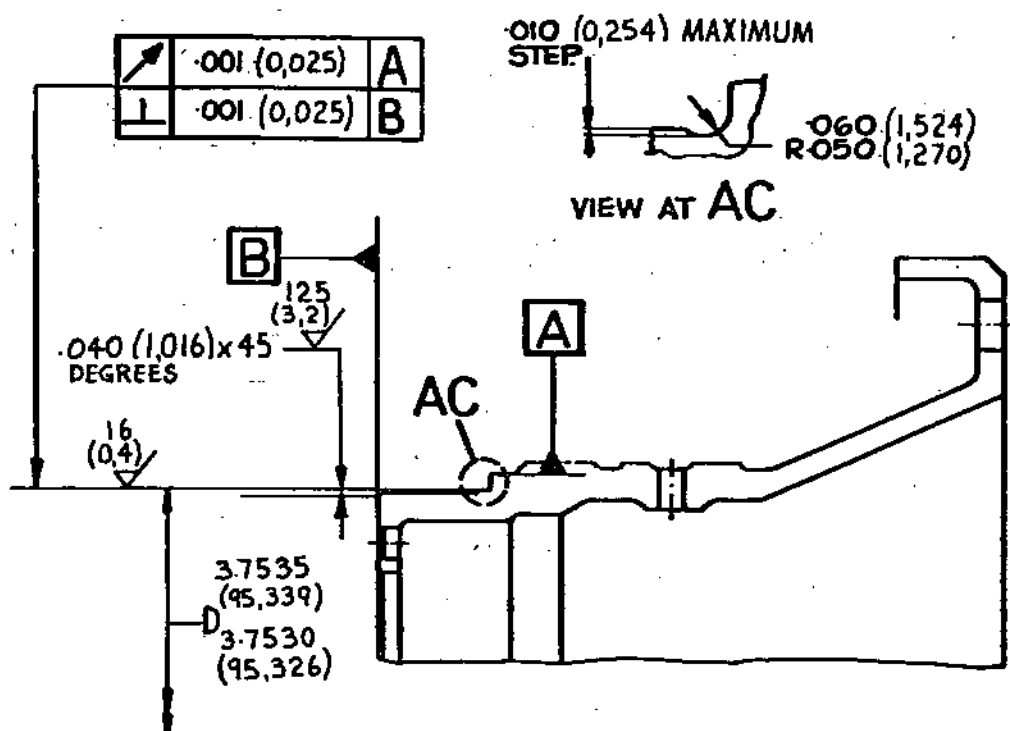
Feb 1/79



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MK. 610-14-28
OVERHAUL



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Standard Dimensions
Figure 401

REPAIR

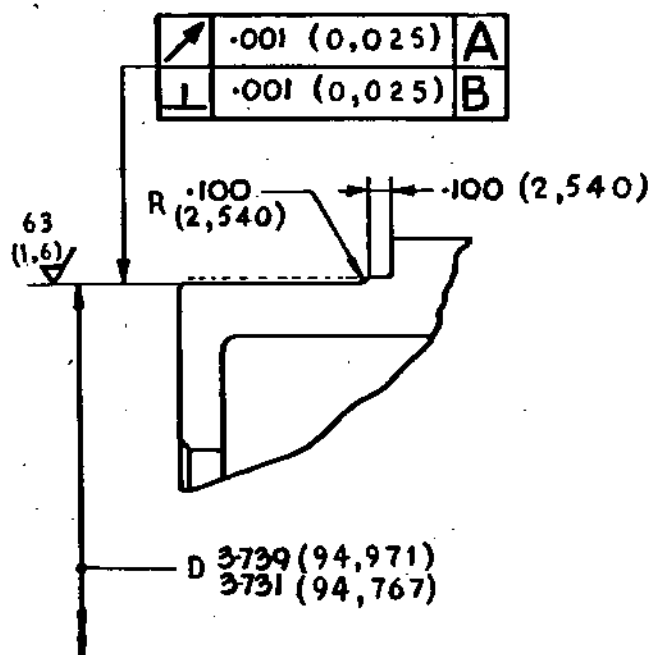
72-31-03

Repair No. 3

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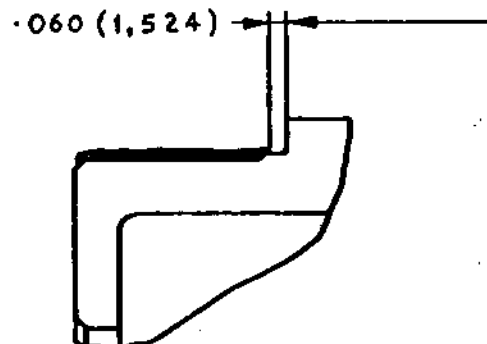
Aug 1/75

TN16081



Dimensions Before Plasma Spraying
Figure 402

OVERSPRAY NOT PERMITTED
WITHIN THIS DIMENSION.—
OVERSPRAY PERMITTED ON
CHAMFER. THIS IS TO BE
REMOVED.



Plasma Spraying Limits

Figure 403

TN16082

REPAIR

72-31-03

Repair No.3

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LP COMPRESSOR ROTOR - REPAIR
STAGE 1-2, 2-3 AND 3-4 SPACER RING LABYRINTH FINS REPAIRED
BY ROLL FORMING

MODIFICATION NO. OL.8394C, OL.8807

Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	1 190A	B.444610
	190B	B.922798
	190C	B.929441
	280A	B.444611
	280B	B.922800
	280C	B.929443
	2 30A	B.429874
	30B	B.922802
	30C	B.929445

1. Introduction

- A. This Repair describes the procedure for restoring defective labyrinth fins on the LP compressor rotor stage 1-2, 2-3 and 3-4 spacer rings, in order to maintain the standard fin/housing clearances. The diameter of each fin is first increased by roll forming then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the roll forming technique applicable to this repair procedure.
- C. Dimensions are shown thus in tables and on illustrations: INCHES (MILLIMETRES).

2. Repair Limitations

- A. Fins which have previously been repaired by welding must not be restored by roll forming.
- B. The first repair to each spacer ring must be carried out in accordance with paragraph 3. Subsequent repairs must be carried out in accordance with paragraphs 3 and 4.
- C. Verify that there is adequate material at each defective location to permit machining to the dimensions before roll forming (Ref.para.3 and 4).



OLYMPUS 593

MK.610-14-28

OVERHAUL



3. Summary of Operations

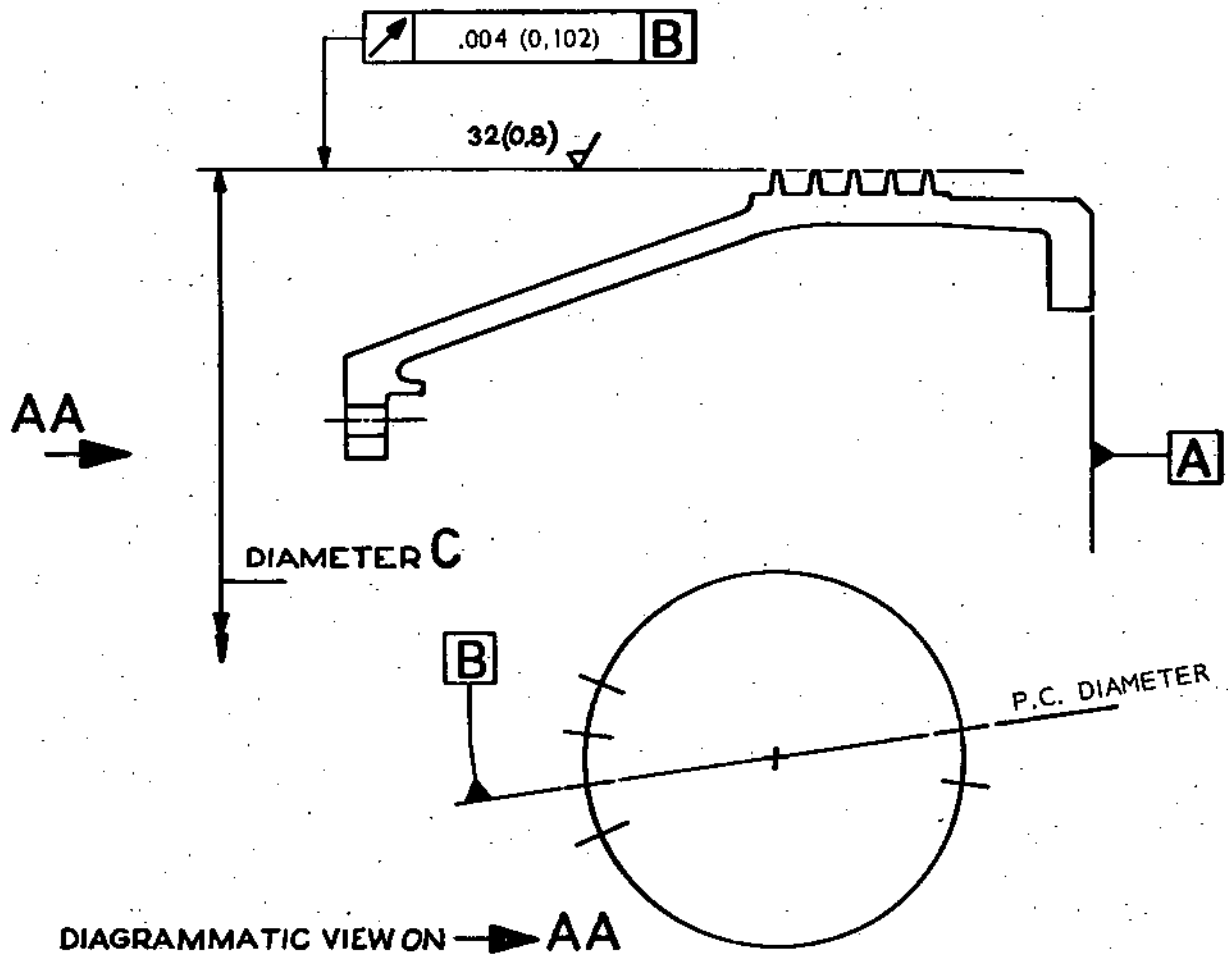
- A. Locate the ring in fixture (Item 5) and set true in centre-lathe on datum face A (Ref.Fig.401).
- B. Clean up defective fins; remove only the minimum amount of material to achieve the specified dimensions (Ref. Fig.402). A localised "witness", not exceeding 0.003 in. (0,076 mm) in depth, is acceptable on each fin.
- C. Carefully remove any burrs.
- D. Apply the roll forming technique to increase the diameter of defective fins to the specified dimensions (Ref. Fig.403).
- E. Remove any folds by careful blending (Ref.Fig.403).
- F. Crack test the spacer ring by the process specified for this component in 72-31-03, Inspection/Check.
- G. Finish machine the fins (Ref.Fig.401); a maximum of 1.000 in. (25,4 mm) of the circumference which has not cleaned up is acceptable on each fin.
- H. Polish fins to remove sharp edges.
- J. Chemically etch the spacer ring using solution A, and etching technique, (Ref.72-09-14 Repair) and repeat the test for cracks (para.F).
- K. Vapour blast the spacer ring; use alumina, garnet or quartz grit mesh 320/400.
- L. Identify repair (Ref.Fig.401). Mark the appropriate repair scheme number close to the standard part number on the spacer ring. For the second repair, mark /2 against the existing repair scheme number.

4. Amended dimensions for repeated rolling of stages 1-2, 2-3 and 3-4 labyrinth fins

- A. Machining dimensions before roll forming (Ref.Fig.402) may be reduced by 0.015 in. (0,38 mm) maximum, if necessary.

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OVERHAUL

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REPAIR SCHEME NO.	DIAMETER "C"	DIMENSION
SAL B.488596	STAGE 1-2	11.8400 (300,736) 11.8388 (300,706)
SAL B.488597	STAGE 2-3	14.1900 (360,426) 14.1886 (360,390)
SAL B.488598	STAGE 3-4	16.3900 (416,306) 16.3884 (416,256)

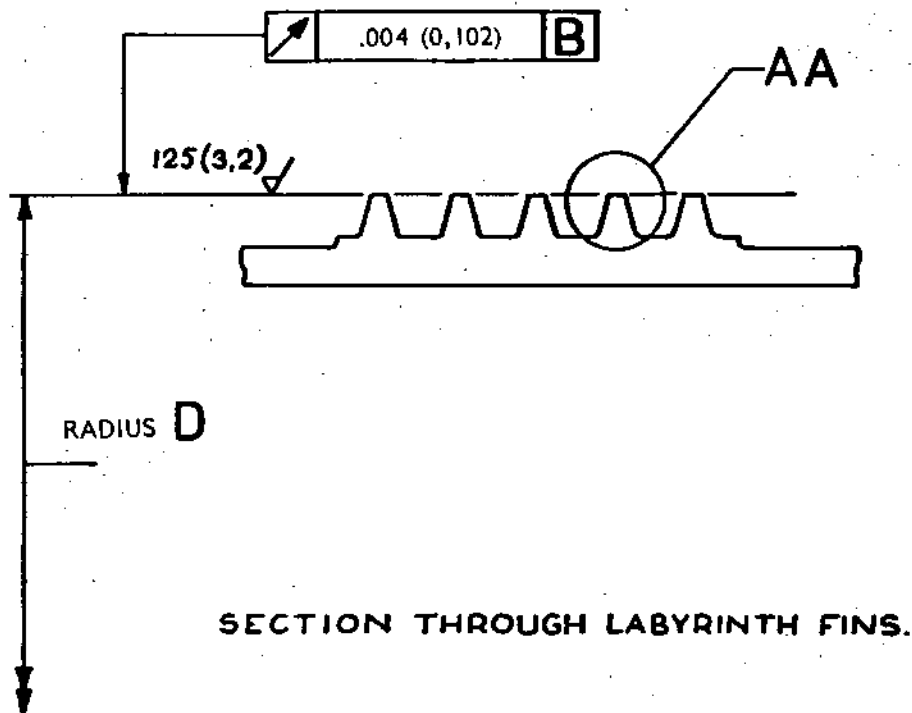
Standard Dimensions
Figure 401REPAIR
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Repair No.4
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TN31613



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MK.610-14-28
OVERHAUL



SECTION THROUGH LABYRINTH FINS.

REPAIR SCHEME NO.	RADIUS "D"	DIMENSION (MINIMUM)
SAL B.488596	STAGE 1-2	5.910 (150,114)
SAL B.488597	STAGE 2-3	7.085 (179,959)
SAL B.488598	STAGE 3-4	8.185 (207,899)

Machining Dimensions Before Roll Forming
Figure 402

REPAIR
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Repair No.4
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TN31614



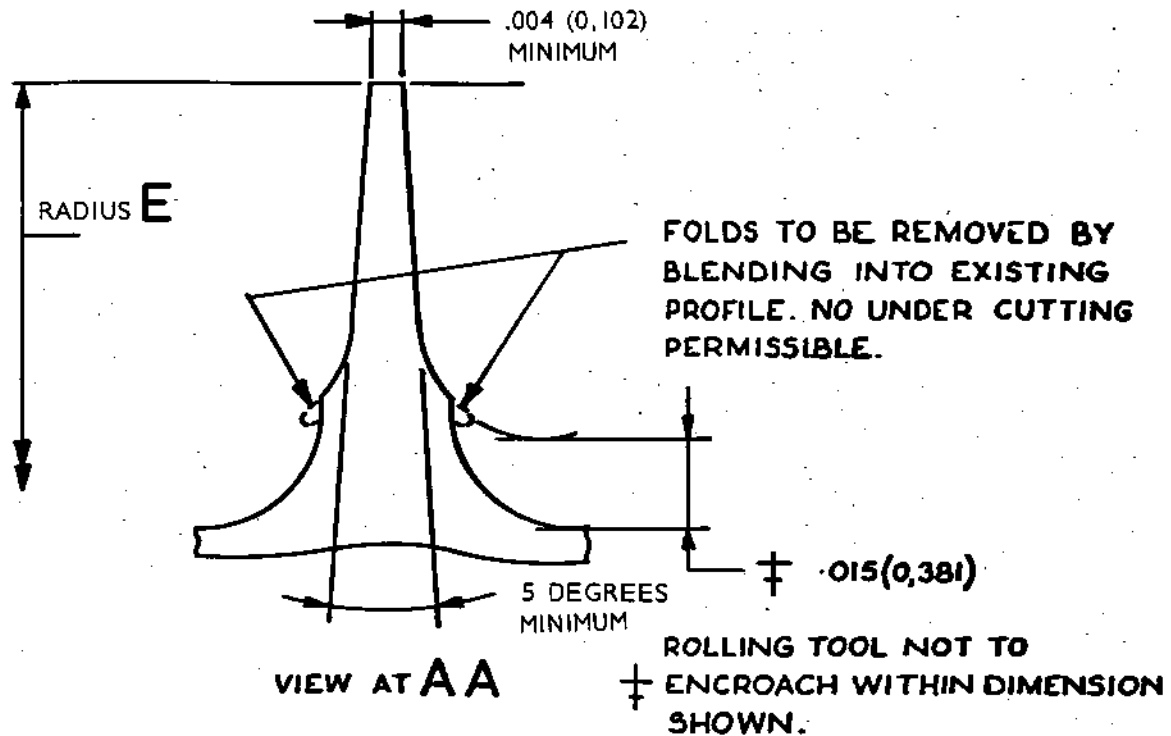
OLYMPUS 593

MK.610-14-28

OVERHAUL



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REPAIR SCHEME NO.	RADIUS "E"	DIMENSION (MAXIMUM)
SAL B.488596	STAGE 1-2	5.923 (150,444)
SAL B.488597	STAGE 2-3	7.098 (180,289)
SAL B.488598	STAGE 3-4	8.198 (208,229)

Roll Forming Dimensions
Figure 403

REPAIR
72-31-03
Repair No.4
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OLYMPUS 593

MK.610-14-28

OVERHAUL



- B. Roll forming radii (Ref.Fig.403) may be reduced by 0.015 in. (0,38 mm) maximum, if necessary.
- C. Standard dimensions (Ref.Fig.401) may be reduced , if necessary, as follows:

DIAMETER "C"	STANDARD MINIMUM DIA.	REDUCED MINIMUM DIA.
STAGE 1-2	11.8388 (300,706)	11.809 (299,949)
STAGE 2-3	14.1886 (360,390)	14.159 (359,639)
STAGE 3-4	16.3884 (416,256)	16.359 (415,519)

5. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Tool Holder	1	S3S12358000	1
Rolling Tool	1	S3S12363000	2
Roller	2	S3S12381000	3
Shims	4	S3S12375-78000	4
Fixture	1	S3S12416000	5

6. Replacement Parts

A. Not Required.

**OLYMPUS 593**MK.610-14-28
OVERHAUL

LP COMPRESSOR ROTOR - REPAIR
STAGE 4-5, 5-6 AND 6-7 SPACER
RING LABYRINTH FINS REPAIRED BY ROLL FORMING

MODIFICATION NO. OL.8396C AND 8420CEffectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	2	90A
		90B
		90C
		150A
		150B
	3	150C
		270B
		270C
		B.423303
		B.922804
		B.929447
		B.423304
		B.922806
		B.929449
		B.922808
		B.929451

1. Introduction

- A. This Repair describes the procedure for restoring defective labyrinth fins on the LP compressor stage 4-5, 5-6 and 6-7 spacer rings, in order to maintain the standard fin/housing clearances. The diameter of each fin is first increased by roll forming then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the roll forming technique applicable to this repair procedure.
- C. Dimensions are shown thus on illustrations:
INCHES (MILLIMETRES).

2. Repair Limitations

- A. This Repair may be applied once only.
- B. Fins which have previously been repaired by welding must not be restored by roll forming.
- C. Verify that there is adequate material at each defective location to permit machining to the dimensions before roll forming (Ref. para. 3.B).

3. Summary of Operations

- A. Locate the ring in fixture (Item 5) and set true in centre-lathe on datum face A (Ref. Fig. 401).

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- B. Clean up defective fins; remove only the minimum amount of material to achieve the specified dimensions (Ref. Fig.402). A localised "witness", not exceeding 0.003 in. (0,076 mm) in depth, is acceptable on each fin.
- C. Carefully remove any burrs.
- D. Apply the roll forming technique to increase the diameter of defective fins to the specified dimensions (Ref. Fig.403). Use 0.005 in. (12,70 mm) shim (maximum).
- E. Remove any folds by careful blending (Ref.Fig.403).
- F. Crack test the spacer ring by the process specified for this component in 72-31-03, Inspection/Check.
- G. Finish machine the fins (Ref.Fig.401); a maximum of 1.000 in. (25,4 mm) of the circumference which has not cleaned up is acceptable on each fin.
- H. Polish fins to remove sharp edges.
- J. Chemically etch the spacer ring using solution A and etching technique, (Ref.72-09-14 Repair), and repeat the test for cracks (para.F.).
- K. Vapour blast the spacer ring; use alumina, garnet or quartz grit mesh 320/400.
- L. Identify repair. Mark the repair scheme number SAL B.488599 close to the standard part number on the spacer ring.

4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Tool Holder	1	S3S12358000	1
Rolling Tool	1	S3S12363000	2
Roller	2	S3S12380000	3
Shims	4	S3S12375-78000	4
Fixture	1	S3S12798000	5

5. Replacement Parts

- A. Not required.

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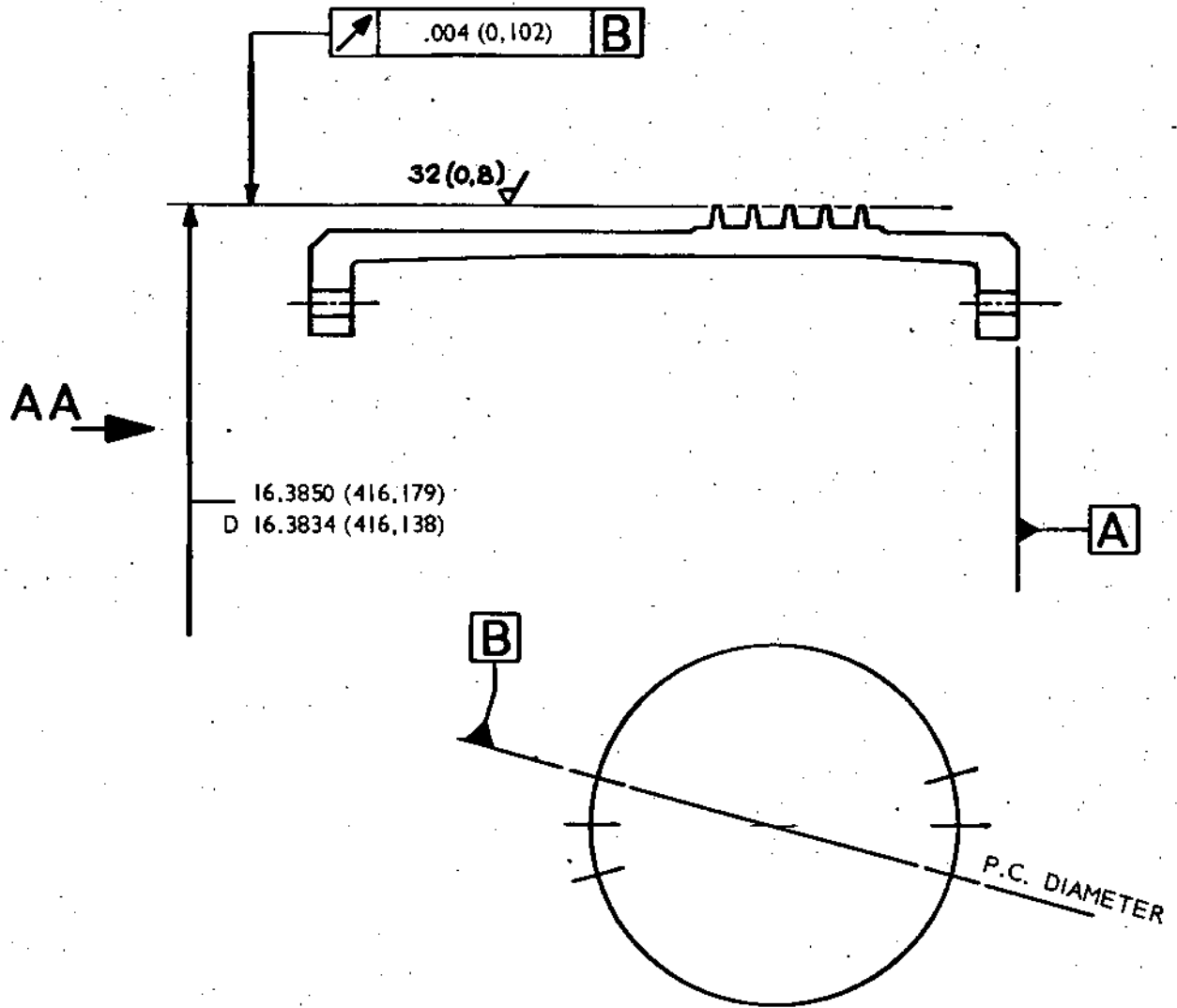
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DIAGRAMMATIC VIEW ON → AA

Standard Dimensions
Figure 401

REPAIR
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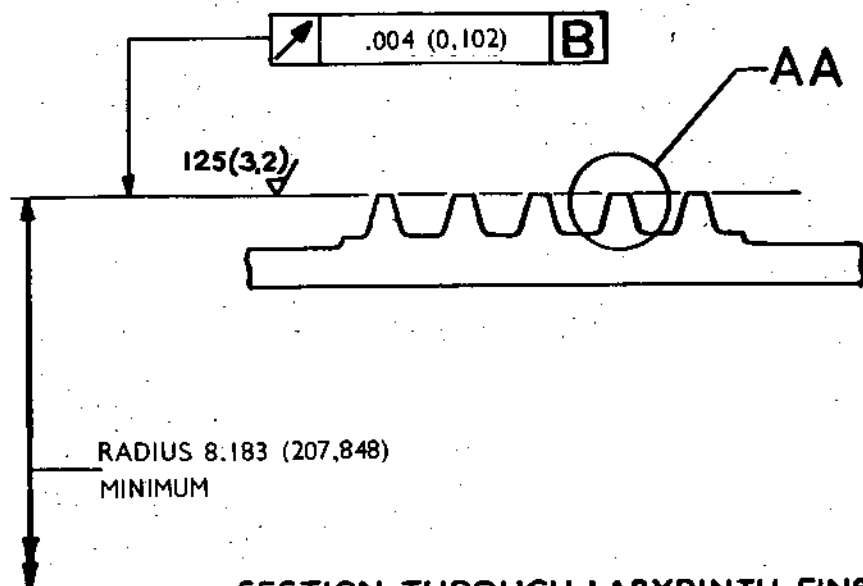
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TN46483



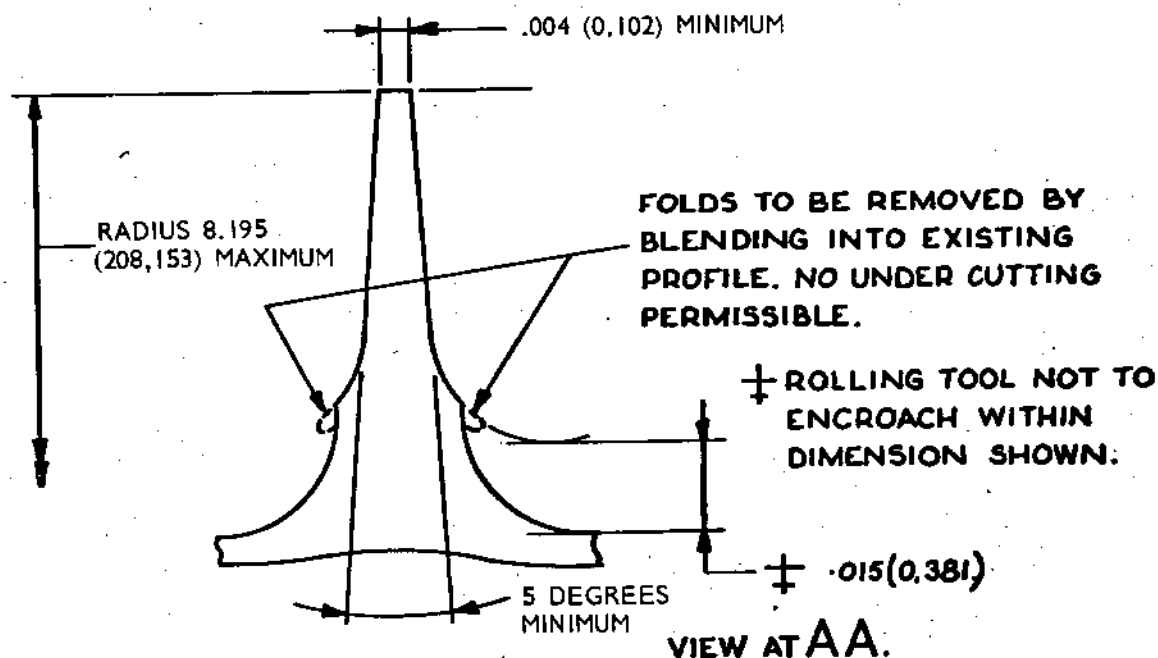
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SECTION THROUGH LABYRINTH FINS.

Dimensions Before Roll Forming
Figure 402



Roll Forming Dimensions
Figure 403

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**OLYMPUS 593**MK.610-14-28 *sneema*
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LP COMPRESSOR ROTOR - REPAIR
BLENDING AND POLISHING DAMAGED BLADES WITH
CONTROL ON NUMBER OF BLENDED BLADES PER STAGE
(SCHEME NO.B.930265 - 72 APPLICABLE TO ALL STAGES)

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Stage</u>	<u>Part No.</u>
72-31-03	01 150	1	B918641, B918642 B923448.
	01 240	2	B914537, B930416, B512699, B512700.
	01 330	3	B248883, B913478, B913479, B914412, B914413, B918856, B929155, B929156, B930417.
	02 40	4	B913489, B913490, B913688, B913689, B929157, B930418.
	02 100	5	B913694, B934124, B934127.
	02 160	6	B913444, B913483 B913695, B913696, B929161, B929162, B930420.
	03 320	7	B913407, B913698, B929163, B929164, B930421.

2. Authority: Modification No. OL.8462C3. Introduction

- A. The text and Fig.401 of this Repair defines the blending procedure (SAL B.930265) applicable to all LP compressor rotor blades and must be read in conjunction with the specific data for each stage of blades given on Fig.402 to 407.
- B. Refer to 72-09-00 Repair for all standard practices applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

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4. Instructions

A. General.

- (1) Test blades for cracks, before and after blending, by the fluorescent dye process specified for the blades in 72-31-03 Inspection/Check; reject cracked blades.
- (2) Blades with dents which deform the opposite surface of the blade are not acceptable for blending; reject blades with this form of damage
- (3) A blend in one zone can run out into the adjacent zone even if it infringes the blend limit for that zone, except at zone X.

B. Procedure.

- (1) Crack test blades to determine full extent of damage. Refer to the fluorescent dye process specified for the blades in 72-31-03 Inspection/Check.

- (2) Dress to remove damage.

CAUTION: IF MECHANICAL BLENDING METHODS ARE USED,
ENSURE THAT BLADES ARE NOT OVERHEATED.

- (a) Polish acceptable surface dents (Ref. para.4.(2)) to remove burrs.
- (b) Blend torn, rough or scored edges to a depth 20 per cent greater than the depth of damage, provided that specified limits are not exceeded.
- (c) If adjacent blends interfere, remove material from between them to produce a coupled blend.
- (d) Profile edge blends smoothly into the aerofoil shape (Ref.Fig.401).
- (e) Polish blends and defective areas.
- (f) Remove only the minimum amount of material consistent with specified requirements and dimensions.

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British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

TEMPORARY REVISION No. 72-513

Insert in 72-31-03 Repair 6 before page 403

REASON FOR ISSUE:

To discontinue on British Airways engines only, the post dressing procedure on L.P. compressor blades as quoted in the Rolls-Royce repair procedure No.6. (MRA 69).

ACTION

Delete paragraphs B(5) Etch the blades and B(7) Vapour blasting.

NOTE: Only applicable to British Airways engines.



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- (g) In zone X, blending is permitted only as defined in (i) and (ii).
 - (i) Blend light nicking of the edges.
 - (ii) Polish out light surface scratches; 0.002 in. (0,050 mm) maximum permissible depth.
- (h) For opposing blends the chordal width must not be reduced by more than A, B or C, as applicable.
- (j) When blending within dimension D of blade tip, blend out towards the tip.
- (k) Blending and polishing marks must be only in a radial direction, from root to tip.
- (l) Blend and polish to a surface finish of 32 MICROINCHES (0,8 MICROMETRES).
- (3) Clean blades by the process specified for the blades in 72-31-03 Cleaning.
- (4) Vapour degrease the blades (Ref.72-09-00 - Cleaning).
- CAUTION: OBSERVE THE RESTRICTION ON THE PERIOD OF IMMERSION FOR TITANIUM COMPONENTS (REF. 72-09-00 CLEANING).
- (5) Etch the blades (Ref.72-09-14 Repair).
 - (a) Use Solution A either by Immersion or by Swab etch.
 - (b) For Immersion etching proceed as follows:
 - (i) Mask the blade roots and other areas not to be etched, with approved Acid Resistant Lacquer (I.C.I.F230-2006).
 - (ii) Etch the blades for the minimum time to achieve the desired surface for inspection, up to a maximum time of 20 seconds after the onset of gassing.
 - (iii) Remove the Lacquer by vapour degreasing (Ref.72-09-00 Cleaning).

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- (c) For Swab etching, apply the etch to the repaired area only. Do not allow the etch solution to come into contact with blade roots. Swab etch for a minimum time of 30 seconds.
- (6) Repeat the test for cracks.
- (7) Vapour blast blended blades (Ref.72-09-13 Repair).
 - (a) Apply masking tape to the blade roots and other areas which are not to be blasted.
 - (b) Vapour blast blades to the Parameters for Procedure A and Special Details for Blades and Vanes specified in the vapour blasting procedure.
 - (c) Remove masking tape from the blades.
- 5. Assessment of Amount of Blending per Blade (All Stages)
 - A. Blades may be blended in several positions provided that the total extent of blending is not more than the equivalent of two blends to the maximum in zone Z.
 - B. Depth of blending is controlled by zones.
 - C. The maximum permissible number of blended blades per stage, when blended to maximum limits, is identified as L on the illustrations.
 - D. Where blades are not blended to the permissible maximum, this number (Ref.para.C.) may be increased, provided that the aggregate of the blending does not exceed L.

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- E. Permissible blending is controlled by depths e.g. stage 1 blade.
- (1) 0.600 in. (15,24 mm) depth x two blends = 1.200 in. (30,48 mm) total = maximum blended blade.
- (2) This maximum may be obtained as defined in (a), (b) or (c), or by any combination of depths the total of which does not exceed 1.200 in. (30,48 mm).
- (a) 0.300 in. (7,62 mm) depth x four blends.
- (b) 0.150 in. (3,81 mm) depth x eight blends.
- (c) 0.100 in. (2,54 mm) depth x twelve blends.
- F. One coupled blend = two blends.
- G. Dimension D blend = one blend.
- H. Dimension E blend = half blend (depth assessed as RADIUS divided by 2).

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6. Assessment of Blending Equivalent to L Number of Blended Blades Per Stage

A. Example for stage 1 blade.

- (1) L = three blades x 1.200 in. (30,48 mm) depth = 3.600 in. (91,44 mm) aggregate depth.
- (2) This aggregate may be obtained as defined in (a); (b) or (c), or by any aggregate of blended blades which does not exceed 3.600 in. (91,44 mm).
 - (a) 0.900 in. (22,86 mm) depth x four blades.
 - (b) 0.600 in. (15,24 mm) depth x six blades.
 - (c) 0.300 in. (7,62 mm) depth x twelve blades.

7. Identify Repair (Ref. Table 401)

- A. Mark the repair scheme number, appropriate to the stage of blades, close to the standard part number on the blades (Ref.72-09-00 Repair).

NOTE: Do not mark the number of this scheme
SAL B.930265 on the blades.

LP ROTOR STAGE	REPAIR SCHEME NUMBER
1	SAL B.930266
2	SAL B.930267
3	SAL B.930268
4	SAL B.930269
5	SAL B.930270
6	SAL B.930271
7	SAL B.930272

Table 401

8. Special Tools, Fixtures and Equipment

- A. Not required.

9. Replacement Parts

- A. Not required.

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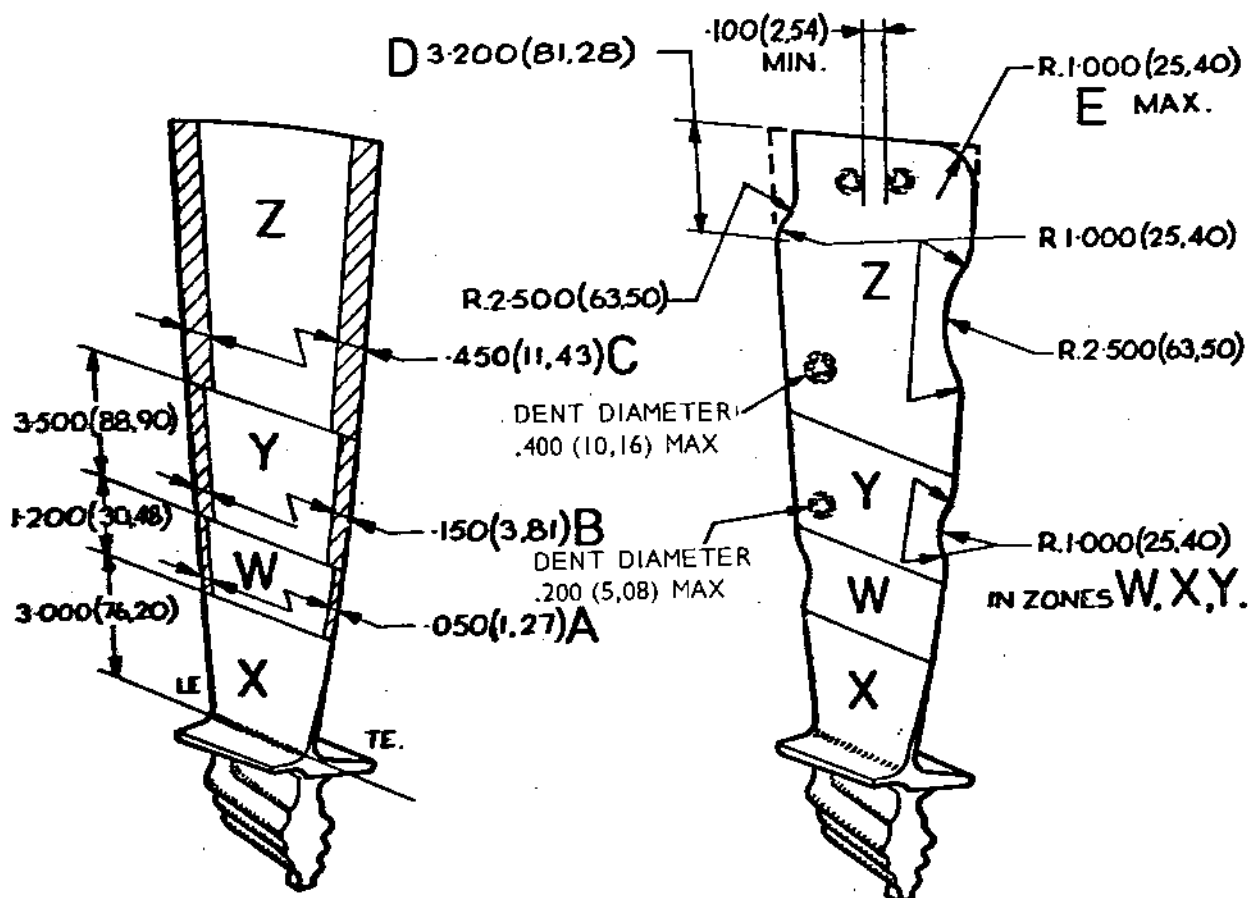
A diagram showing the profile of an aerofoil. Two curved lines represent the upper and lower surfaces. Arrows on the left and right indicate the direction of flow, which is from left to right.

MARK SAL B.930266 CLOSE TO STANDARD PART NUMBER.

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THIS SCHEME MUST BE READ IN CONJUNCTION WITH SAL B.930265
(REF. PARA.3, A).

IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX., PERMITTED.

DIMENSIONS D AND E CAN BE APPLIED TO EITHER LEADING OR TRAILING
EDGES.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 4.

MARK SAL B.930267 CLOSE TO STANDARD PART NUMBER.

Stage 2 LP Compressor Blades - Blending Data
Figure 403

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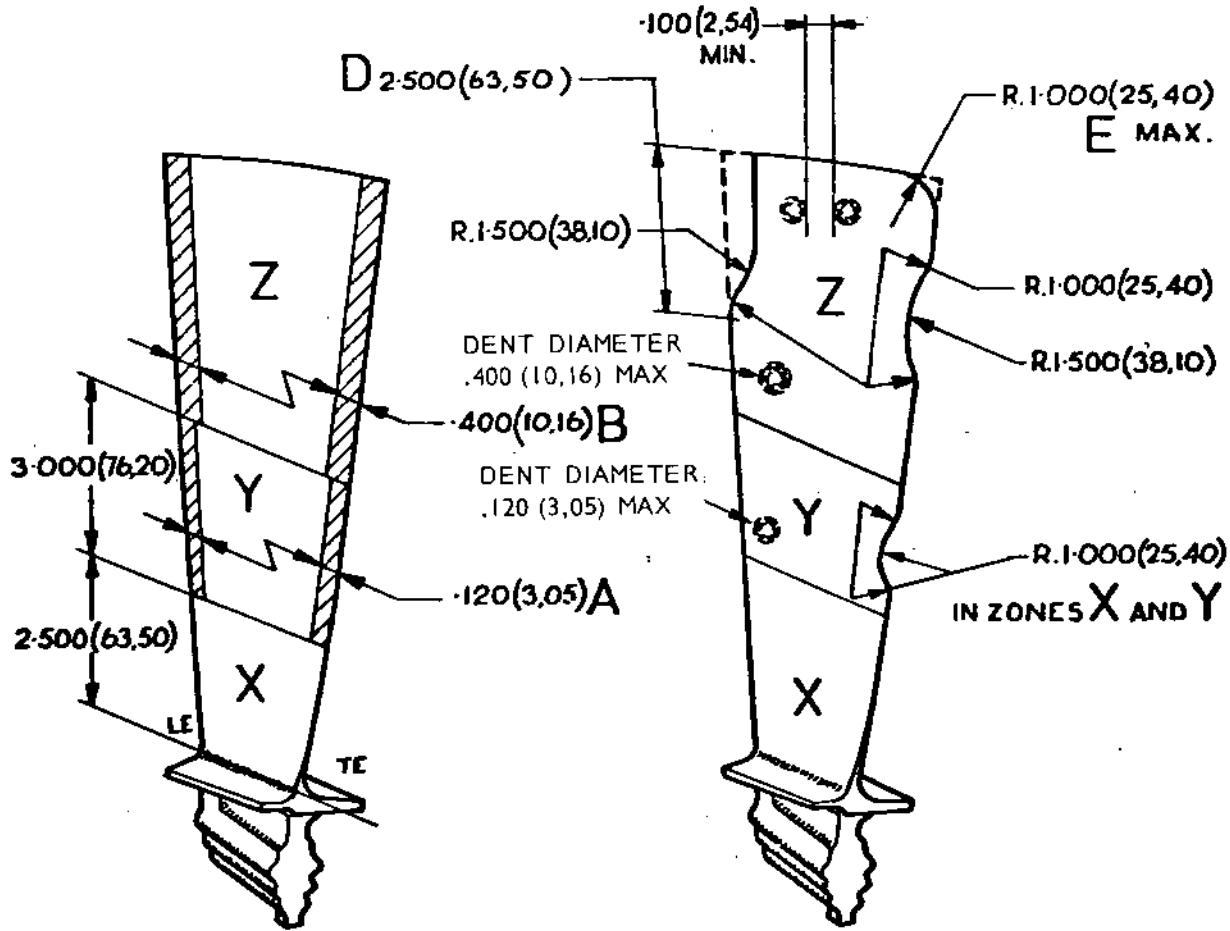
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MK.610-14-28
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THIS SCHEME MUST BE READ IN CONJUNCTION WITH SAL B.930265
(REF. PARA.3, A).

IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX., PERMITTED.

DIMENSIONS D AND E CAN BE APPLIED TO EITHER LEADING OR TRAILING
EDGES.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 4.

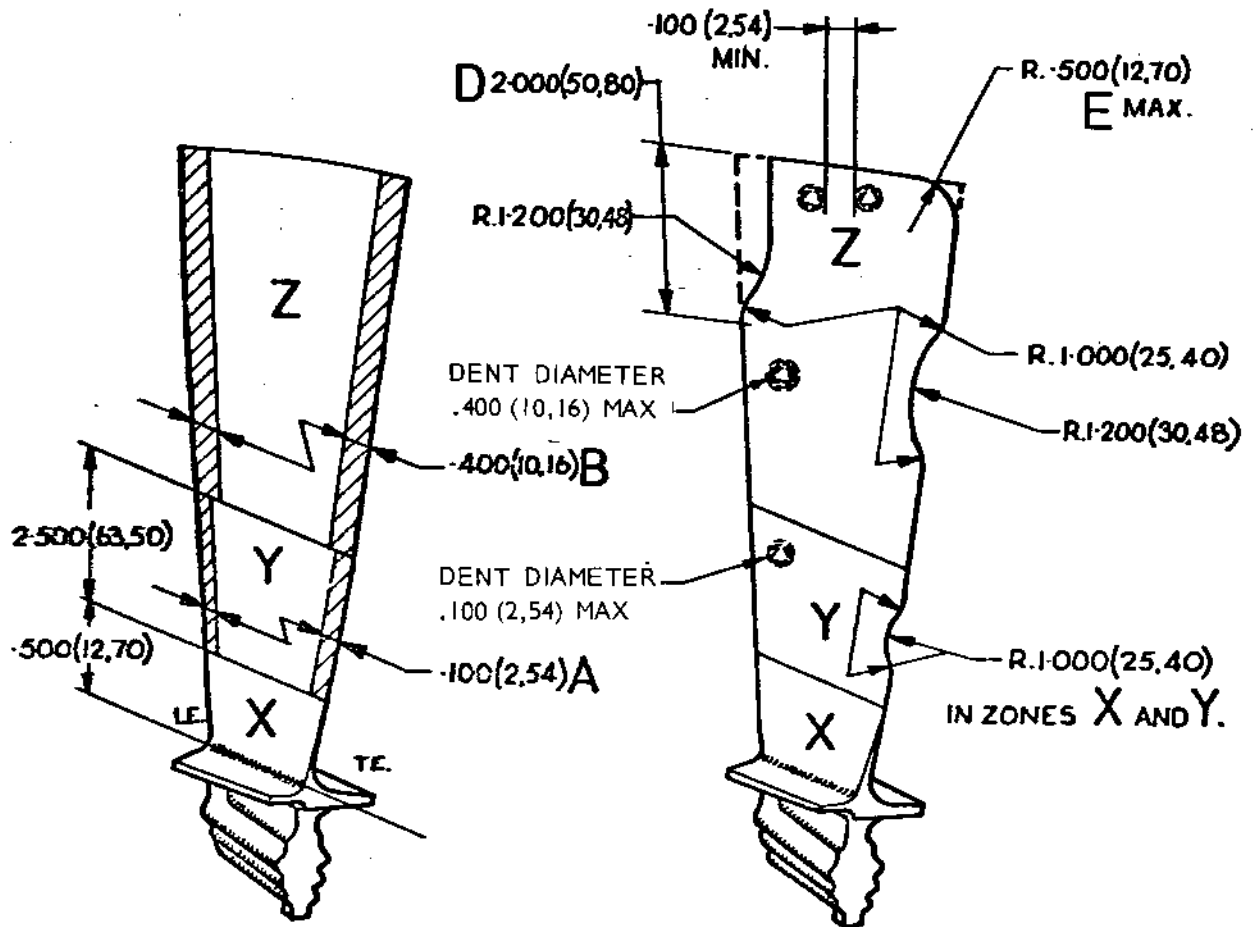
MARK SAL B.930268 CLOSE TO STANDARD PART NUMBER.

Stage 3 LP Compressor Blades - Blending Data
Figure 404

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THIS SCHEME MUST BE READ IN CONJUNCTION WITH SAL B.930265
(REF. PARA.3, A).

IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX., PERMITTED.

DIMENSIONS D AND E CAN BE APPLIED TO EITHER LEADING OR TRAILING EDGES.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 4.

MARK SAL B.930269 CLOSE TO STANDARD PART NUMBER.

Stage 4 LP Compressor Blades - Blending Data
Figure 405

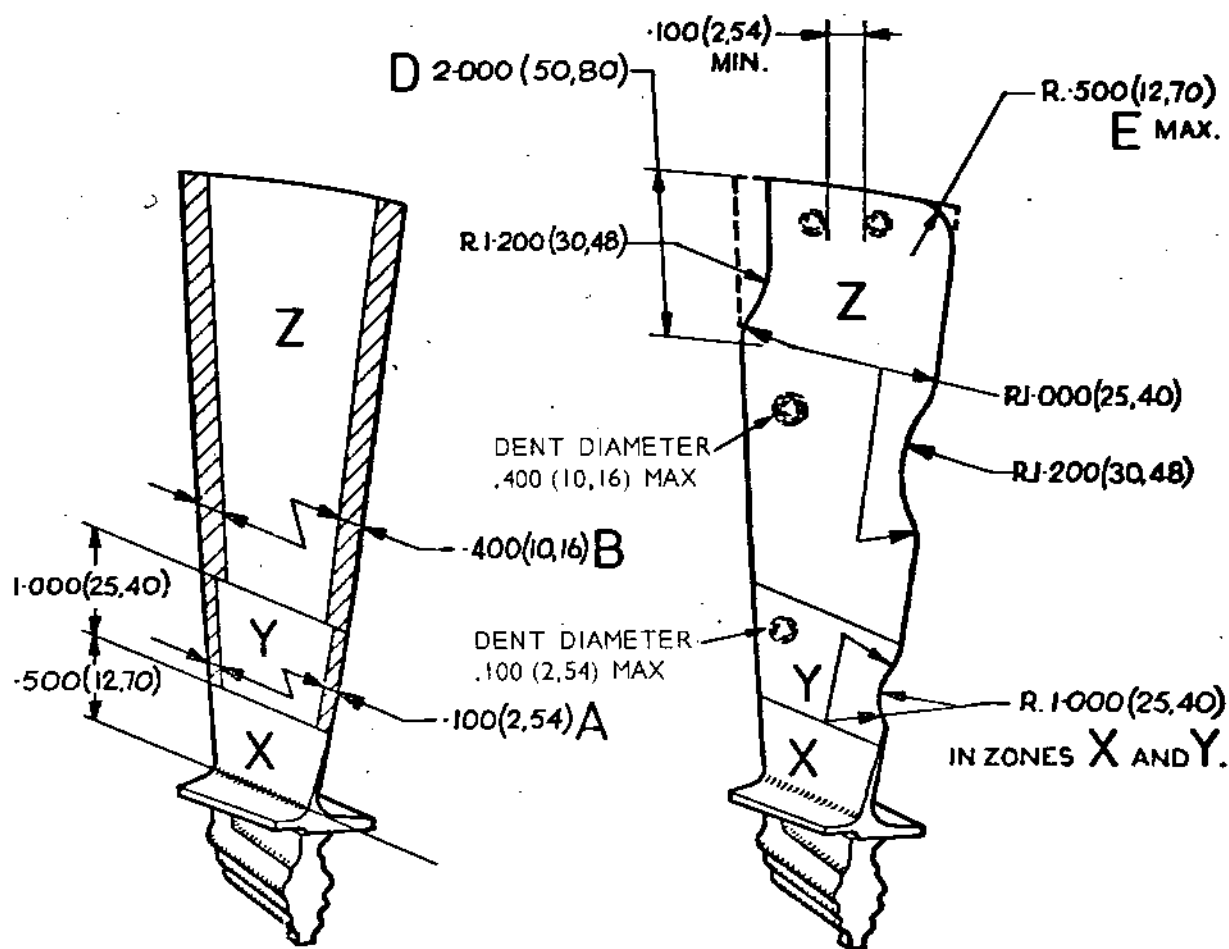
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MK. 610-14-28
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THIS SCHEME MUST BE READ IN CONJUNCTION WITH SAL B.930265
(REF. PARA.3, A).

IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX., PERMITTED.

DIMENSIONS D AND E CAN BE APPLIED TO EITHER LEADING OR TRAILING
EDGES.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 4.

MARK SAL B.930270 CLOSE TO STANDARD PART NUMBER.

Stage 5 LP Compressor Blades - Blending Data
Figure 406

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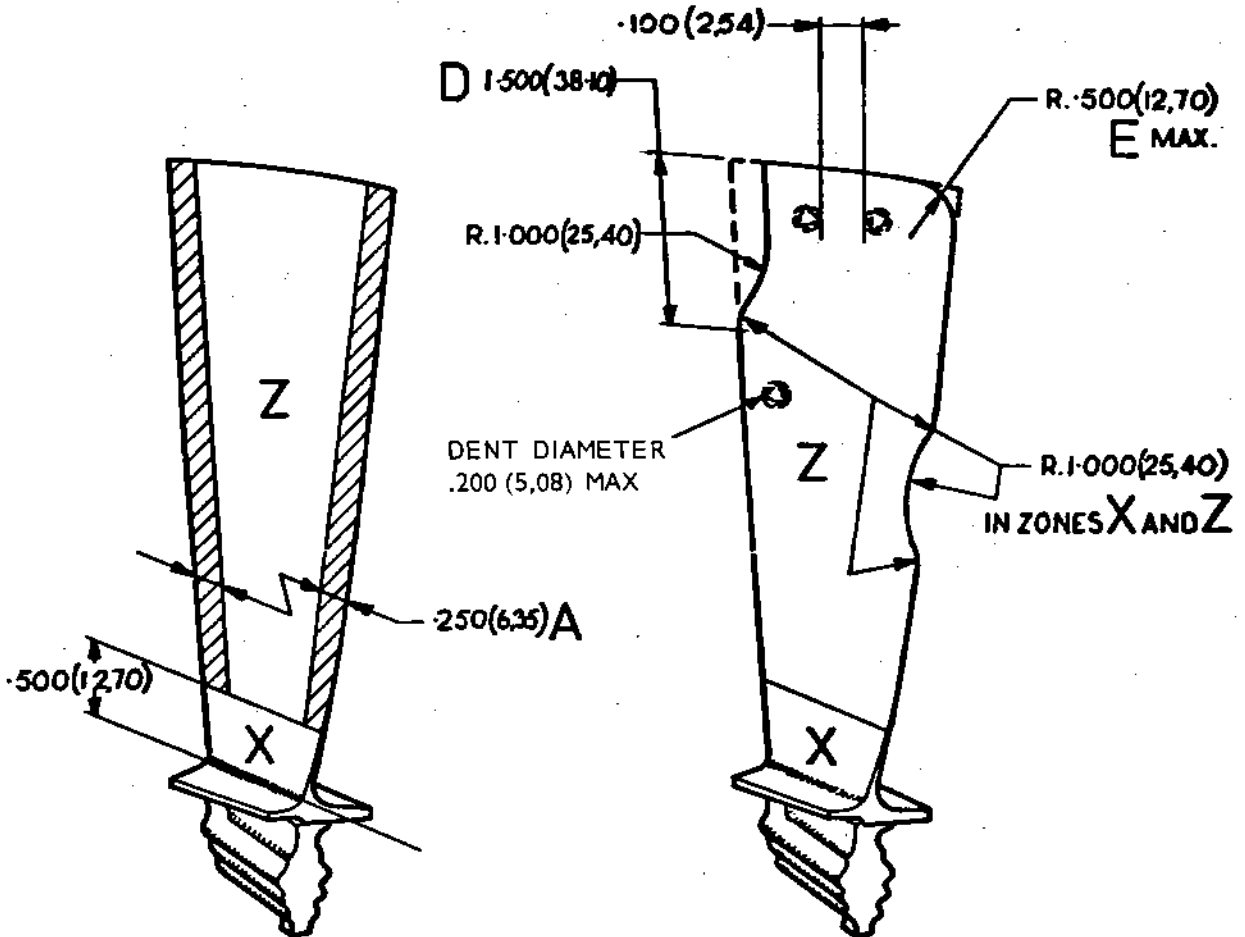


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THIS SCHEME MUST BE READ IN CONJUNCTION WITH SAL B.930265
(REF. PARA.3, A).

IN ZONE X, EDGE BLENDS 0.010 (0,25) DEEP MAX., PERMITTED.

DIMENSIONS D AND E CAN BE APPLIED TO EITHER LEADING OR TRAILING
EDGES.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 4.

MARK APPROPRIATE SCHEME NUMBER CLOSE TO STANDARD PART NUMBER:

STAGE 6	SAL B.930271
STAGE 7	SAL B.930272

Stage 6 and 7 LP Compressor Blades - Blending Data
Figure 407

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**OLYMPUS 593**MK.610-14-28 *sneema*
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LP COMPRESSOR ROTOR DISKS STAGES 1 to 7 - REPAIR BY BLENDING
TO REMOVE LIGHT IMPACT AND OTHER DAMAGE

MODIFICATION NO. OL.8717C AND OL.8767C1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	1 160A	B.902963 St.1
		B.916430 St.1
	160B	B.922796 St.1
	160C	B.929440 St.1
	160E	B.930651 St.1
		B.930006 St.1
		B.930652 St.1
	250A	B.902964 St.2
		B.916431 St.2
	250B	B.922799 St.2
	250C	B.929442 St.2
	250E	B.930654 St.2
		B.932723 St.2
		B.932724 St.2
	250F	B.514389 St.2
		B.514390 St.2
	360A	B.902965 St.3
		B.916432 St.3
	360B	B.922801 St.3
	360C	B.929444 St.3
	360E	B.930655 St.3
		B.932725 St.3
		B.932726 St.3
	360F	B.514391 St.3
		B.514392 St.3
	2 60A	B.902966 St.4
		B.916433 St.4
	60B	B.922803 St.4
	60C	B.929446 St.4
	60E	B.930656 St.4
		B.932727 St.4
		B.932728 St.4
	60F	B.514393 St.4
		B.514394 St.4
	120A	B.902967 St.5
		B.916434 St.5
	120B	B.922805 St.5
	120C	B.929448 St.5
	120E	B.930657 St.5
		B.932729 St.5
		B.932730 St.5

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<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
	2 120F	B.514395 St.5
		B.514396 St.5
	180A	B.902968 St.6
		B.916435 St.6
	180B	B.922807 St.6
	180C	B.929450 St.6
	180E	B.930658 St.6
		B.932731 St.6
		B.932732 St.6
	180F	B.514397 St.6
		B.514398 St.6
	3 340A	B.904570 St.7
	340B	B.925080 St.7
	340C	B.929452 St.7
	340E	B.930659 St.7
		B.932733 St.7
		B.932734 St.7
		B.916436 St.7
	340F	B.514399 St.7
		B.514400 St.7

2. Introduction

A. General.

CAUTION: THIS PROCEDURE CONTAINS OPERATIONS THAT ARE SUBJECT TO COMPONENT MANUFACTURING TECHNIQUE (CMT) CONTROL. THESE OPERATIONS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE MANUFACTURER.

- (1) This repair describes the procedure for removing light impact and other damage from the broached root forms of disks (Ref.Fig.401), by blending using conventional hand tools (Ref. 72-09-22 Repair).
- (2) Dimensions are shown thus in tables and illustrations: INCHES (MILLIMETERS).
- (3) Refer to Chapter 72-09-00 Repair, for all standard practices applicable to this repair procedure.
- (4) Remove all sharp edges 0.004 to 0.020 in. (0,102 to 0,508 mm) unless otherwise stated.
- (5) Tolerances on dimensions are plus/minus 0.010 in. (0,25 mm), unless otherwise stated.

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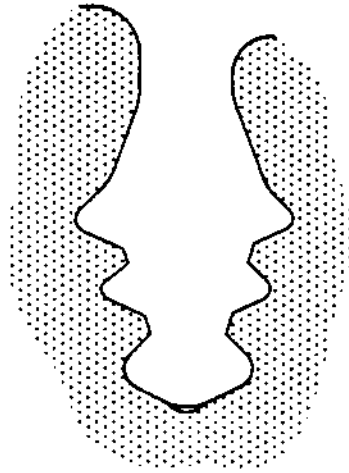


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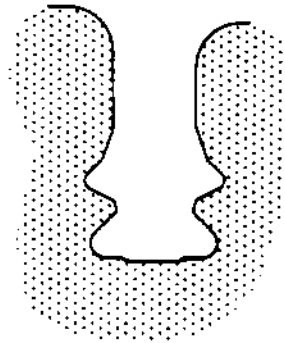


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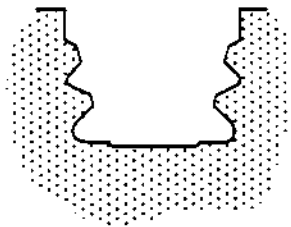
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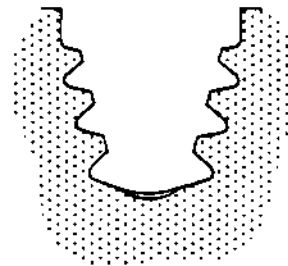
STAGES 1 AND 2



STAGE 3



STAGES 4 AND 5



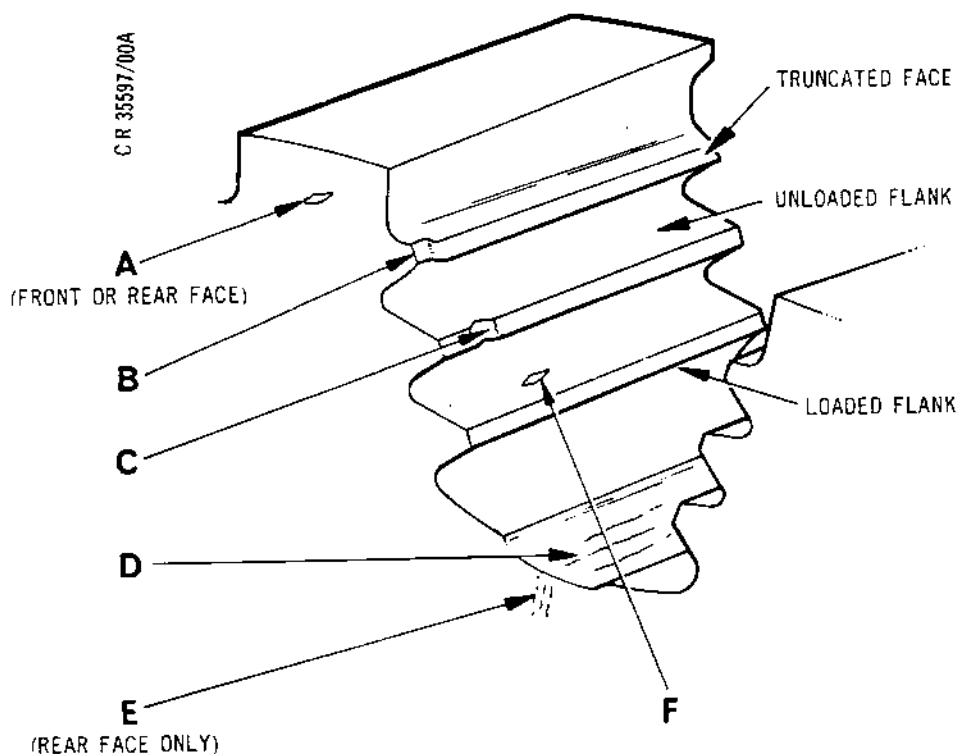
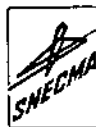
STAGES 6 AND 7

Root Broaching Forms
Figure 401

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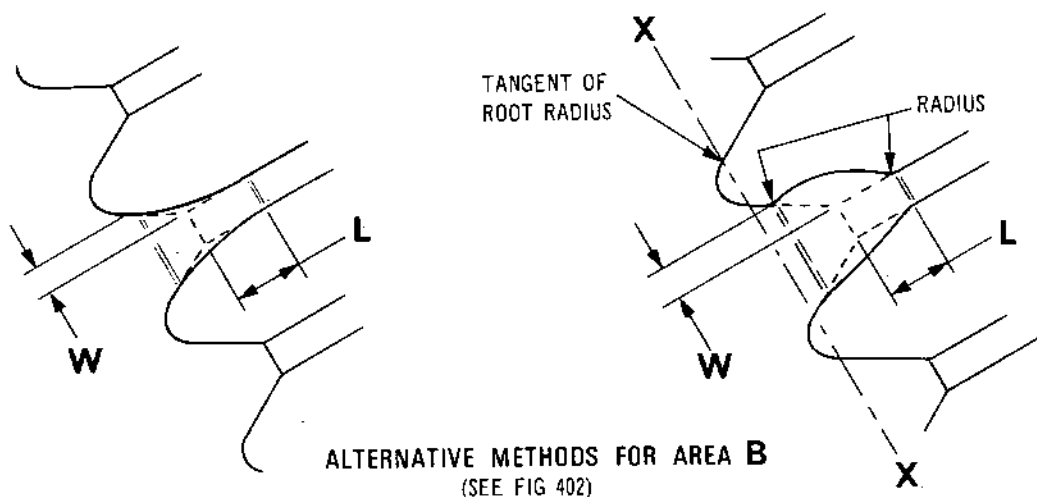
- A SMALL AREAS, LIGHT IMPACT DAMAGE
- B CORNER, LIGHT IMPACT DAMAGE
- C LIGHT IMPACT DAMAGE
- D LIGHT SCRATCHES IN ROOT OR RELIEF, CAUSED BY LOCKING TAG
- E LIGHT FRET MARKS FROM BLADE TANG
- F LIGHT DAMAGE ON UNLOADED FLANK

Typical Damage Forms and Areas
Figure 402

CR 35584/00A

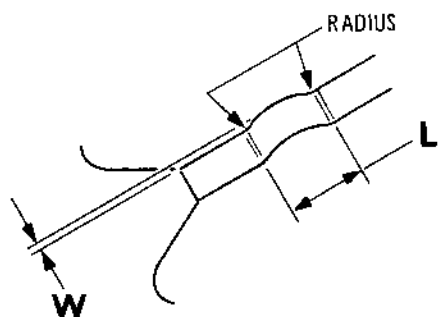


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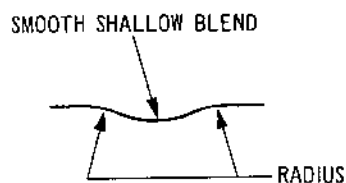


CONVEX RADIUS BLEND

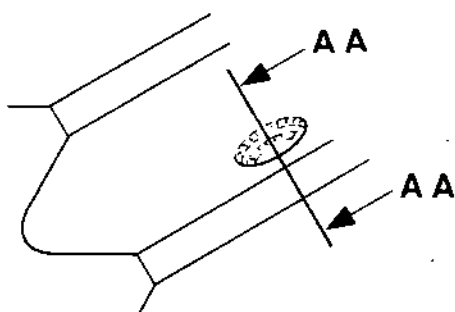
CONCAVE RADIUS BLEND



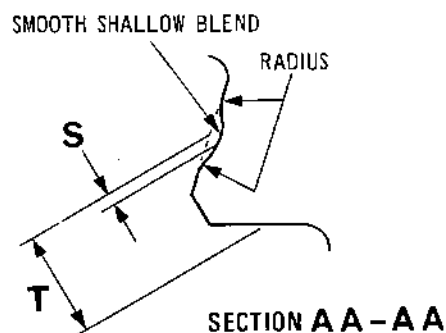
FOR AREA C
(SEE FIG 402)



TYPICAL FOR AREAS A AND E
(SEE FIG 402)



FOR AREA F
(SEE FIG 402)



SECTION AA-AA

Blending Details
Figure 403



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- (6) Each stage of disk has its own CMT Certificate Number as follows:

<u>Disk</u>	<u>CMT Certificate No.</u>
St.1	CMT 105/B.497538
St.2	CMT 106/B.497538
St.3	CMT 107/B.497538
St.4	CMT 108/B.497538
St.5	CMT 109/B.497538
St.6	CMT 110/B.497538
St.7	CMT 111/B.497538

- (7) Operations detailed in this repair procedure that are subject to Component Manufacturing Technique Control are identified by the initials 'CMT'.

B. Repair Limitations.

- (1) Damage to loaded flanks (Ref.Fig.402) is not acceptable.
- (2) Blend depth maximums are as follows:

<u>Area (Ref.Fig.402)</u>	<u>Maximum Blend Depth</u> (<u>Ref.Fig.403</u>)
A	0.005 in. (0,127 mm).
B and C For C, W max = 0.010 in. (0,25 mm)	'W x L' must not exceed 10% of the surface area of loaded flank face.
D and E (Critical Areas)	0.002 in. (0,05 mm).
F	Depth S not to exceed 10% of T.

- (3) No blend to extend below XX (Ref.Fig.403).

3. Instructions

A. Blend and Polish.

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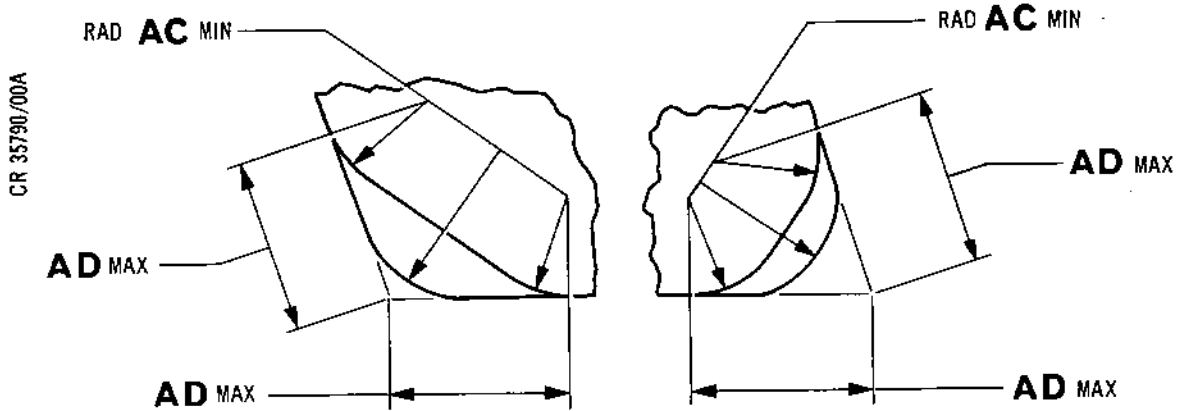
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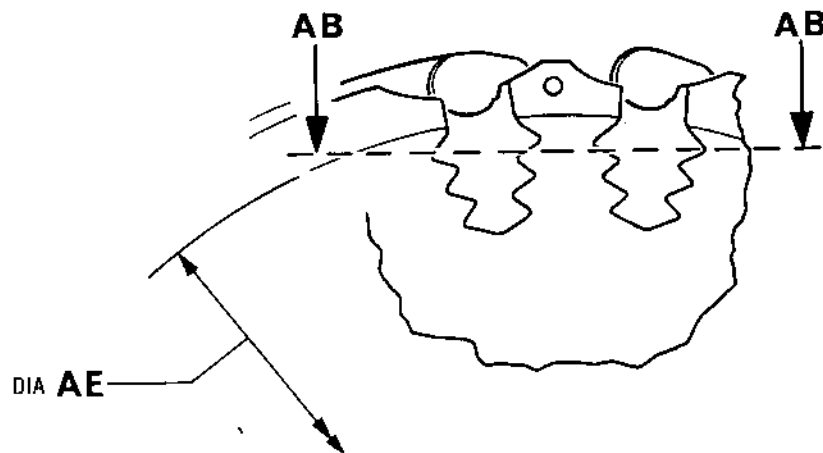


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ENLARGED SECTION AB-AB



TYPICAL VIEW ON BLADE SLOTS

STAGE	RAD AC	DIM AD	DIA AE
1	0.050 (1,27)	0.100 (2,54)	12.500 (317,50)
2	0.050 (1,27)	0.100 (2,54)	15.350 (389,89)
3	0.030 (0,76)	0.060 (1,52)	16.900 (429,26)
4 TO 7	0.030 (0,76)	0.060 (1,52)	19.100 (485,14)

MAX/MIN SLOT EDGE REMOVAL TO BE
NORMAL TO FIR TREE CONTOUR

BLENDING OF SLOT EDGES MUST NOT
EXTEND BEYOND DIAMETER AE

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Radiusing Fir Tree Serration/Disk Face Edge
Figure 404

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- (1) Hand blend the damaged areas, within limitations, to remove damage, using conventional hand tools and produce radii as required at intersection of blend and flank (Ref.Fig.402 and 403). When blending area B the edge between the disk face and the serration must be radiused. The aim is to produce a radiused form, but a chamfer blended at the corners is acceptable, provided it falls within the dimensions shown in Fig.404 (Ref.72-09-22 Repair).
- (2) Polish areas blended to achieve a surface finish of 63 micro inches (1,6 micrometers). Area D (Ref.Fig.402) must only be hand polished using fine grade emery cloth.

B. Inspect.

- (1) Etch the blended areas in accordance with Chapter 72-09-14, Repair, using solution A. CMT
- (2) Test the blended areas for cracks using the fluorescent dye penetrant process specified for this component in Chapter 72-31-03, Inspection/Check. CMT

C. Vapour Blast.

- (1) Vapour blast the etched areas in accordance with Chapter 72-09-13, Repair, using procedure B. CMT

D. Identify.

- (1) Using the vibro-percussion engraving technique, Ref. Chapter 72-09-00, Repair, mark on SAL B.497538 or R7 adjacent the existing part number. Markings must be clear of the blade slots by 0.030 in. (0,75 mm) minimum.

E. Finally Inspect.

- (1) Finally inspect the disk to ensure the repair has been carried out satisfactorily and that the disk is in a serviceable condition.

4. Special Tools, Fixtures and Equipment

None required.

5. Replacement Parts

None required.

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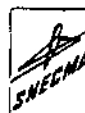
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LP COMPRESSOR ROTOR - STAGE 1/2, 2/3, 3/4, 4/5, 5/6 AND 6/7
SPACER RINGS - RESTORATION OF LABYRINTH FINS
BY PLASMA WELD BUILD-UP

MODIFICATION NO. OL.8695C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>	<u>Stage</u>
72-31-03	1 190D	B.930176	1/2
	1 280D	B.930178	2/3
	2 30D	B.930180	3/4
	2 90D	B.930182	4/5
	2 150D	B.930184	5/6
	3 270D	B.930186	6/7

2. Introduction

A. General.

CAUTION: THIS PROCEDURE CONTAINS OPERATIONS THAT ARE SUBJECT TO COMPONENT MANUFACTURING TECHNIQUE (CMT) CONTROL. THESE OPERATIONS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE MANUFACTURER.

- (1) This repair describes the procedure to be followed in order to restore to a serviceable condition LP compressor rotor spacer rings (stages 1/2, 2/3, 3/4, 4/5, 5/6 and 6/7) that have been rendered unserviceable through wear of the outer diameter of the labyrinth fins.

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- (2) The defective spacer ring is restored to an acceptable condition by machining the labyrinth fins to a uniform diameter, increasing this diameter by the deposition of metal using the plasma welding technique, and finally machining the fins to the required dimensions.
- (3) Refer to Chapter 72-09-00 Repair, for all Standard Practices applicable to this repair procedure.
- (4) Dimensions in tables and on illustrations are shown thus: INCHES (MILLIMETRES).
- (5) Remove all sharp edges 0.004 to 0.020 in. (0,102 to 0,508 mm), unless otherwise stated.
- (6) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (7) Tolerances on angles are plus/minus 2 degrees unless otherwise stated.
- (8) Operations detailed in this repair procedure that are subject to Component Manufacturing Technique Control are identified by the initials 'CMT'.
- (9) This repair procedure covers stages 1/2 to 6/7 spacer rings in the LP compressor rotor; each stage has its own salvage number, repair scheme number suffix and CMT control certificate number as follows:

Spacer Ring Stage	Salvage Number	Repair Scheme Number	CMT Certificate Number
1/2	B.497449	R.7A	CMT 112/B.497449
2/3	B.497450	R.7B	CMT 113/B.497450
3/4	B.497451	R.7C	CMT 114/B.497451
4/5	B.497452	R.7D	CMT 115/B.497452
5/6	B.497453	R.7E	CMT 116/B.497453
6/7	B.497454	R.7F	CMT 117/B.497454

- (10) The steps of procedure detailed in paragraph 4 are applicable to all stages of spacer rings covered by this repair unless a statement is made to the contrary.



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- (11) All tools referred to by item number in procedural steps are detailed in paragraph 5.
- (12) A test piece must be produced, subjected to the various processes detailed in this repair procedure and metallurgically examined, prior to commencement of each of the salvage schemes. A new test piece is required initially and upon any change of airline operator, sub-contractor, machine or welding equipment (Ref.para.3).

3. Production and Use of Test Piece

A. Produce Test Piece.

- (1) Withdraw from stores non-standard spacer ring, part number B.356374. This component is in a fully heat-treated condition.
- (2) Etch the spacer ring (Ref.72-09-14 Repair); use solution 'A' detailed in the referenced procedure. Component to be immersed in the solution for a period of 30 seconds from the onset of gassing.
- (3) Test the spacer ring for cracks; use the fluorescent dye penetrant process specified for this component in 72-31-03 Inspection/Check.
- (4) Line through all existing markings on the spacer ring and mark on 'B.497465 TEST PIECE'; use the electro-chemical marking technique (Ref.72-09-00 Repair). This component may be used as a test piece for all the salvage schemes covered by this repair procedure.

B. Machine Test Piece.

- (1) Install the test piece in machining fixture (Ref. para.4 Item 3 and Fig.405). Secure in position using four clamps.
- (2) Install machining fixture/test piece on a centre lathe; set true on fixture clocking diameter (Ref.Fig.405).

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- (3) Machine the outer diameter of the labyrinth fins to produce 16.265/16.260 in. (413,13/413,00 mm) dimension (Ref.Fig.401).
- (4) Remove machining fixture/test piece from the lathe and remove the test piece from the fixture.
- (5) Remove all burrs from the machined area of the test piece; use conventional hand tools.

C. Build Up Labyrinth Fins on Test Piece.

- (1) Build up the labyrinth fins to produce a minimum diameter of 16.470/16.460 in. (418,338/418,084 mm) (Ref.Fig.401); use the plasma welding technique detailed in Chapter 72-09-12 Repair, and observe the following instructions.
 - (a) Allow component to cool for 10 to 15 minutes between each weld deposit.
 - (b) Clean each weld deposit; use a rotary stainless steel brush.
 - (c) Remove surface cavities and weld bead irregularities on completion of each weld deposit; use a non-abrasive cutter.
- (2) Welding data.

Material:	Titanium MSRR 8634
Preparation:	Machined surface
Weld geometry:	Circumferential
Filler wire:	MSRR 9500/70
	26 swg (0.018 in. (0,460 mm) diameter)

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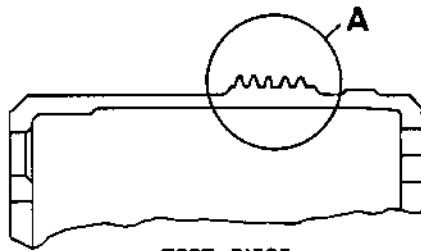


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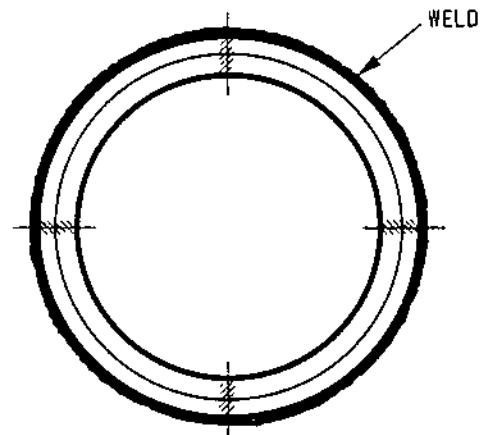
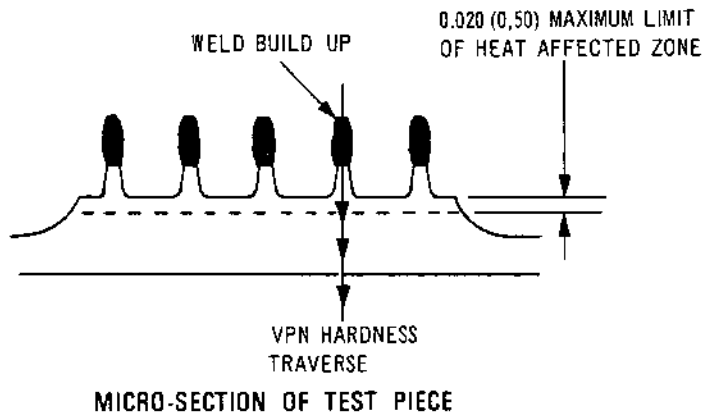
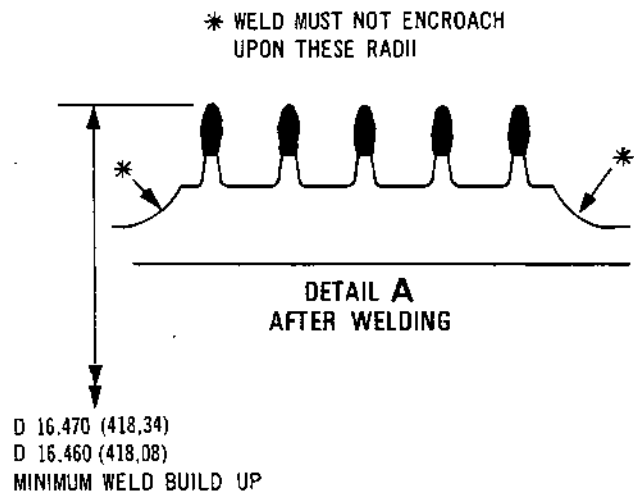
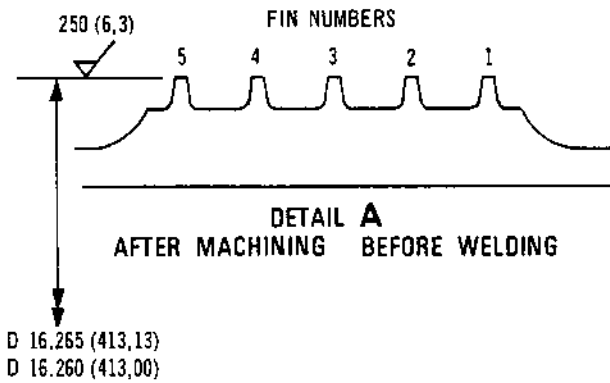
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TEST PIECE
(MAKE FROM B 356374)

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓



DIAGRAMMATIC VIEW SHOWING
POSITIONS OF MICRO-SECTIONS.

Production of Test Piece, B.497465
Figure 401

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Feed rate (wire):	40 in. (1016 mm) per minute
Machine:	Union Carbide 100 amp with fine wire feed
Upslope current:	Nil
Welding current:	1st run - 35 amps no wire
(Applicable to all fins)	2nd/3rd runs - 35 amps with wire
	4th/5th runs - 26 amps with wire
	6th run - 24 amps with wire
	7th/subsequent runs - 22 amps with wire
Downslope current:	Machine maximum
Plasma gas (torch):	Argon 0.35 cu ft/h at 30 psi (0,165 l/min at 207 kPa)
Shield gas (torch):	Argon 15 cu ft/h at 30 psi (7 l/min at 207 kPa)
Backing gas:	Nil
Trailing gas:	Argon 30 cu ft/h at 30 psi (14 l/min at 207 kPa)
Weld speed:	5 in./min (127 mm/min) on Roturn variable control turntable
Nozzle:	orifice dia. 0.052 in. (1,321 mm)
Electrode:	3/32 in. (2,3812 mm) dia. thoriated tungsten
Arc length:	0.200 in. (5,08 mm)
Polarity:	Electrode negative

C. Examine Test Piece.

- (1) Test the spacer ring (test piece) for cracks; use the fluorescent dye penetrant process specified for this component in 72-31-03 Inspection/Check.
- (2) Metallurgically examine the test piece.

NOTE: The following examination must be carried out by the controlling laboratory.

- (a) Produce four suitable micro-sections at 90 deg from the test piece weld surface (Ref.Fig.401).

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- (b) Subject the micro-sections to a VPN hardness check using a 5 kg load and a 2/3rd objective at 0.020 in. (0,508 mm) increments traversed across the micro-sections. Check that the heat affected zone is limited to the specified area (Ref. Fig.401).

4. Repair LP Compressor Rotor Spacer Rings

A. Machine Spacer Ring.

- (1) Install spacer ring in a machining fixture suitable for the stage of spacer ring under repair (Ref. para.4 Item 1, 2 or 3 and Fig.402, 403, 404 or 405). Secure in position using four clamps.
- (2) Install machining fixture/spacer ring on a centre lathe; set true on fixture clocking diameter.
- (3) Machine the outer diameter of spacer ring labyrinth fins to produce required diameter (Ref. diameter 'X' Table 401 and Fig.406).
- (4) Remove machining fixture/spacer ring from the lathe and remove the spacer ring from the fixture.
- (5) Remove all burrs from the machined area of the spacer ring; use conventional hand tools.
- (6) Inspect the spacer ring to ensure satisfactory completion of the specified machining operation.

B. Examine Spacer Ring.

- (1) Test the spacer ring for cracks; use the fluorescent dye penetrant process specified for this component in 72-31-03 Inspection/Check. CMT

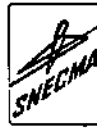
C. Build Up Labyrinth Fins on Spacer Ring.

- (1) Build up the labyrinth fins to produce a minimum weld build up of 0.080 in. (2,032 mm) (Ref.Fig.406); use the plasma welding technique detailed in Chapter 72-09-12 Repair, and observe the following instructions: CMT
 - (a) Allow component to cool for 10 to 15 minutes between each deposition of weld material.

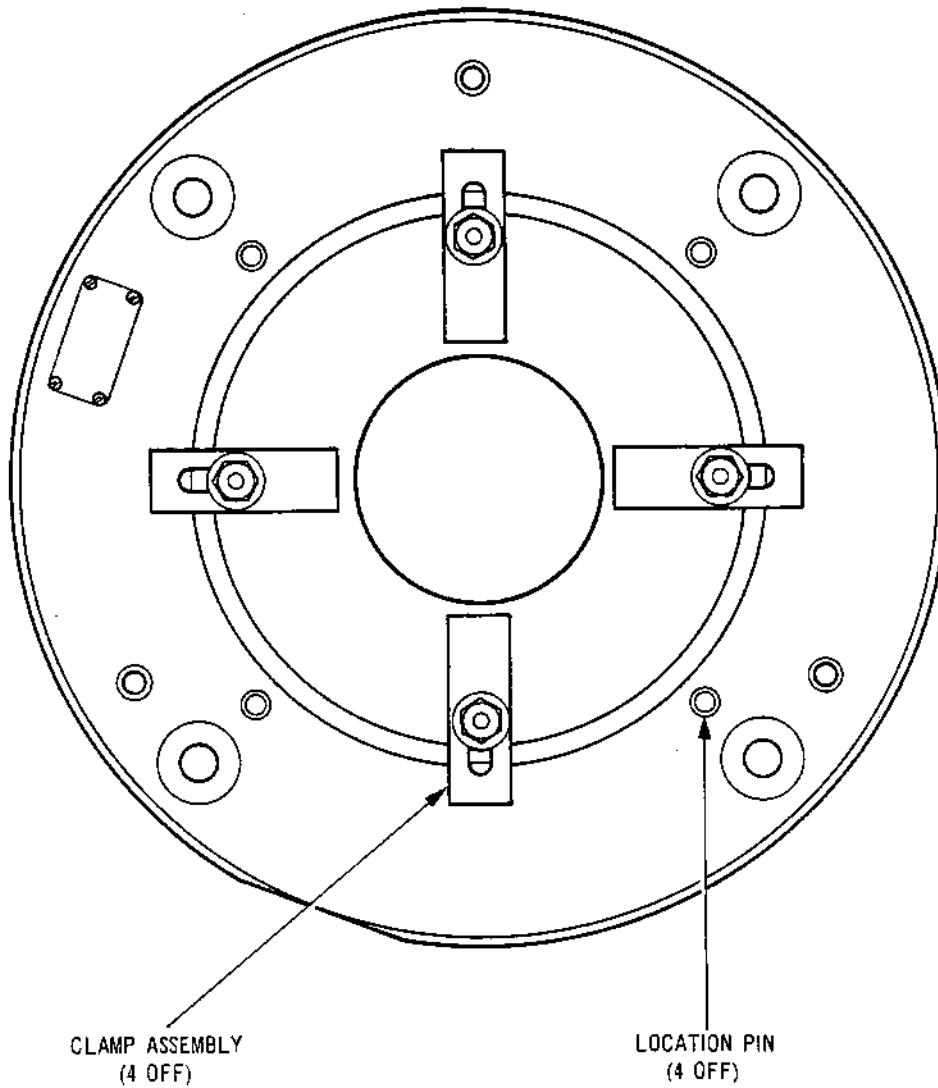


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Front View of Typical Machining Fixture for Spacer Rings
Figure 402

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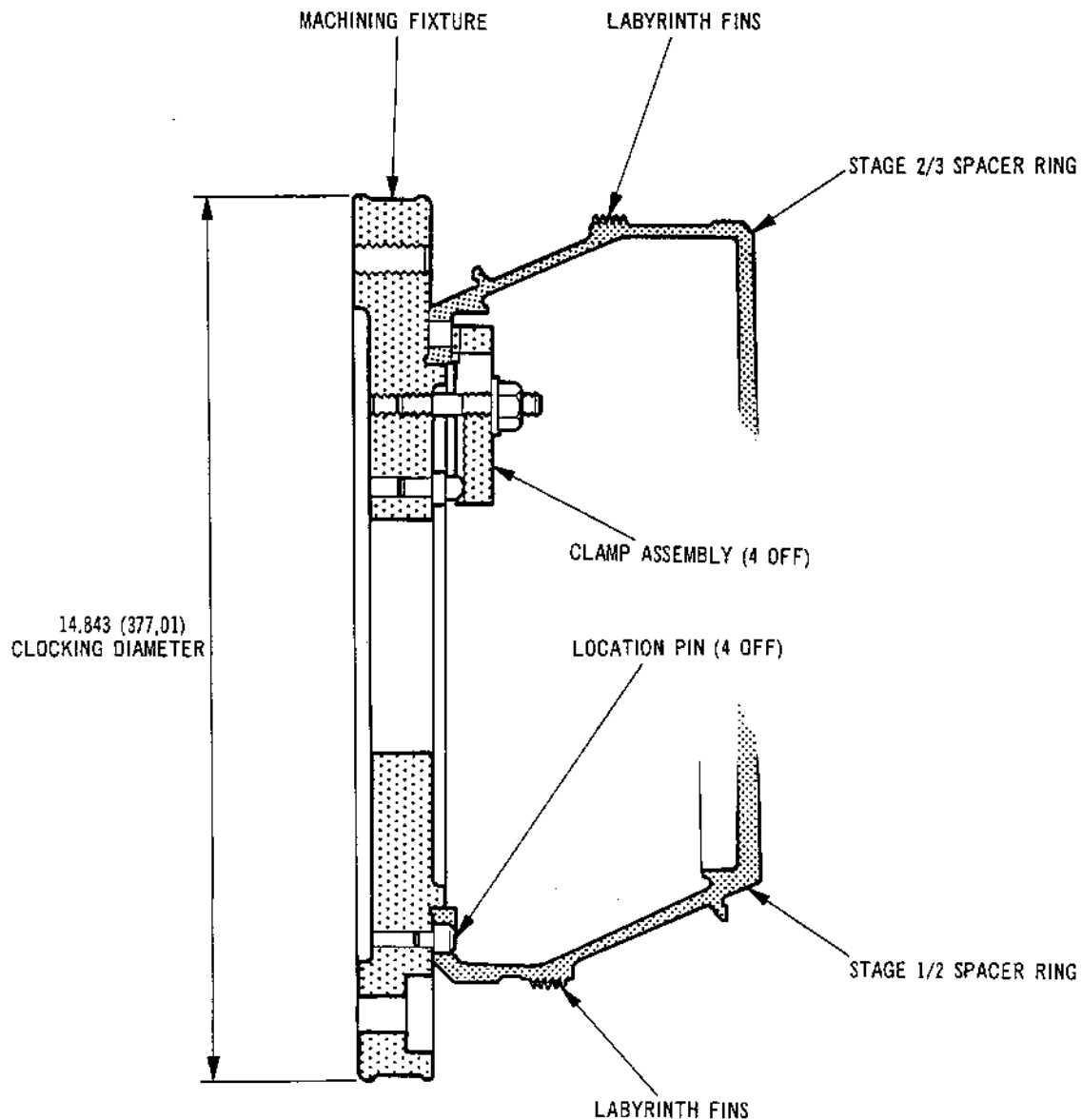


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TYPICAL SECTION

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Machining Fixture for Stages 1/2 and 2/3 Spacer Rings S3S.15781000
Figure 403

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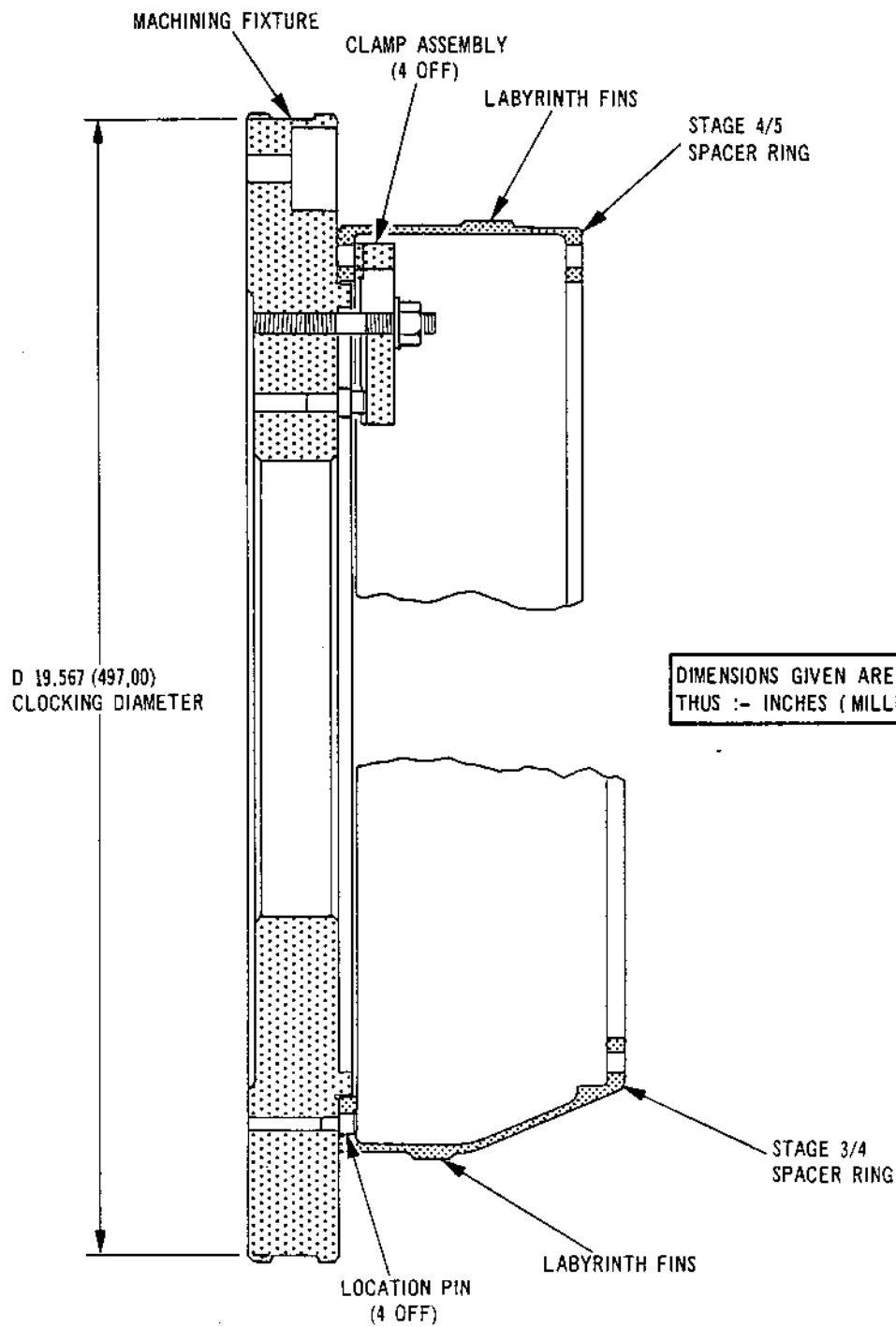


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TYPICAL SECTION

Machining Fixture for Stages 3/4 and 4/5 Spacer Rings S3S.15783000
Figure 404

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MACHINING FIXTURE

CLAMP ASSEMBLY
(4 OFF)

LABYRINTH FINS

STAGE 6/7
SPACER RING

D 19.567 (497.00)
CLOCKING DIAMETER

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

STAGE 5/6
SPACER RING

LABYRINTH FINS

LOCATION PIN
(4 OFF)

TYPICAL SECTION

Machining Fixture for Stages 5/6 and 6/7 Spacer Rings S3S.15785000
Figure 405

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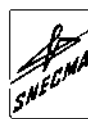
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- (b) Clean each weld deposit; use a rotary stainless steel brush.
- (c) Remove surface cavities and weld bead irregularities on completion of each deposition of weld material; use a non-abrasive cutter.

(2) Welding data.

CMT

Material:	Titanium MSRR 8634
Preparation:	Machined surface
Weld geometry:	Circumferential
Filler wire:	MSRR 9500/70 26 swg (0.018 in. (0,460 mm) diameter)
Machine:	Union Carbide 100 amp with fine wire feed
Upslope current:	Nil
Downslope current:	Machine maximum
Weld speed:	5 in./min (127 mm/min) on Roturn variable control turntable
Nozzle:	orifice dia. 0.052 in. (1,321 mm)
Electrode:	3/32 in. (2,3812 mm) dia. thoriated tungsten
Polarity:	Electrode negative
Arc length:	0.150 in. (3,81 mm)
Feed rate (wire):	48 in. (1219 mm) per minute
Plasma gas (torch):	Argon 0.2 cu ft/h at 30 psi (0,094 l/min at 207 kPa)
Shield gas (torch):	Argon 15 cu ft/h at 30 psi (7 l/min at 207 kPa)
Backing gas:	Nil
Trailing gas:	Argon 20 cu ft/h at 30 psi (9,43 l/min at 207 kPa)

NOTE: The preceding data is applicable to all stages of spacer rings. The following data is applicable to spacer rings as indicated.

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Welding current:

Stage 1/2 spacer ring: No.1 fin - 1st run; 23 amps
no wire
Subsequent runs;
27 amps with wire

No.2-5 fins - 1st run; 29
amps no wire
Subsequent
runs; 32 amps
with wire

Stage 2/3 spacer ring: All fins - 1st run; 32 amps
no wire
Subsequent runs;
34/38 amps with
wire

Stage 3/4, 4/5, 5/6
and 6/7:

All fins - 1st run; 32 amps
no wire
Subsequent runs;
34 amps with wire

D. Examine Spacer Ring.

- (1) Test the spacer ring for cracks; use the fluorescent dye penetrant process specified for this component in 72-31-03 Inspection/Check. CMT

E. Machine Spacer Ring.

- (1) Install spacer ring in a machining fixture suitable for the stage of spacer ring under repair (Ref. para.4 Item 1, 2 or 3 and Fig.402, 403, 404 or 405). Secure in position using four clamps.
- (2) Install machining fixture/spacer ring on a centre lathe; set true on fixture clocking diameter.



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- (3) Finish turn the built-up fins on the spacer ring to produce the required dimensions (Ref.Fig.406 and Table 401); use the specified form tool (Ref.para.4 Item 4). Observe the following parameters: CMT

Coolant:	Neat soluble oil at 60-1 dilution
Speed:	50-100 rpm and 15 rpm (manual)
Feed:	0.004 in. (0,10 mm) per revolution
Depth of finishing cut:	0.002 in. (0,05 mm) maximum

- (4) Remove machining fixture/spacer ring from the lathe and remove the spacer ring from the fixture.
- (5) Remove all burrs and sharp edges from the machined area of the spacer ring; use conventional hand tools.

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- (6) Inspect the spacer ring to ensure satisfactory completion of the specified machining operations.

F. Etch the Spacer Ring.

- (1) Etch the spacer ring (Ref.72-09-14 Repair); use immersion solution 'A' detailed in the referenced procedure. Component to be immersed in the solution for a period of 30 seconds from the onset of gassing. CMT

G. Examine the Spacer Ring.

- (1) Test the spacer ring for cracks; use the fluorescent dye penetrant process specified for this component in 72-31-03 Inspection/Check. CMT

H. Vapour Blast the Spacer Ring.

- (1) Vapour blast the spacer ring (Ref.72-09-13 Repair); use Procedure 'B' detailed in referenced procedure. CMT

J. Identify Repair.

- (1) Mark the repair scheme number (Ref.para.2.A.(9)) close to the standard part number on the repaired spacer ring; use the electro-chemical marking technique (Ref.72-09-00 Repair).

K. Inspect the Spacer Ring.

- (1) Carry out a final visual inspection and dimensional check of the spacer ring to ensure satisfactory completion of repair and suitability for service.



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SALVAGE NO.	STAGE NO.	DIAMETER		DIMENSION					DATUM 'A'
		'X'	'Y'	'Z'	'P'	'Q'	'R'	'S'	
B.497449	1/2	11.720	11.8400	11.600	2.235	2.085	1.935	1.785	1.635
		11.715	11.8388		2.225	2.075	1.925	1.775	1.625
		(297,69) (297,56)	(300,74) (300,70)	(294,64)	(56,77) (56,52)	(52,96) (52,71)	(49,15) (48,90)	(45,35) (45,10)	(41,53) (41,28)
B.497450	2/3	14.070	14.1900	13.950	2.680	2.530	2.380	2.230	2.080
		14.065	14.1886		2.670	2.520	2.370	2.220	2.070
		(357,38) (357,25)	(360,43) (360,39)	(354,33)	(68,07) (67,82)	(64,26) (64,01)	(60,45) (60,20)	(56,64) (56,39)	(52,83) (52,58)
B.497451	3/4	16.270	16.3900	16.150	1.895	1.745	1.595	1.445	1.295
		16.265	16.3884		1.885	1.735	1.585	1.435	1.285
		(413,26) (413,13)	(416,31) (416,27)	(410,21)	(48,13) (47,88)	(44,32) (44,07)	(40,51) (40,26)	(36,70) (36,45)	(32,89) (32,64)
B.497452	4/5	16.265	16.3850	16.145	1.945	1.795	1.645	1.495	1.345
		16.260	16.3834		1.935	1.785	1.635	1.485	1.335
		(413,13) (413,00)	(416,18) (416,14)	(410,08)	(49,40) (49,15)	(45,59) (45,34)	(41,78) (41,53)	(37,97) (37,72)	(34,16) (33,91)
B.497453	5/6	16.265	16.3850	16.145	1.855	1.705	1.555	1.405	1.255
		16.260	16.3834		1.845	1.695	1.545	1.395	1.245
		(413,13) (413,00)	(416,18) (416,14)	(410,08)	(47,12) (46,87)	(43,31) (43,06)	(39,50) (39,25)	(35,69) (35,44)	(31,88) (31,63)
B.497454	6/7	16.265	16.3850	16.145	1.705	1.555	1.405	1.255	1.105
		16.260	16.3834		1.695	1.545	1.395	1.245	1.095
		(413,13) (413,00)	(416,18) (416,14)	(410,08)	(43,31) (43,06)	(39,50) (39,25)	(35,69) (35,44)	(31,88) (31,63)	(28,07) (27,82)

Machining Dimensions (Ref.Fig.406)
Table 401

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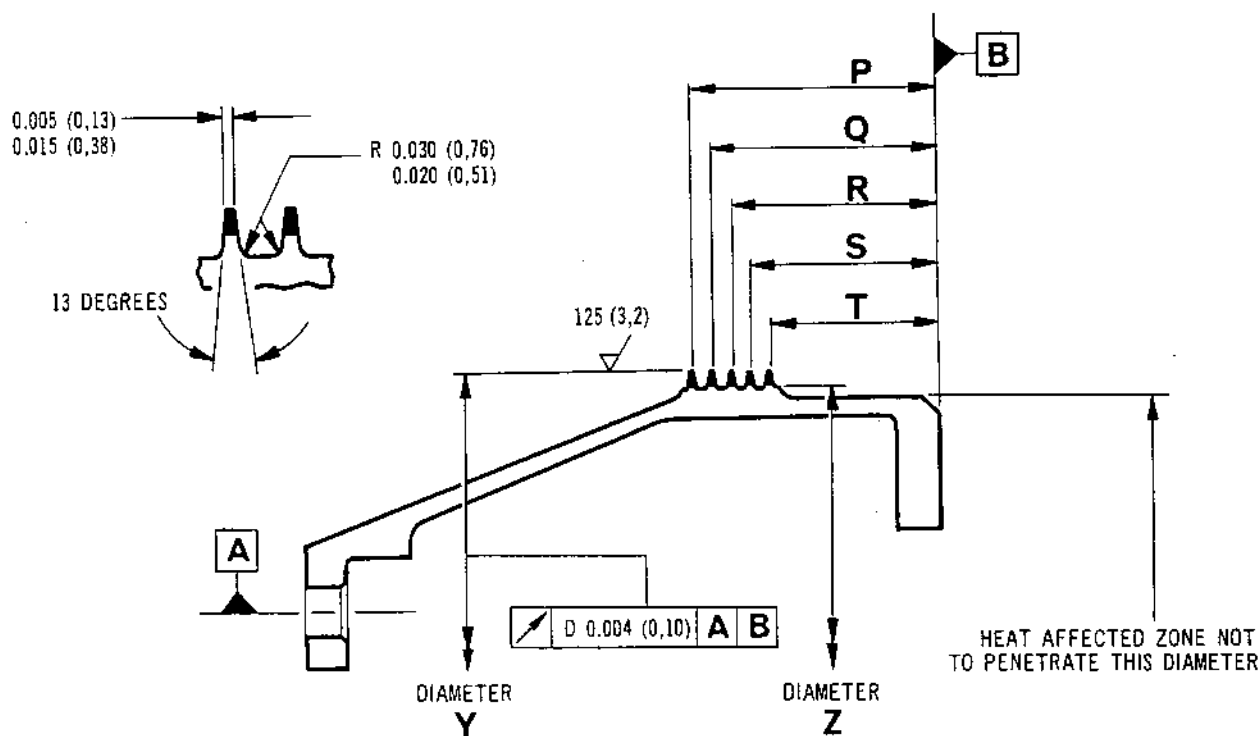
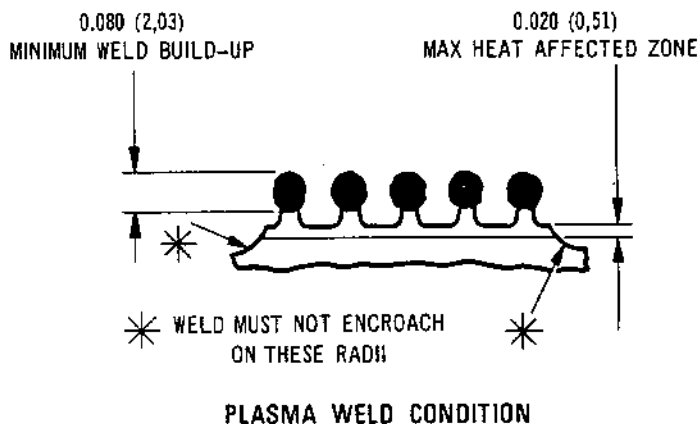
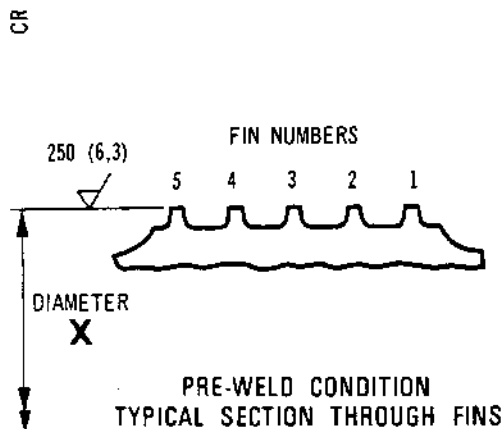
MK.610-14-28

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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓



FINISHED MACHINED CONDITION OF TYPICAL SPACER

FEATURES SHOWN ARE COMMON TO ALL SPACERS COVERED IN THIS REPAIR

LP Compressor Rotor Spacer Rings - Machining
and Welding Dimensions
Figure 406

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4. Special Tools, Fixtures and Equipment

A. The following tools, fixtures and equipment are required to complete this repair:

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>	<u>Fig.No.</u>
Fixture, machining Stages 1/2 and 2/3	1	S3S.15781000	1	402 & 403
Fixture, machining Stages 3/4 and 4/5	1	S3S.15783000	2	402 & 404
Fixture, machining Stages 5/6 and 6/7	1	S3S.15785000	3	402 & 405
Form tool	1	S3S.15787000	4	-

5. Replacement Parts

A. Not required.

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sneema

LP COMPRESSOR ROTOR - REPAIR
ROTOR SHAFT REAR - THRUST BEARING
LOCATION RESTORED BY PLASMA SPRAY

MODIFICATION NO.8817C

1. Effectivity

I.P.C.

Fig/Item

Part No.

72-31-03

3 230

B.922515

B.935731

B.509533

2. Introduction

A. General.

CAUTION: THIS PROCEDURE CONTAINS OPERATIONS THAT ARE SUBJECT TO COMPONENT MANUFACTURING TECHNIQUE (CMT) CONTROL. THESE OPERATIONS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE MANUFACTURER. CMT CERTIFICATE NUMBER CMT 122/B.935531.

- (1) This repair describes the procedure for restoring a corroded thrust bearing location on the rear rotor shaft by plasma spraying and machining to standard dimensions.
- (2) Dimensions are shown thus, INCHES (MILLIMETRES) in tables and illustrations.
- (3) Refer to Chapter 72-09-00, Repair, for all standard practices applicable to this repair procedure.
- (4) The operations that are subject to Component Manufacturing Technique Control are indicated CMT.
- (5) A test piece shall be produced and subjected to metallurgical examination; test pieces are required initially, and upon any change of airline operator, sub-contractor, machine or welding equipment.
- (6) Remove sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.
- (7) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.

CMT

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- (8) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (9) Surface texture is to be 125 micro inches (3,2 micro-metres) unless otherwise stated.
- (10) All tools referred to by item number in procedural steps are detailed in para.4.
- (11) Protect the component against corrosion after each operation and place in a container for protection against damage during transit between operations (Ref.72-09-20 Repair).

B. Repair Limitations.

None.

3. Instructions

A. Remove aluminium paint.

- (1) Remove the aluminium paint, if not already removed, using cleaning process F (Ref.72-09-00 Cleaning).

B. Machine.

- (1) Locate the flange of the rear rotor shaft to the faceplate of a grinding machine and set true.
- (2) Grind the thrust bearing location to 5.463 in. (138,76 mm) minimum diameter, under the following conditions:

Grinding wheel	:	A60 KV grit range 46-80 grade range J-L.
Coolant	:	Translucent soluble oil
Feed	:	0.0005 in. (0,013 mm)/rev.
Surface speed	:	70-92 ft/min (21,3 - 28,0 m/min)

CMT

- (3) Remove burrs and sharp edges.

C. Inspect.

- (1) Inspect for the satisfactory completion of the grinding operation.

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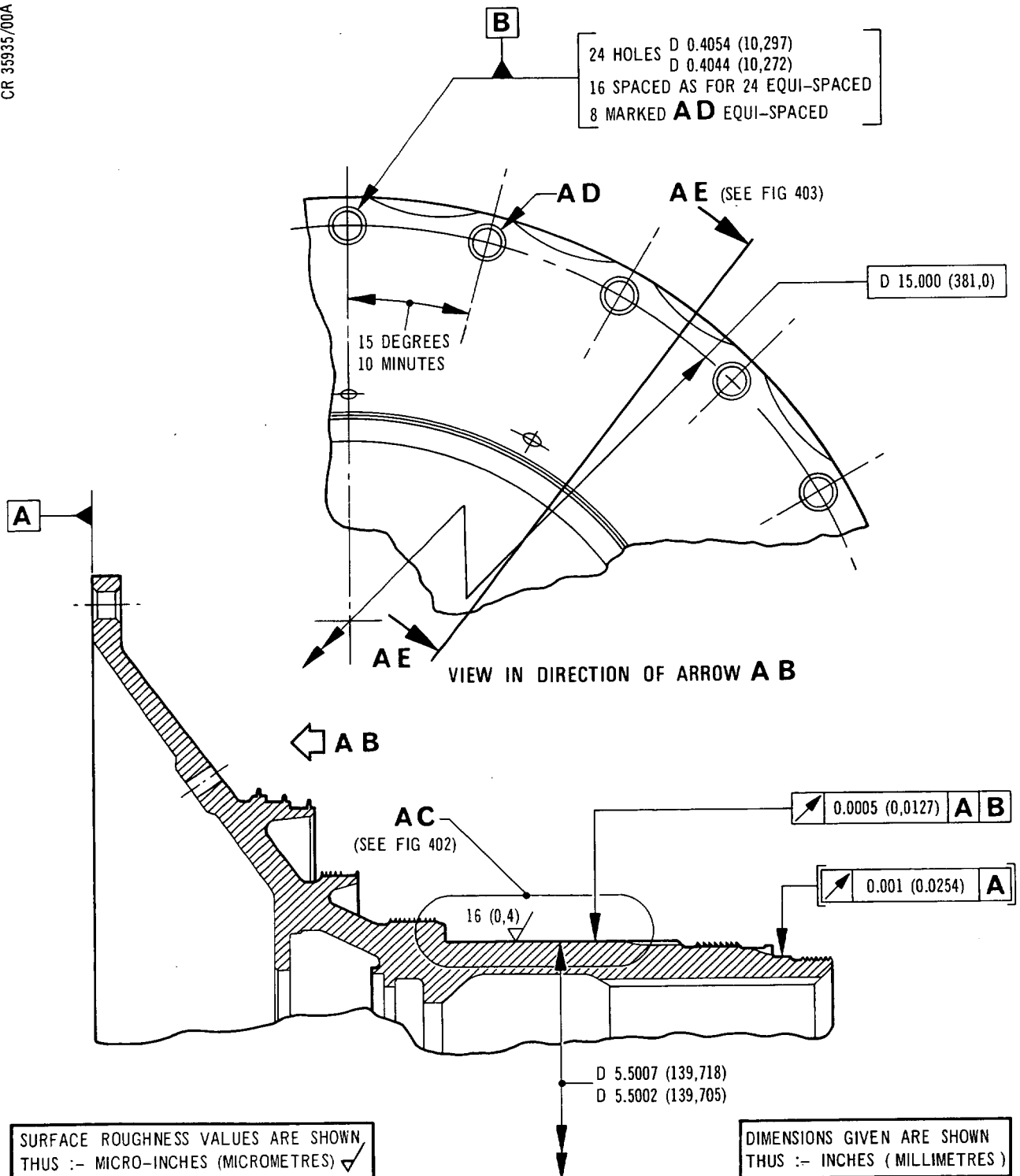
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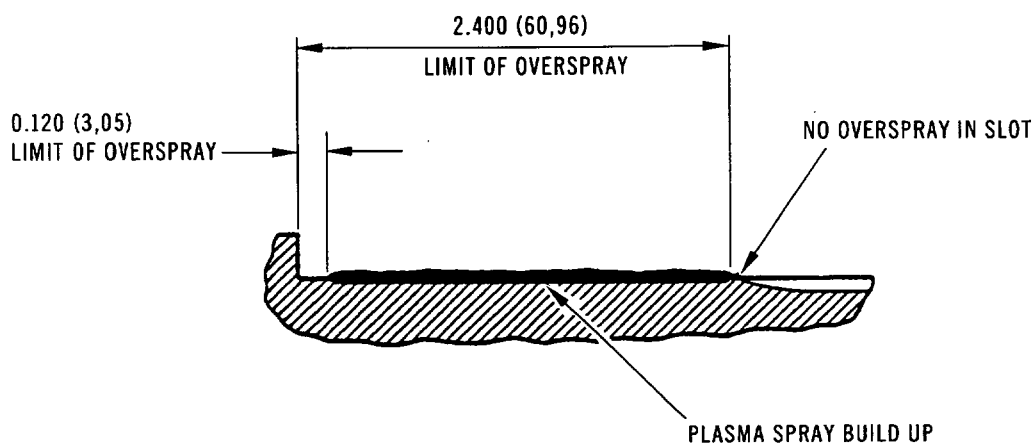
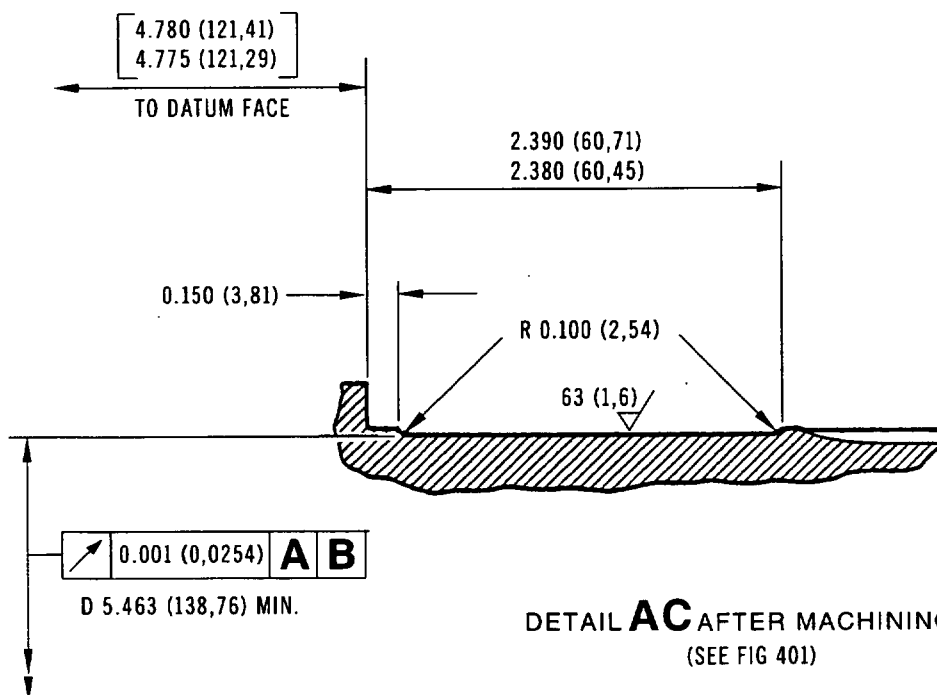
LP Rotor Shaft Rear Standard Dimensions
Figure 401

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SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Machining and Plasma Spray Details
Figure 402

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- (2) Inspect for cracks using the magnetic particle crack detection procedure for this component in Chapter 72-31-03, Inspection/Check.

CMT

D. Plasma Spray.

- (1) Plasma flame spray the area indicated in Fig.401 and 402 using the technique specified in Chapter 72-09-11, Repair, with METC0450 (MSRR 9507/5).

CMT

E. Inspect.

- (1) Inspect for the satisfactory completion of the spraying operation.

F. Machine.

- (1) Locate the flange of the rear rotor shaft to the faceplate of a grinding machine and set true.
- (2) Finish grind the thrust bearing location to 5.5007/5.5002 in. (139,718/139,705 mm) diameter, under the following conditions:

Grinding wheel	:	A60 JV grit range 46-80 grade range I-K
Coolant	:	Soluble oil 60 to 1 dilution
Feed	:	0.0002 in. (0,0051 mm) per rev.
Surface speed	:	85-100 ft/min (25,9 - 30,5 m/min)

CMT

- (3) Remove burrs and sharp edges.

G. Inspect.

- (1) Inspect for the satisfactory completion of the grinding operation.
- (2) Inspect for cracks using the fluorescent dye penetrant process detailed for this component in Chapter 72-33-02, Inspection/Check.

CMT

H. Aluminium Paint.

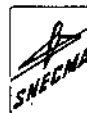
- (1) Apply high heat resisting aluminium enamel to the areas indicated AH in Fig.403, using the process detailed in Chapter 72-09-04, Repair.



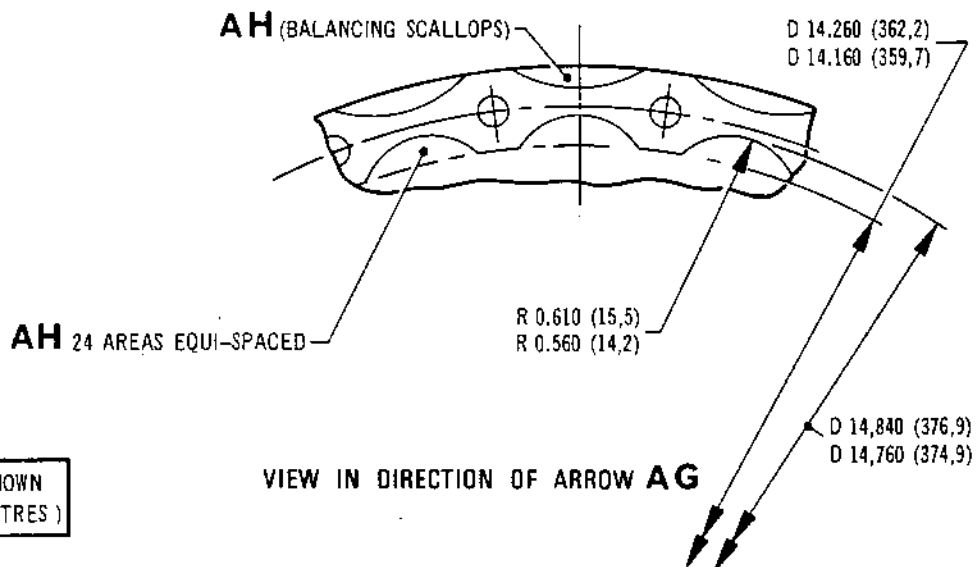
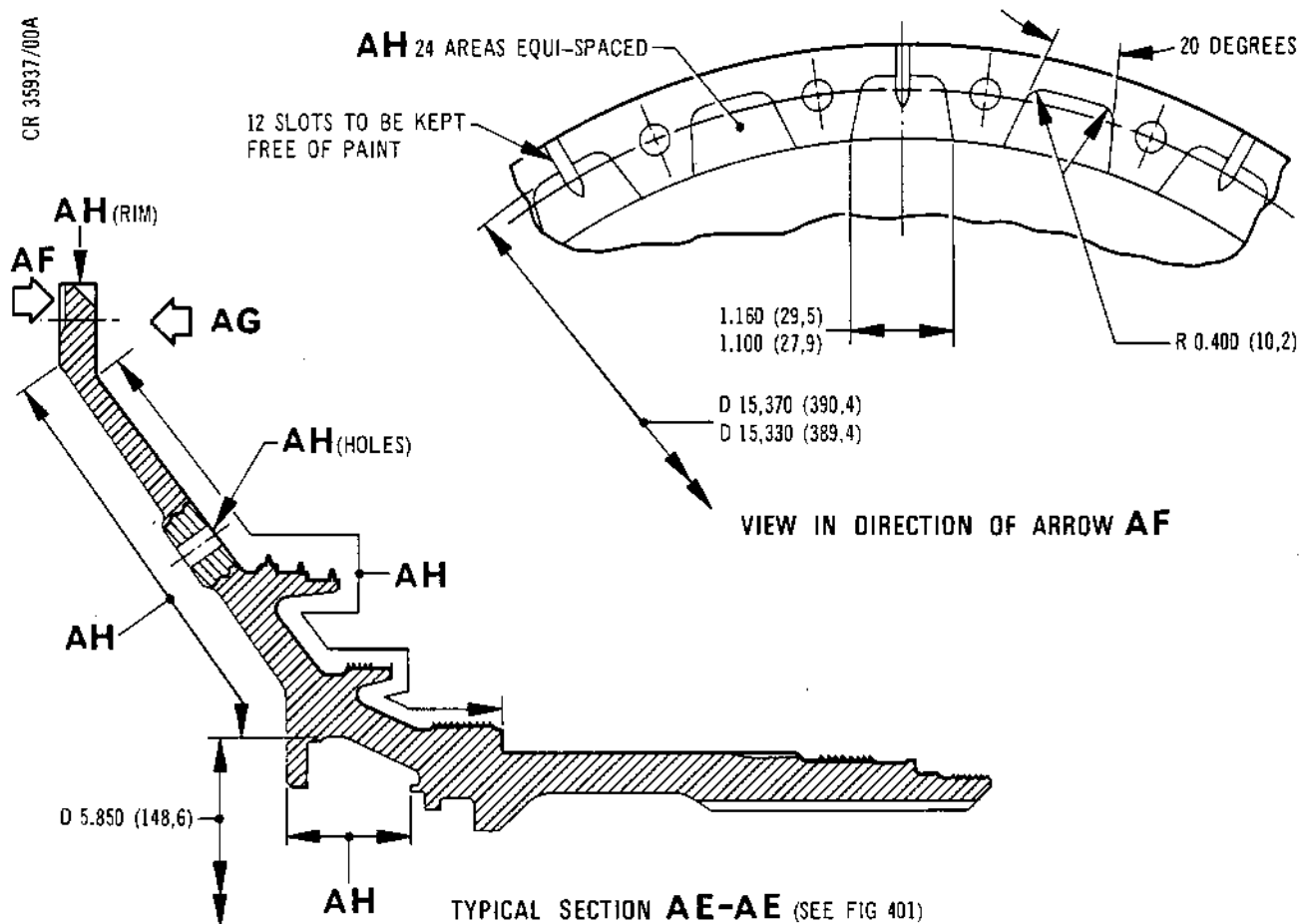
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Areas to be Aluminium Painted
Figure 403

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J. Inspect.

- (1) Inspect for the satisfactory completion of the painting operation.

K. Identify.

- (1) Mark SAL.B.935531 or R9 adjacent to the existing part number, using the electro-chemical marking or vibro-percussion engraving (Ref.72-09-00, Repair).
- (2) When B.922515 and B.930085 are protected with heat resisting aluminium enamel on the flanges (Ref. Fig.403), the part numbers change (Ref.SB.0L.593-72-8763-293). Line through the existing part numbers, and mark on new part numbers as follows:

B.922515 becomes B.935731
B.930085 becomes B.936864

Use electro-chemical marking or vibro-percussion engraving (Ref.72-09-00, Repair).

L. Final Inspection.

- (1) Finally inspect the rear rotor shaft to ensure that the repair has been carried out satisfactorily, and that the shaft is in a serviceable condition.

4. Special Tools, Fixtures and Equipment

None.

5. Replacement Parts

None.

**OLYMPUS 593**

MK.610-14-28

OVERHAUL



LP COMPRESSOR ROTOR DISKS STAGES 1 TO 7 - REPAIR
BY BLENDING TO REMOVE HANDLING AND OTHER DAMAGE
TO DISK BORE, FRONT AND REAR FACES

MODIFICATION NO. 0L.8819C1. Effectivity

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	1 160	B.929440, B.929477, B.930006, B.930651 B.930652
		B.929442, B.929478, B.930654, B.932723, B.932724
		B.929444, B.929479, B.930655, B.932725, B.932726
	2 60	B.929446, B.929480, B.930656, B.932727, B.932728
		B.929448, B.929481, B.930657, B.932729, B.932730
		B.929450, B.929482, B.930658, B.932731, B.932732
	3 340	B.929452, B.929453, B.930659, B.932733, B.932734

2. Introduction

A. General.

CAUTION: THIS PROCEDURE CONTAINS OPERATIONS THAT ARE
SUBJECT TO COMPONENT MANUFACTURING TECHNIQUE
(CMT) CONTROL. THESE OPERATIONS SHALL NOT
BE VARIED WITHOUT REFERENCE TO THE MANUFACTURER.

- (1) This repair describes the procedure for blending handling and other damage at the disk bore, front and rear faces using conventional hand tools.
- (2) Dimensions are shown thus, INCHES(MILLIMETRES) in tables and illustrations.

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OVERHAUL



sneema

- (3) Refer to Chapter 72-09-00, Repair, for all standard practices applicable to this repair procedure.
- (4) The operations that are subject to Component Manufacturing Technique Control are indicated CMT.
- (5) Remove sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.
- (6) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (7) Each stage of disk has its own CMT Certificate Number as follows:

<u>Disk</u>	<u>CMT Certificate No.</u>
St.1	CMT 105/B.935533
St.2	CMT 106/B.935533
St.3	CMT 107/B.935533
St.4	CMT 108/B.935533
St.5	CMT 109/B.935533
St.6	CMT 110/B.935533
St.7	CMT 111/B.935533

B. Repair Limitations.

- (1) On disk stages 3, 4, 5 and 6, blends are not permitted directly opposite each other through the thickness of the web.
- (2) Blending must not be carried out over the area indicated in Fig.401.
- (3) Maximum blend depths are as follows:

<u>Area (Ref.Fig.401)</u>	<u>Max. Blend Depth</u>
AB	0.010 in. (0,25 mm)
AC	0.005 in. (0,13 mm)

3. Instructions

A. Blend and Polish.

- (1) Hand blend the damaged areas, in accordance with Overhaul Manual chapter 72-09-22, Repair within limitations, to remove damage using conventional hand tools.

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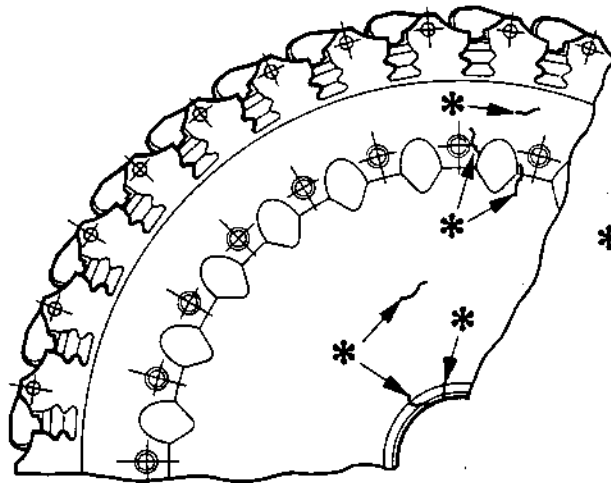
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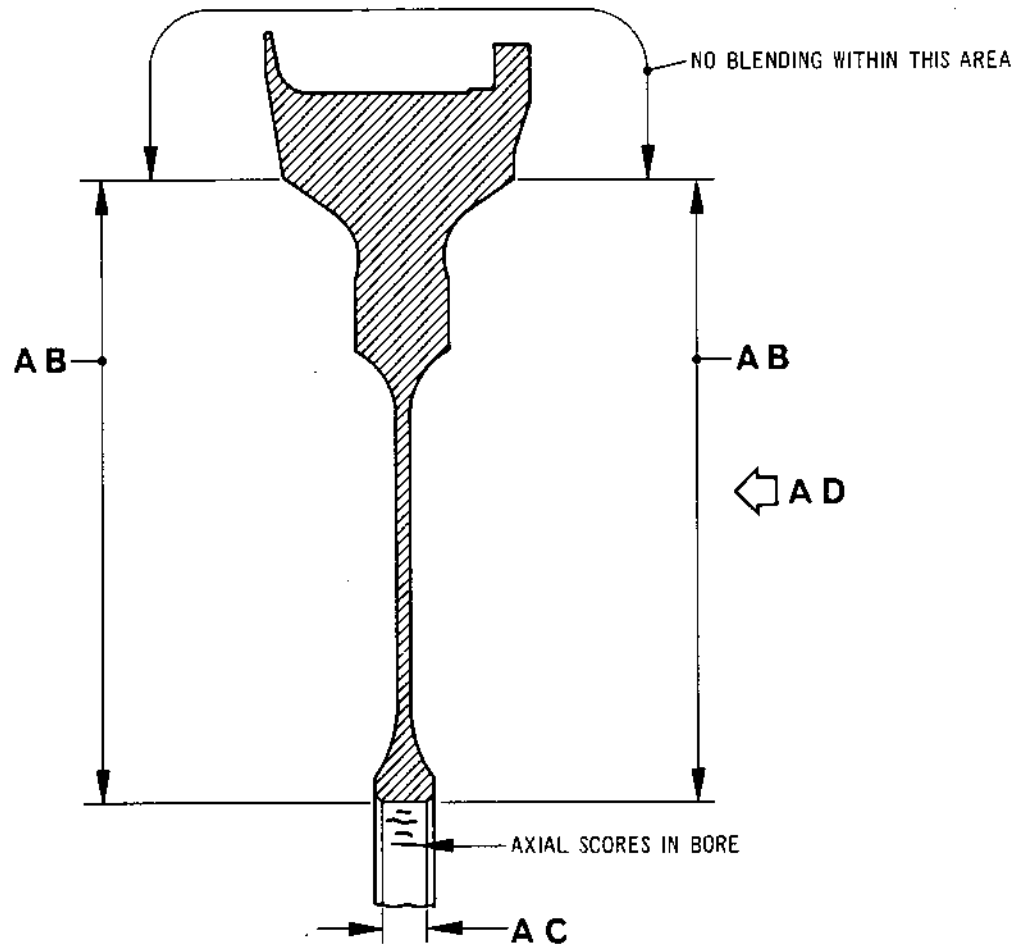
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* TYPICAL LOCAL HANDLING DAMAGE

VIEW IN DIRECTION OF ARROW AD



TYPICAL SECTION THROUGH DISK

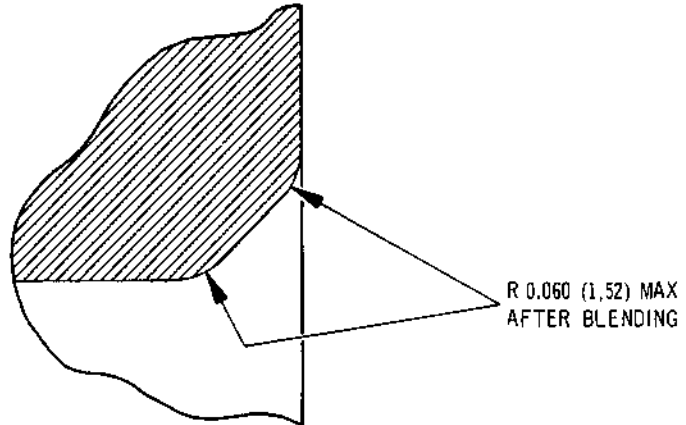
LP Compressor Rotor Disks Stages 1 to 7
Figure 401



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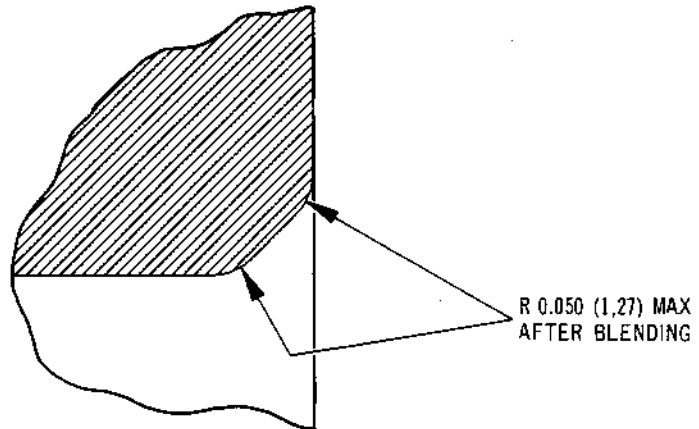
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OVERHAUL



ENLARGED VIEW SHOWING DISK BORE CHAMFER

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



ENLARGED VIEW SHOWING BOLT HOLE CHAMFER

LP Compressor Rotor Disks Stages 1 to 7
Figure 402



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OVERHAUL



(2) Where damage extends into bolt-hole chamfers or bore chamfer, radius the corners after blending as detailed in Fig.402.

(3) Polish the blended areas to achieve a surface finish of 63 micro-inches (1,6 micro-metres). Blends must be smooth, continuous and free from scratches.

B. Inspect.

(1) Etch the blended areas in accordance with Chapter 72-09-14 Repair, using solution A. CMT

(2) Inspect for cracks using the fluorescent dye penetrant process specified for this component in Chapter 72-31-03, Inspection/Check. CMT

C. Vapour Blast.

(1) Vapour blast the etched areas in accordance with Chapter 72-09-13 Repair, using procedure B. CMT

D. Identify.

(1) Mark SAL B.935533 or R10 next to the existing part number, but not closer than 0.030 in. (0,75 mm) to the blade slots. Use vibro-percussion engraving Ref. Chapter 72-09-00 Repair.

E. Final Inspection.

(1) Finally inspect the disks to ensure that the repair has been carried out satisfactorily and that the disks are in a serviceable condition.

4. Special Tools, Fixtures and Equipment

None.

5. Replacement Parts

None.



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OVERHAUL



LP COMPRESSOR ROTOR - REPAIR BY
BLENDING AND POLISHING DAMAGED
STAGE 1 BLADES WITH SHOT PEENED AEROFOIL

MODIFICATION NO.OL.8832C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Stage</u>	<u>Part No.</u>
72-31-03	01/1500	1	B.935789 B.935790 B.935791 B.935792

2. Introduction

- A. The text and Fig. 401 of this Repair defines the blending procedure applicable to LP compressor stage 1. rotor blades stated above and must be read in conjunction with the specific data for this stage (Ref.Fig.402).
- B. Refer to 72-09-00 Repair for all standard practices applicable to this repair procedure.
- C. Dimensions are shown thus:
- INCHES (MILLIMETRES).
- D. Produce a test piece to ensure that the correct parameters are used, (Ref.72-09-15 Repair).

3. Instructions

A. General

- (1) Test blades for cracks, before and after blending, by the fluorescent dye process specified for the blades in 72-31-03 Inspection/Check; reject cracked blades.
- (2) Blades with dents which deform the opposite surface of the blade are not acceptable for blending; reject blades with this form of damage.

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- (3) A blend in one zone can run out into the adjacent zone even if it infringes the blend limit for that zone, except at zone X.

B. Procedure

- (1) Crack test blades to determine the full extent of the damage. Refer to the fluorescent dye process specified for the blades in 72-31-03 Inspection/Check.
- (2) Dress to remove damage.

CAUTION: IF MECHANICAL BLENDING METHODS ARE USED, ENSURE THAT THE BLADES ARE NOT OVERHEATED.

- (a) Polish acceptable surface dents; Ref. to para. 3(2).
- (b) Blend torn, rough or scored edges to a depth 20 per cent greater than the damage depth, provided that the specified limits are not exceeded.
- (c) If adjacent blends interfere, remove the material from between them to produce a coupled blend.
- (d) Edge blends to be smoothly profiled into aerofoil shape (Ref.Fig.401).
- (e) Polish blends and defective areas.
- (f) Remove only the minimum amount of material consistent with specified requirements and dimensions.
- (g) In zone X, blending is permitted only as defined in (i) and (ii).
- (i) Blend light nicking of the edges.
- (ii) Polish out light surface scratches, 0.002 in. (0,050 mm) maximum permissible depth.
- (h) For opposing blends the chordal width must not be reduced by more than A, B or C, as applicable.

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SNECMA

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- (j) When blending within dimension D of blade tip, blend out towards the tip
- (k) Blending and polishing marks must only be in a radial direction, from root to tip.
- (l) Blend and polish to a surface finish of 32 MICROINCHES (0,8 MICROMETRES).
- (3) Clean the blades by the process specified for blades in 72-31-03 cleaning.
- (4) Vapour degrease the blades.

CAUTION: OBSERVE THE RESTRICTION ON THE PERIOD OF IMMERSION FOR TITANIUM COMPONENTS (REF. 72-09-00 CLEANING).

- (5) Etch the blades (Ref.72-09-14 Repair).
 - (a) Use Solution A either by Immersion or by Swab etch.
 - (b) For Immersion etching proceed as follows:
 - (i) Mask the blade roots and other areas not to be etched, with approved Acid Resistant Lacquer (I.C.I.F230-2006).
 - (ii) Etch the blades for the minimum time to achieve the desired surface for inspection, up to a maximum time of 20 seconds after the onset of gassing.
 - (iii) Remove the Lacquer by vapour degreasing (Ref.72-09-00 Cleaning).
 - (c) For Swab etching, apply the etch to the repaired area only. Do not allow the etch solution to come into contact with blade roots. Swab etch for a minimum time of 30 seconds.

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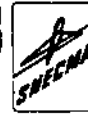
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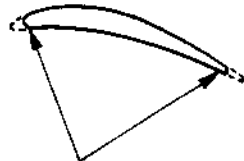


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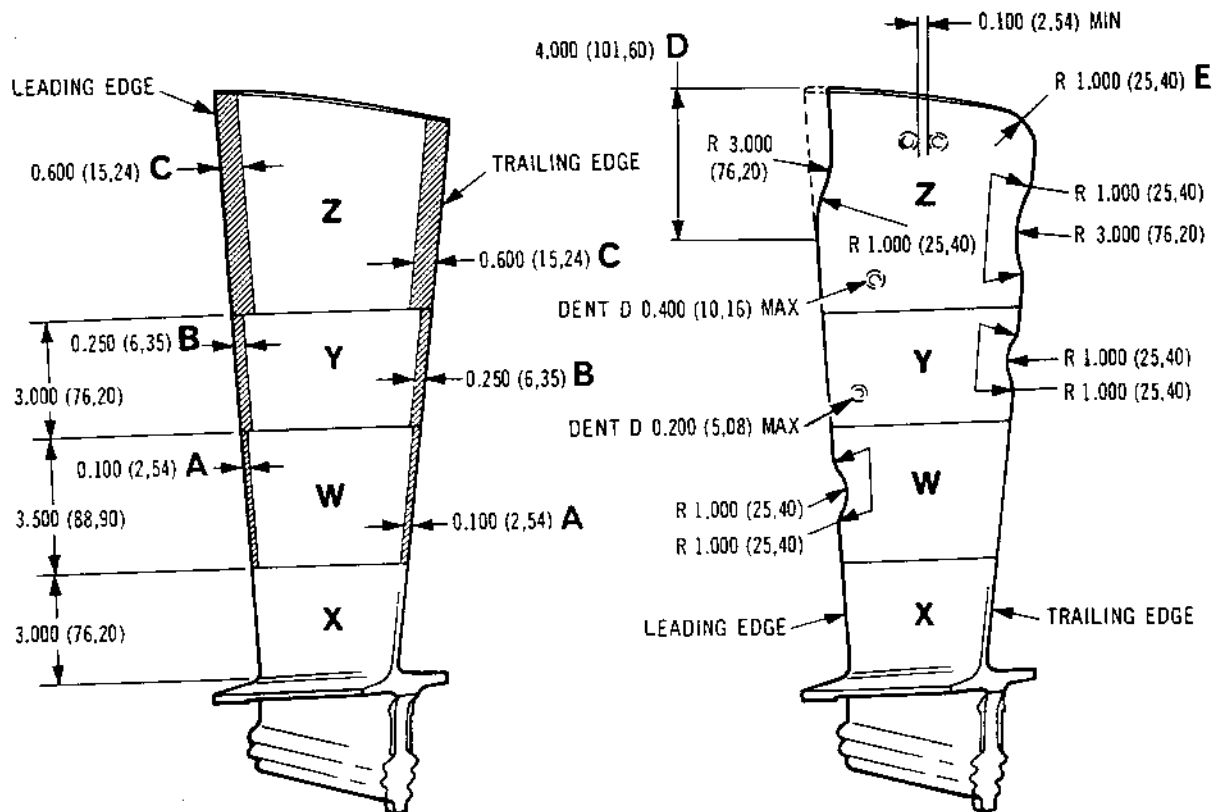


CR 35960/00A



RADII TO BLEND SMOOTHLY INTO AEROFOIL SHAPE

Blending Instructions Figure 401



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Stage 1 LP Compressor Blades - Blending Data Figure 402

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- (6) Repeat the test for cracks.

NOTE: If mechanical polishing methods have been used, also inspect for burns.

- (7) Shot peen the blade aerofoil surface.

- (a) Process control.

Parameters for shot peening.

- | | |
|---------------------------|-----------------------|
| (i) Peening medium | S230 size steel shot. |
| (ii) Intensity | 6-10 'A' |
| (iii) Coverage | 200 per cent |
| (iv) Almen 'A' test strip | |

- (b) Safety precautions.

- (i) All apparatus must be earthed to ensure dispersion of any heavy charge which might be generated during the process.
- (ii) Cabinets must be fitted with explosion doors and continuous low speed air extraction.
- (iii) A face mask and rubber protective gloves must be worn by the operator during peening and when cleaning the exhaust filters.

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(c) Peening intensity.

- (i) Shot peen the test piece using the parameters detailed in para. (7)(a), ensuring a uniform coverage of the exposed surface.
- (ii) Remove the Almen test piece and measure the "height of arc" of curvature of the test piece with a standard Almen gauge; Ref. to 72-09-15 Repair.

NOTE: Full control is essential on all aspects of the peening process to ensure that the amount and uniformity of stress and depth of layer is consistently maintained. Use automatic peening wherever possible.

(d) Mask the areas that do not require shot peening.

(e) Shot peen the blade aerofoil surface. Refer to Figure 403 for the shot peening area.

NOTE: Overspray onto the blade platform is permissible.

(f) Inspect the blade aerofoil surface.

- (i) Visually inspect the shot peened surfaces for uniformity of coverage and complete overlapping of shot impressions.
- (ii) Inspect the peened surfaces at X5 magnification to ensure that no roughness is present.



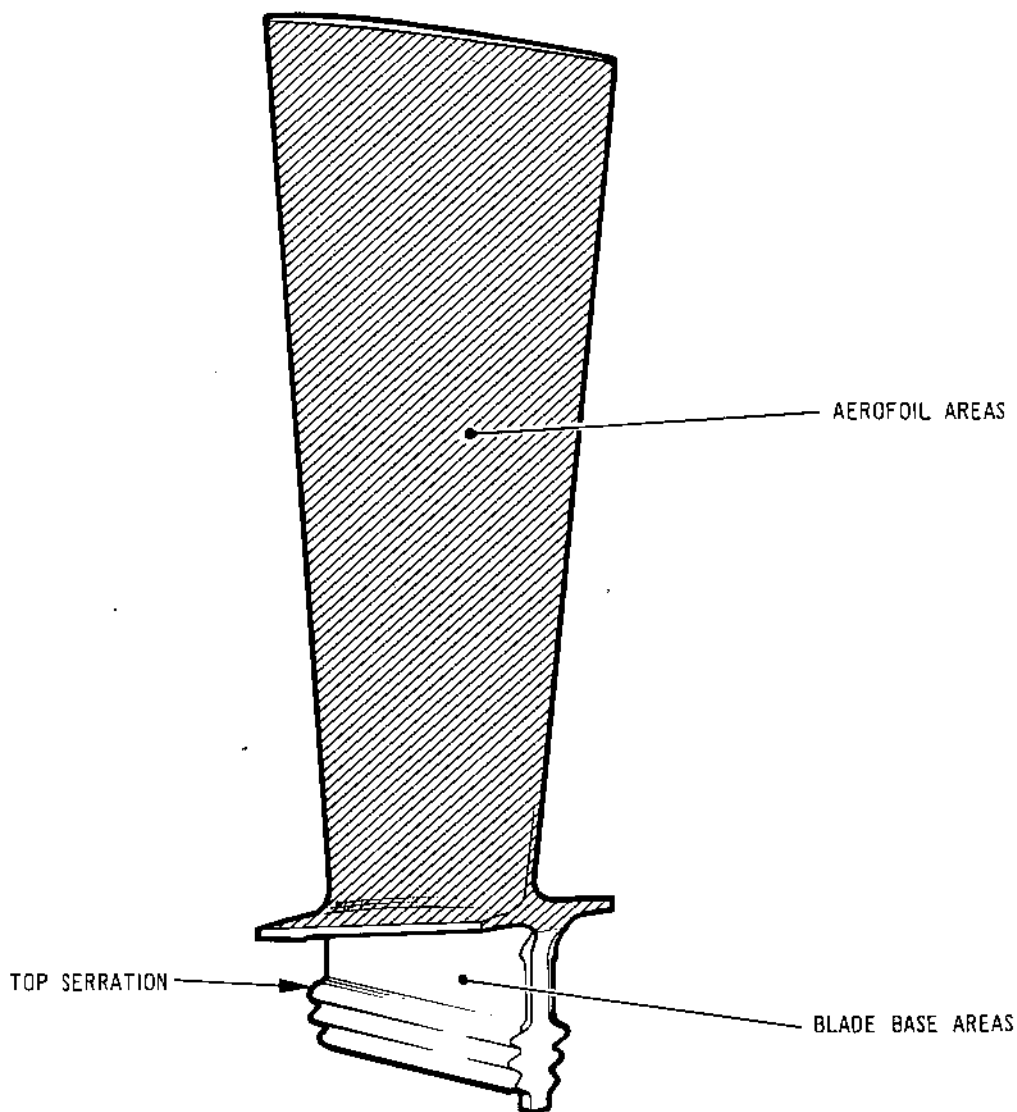
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SHOT PEEN 230 BOTH SIDES AND DRY GLASS
BEAD PEEN 0.0015/0.0030 IN. WHERE MARKED



LP Compressor Blade (Stage 1) Peening Area
Figure 403

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(iii) Repeat the shot peening process at once if the uniformity of coverage or intensity has not been achieved.

(8) Dry glass bead peen the aerofoil surface.

(a) Apply dry glass bead peening to the aerofoil surface and any overspray areas, observing the safety precautions referred to in para. (7) (b). Avoid direct contact with the powdered glass.

(b) Process control.

Parameters for dry glass bead peening.

(i)	Blasting medium	Glass beads 0.0015/0.003 in. (0,0381/0,762 mm) diameter
(ii)	Intensity	4-8 N
(iii)	Coverage	200 per cent
(iv)	Peening test strip	Type N

(c) Peening intensity.

(i) Vapour degrease the Almen 'N' test piece, refer to Overhaul Manual (72-09-00 Cleaning).

(ii) Establish the peening intensity, refer to para. (7)(c) for procedure.

(d) Mask the areas that do not require glass bead peening.

(e) Check that the glass beads are not contaminated and that the beads are free from sharp edges and broken pieces.

(f) Secure the blade in the blast cabinet; check that the cabinet is charged with the correct peening medium.

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- (g) Dry glass beadpeen the aerofoil surface and any overspray areas to produce an even coloured uniform matt surface.
- (h) Remove all trace of dry glass bead peening medium from the blade surface using a clean, dry air blast or a soft brush, vacuum assisted if necessary, to remove the particles.

NOTE: Reduce handling of the blade to a minimum to avoid contamination.

- (j) Inspect the blade aerofoil surface.
 - (i) Visually inspect the glass bead peened surface for uniform coverage and complete overlapping of the shot impressions.
 - (ii) Inspect the glass bead peened surface using X5 magnification ensuring that no roughness is present.
 - (iii) Repeat the peening process immediately if the uniformity of coverage or intensity has not been achieved.
- (9) Mark 'SAL.B.935525' or 'R11' adjacent to normal part number. Use the vibro-percussion engraving technique or the electro-chemical marking technique. (Ref. 72-09-00 Repair).

- (10) Finally inspect the blade for completion of the previous operations.

4. Assessment of Amount of Blending per Blade

- A. Blades may be blended in several positions provided that the total extent of blending is not more than the equivalent of two blends to the maximum in zone Z.
- B. Depth of blending is controlled by zones.
- C. The maximum permissible number of blended blades in the stage, when blended to maximum limits, is identified as L in para. 6.

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D. Where blades are not blended to the permissible maximum, this number (Ref. Para. C.) may be increased, provided that the aggregate of the blending does not exceed L.

E. Permissible blending is controlled by depths.

Example:

- (1) 0.600 in. (15,24 mm) depth x two blends = 1.200 in. (30,48 mm) total = maximum blended blade.
- (2) This maximum may be obtained as defined in (a), (b) or (c), or by any combination of depths, the total of which does not exceed 1.200 in. (30,48 mm).
 - (a) 0.300 in. (7,62 mm) depth x four blends.
 - (b) 0.150 in. (3,81 mm) depth x eight blends.
 - (c) 0.100 in. (2,54 mm) depth x twelve blends.

F. One coupled blend = two blends.

G. Dimension D blend = one blend.

H. Dimension E blend = half blend (depth assessed as $RADIUS \div 2$).

5. Assessment of Blending Equivalent to L number of Blended Blades Per Stage

A. Example:

- (1) L = three blades x 1.200 in. (30,48 mm) depth = 3.600 in. (91,44 mm) aggregate depth.
- (2) This aggregate may be obtained as defined in (a), (b) or (c), or by any aggregate of blended blades which does not exceed 3.600 in. (91,44 mm).
 - (a) 0.900 in. (22,86 mm) depth x four blades.
 - (b) 0.600 in. (15,24 mm) depth x six blades.
 - (c) 0.300 in. (7,62 mm) depth x twelve blades.

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6. Specific Blending Data Relating to Fig.402

This scheme must be read in conjunction with para. 2.A.

In zone X, edge blends 0.010 in (0,25 mm) deep max. permitted, with blend radii as for zone W.

Dimensions D and E can be applied to either leading or trailing edges.

L - maximum number of blades blended to the maximum is 3.

Mark 'SAL.B.935525' or 'R11' adjacent to standard part number.

7. Special Tools, Fixtures and Equipment

A. Not required

8. Replacement Parts

A. Not required

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REPAIR

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LP COMPRESSOR ROTOR - REAR ROTOR SHAFT ASSY-
REMOVAL OF CORROSION BY MACHINING AND
GRIT BLASTING

MODIFICATION No. OL.8821C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	3/230	B.922515 B.930085 B.935731 B.509533

2. Introduction

A. General

CAUTION: THIS PROCEDURE CONTAINS OPERATIONS THAT ARE SUBJECT TO COMPONENT MANUFACTURING TECHNIQUE (CMT) CONTROL. THESE OPERATIONS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE MANUFACTURER.

CMT CERTIFICATE NUMBER CMT 122/B.935539.

- (1) This repair describes the procedure for removing corrosion pitting by machining and grit blasting, followed by application of protective coating.
- (2) Dimensions are shown thus, INCHES (MILLIMETERS) in tables and illustrations.
- (3) Refer to Chapter 72-09-00, Repair, for all standard practices applicable to this repair procedure.
- (4) The operations that are subject to Component Manufacturing Technique Control are indicated CMT.
- (5) Remove sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.
- (6) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (7) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.

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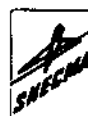
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- (8) Surface texture is to be 125 micro inches (3,2 micrometres) unless otherwise stated.
- (9) Protect the component against corrosion after each operation and place in a container for protection against damage during transit between operations (Ref.72-09-20 Repair).

B. Repair Limitations

- (1) This repair may be carried out once only.

3. Instructions

A. Preparation

- (1) Remove shank nuts (Ref.SB.0L.593-72-8896-347) is required (Ref.72-09-00 Repair).
- (2) Remove the protective coating, if not already removed during cleaning, using cleaning process F (Ref. 72-09-00 Cleaning).
- (3) De-rust using process H (Ref.72-09-00 Cleaning).

B. Machine

- (1) Locate the rotor shaft rear to a cylinder grinding machine and set true.
- (2) Finish grind the front and rear faces of the flange, removing the minimum amount of material necessary to remove all traces of corrosion. Refer to Figure 401 for maximum machining allowances. The following conditions must be observed:

Grinding wheel : A60K grit range 46-80 grade range J-L

Coolant : GP soluble oil 60 to 1 dilution

Speed : 100 ft/min (30,5 m/min)

Feed : 0.0005 in.(0,013 mm) per rev.

CMT

- (3) Remove burrs and sharp edges.

C. Inspect

- (1) Inspect for the satisfactory completion of the machining operation.

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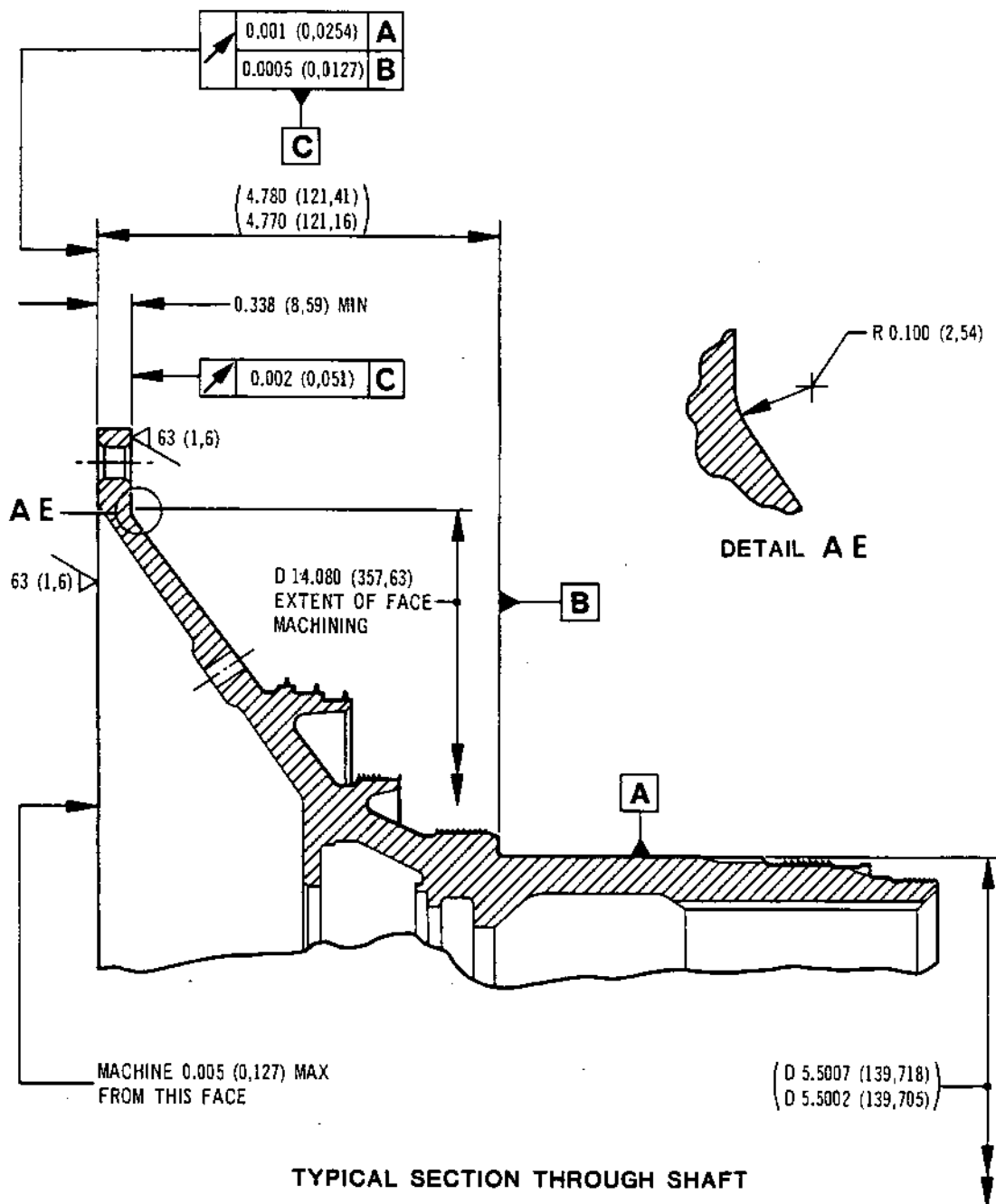
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

LP Rotor Shaft Rear - Machining Details
Figure 401

REPAIR

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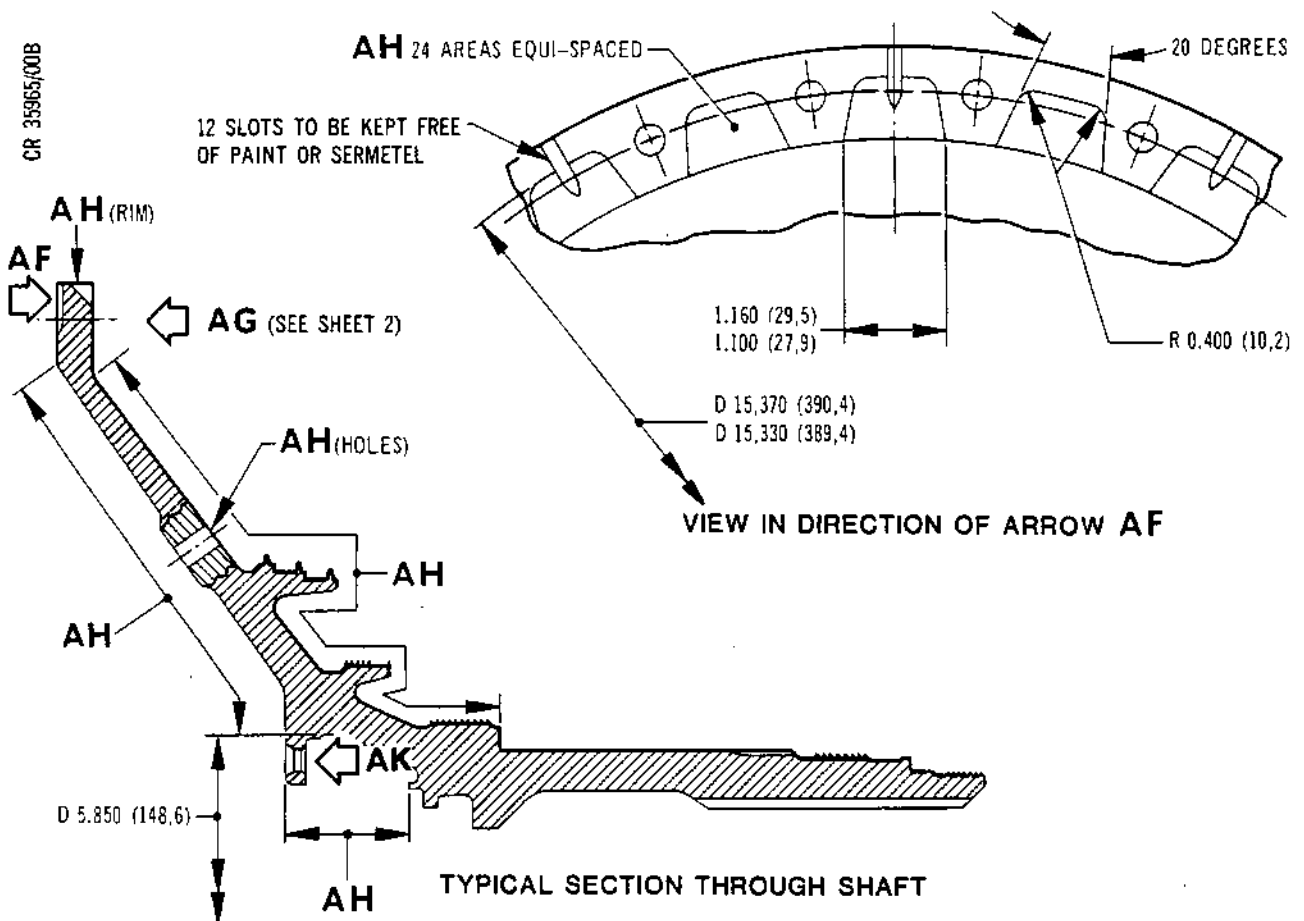
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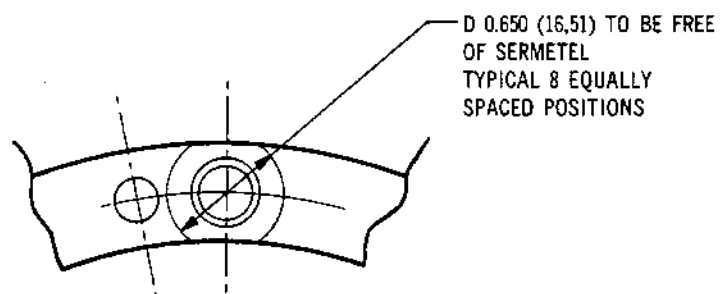
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CR 35965/00B



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



VIEW IN DIRECTION OF ARROW AK
(POST SB. OL.593-72-8896-347 STANDARD)

Areas to be Protected
Figure 402 (Sheet 1 of 2)

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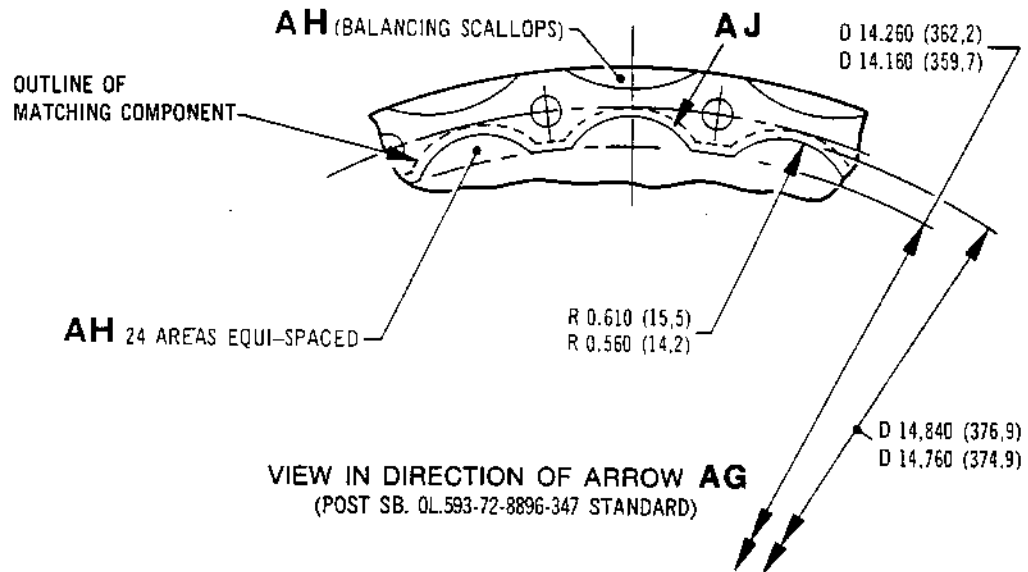
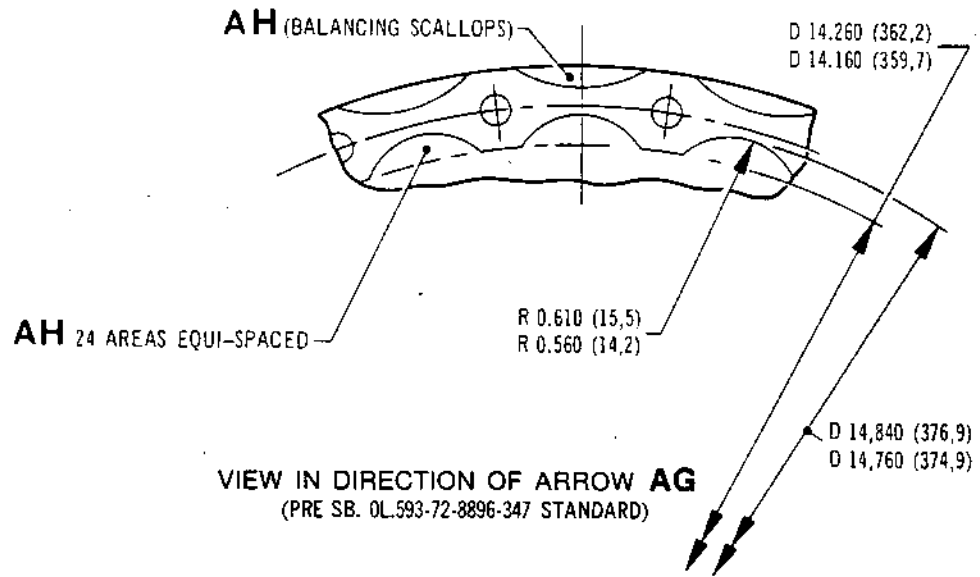
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CR 36398/00A



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Areas to be Protected
Figure 402 (Sheet 2 of 2)

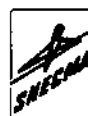
REPAIR
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D. Dry Abrasive Blast

- (1) Mask or blank the areas which do not require protective coating. (Ref.Fig.402).
- (2) Dry abrasive blast the areas to be coated, using the procedure detailed in Chapter 72-09-24 Repair. The working pressure for the vacuum pickup cabinet is 80/70 p.s.i. (552/483 kPa).

CMT

E. Inspect

- (1) Inspect for cracks using the magnetic particle crack detection procedure for this component detailed in Chapter 72-31-03 Inspection/Check.

CMT

F. Re-Protect

- (1) Components pre SB.0L.593-72-8896-347 standard only.

NOTE: At this point it is permissible to effect SB.0L.593-72-8896-347 if applicable. If effected, identity numbers as detailed in para.H must be marked. If not effected continue as follows:-

- (a) Apply aluminium paint where marked AH (Ref. 72-09-04 Repair).

NOTE: This embodies SB.0L.593-72-8763-293. Refer to Service Bulletin and re-partnumber accordingly.

- (2) Components to SB.0L.593-72-8896-347 standard only.

- (a) Apply Sermetel coating where marked AH (Ref. TSD 594 OP 349) using type A stoved at 515 deg.C or type B. Apply seal coating on top of Sermetel coating. Area marked AJ to be brush touched-up on assembly.

- (3) Inspect for the satisfactory completion of the protection operations.

G. Assembly

- (1) Install shank nuts to SB.0L.593-72-8896-347 standard components only (Ref.72-09-00 Repair).

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H. Identify

- (1) Mark the rotor shaft rear with the following numbers, using electro-chemical marking or vibro-percussion engraving as detailed in Chapter 72-09-00 Repair:
 - (a) For B.922515 and B.930085 only, mark the new assembly number. Refer to Service Bulletin OL593-72-8763-293 for the appropriate part numbers. A record of accomplishment is required.
 - (b) Mark SAL. B.935539 or R12 adjacent to the part number.

J. Final Inspection

- (1) Finally inspect the rotor shaft rear to ensure that the repair has been carried out satisfactorily, and that the rotor shaft rear is in a serviceable condition.

4. Special Tools, Fixtures and Equipment

None.

5. Replacement Parts

None.

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LP COMPRESSOR ROTOR - ROTOR SHAFT FRONT
LABYRINTH FINS RESTORED BY TIG WELDING

MODIFICATION NO. OL.8900C1. Effectivity

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	1 90	B.916195, B.922809, B.925001, B.930060, B.930173.

2. Introduction

A. General.

- (1) This repair describes the procedure for restoring labyrinths number 1, 2a and 2b by mechanised TIG welding and machining to the standard dimensions.
- (2) Dimensions are shown thus, INCHES (MILLIMETRES) in tables and illustrations.
- (3) Refer to Chapter 72-09-00, Repair for all standard practices applicable to this repair.
- (4) Remove sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.
- (5) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (6) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (7) Surface texture is to be 125 micro-inches (3,2 micrometres) unless otherwise stated.
- (8) All tools referred to by item number in procedural steps are detailed in para.4.
- (9) Protect the component against corrosion after each operation, and place in a container for protection against damage during transit between operations.

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- (10) A test piece shall be produced and subjected to metallurgical examination; test pieces are required initially and upon any subsequent change of airline operator, sub-contractor, machine or locality. Test pieces are also required after every ten component repairs or annually, where time elapsed between component repairs exceeds one year.

3. Test Piece

A. Produce Test Piece.

- (1) Produce a test piece from fully heat-treated MSRR.8634 material to the dimensions given in Fig.401.
- (2) It is permissible to use an unserviceable standard part as a test piece. In this case, machine the labyrinth fins to the dimensions given in Fig.403.
- (3) Remove burrs and sharp edges from the fins.
- (4) Inspect for cracks using the F2A fluorescent dye penetrant process specified in Chapter 72-09-00 Inspection/Check.

B. Weld Test Piece.

- (1) Build up the single fin to a minimum height of 0.075 in. (1.91 mm) as indicated in Figure 401 by mechanised TIG welding using filler rods OMat 366 as instructed in TSD 594 OP 409. For welding data, refer to paragraph 7.
- (2) Build up the blanket weld with a single weld run only, as indicated in Figure 401 by mechanised TIG welding using filler rods OMat 366 as instructed in TSD 594 OP 409. For welding data, refer to paragraph 7.

C. Machine.

- (1) Locate the test piece in a lathe and machine the blanket weld only, removing the minimum material, until the surface is free of defects, e.g. voids, porosity, etc.

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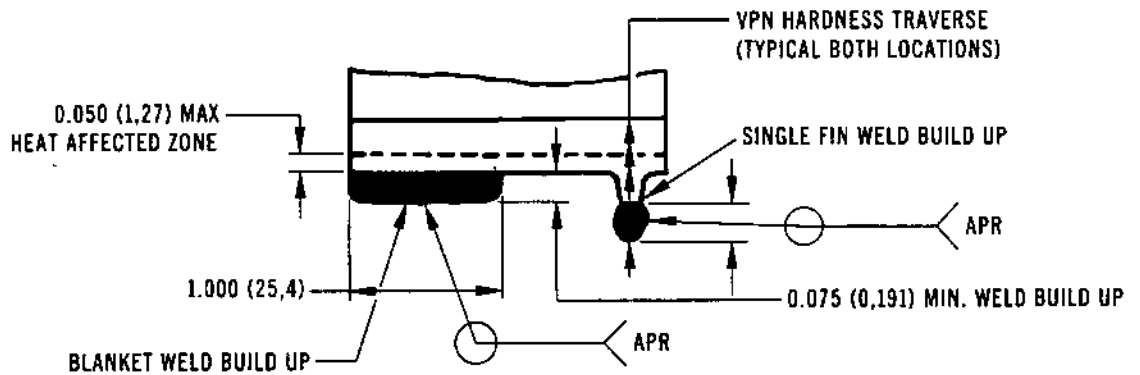
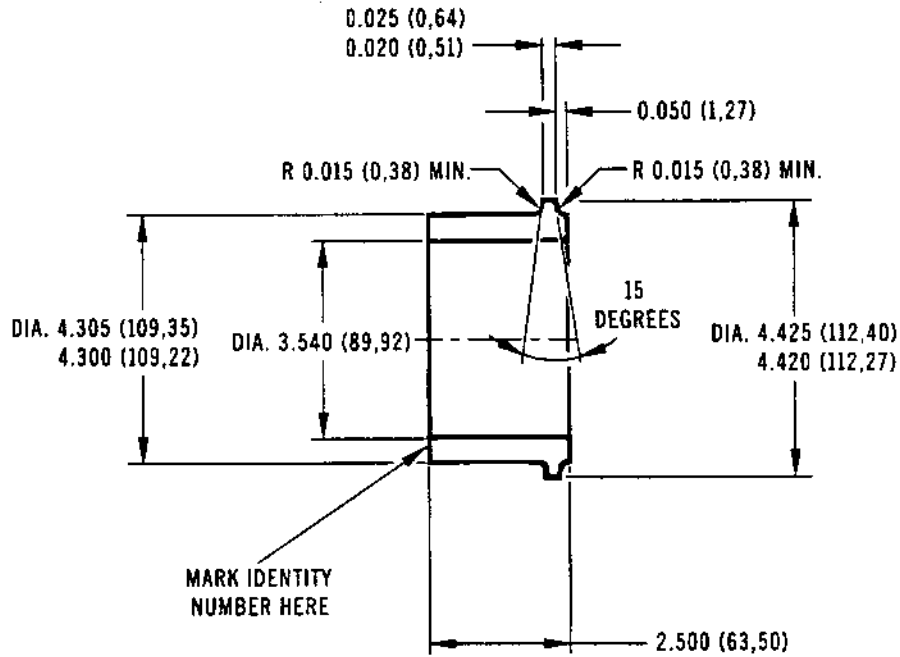


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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Test Piece Details
Figure 401



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D. Inspect

- (1) Inspect for cracks using the F2A fluorescent dye penetrant process specified in Chapter 72-09-00 Inspection/Check.

E. Weld.

- (1) Repeat operations in paras. 3B(2) to 3D until the minimum build-up is achieved (Ref.Fig.401).

F. Identify.

- (1) Mark B509249 on the test piece using vibro-percussion marking as instructed in Chapter 72-09-00 Repair.

G. Inspect.

- (1) Inspect the blanket weld only, using the ultrasonic C-scan process as specified in Chapter 72-09-00 Inspection/Check.

H. Metallurgical Examination.

NOTE: The following examination must be carried out by the controlling laboratory.

- (1) Produce four suitable micro-sections at 90 deg. from the test piece surface.
- (2) Subject the micro-sections to a VPN hardness check using a 5 kg load and 2/3rds objective at 0.020 in. (0,51 mm) increments, traversed across the micro-sections. Check that the heat affected zone is limited to the area shown in Figure 401 (test piece) or Figure 406 and 407 (unservicable standard part).

4. Instructions

A. Machine.

- (1) Locate the rotor shaft front on a centre-lathe, with the large flange secured to a faceplate. Set true to datum diameters A and B (Ref.Fig.402).
- (2) Machine the seal fins of the No's.1, 2a and 2b labyrinths to the dimensions given in Figure 403.
- (3) Remove burrs and sharp edges.

**OLYMPUS 593**MK.610-14-28 *sneema*
OVERHAUL**B. Inspect.**

- (1) Inspect for the satisfactory completion of the machining operation.
- (2) Inspect for cracks using the fluorescent dye penetrant process detailed for this component in Chapter 72-31-03 Inspection/Check.
- (3) Measure and record the position of the fins on the labyrinths No's.2a and 2b (Ref.Fig.405).

C. Weld.

- (1) Build-up the fins of the No's.2a and 2b labyrinths as indicated in Figure 404, by mechanised TIG welding using filler rods OMat 366 as instructed in TSD 594 OP 409. Weld build-up must be sufficient to allow finish dimensions to be achieved (Ref.Fig.402 and 407). For welding data, refer to paragraph 7.
- (2) Build-up the No.1 labyrinth location as indicated in Figure 404, by a single weld run only, using mechanised TIG welding with filler rods OMat 366 as instructed in TSD 594 OP 409. For welding data, refer to paragraph 7.

D. Machine.

- (1) Locate the shaft on a centre-lathe with the large flange secured to a faceplate. Set true to datum diameter A and B (Ref.Fig.402).
- (2) Machine the No.1 labyrinth seal location, removing the minimum material, until the surface is free of all defects, e.g. voids, porosity etc.

E. Inspect.

- (1) Inspect the No's.1, 2a and 2b seal locations using the fluorescent dye penetrant process specified for this component in Chapter 72-31-03, Inspection/Check.

REPAIR

72-31-03

Repair No.13

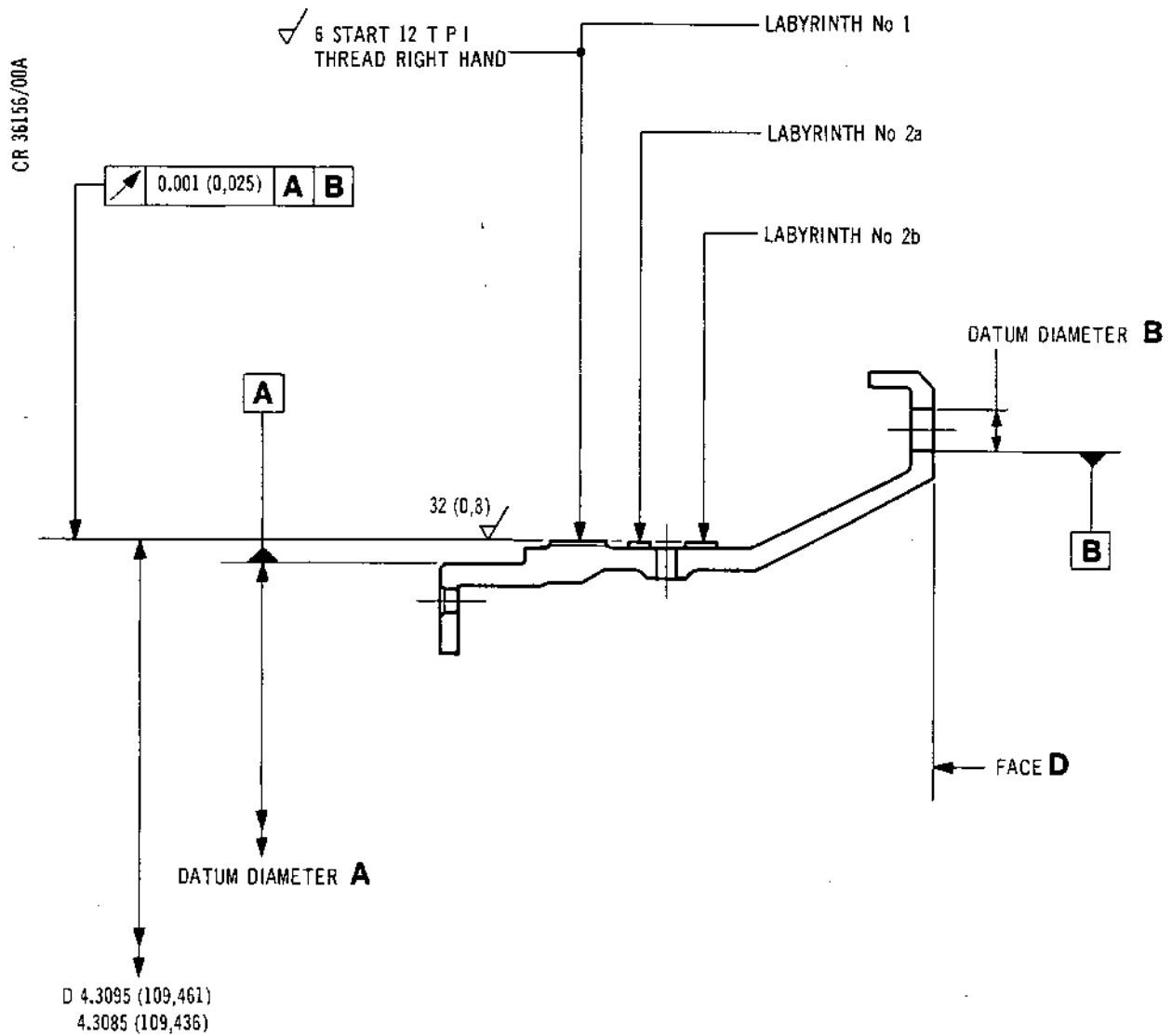
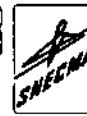
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

Standard Dimensions
Figure 402

REPAIR
72-31-03
Repair No.13
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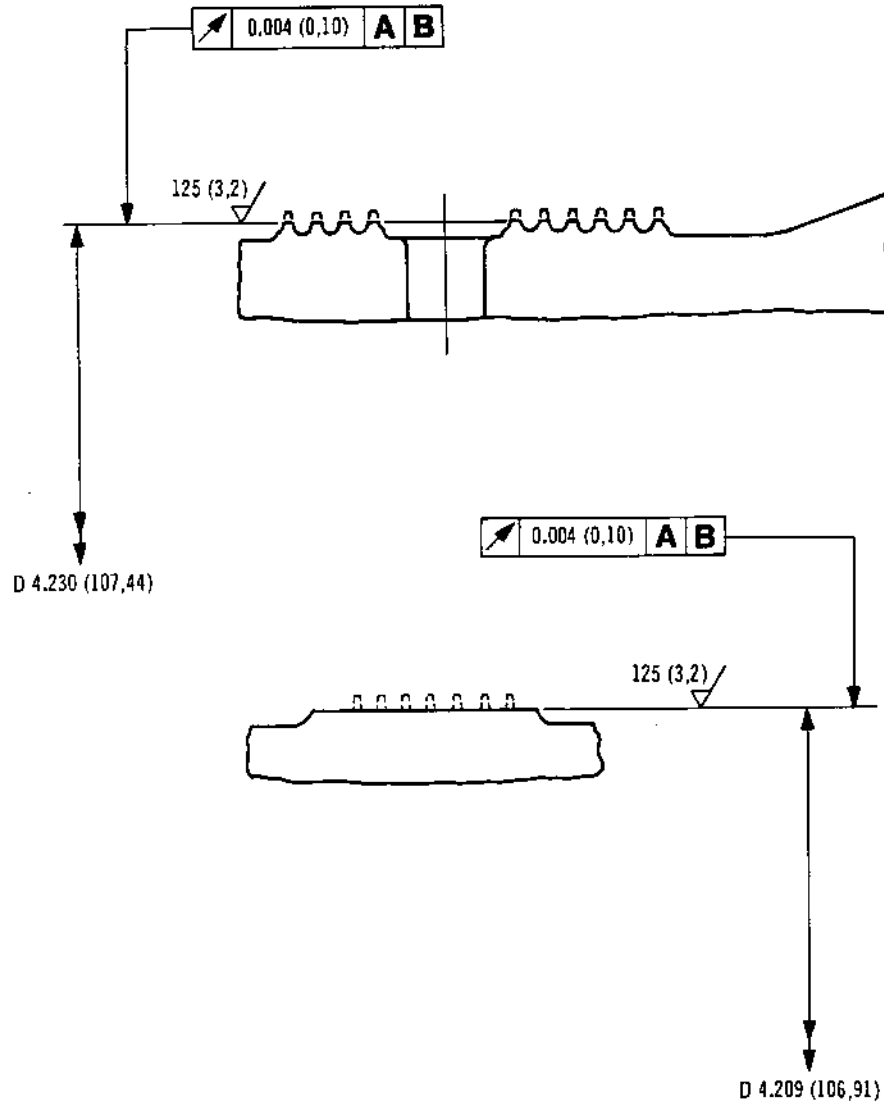
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SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Machining Details
Figure 403

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72-31-03
Repair No.13
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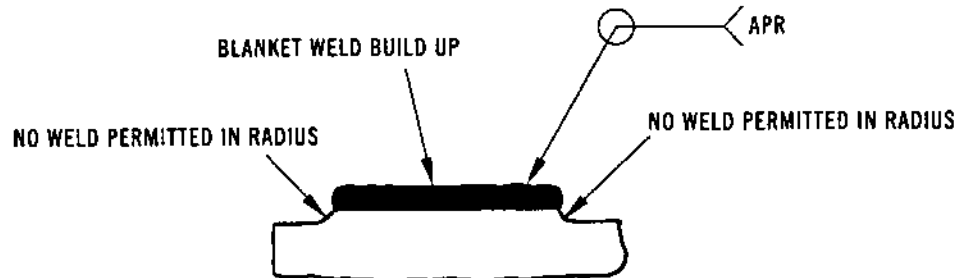
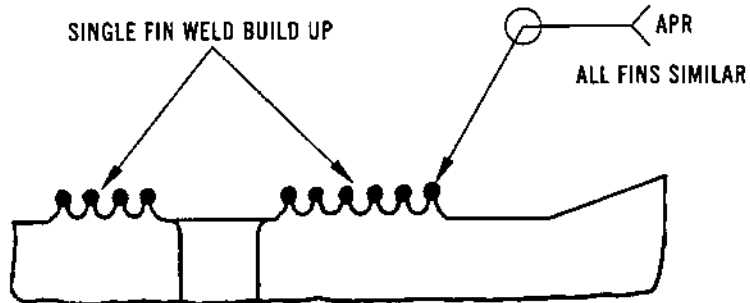
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Welding Details
Figure 404

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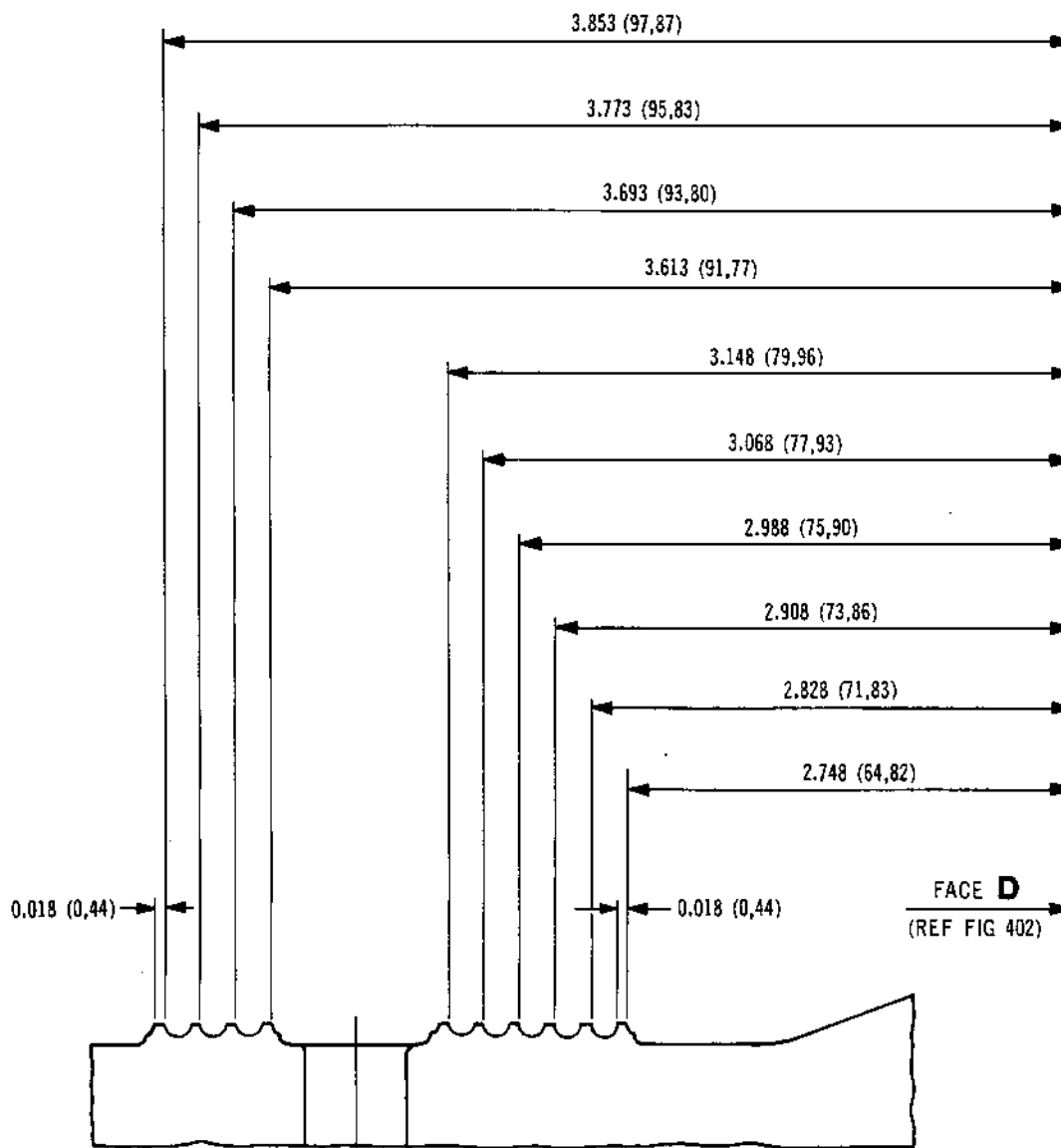
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Reference Dimensions
Figure 405

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OVERHAUL

F. Weld.

- (1) Repeat the welding, machining and inspection operations for labyrinth No.1 only as instructed in paragraphs 4C(2), 4D and 4E, until sufficient material is built up to achieve the finish dimensions (Ref. Fig.402 and 406).

G. Inspect.

- (1) Inspect the shaft for distortion (Ref.Fig.402).
- (2) Inspect the welding as detailed in TSD 594 OP 409.
- (3) Inspect the shaft using the fluorescent dye penetrant process specified for this component in Chapter 72-31-03 Inspection/Check.
- (4) Inspect the No.1 labyrinth location using the ultrasonic C-scan process as specified in Chapter 72-09-00 Inspection/Check.

H. Machine.

- (1) Locate the shaft on a centre-lathe with the large flange secured to a faceplate. Set true to datum diameter A and B (Ref.Fig.402).
- (2) Finish machine the fins of No's.2a and 2b labyrinths using form tool ref. tool item 1, to the dimensions given in Figure 407. Use the dimensions previously recorded (para.48(3)) to ensure that the maximum step is 0.005 in. (0,13 mm) (Ref.Fig.407 view AA).
- (3) Finish machine the No.1 labyrinth (windback seal) using form tool ref. tool item 2, to the dimensions given in Figure 406.

J. Inspect.

- (1) Inspect for the satisfactory completion of the machining operation.
- (2) Chemically etch the repaired areas as instructed in Chapter 72-09-14 Repair, using Solution A.

REPAIR

72-31-03

Repair No.13

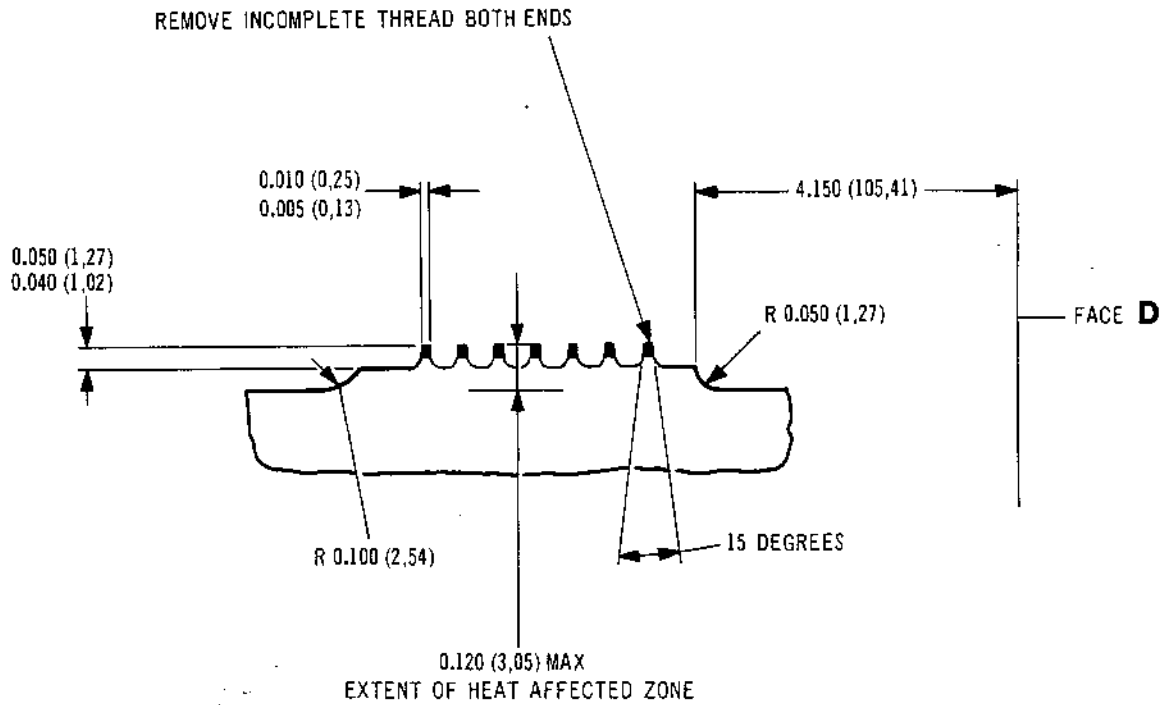
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LABYRINTH No 1

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Labyrinth Machining Details
Figure 406

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Repair No.13
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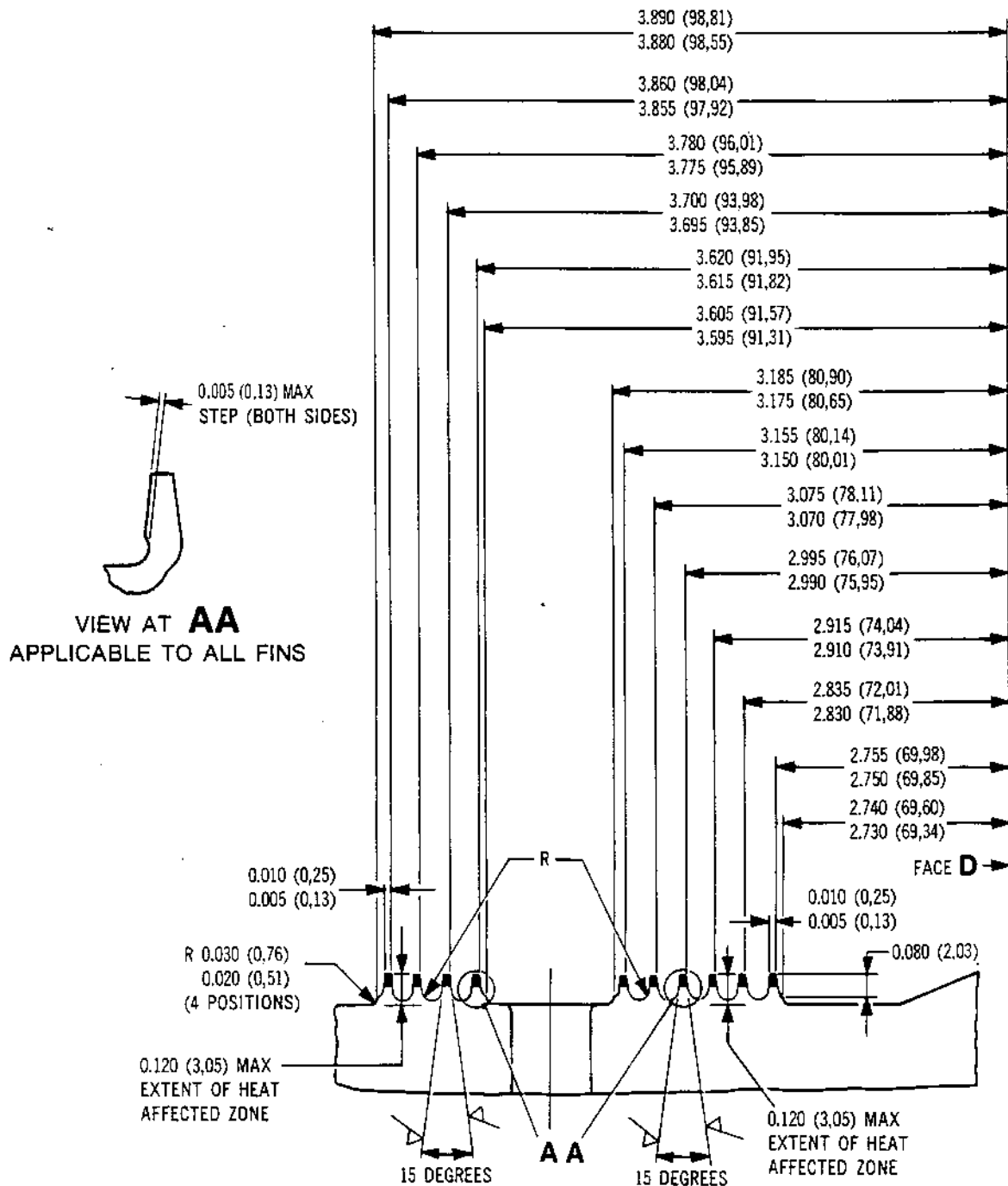
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OVERHAUL

sneema

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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

LABYRINTH Nos 2a AND 2b

Labyrinth Machining Details
Figure 407

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Repair No.13

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OVERHAUL

- (3) Inspect the shaft using the fluorescent dye penetrant process specified for this component in Chapter 72-31-03 Inspection/Check.

K. Vapour Blast.

- (1) Mask off the shaft with suitable waterproof masking tape. Ensure that only the repair area is exposed.
- (2) Vapour blast the labyrinth fins as instructed in Chapter 72-09-13 Repair, using 320/400 mesh aluminium oxide grit at Almen 2N intensity minimum.

L. Identify.

- (1) Mark the appropriate salvage number (Ref. Table 401) adjacent to the existing part number, using electrochemical or vibro-percussion marking as specified in Chapter 72-09-00 Repair.

SALVAGE NO.	LABYRINTH NO.	TEST PIECE
B488673	1	B509249
B488674	2a	B509249
B488675	2b	B509249

Table 401

M. Final Inspection.

- (1) Finally inspect the shaft to ensure that the repair has been carried out satisfactorily and that the shaft is in a serviceable condition.

5. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Qty.</u>	<u>Part No.</u>	<u>Item</u>
Form tool	1	S3S 15511000	1
Form tool	1	S3S 15510000	2

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6. Replacement Parts

None.

7. Welding Machine Details**A. Labyrinth No.1 (Blanket Weld).**

Material	:	Titanium IMI 550
Weld Process	:	Hobart Dabber Welder System
Weld Current	:	400 DC
Amperage	:	100 Amp
Weld Preparation	:	Machined Surface, Degrease using MEK. OMat 135
Electrode Specification	:	Material: 2% Thoriated Tungsten Size: 1/16 in. (1,6 mm) dia. OMat 3/153
Shielding Gas	:	Hy-Plas
Gas Flow Rate	:	35 CFH (991,5 L/h)
Trailing Gas	:	-
Gas Flow Rate	:	-
Voltage (AVC)	:	8.2
Deadband	:	4
Sensitivity	:	3
Lock Out	:	No
Retract Distance	:	0
Starting Arc Gap	:	.05
Start Delay	:	2.7

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Welding Current

Fusion Mode	:	Pendant Setting 35 Amps
Weld Mode	:	Pendant Setting 36 Amps
Filler Material Spec.	:	OMat 366
Size	:	.030 in. (0,76 mm) dia.
Feed Rate	:	8 IPM (203,2 mm/min.)
Filler Wire Start Delay	:	2.3
Filler Wire Stop Delay	:	0.1
Dabber Strokes/Min	:	250
Stroke Length	:	0.470 in. (12 mm)
Pulsation	:	No
Weld Speed		
Fusion Mode	:	50
Weld Mode	:	50

NOTE: All readings shown are machine dial readings unless otherwise indicated.

COMMENTS: Set table at 800, wire brush after each weld deposit.

B. Labyrinth 2a and 2b (Individual).

Material	:	Titanium IMI 550
Weld Process	:	Hobart Dabber Welder System
Weld Current	:	400 DC
Amperage	:	100 Amp
Weld Preparation	:	Machined Surface, Degrease using MEK. OMat 135

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Electrode Specification : Material: 2% Thoriated Tungsten
Size: 1/16 in. (1,6 mm) dia.
OMat 3/153

Shielding Gas : Argon

Gas Flow Rate : 35 CFH (991,5 L/h)

Trailing Gas : Argon

Gas Flow Rate : 10 CFH (283,3 L/h)

Voltage (AVC) : 7.3

Deadband : 4

Sensitivity : 3

Lock Out : No

Retract Distance : 0

Starting Arc Gap : .05

Start Delay : 1.7

Welding Current

 Fusion Mode : Pendant Setting 29 Amps

 Weld Mode : Pendant Setting 37 Amps

Filler Material Spec. : OMat 366

Size : .030 in. (0,76 mm) dia.

Feed Rate : 5.6 IPM (142,2 mm/min.)

Filler Wire Start Delay : 1.7

Filler Wire Stop Delay : 0.1

Dabber Strokes/Min : 350

Stroke Length : 0.470 in. (12 mm)

Pulsation : No

REPAIR

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OVERHAUL



Weld Speed

Fusion Mode : 90

Weld Mode : 110

NOTE: All readings shown are machine dial readings unless otherwise indicated.

COMMENTS: Set table at 90°, wire brush after each weld deposit.

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OLYMPUS 593

MK.610-14-28 SNECMA
OVERHAULSHAFT, ASSEMBLY, ROTOR REARPROVISION FOR RESTORING THE DIAMETER OF
LABYRINTH FINS BY MECHANISED T.I.G. WELDINGREPAIR NO. B488624-61. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	3 230A	B922515
		B930085
	230B	B935731
	230C	B936864
		B509533

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

A test piece B497475 is required initially and upon any subsequent change in airline operator, sub-contractor, machine or locality.

3. GENERALUNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)
 Dimensions in Inches (Millimetres)
 Tolerances on machined dimensions plus/minus 0.010 (0,25)
 Tolerance on angles plus/minus 2 degrees
 Break sharp edges 0.004 to 0.020 (0,1 to 0,5)
 Surface texture interpretation to ISO1302 (JES137)
 Surface texture to be 63 (1,6) Microinches (Micrometres)
 Welding symbols to ISO2553 (JES139)
 3rd Angle Projection

4. REPAIR PROCEDURESUPPLEMENTARY INFORMATION

- | | | |
|----|-----------------------------|---|
| 1) | Remove protective coatings. | Refer to Overhaul Manual
Chapter 72-09-00, Cleaning,
Process F. |
| 2) | Remove shank nuts. | Refer to Overhaul Manual
Chapter 72-09-00, Repair. |

REPAIR

72-31-03

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**OLYMPUS 593**MK.610-14-28 *sneema*

OVERHAUL.

- 3) Locate component on centre lathe and set true to datum diameter A. Refer fig.401
- 4) Machine damaged labyrinth fins to the dimensions given. Hand blend to remove burrs and sharp edges. Refer fig.402 and 403
- 5) Crack detect machined areas. Refer Overhaul Manual Chapter 72-31-03 Inspection/Check
- 6) Measure and record position of the number 3 and 4 labyrinth fins. Refer fig.404
- 7) Build up number 3 and 4 labyrinth fins by mechanised T.I.G. welding. Weld build-up must be sufficient to allow finished dimensions to be achieved. Refer TSD.594 OP.409 Use filler rods OMat 306 Refer Para.6.A and B Data. Refer fig.405
- 8) Build up number 5 labyrinth location by mechanised T.I.G. welding. Weld build-up must be sufficient to allow finished dimensions to be achieved. Refer TSD.594 OP.409 Use filler rods OMat 306 Refer Para.6.C Data. Refer fig.405
- 9) Locate component on centre lathe and set true to datum diameter A. Refer fig.401
- 10) Machine number 5 labyrinth location, removing the minimum amount of material, until the surface is free of all defects, e.g. voids, porosity etc.
- 11) Carry out dimensional checks to ensure that sufficient depth of weld has been deposited.
- 12) If necessary, repeat ops. 8 to 11 for the number 5 labyrinth location, until sufficient material is built up to achieve finished dimension.

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OVERHAUL

- | | | |
|-----|---|---|
| 13) | Dimensionally inspect for distortion. | Refer fig.401 |
| 14) | Crack detect. | Refer Overhaul Manual
Chapter 72-31-03
Inspection/Check |
| 15) | Ultrasonically inspect the number 5 labyrinth location using the C-scan process | Refer Overhaul Manual
Chapter 72-09-00
Inspection/check |
| 16) | Locate component on centre lathe and set true to datum diameter A. | Refer fig.401 |
| 17) | Finish machine the labyrinth fin number 3 to the dimensions given. Use dimensions obtained in op.6 to ensure maximum step does not exceed 0.005 (0,13). | Refer Para.7. Tools, item 1.
Refer fig.406 |
| 18) | Finish machine the labyrinth fin number 4 to the dimensions given. Use dimensions obtained in op.6 to ensure maximum step does not exceed 0.005 (0,13). | Refer Para.7. Tools, item 2 and 3.
Refer fig.406 and .407 |
| 19) | Finish machine the labyrinth fin number 5 to the dimensions given. | Refer Para.7. Tools, item 4.
Refer fig.408 |
| 20) | Crack detect. | Refer Overhaul Manual
Chapter 72-51-04
Inspection/Check |

At this point it is permissible to embody SB.OL.593-72-8896-347 if applicable. Repair identity number RI B488624-6 (R14A-C) as applicable must be marked on component adjacent to new part number.

- 21) Reprotect component.

Pre - OLY MOD.8896 standard.

Apply Aluminium paint to surfaces marked AJ.
This embodies OLY MOD.8763.
Re-part number accordingly.

Refer Overhaul Manual
Chapter 72-09-04 Repair.
Refer fig.410 and 411
Refer SB.OL.593-72-8763-293.

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OVERHAUL

Post - OLY MOD.8896 standard.

Apply corrosion resistant coating type A or B followed by corrosion resistant sealing coating to surfaces marked AJ.

Refer TSD 594 OP.349 using OMat 7/46 and 7/168. Refer fig.410, 412 and 413.

Area marked AN to be touched up locally by brush on assembly.

Refer Overhaul Manual Chapter 72-09-04, Repair using OMat 7/22 (Do not hand abrade prior to application).

22) Fit shank nuts.

Refer to Overhaul Manual Chapter 72-09-00, Repair Refer Para.8. Replacement parts, item 1.

23) Mark Repair Instruction number RI B488624-6 or R14 A-C as applicable on component adjacent to normal 'assy. of' number using the vibro-percussion engraving technique.

Refer Overhaul Manual Chapter 72-09-00, Repair. No.3 Labyrinth-B488624(R14A) No.4 Labyrinth-B488625(R14B) No.5 Labyrinth-B488626(R14C)

5. Material

<u>Component</u>	<u>Material</u>	<u>RR Code</u>
Shaft, Assembly, Rotor Rear.	MSRR6001 Low Alloy Steel	AGY

6. Data

A. T.I.G weld data for Number 3 Labyrinth (for guidance only)

Weld process:	Hobart dabber welder system
Weld current:	400 DC
Amperage:	100 amp
Weld preparation:	Machined surface, degrease using M.E.K. OMat 135.
Electrode:	Material: 2% thoriated tungsten. Size: 0.063(1,59) diameter. OMat 3/153.
Shielding gas:	Argon.
Gas flow rate:	35 cu ft/hour (991,5 L/hour).
Trailing gas:	--
Gas flow rate:	--
Voltage (AVC):	8.6
Deadband:	4
Sensitivity:	3
Lock out:	No

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MK.610-14-28 shecma

OVERHAUL

Retract distance: 0
 Starting arc gap: 0.05
 Start delay: 1.5

Welding current.

Fusion mode: Pendant setting 30.5 amps.
 Weld mode: Pendant setting 35 amps.
 Filler material spec: OMat 306
 Size: 0.030(0,76) diameter.
 Feed rate: 8.4 ins/min (213 mm/min).
 Wire start delay: 1.5
 Wire stop delay: 0.1
 Dabber strokes/min: 390
 Stroke length: 0.47(12)
 Pulsation: No
 Weld speed.
 Fusion mode: 50
 Weld mode: 50 increasing to 75 as fin height progresses.

Note: All readings shown are machine dial readings unless otherwise indicated

Comments: Set table at 550, wire brush after each weld deposit.

B. T.I.G weld data for Number 4 labyrinth (for guidance only)

Weld process: Hobart dabber welder system
 Weld current: 400 DC
 Amperage: 100 amp
 Weld preparation: Machined surface, degrease using M.E.K. OMat 135.
 Electrode: Material: 2% thoriated tungsten. Size: 0.063(1,59) diameter. OMat 3/153.
 Shielding gas: Argon.
 Gas flow rate: 35 cu ft/hour (991,5 L/hour).
 Trailing gas: --
 Gas flow rate: --
 Voltage (AVC): 7.2
 Deadband: 4
 Sensitivity: 3
 Lock out: No
 Retract distance: 0
 Starting arc gap: 0.05
 Start delay: 1.5
 Welding current.
 Fusion mode: Pendant setting 30.5 amps.
 Weld mode: Pendant setting 34 amps.
 Filler material spec: OMat 306
 Size: 0.030(0,76) diameter.

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**OLYMPUS 593**MK.610-14-28 SNECMA
OVERHAUL

Feed rate: 8.4 ins/min (213 mm/min).
Wire start delay: 1.5
Wire stop delay: 0.1

Dabber strokes/min: 395
Stroke length: 0.47(12)
Pulsation: No
Weld speed.
Fusion mode: 50
Weld mode: 50 increasing to 75 as fin height progresses.

Note: All readings shown are machine dial readings unless otherwise indicated

Comments: Set table at 90°, wire brush after each weld deposit.

C. T.I.G weld data for Number 5 Labyrinth (for guidance only)

Weld process: Hobart dabber welder system
Weld current: 400 DC
Amperage: 100 amp
Weld preparation: Machined surface, degrease using M.E.K. OMat 135.
Electrode: Material: 2% thoriated tungsten. Size: 0.063(1,59) diameter. OMat 3/153.
Shielding gas: Argon.
Gas flow rate: 35 cu ft/hour (991,5 L/hour).
Trailing gas: --
Gas flow rate: --
Voltage (AVC): 7.1
Deadband: 4
Sensitivity: 3
Lock out: No
Retract distance: 0
Starting arc gap: 0.04
Start delay: 2.7
Welding current.
Fusion mode: Pendant setting 40 amps.
Weld mode: Pendant setting 69 amps.
Filler material spec: OMat 306
Size: 0.030(0,76) diameter.
Feed rate: 6.0 ins/min (152 mm/min).
Wire start delay: 2.3
Wire stop delay: 0.1
Dabber strokes/min: 305
Stroke length: 0.47(12)
Pulsation: No
Weld speed.
Fusion mode: 35
Weld mode: 35

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OVERHAUL

Note: All readings shown are machine dial readings unless otherwise indicated

Comments: Set table at 80°, wire brush after each weld deposit.

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
S3S15547000	Form Tool	1
S3S15509000	Form Tool	2
S3S15511000	Form Tool	3
S3S15510000	Form Tool	4

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
AS27861	Nut, Self Locking	8	1

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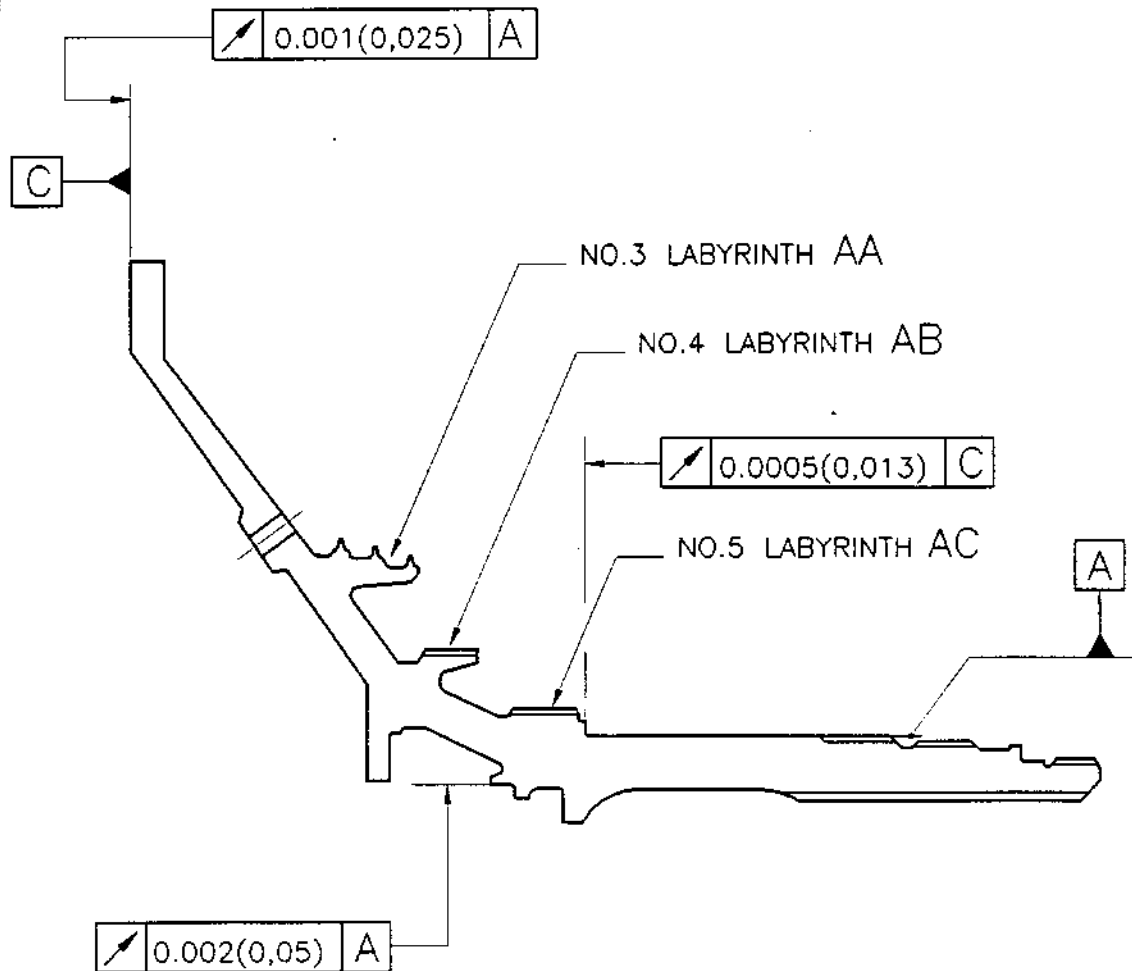
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MK.610-14-28 *sneema*
OVERHAUL



TYPICAL SECTION THROUGH SHAFT ROTOR REAR L.P.
FIG.401

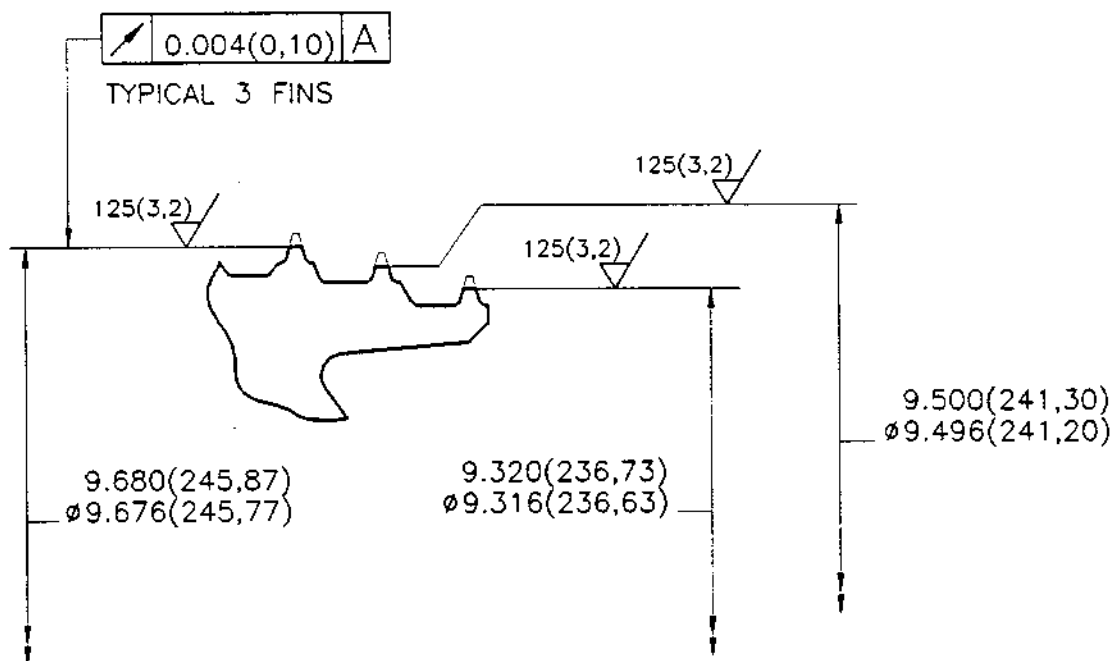


OLYMPUS 593

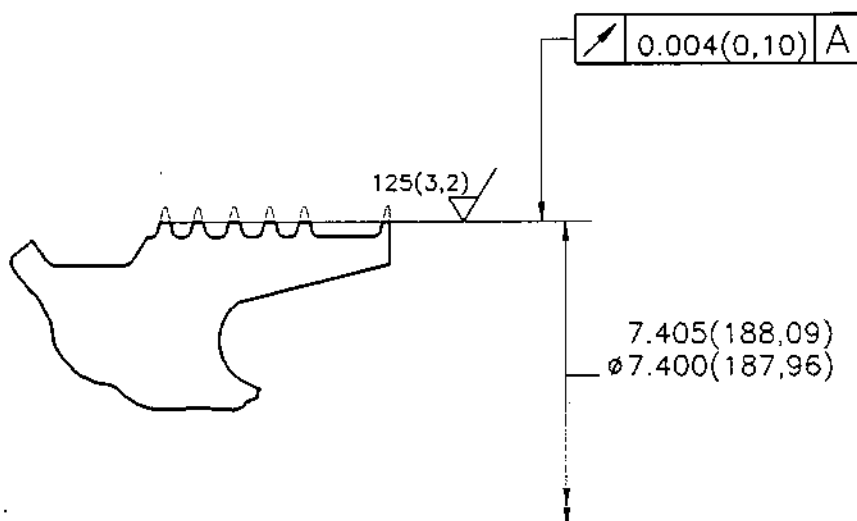


MK.610-14-28
OVERHAUL

sneema



DETAIL AA



DETAIL AB

MACHINING DETAILS
FIG.402

REPAIR

72-31-03

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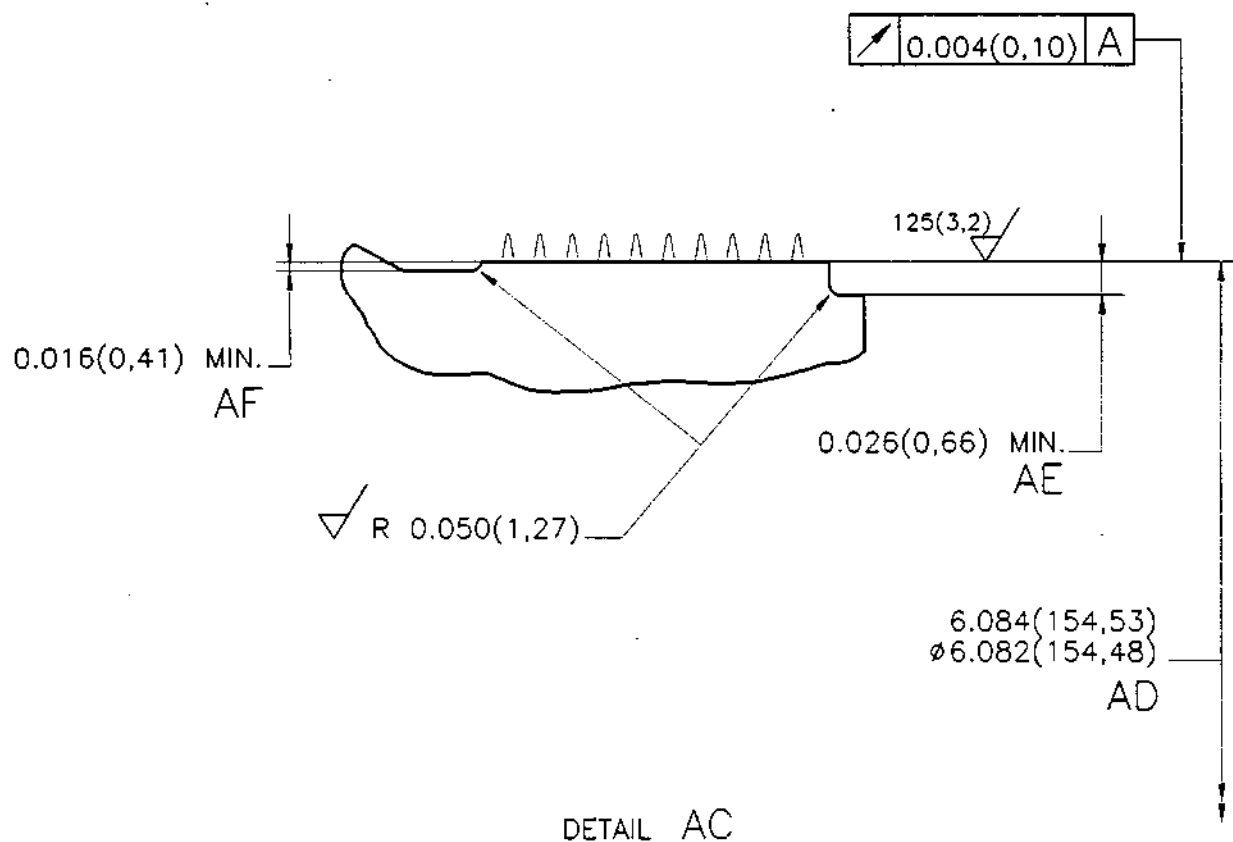


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MK.610-14-28 SNECMA
OVERHAUL

NOTE: IF DIAMETER MARKED AD FAILS TO CLEAN UP
WITHIN THIS DIMENSION, IT MAY BE FURTHER
REDUCED TO A MINIMUM OF $\phi 6.069(154,15)$
WITH DIMENSIONS MARKED AE AND AF IGNORED.



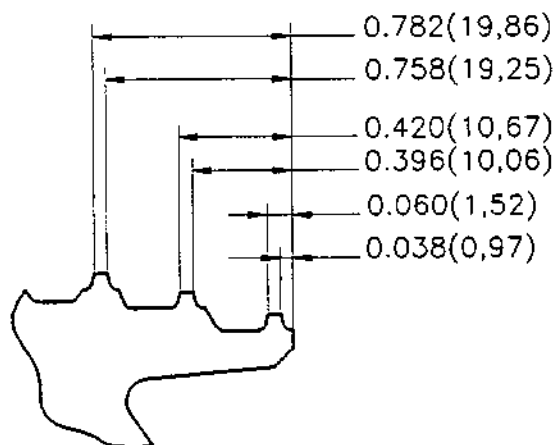
MACHINING DETAILS
FIG.403



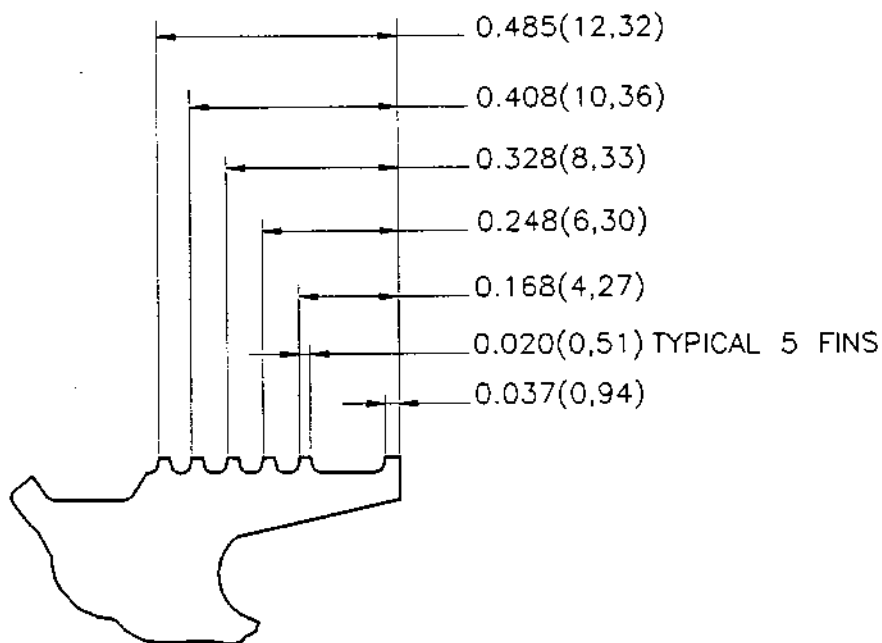
OLYMPUS 593



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OVERHAUL



REPEAT DETAIL AA



REPEAT DETAIL AB

REFERENCE DIMENSIONS
FIG.404

REPAIR

72-31-03

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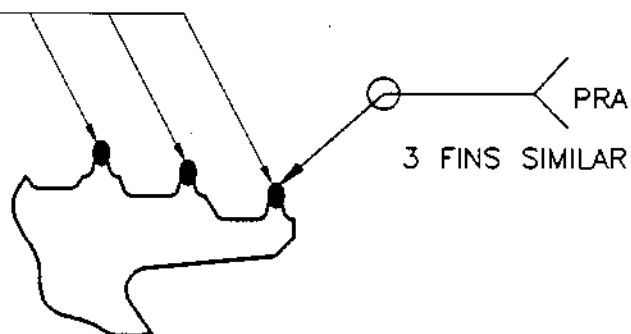


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MK.610-14-28
OVERHAUL

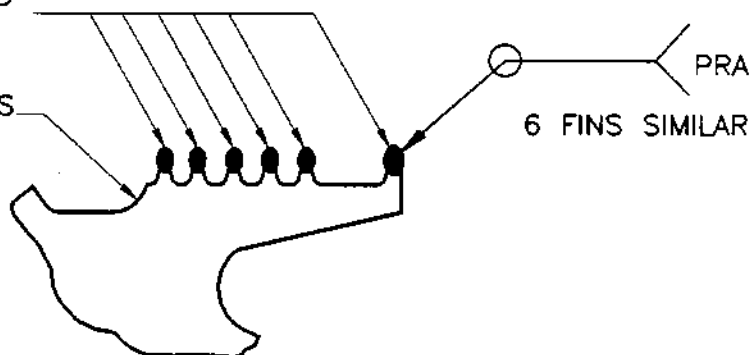
SINGLE FIN WELD BUILD UP



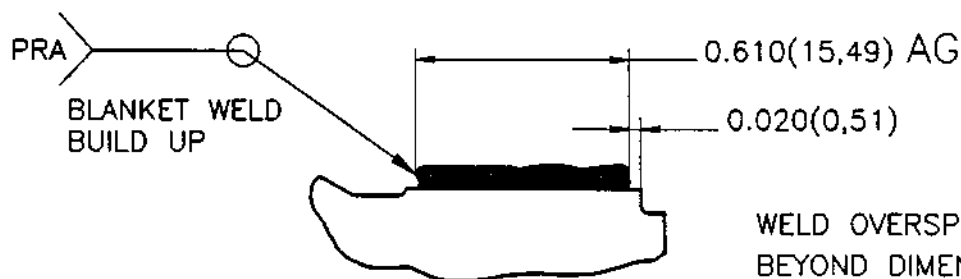
REPEAT DETAIL AA

SINGLE FIN WELD BUILD UP

NO WELD IN RADIUS



REPEAT DETAIL AB



REPEAT DETAIL AC

WELD OVERSPILL
BEYOND DIMENSION
AG IS NOT
PERMISSIBLE.

WELD DETAILS
FIG.405

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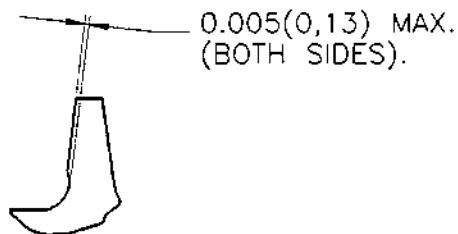
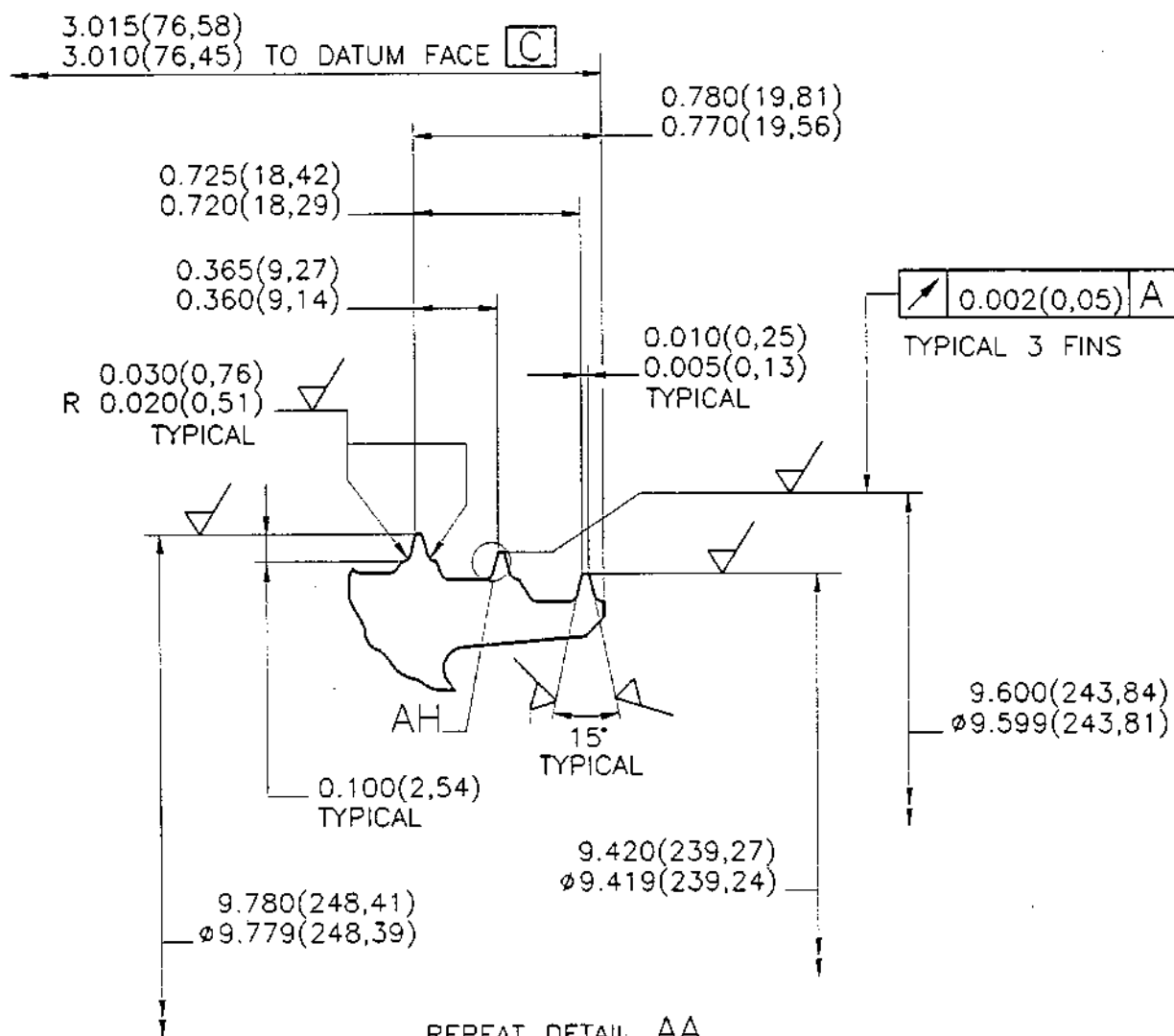


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DETAIL AH
APPLICABLE TO ALL FINS

MACHINING DETAILS
FIG.406

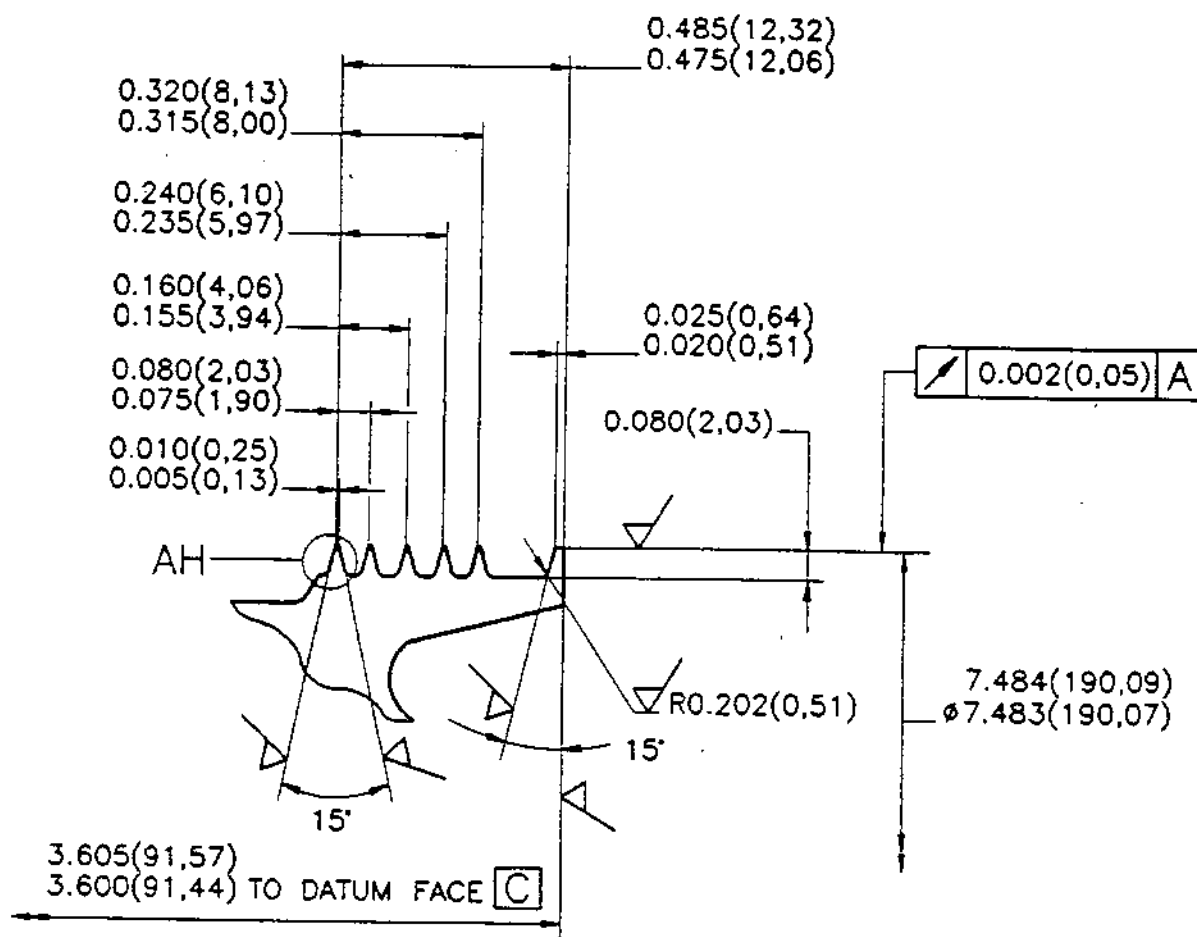
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OVERHAUL



REPEAT DETAIL AB

MACHINING DETAILS
FIG.407

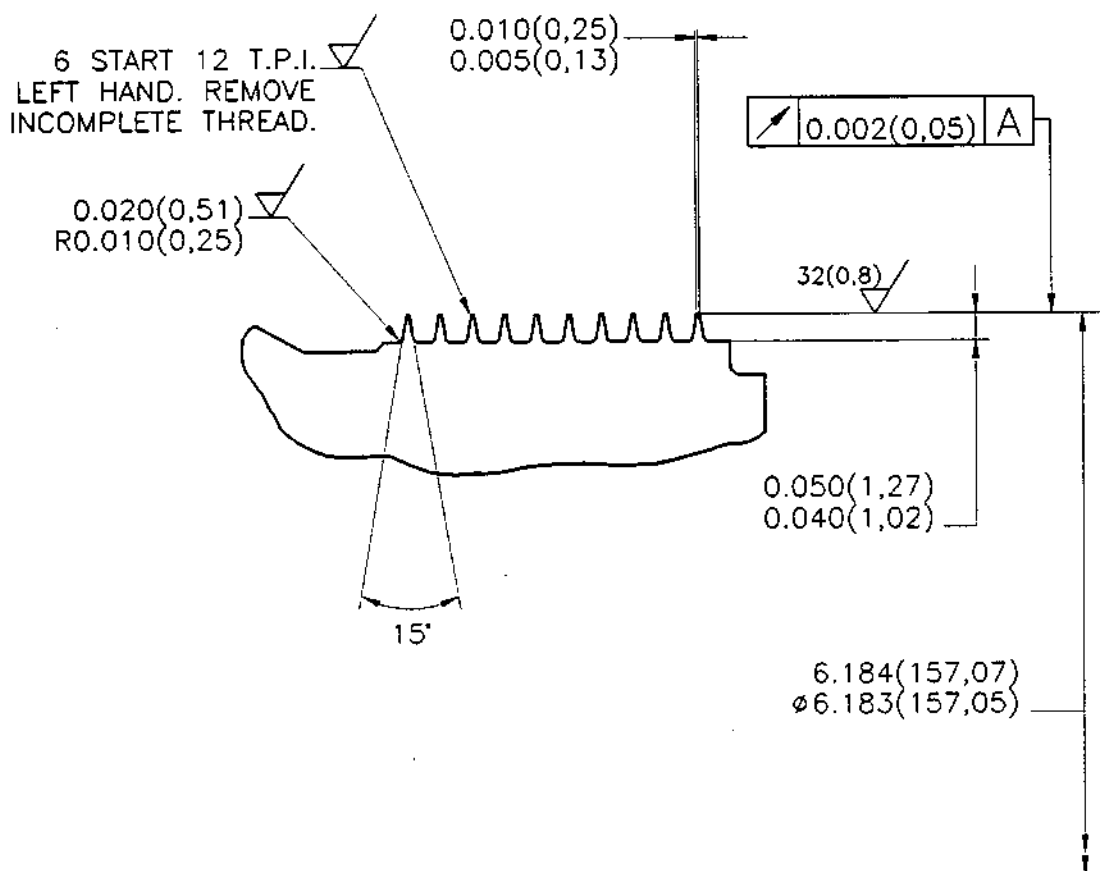
REPAIR
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REPEAT DETAIL AC

MACHINING DETAILS
FIG.408

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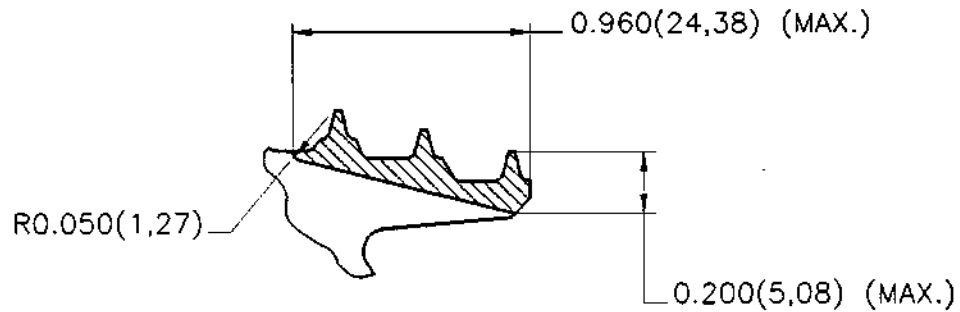
Jan 31/94



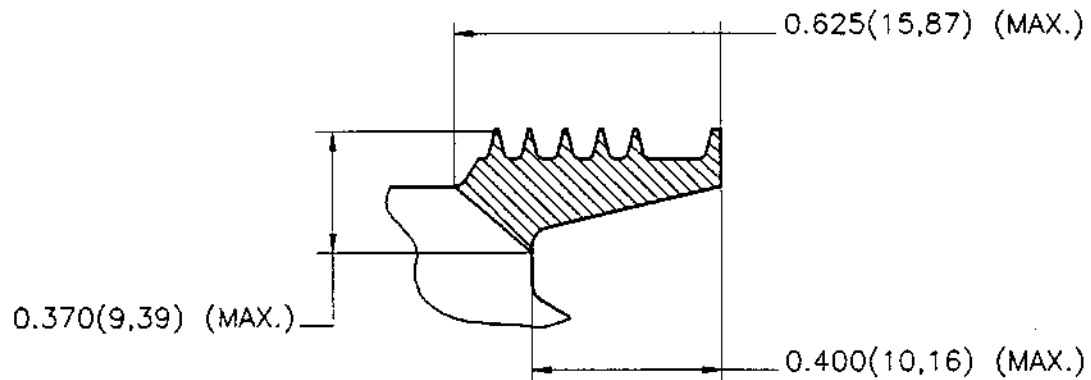
OLYMPUS 593



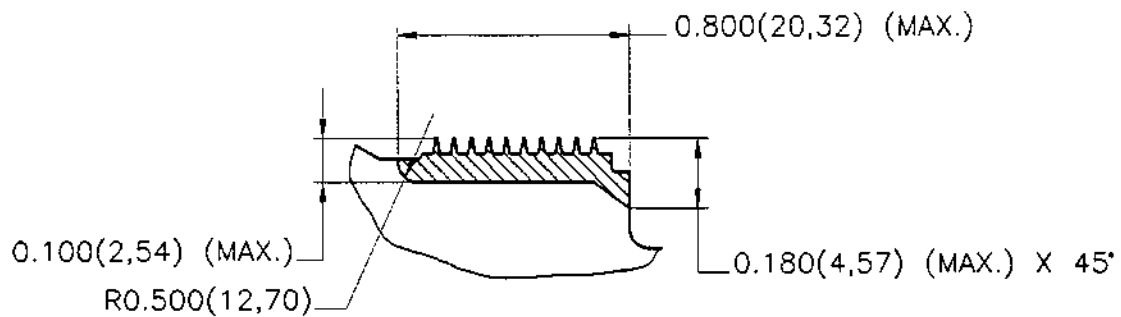
MK.610-14-28 snecma
OVERHAUL



REPEAT DETAIL AA



REPEAT DETAIL AB



REPEAT DETAIL AC

HEAT AFFECTED ZONE DETAILS
FIG.409

REPAIR

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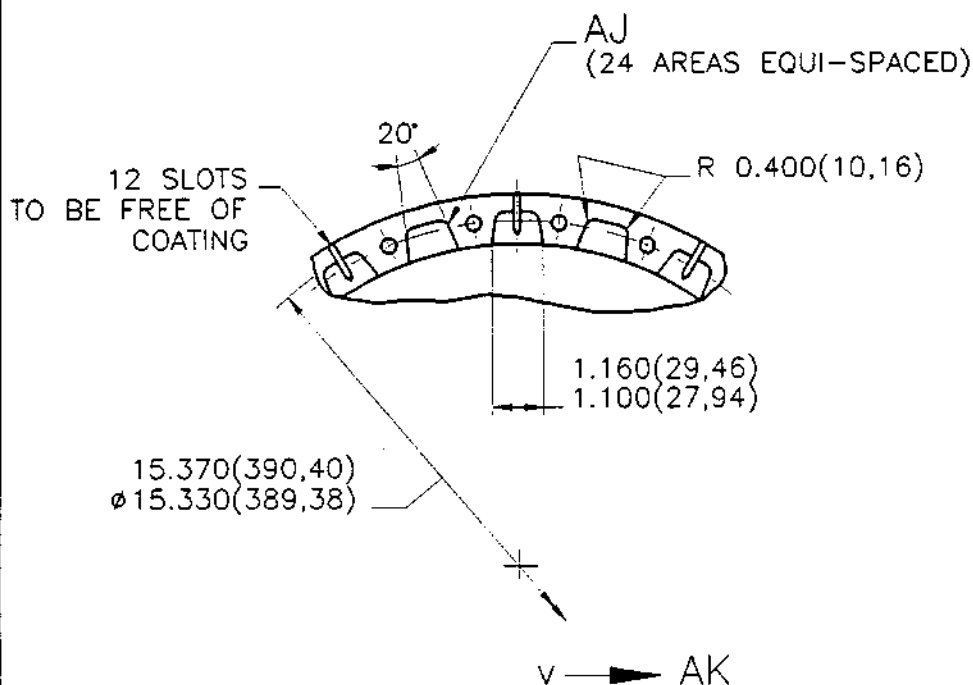
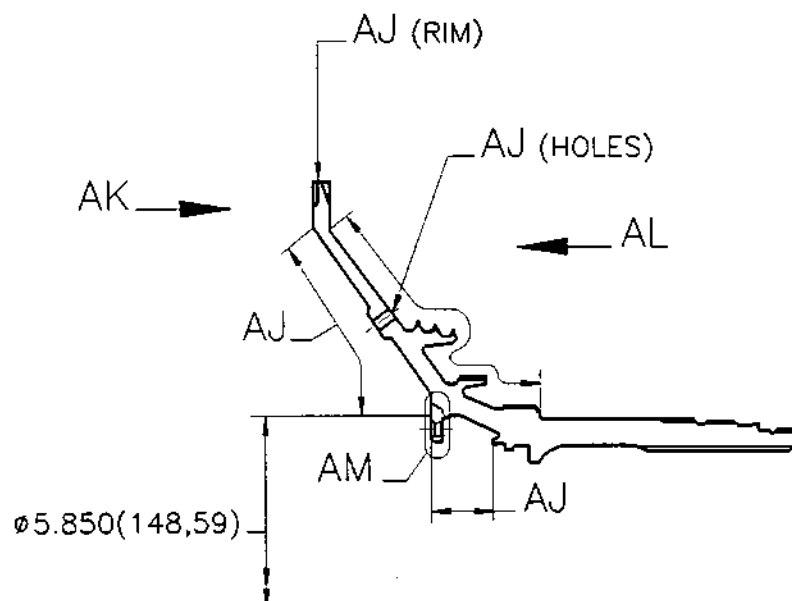


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OVERHAUL

sneema



RE-PROTECTION DETAILS
FIG.410

REPAIR

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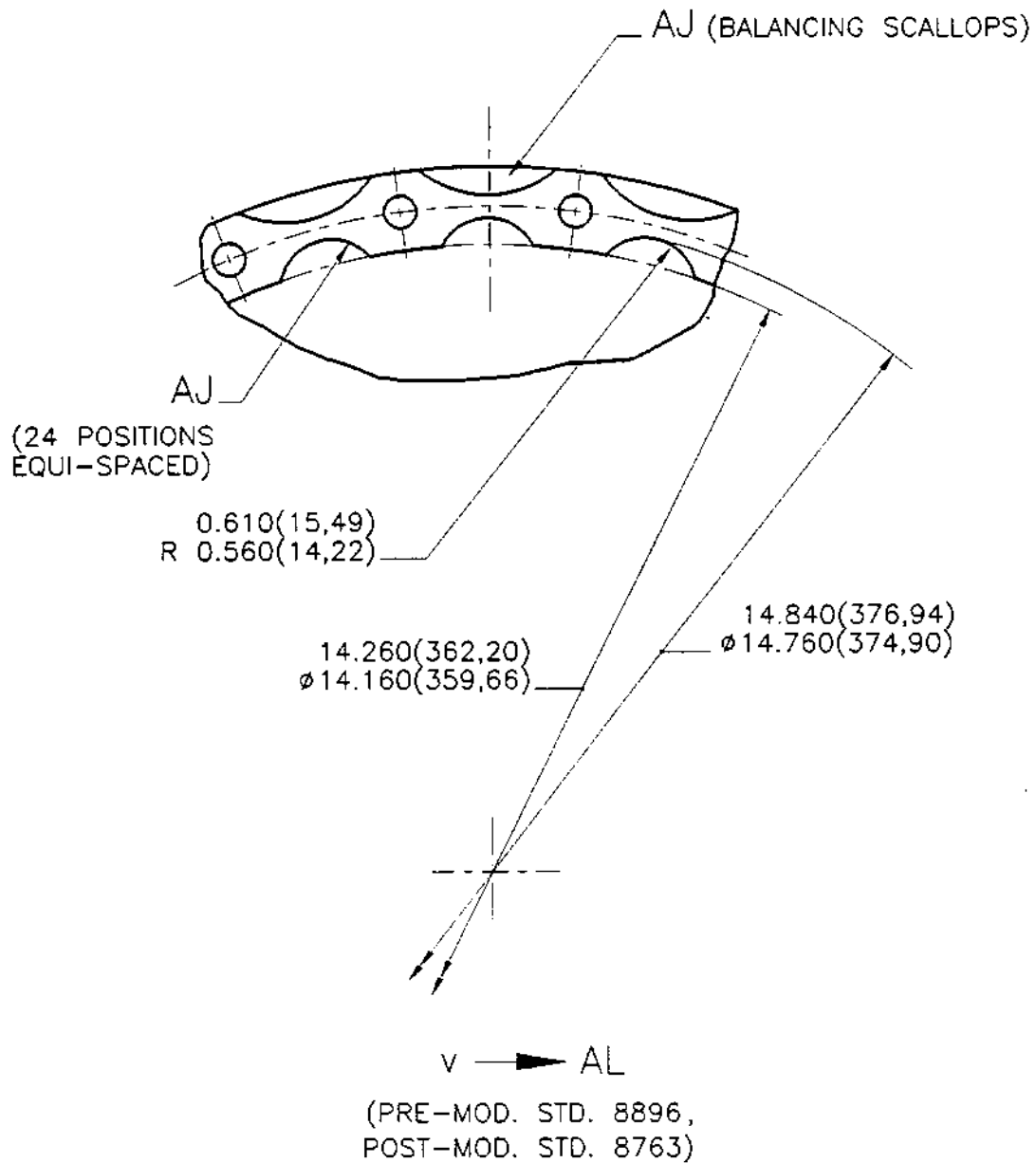
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OVERHAUL



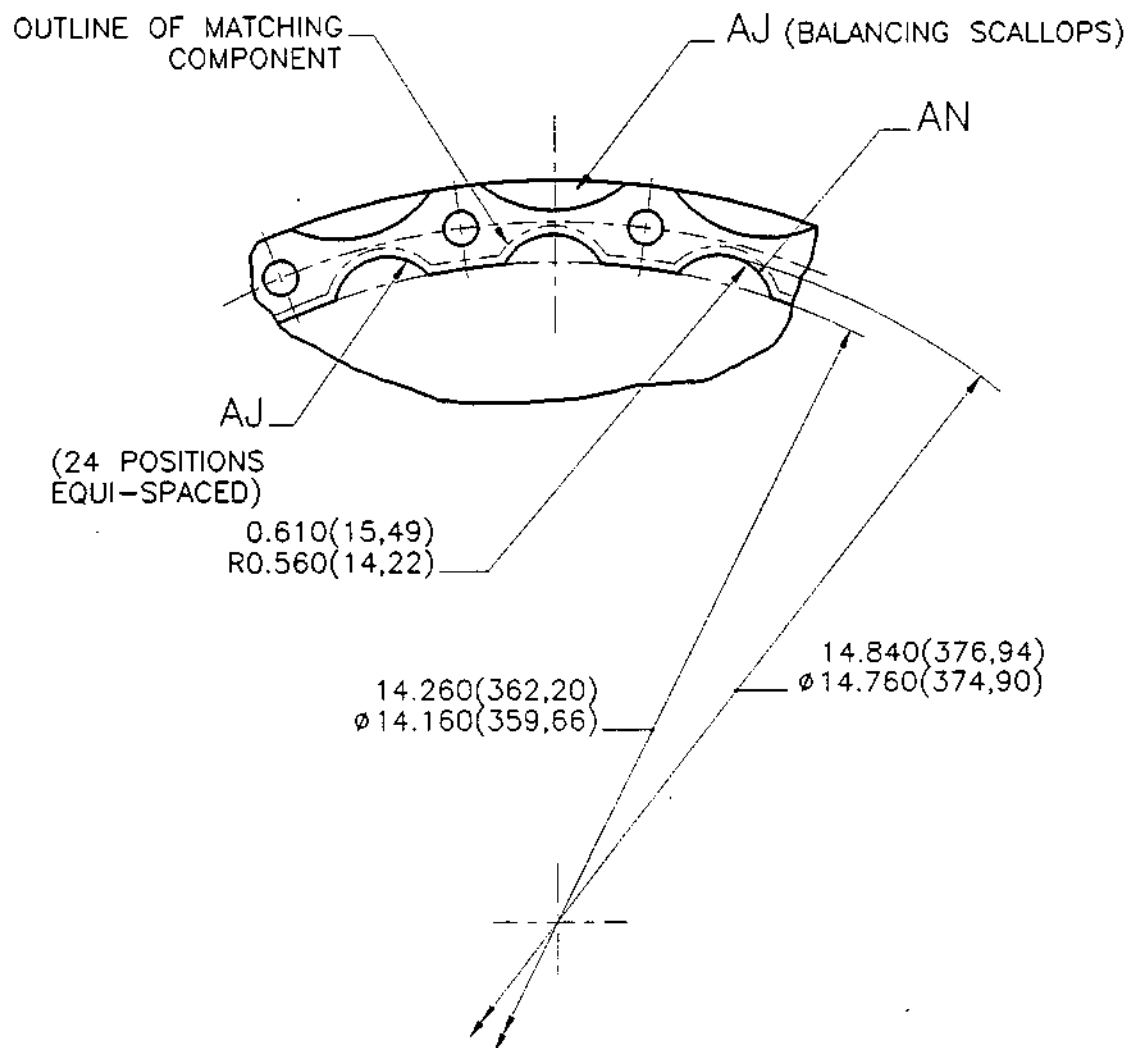
RE-PROTECTION DETAILS
FIG.411



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MK.610-14-28
OVERHAUL



v → AL

(POST-MOD. STD. 8896)

RE-PROTECTION DETAILS
FIG.412

REPAIR

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Repair No. 14

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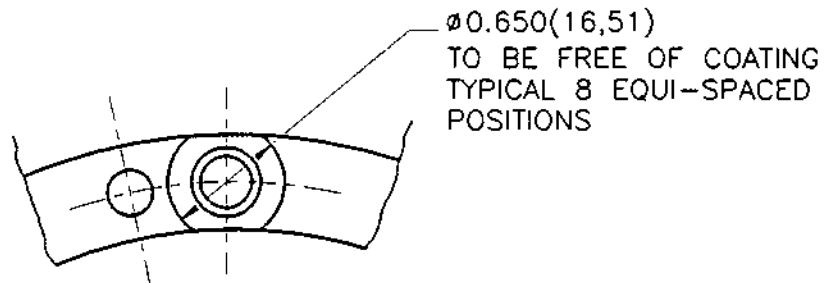
Jan 31/94



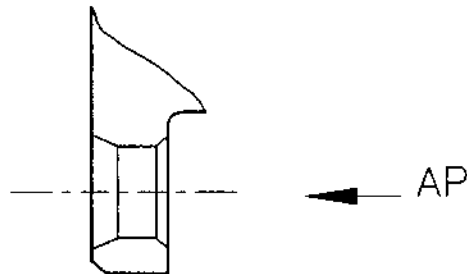
OLYMPUS 593



MK.610-14-28 snecma
OVERHAUL



v → AP



DETAIL AM
(POST-MOD. STD. 8896)

RE-PROTECTION DETAILS
FIG.413

REPAIR
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OVERHAUL

RING, SPACER, STAGES 1-2, 2-3, 3-4, 4-5, 5-6, 6-7 (L.P.C)

PROVISION FOR THE BLENDING OF SCORING AND
/OR GOUGING ON THE BOLT LOCATING DIAMETER

B514631

1. EFFECTIVITY

<u>IPC</u>		<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	1	190A	B444610
			B429872
		190B	B922798
		190C	B929441
		190D	B930176
		190E	B514361
72-31-03	1		B514362
			B514363
		280A	B444611
			B429873
		280B	B922800
		280C	B929443
		280D	B930178
		280E	B514365
			B514366
			B514367
72-31-03	2	30A	B429874
		30B	B922802
		30C	B929445
		30D	B930180
		30E	B514369
			B514370
72-31-03	2	90A	B423303
		90B	B922804
		90C	B929447
		90D	B930182
		90E	B514371
			B514372
72-31-03	2	150A	B423304
		150B	B922806
		150C	B929449
		150D	B930184
		150E	B514373
			B514374
72-31-03	3		B514375
		270A	B423305
		270B	B922808
		270C	B929451
		270D	B930186
		270E	B514376

REPAIR

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OVERHAUL

B514377

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

Blending is limited to removal of high metal and sharp edges only.

This Repair Instruction may be embodied any number of times provided that the maximum residual depth of damage does not exceed 0.025 (0,64) after removal of high metal.

This repair instruction may be embodied to any number of dee head bolt location positions.

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus .010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- 1) Using hand tools only, carefully blend to remove high metal and sharp edges only. Remove the minimum amount of material necessary. Residual depth of defect(s) after removal of high metal 0.025 (0,64) maximum.

Refer figs 401 to 403.
Refer para.2. REPAIR LIMITATIONS.
Refer para.6. DATA.

CAUTION: If during metal removal, blending or polishing, the material exhibits discolouration due to local overheating, the component must be referred to the local controlling laboratory for assessment by etching and metallurgical examination.

REPAIR

72-31-03

Repair No. 15

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**OLYMPUS 593**MK.610-14-28 *sneema*
OVERHAUL

- 2) Locally etch repaired area(s). Refer Overhaul Manual Chapter 72-09-14 Repair para. J, solution A.
- 3) Binocular inspect at X15 magnification.
- 4) Locally crack detect repaired area(s). Refer Overhaul Manual Chapter 72-31-03 Inspection/check
- 5) Locally vapour blast etched area(s). Refer Overhaul Manual Chapter 72-09-13 Repair para. J, process B.
- 6) Mark Repair Instruction no. RI B514631 or R15 on component adjacent to normal 'assembly of' number using the vibro-percussion engraving technique. Refer Overhaul Manual Chapter 72-09-00 Repair.

5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
RING, SPACER, STAGES 1-2, 2-3, 3-4, 4-5, 5-6, 6-7 (L.P.C).	TITANIUM ALLOY IMI 550 MSRR 8634	TCT

6. DATA

The definition of the term HAND TOOLS ONLY is deemed to imply that the following may be used:-

GUN - USHIO AIR TOOL COMPANY Ltd

TYPE MSG-3BSN 65000 R.P.M (6 BAR AIR PRESSURE).

WHEEL - MASTER ABRASIVE

TYPE A120 HFX.

NOTE: Load/pressure applied when using the above equipment should not be sufficiently great so as to produce smoking and/or an unpleasant odour from the adhesive agent in the abrasive wheel.



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MK.610-14-28
OVERHAUL

sheema

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE.		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			

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72-31-03

Repair No. 15

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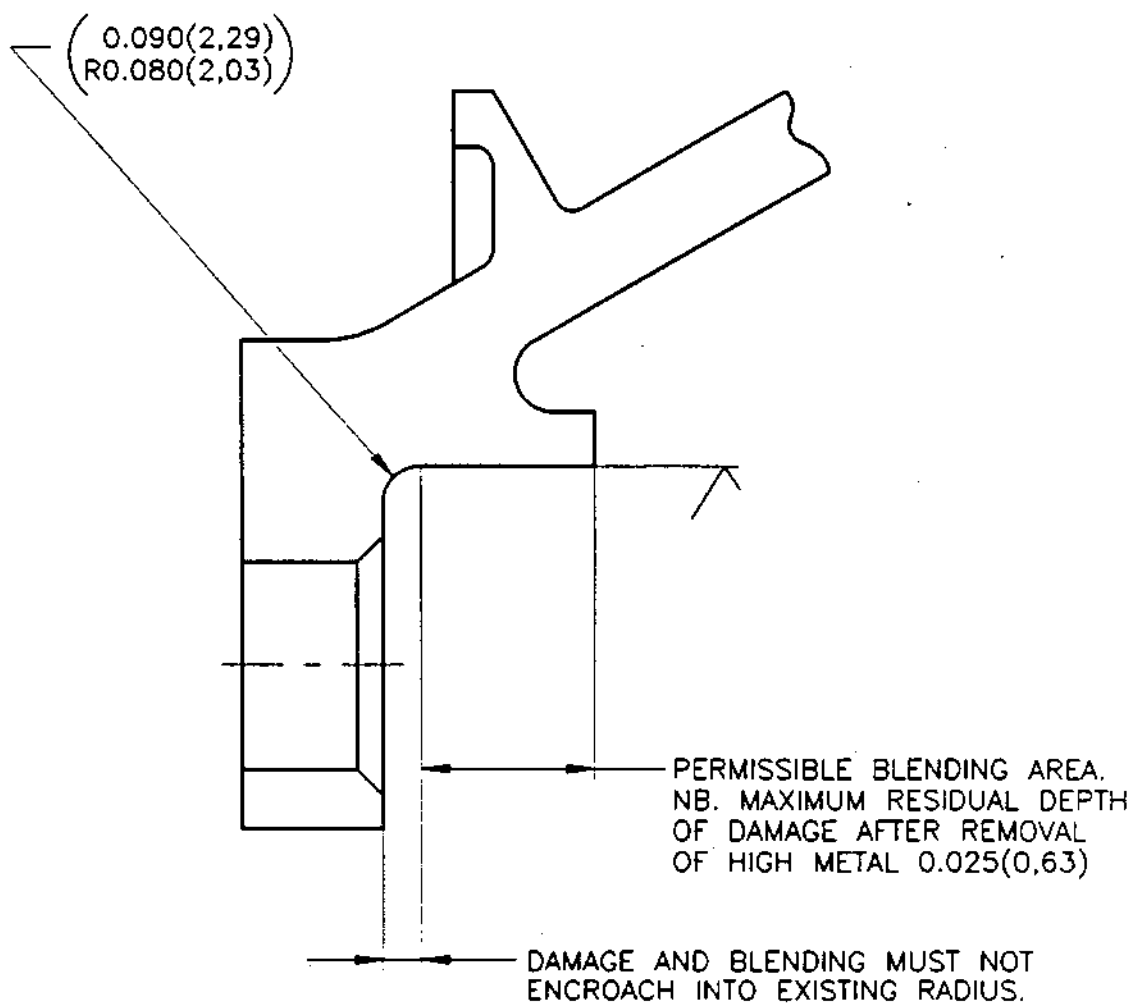


MK.610-14-28

sneema

OVERHAUL

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TYPICAL VIEW ON SPACER FRONT FLANGE AT BOLT LOCATION POSITION
STAGES 1-2 AND 2-3 ONLY.
FIG.401

REPAIR

72-31-03

Repair No. 15

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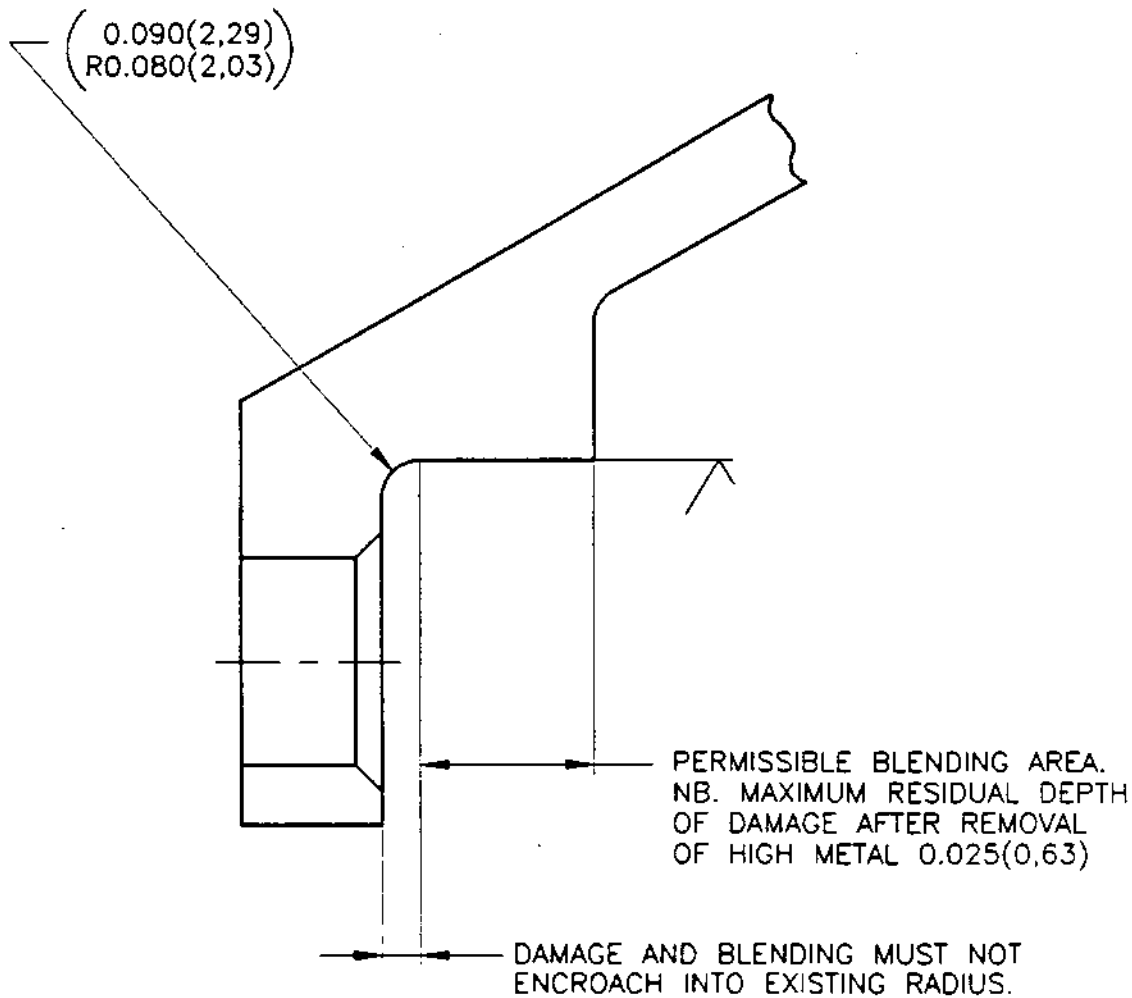
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MK.610-14-28 *sneema*
OVERHAUL



TYPICAL VIEW ON SPACER FRONT FLANGE AT BOLT LOCATION POSITION
STAGE 3-4 ONLY.

FIG.402

REPAIR

72-31-03

Repair No. 15

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OLYMPUS 593

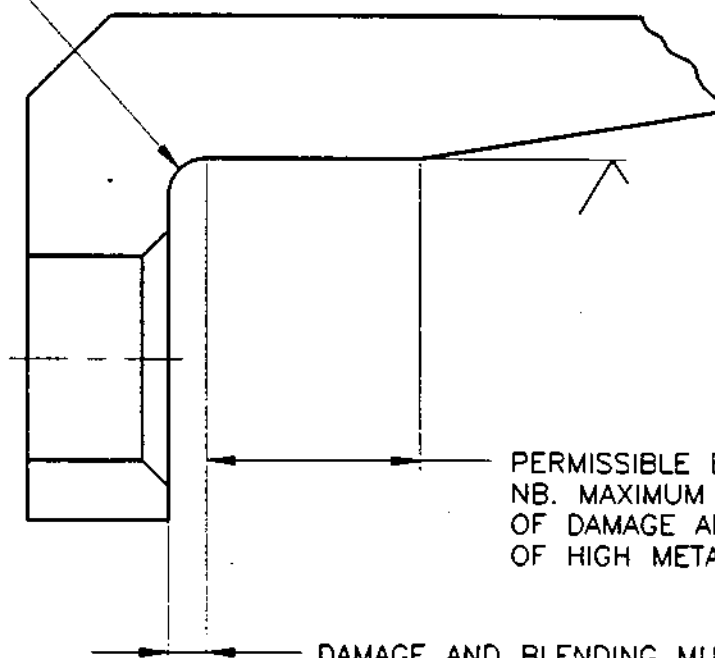


MK.610-14-28
OVERHAUL

snecma

Printed in England

(0.090(2,29)
R0.080(2,03))



PERMISSIBLE BLENDING AREA.
NB. MAXIMUM RESIDUAL DEPTH
OF DAMAGE AFTER REMOVAL
OF HIGH METAL 0.025(0,63)

DAMAGE AND BLENDING MUST NOT
ENCROACH INTO EXISTING RADIUS.

TYPICAL VIEW ON SPACER FRONT FLANGE AT BOLT LOCATION POSITION
STAGES 4-5, 5-6 AND 6-7 ONLY.

FIG.403

REPAIR

72-31-03

Repair No. 15

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OLYMPUS 593



MK.610-14-28 *sneema*
OVERHAUL

RING, SPACER, (LPC)
STAGES 1-2 TO 6-7

RE-BUILDING OF LABYRINTH FINS
BY MECHANISED T.I.G. WELDING.

B516426-31

1. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	1 /190A	B444610
		B429872
	1 /190B	B922798
	1 /190C	B929441
	1 /190D	B930176
	1 /190E	B514361
		B514362
72-31-03		B514363
	1 /280A	B444611
		B429873
	1 /280B	B922800
	1 /280C	B929443
	1 /280D	B930178
	1 /280E	B514365
72-31-03		B514366
		B515367
	2 /30A	B429874
	2 /30B	B922802
	2 /30C	B929445
	2 /30D	B930180
	2 /30E	B514369
72-31-03		B514370
	2 /90A	B423303
	2 /90B	B922804
	2 /90C	B929447
	2 /90D	B930182
	2 /90E	B514372
		B514371
72-31-03	2 /150A	B423304
	2 /150B	B922806
	2 /150C	B929449
	2 /150D	B930184
	2 /150E	B514374
		B514375
		B514373

REPAIR

72-31-03

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**OLYMPUS 593**MK.610-14-28 *sneema*
OVERHAUL**1. EFFECTIVITY (CON'T)**

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-03	3 /270A	B423305
	3 /270B	B922808
	3 /270C	B929451
	3 /270D	B930186
	3 /270E	B514377
		B514376

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

A test sample is required for validation purposes prior to the initial repair and any subsequent change of process, sub-contractor or locality. Details of the validation test requirements should be obtained by writing to the Repair Authority at Rolls-Royce Plc.

It is not permissible to repair spacers where the labyrinth fins are worn below these diameters:

Stage 1-2:- 11.715(297,56)
Stage 2-3:- 14.065(357,25)
Stage 3-4:- 16.265(413,13)
Stages 4-5, 5-6, 6-7:- 16.260(413,00)

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)
Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURE**SUPPLEMENTARY INFORMATION**

- 1) Load component to machining
fixture and set true to datums.

Refer Fig.401.
Refer para.7. Tools, item 1,
2 or 3.

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- | | | |
|-----|--|--|
| 2) | Machine the labyrinth fins to the required diameter. | Refer Figs.402 and 404. |
| 3) | Remove component from machining fixture. | |
| 4) | Deburr component. | |
| 5) | Dimensionally inspect. | Refer Figs.402 and 404. |
| 6) | Locally dye penetrant inspect repair area. | Refer TSD 594 OP.210 |
| 7) | Load component to welding machine and set true to datums. | Refer Fig.401. |
| 8) | Build-up fins by Inert gas arc welding.
Weld build-up must be sufficient to allow finish machining dimensions to be achieved. | Refer TSD 594 OP.409
Use filler rods OMat 366.
Refer para.6. Data.
Refer Fig.402. |
| 9) | Dimensionally inspect to ensure sufficient depth of weld has been deposited. | Refer Fig.402. |
| 10) | Remove component from welding machine. | |
| 11) | Load component to machining fixture and set true to datums. | Refer Fig.401.
Refer para.7. Tools, item 1, 2 or 3. |
| 12) | Finish machine fins to dimensions given. | Refer Figs.403 and 404.
Refer para.7. Tools, item 4. |
| 13) | Remove component from machining fixture. | |
| 14) | Deburr component. | |
| 15) | Dimensionally inspect. | Refer Figs.403 and 404. |

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72-31-03

Repair No. 16

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OVERHAUL

- 16) Inspect for weld porosity.

Refer TSD 594-J
 TASK 70-00-00-300-409
 SUBTASK
 70-00-00-220-409-001
 Post weld inspection
 (Group 1 Butt weld)
 - Refer to Fig.
 70-00-00-990-409-A06
 Defect 9 (Group 1)
 and Fig. 70-00-00-00-
 990-409-011.

NOTE: If the fin side flanks do not clean up after machining, then the following is acceptable:
 Areas 0.005 maximum depth x 1.000 long. Total length per fin side flank not to exceed 5.000.

- 17) Locally etch repair area. Refer TSD 594 OP.133
- 18) Locally dye penetrant inspect repair area. Refer TSD 594 OP.210
- 19) Vapour blast area affected by etching. Refer Overhaul Manual Chapter 72-09-13 Repair.
- 20) Mark Repair Instruction number RI B516426-31 or R16A-F (see Table A) on component, adjacent to normal 'assembly of' number, using the vibro-percussion engraving technique. Refer Overhaul Manual Chapter 72-09-00 Repair. Refer Fig.401.

TABLE A.

SPACER RING STAGE.	REPAIR INSTRUCTION NUMBER.	'R' NUMBER.
1-2	B516426	16A
2-3	B516427	16B
3-4	B516428	16C
4-5	B516429	16D
5-6	B516430	16E
6-7	B516431	16F

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5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
RING, SPACER, (L.P.C) STAGES 1-2 TO 6-7.	TITANIUM MSRR 8634	TCT

6. DATAWELDING DATA.

Welding parameters to be defined by test sample validation.

POST WELD MACHINING DETAILS.

Lubricant: G.P soluble oil at 60-1 dilution.

Speed: 50-100 RPM and 15 RPM (manual).

Feed: 0.004(0,01)/REV.

Depth of Finishing Cut: 0.002(0,05) maximum.

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
S3S15781000	FIXTURE, MACHINING STAGES 1-2 AND 2-3.	1
S3S15783000	FIXTURE, MACHINING STAGES 3-4 AND 4-5.	2
S3S15785000	FIXTURE, MACHINING STAGES 5-6 AND 6-7.	3
S3S15787000	FORM TOOL.	4

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			

REPAIR

72-31-03

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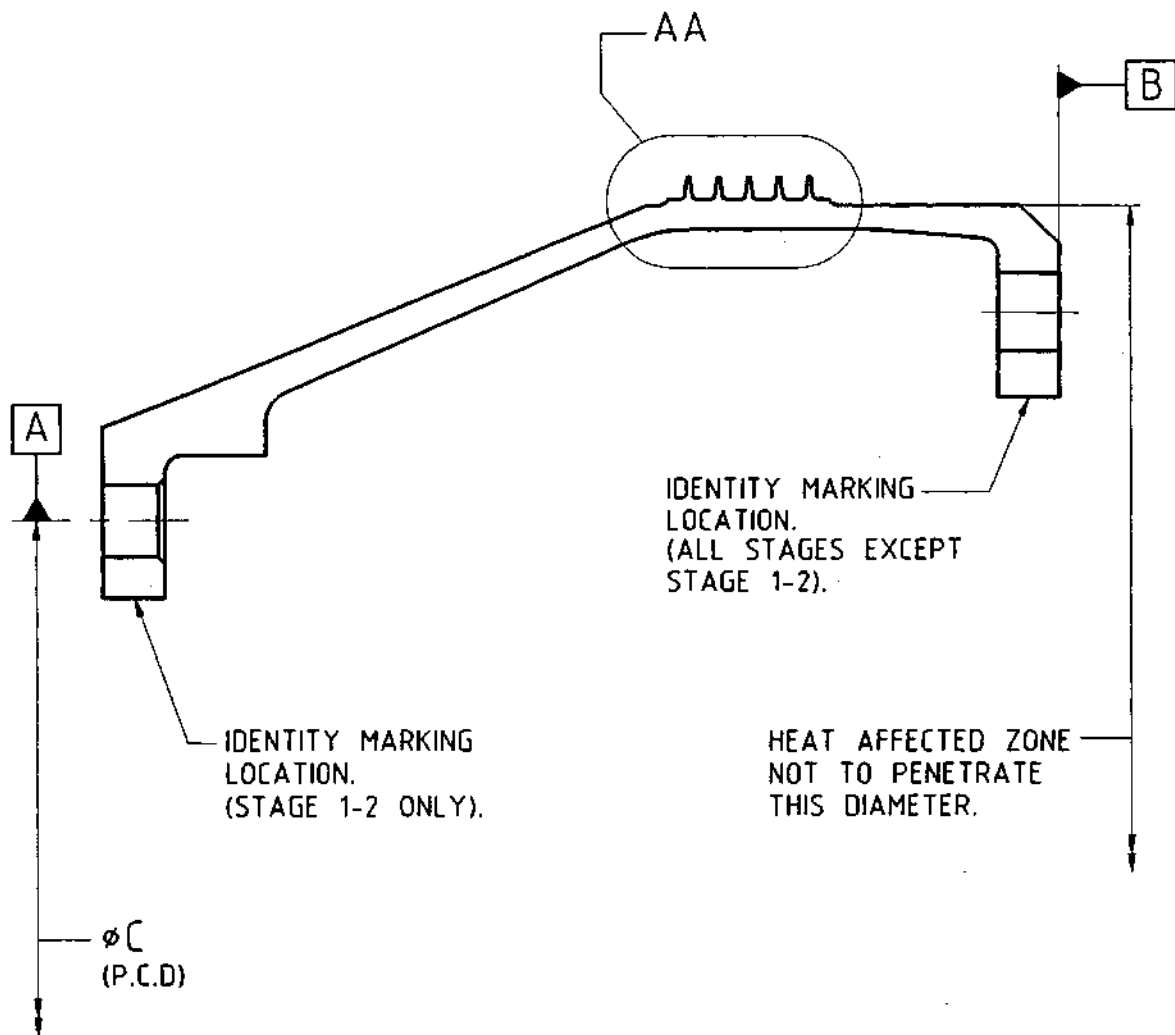
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OVERHAUL



SECTION THROUGH TYPICAL SPACER
FIG.401.

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MK.610-14-28 sheema
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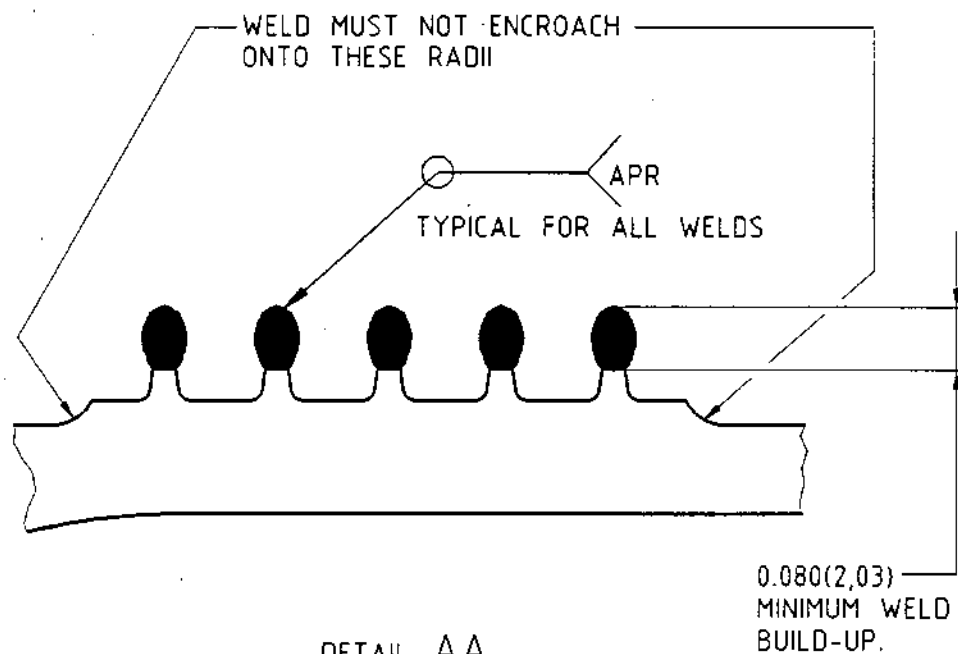
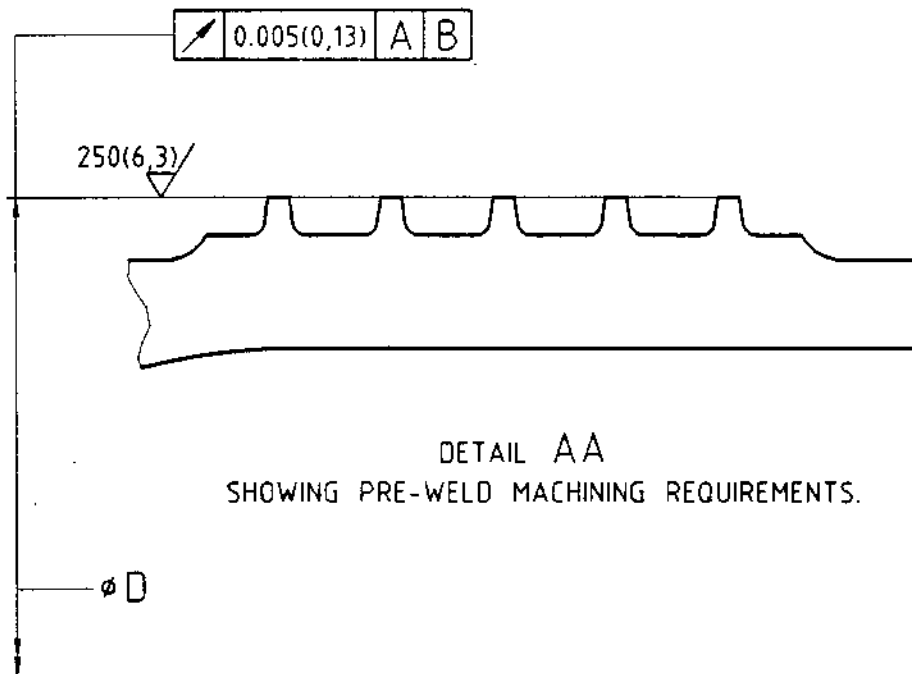


FIG.402.

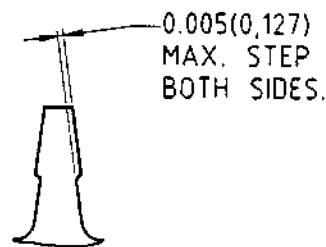
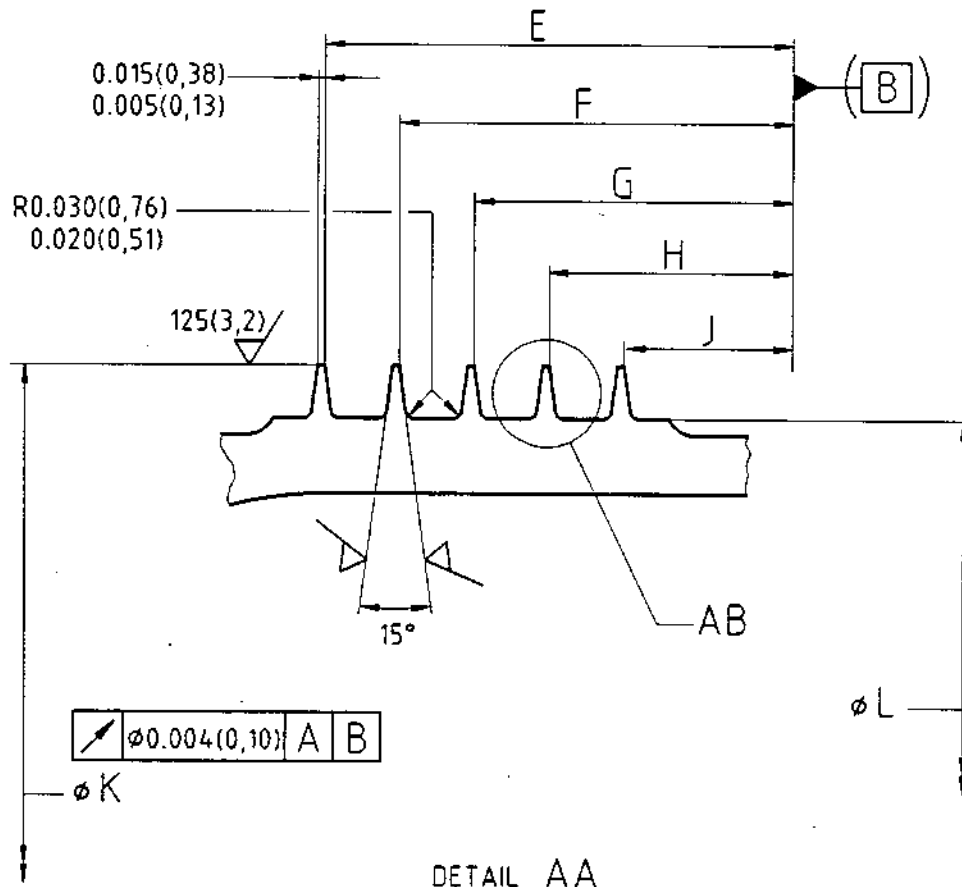


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OVERHAUL

sneema



DETAIL AB
APPLICABLE TO ALL FINS.

VIEW SHOWING TYPICAL POST-WELD MACHINING DETAILS
OF LABYRINTH FINS.
FIG.403.



OLYMPUS 593



MK.610-14-28
OVERHAUL

Printed in England

SPACER STAGE	Ø C	Ø D	DIMENSION					Ø K	Ø L
			E	F	G	H	J		
1-2	7.200 (182,88)	11.720 (297,69)	2.235 (56,77)	2.085 (52,96)	1.935 (49,15)	1.785 (45,35)	1.635 (41,53)	11.8400 (300,736)	11.600 (294,64)
		11.715 (297,56)	2.225 (56,52)	2.075 (52,71)	1.925 (48,90)	1.775 (45,10)	1.625 (41,28)	11.8388 (300,706)	
2-3	10.300 (261,62)	14.070 (357,38)	2.680 (68,07)	2.530 (64,26)	2.380 (60,45)	2.230 (56,64)	2.080 (52,83)	14.1900 (360,426)	13.950 (354,33)
		14.065 (357,25)	2.670 (67,82)	2.520 (64,01)	2.370 (60,20)	2.220 (56,39)	2.070 (52,58)	14.1886 (360,390)	
3-4	12.800 (325,12)	16.270 (413,26)	1.895 (48,13)	1.745 (44,32)	1.595 (40,51)	1.445 (36,70)	1.295 (32,89)	16.3900 (416,306)	16.150 (410,21)
		16.265 (413,13)	1.885 (47,88)	1.735 (44,07)	1.585 (40,26)	1.435 (36,45)	1.285 (32,64)	16.3884 (416,265)	
4-5	14.900 (378,46)	16.265 (413,13) 16.260 (413,00)	1.945 (49,40)	1.795 (45,59)	1.645 (41,78)	1.495 (37,97)	1.345 (34,16)	16.3850 (416,179) 16.3834 (416,138)	16.145 (410,08)
			1.935 (49,15)	1.785 (45,34)	1.635 (41,53)	1.485 (37,72)	1.335 (33,91)		
5-6	14.950 (379,73)		1.855 (47,12)	1.705 (43,31)	1.555 (39,50)	1.405 (35,69)	1.255 (31,88)		
			1.845 (46,87)	1.695 (43,06)	1.545 (39,25)	1.395 (35,44)	1.245 (31,63)		
6-7	15.000 (381,00)		1.705 (43,31)	1.555 (39,50)	1.405 (35,69)	1.255 (31,88)	1.105 (28,07)		
			1.695 (43,06)	1.545 (39,25)	1.395 (35,44)	1.245 (31,63)	1.095 (27,82)		

DIMENSIONING CHART.
FIG.404

REPAIR

72-31-03

Repair No. 16

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

snecma

LP COMPRESSOR DRIVE SHAFT - REPAIRTABLE OF CONTENTS

Repair No.	Title	Scheme No.
1	Drive Shaft Front Labyrinth Fins Repaired by Roll Forming	SAL B.478090
2	CANCELLED (See Table of Approved Repair Schemes)	
3	Drive Shaft Front Labyrinth Fins Restored by TIG Welding	SAL B.488627
4	Disk A/O Stiffening, Provision for Removal and Replacement of Rear End Disk	SAL B.513473
5	Shaft, Assembly of, Drive, Compressor LP - The Blending of Damage on the Bolt Locating Diameter	SAL.B.517756
6	Shaft, Drive, Compressor LP, Rear - Blending of damaged areas of serrations	SAL.B.517842

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REPAIR

72-31-04Contents 1
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MK.610-14-28

OVERHAUL



LP COMPRESSOR DRIVE SHAFT - REPAIR
DRIVE SHAFT FRONT LABYRINTH FINS
REPAIRED BY ROLL FORMING

MODIFICATION NO.OL.8326C, OL.8807C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-04 .	1 210A	B.922582, B.922583, B.922588, B.922593
	210B	B.926912
	210C	B.933251, B.933259, B.933260, B.933261, B.933262, B.933263

2. Introduction

- A. This Repair describes the procedure for restoring defective labyrinth fins on the LP compressor drive shaft front, in order to maintain the fin/housing clearances of labyrinth No.9A and No.9B. The diameter of each fin is first increased by roll forming then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the roll forming technique applicable to this repair procedure.
- C. Dimensions are shown thus on illustrations:
INCHES (MILLIMETRES).
- D. Protect the component against corrosion after each operation, and place in a container for protection against damage during transit between operations (Ref.72-09-20 Repair).

3. Repair Limitations

- A. Fins which have previously been repaired by welding must not be restored by roll forming.
- B. The first repair to each LP compressor drive shaft front must be carried out in accordance with paragraph 4. Subsequent repairs must be carried out in accordance with paragraphs 4 and 5.
- C. Verify that there is adequate material at each defective location to permit machining to the dimensions before roll forming (Ref.para.4 and 5).

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4. Summary of Operations

- A. Secure the large end of shaft to the centre-lathe face-plate; use dummy centre (Item 6) at the small end. Set the shaft true on datum diameter A and PC diameter A (Ref.Fig.401).
- B. Clean up defective fins; remove only the minimum amount of material to achieve the specified dimension (Ref.Fig.402). A localised "witness" not exceeding 0.003 in. (0,076 mm) in depth, is acceptable on each fin.
- C. Carefully remove any burrs.
- D. Apply the roll forming technique to increase the diameter of defective fins to the specified dimension (Ref.Fig.403).
- E. Remove any folds by careful blending (Ref.Fig.403).
- F. Crack test the shaft using the magnetic particle detection method detailed for this component in 72-31-04, Inspection/Check.
- G. Finish machine the fins (Ref.Fig.401); a maximum of 1.000 in. (25,4 mm) of the circumference which has not cleaned up is acceptable on each fin.
- H. Polish fins to remove sharp edges.
- J. Repeat the test for cracks (para.F.).
- K. Identify repair. Mark the repair scheme number SAL B.478090 or R1 close to the standard part number on the drive shaft. For the second repair, mark /2 against the existing repair scheme number.

5. Amended dimensions for repeated rolling of No.9A and 9B labyrinth fins

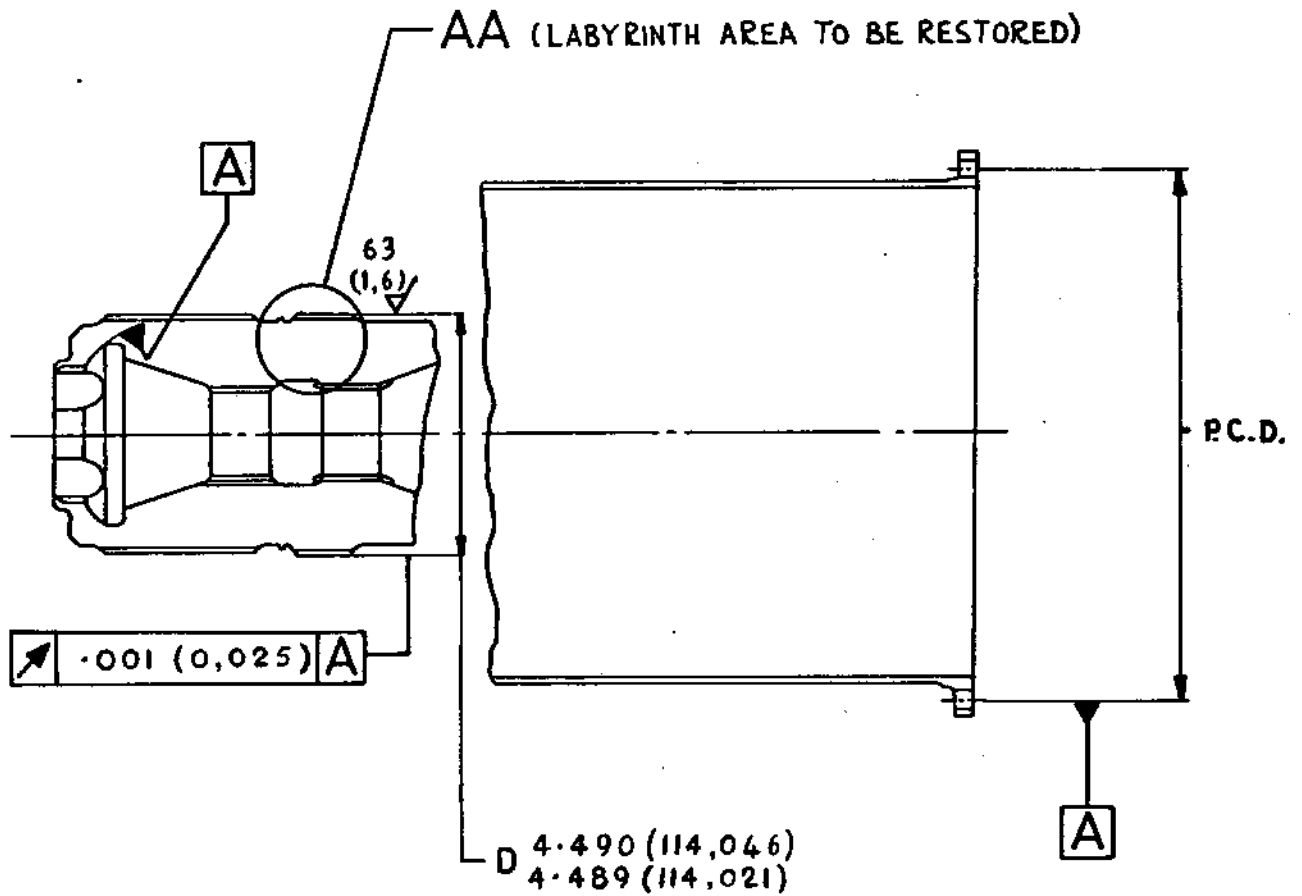
- A. Machining dimensions before roll forming (Ref.Fig.402) may be reduced to 2.2345 in. (56,756 mm) minimum, if necessary.



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MK. 610-14-28
OVERHAUL



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TN4810

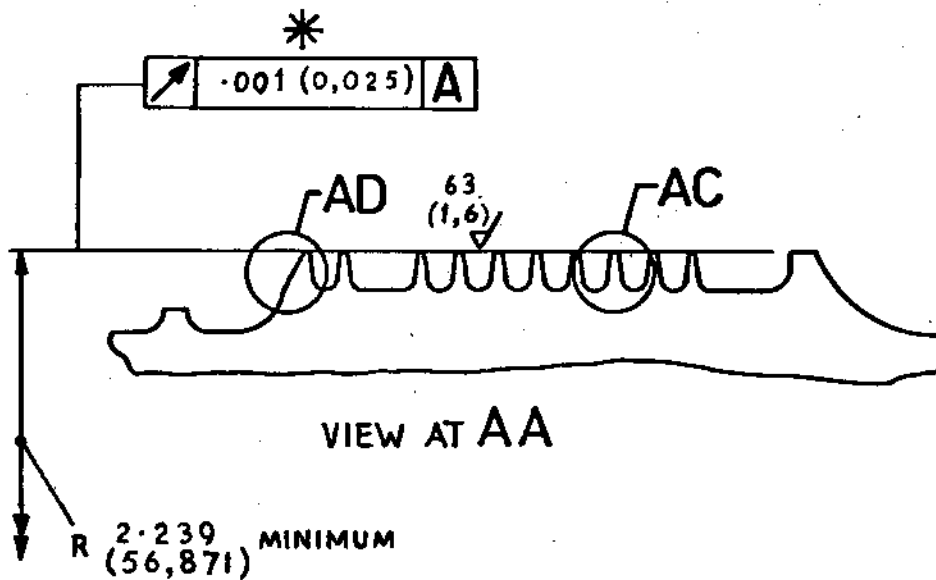
Standard Dimensions
Figure 401

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MK.610-14-28
OVERHAUL



* .003 (0,076) LOCAL WITNESS IS IN ADDITION
TO THESE TOLERANCES.

TN4811

Machining Dimensions Before Roll Forming
Figure 402

REPAIR

72-31-04

Repair No.1

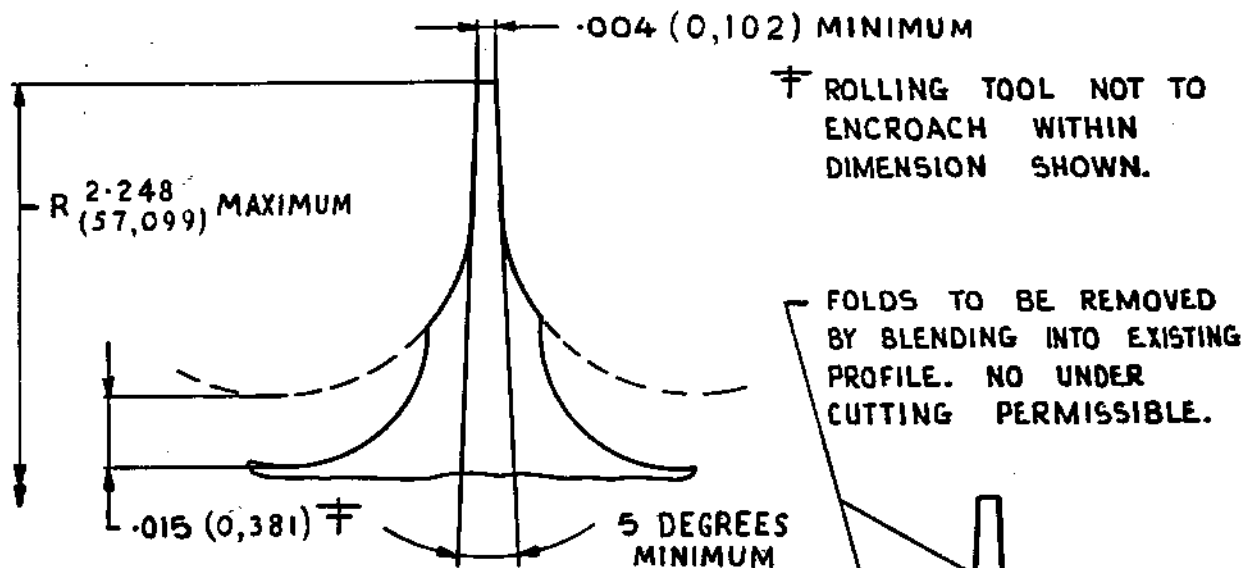
Page 404

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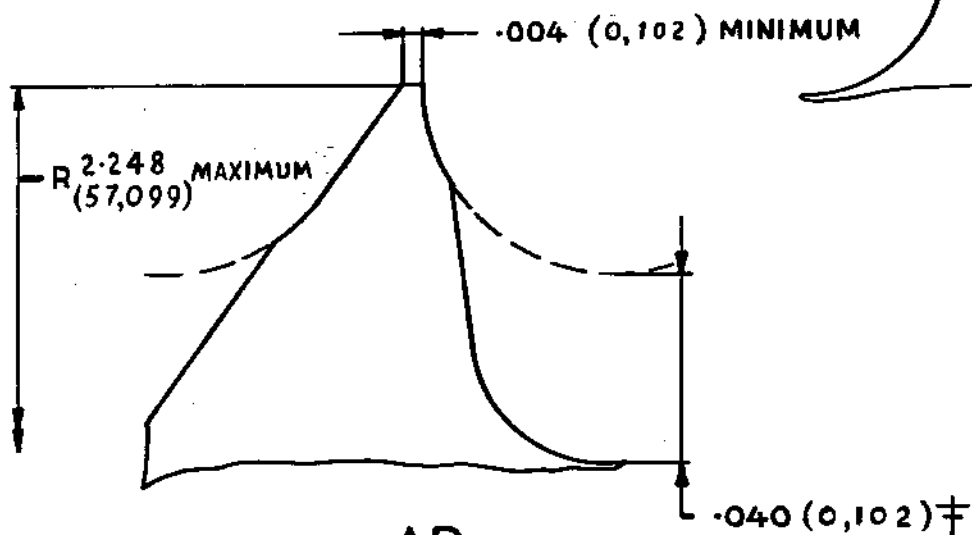


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VIEW AT AC



Roll Forming Dimensions and Fold Blending Detail
Figure 403

REPAIR

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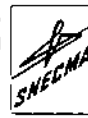
Repair No.1
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OVERHAUL



B. Roll forming radii (Ref.Fig.403) may be reduced to 2.2435 in. (56,985 mm) minimum, if necessary.

C. Standard dimensions (Ref.Fig.401) may be reduced to 4.480 in. (113,79 mm) minimum, if necessary.

6. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Tool Holder	1	S3S.12358000	1
Rolling Tool	1	S3S.12363000	2
Roller	2	S3S.12379000	3
Roller	1	S3S.12373000	4
Shims	4	S3S.12375-78000	5
Dummy Centre	1	S3S.12370000	6

7. Replacement Parts

A. Not required.

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 MK.610-14-28 *sneema*
OVERHAUL
SHAFT, DRIVE, COMPRESSOR LP, REARBLENDING OF DAMAGED AREAS OF SERRATIONSB9355431. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-04	2 120A	B922348
	2 120B	B926914

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

End serration minor damage:-

Gouge damage to a maximum 0.030(0,76) deep by 0.020(0,51) wide by 0.200(5,08) long may be blended/polished.

The maximum number of serrations with minor damage must not exceed twelve.

Gouges and blending must not encroach into the serration radius.

End serration major damage:-

Major damage is gouge damage in excess of the above limits and requires complete removal of serration.

Gouges must not encroach into the serration radius.

The maximum length of complete removal of serration must not exceed 0.350(8,89).

The maximum number of serrations with major damage must not exceed six.

Blending to remove serration must not extend below 4.144(105,26) minimum diameter or encroach into the serration radius.

REPAIR

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**OLYMPUS 593**MK.610-14-28 SNECMA
OVERHAUL**2. REPAIR LIMITATIONS (CONTINUED)**

Serration flank scoring damage:-

The maximum depth of a score must not exceed 0.012(0,30).

The maximum length of a score must not exceed 2.500(63,50).

The maximum total blended length of serration scoring must not exceed 15.000(381,00).

Scoring and blending must not encroach into the serration radius.

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 63 (1,6) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURE**SUPPLEMENTARY INFORMATION**

- 1) Magnetic particle inspect the serrations and surrounding area.
- 2) Visually inspect to establish areas of damage.
- 3) Temporarily mark up location of damaged areas to be blended.
- 4) Blend to remove damage. Remove minimum amount of material. All blends to be smooth and continuous.
- 5) Polish blended areas to achieve required surface finish.

Refer Overhaul Manual
Chapter 72-31-04

Refer Overhaul Manual
Chapter 72-31-04
Inspection/Check.

Refer Repair Limitations.
Refer Overhaul Manual
Chapter 72-09-22 Repair.
Use hand tools only.
Refer Figs.401 and 402.

REPAIR

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**OLYMPUS 593****MK.610-14-28 SNECMA
OVERHAUL**

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- 6) Magnetic particle inspect the serrations and surrounding area. Refer Overhaul Manual Chapter 72-31-04
- 7) Mark Repair Instruction number RI B935543 or R2 on component, adjacent to normal 'assembly of' number, using the vibro-percussion engraving technique. Refer Overhaul Manual Chapter 72-09-00 Repair.

5. MATERIALCOMPONENTMATERIALRR CODESHAFT, DRIVE,
COMPRESSOR LP, REAR

MSRR6519

EBH

6. DATA

NONE.

7. TOOLSTOOL NUMBERDESCRIPTIONITEM

NONE.

8. REPLACEMENT PARTSPART NUMBERDESCRIPTIONQUANTITYITEM

NONE.

REPAIR

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Repair No. 2

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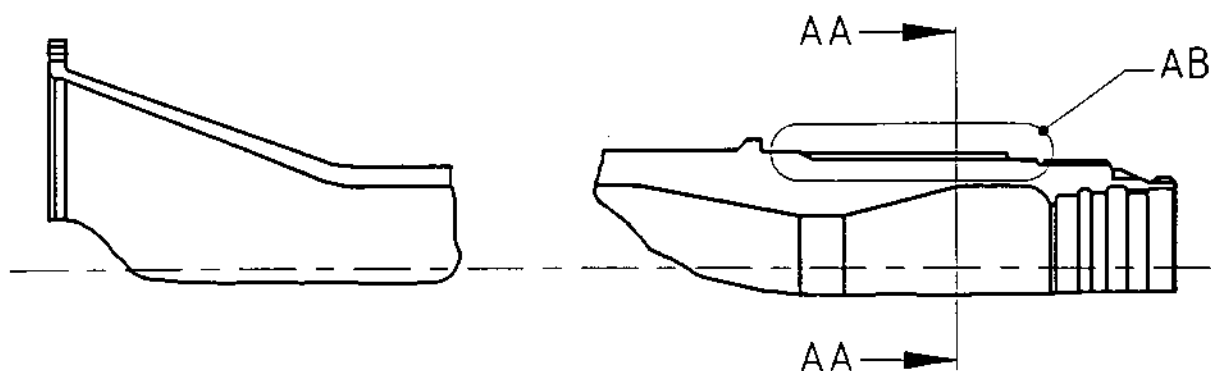
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OLYMPUS 593

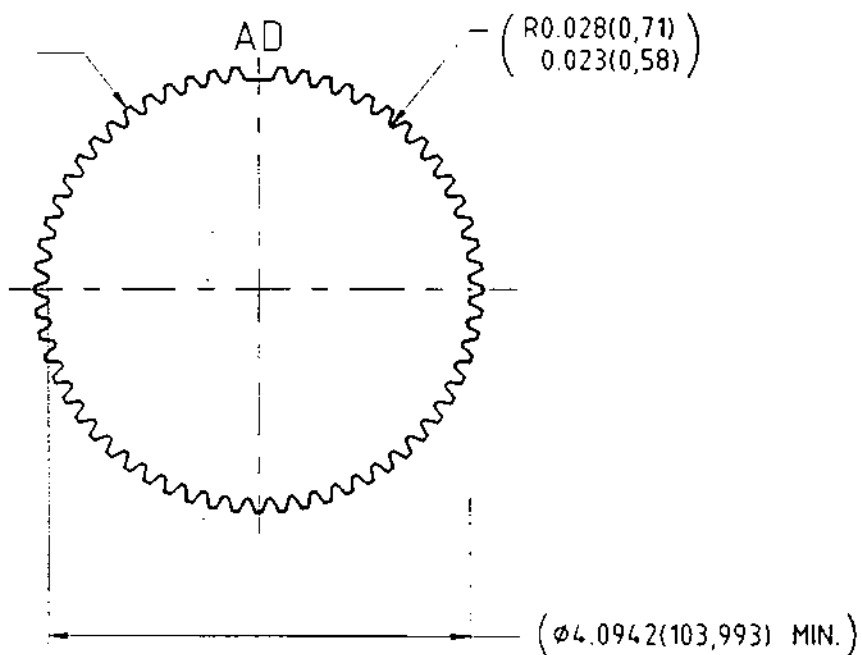


MK.610-14-28 SNECMA
OVERHAUL



TYPICAL SECTION THROUGH SHAFT

60 SERRATIONS EQUALLY
SPACED.
ONE SERRATION AT AD
REMOVED.



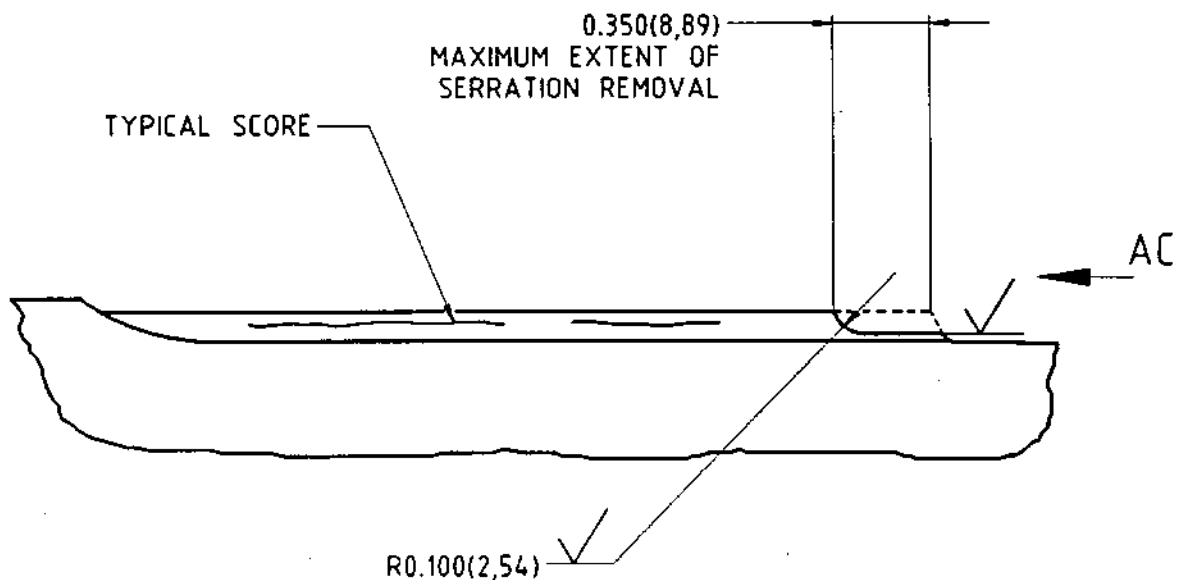
SECTION AA
FIG.401.



OLYMPUS 593

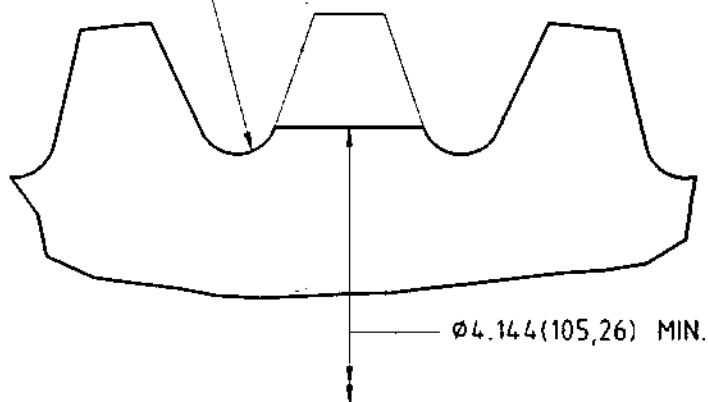


MK.610-14-28 SNECMA
OVERHAUL



DETAIL AB
SHOWING SERRATION FLANK

BLENDING NOT TO ENCROACH
INTO ROOT RADIUS



v — AC

SHOWING MAXIMUM DEPTH OF SERRATION REMOVAL

FIG.402.

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sneema

OVERHAUL

LP COMPRESSOR DRIVE SHAFT - REPAIR
DRIVE SHAFT FRONT LABYRINTH FINS
RESTORED BY TIG WELDING

MODIFICATION NO. OL.8919C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-04	1 210A	B.922593
	210B	B.926912
	210C	B.933251, B.933259, B.933260, B.933261, B.933262, B.933263

2. Introduction

A. General.

CAUTION: COMPLIANCE WITH ALL ASPECTS OF THIS REPAIR PROCESS SHALL BE ACHIEVED WITHOUT DEVIATION. WHERE A NEED TO DEVIATE IS CONSIDERED NECESSARY REFERENCE SHALL BE MADE TO THE REPAIR AUTHORITY FOR AGREEMENT.

- (1) This repair describes the procedure for restoring the labyrinths number 9a and 9b by mechanised TIG welding, and machining to the standard dimensions.
- (2) Dimensions are shown thus; INCHES (MILLIMETRES) in tables and illustrations.
- (3) Refer to Chapter 72-09-00 Repair, for all standard practices applicable to this repair procedure.
- (4) A test piece shall be produced and subjected to metallurgical examination; test pieces are required initially and upon any change of airline operator, sub-contractor, machine or welding equipment. Test pieces are also required after every ten component repairs or annually, where time elapsed between component repairs exceeds one year.

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- (5) Remove sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.
- (6) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (7) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (8) Surface texture is to be 63 micro-inches (1,6 micro-meters) unless otherwise stated.
- (9) All tools referred to by item number in procedural steps are detailed in para.5.
- (10) Protect the component against corrosion after each operation, and place in a container for protection against damage during transit between operations (Ref 72-09-20 Repair).

3. Test Piece

A. Produce Test Piece.

- (1) Produce a test piece from fully heat-treated MSRR.6542 material to the dimensions given in Figure 401. It is permissible to use an unserviceable standard part as a test piece. In this case, machine the labyrinth fins to the dimensions given in Figure 402.
- (2) Remove the sharp edges from the fin.
- (3) Inspect for cracks using the F2A fluorescent dye penetrant process specified in Chapter 72-09-00 Inspection/Check.

B. Weld Test Piece.

- (1) Build up the single fin to a minimum height of 0.060 in. (1,52 mm) as indicated in Figure 401 by mechanised TIG welding using filler rods OMat 3/54 as instructed in TSD 594 OP 409. For welding data, refer to paragraph 7.

C. Heat Treat.

- (1) Heat treat the test piece in an argon gas atmosphere at 580 deg.C plus/minus 5 deg.C for one hour. Cool in air.

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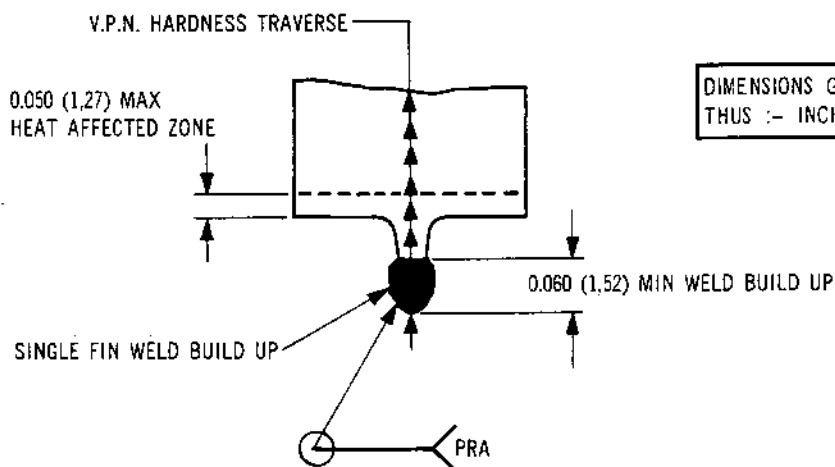
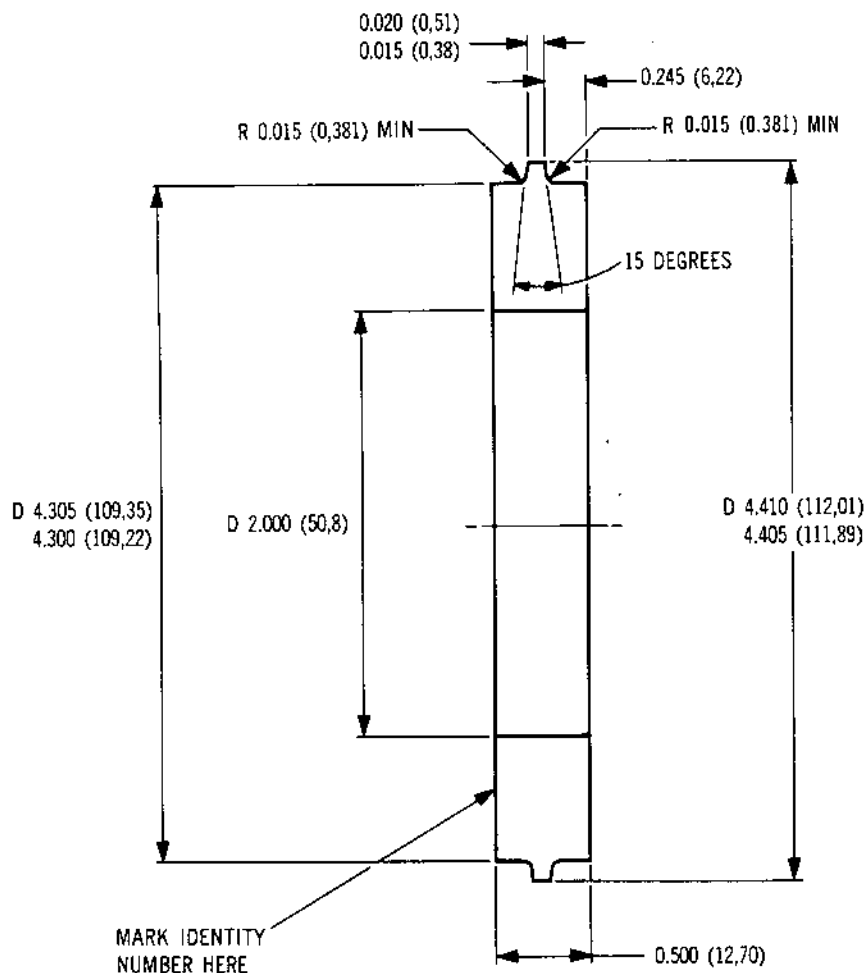
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Test Piece Details
Figure 401

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72-31-04

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D. Identify.

- (1) Mark B.497477 on the test piece using vibro-percussion marking as instructed in Chapter 72-09-00 Repair.

E. Metallurgical Examination.

NOTE: The following examination must be carried out by controlling laboratory.

- (1) Produce four suitable micro-sections at 90 deg. from the test piece surface.
- (2) Subject the micro-sections to a VPN hardness check using a 5 kg load and a 2/3rds objective at 0.020 in. (0,51 mm) increments, traversed across the micro-sections. Check that the heat affected zone is limited to the area shown in Figure 401 (test piece) or Figure 405 (unservicable standard part).

4. Instructions

A. Preparation.

- (1) Remove the aluminium paint from the LP compressor drive shaft, if not already removed by cleaning, using cleaning process F (Ref. TSD594 OP.114).

B. Inspect.

- (1) Inspect the shaft using the magnetic particle process specified for this component in Chapter 72-31-04 Inspection/Check.

C. Machine.

- (1) Locate the shaft on a centre-lathe, with the large flange secured to a faceplate and the small end located by a dummy centre ref. tool item 1, and set true.
- (2) Machine the seal fins of the No's. 9a and 9b labyrinths to the dimensions given in Figure 402.
- (3) Remove burrs and sharp edges.

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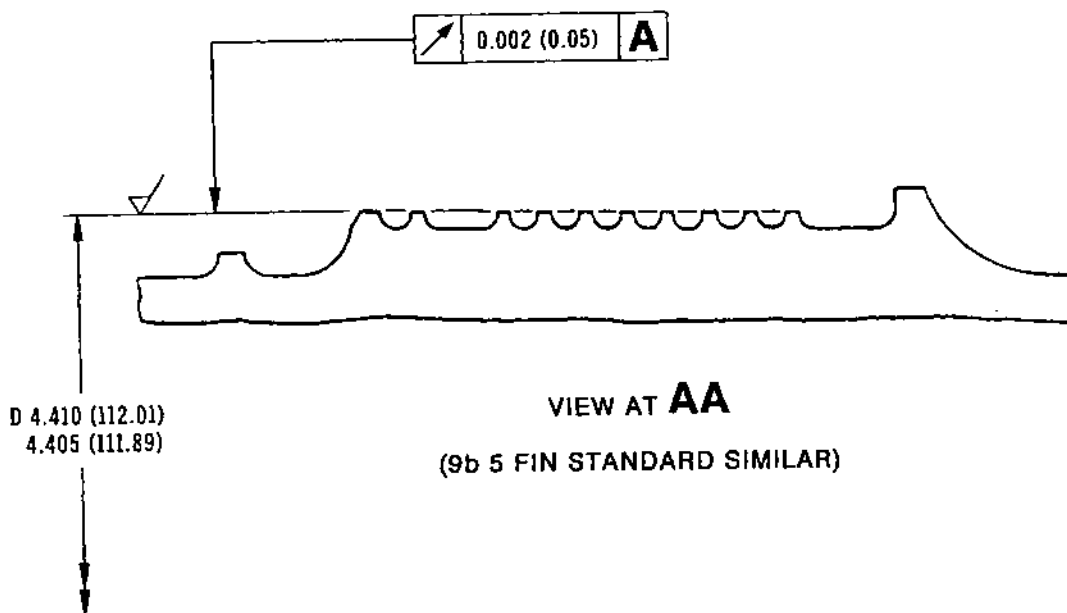
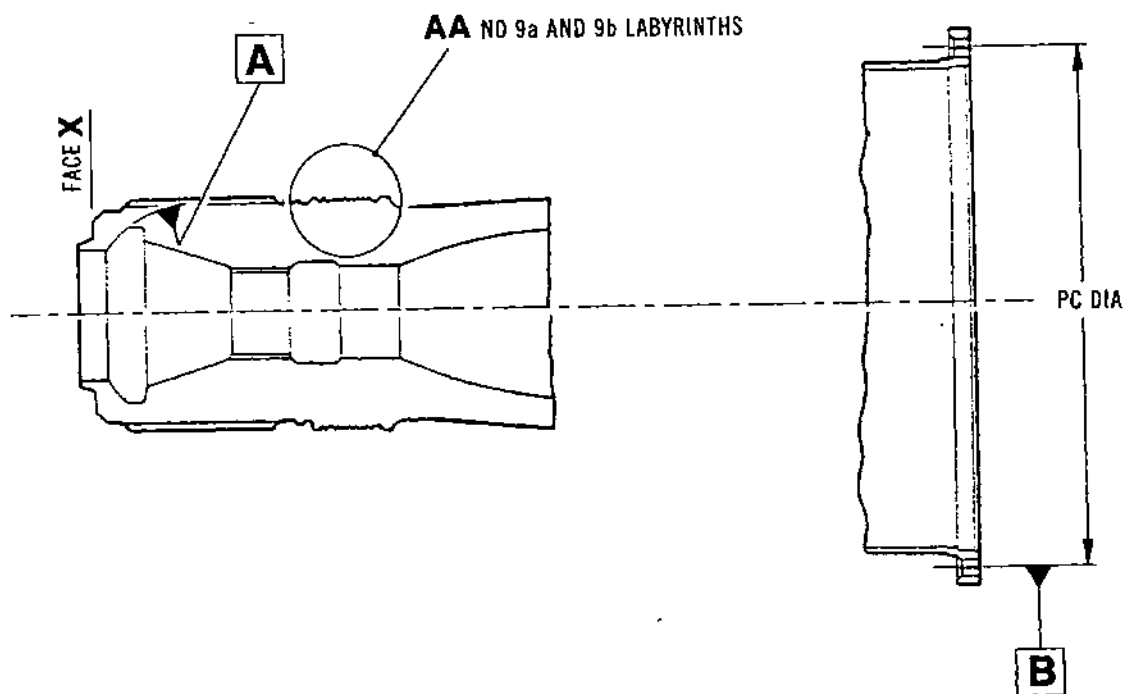


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SNECMA



LP Compressor Drive Shaft Machining Details
Figure 402



OLYMPUS 593

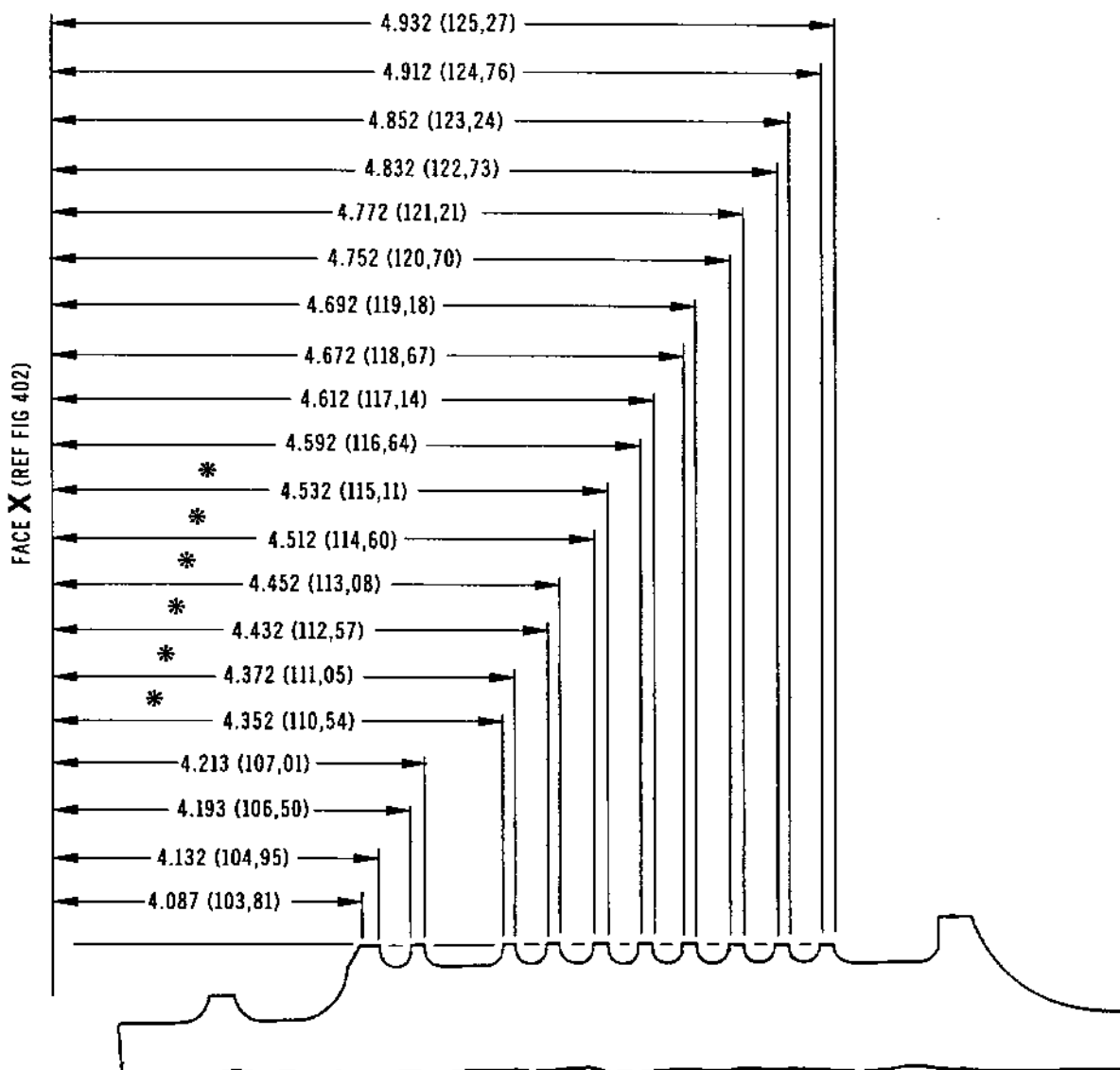


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SECTION THROUGH NO 9a AND 9b LABYRINTHS
(9b 5 FIN STANDARD SIMILAR - DIMENSIONS MARKED * NOT APPLICABLE)

Reference Dimensions
Figure 403

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D. Inspect.

- (1) Inspect for the satisfactory completion of the machining operation.
- (2) Inspect for cracks using the magnetic particle process detailed for this component in Chapter 72-31-04 Inspection/Check.
- (3) Measure and record the position of the fins on labyrinths No's.9a and 9b (Ref.Fig.403).

E. Weld.

- (1) Build up the fins of the No's.9a and 9b labyrinths as indicated in Figure 404, by mechanised TIG welding using filler rods OMat 3/54 as instructed in TSD 594 OP 409. Weld build-up must be sufficient to allow finish dimensions to be achieved (Ref.Fig.404). For welding data, refer to paragraph 7.

F. Inspect.

- (1) Inspect the shaft using the magnetic particle process specified for this component in Chapter 72-31-04, Inspection/Check.

G. Heat Treat.

- (1) Heat treat the shaft in an inert gas or vacuum furnace at 580 deg.C. plus/minus 5 deg.C. for one hour. Cool in air.

H. Inspect.

- (1) Inspect the welding as detailed in TSD 594 OP 409.
- (2) Inspect the shaft using the magnetic particle process specified for this component in Chapter 72-31-04, Inspection/Check.

J. Machine.

- (1) Locate the shaft on a centre-lathe with the large flange secured to a faceplate and the small end located by a dummy centre ref. tool item 1, and set true.

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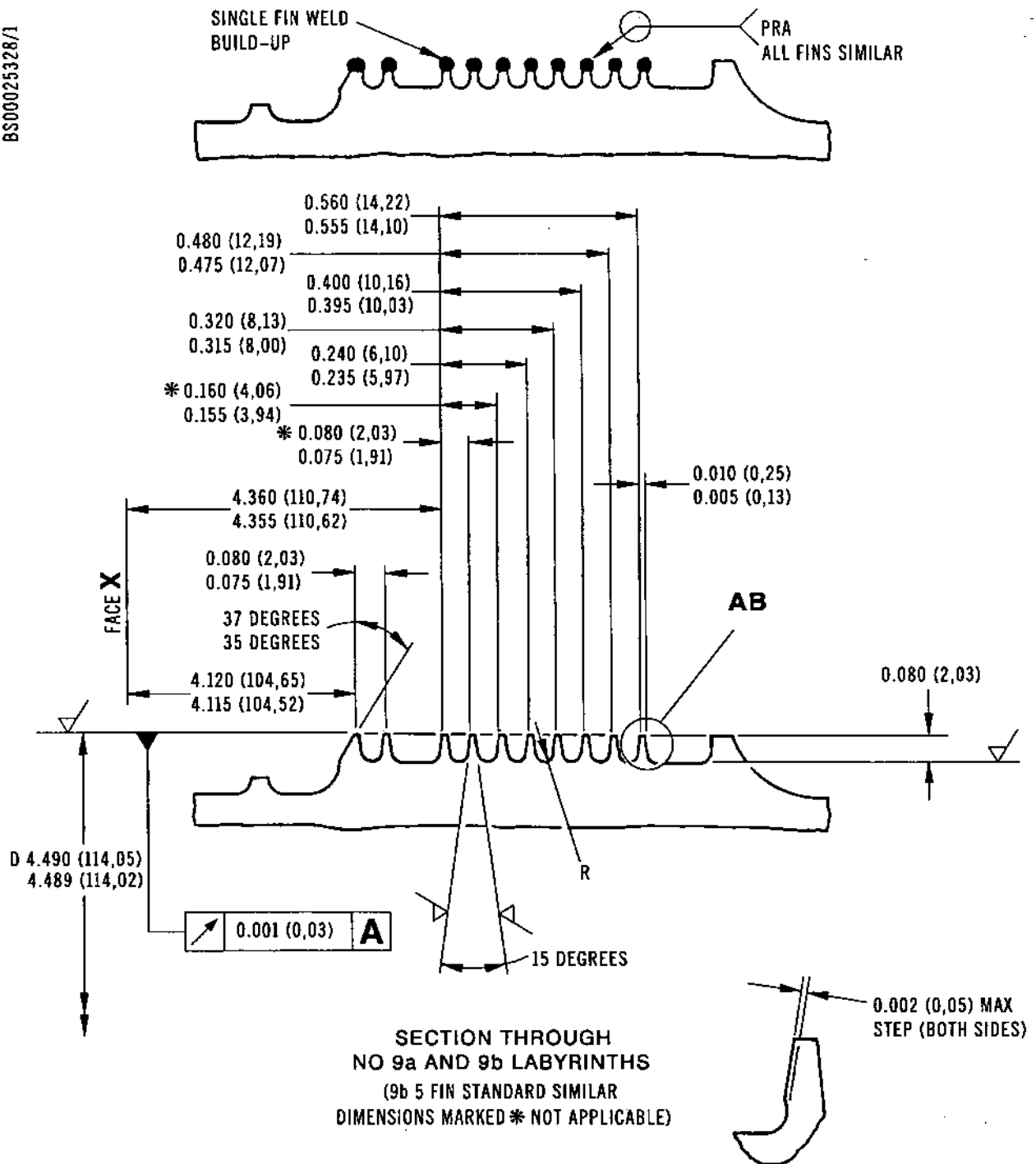
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VIEW AT **AB**
APPLICABLE TO ALL FINS

Welding and Machining Details
Figure 404

REPAIR

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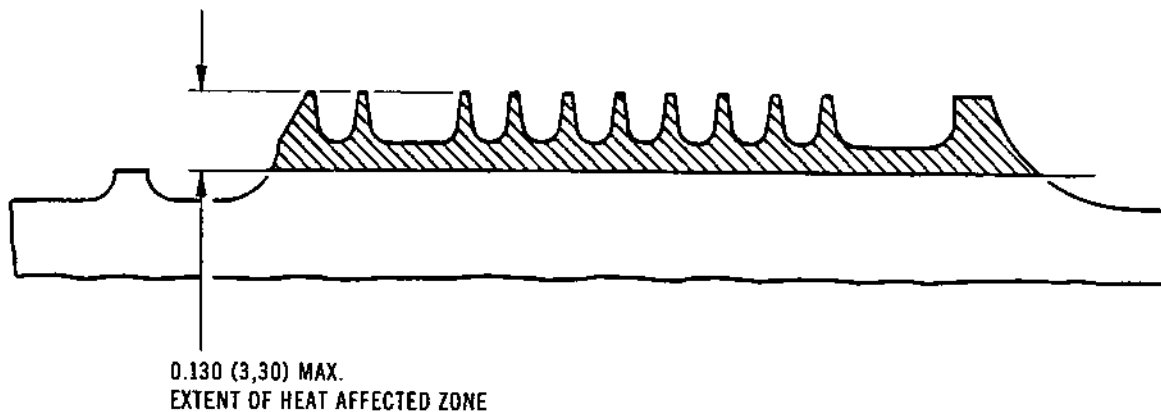


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SECTION THROUGH NO 9a AND 9b LABYRINTHS
(9b 5 FIN STANDARD SIMILAR)

Heat Affected Zones
Figure 405

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- (2) Finish machine the fins of No's.9a and 9b labyrinths using form tool ref. tool item 2, to the dimensions given in Figure 404. Use the dimensions previously recorded (para.40(3)) to ensure that the maximum step is 0.002 in. (0,05 mm) (Ref.Fig.404 view AB).

K. Inspect.

- (1) Inspect for the satisfactory completion of the machining operation.
- (2) Inspect the shaft using the magnetic particle process specified for this component in Chapter 72-31-04 Inspection/Check.

L. Identify.

- (1) Mark SAL B.488627 or R3 adjacent to the existing part number, using vibro-percussion marking as specified in Chapter 72-09-00 Repair.

M. Protect.

- (1) Apply high heat resisting aluminium enamel to the shaft as instructed in Chapter 72-09-04 Repair.

N. Final Inspection.

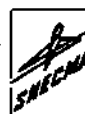
- (1) Finally inspect the shaft to ensure that the repair has been carried out satisfactorily and that the shaft is in a serviceable condition.

5. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Qty.</u>	<u>Part No.</u>	<u>Item</u>
Dummy centre	1	S3S12370000	1
Form tool	1	S3S15511000	2

6. Replacement Parts

None.

**OLYMPUS 593**MK.610-14-28
OVERHAULDISK A/O STIFFENINGPROVISION FOR REMOVAL AND REPLACEMENT OF REAR END DISCREPAIR NO. B5134731. EFFECTIVITY

IPC	Fig./Item	Part No.
72-31-04	01 190A	B443042
	01 190B	B488213

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary reference should be made to the Repair authority for agreement.

Minimum diameter to which centre tube may be machined, must not be less than dia. 2.4857(63,137) (refer fig.401).

Minimum wall thickness of tube 0.040(1,02).

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimeters)

Tolerances on machined dimensions plus/minus .010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges .004 to .020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometers)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDUREREPAIR PROCEDURE

- 1) Completely remove aluminium paint from assembly.

SUPPLEMENTARY INFORMATION

Refer Overhaul Manual
Chapter 72-09-00 Process F
Cleaning.

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- | | |
|---|---|
| 2) Set component in a centre lathe and set true to datum A. Machine away the end disc support flange to remove the disc without exceeding the Repair Limitations in Para.2.
Traces of braze material on 5% of surface area is acceptable. | Refer fig.401
Record identity markings and retain for remarking. |
| 3) Dimensionally inspect machined areas. | Refer fig.401 |
| 4) Remove and discard the carbon bushings item 4 from the remains of the end disc and from the stiffening disc assembly. If serviceable, retain retaining plates item 2 and item 5 for future use. | Refer fig.402 and 403 |
| 5) Remove chromium plating from surfaces marked AF. All other surfaces to be masked. | Refer Overhaul Manual
Chapter 72-09-07
Repair.
Refer fig.405 |
| 6) Carefully remove remains of 3-off rivets item 1 from the end of the centre tube. | Refer fig.402 |
| 7) Inspect stiffening disc assembly for cracking all over. | Refer Overhaul Manual
Chapter 72-31-04
Inspection/Check. |
| 8) Trial fit the new rear end disc on the end of the centre tube, aligning the 3 off 0.750 dia. holes in the disc flank with the existing holes in the other discs within 1030'.
In this position, check that the rivet holes in the rear disc support flange coincide with existing rivet holes in the tube. If necessary relieve the holes, removing minimum material, to allow fitment of rivets. | Refer Para 8.REPLACEMENT
PARTS Item 3.
Refer fig.401 402 |



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- | | |
|---|---|
| 9) Vapour degrease the new end disc and stiffening disc assembly prior to brazing. | Refer Overhaul Manual Chapter 72-09-00 Cleaning |
| 10) Apply braze paste to joint area between centre tube and new rear end disk and reassemble. Align 3 off 0.750 dia. holes within 1030' of existing holes in other disks and ensure rivet holes in both parts coincide. | Microbraze 130
MSRR 9500/114
Refer fig.401 and 402 |
| 11) Dimensionally inspect. | Refer fig.401 and 402 |
| 12) Rivet in position. | Refer Para 8. REPLACEMENT PARTS item 1
Refer fig.402 |
| 13) Dimensionally inspect. | Refer fig.401 |
| 14) Vacuum braze at 1030°C \pm 10°C for 10 minutes. Vacuum cool to 900°C and gas fan quench to 150°C. | Refer TSD 594 OP 416.
NB: Support the assembly in the vertical position, on the centre boss of the replacement disc. |
| 15) Inspect the integrity of the brazed joint and of the existing joints, there should be a continuous witness of braze at both sides of the joint. | Refer TSD 594 OP 416 Section 6. |
| 16) Heat treat at 700°C \pm 50°C for 16 hours in argon. Cool in argon. | NB: Support the assembly in the vertical position, on the centre boss of the replacement disc. |
| 17) Inspect for distortion. | Refer fig.401 |
| 18) Inspect for cracking all over. | Refer Overhaul Manual Chapter 72-31-04 Inspection/Check. |
| 19) Inspect Retaining Plates items 2 and 5 removed at op.3 for serviceability, if unserviceable obtain new Retaining Plates. | Refer Para 8. REPLACEMENT PARTS Items 2 and 5. |

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- | | |
|---|--|
| 20) Heat Stiffening disk assembly to $400^{\circ}\text{C} \pm 10^{\circ}\text{C}$ for 1 hour. Assemble new Carbon Bushes and Retaining Plates.
Allow to cool. | Refer Para 8. REPLACEMENT PARTS Item 4.
Refer fig.402 and 403 |
| 21) Set component in a centre lathe with the replacement disk end of the assembly supported.
Set true to datums A at each end of the tube. Machine the internal diameter of the carbon bush in the replacement disc to 1.950 inches. | Refer fig.401 and 402 |
| 22) Dimensionally inspect. | Refer fig.401 |
| 23) Set component in a centre lathe using a revolving centre located in the previously machined bush bore. Set true to datums A at each end of the tube. Machine the replacement disc outside diameter to the pre-plating dimensions. | Refer fig.401 and 404 |
| 24) Dimensionally inspect. | Refer fig.401 and 404 |
| 25) Inspect machined area for cracking. | Refer Overhaul Manual Chapter 72-31-04
Inspection/Check. |
| 26) Set component in a milling machine with the centre tube supported using vee-blocks. Set true to datums A at each end of the tube. Machine the internal diameter of the carbon bushes to final dimensions. | Refer fig.402 and 403 |
| 27) Dimensionally inspect. | Refer fig.402 and 403 |
| 28) Chrome plate surfaces marked AF 0.001(0,025) thick, maintaining dimensions shown. When post plating dimensions cannot be maintained it is permissible to chrome plate 0.006(0,15) thick and machine to final dimensions. | Refer Overhaul Manual Chapter 72-09-07
Repair.
Refer fig.405 |

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- 29) Dimensionally inspect. Refer fig.401
- 30) Visually inspect chrome plating. Refer Overhaul Manual
Plating to be smooth and Chapter 72-09-07.
continuous. Repair.
- 31) All identity markings retained in Refer Overhaul Manual
op.2) to be remarked where shown. Chapter 72-09-00.
Mark SAL B513473 or R4 adjacent Repair.
to existing assembly number using Refer fig.401
vibro-percussion engraving.
- 32) Apply high heat resistant Refer Overhaul Manual
Aluminium enamel all over except Chapter 72-09-04.
where marked AC and bore of tube. Repair
Identity markings must be visible Refer figs.401, 402
through aluminium paint. and 403

5. MATERIAL

COMPONENT	MATERIAL	RR CODE
TUBE	NIMONIC 75 MSRR 7104	QGP
END DISC	H.R ALLOY DTD 736	

6. DATA

NONE.

7. TOOLS

NONE.

8. REPLACEMENT PARTS

PART NO.	DESCRIPTION	QUANTITY	ITEM
AVDEL 4051/0409	RIVETS	3	1
B428125	RETAINING PLATE	1	2
B391327	END DISC	1	3
B428124	CARBON BUSH	2	4
B428126	RETAINING PLATE	1	5

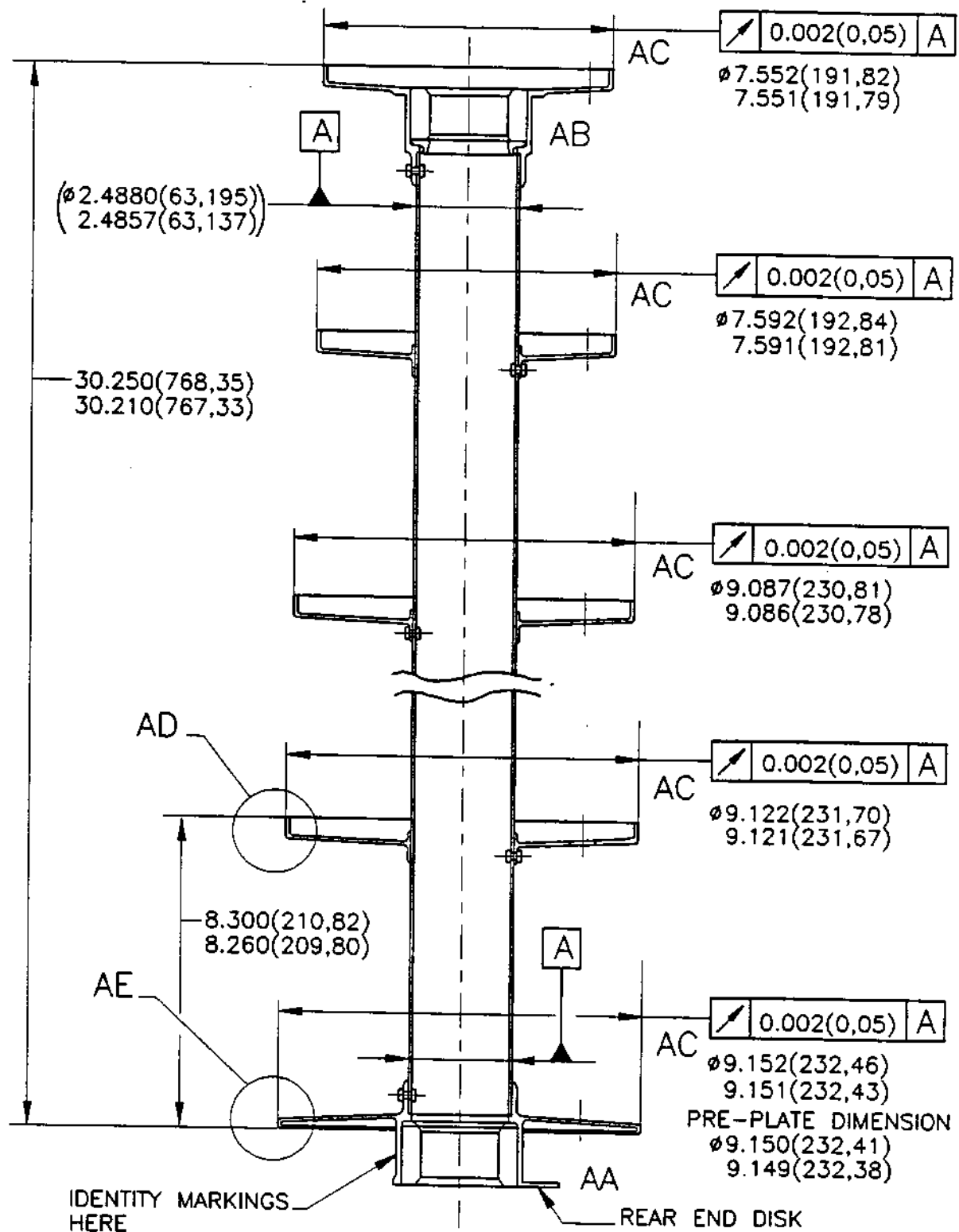
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GENERAL SECTION THROUGH STIFFENING DISK
FIG.401

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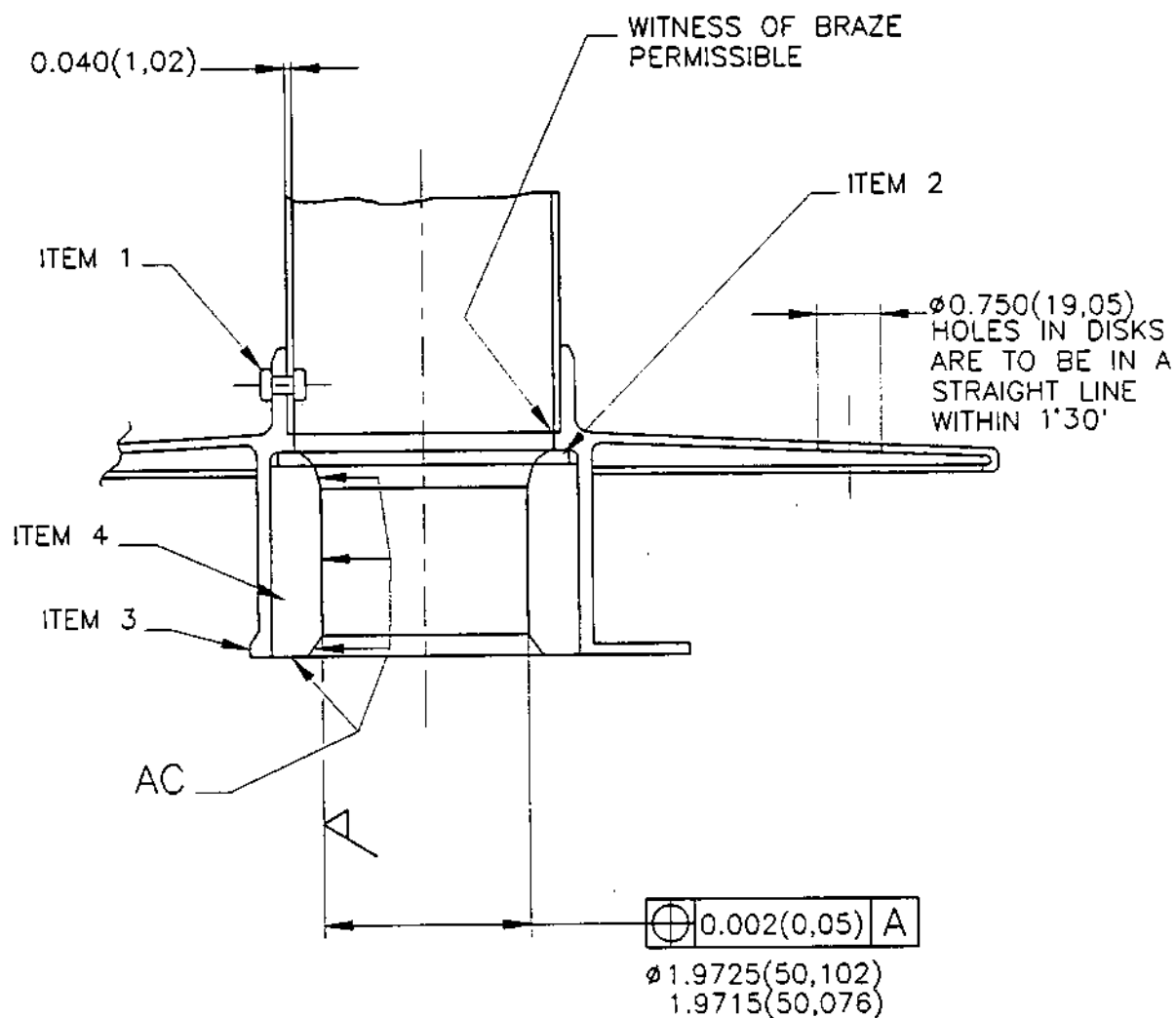


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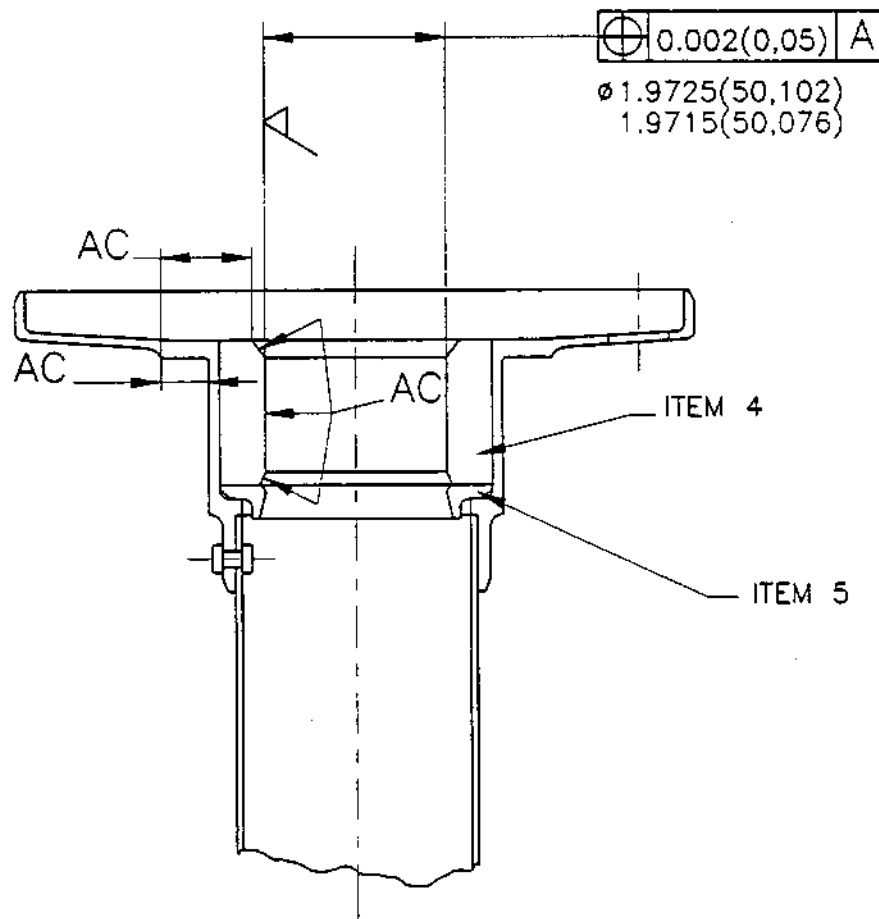
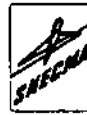
VIEW AT AA
FIG.402

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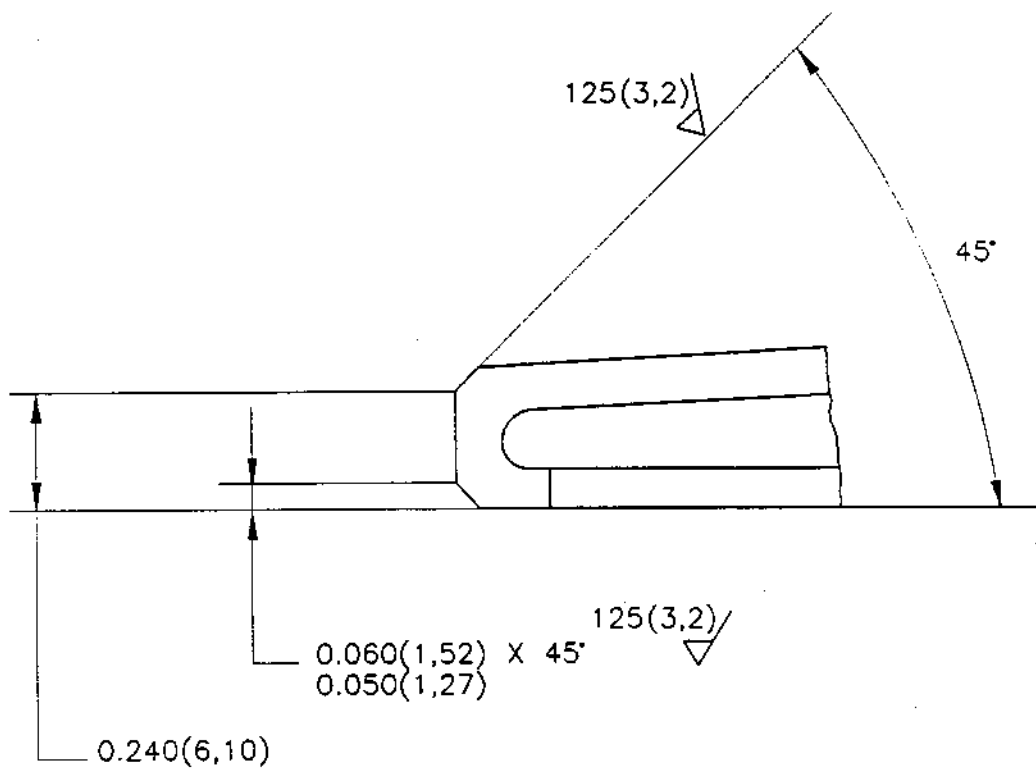
VIEW AT AB
FIG.403

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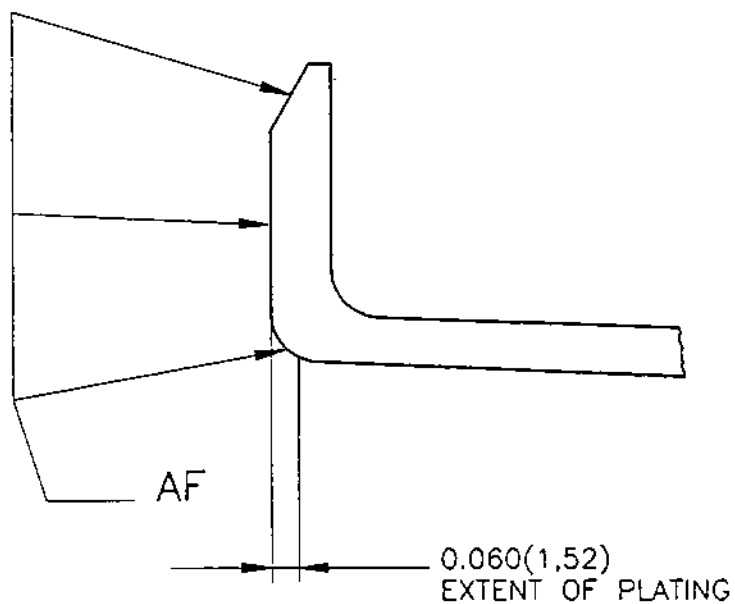
VIEW AT AE
FIG.404



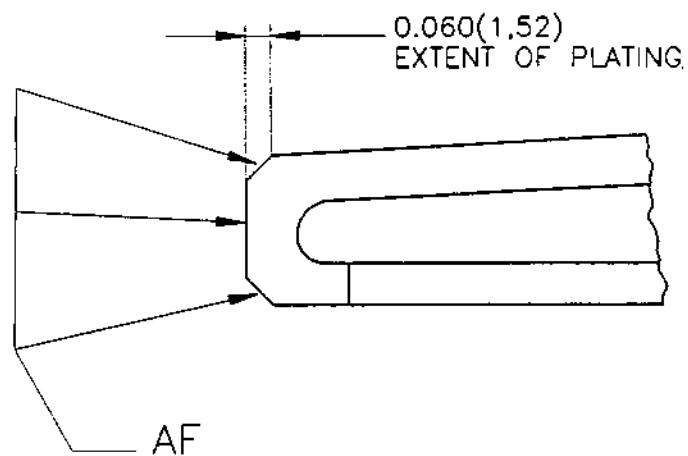
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VIEW AT AD
4 DISKS SIMILAR



REPEAT VIEW AT AE

CHROME PLATE 0.001(0,025) THICK WHERE MARKED AF

FIG.405

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SHAFT, ASSEMBLY OF, DRIVE, COMPRESSOR LP -
THE BLENDING OF DAMAGE ON THE BOLT LOCATING DIAMETER

B517756

1. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-04	1/210A	B922582
		B922583
		B922588
		B922593
		B926912
	1/210B	B933251
	1/210C	B933259
		B933260
		B933261
		B933262
		B933263

2. REPAIR LIMITATIONS

Compliance with all aspects of this Repair Process shall be achieved without deviation. Where a need to deviate is considered necessary reference shall be made to the Repair Authority for agreement.

This instruction gives the procedure for the blending of damage on the bolt locating diameter on the Shaft, Assembly of, Drive, Compressor LP.

Source demonstration is not necessary for this repair.

This instruction may be applied any number of times provided that the maximum residual depth of damage does not exceed 0.035 (0,89) after removal of high metal.

3. GENERAL**UNLESS OTHERWISE SPECIFIED**

Drawing practice & tolerance interpretation to ISO1101 (JES160)
 Dimensions in Inches (Millimeters)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 63 (1,6) Microinches (Micrometers)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

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ALL TASKS identified in this instruction are in the Engine Overhaul Processes Manual (TSD594-J)

4. REPAIR PROCEDURE**SUPPLEMENTARY INFORMATION**

1) Visually inspect to establish areas of damage.

2) Blend to remove damage.

Refer Overhaul Manual
Chapter 72-09-22 Repair.
Use hand tools only.
Refer Fig.401.

3) Remove sharp edges.

4) Polish blended areas to achieve surface finish same as adjacent material.

5) Magnetic particle inspect the component.

Refer to
TASK 70-00-00-200-201.
Cracks are not permitted.

6) Mark Repair Instruction number RI B517756 or R5 on component adjacent part number.

Refer to
TASK 70-00-00-300-363
SUBTASK 70-00-00-180-363-027.
Use vibration peen equipment.

5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
SHAFT, ASSEMBLY OF, DRIVE, COMPRESSOR LP	FV535	EBM

6. DATA

NONE.

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE.		

8. REPLACEMENT PARTS

<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			

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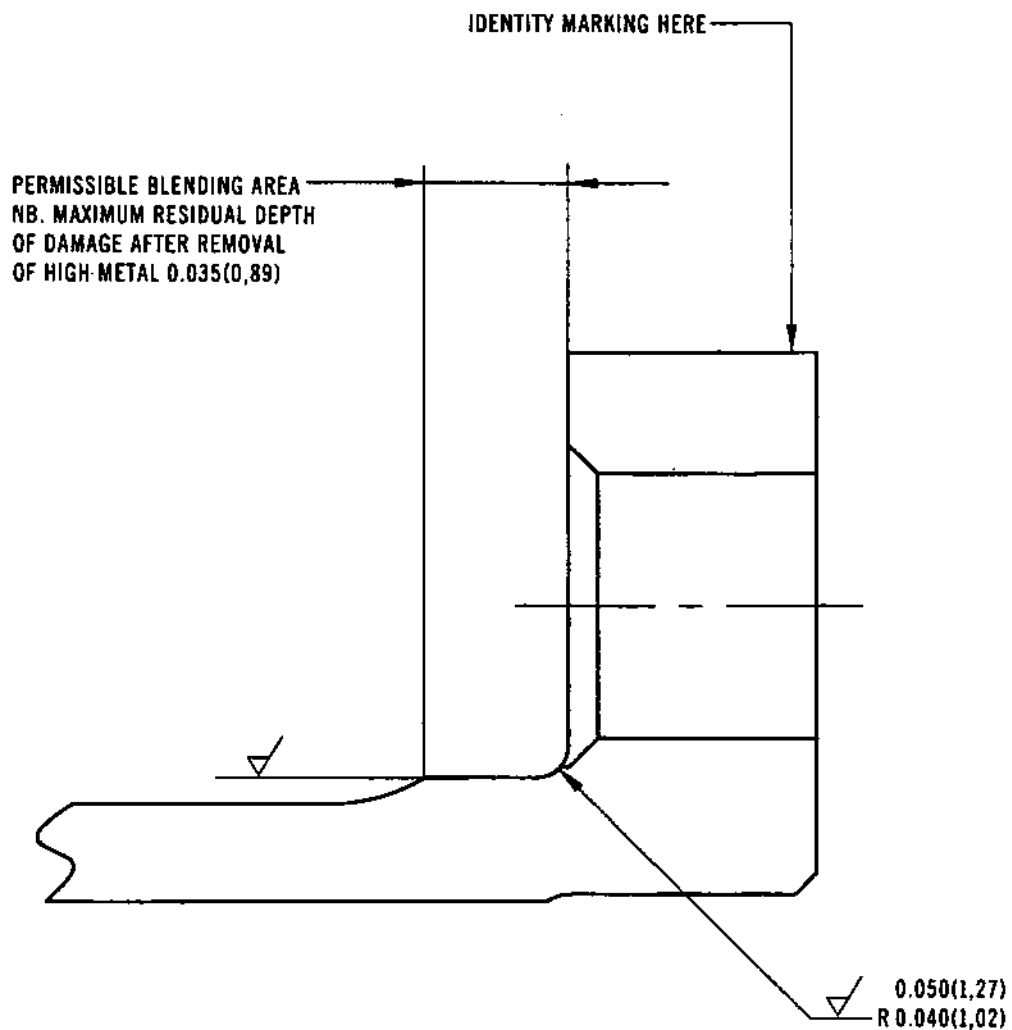


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Drive Shaft Rear Flange Bolt
Location Position
Figure 401

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SHAFT, DRIVE, COMPRESSOR LP, REARBLENDING OF DAMAGED AREAS OF SERRATIONSB5178421. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-31-04	2 120A	B922348
	2 120B	B926914

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

End serration minor damage:-

Gouge damage to a maximum 0.030(0,76) deep by 0.020(0,51) wide by 0.200(5,08) long may be blended/polished.

The maximum number of serrations with minor damage must not exceed twelve.

Gouges and blending must not encroach into the serration radius.

End serration major damage:-

Major damage is gouge damage in excess of the above limits and requires complete removal of serration.

Gouges must not encroach into the serration radius.

The maximum length of complete removal of serration must not exceed 0.350(8,89).

The maximum number of serrations with major damage must not exceed six.

Machining to remove serration must not extend below 4.144(105,26) minimum diameter or encroach into the serration radius.

REPAIR

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Repair No.6

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2. REPAIR LIMITATIONS (CONTINUED)**Serration flank scoring damage:-**

The maximum depth of a score must not exceed 0.012(0,30).
The maximum length of a score must not exceed 2.500(63,50).
The maximum total blended length of serration scoring must not exceed 15.000(381,00). For any group of 6 adjacent teeth, the maximum total length of blended flank must not exceed 7.500(190,50).
Scoring and blending must not encroach into the serration radius.

3. GENERAL**UNLESS OTHERWISE SPECIFIED**

Drawing practice & tolerance interpretation to ISO1101 (JES160)
Dimensions in Inches (Millimetres)
Tolerances on machined dimensions plus/minus 0.010 (0,25)
Tolerance on angles plus/minus 2 degrees
Break sharp edges 0.004 to 0.020 (0,1 to 0,5)
Surface texture interpretation to ISO1302 (JES137)
Surface texture to be 63 (1,6) Microinches (Micrometres)
Welding symbols to ISO2553 (JES139)
3rd Angle Projection

4. REPAIR PROCEDURE**SUPPLEMENTARY INFORMATION**

- 1) Magnetic particle inspect the serrations and surrounding area.
- 2) Visually inspect to establish areas of damage.
- 3) Temporarily mark up location of damaged areas to be blended/machined.

Refer Overhaul Manual
Chapter 72-31-04

Refer Overhaul Manual
Chapter 72-31-04
Inspection/Check.

FOR MAJOR END SERRATION DAMAGE PROCEED AS FOLLOWS, FOR ALL OTHER DAMAGE REFER TO OPERATION 8.

- 4) Locate component to a suitable machine, set true and secure.
- 5) Mill to remove damage from serration(s).
- 6) Remove all burrs and sharp edges from milled serration(s).

Refer to Figs.401 and 402.

Refer to Figs.401 and 402.
Refer to Para.6 Data.

Refer to Figs.401 and 402.

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- 7) Visually and dimensionally inspect milled serration(s). Refer to Figs.401 and 402.
- 8) Blend to remove damage. Refer Repair Limitations. Remove minimum amount of material. Refer Overhaul Manual Chapter 72-09-22 Repair. All blends to be smooth and continuous. Use hand tools only. Refer Figs.401 and 402.
- 9) Polish blended areas to achieve required surface finish.
- 10) Magnetic particle inspect all repaired areas. Refer Overhaul Manual Chapter 72-31-04
- 11) Mark Repair Instruction number RI B517842 or R6 on component, adjacent to normal 'assembly of' number, using the vibro-percussion engraving technique. Refer Overhaul Manual Chapter 72-09-00 Repair.

5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
SHAFT, DRIVE, COMPRESSOR LP, REAR	MSRR6519	EBH

6. DATAMILLING INFORMATION

Tool Grade : T1 or M2.
Coolant : Milky Type Soluble Oil.
Depth of cut : As required.
Surface Speed : 30-40(9,14-12,19) ft/min(m/min).
Feed : 0.002(0,05) / Tooth.

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE.		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			

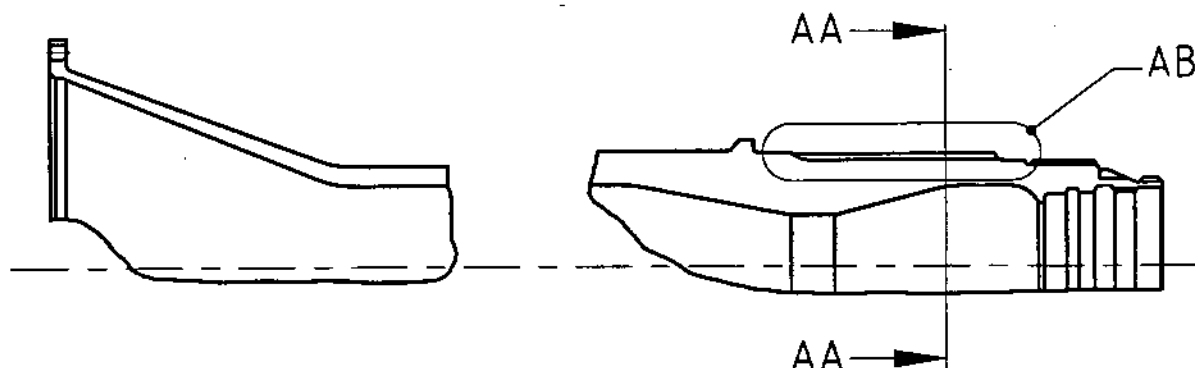


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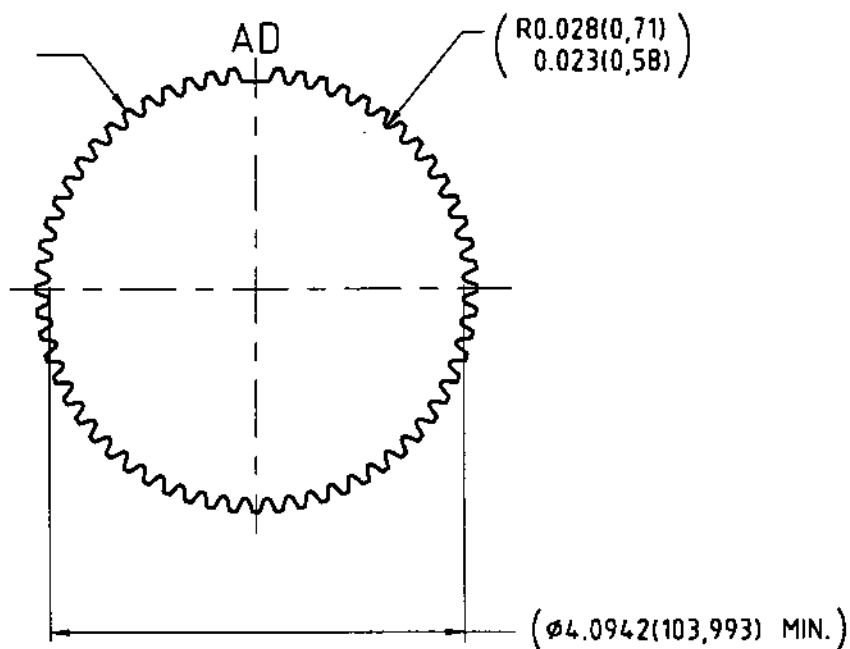


sneema



TYPICAL SECTION THROUGH SHAFT

60 SERRATIONS EQUALLY
SPACED.
ONE SERRATION AT AD
REMOVED.

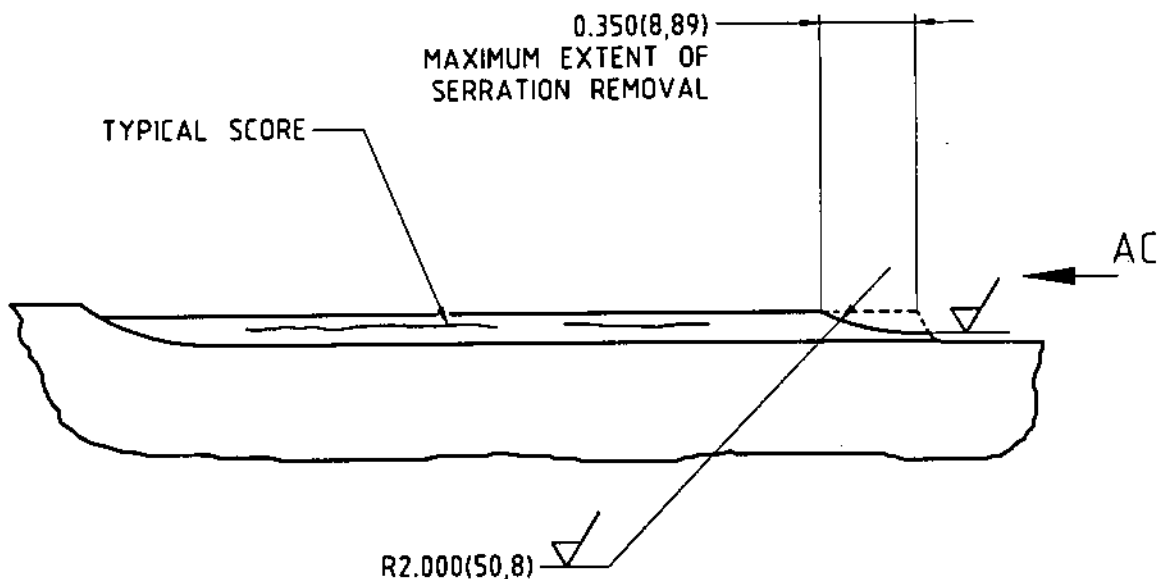


SECTION AA
FIG.401.



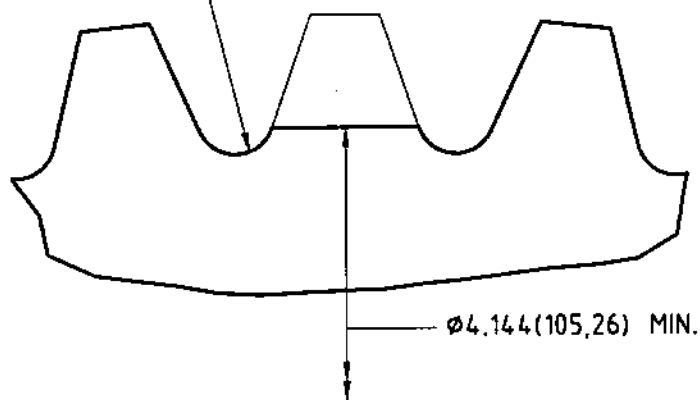
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DETAIL AB
SHOWING SERRATION FLANK

BLENDING NOT TO ENCROACH
INTO ROOT RADIUS



v → AC

SHOWING MAXIMUM DEPTH OF SERRATION REMOVAL
FIG.402.

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COMPRESSOR INTERMEDIATE CASE - REPAIRTABLE OF CONTENTS

Repair No.	Title	Scheme No.
1	CANCELLED	
2	CANCELLED	
3	Labyrinth Static Ring Fins Repaired by Roll Forming	SAL.B.478093
4	CANCELLED	
5	CANCELLED	
6	CANCELLED	
7	Not Issued	
8	Rear Outer Air Baffle Unit Repaired by Fitting Replacement Outer Labyrinth Housing	SAL.B.488604
9	Outer Labyrinth Housing Assembly Repaired by Fitting New Labyrinth Housing	SAL.B.478062
10	Inner Case Repaired by Fitting Non- Standard Shouldered Pins	B.488652-60

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Repair No.	Title	Scheme No.
11	Fitting Non-Standard Shouldered Pins to Outer Case	SAL.B.488685-87
12	LP Bearing Housing Seal Lands Repaired by Application of Sprayed Coating	SAL.B.492901-2
13	Housing, Bearing H.P. - Restoration of Squeeze Film Lands by Re-spray Coating	SAL.B.492903-4
14	Fitting Replacement Shank Nuts to Outer Case and Re-Swaging Existing Nuts	SAL.B.492925
15	Fitting Replacement Shank Nuts to Inner Case and Re-Swaging Existing Nuts	SAL.B.492926
16	Compressor Intermediate Case RH Gearbox Mounting Repaired by Restoring Seal Recess Face	SAL.B.497444
17	Outer Labyrinth Housing Repaired by Machining Damage Caused by Fretting from Faces of Bolt Locations	SAL.B.493751
18	Compressor Intermediate Case Repair of Local Damage to Rokide 'Z' Coating by Re-spraying	SAL.B.935534
19	Oil Sump Assembly Tube Ends Restored by Plasma Spray	SAL.B.502641
20	Baffle assy, of Air, Rear Outer. Removal and replacement of abradable coatings	SAL.B.514647
21	Housing, Labyrinth, Inner (LP). Removal and replacement of abradable coatings	SAL.B.514664
22	Housing, Assy. of, Labyrinth Outer. Removal and replacement of abradable coatings	SAL.B.514666

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Repair No.	Title	Scheme No.
23	Housing, Labyrinth, Inner (HP). Removal and replacement of abradable coatings	SAL.B.514667
24	Ring, Assy. of, Seal Static Housing. Removal and replacement of abradable coatings	SAL.B.514668
25	Bearing, LP Compressor Thrust. Removal of coating pick-up by dressing	SAL.B.514799
26	Outer case. Removal of impact damage by blending	SAL.B.514784
27	Housing and Thrust Ring, LP Comp. Thrust Ring Bearing. Restoration of washer, thrust rear abutment face by application of plasma sprayed coating	SAL.B.515007
28	Tube Assembly, Vent. Repair of damaged and/or fretted areas	SAL.B.497468

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COMPRESSOR INTERMEDIATE CASE - REPAIR LP OUTER LABYRINTH HOUSING
SEAL LANDS REPAIRED BY APPLICATION OF ABRADABLE COATING

Printed in England

This repair is CANCELLED. It is superseded by the requirements of Service Bulletin OL.593-72-8490-267 Part 1 initially and 72-32-00 Repair No.22 subsequently.

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Repair No.1

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COMPRESSOR INTERMEDIATE CASE - REPAIR
HP REAR OUTER AIR BAFFLE SEAL LANDS REPAIRED BY
APPLICATION OF ABRADABLE COATING

Printed in England

This repair is CANCELLED. It is superseded by the requirements of Service Bulletin OL.593-72-8490-267 Part 4 initially and 72-32-00 Repair No.20 subsequently.

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Repair No.2

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COMPRESSOR INTERMEDIATE CASE - REPAIR
LABYRINTH STATIC RING FINS
REPAIRED BY ROLL FORMING

1. Effectivity

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-32-00	5 30A	B.484334
	30A	B.492650
	30B	B.494286

2. Introduction

- A. This Repair describes the procedure for restoring defective fins on the labyrinth static ring, in order to maintain the standard fin/housing clearances of labyrinth No.10A. The diameter of each fin is first increased by roll forming then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the roll forming technique applicable to this repair procedure.
- C. Dimensions are shown thus on illustrations:
INCHES (MILLIMETRES).

3. Repair Limitations

- A. This Repair may be applied once only.
- B. Fins which have previously been repaired by welding must not be restored by roll forming.
- C. Verify that there is adequate material at each defective location to permit machining to the dimensions before roll forming (Ref.para.3.B).

4. Summary of Operations

- A. Secure the labyrinth ring to the faceplate of an external grinder and set true on datum diameter A (Ref.Fig.401).
- B. Clean up defective fins; remove only the minimum amount of material to achieve the specified dimensions (Ref. Fig.402). A localised "witness", not exceeding 0.003 in. (0,076 mm) in depth, is acceptable on each fin.

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- C. Carefully remove any burrs.
- D. Apply the roll forming technique to increase the diameter of defective fins to the specified dimensions (Ref. Fig.403).
- E. Remove any folds by careful blending (Ref.Fig.403).
- F. Crack test the labyrinth ring using the magnetic particle detection method detailed for this component in 72-32-00, Inspection/Check.
- G. Finish machine the fins (Ref.Fig.401); a maximum of 1.000 in. (25,4 mm) of the circumference which has not cleaned up is acceptable on each fin.
- H. Polish the fins to remove sharp edges.
- J. Repeat the test for cracks (para.F).
- K. Identify repair. Mark the repair scheme number SAL B.478093 close to the standard part number on the labyrinth ring.

5. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Tool Holder	1	S3S.12358000	1
Rolling Tool	1	S3S.12363000	2
Roller	2	S3S.12379000	3
Shims	4	S3S.12375-78000	4

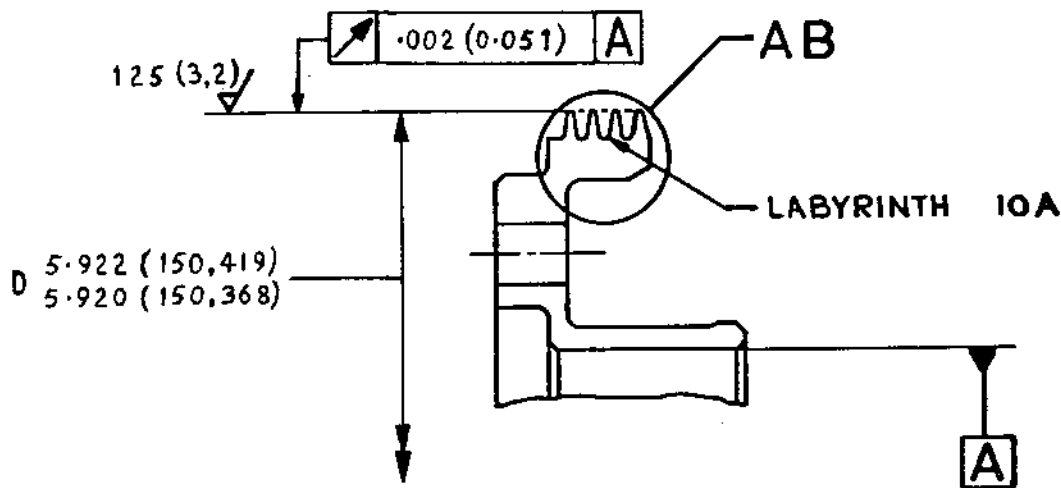
6. Replacement Parts

- A. Not required.

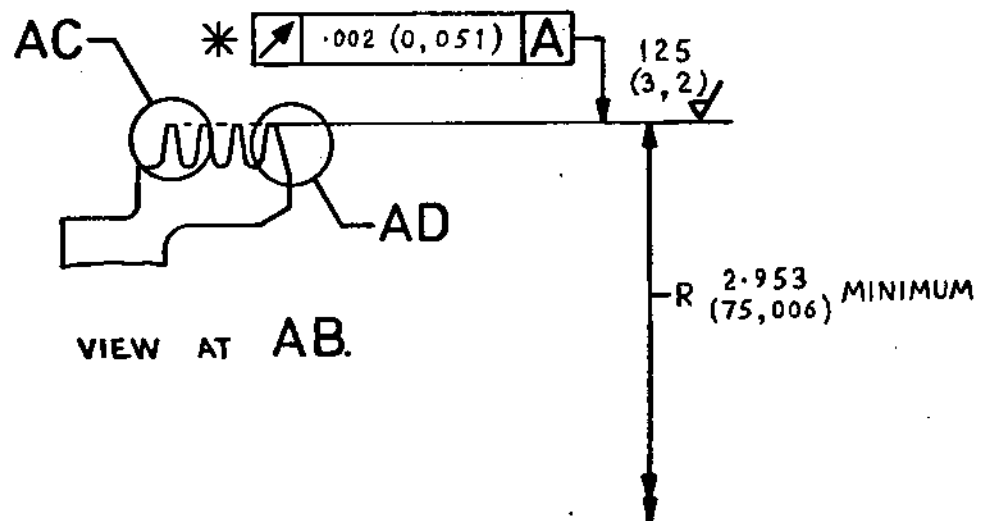


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Standard Dimensions
Figure 401



* .003 (0,076) LOCAL WITNESS IS IN ADDITION
TO THIS TOLERANCE.

Machining Dimensions Before Roll Forming
Figure 402

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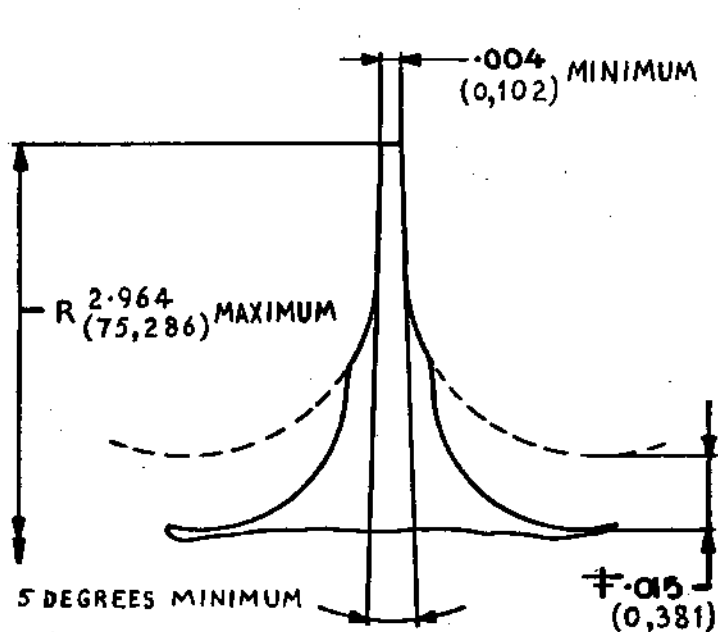
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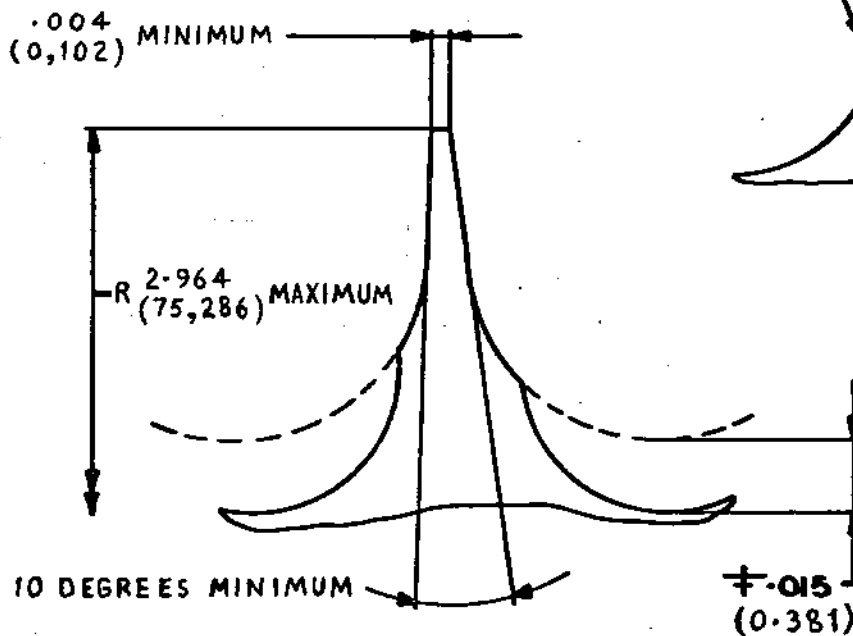
MK.610-14-28
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ROLLING TOOL NOT
TO ENCROACH WITHIN
DIMENSION SHOWN.

FOLDS TO BE
REMOVED BY BLENDING
INTO EXISTING
PROFILE. NO UNDER
CUTTING PERMISSIBLE.

VIEW AT AC.



VIEW AT AD.

Roll Forming Dimensions and Fold Blending Detail
Figure 403

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MK.610-14-28 sheema
OVERHAUL

COMPRESSOR INTERMEDIATE CASE - REPAIR
LP INNER LABYRINTH HOUSING SEAL
LANDS REPAIRED BY APPLICATION OF ABRADABLE COATING

Printed in England

This repair is CANCELLED. It is superseded by the requirements of Service Bulletin OL.593-72-8490-267 Part 2 initially and 72-32-00 Repair No.21 subsequently.

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MK.610-14-28 *sneema*
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COMPRESSOR INTERMEDIATE CASE - REPAIR
HP INNER LABYRINTH HOUSING SEAL LANDS
REPAIRED BY APPLICATION OF ABRADABLE COATING

Printed in England

This repair is CANCELLED. It is superseded by the requirements of Service Bulletin OL.593-72-8490-267 Part 3 initially and 72-32-00 Repair No.23 subsequently.

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MK.610-14-28 *sheema*
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COMPRESSOR INTERMEDIATE CASE - REPAIR
STATIC HOUSING SEAL LANDS REPAIRED
BY APPLICATION OF ABRADABLE COATING

Printed in England

This repair is CANCELLED. It is superseded by the requirements of Service Bulletin OL.593-72-8490-267 Part 5 initially and 72-32-00 Repair No.24 subsequently.

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COMPRESSOR INTERMEDIATE CASE ASSEMBLY - REPAIR
REAR OUTER AIR BAFFLE UNIT REPAIRED BY FITTING REPLACEMENT
OUTER LABYRINTH HOUSING

1. Effectivity

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-32-00	2 30C	B.491796
	2 30C	B.492612
	2 30D	B.494278

2. Introduction

- A. This Repair describes the procedure for fitting a standard replacement outer labyrinth housing to the rear outer air baffle unit, in order to maintain the standard fin/housing clearances of labyrinth No.8.
- B. Refer to Chapter 72-09-00, Repair for all standard practices and tolerancing applicable to this repair procedure.
- C. Dimensions are shown thus on illustrations:
INCHES (MILLIMETRES).
- D. Machining surface texture to be 63 micro-inches
(1,6 micrometers) unless otherwise stated.

3. Summary of Operations

- A. Strip the rear outer baffle unit of all aluminium paint
(Ref.72-09-00 Cleaning Process F).
- B. Remove the Defective Outer Labyrinth Housing.
 - (1) Set up the fixture (item 2) in a centre-lathe.
Locate the air baffle on the base plate of the fixture
on datum face A and clock true on datum bore B
(Ref.Fig.402).
 - (2) Part-off the labyrinth housing and turn the baffle
back to the specified dimension (Ref.Fig.401).
 - (3) Remove the component from the fixture; remove all
burrs and sharp edges.

NOTE: If convenient, leave the fixture in position
on the lathe for final machining operations.

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sneema

C. Inspect the Air Baffle.

- (1) Inspect the component for satisfactory completion of the previous operations.
- (2) Test for cracks by the fluorescent penetrant process specified for this component in 72-32-00, Inspection/Check.

D. Prepare Components for Welding.

- (1) Inspect the replacement housing for satisfactory condition; record the batch and serial numbers.
- (2) Clean and degrease the areas to be welded, by abrading with Scotchbrite and vapour degreasing, or by cleaning with a group 2, 3 or 4 solvent (Ref.72-09-00 - Cleaning).

E. Weld Components.

- (1) Locate the new labyrinth housing on the air baffle; use expanding ring (item 1).
- (2) Argon-arc tackweld the labyrinth housing to the air baffle.
- (3) Remove the expanding ring.
- (4) True-up mating edges preparatory to final welding.
- (5) Autogenous inert-gas weld the labyrinth housing to the air baffle.

NOTE: Ensure that sufficient allowance is left for final machining in unit form.

- (6) If necessary, dress the weld (Ref.Fig.402); remove heat discolouration.

F. Inspect the Air Baffle.

- (1) Examine the new welded joint by the radiographic (X-ray method).
- (2) Repeat the crack test.

G. Heat Treat the Air Baffle.

- (1) Heat the air baffle to 650°C (plus/minus 10°C); soak at this temperature for one hour.

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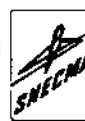
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(2) Cool the baffle in air.

H. Repeat the Crack Test.

J. Inspect the Baffle before Machining.

(1) Inspect the baffle to ensure that adequate allowance remains for final machining.

K. Machine to Final Dimensions.

(1) If the fixture (item 2) was removed after operation 2B, reset the fixture in the centre-lathe.

(2) Locate the air baffle in the fixture on datum face A, (Ref.Fig.402) and set true.

(3) Clean up small end face.

(4) Finish turn datum bore B to specified dimensions, (Ref.Fig.402).

(5) Relocate the component in the fixture and set true to datum bore B.

(6) Finish turn the end face of datum bore B to produce the dimension 1.784 in./1.782 in. (45,314 mm/45,263 mm) from datum face A, (Ref.Fig.402).

(7) Finish turn the diameter 8.365 in./8.360 in. (212,471 mm/212,344 mm), (Ref.Fig.402), to length 0.130 in./0.132 in. (3,302 mm/3,353 mm) and form the corner radius 0.030 in. (0,762 mm), (Ref.Fig.403).

(8) Finish form the 31 deg/30 deg and 30 deg angles (Ref.Fig.403) to produce the diameter 8.530 in. (216,662 mm); form the corner radii.

NOTE: A step of 0.010 in. (0,254 mm) (maximum) is permissible.

(9) Chamfer datum bore B 0.040 in. (1,016 mm) x 45 deg, (Ref.Fig.403). Remove burrs.

(10) Inspect for satisfactory completion of all previous operations.

(11) Locate the component on fixture (item 2) on datum face A. Set true on datum bore B.

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- (12) Finish form and face 31 deg/30 deg angle to produce 0.236 in./0.234 in. (5,995 mm/5,944 mm) lip, (Ref.Fig.403), and diameter 9.380 in. (283,252 mm), (Ref.Fig.402); form the 0.100 in. (2,540 mm) corner radius.
- (13) Check 0.110 in. (2,794 mm) wall section (Ref.Fig.403); chamfer other end of datum bore B (Ref. previous operation 2K(9)).
- (14) Finish turn bore X to the specified diameter (Ref. Fig.402 and 405). Produce the dimension 0.650 in./0.640 in. (16,510 mm/16,256 mm) and form the corner radius 0.020 in. (0,508 mm), (Ref.Fig.403).
- (15) Finish turn bore Y to the specified diameter (Ref. Fig.402 and 405). Produce dimension 1.010 in./1.000 in. (25,654 mm/25,400 mm) and form the corner radius 0.020 in. (0,508 mm) (Ref.Fig.403).
- (16) Finish turn bore Z to the specified diameter (Ref. Fig.402 and 405). Produce dimension 1.370 in./1.360 in. (34,798 mm/34,544 mm) and form the 0.020 in. (0,508 mm) corner radius, (Ref.Fig.403).
- (17) Turn end face to 1.730 in./1.720 in. (43,942 mm/43,688 mm) dimension; chamfer the three bores 0.020 in./0.030 in. (0,508 mm/0,762 mm) x 45 deg, (Ref.Fig.403).
- (18) Finish turn the outside diameters of the labyrinth housing to produce 30 deg angles; maintain a wall section of 0.080 in./0.075 in. (2,032 mm/1,905 mm) at bores X and Y, and 0.060 in./0.055 in. (1,52 mm/1,40 mm) at bore Z. Produce the 1.640 in. (41,656 mm), 0.770 in. (19,558 mm) and 0.410 in. (10,414 mm) dimensions and form the 0.050 in. (12,700 mm) corner radii, (Ref.Fig.403).
- (19) Remove burrs and sharp edges.
- (20) Inspect for satisfactory completion of all previous operations.

L. Machine Offset Dimensions.

- (1) Relocate the air baffle in the fixture and set true on the offset clocking register.

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- (2) Finish turn the specified offset dimensions and form the 0.020 in. (0,508 mm) corner radii in bores X, Y and Z, (Ref.Fig.402 and 405). Check the 0.020 in./0.030 in. (0,508 mm/0,762 mm) chamfers, (Ref.Fig.403).

M. Finish Machine Slots.

- (1) Locate the air baffle in fixture (item 2) and set true in milling machine on datum bore B.
- (2) Finish machine to width and form the corner radii in the six slots, to produce the specified dimension to the centre line, (Ref.Fig.404).
- (3) Remove all burrs and sharp edges.
- (4) Inspect for satisfactory completion of previous operations.
- (5) Repeat the test for cracks.

N. Identify repair. Mark the repair scheme number SAL B.488604 close to the standard part number on the air baffle.

P. Apply Aluminium Paint.

- (1) Mask the areas not to be painted (Ref.Fig.406).
- (2) Prepare surfaces and apply high heat resisting aluminium paint to all unmasked areas of the component. The full procedure is described in 72-09-04 Repair.
- (3) Finally view the component for the satisfactory completion of the repair.

4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Expanding Ring	1	S3S12814000	1
Support Fixture	1	S3S12815000	2

5. Replacement Parts

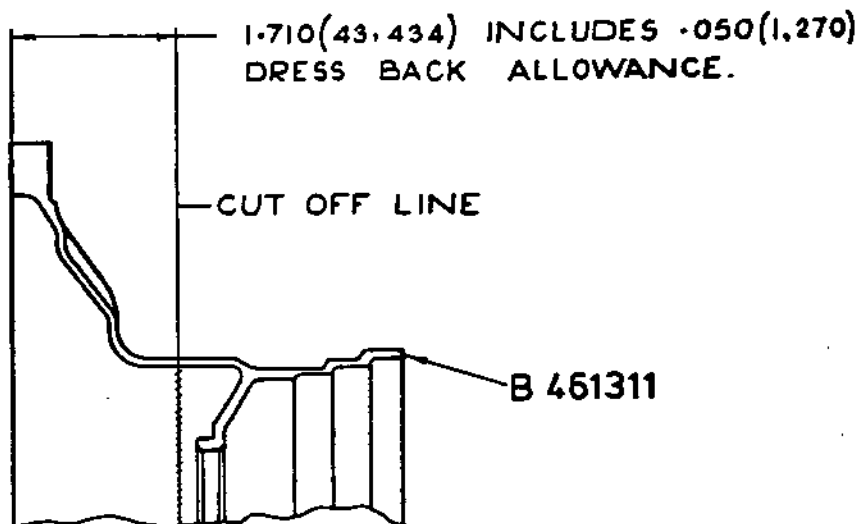
<u>Description</u>	<u>Quantity</u>	<u>Part No.</u>
Labyrinth Housing	1	B.461311

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Details for Removal of Defective Labyrinth Housing
Figure 401

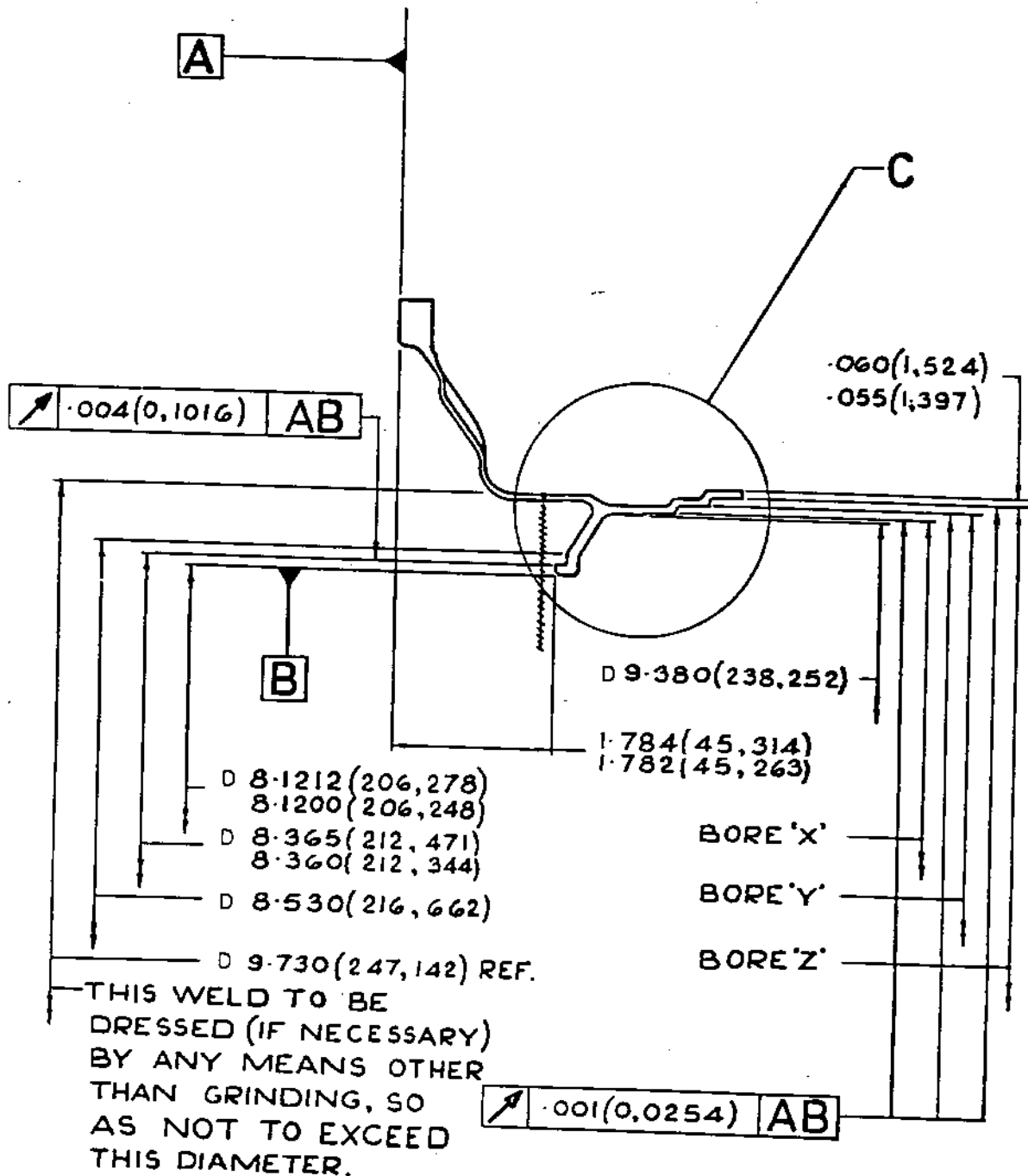
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Standard Dimensions
Figure 402

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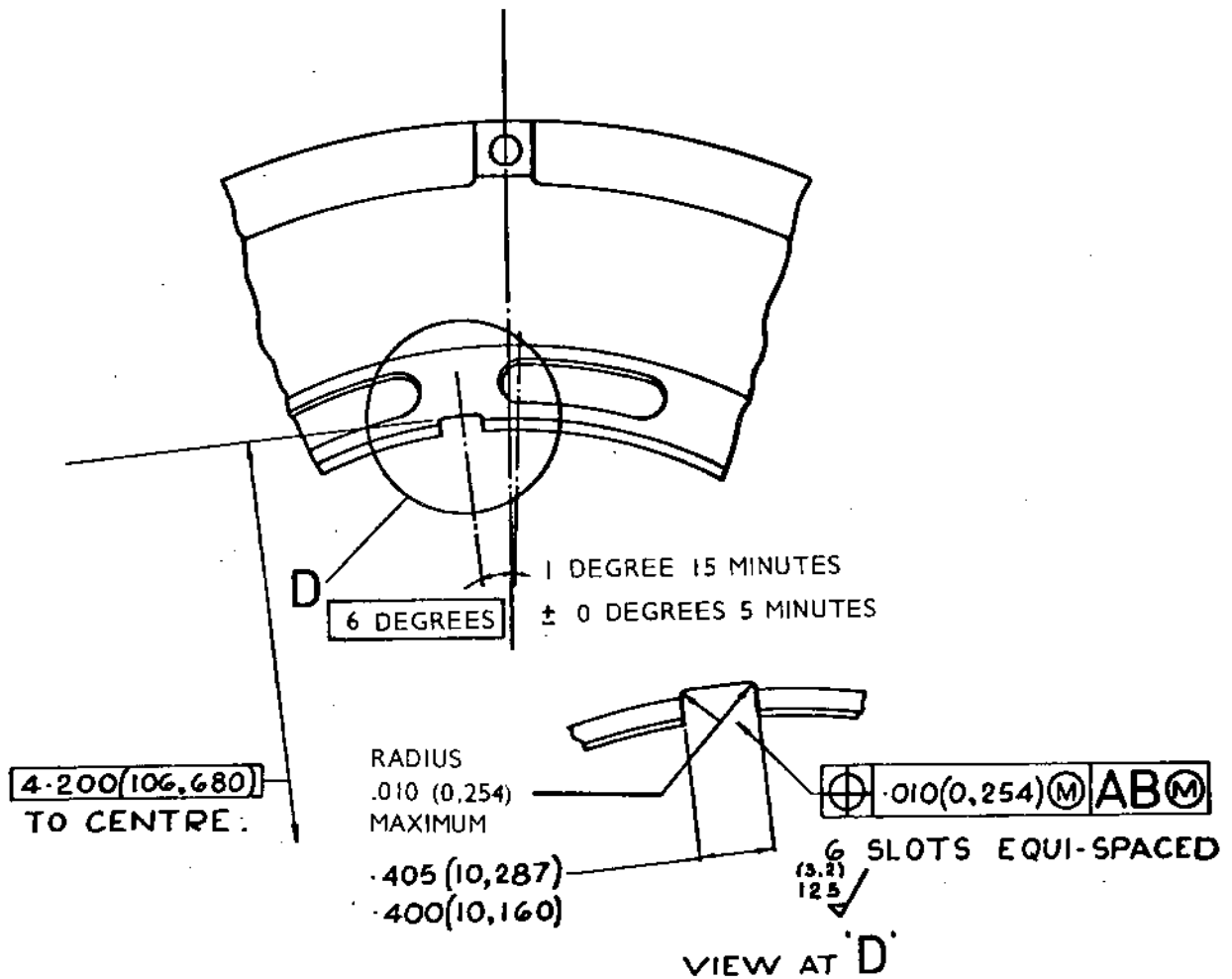
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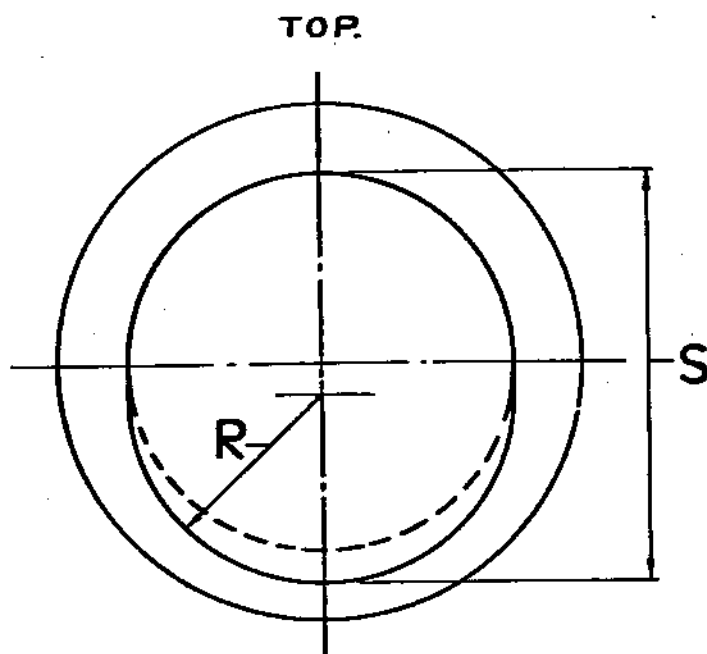
Slot Final Machining Details
Figure 404

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DIAGRAMMATIC SECTION THRO' BORES X,Y & Z.
(REF. FIG. 402)

BORE (REF.FIG.402)	RADIUS R	DIMENSION S	DIAMETER
X	4.721 (119,914)	9.448 (239,979)	9.442 (239,827)
	4.719 (119,863)	9.445 (239,903)	9.440 (239,776)
Y	4.811 (122,200)	9.628 (244,551)	9.622 (244,399)
	4.809 (122,149)	9.625 (244,475)	9.620 (244,348)
Z	4.901 (124,486)	9.808 (249,123)	9.802 (248,971)
	4.899 (124,435)	9.805 (249,047)	9.800 (248,920)

Bore Offset Machining Details
Figure 405

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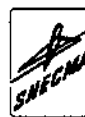
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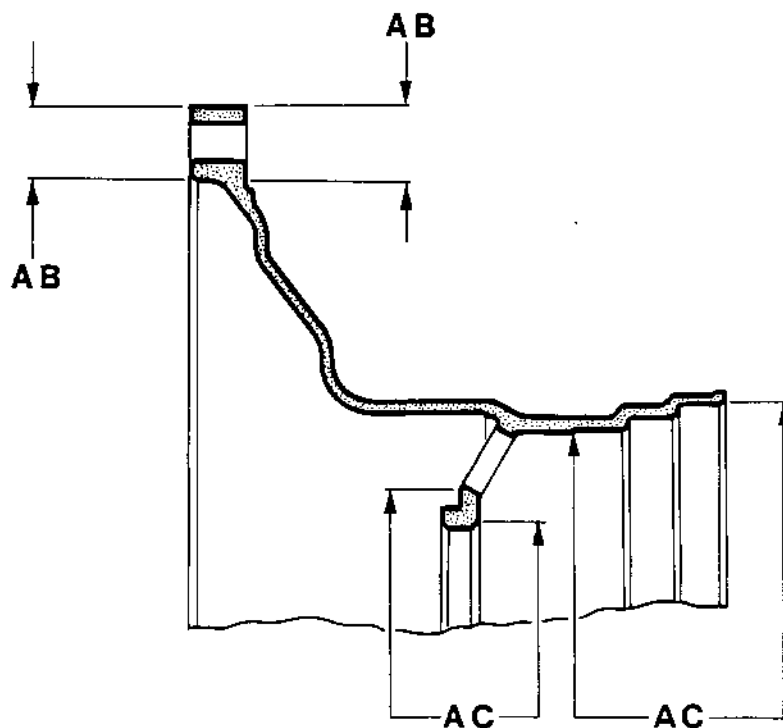
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CR 36094/00A



ALUMINIUM PAINT ALL OVER
EXCEPT JOINT FACES **AB**
AND SURFACES ENCLOSED BY **AC**

Areas to be Painted
Figure 406

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COMPRESSOR INTERMEDIATE CASE ASSEMBLY - REPAIR
OUTER LABYRINTH HOUSING ASSEMBLY REPAIRED BY FITTING NEW
LABYRINTH HOUSING

1. Effectivity

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-32-00	1 350C	B.491792
	1 350D	B.494281

2. Introduction

- A. This Repair describes the procedure for fitting a replacement labyrinth housing to the outer labyrinth housing assembly, in order to maintain the standard fin/housing clearances of labyrinth No.3.
- B. Refer to Chapter 72-09-00, Repair for all standard practices and tolerancing applicable to this repair procedure.
- C. Dimensions are shown thus on illustrations: INCHES (MILLIMETRES).
- D. Machining surface texture, unless otherwise stated, to be 63 MICROINCHES (1,6 MICROMETRES).

3. Summary of Operations

- A. Strip the labyrinth housing of all aluminium paint (Ref.72-09-00, Cleaning Process F).
- B. Remove Defective Section of Component.
 - (1) Set up the fixture (item 1) in a centre-lathe. Locate and secure the component in the fixture on datum face A and clock true on datum bore B (Ref. Fig.402).
 - (2) Cut off the defective section and face back to the specified dimension (Ref.Fig.401).
 - (3) Remove burrs and sharp edges.



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OVERHAUL



SNECMA

- (4) Inspect the component for satisfactory completion of previous operations.
- (5) Test the housing for cracks by the method specified for this component in 72-32-00, Inspection/Check.

4. Fit Replacement Labyrinth Housing

A. Prepare Components for Welding.

- (1) Inspect the replacement housing for satisfactory condition; record the batch and serial numbers.
- (2) Clean and degrease the areas to be welded by abrading with Scotchbrite and vapour degreasing, or by cleaning with a group 2, 3 or 4 solvent (Ref.72-09-00 - Cleaning).

B. Weld Components.

- (1) Assemble the components in the welding fixture (item 2) and check for correct alignment.
- (2) Argon-arc tackweld the components.
- (3) Remove the assembly from the fixture.
- (4) True-up mating edges preparatory to final welding.
- (5) Autogenous inert-gas weld the tacked joint.
- (6) Remove any heat discolouration from the component.

C. Inspect the Labyrinth Housing Assembly.

- (1) Examine the new welded joint by the radiographic (X-ray) method.
- (2) Repeat the crack test.

D. Heat Treat the Labyrinth Housing.

- (1) Heat the housing to 650 deg C (plus/minus 10 deg C); soak at this temperature for one hour.
- (2) Cool the housing in air.

E. Repeat the crack test.

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F. Inspect the Assembly Before Machining.

- (1) Ensure that adequate allowance remains for final machining.
- (2) Check for distortion; if necessary, dress to rectify.
- (3) Repeat the crack test.

G. Machine to Final Dimensions.

- (1) Set up the fixture (item 1) in a centre-lathe.
- (2) Locate the labyrinth housing in the fixture on datum face A (Ref.Fig.402) and set true.
- (3) Clean up small end face.
- (4) Finish turn datum bore B to specified dimensions (Ref.Fig.402).
- (5) Re-locate the housing in the fixture and set true to datum bore B.
- (6) Finish turn the end face of bore B to produce the dimension 2.630 in./2.628 in. (66,802 mm/66,751 mm) from the lug faces (Ref.Fig.402).
- (7) Finish turn the diameter 8.365 in./8.360 in. (212,471 mm/212,344 mm) (Ref.Fig.402), to length 0.130 in./0.132 in. (3,302 mm/3,353 mm) and form the corner radius 0.030 in. (0,762 mm) (Ref. Fig.403).
- (8) Finish form the 31 deg/30 deg and 30 deg angles (Ref.Fig.403) to produce the 8.530 in. (216,662 mm) diameter (Ref.Fig.402); form the corner radii 0.100 in. (2,54 mm) and 0.500 in. (12,70 mm).

NOTE: A step of 0.010 in. (0,254 mm) (maximum) is permissible.

- (9) Chamfer datum bore B at one end 0.040 in. (1,016 mm) x 45 deg (Ref.Fig.403). Remove burrs.
- (10) Inspect for satisfactory completion of all previous operations.

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- (11) Re-locate the housing in the fixture (item 1) on face A; set true to datum bore B.
- (12) Finish form and face 31 deg/30 deg angle (Ref.Fig.403) to produce 0.236 in./0.234 in. (5,995 mm/5,944 mm) lip and diameter 9.380 in. (238,252 mm) (Ref.Fig.402); form the 0.100 in. (2,54 mm) corner radii.
- (13) Check 0.110 in. (2,794 mm) wall section (Ref.Fig.403).
- (14) Chamfer other end of datum bore B (Ref. para.(9)).
- (15) Finish turn bores X, Y and Z to the specified diameters, lengths and corner radii (Ref.Fig.402 and 403).
- (16) Turn front face to produce 1.570 in./1.560 in. (39,878 mm/39,624 mm) dimension (Ref.Fig.402).
- (17) Finish turn outside diameters of labyrinth housing to produce 30 deg angles (Ref.Fig.403) and lips to dimensions 2.190 in. (55,626 mm), 0.770 in. (19,558 mm), 0.410 in. (10,414 mm) and 0.050 in. (1,270 mm) (Ref.Fig.402). Maintain wall sections of 0.080 in./0.075 in. (2,032 mm/1,905 mm) and 0.060 in./0.050 in. (1,524 mm/1,270 mm) and form 0.100 in. (2,54 mm) and 0.050 in. (1,270 mm) corner radii (Ref.Fig.403).
- (18) Remove burrs and sharp edges.
- (19) Inspect for satisfactory completion of all previous operations.

H. Machine Offset Dimensions.

- (1) Re-locate and secure the housing in fixture (item 1) and set true on the offset clocking register.
- (2) Finish turn the specified offset dimensions and form the 0.020 in. (0,508 mm) corner radii in bores X, Y and Z (Ref.Fig.402 and 403).
- (3) Remove burrs.

J. Finish Machine Slots.

- (1) Re-locate and secure the housing in the fixture (item 1) and set true in milling machine on datum bore B.

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- (2) Finish machine to width and form the corner radii in the six slots, to the specified dimension to the centre line (Ref.Fig.404).
- (3) Remove burrs and sharp edges.
- (4) Inspect for satisfactory completion of previous operations.
- (5) Repeat the test for cracks.

K. Identify Repair.

Mark the repair scheme number SAL B.478062 close to the standard part number on the component.

L. Apply Aluminium Paint.

- (1) Mask joint faces AB, areas AC and surfaces enclosed by AD (Ref.Fig.405).
- (2) Prepare surfaces and apply high heat resisting aluminium paint to all unmasked areas of the component. The full procedure is described in 72-09-04, Repair.
- (3) Remove masking.
- (4) Finally view the component for satisfactory completion of the repair.

5. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Fixture	1	S3S12961000	1
Fixture	1	S3S12960000	2

6. Replacement Parts

<u>Description</u>	<u>Quantity</u>	<u>Part No.</u>
Labyrinth Housing	1	B.461307PM.1

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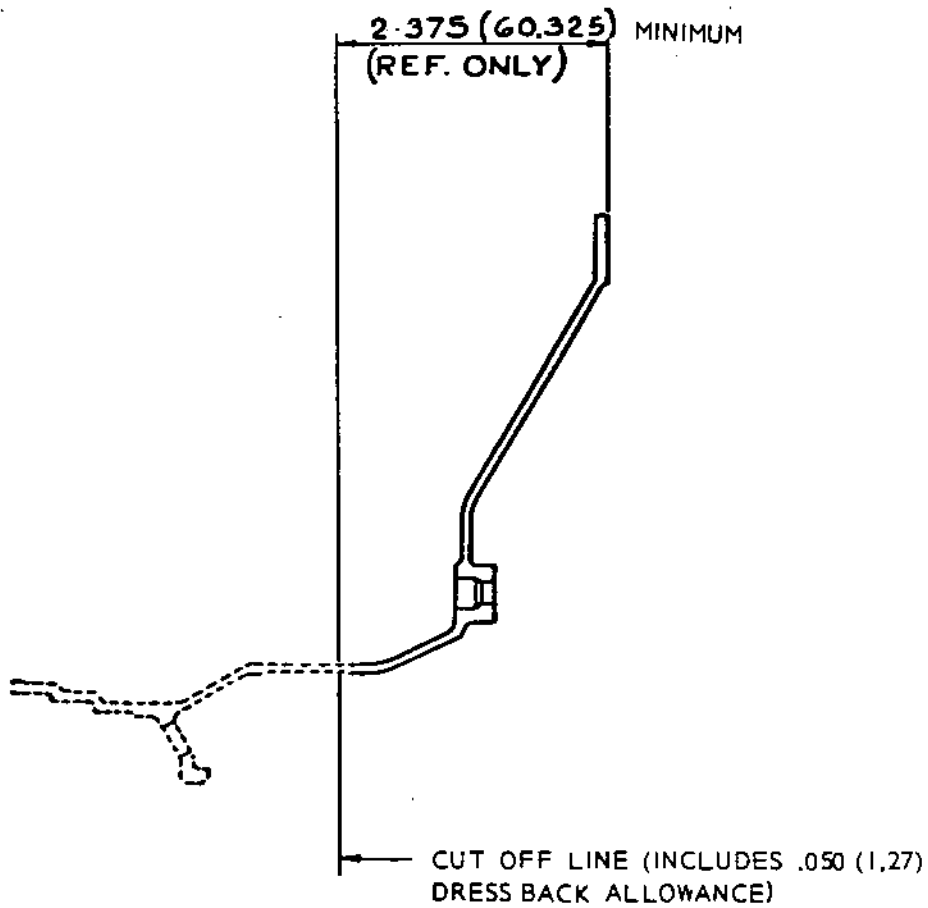
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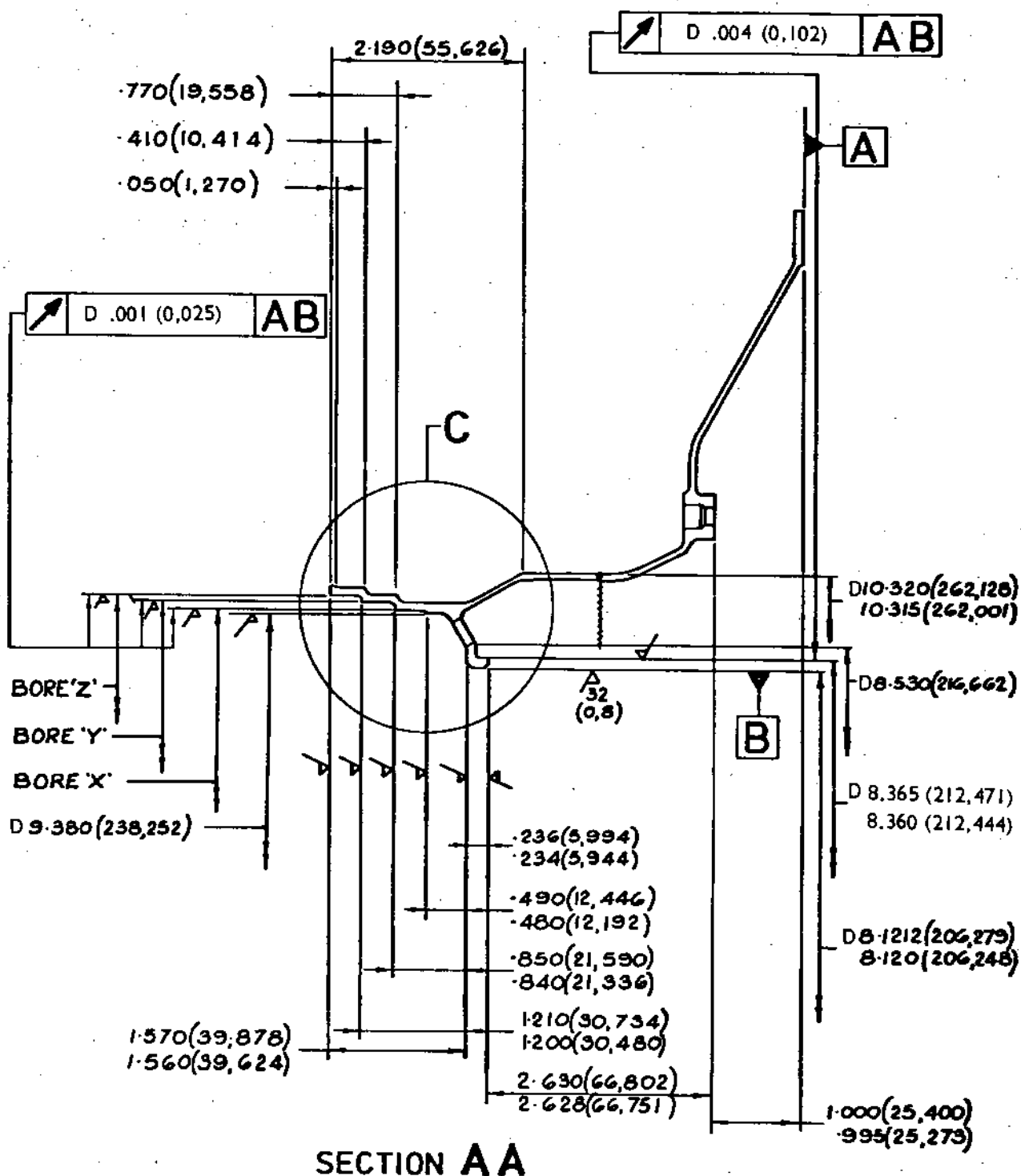


Details for Removal of Defective Labyrinth Housing
Figure 401

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TN43017



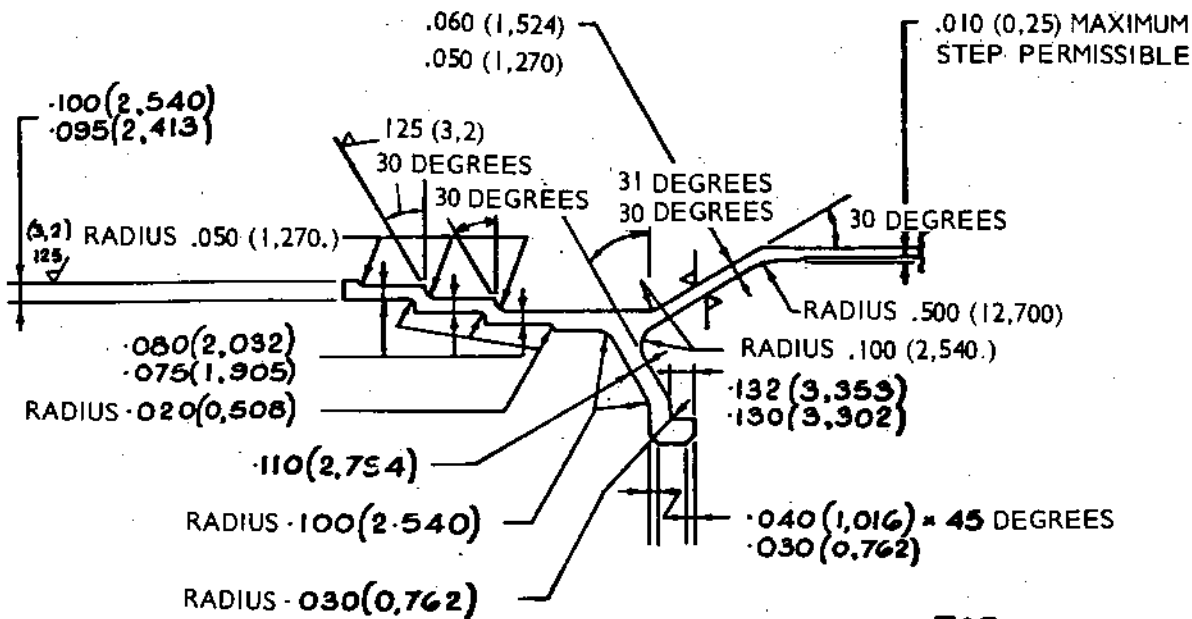
Standard Dimensions
Figure 402

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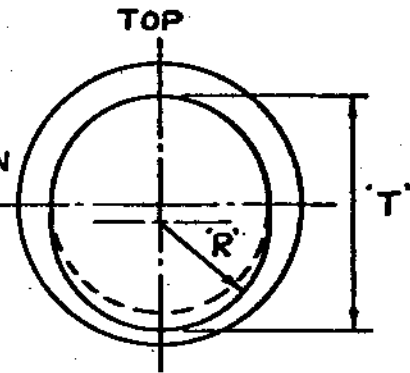
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ENLARGED VIEW AT 'C'
(REF. FIG. 402)

DIAGRAMMATIC SECTION
THRO' BORES X, Y, & Z.



BORE (REF. FIG. 402)	RADIUS R		DIMENSION T		DIAMETER	
X	4.721	(119,913)	9.448	(239,979)	9.442	(239,827)
	4.719	(119,863)	9.445	(239,903)	9.440	(239,776)
Y	4.811	(122,199)	9.628	(244,551)	9.622	(244,399)
	4.809	(122,149)	9.625	(244,475)	9.620	(244,348)
Z	4.901	(124,485)	9.808	(249,123)	9.802	(248,971)
	4.899	(124,435)	9.805	(249,047)	9.800	(248,920)

Standard Dimensions
Figure 403

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FN43018



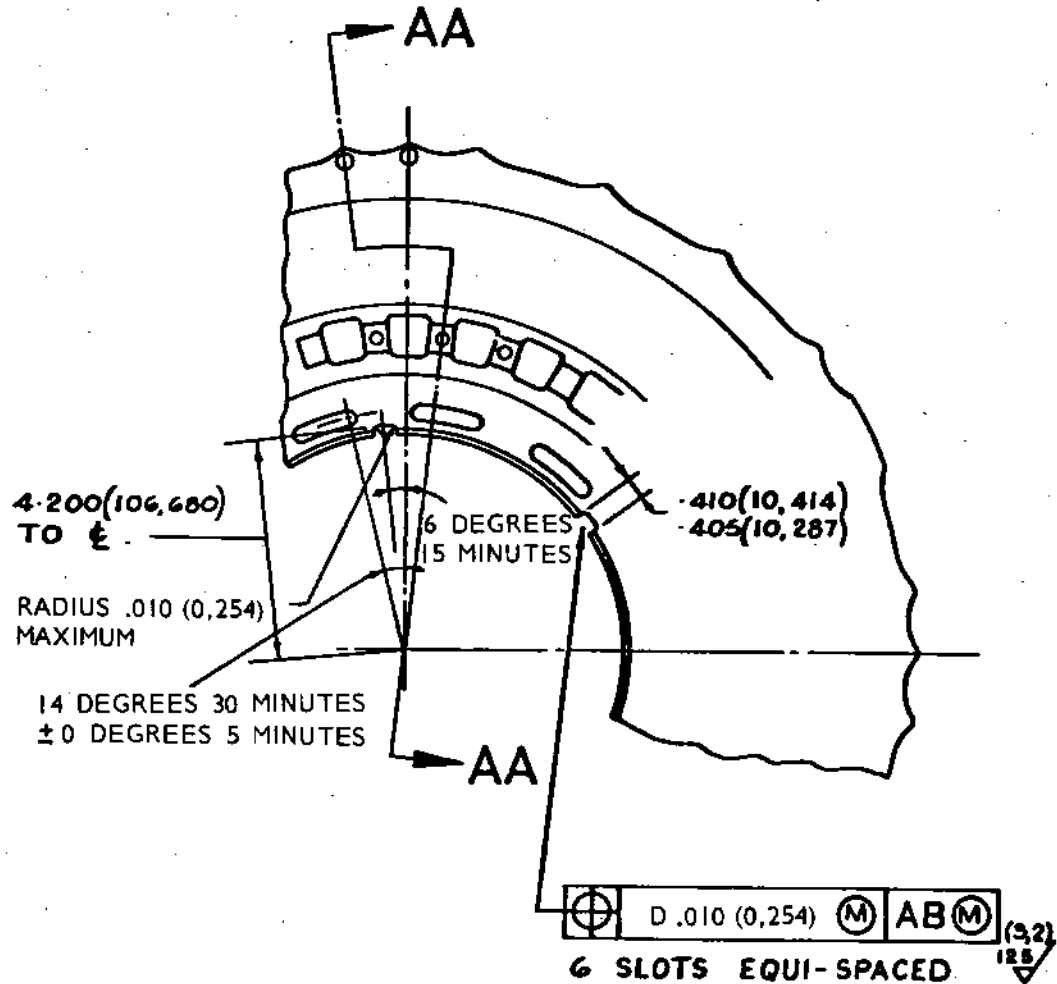
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Slot Final Machining Details
Figure 404

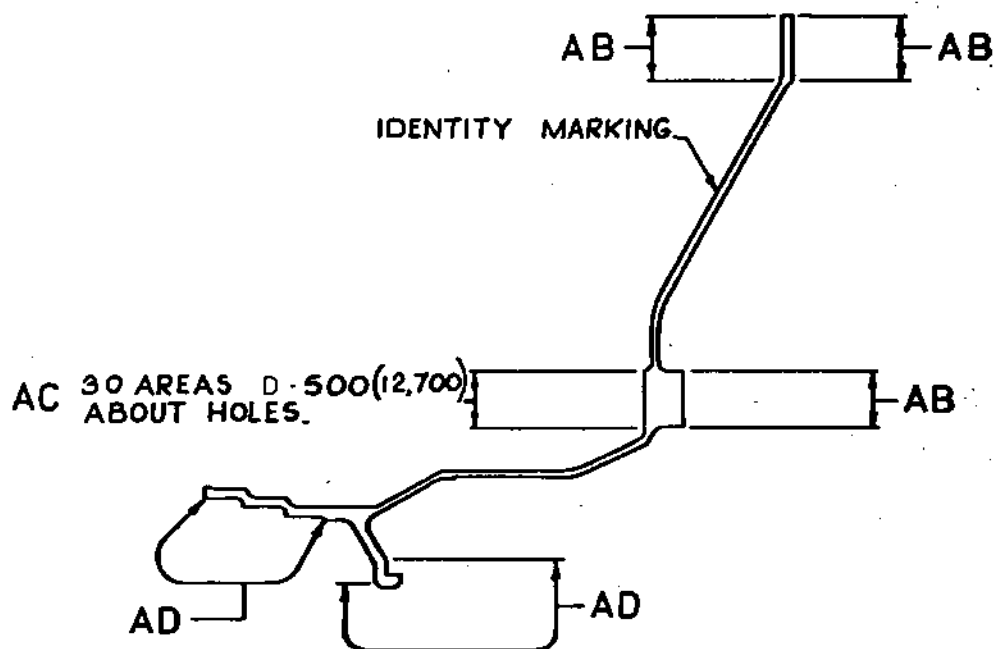
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ALUMINIUM PAINT ALL OVER EXCEPT:-

JOINT FACES AB, AREAS AC AND SURFACES
ENCLOSED BY AD.

Areas to be Painted
Figure 405

TN43020



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OVERHAUL



COMPRESSOR INTERMEDIATE CASE ASSEMBLY - REPAIR
INNER CASE REPAIRED BY FITTING NON-STANDARD SHOULDERED PINS

Applicable to:

Inner Case B.423988

Authority:

Modification No. OL.8423C

1. Introduction

- A. This Repair describes the procedure for repairing pin locations in the inner case by opening the defective locations to receive pins which are oversize on the fast-end diameter. Three increments of oversize are available to permit successive repairs to each location.
- B. Refer to Chapter 72-09-00, Repair for all standard practices and tolerancing applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

2. Summary of Operations

- A. Prepare Defective Locations.
 - (1) Measure the defective locations to determine the minimum oversize dimension required (Ref. Table 401); this will permit successive repairs.
 - (2) Location X only (Ref.Fig.401).
 - (a) Locate the case on its small end face on a jig boring machine.
 - (b) Set true to the defective pin location, SECTION AA.
 - (c) Finish bore the location to the selected oversize diameter.

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- (d) Remove burrs and sharp edges.
 - (3) Location Y only (Ref.Fig.402 VIEW ON AB AND AD).
 - (a) Locate the case on its large end face on a jig boring machine with a universal boring head.
 - (b) Set true to vanes 5 or 6, as applicable, on inside of casing.
 - (c) Finish bore the location to the selected over-size diameter and the specified depth; form the 0.020 in./0.030 in. (0,508 mm/0,762 mm) corner radius and vanes 5 or 6.
 - (d) Remove burrs and sharp edges.
 - (4) Location Z only (Ref.Fig.402, VIEW ON AC).
 - (a) Locate the case on its large end face on a universal jig boring machine with a universal boring head.
 - (b) Set true to vane 4 on inside of casing.
 - (c) Finish bore the locations to the selected oversize diameter.
 - (d) Remove burrs and sharp edges.
 - (5) Inspect for satisfactory completion of all previous operations.
- B. Fit Oversize Fast-End Pins.
- (1) Select the correct non-standard pins for the locations prepared (Ref. Table 401).
 - (2) Freeze and fit the pins to the case.
 - (3) Inspect to ensure that all pins have been fitted correctly.
 - (4) Test the case for cracks by the fluorescent dye process specified for this component in 72-32-00 Inspection/Check.

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OVERHAUL

C. Identify repair (Ref. Table 401). Mark the appropriate repair scheme numbers close to the standard part number on the case.

LOCATION	REPAIR SCHEME NUMBER	AMOUNT OVERSIZE	HOLE DIAMETERS	NON-STD. PIN REQD.
X (REF. FIG. 401)	SAL.B.488652	0.010 (0,254)	0.2592 (6,584) 0.2586 (6,568)	B.488661
	SAL.B.488653	0.015 (0,381)	0.2642 (6,711) 0.2636 (6,695)	B.488662
	SAL.B.488654	0.020 (0,508)	0.2692 (6,838) 0.2686 (6,822)	B.488663
Y (REF. FIG. 402)	SAL.B.488655	0.010 (0,254)	0.1970 (5,004) 0.1965 (4,991)	B.488664
	SAL.B.488656	0.015 (0,381)	0.2020 (5,131) 0.2015 (5,118)	B.488665
	SAL.B.488657	0.020 (0,508)	0.2070 (5,258) 0.2065 (5,245)	B.488666
Z (REF. FIG. 403)	SAL.B.488658	0.010 (0,254)	0.2592 (6,584) 0.2586 (6,568)	B.488667
	SAL.B.488659	0.015 (0,381)	0.2642 (6,711) 0.2636 (6,695)	B.488668
	SAL.B.488660	0.020 (0,508)	0.2692 (6,838) 0.2686 (6,822)	B.488669

Table 401

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**OLYMPUS 593**MK.610-14-28
OVERHAUL**3. Special Tools, Fixtures and Equipment**

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Plug Gauge	1	S3S15008000	1
Plug Gauge	1	S3S15009000	2
Plug Gauge	1	S3S15007000	3
Plug Gauge	1	S3S15010000	4
Plug Gauge	1	S3S15012000	5
Plug Gauge	1	S3S15011000	6

A. Use items 1, 2 and 3 respectively for the three oversize increments at location X and Z (Ref. Table 401).

B. Use items 4, 5 and 6 respectively for the three oversize increments at location Y (Ref. Table 401).

4. Replacement Parts

<u>Description</u>	<u>Quantity</u>	<u>Part No.</u>
Shouldered Pin	As req'd.	Ref. Table 401

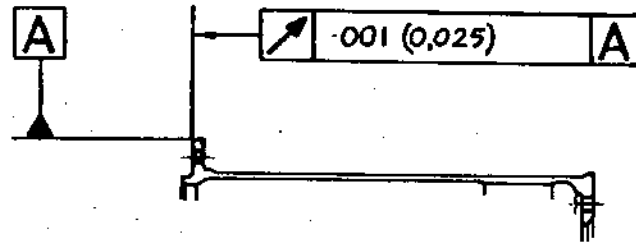
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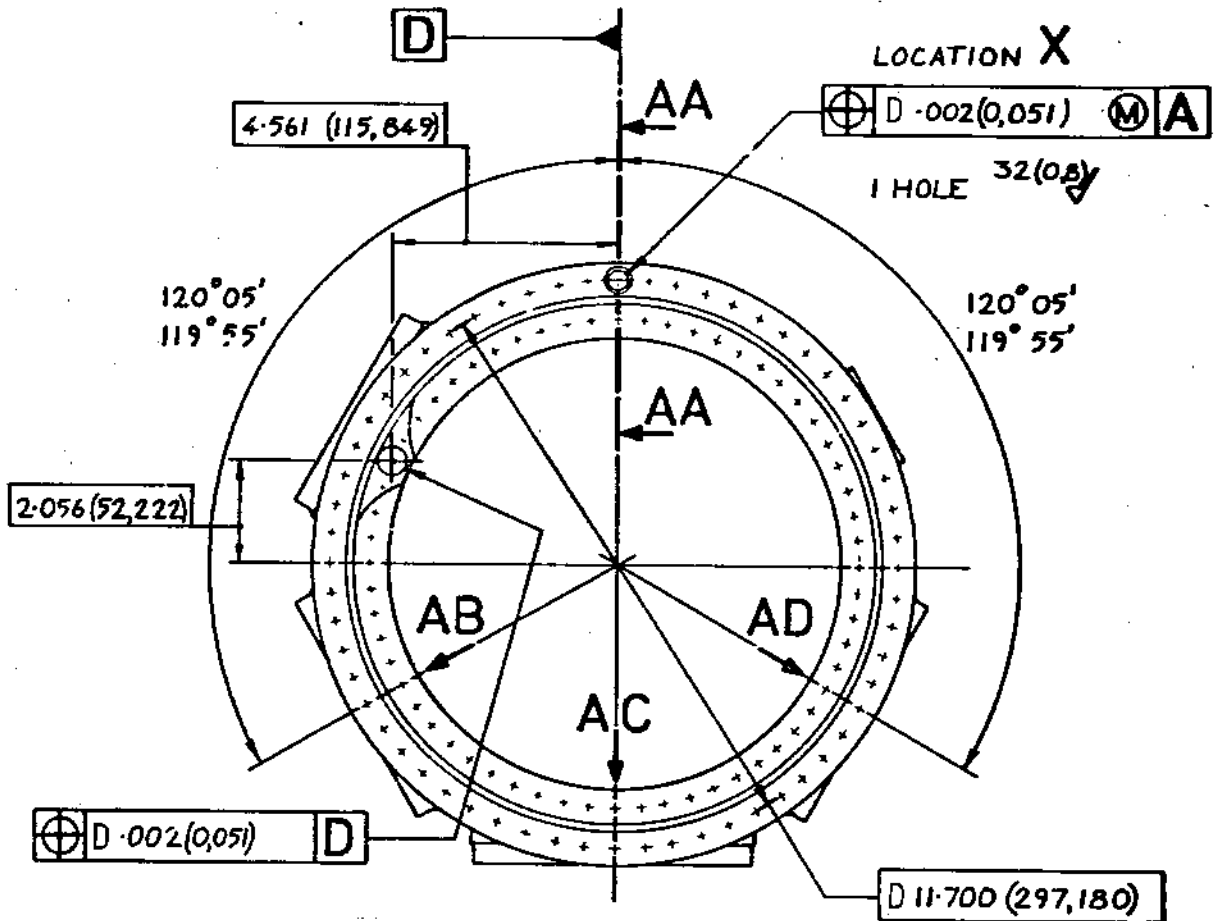


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SECTION AA-AA



Inner Case - Fitting Non-standard Shouldered Pins
Figure 401

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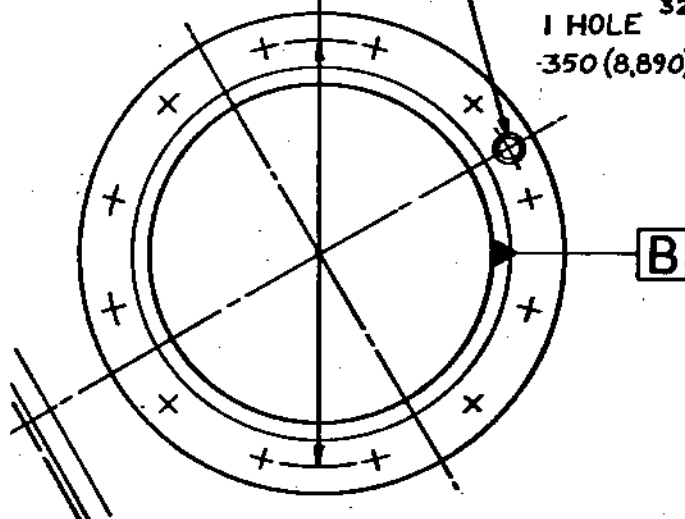


LOCATIONS- Y

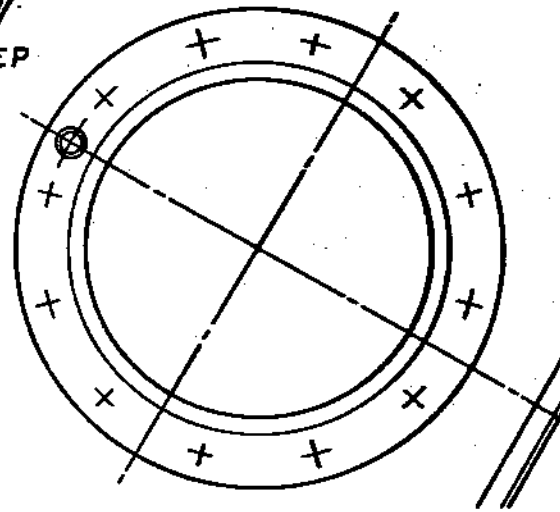
D 4450 (113,030)

⊕ D-008 (0,203) ⊙ B

1 HOLE $\frac{32}{100}$ (0,8)
-350 (8,890) DEEP

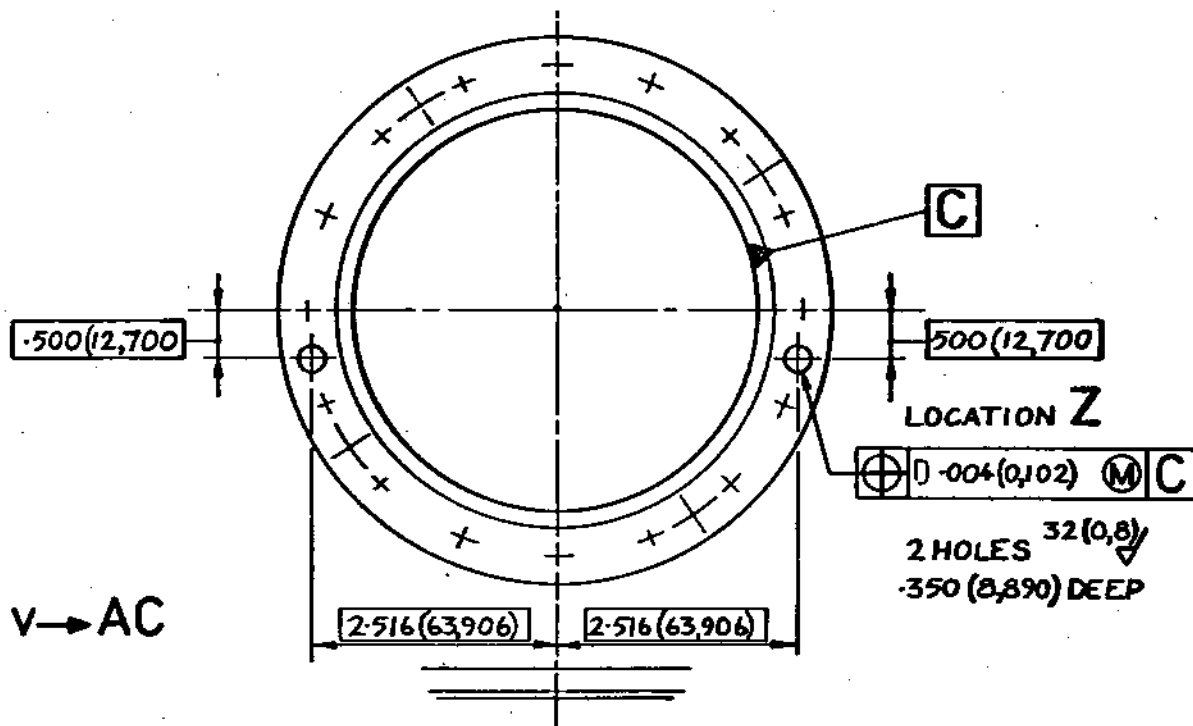


v→AB



v→AD

SIMILAR TO v→AB



Inner Case - Fitting Non-standard Shouldered Pins
Figure 402

7N192

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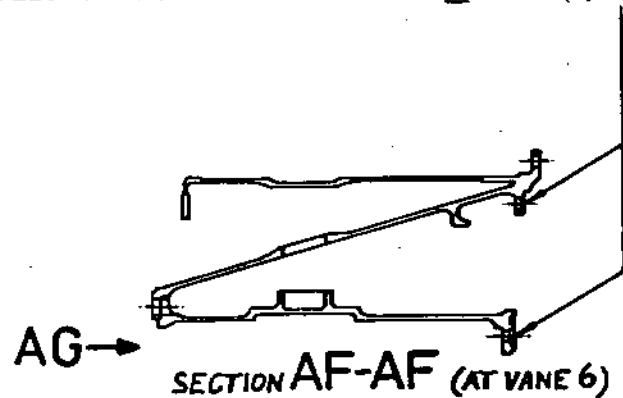
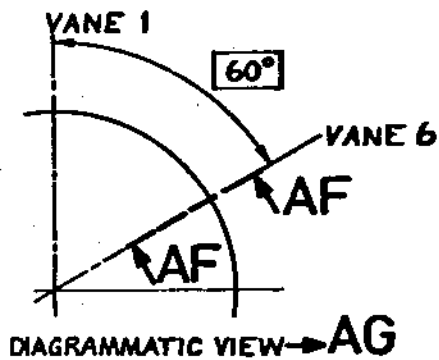
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WITH OUTER CASING-SUB ASSY THE ANGULAR
RELATIONSHIP OF THESE HOLES IS IMPORTANT TO WITHIN $\pm 0.001 (0.025)$



Inner Case - Fitting Non-standard Shouldered Pins
Figure 403

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TN13893



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OVERHAUL

COMPRESSOR INTERMEDIATE CASE ASSEMBLY - REPAIR FITTING STANDARD SHOULDERED PINS TO OUTER CASE

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-32-00	05 420B	B.431211
	420C	B.423987
		B.491631

2. Authority:

Modification No. 0L.8423C,
0L.8462C

3. Introduction

- A. This Repair describes the procedure for repairing pin locations in the outer case by opening the defective locations to receive pins which are oversize on the fast-end diameter. Three increments of oversize are available to permit successive repairs at each location.
- B. Refer to Chapter 72-09-00 Repair for all standard practices and tolerancing applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

4. Instructions

A. Prepare Defective Locations.

- (1) Measure the defective locations to determine the minimum oversize dimension required (Ref.Fig.401); this will permit successive repairs.
- (2) Locate the case on its small end face on a jig boring machine.
- (3) Set true to the defective pin locations.
- (4) Finish bore the locations to the selected oversize diameter. Use the correct plug gauge (Ref.para.5).
- (5) Remove burrs and sharp edges.
- (6) Inspect for satisfactory completion of all previous operations.



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B. Fit Oversize Fast-End Pins.

- (1) Select the correct non-standard pins for the locations prepared (Ref.Fig.402).
- (2) Freeze and fit the pins to the case.
- (3) Inspect to ensure that all pins have been fitted correctly.
- (4) Test the case for cracks by the fluorescent dye process specified for this component in 72-32-00 Inspection/Check.

C. Identify repair (Ref.Fig.402). Mark the appropriate repair scheme numbers close to the standard part number on the case.

5. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Plug Gauge	1	S3S15342000	1
Plug Gauge	1	S3S15343000	2
Plug Gauge	1	S3S15344000	3

A. SAL B.488685. Use item 1.

B. SAL B.488686. Use item 2.

C. SAL B.488687. Use item 3.

6. Replacement Parts

<u>Description</u>	<u>Quantity</u>	<u>Part No.</u>
Shouldered Pin	As required	Ref.Fig.402

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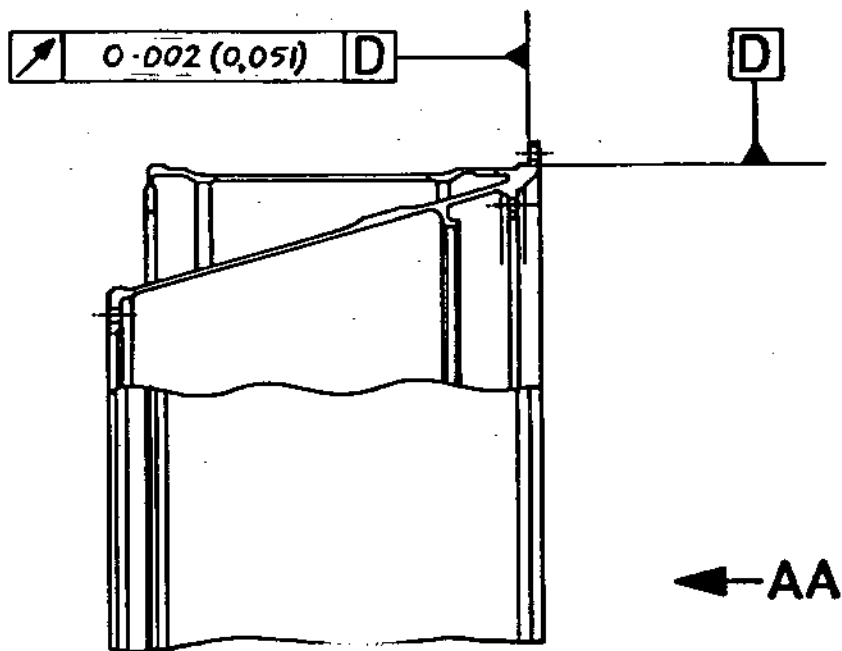
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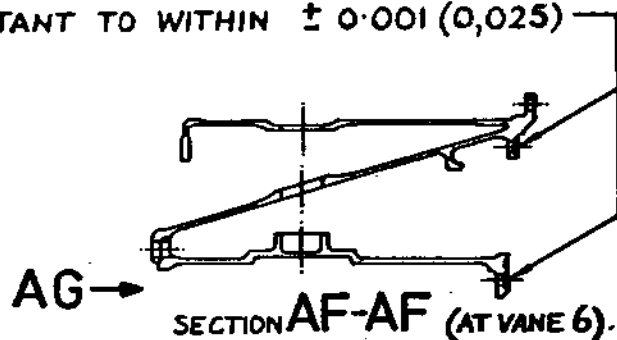
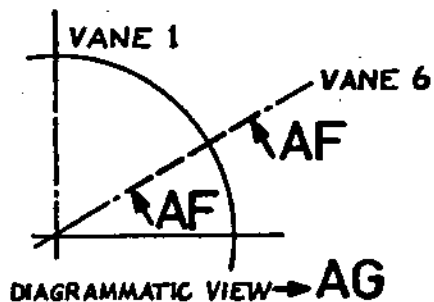
OLYMPUS 593

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WHEN REASSEMBLING INNER CASING - SUB ASSY OF WITH
OUTER CASING - SUB ASSY OF THE ANGULAR RELATIONSHIP
OF THESE HOLES IS IMPORTANT TO WITHIN ± 0.001 (0.025)



Outer Case - Fitting Non-standard Shouldered Pins
Figure 401

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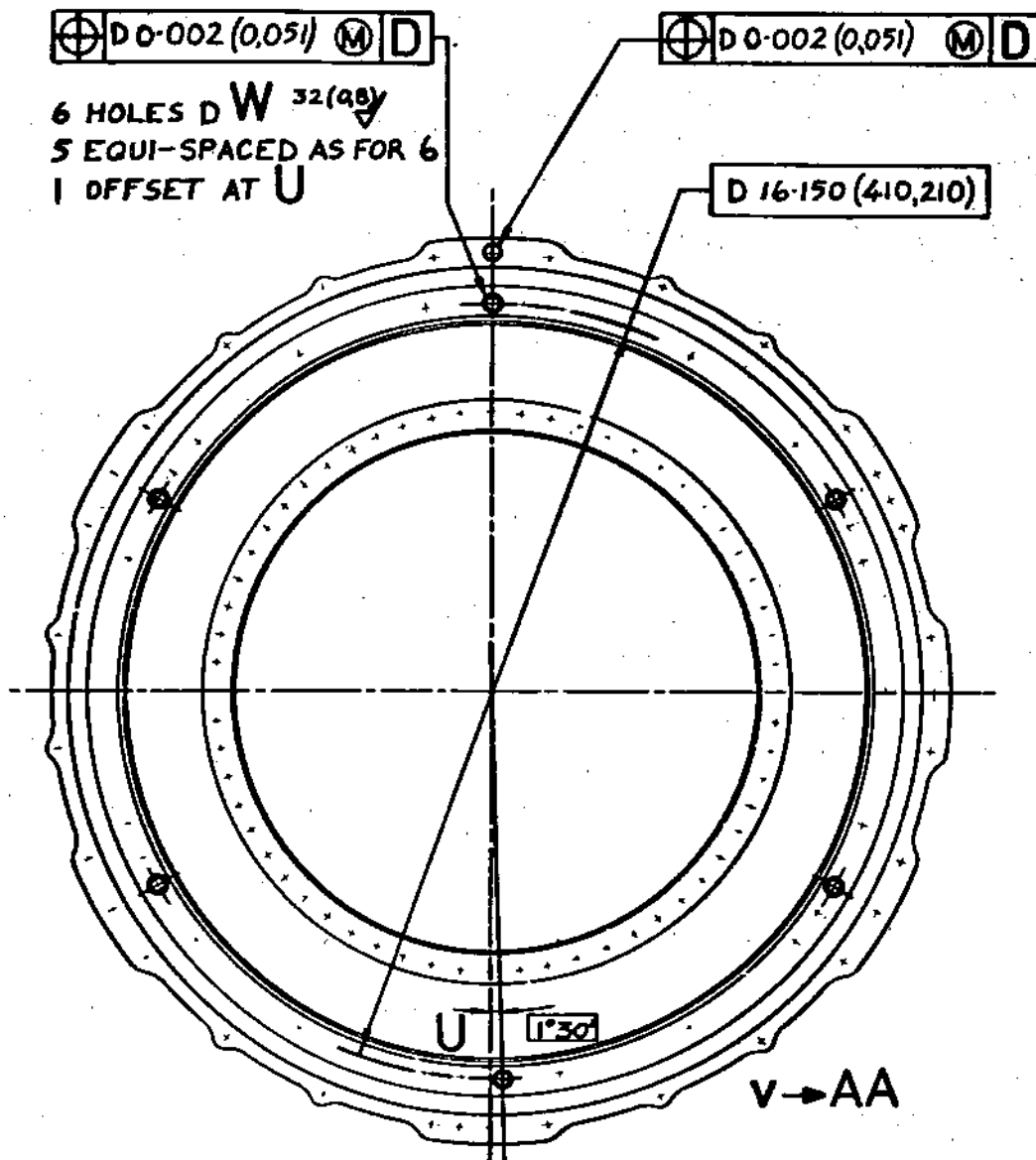
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REPAIR SCHEME NUMBER	AMOUNT OVERSIZE	DIAMETER W	NON-STD. PIN REQ'D.
B.488685	0.010 (0,254)	0.3217 (8,171) 0.3211 (8,156)	B.488688
B.488686	0.015 (0,381)	0.3267 (8,298) 0.3261 (8,283)	B.488689
B.488687	0.020 (0,508)	0.3317 (8,425) 0.3311 (8,410)	B.488690

Outer Case - Fitting Non-standard Shouldered Pins
Figure 402

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OVERHAUL



COMPRESSOR INTERMEDIATE CASE ASSEMBLY - REPAIR
LP BEARING HOUSING SEAL LANDS REPAIRED BY
APPLICATION OF SPRAYED COATING

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-32-00	01 280A	B.487893 (Component of Sub-assy)

2. Authority:

Modification No. 0L.8423C

3. Introduction

- A. This Repair describes the procedure for repairing the LP bearing housing by building up the squeeze film lands with a sprayed on coating, in order to maintain the standard clearance between the housing and the No.2 bearing.
- B. Refer to Chapter 72-09-00 Repair for all standard practices, tolerancing and the spraying processes applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

4. Instructions

- A. Remove existing coating from the two seal lands.
 - (1) The coating may be removed by machining or a chemical process approved by the controlling laboratory.
 - (2) Inspect to ensure that existing coating has been removed completely.
- B. Grind Seal Lands (Ref.Fig.401).
 - (1) Locate and secure the housing to the faceplate of an internal grinder; clock true on datum diameter A.
 - (2) Grind the lands to the specified dimensions (Ref.VIEW 1); use diamond wheel (item 1).

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- (3) Inspect to ensure satisfactory completion of operation (2).
- (4) Test the housing for cracks by the fluorescent dye process specified for this component in 72-32-00 Inspection/Check.

C. Apply Sprayed Coating.

- (1) Employ one of the following methods to apply the coating.

METHOD 1. (SAL B.492901) Plasma spray tungsten carbide cobalt (METCO 73 FNS1) on the faces identified XX and dimensions specified on Fig.401.

METHOD 2. (SAL B.492902) Detonation spray tungsten carbide (LWLN 40) on the faces identified XX and dimensions specified on Fig.401.

- (2) Submit a test piece (Ref.72-09-00 Repair) and ensure that it is accepted by the controlling laboratory before commencing grinding operations.

D. Finish Grind Sprayed Coating (Ref.Fig.401).

- (1) Locate and secure the housing to the faceplate of an internal grinder; clock true on datum diameter A.
- (2) Finish grind the two lands to the dimensions specified on VIEW 2; use diamond wheel (item 1).
- (3) Finish grind to remove surplus spray from the sides of lands and blend with existing radii; maintain the dimensions specified on the diagrammatic view.
- (4) Dress to remove surplus spray and ensure hole is free from spray; form the specified radius around the hole.
- (5) Inspect to ensure satisfactory completion of all previous operations.
- (6) Repeat the test for cracks.

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- E. Identify repair (Ref.paragraph 4.C.). Mark the appropriate repair scheme number close to the standard part number on the housing.

5. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Diamond Wheel	1	S3S15345000	1

6. Replacement Parts

A. Not required.

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REPAIR

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Repair No.12

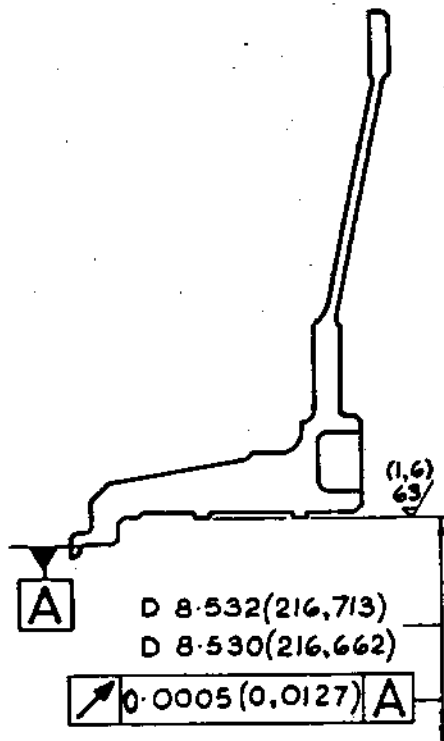
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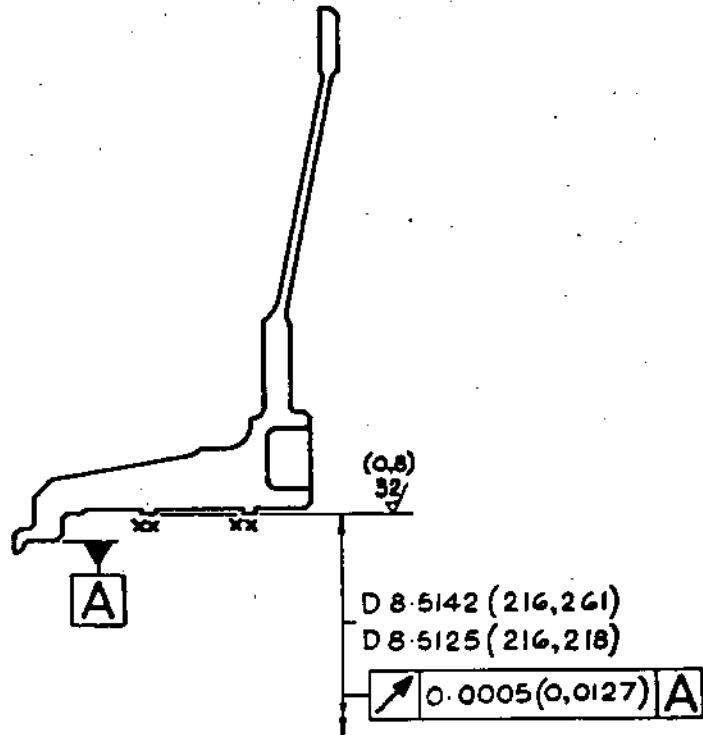


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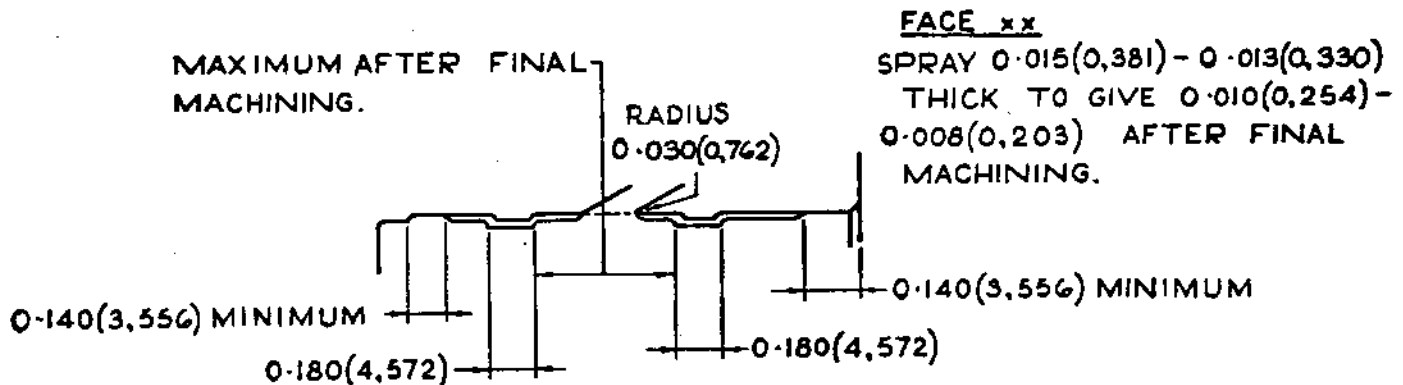
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VIEW 1



VIEW 2



DIAGRAMMATIC VIEW SHOWING EXTENT OF PERMISSIBLE OVERSPRAY, WITH HOLE FREE OF SPRAY AND SHARP EDGES BLENDED OUT.

LP Bearing Housing - Repair of Seal Lands
Figure 401

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COMPRESSOR INTERMEDIATE CASE ASSEMBLY - REPAIR
HP BEARING HOUSING SEAL LANDS REPAIRED BY
APPLICATION OF SPRAYED COATING

1. Effectivity

<u>Engine</u>	<u>Part Description</u>	<u>Part No.</u>	<u>Classification</u>
Olympus	Housing, Bearing H.P.	B487894	Unclassified
		B471555	Unclassified

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process shall be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

This instruction gives the procedure for restoration of squeeze film lands by re-spray coating on the Housing, Bearing H.P. by two alternative methods. Validation testing is not required for this Repair Instruction.

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 (0,1) TO 0.020 (0,5)

Machine where marked

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 32 Microinches (0,8 Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

ALL TASKS identified in this instruction are in the Engine Overhaul Processes Manual (TSD594-J). This Repair Instruction is covered by two alternative parts.

PART A.

B492903 restores the squeeze film lands by plasma spraying with a bond coating (OMat 3/188-Metco 450NS) followed by top coating of (OMat 3/114C-Metco 73F-NS-2).

PART B.

B492904 restores the squeeze film lands by detonation spray tungsten carbide (LWIN 40, MSRR 9507/304).

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4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

PART A - REPAIR INSTRUCTION B492903.

A. Remove the coating from the Part

- 1) Mask the area not to be processed. Refer to TASK 70-00-00-100-140.
- 2) Remove the coating from the part. Refer to TASK 70-00-00-100-107.
SUBTASK 70-00-00-860-107-056.
Use chemical stripping equipment.

B. Dry Non-Mettalic Abrasive Blast (if necessary)

- 1) Mask the area not to be processed. Refer to TASK 70-00-00-100-140.
- 2) Blast to remove any remnants of coating from the part. Refer to TASK 70-00-00-100-107.
SUBTASK 70-00-00-860-107-060.
Use OMat 184 Abrasive medium.

C. Machine the Part (Optional removal of coating)

- 1) Install the part in the grinding fixture. Refer to Fig. 401.
- 2) Grind the part to the applicable dimension. Use a grinding machine.

D. Remove burrs (If op.10 has been carried out)

- 1) Remove any burrs and sharp edges from the machined squeeze film lands. Use hand held tools.
Refer to Overhaul Manual Chapter 72-09-22 Repair.
Refer to Fig. 401.

E. Etch the Repaired Area

- 1) Do a swab etch of the repaired area to ensure complete removal of coating. Refer to TASK 70-00-00-100-133.
SUBTASK 70-00-00-110-133-001.

F. Examine the Part

- 1) Do a dimensional inspection of the part. Use inspection equipment.
Refer to Fig.401.

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4. REPAIR PROCEDURESUPPLEMENTARY INFORMATIONPART A - REPAIR INSTRUCTION B492903.G. Penetrant Crack Test

- 1) Do a penetrant crack test on the repair area.

Refer to TASK 70-00-00-200-210.
SUBTASK 70-00-00-231-210-002.
Use OMat 651 Fluorescent penetrant
High sensitivity post-emulsified.
Cracks are not permitted.
Use penetrant crack test
equipment.

H. Bond Coat

- 1) Apply the bond coat to the repair area where marked XX (squeeze film lands) to a thickness of 0.003(0,076) to 0.005(0,13).

Refer to TASK 70-00-00-300-704.
SUBTASK 70-00-00-340-704-001.
Use OMat 3/188 Metal spraying
powder nickel aluminium (95/5).
Use metal spray equipment.
Refer to Fig.402 and 403.

J. Metal Spray the Part

- 1) Apply the metal spray to the repair area where marked XX (squeeze film lands) to a minimum thickness of 0.010(0,25).

Refer to TASK 70-00-00-300-704.
SUBTASK 70-00-00-860-704-057 and
SUBTASK 70-00-00-340-704-026.
OMat/3/113C Metal spraying
powder, tungsten carbide/cobalt.
Apply sufficient metal spray to
permit the part to be machined.
Use metal spray equipment.
Refer to Fig. 402 and 403.

K. Visually Inspect Sprayed Coating

- 1) Visually inspect prior to machining for evidence of blistering, lifting, cracking or chipping.

Refer to TASK 70-00-00-300-704.
SUBTASK 70-00-00340-704-001.

L. Machine the Part

- 1) Install the part in the grinding fixture.

Refer to Fig. 402 and 403.



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OVERHAUL4. REPAIR PROCEDURESUPPLEMENTARY INFORMATIONPART A - REPAIR INSTRUCTION B492903.

- 2) Grind the part to the applicable dimension.

Use a grinding machine.
Use the S3S15345000 Diamond Wheel 1 off.
Refer to Fig. 402 and 403.

M. Remove Burrs/Excess Spray

- 1) Remove any burrs and sharp edges. Remove any excess spray. Produce 0.030(0,76) corner radius around edge of hole.

Use hand held tools.
Refer to Overhaul Manual Chapter 72-09-22 Repair.

N. Examine the Part

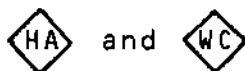
- 1) Examine and measure the dimensions of the part.

Use inspection equipment.
Refer if outside limits.
Refer to TASK 70-00-00-300-704.
SUBTASK 70-00-00-340-704-063.
Refer to Fig. 402 and 403.

P. Identify the Repair and Coating

- 1) Mark on B492903 or R13A and the coating identification symbols shown below, adjacent to the part number.

Refer to Overhaul Manual Chapter 72-09-00 Repair.
Use vibration peen equipment.
Refer to Fig. 401.

PART B - REPAIR INSTRUCTION B492904.A. Remove the coating from the Part

- 1) Mask the area not to be processed.
- 2) Remove the coating from the part.

Refer to TASK 70-00-00-100-140.

Refer to TASK 70-00-00-100-140.
SUBTASK 70-00-00-860-107-056.
Use chemical stripping equipment.

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SNECMA

4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

PART B - REPAIR INSTRUCTION B492904.

B. Dry Non-Mettalic Abrasive Blast (if necessary)

- | | |
|---|---|
| 1) Mask the area not to be processed. | Refer to TASK 70-00-00-100-140. |
| 2) Blast to remove any remnants of coating from the part. | Refer to TASK 70-00-00-100-107.
SUBTASK 70-00-00-860-107-060.
Use OMat 184 Abrasive medium. |

C. Machine the Part (Optional removal of coating)

- | | |
|--|---|
| 1) Install the part in the grinding fixture. | Refer to Fig. 401. |
| 2) Grind the part to the applicable dimension. | Use a grinding machine.
Refer to Fig. 401. |

D. Remove burrs (If op.24 has been carried out)

- | | |
|---|---|
| 1) Remove any burrs and sharp edges from the machined squeeze film lands. | Use hand held tools.
Refer to Overhaul Manual Chapter 72-09-22 Repair.
Refer to Fig. 401. |
|---|---|

E. Etch the Repaired Area

- | | |
|---|--|
| 1) Do a swab etch of the repaired area to ensure complete removal of coating. | Refer to TASK 70-00-00-100-133.
SUBTASK 70-00-00-110-133-001. |
|---|--|

F. Examine the Part

- | | |
|---|--|
| 1) Do a dimensional inspection of the part. | Use inspection equipment.
Refer to Fig.401. |
|---|--|

G. Penetrant Crack Test

- | | |
|--|---|
| 1) Do a penetrant crack test on the repair area. | Refer to TASK 70-00-00-200-210.
SUBTASK 70-00-00-231-210-002.
Use OMat 651 Fluorescent penetrant
High sensitivity post-emulsified.
Cracks are not permitted.
Use penetrant crack test equipment. |
|--|---|

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4. REPAIR PROCEDURE**SUPPLEMENTARY INFORMATION****PART B - REPAIR INSTRUCTION B492904.****H. Metal Spray the Part**

- | | |
|--|---|
| 1) Apply the metal spray to the repair area where marked XX by Detonation Flame Deposition (squeeze film lands) to a minimum thickness of 0.015(0,38). | Refer to TASK 70-00-00-300-704. SUBTASK 70-00-00-860-704-057 and Use MSRR 9507/304 Tungsten Carbide (LW1N 40).
Apply sufficient metal spray to permit the part to be machined. Use metal spray equipment. Refer to Fig. 402 and 403. |
|--|---|

J. Visually Inspect Sprayed Coating

- | | |
|---|--|
| 1) Visually inspect prior to machining for evidence of blistering, lifting, cracking or chipping. | Refer to TASK 70-00-00-300-704. SUBTASK 70-00-00340-704-001. |
|---|--|

K. Machine the Part

- | | |
|--|---|
| 1) Install the part in the grinding fixture. | Refer to Fig. 402 and 403. |
| 2) Grind the part to the applicable dimension. | Use a grinding machine. Use the S3S15345000 Diamond Wheel 1 off. Refer to Fig. 402 and 403. |

L. Remove Burrs/Excess Spray

- | | |
|--|---|
| 1) Remove any burrs and sharp edges. Remove any excess spray. Produce 0.030(0,76) corner radius around edge of hole. | Use hand held tools. Refer to Overhaul Manual Chapter 72-09-22 Repair. Refer to Fig. 403. |
|--|---|

M. Examine the Part

- | | |
|--|---|
| 1) Examine and measure the dimensions of the part. | Use inspection equipment. Refer if outside limits. Refer to TASK 70-00-00-300-704. SUBTASK 70-00-00-340-704-063. Refer to Fig. 402 and 403. |
|--|---|

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4. REPAIR PROCEDURESUPPLEMENTARY INFORMATIONPART B - REPAIR INSTRUCTION B492904.N. Identify the Repair and Coating

- 1) Mark on B492904 or R13B and the coating identification symbols shown below, adjacent to the part number.

Refer to Overhaul Manual Chapter 72-09-00 Repair.
Use vibration peen equipment.
Refer to Fig. 401.

5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
HOUSING, BEARING H.P.	TI. ALLOY (MSRR8628) IM1550	TBS

6. DATA

NONE.

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
S3S15345000	Diamond Wheel	1

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			

9. STANDARD EQUIPMENT

Chemical stripping equipment.
Grinding machine.
Hand held tools.
Inspection equipment.
Metal spray equipment.
Penetrant crack test equipment.
Vibration peen equipment.

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10. CONSUMABLE MATERIAL

OMat 184	Abrasive medium.
OMat 3/114C	Metal spraying powder, tungsten carbide/cobalt.
OMat 3/188	Metal spraying powder nickel aluminium (95/5).
OMat 651	Fluorescent penetrant High sensitivity post-emulsified.

- NOTE:
1. To identify the consumable materials refer to the Overhaul Materials Manual (OMat).
 2. Other necessary consumable materials are referred to in the Engine Overhaul Processes Manual (TSD594-J).

11. EXPENDABLE PARTS

NONE.

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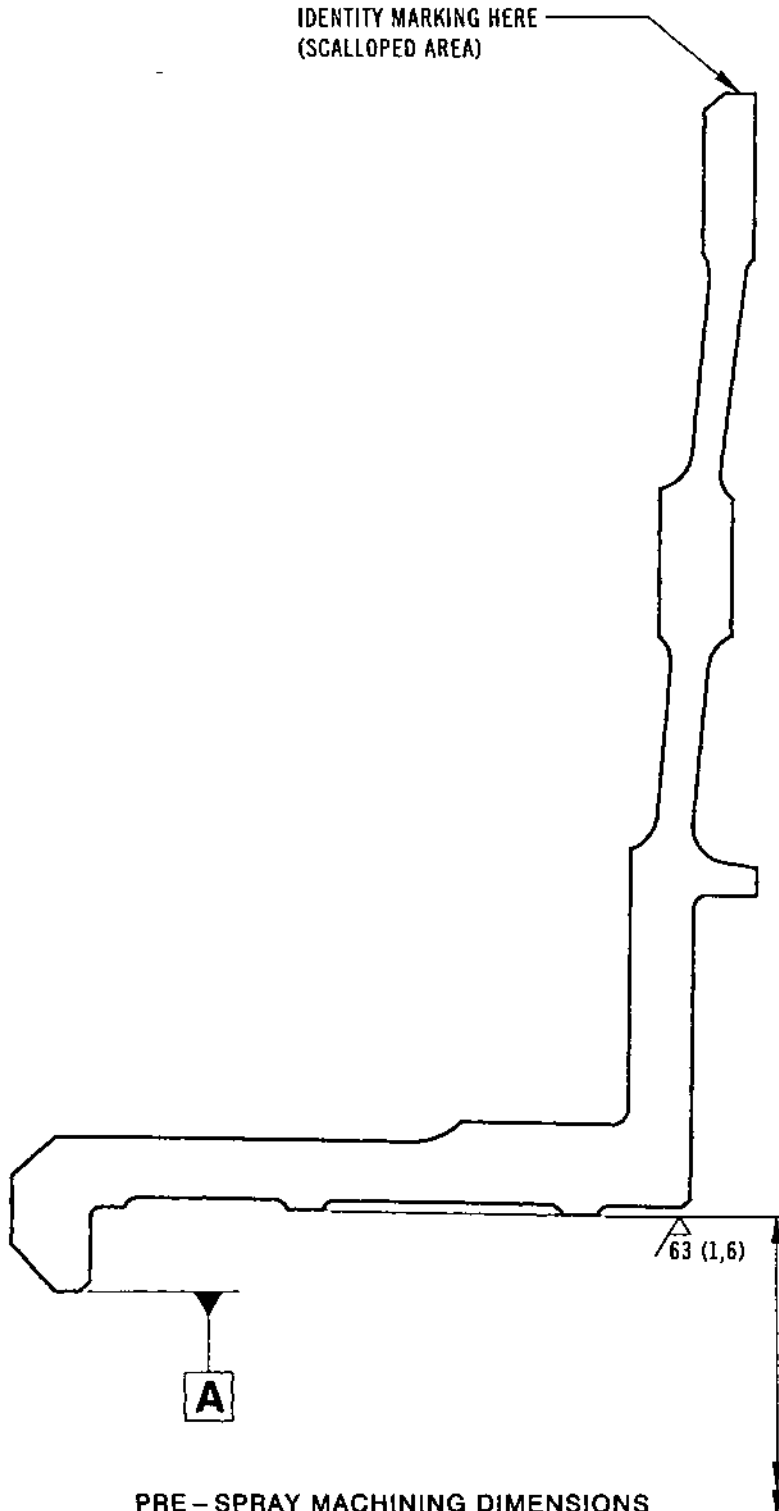


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IDENTITY MARKING HERE
(SCALLOPED AREA)



PRE-SPRAY MACHINING DIMENSIONS

Pre-spray Machining Dimensions
Fig. 401.

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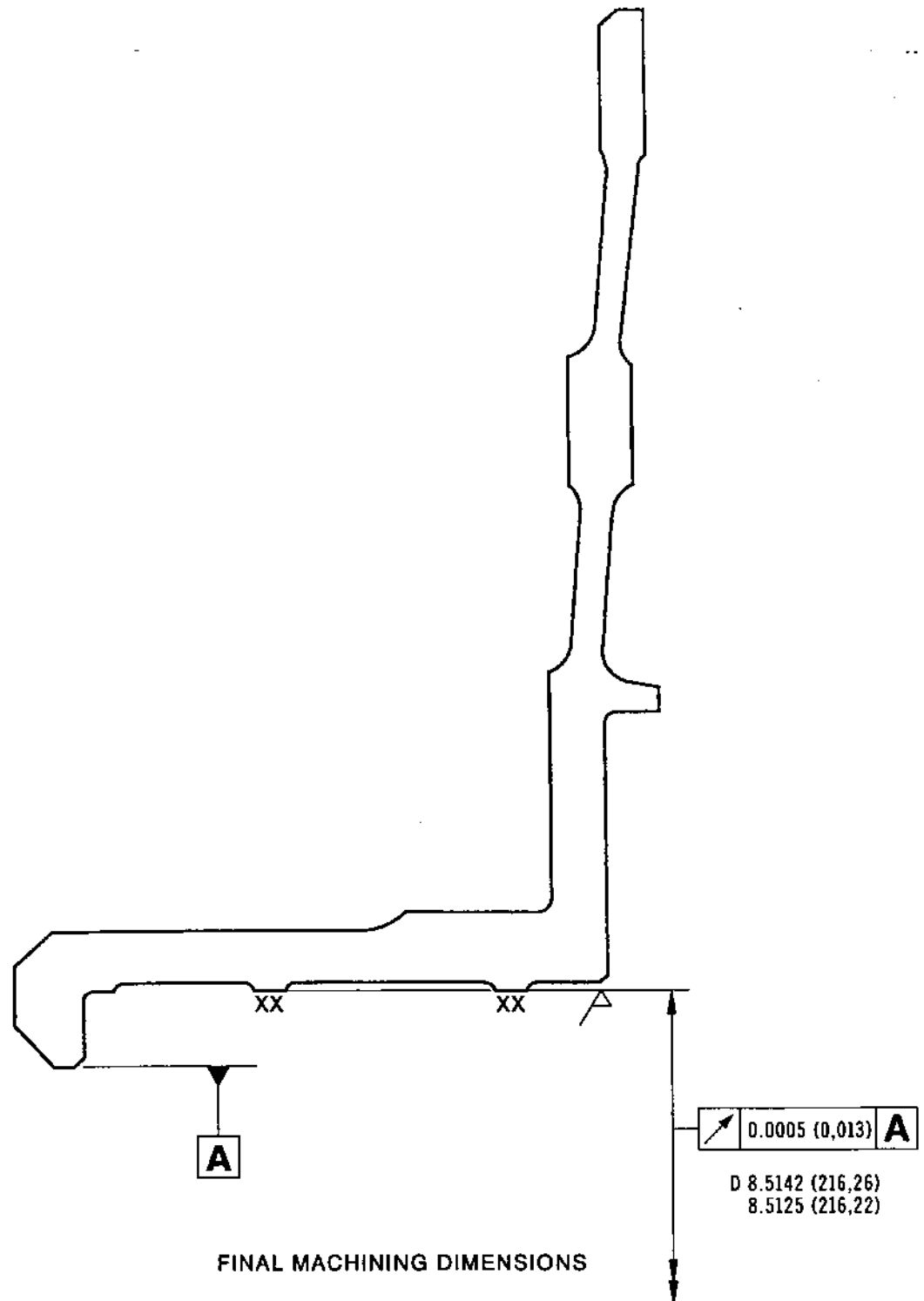
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Final Machining Dimensions
Fig. 402

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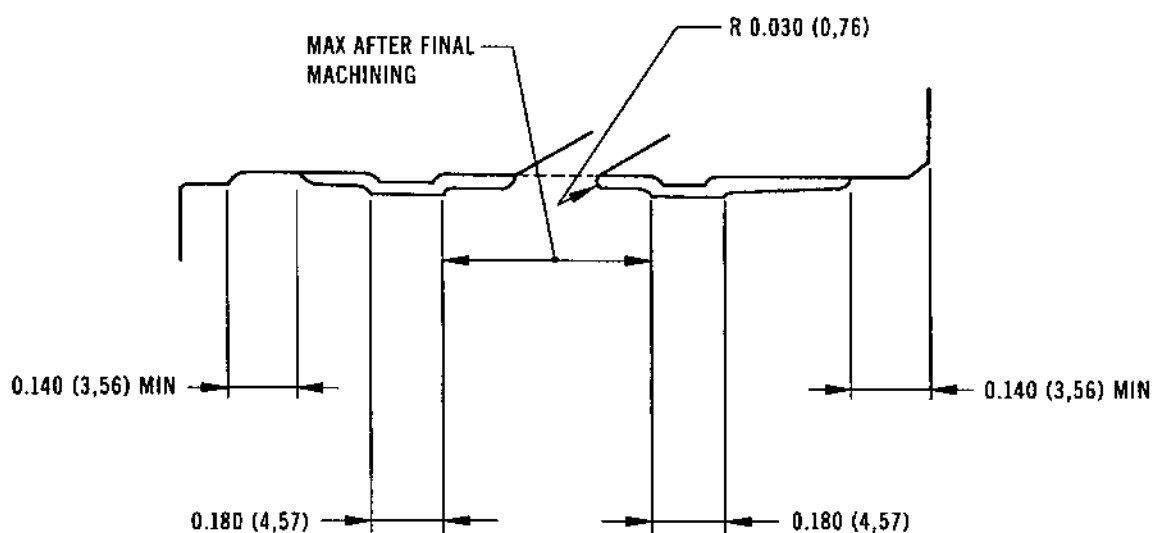


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DIAGRAMMATIC VIEW SHOWING EXTENT OF PERMISSIBLE OVERSPRAY,
WITH HOLE FREE OF SPRAY AND SHARP EDGES BLENDED OUT

Diagrammatic View Showing Extent of Permissible Overspray,
with Hole Free of Spray and Sharp Edges Blended Out

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COMPRESSOR INTERMEDIATE CASE ASSEMBLY REPAIR -
FITTING REPLACEMENT SHANK NUTS TO OUTER CASE
AND RE-SWAGING EXISTING NUTS

Applicable to:

Outer Case B.491631

Authority:

Modification No. OL.8423C

1. Introduction

- A. This Repair defines the procedure for repairing outer cases in which the shank nuts are loose or defective.
- B. Refer to Chapter 72-09-00, Repair for all standard practices and tolerancing applicable to this repair procedure; the full procedure for removing and fitting shank nuts is also described in this Chapter.
- C. Dimensions are shown thus on Figure 401: INCHES.
(MILLIMETRES).

2. Summary of Operations

- A. Inspect the shank nuts for condition and security.

NOTE: A correctly swaged shank nut may be permitted partial rotation up to stop, but axial movement is not acceptable.

- B. Remove defective shank nuts; take care to avoid damage to the holes in the case.
- C. Check the condition and dimensions of nut locations in the case (Ref.Fig.401).

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REPAIR

72-32-00

Repair No.14

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

- D. Dress as necessary but ensure that specified hole and chamfer locations are maintained.
- E. Test the case for cracks by the fluorescent penetrant process specified for this component in 72-32-00 Inspection/Check.
- F. Assemble the replacement shank nuts to the case; use the swaging tool (item 1). Swage existing shank nuts as required. The procedure is described fully in 72-09-00, Repair.
- G. Inspect the case fully to ensure that all shank nuts have been fitted correctly.
- H. Identify repair. Mark the repair scheme number SAL B.492925 close to the standard part number on the case.

3. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Swaging Tool	1	S3S12440000	1

4. Replacement Parts

<u>Description</u>	<u>Quantity</u>	<u>Part No.</u>
Shank Nut	As req'd.	AS.27861

TN45891

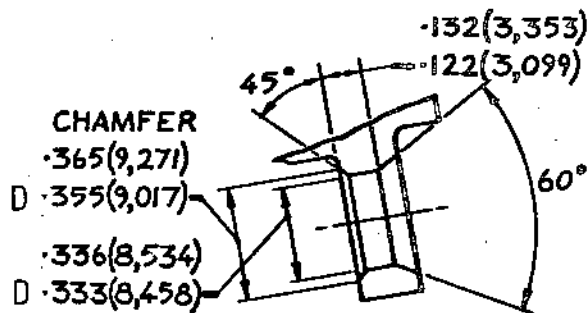
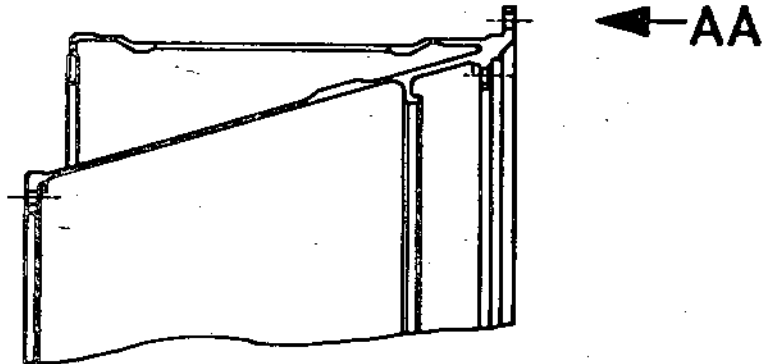


OLYMPUS 593

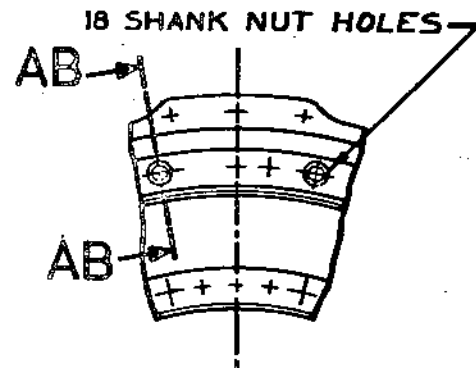
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OVERHAUL



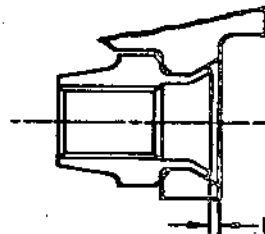
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PART SECTION **AB-AB**
-ENLARGED



PART VIEW **AA**



UNDERFLUSH

SHANK NUT-AS 27861 - SWAGED IN POSITION

TN45890

Outer Case - Fitting Replacement Shank Nuts
Figure 401

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72-32-00
Repair No. 14
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COMPRESSOR INTERMEDIATE CASE ASSEMBLY - REPAIR
FITTING REPLACEMENT SHANK NUTS TO INNER CASE AND
RE-SWAGING EXISTING NUTS

Applicable to:

Inner Case B.423988

Authority:

Modification No. OL.8423C

1. Introduction

- A. This Repair defines the procedure for repairing inner cases in which the shank nuts are loose or defective.
- B. Refer to Chapter 72-09-00, Repair for all standard practices and tolerancing applicable to this repair procedure; the full procedure for removing and fitting shank nuts is also described in this Chapter.
- C. Dimensions are shown thus on Fig.401: INCHES (MILLIMETRES).

2. Summary of Operations

- A. Inspect the shank nuts for condition and security.

NOTE: A correctly swaged shank nut may be permitted partial rotation up to stop, but axial movement is not acceptable.

- B. Remove defective shank nuts; take care to avoid damage to the holes in the case.
- C. Check the condition and dimensions of nut locations in the case (Ref.Fig.401).

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- D. Dress as necessary but ensure that specified hole and chamfer dimensions are maintained.
- E. Test the case for cracks by the fluorescent penetrant process specified for this component in 72-32-00 Inspection/Check.
- F. Assemble the replacement shank nuts to the case; use the swaging tool (item 1). Swage existing shank nuts as required. The procedure is described fully in 72-09-00, Repair.
- G. Inspect the case fully to ensure that all shank nuts have been fitted correctly.
- H. Identify repair. Mark the repair scheme number SAL B.492926 close to the standard part number on the case.

3. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Swaging Tool	1	S3S12440000	1

4. Replacement Parts

<u>Description</u>	<u>Quantity</u>	<u>Part No.</u>
Shank Nut	As req'd	AS.27861

TN3856

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Repair No.15
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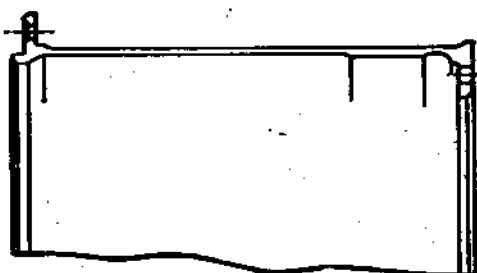
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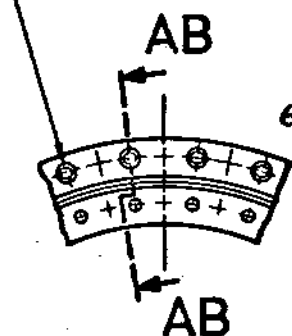
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AA →

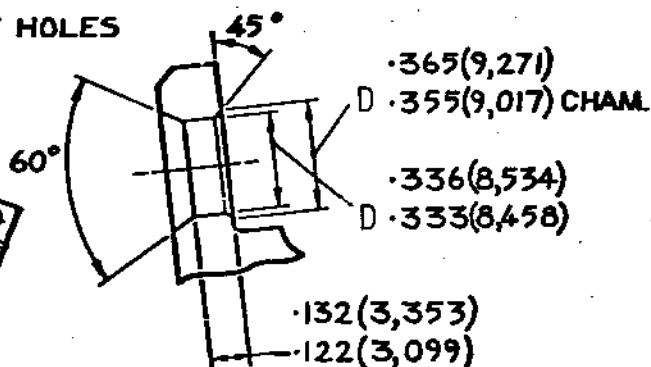


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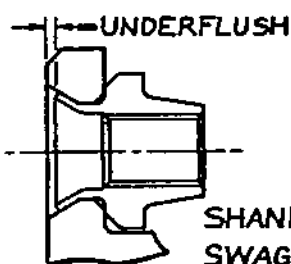
30 SHANK NUT HOLES



PART VIEW → AA

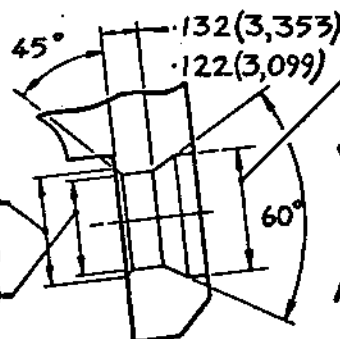


PART SECTION AB-AB ENLARGED

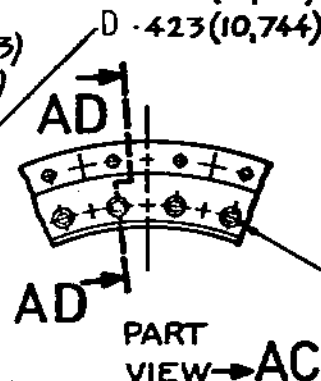


SHANK NUT - AS 27861
SWAGED IN POSITION

.365(9,271)
CHAM. D .355(9,017)
.336(8,534)
D .333(8,458)



PART SECTION AD-AD ENLARGED



PART VIEW → AC

30 SHANK NUT HOLES

Inner Case - Fitting Replacement Shank Nuts
Figure 401

TN3857

**OLYMPUS 593**

MK.610-14-28

OVERHAUL



COMPRESSOR INTERMEDIATE CASE RH GEARBOX MOUNTING -
REPAIR - RESTORE SEAL RECESS FACE

MODIFICATION NO. 8680C1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-32-00	8 220A	B.477636

2. Introduction

A. General.

- (1) This repair describes the procedure for the restoration of the seal recess on the gearbox mounting.
- (2) The damaged seal recess is machined oversize, then built up by plasma flame deposition and machined to size.
- (3) Dimensions are shown thus, in tables and illustrations: INCHES (MILLIMETRES).
- (4) Refer to Chapter 72-09-00 Repair for all standard practices applicable to this repair procedure.
- (5) Remove all sharp edges 0.004 to 0.020 in. (0,10 to 0,50 mm) unless otherwise stated.
- (6) Tolerances on machined dimensions, are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (7) Place the gearbox mounting in a suitable container for protection against damage during transit between operations.

B. Repair Limitations.

- (1) There are no limitations to the number of times this repair may be carried out on an individual component.

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TN49321



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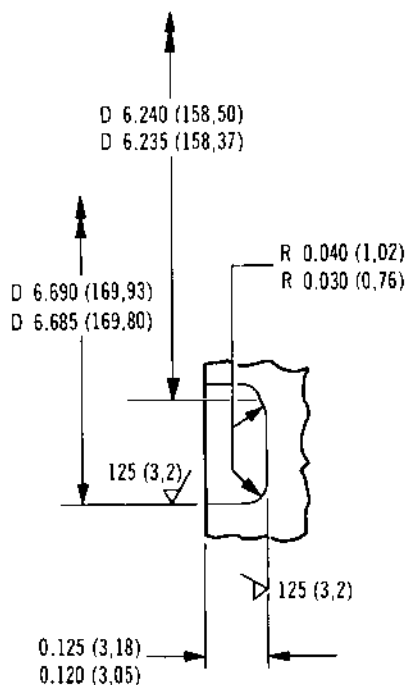
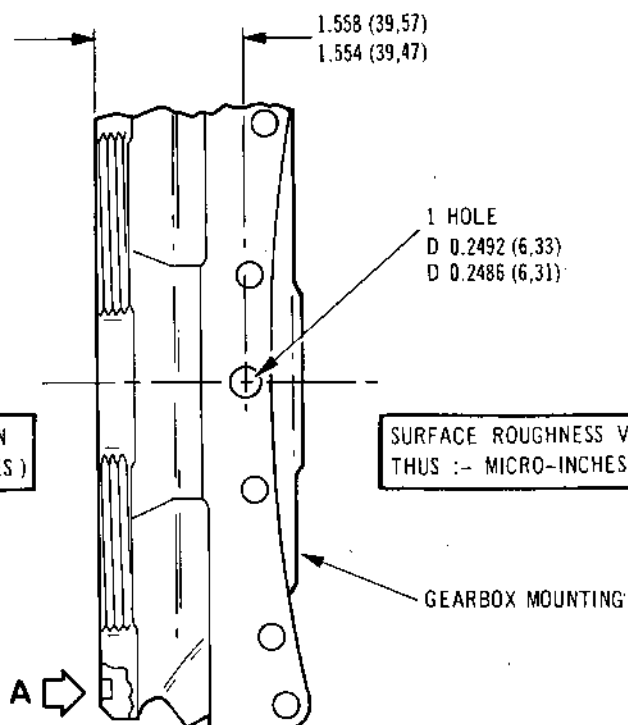
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OVERHAUL

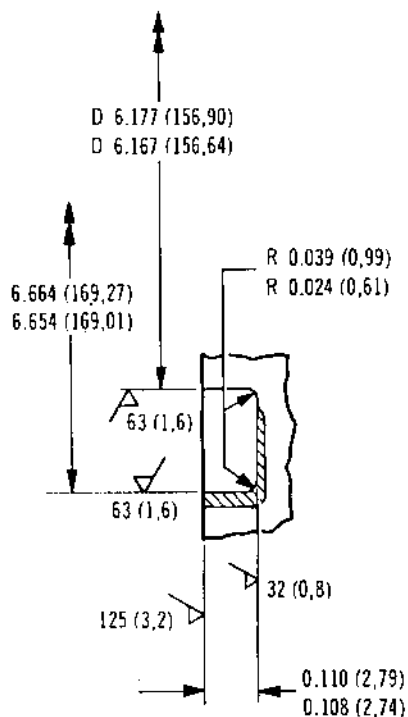
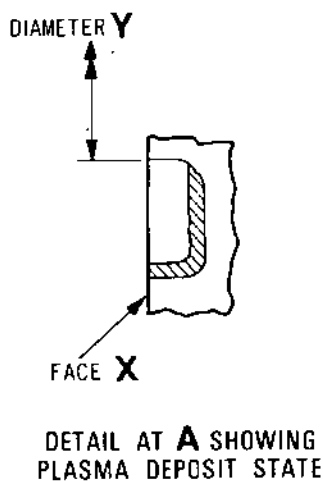


DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓



DETAIL AT A SHOWING
PRE PLASMA DIMENSIONS



DETAIL AT A SHOWING
FINAL MACHINE DIMENSIONS

Gearbox Mounting - Plasma Spray and Machining Dimensions
Figure 401

TN49322

REPAIR
72-32-00

Repair No.16

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3. Instructions

A. Machine Recess.

- (1) Locate the component on the face plate of a suitable centre lathe and true up face X (Ref.Fig.401).
- (2) Machine to produce the pre-plasma spray dimensions shown in Fig.401.
- (3) Visually inspect the machining to ensure that the required parameters have been achieved. Remove the component from the centre lathe.
- (4) Test the component for cracks by the fluorescent dye penetrant process specified for this component in Chapter 72-32-00 Inspection/Check.

B. Plasma Flame Spray.

- (1) Mask the gearbox mounting as required, using a suitable masking tape (Ref.para.6), except the areas to be sprayed.
- (2) Plasma flame spray the area indicated in Fig.401, using the technique specified in Chapter 72-09-11 Repair, to a minimum thickness of 0.028 in. (0,50 mm) using MSRR 9507/14 spraying medium. Refer to para.6. for parameter and technique recommendations.

NOTE: Over spray is permissible only on faces X and Y, Ref.Fig.401.

- (3) Visually inspect the plasma spray deposit using the technique specified in Chapter 72-09-11 Repair. Remove masking.

C. Machine Recess.

- (1) Locate the component on the face plate of a suitable centre lathe and true up face X (Ref.Fig.401).

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- (2) Machine to produce the final machining dimensions shown on Fig.401. Remove any over spray from faces X and Y.

D. Inspect.

- (1) Test the component for cracks by the fluorescent dye penetrant process specified for this component in Chapter 72-32-00 Inspection/Check.
- (2) Dimensionally check the component to ensure that all parameters have been achieved.

E. Identify.

- (1) Mark salvage B.497444 or R16 close to the standard part number, using the electro-chemical marking technique Ref. Chapter 72-09-00 Repair.

F. Finally Inspect.

- (1) Finally inspect the component to ensure the repair has been carried out satisfactorily and that the component is in a serviceable condition.
- (2) Generally clean the component to remove grease and foreign bodies, then place the component in a suitable protective container and store as required.

4. Special Tools, Fixtures and Equipment

None.

5. Replacement Parts

None.

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6. Plasma Spray Parameter and Technique Recommendations

A. Technique.

(1) Preparation.

Method of cleaning: Genklene.

Grit type: Blastite No.1.

Mesh size: 18/24.

Nozzle press: 15 psi (105 kPa).

Nozzle/work distance: 2 inches/3 inches
(50,8 mm/76,2 mm).

(2) Masking.

Method: Turco 522 metallic tape.

(3) Coating.

Top coat type: Metco 443.

Thickness: 0.028 inches (0,71 mm).

Machining allowance: 0.010 inches (0,25 mm).

Gun to work distance: 5 inches/6 inches
(127,0 mm/152,4 mm).

Gun to work angle: 90 degrees/70 degrees.

(4) Cooling.

Method: Air 2 cooling nozzles.

B. Parameters.

(1) Material.

Designation and title: Metco 443NS.

Supply: Metco Ltd., Chobham, Woking, Surrey, England.

Mesh range: Minus 120 plus 325 Microns.



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(2) Equipment.

Gun: 3MB.

Cathode: 3M-11A.

Anode: 3M-7A-GH.

Secondary gas flow tube: 2M-166.

Powder port: 2.

Gases.

Arm primary: Argon.

Pressure: 100 psi (700 kPa).

Arc secondary: Hydrogen.

Pressure: 50 psi (350 kPa).

Power Supply.

Current: 500 amps.

Voltage: 460 volts.

(3) Operating Conditions.

Gas Flows.

Primary: 80 specific cu ft/hr (40 specific litres/min).

Secondary: 20 specific cu ft/hr (10 specific litres/min).

Power settings.

Current (approx.):	500 amps.)	To give
)	power level
Voltage (approx.):	70-80 volts.)	of 35-40 kW.

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Powder control.

Meter wheel: S.

Meter wheel speed: 14 r.p.m.

Carrier gas flow: 37 specific cu ft/hr
(18,5 specific litres/min).

Powder delivery rate: 8 lb/hr (60 g/min).

Deposit efficiency: 70%.

- (4) Maximum thickness of coating,
0.100 inch (2,54 mm) Outside Diameter
0.080 inch (2,03 mm) Inside Diameter
as Sprayed.

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REPAIR

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MK.610-14-28 *sneema*
OVERHAUL

COMPRESSOR INTERMEDIATE CASE ASSEMBLY - REPAIR
OUTER LABYRINTH HOUSING ASSEMBLY REPAIRED BY MACHINING
DAMAGE, CAUSED BY FRETTING, FROM FACES OF BOLT LOCATIONS

MODIFICATION NO.0L.8653

1. Effectivity

<u>I.P.C.</u>	<u>Fig/Item</u>	<u>Part No.</u>
72-32-00	1/350A	B.429766
	1/350B	B.461306
	1/350C	B.491792
	1/350D	B.494281
		B.494432

2. Introduction

A. General.

- (1) This repair applies to any number of the thirty equi-spaced bolt locations of the inner attachment flange and describes the procedure for removal of damage from the face surrounding the bolt location.
- (2) Refer to 72-09-00, Repair, for all standard practices applicable to this repair procedure.
- (3) Tools referred to by item number are detailed in paragraph 4.
- (4) Surface texture is to be 125 micro-inches (3,2 micrometres).
- (5) Protect the component against corrosion after each operation and place in a container for protection against damage during transit between operations.

3. Instructions

A. Remove Fretting.

- (1) Locate the fixture (Ref. tool item 1) on a radial drilling machine and secure the outer labyrinth housing to the fixture.
- (2) Using the spotface cutter (Ref. tool item 2) remove only sufficient material to clear the damage but ensure that the minimum dimension of 0.340 in. (8,64 mm) is maintained at the spotface position.

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72-32-00

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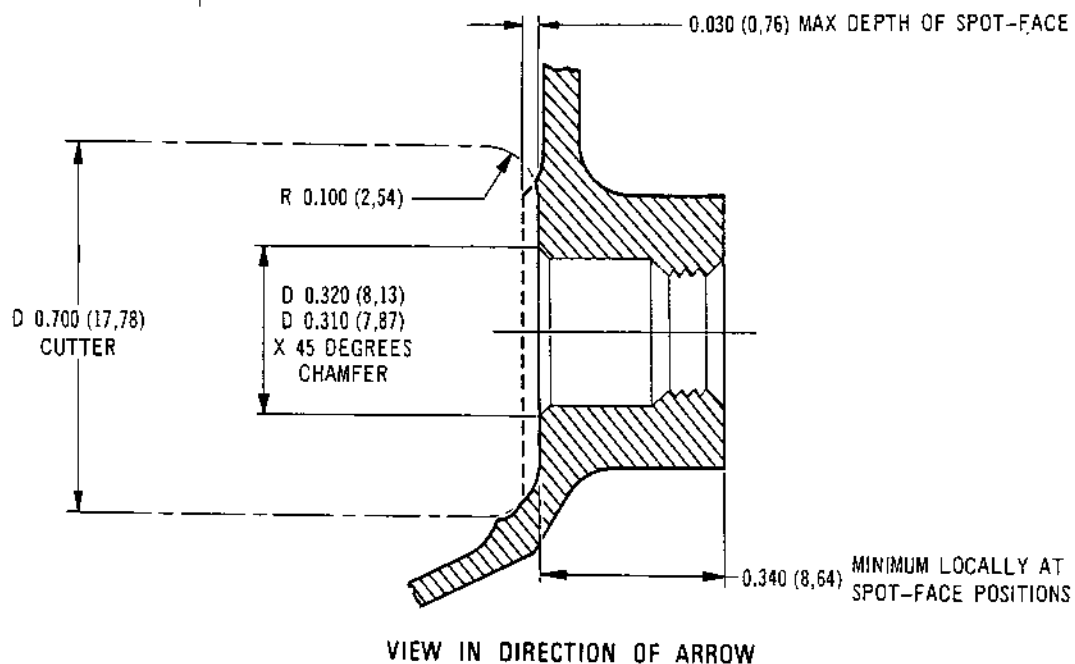
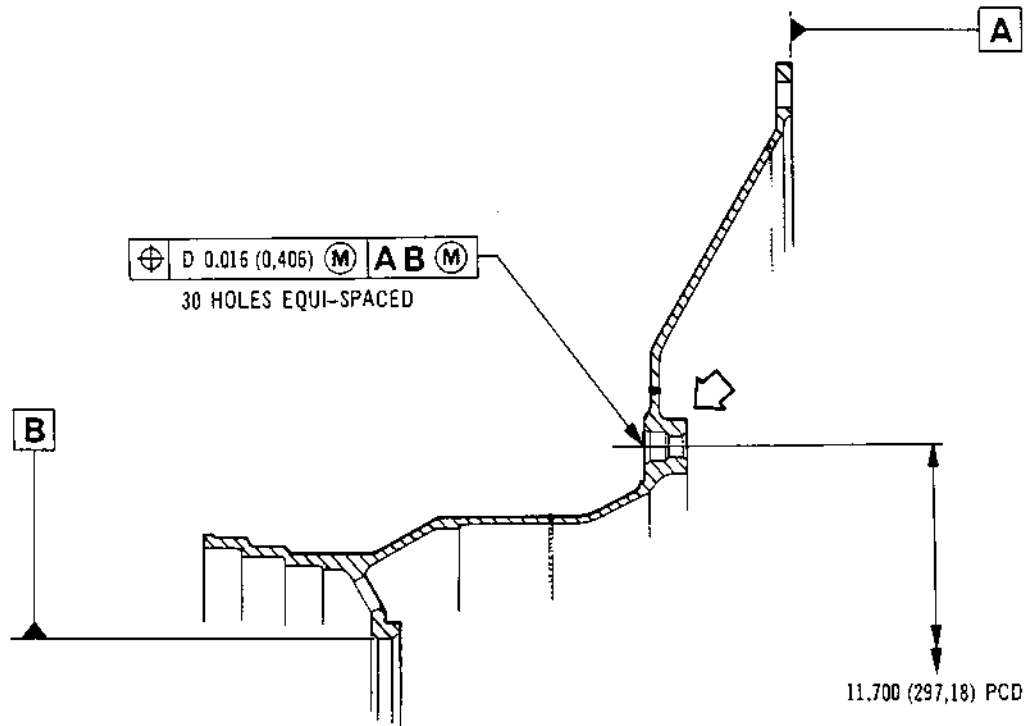
OLYMPUS 593

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CR 35864/00A



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Labyrinth Housing Assembly - Repair Details
Figure 401

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- (3) If necessary, produce the 0.320/0.310 in (8,13/7,87 mm) diameter x 45 deg chamfer.
- (4) Remove the labyrinth housing from the holding fixture and remove sharp edges 0.020 in (0,51 mm) radius.

B. Inspect.

- (1) Visually and dimensionally inspect the labyrinth housing to ensure that all previous operations have been completed satisfactorily.
- (2) Inspect the labyrinth housing by the fluorescent dye penetrant crack detection method, using the process recommended for this component in 72-32-00, Inspection/Check.

C. Identify.

- (1) Mark SAL.B.493751 or R17 next to the existing part number, using the electro-chemical or vibro-percussion marking technique detailed in 72-09-00, Repair.

D. Finally Inspect.

Finally inspect the repair and check that the labyrinth housing is serviceable.

4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Qty</u>	<u>Tool No.</u>	<u>Item</u>
Holding Fixture	1	S3S.15724000	1
Spotface Cutter	1	S3S.15725000	2

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COMPRESSOR INTERMEDIATE CASE OUTER
REPAIR OF LOCAL DAMAGE TO ROKIDE 'Z' COATING
BY RE-SPRAYING

MODIFICATION NO. OL.8824C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-32-00	-	B.919801, B.919802, B.925857
	6/100B	B.928254
	6/100C	B.928256, B.928257, B.928258, B.928259, B.928264

2. Introduction

A. General

- (1) This repair describes the procedure to restore the intermediate case Rokide 'Z' coating to a serviceable condition by re-spraying.
- (2) Dimensions are shown thus, INCHES (MILLIMETRES), in tables and illustrations.
- (3) Refer to Chapter 72-09-00, Repair, for all standard practices applicable to this repair procedure.
- (4) Surface texture is to be consistent with the surrounding coating or neighbouring vane.



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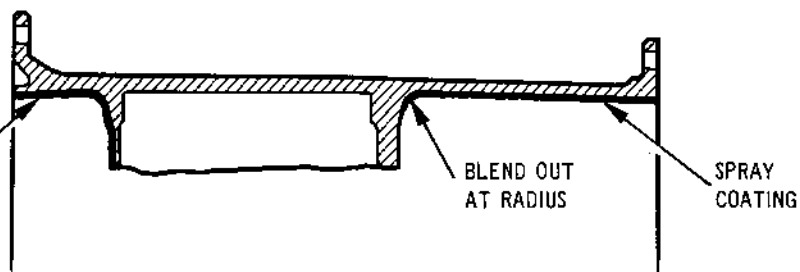
MK.610-14-28
OVERHAUL



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

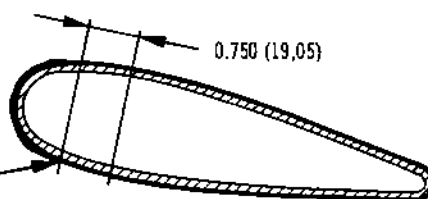
CR 35959/00A

NOTE:-
SPRAY COATING EXTENDS ACROSS
FULL WIDTH OF INNER SURFACE
OF OUTER CASE

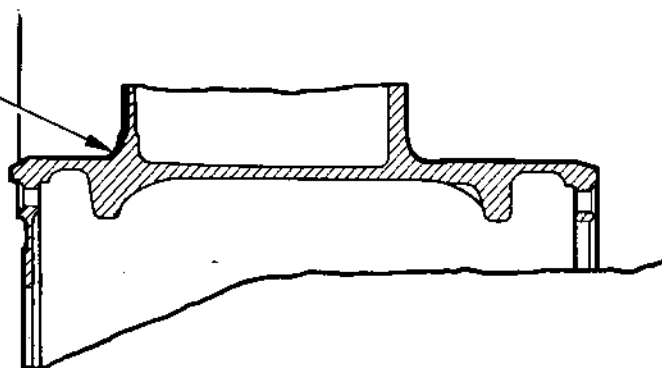


TOTAL THICKNESS OF COATING TO BE
0.008 (0,20) AT THIS POINT
0.010 (0,25)

AFTER THIS POINT COATINGS
TO BE BLENDED INTO VANE CONTOUR



BLEND OUT AT RADIUS



PART SECTION THROUGH INTERMEDIATE CASE
AT VERTICAL CENTRE LINE

Intermediate Case - Repair Details
Figure 401

REPAIR

72-32-00

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3. Instructions

A. Preparation

- (1) Locally degrease the case using a clean, lint-free cloth moistened with trichloroethane.
- (2) Mask off areas which do not require abrasive blasting. Protect all holes and passages, preferably by means of plugs.
- (3) Abrasive blast damaged area of coating; refer to the Overhaul Manual 72-09-24 Repair, using 18/22 mesh Alumina.

B. Spraying

- (1) Spray the damaged area as detailed in the Overhaul Manual 72-09-10 Repair, using Rokide 'Z' coat; use coating medium MSRR 9507/108. Ensure 0.025 in. (0,51/0,64 mm) thick overlap with existing coat. The total thickness of the coating on the vane is as specified in Fig.401.

C. Inspection

- (1) Inspect the coating dimensionally, for uniformity, and to ensure that there is no evidence of blistering, lifting, cracking or chipping.
- (2) If the coating is faulty it must be completely removed prior to re-processing (refer to Chapter 72-09-25 Repair, process K).

D. Finishing

- (1) Dress coating to blend it to the existing coating profile; blend out at radii as defined in Fig.401.

E. Inspect and Identify

- (1) Mark SAL.B.935534 or R18 adjacent to the part number.
- (2) Inspect to ensure that the repair has been carried out satisfactorily, and that the case is in a serviceable condition.



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4. Special Tools, Fixtures and Equipment

No special tooling is required.

5. Replacement Parts

A. Not required.

**OLYMPUS 593**

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OVERHAUL



HP COMPRESSOR CASE AND VANES - REPAIR
OIL SUMP ASSEMBLY END TUBES RESTORED BY
PLASMA SPRAY

MODIFICATION No. OL.8869C1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-32-00	4 360	B.423701 B.497840

2. Introduction

A. General

- (1) This repair describes the procedure to restore the seal locations on the tube ends of the oil sump assembly by plasma spray.
- (2) Dimensions are shown thus: INCHES (MILLIMETRES) in tables and illustrations.
- (3) Refer to Chapter 72-09-00 Repair, for all standard practices applicable to this repair procedure.
- (4) Remove sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.
- (5) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (6) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (7) Surface texture is to be 125 micro-inches (3,2 micro-metres) unless otherwise stated.
- (8) All tools referred to by item number in procedural steps are detailed in para.4.
- (9) Protect the component against corrosion after each operation, and place in a container for protection against damage during transit between operations.

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Repair No.19
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3. Instructions

A. Machine Seal Locations (Ref.Figs.401, 402).

- (1) Locate an expanding mandrel in the chuck of a suitable lathe, and set true.
- (2) Secure the sump assembly to the expanding mandrel.
- (3) Machine the seal location, removing the minimum amount of material to remove the damage, with a minimum diameter of 1.100 in. (27,94 mm). Remove burrs and sharp edges.
- (4) Remove the sump assembly from the mandrel, and secure the sump assembly in position to machine the second seal location.
- (5) Machine the second seal location, removing the minimum amount of material to remove the damage with a minimum diameter of 1.100 in. (27,94 mm). Remove burrs and sharp edges.

B. Inspect.

- (1) Inspect for the satisfactory completion of the machining operation.
- (2) Crack test the sump assembly using the fluorescent dye penetrant process specified for this component in Chapter 72-32-00 Inspection/Check.

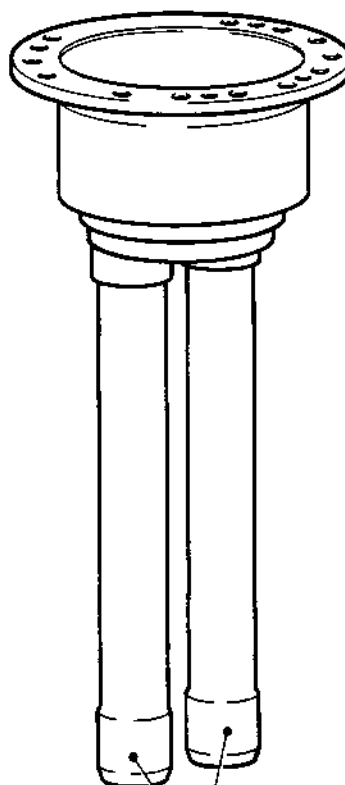
C. Restore Oil Seal Locations (Ref.Figs.401, 402).

- (1) Plasma Spray.
 - (a) Plasma spray the oil seal locations as detailed in Chapter 72-09-11 Repair or TSD 594 OP704, using MSRR 9507/35 material. Plasma spray thickness must be sufficient to allow for final machining to size.



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OIL SEAL LOCATIONS

Oil Sump Assembly
Figure 401

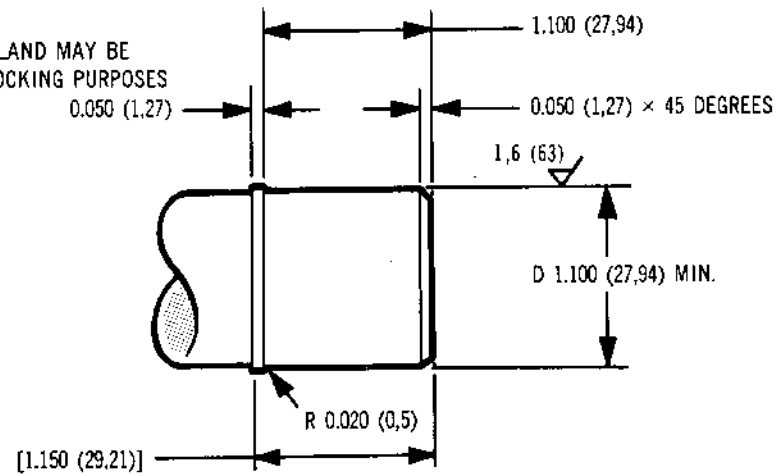


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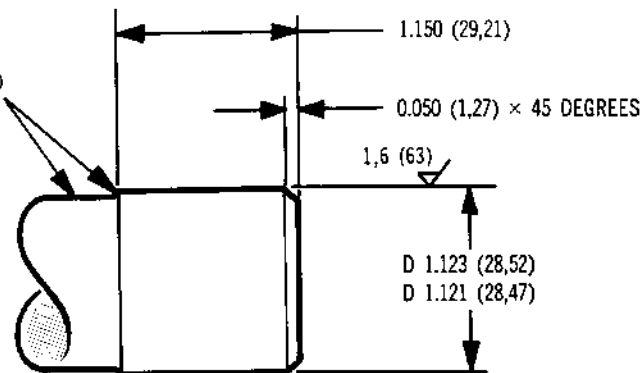
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NOTE:- THIS LAND MAY BE
LEFT FOR CLOCKING PURPOSES
0.050 (1,27)



PRE COATING MACHINING

OVERSPRAY
HERE NOT PERMITTED



FINAL MACHINING

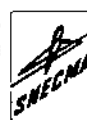
SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Machining Details
Figure 402



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D. Final Machining (Ref.Figs.401, 402).

- (1) Locate the expanding mandrel in the chuck of the lathe, and set true.
- (2) Secure the sump assembly to the expanding mandrel.
- (3) Machine the seal locations to the dimensions given in Fig.402. Remove burrs and sharp edges.

E. Inspect.

- (1) Inspect for the satisfactory completion of the plasma spray and final machining operations. Examine plasma spray coatings using 7 times magnification.
- (2) Crack test the oil sump assembly using the fluorescent dye penetrant process specified for this component in Chapter 72-32-00 Inspection/Check.

F. Identify.

- (1) Mark the salvage scheme number SAL B.502641 or R19 adjacent to the existing part number, using electro-chemical marking or vibro-percussion engraving detailed in Chapter 72-09-00 Repair.

G. Final Inspection.

- (1) Finally inspect the sump assembly to ensure that the repair has been carried out satisfactorily and that the sump assembly is in a serviceable condition.

4. Special Tools, Fixtures and Equipment

None.

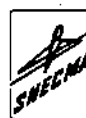
5. Replacement Parts

None.

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OVERHAUL

BAFFLE, ASSY OF, AIR, REAR OUTERREMOVAL AND REPLACEMENT OF ABRADABLE COATINGSREPAIR NO. B5146471. EFFECTIVITY

IPC	Fig./Item	Part No.
72-32-00	2 30D	B494278 B494433

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

Temporary re-protection of components between operations should be carried out in accordance with TSD 594 OP.340.

3. GENERALUNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURESUPPLEMENTARY INFORMATION

- 1) Strip to remove existing aluminium paint.

Refer Overhaul Manual
Chapter 72-09-00 Cleaning,
Process F.

- 2) Strip to remove existing combustion sprayed seal coatings.

Refer Overhaul Manual
Chapter 72-09-25 Repair,
using Para.L. Process A
and Process K.

REPAIR

72-32-00

Repair No. 20

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- | | |
|--|---|
| 3) Locally swab etch seal bore locations to ensure complete removal of combustion sprayed coatings. | Refer Overhaul Manual
Chapter 72-09-14 Repair,
using Para.1.L. Solution E. |
| 4) Crack detect. | Refer Overhaul Manual
Chapter 72-32-00
Inspection/Check. |
| 5) Locally dry abrasive blast seal bore locations. | Refer TSD 594 OP.704 Para.6,
using OMat 1/238. |
| 6) Combustion flame spray seal bores AA, AB and AC with bond coat 0.003/0.005 (0,08/0,13) thick. | Refer Overhaul Manual
Chapter 72-09-06 Repair
and TSD 594 OP.704 using
Nickel/Aluminium (80/20)
wire (OMat 3/90) or Nickel/
Aluminium (95/5) composite
powder (OMat 3/188).
Refer fig.402. |
| 7) Combustion flame spray an abradable coating 0.035 (0,89) minimum thickness over the bond coating. | Refer Overhaul Manual
Chapter 72-09-06 Repair
and TSD 594 OP.704 Appendix 1
Process 019/020 using Nickel/
Graphite (75/25) powder
(OMat 3/91). |
| 8) Identify TOP position of the Labyrinth and locate to TOP position of holding fixture and secure. Set true on a centre lathe to concentric clocking register on fixture. | Refer Para.7. TOOLS,
Item 1.
Refer fig.401 for location
of TOP marking. |
| 9) Finish turn abradable coated bore AA producing Dia.AF to dimensions given. | Refer Para 7. TOOLS,
Item 2.
Refer Figs.401 to 404. |
| 10) Finish turn abradable coated bore AB producing Dia.AF to dimensions given. | Refer Para.7. TOOLS,
Item 2.
Refer Figs.401 to 404. |
| 11) Finish turn abradable coated bore AC producing Dia.AF to dimensions given. | Refer Para.7. TOOLS,
Item 2.
Refer Figs.401 to 404. |

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- | | | |
|-----|---|--|
| 12) | Finish turn front face of bores removing surplus spray to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Figs.401 and 402. |
| 13) | Finish turn front chamfer of bores AA, AB and AC to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Fig.402. |
| 14) | Remove from fixture. Visually and dimensionally inspect previous operations. | Refer figs.401 to 404. |
| 15) | Identify TOP position of the Labyrinth and locate to TOP position of holding fixture and secure. Set true on a centre lathe to offset clocking register on fixture. | Refer Para.7. TOOLS, Item 1.
Refer fig.401 for location of TOP marking. |
| 16) | Finish turn offset in bore AA producing Rad.AE to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Figs.401 to 404. |
| 17) | Finish turn offset in bore AB producing Rad.AE to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Figs.401 to 404. |
| 18) | Finish turn offset in bore AC producing Rad.AE to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Figs.401 to 404. |
| 19) | Finish turn front chamfer of bores AA, AB and AC over offset Rad.AE to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Figs.402 and 403. |
| 20) | Remove from fixture. Visually and dimensionally inspect previous operations. | Refer figs.401 to 404. |
| 21) | Remove all sharp edges and any surplus spray. | Use standard hand tools. |
| 22) | Apply aluminium enamel all over except faces AG and areas enclosed by AH. | Refer Overhaul Manual Chapter 72-09-04 Repair.
Refer Fig.401. |

REPAIR

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Repair No. 20

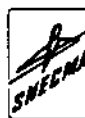
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23) Mark Repair Instruction number RI B514647 or R20 adjacent to normal 'assy of' number using the electro-chemical marking or vibro-percussion engraving techniques.

Refer Overhaul Manual Chapter 72-09-00 Repair. Refer fig.401 for identity marking location.

5. MATERIAL

COMPONENT	MATERIAL	RR CODE
BAFFLE, ASSY OF, AIR, REAR OUTER	JETHETE MSRR 6503	EAK

6. DATA

NONE.

7. TOOLS

TOOL NUMBER	DESCRIPTION	ITEM
S3S 15789000	HOLDING FIXTURE	1
N/A	WIMET TIPPED TOOL	2

8. REPLACEMENT PARTS

PART NUMBER	DESCRIPTION	QUANTITY	ITEM
NONE.			

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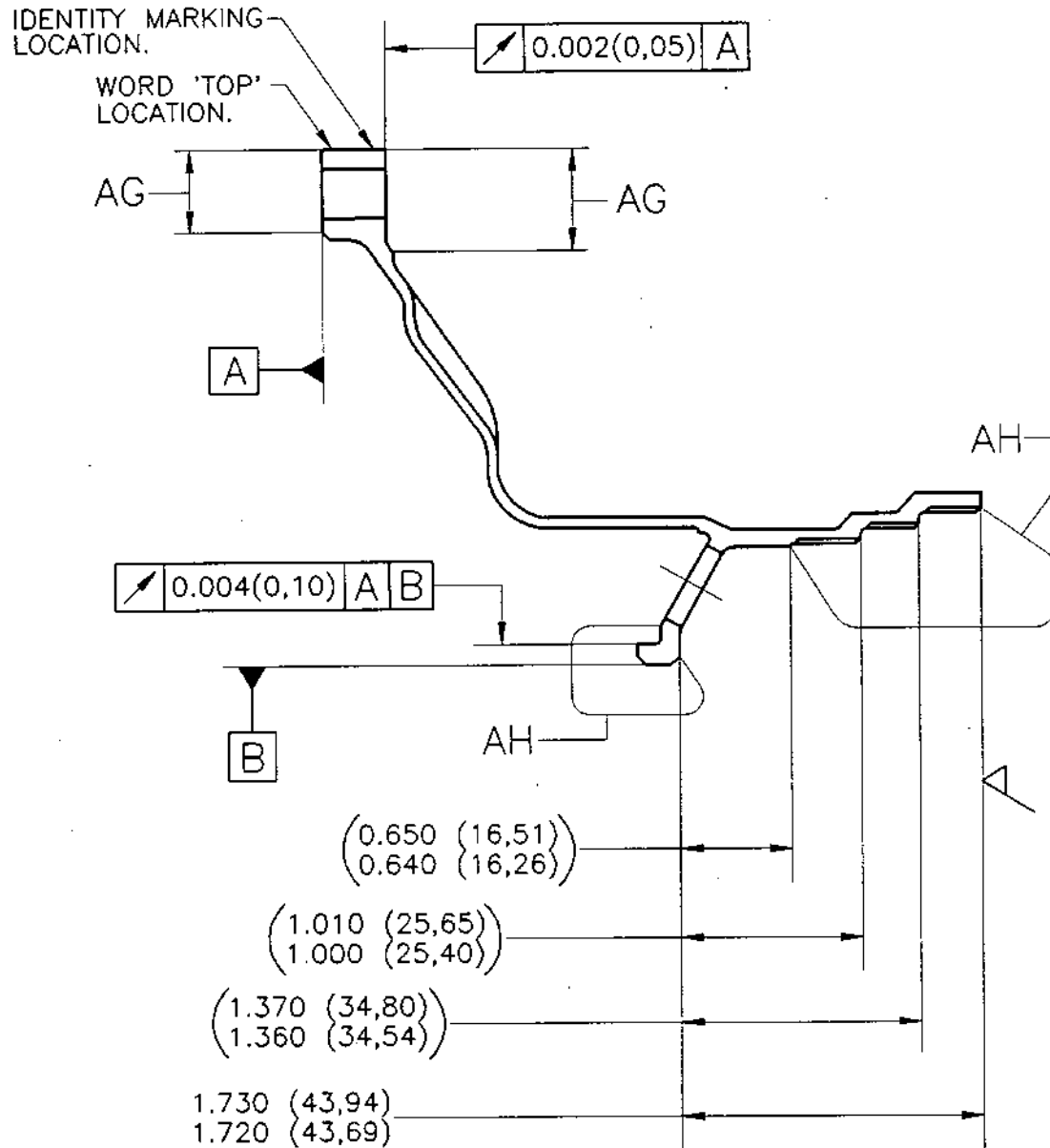


FIG.401

REPAIR

72-32-00

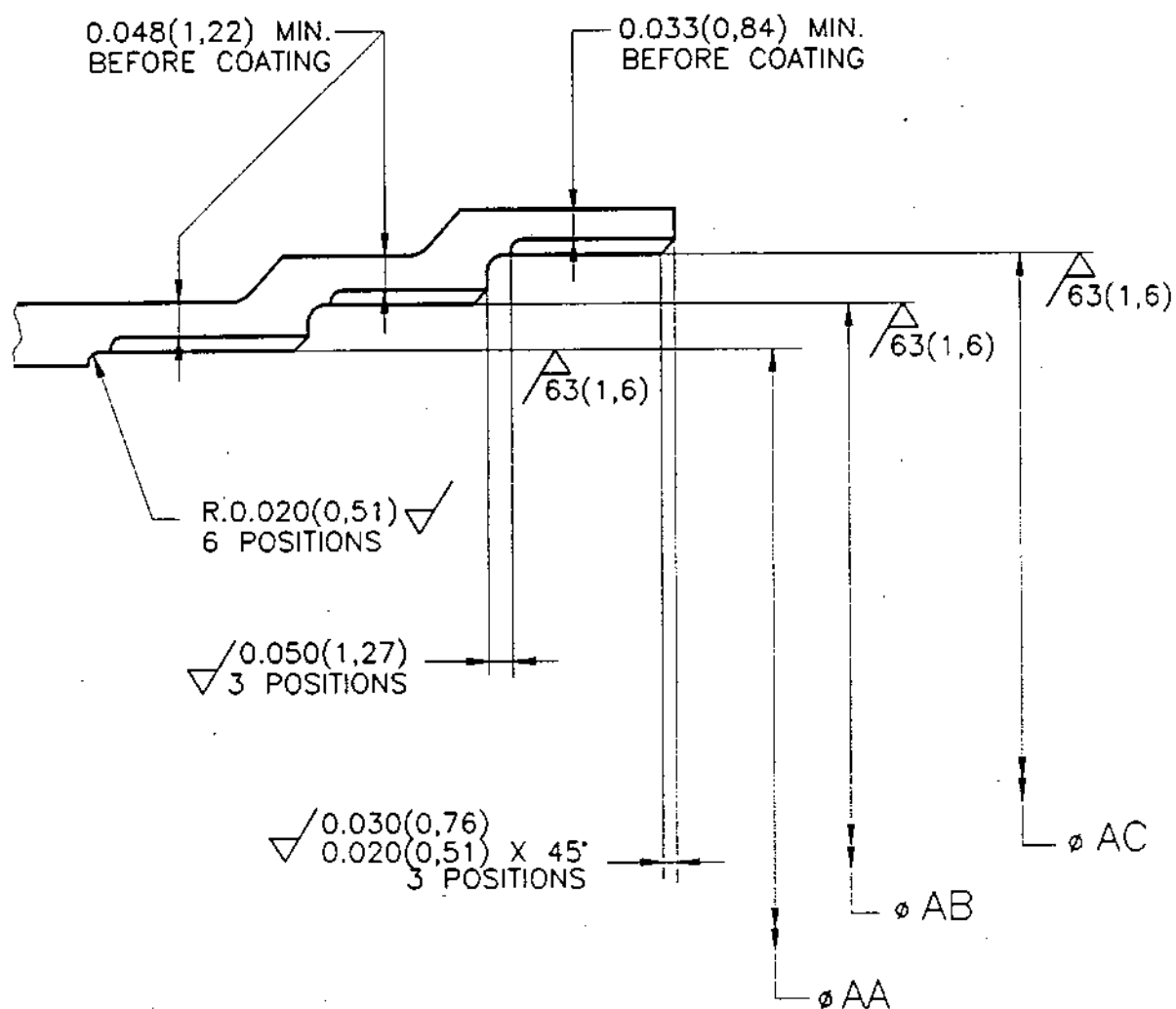
Repair No. 20

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SECTION SHOWING EXTENT OF COATING.
FIG.402

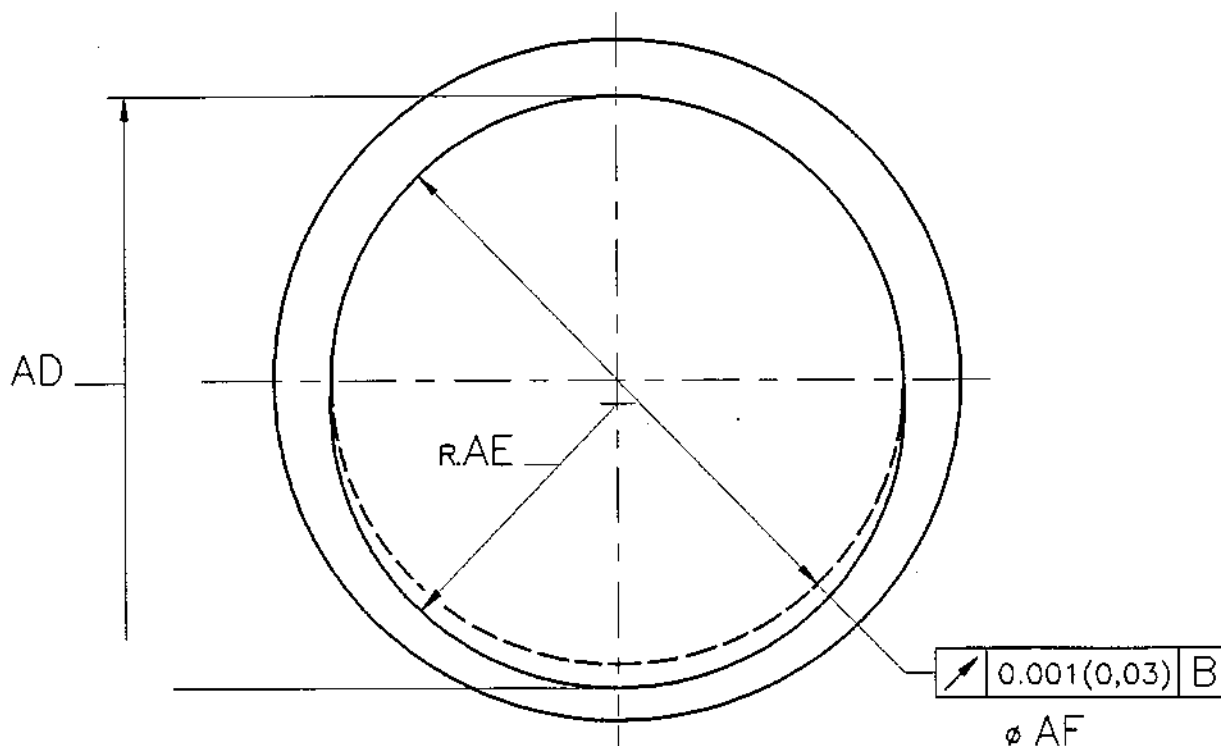
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72-32-00
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DIAGRAMMATIC SECTION THROUGH
BORES AA,AB AND AC.

FIG.403

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	BEFORE COATING (REF.ONLY)		
	DIMN.AD	R. AE	ø AF
BORE AA	9.498(241,25)	4.746(120,55)	9.492(241,10)
	9.495(241,17)	4.744(120,50)	9.490(241,05)
BORE AB	9.678(245,82)	4.836(122,83)	9.672(245,67)
	9.675(245,75)	4.834(122,78)	9.670(245,62)
BORE AC	9.848(250,14)	4.921(124,99)	9.842(249,99)
	9.845(250,06)	4.919(124,94)	9.840(249,94)

	AFTER COATING		
	DIMN.AD	R. AE	ø AF
BORE AA	9.448(239,98)	4.721(119,91)	9.442(239,83)
	9.445(239,90)	4.719(119,86)	9.440(239,78)
BORE AB	9.628(244,55)	4.811(122,20)	9.622(244,40)
	9.625(244,48)	4.809(122,15)	9.620(244,35)
BORE AC	9.808(249,12)	4.901(124,49)	9.802(248,97)
	9.805(249,05)	4.899(124,43)	9.800(248,92)

FIG.404

REPAIR

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**OLYMPUS 593**

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OVERHAUL

HOUSING, LABYRINTH, INNER (LP).REMOVAL AND REPLACEMENT OF ABRADABLE COATINGSREPAIR NO. B5146641. EFFECTIVITY

IPC	Fig./Item	Part No.
72-32-00	1 330C	B494279 B494280

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

Temporary re-protection of components between operations should be carried out in accordance with TSD 594 OP.340.

3. GENERALUNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURESUPPLEMENTARY INFORMATION

- | | |
|---|---|
| 1) Strip to remove existing combustion sprayed seal coatings. | Refer Overhaul Manual Chapter 72-09-25 Repair, using Para.L. Process A and Process K. |
| 2) Locally swab etch seal bore locations to ensure complete removal of combustion sprayed coatings. | Refer Overhaul Manual Chapter 72-09-14 Repair, using Para.1.L. Solution E. |

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- | | |
|--|---|
| 3) Crack detect. | Refer Overhaul Manual
Chapter 72-32-00
Inspection/Check. |
| 4) Locally dry abrasive blast seal bore locations. | Refer TSD 594 OP.704 Para.6,
using OMat 1/238. |
| 5) Combustion flame spray seal bores AC and AD with bond coat 0.003/0.005 (0,08/0,13) thick. | Refer Overhaul Manual
Chapter 72-09-06 Repair
and TSD 594 OP.704 using
Nickel/Aluminium (80/20)
wire (OMat 3/90) or Nickel/
Aluminium (95/5) composite
powder (OMat 3/188).
Refer fig.402. |
| 6) Combustion flame spray an abradable coating 0.030 (0,76) minimum thickness over the bond coating. | Refer Overhaul Manual
Chapter 72-09-06 Repair
and TSD 594 OP.704 Appendix 1
Process 019/020 using Nickel/
Graphite (75/25) powder
(OMat 3/91). |
| 7) Identify the TOP position of the Labyrinth and locate to TOP position of holding fixture and secure. Set true on a centre lathe to concentric clocking register on fixture. | Refer Para.7. TOOLS,
Item 1.
Refer fig.401 for location
of TOP marking. |
| 8) Finish turn abradable coated bore AC to dimensions given. | Refer Para.7. TOOLS,
Item 2.
Refer Figs.401 and 402. |
| 9) Finish turn to remove surplus spray from front face and 45° rear face of bore AC and chamfer front face, to dimensions given. | Refer Para.7. TOOLS,
Item 2.
Refer Figs.401 and 402. |
| 10) Finish turn abradable coated bore AD producing taper to dimensions given. | Refer Para.7. TOOLS,
Item 2.
Refer Figs.401 and 402. |
| 11) Finish turn to remove surplus spray from end faces of bore AD and produce chamfers to dimensions given. | Refer Para.7. TOOLS,
Item 2.
Refer Figs.401 and 402. |

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OVERHAUL



- 12) Remove from fixture. Visually and dimensionally inspect previous operations. Refer Figs.401 and 402.
- 13) Identify the TOP position of the Labyrinth and locate to TOP position of holding fixture and secure. Set true on a centre lathe to offset clocking register on fixture. Refer Para.7. TOOLS, Item 1. Refer fig.401 for location of TOP marking.
- 14) Finish turn offset in bore AC producing Rad.AG, Dim.AH and chamfer to front face, to dimensions given. Refer Para.7. TOOLS, Item 2. Refer Figs.401 to 404.
- 15) Finish turn cylindrical offset in tapered bore AD producing Rad.AG and Dim.AH measured at Point AF and chamfer both ends, to dimensions given. Refer Para.7. TOOLS, Item 2. Refer Figs.401 to 404.
- 16) Remove from fixture. Visually and dimensionally inspect previous operations. Refer Figs.401 to 404.
- 17) Remove all sharp edges and any surplus spray. Use standard hand tools.
- 18) Mark Repair Instruction number RI B514664 or R21 adjacent to normal 'assy of' number using the electro-chemical marking or vibro-percussion engraving techniques. Refer Overhaul Manual Chapter 72-09-00 Repair. Identity markings are adjacent to TOP marking (refer fig.401).

5. MATERIAL

COMPONENT	MATERIAL	RR CODE
HOUSING, LABYRINTH, INNER (LP).	JETHETE MSRR 6503	EAK

6. DATA

NONE.

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OVERHAUL



7. TOOLS

TOOL NUMBER	DESCRIPTION	ITEM
S3S 12353000	HOLDING FIXTURE	1
N/A	WIMET TIPPED TOOL	2

8. REPLACEMENT PARTS

PART NUMBER	DESCRIPTION	QUANTITY	ITEM
NONE.			

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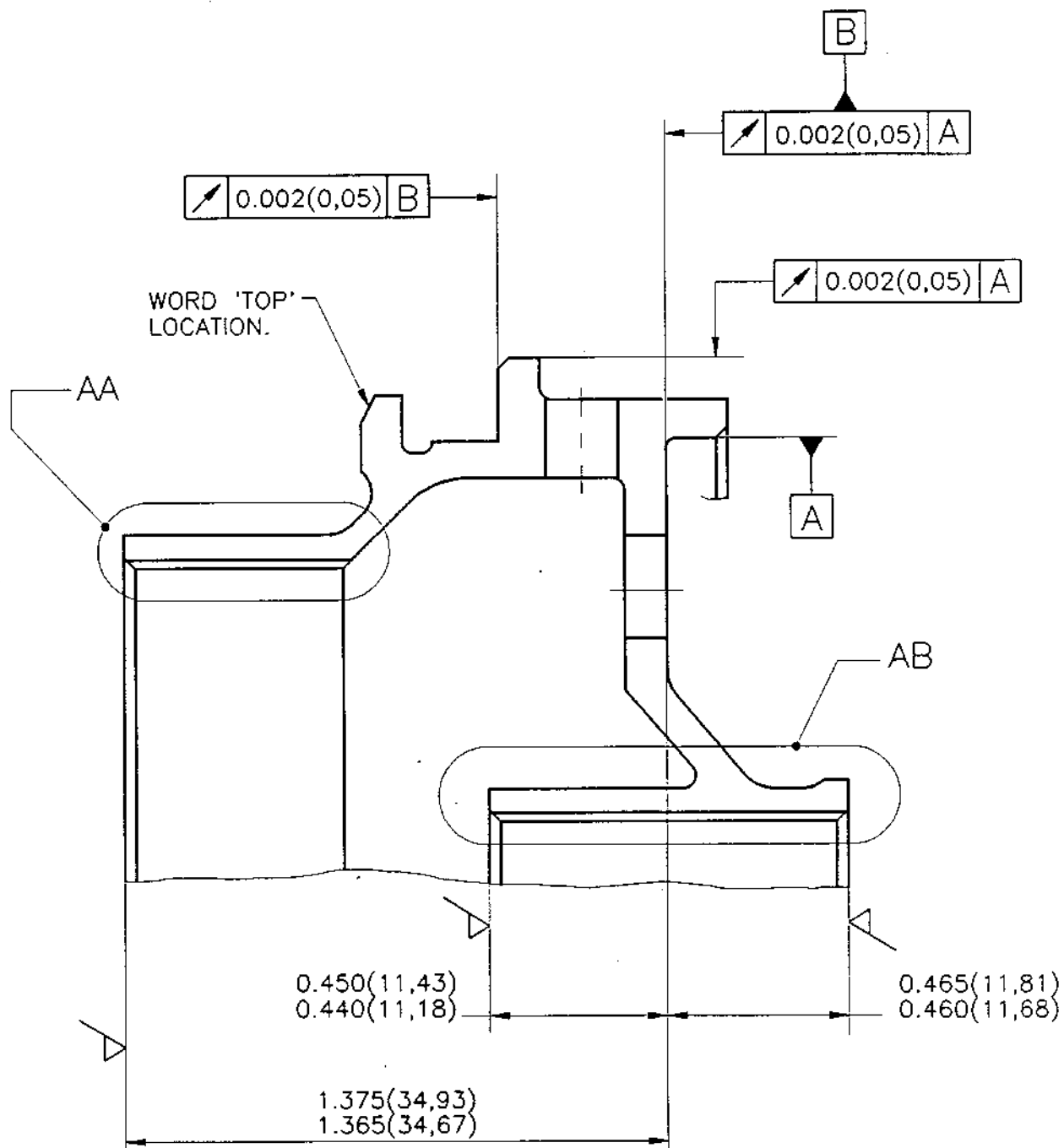


FIG.401

REPAIR

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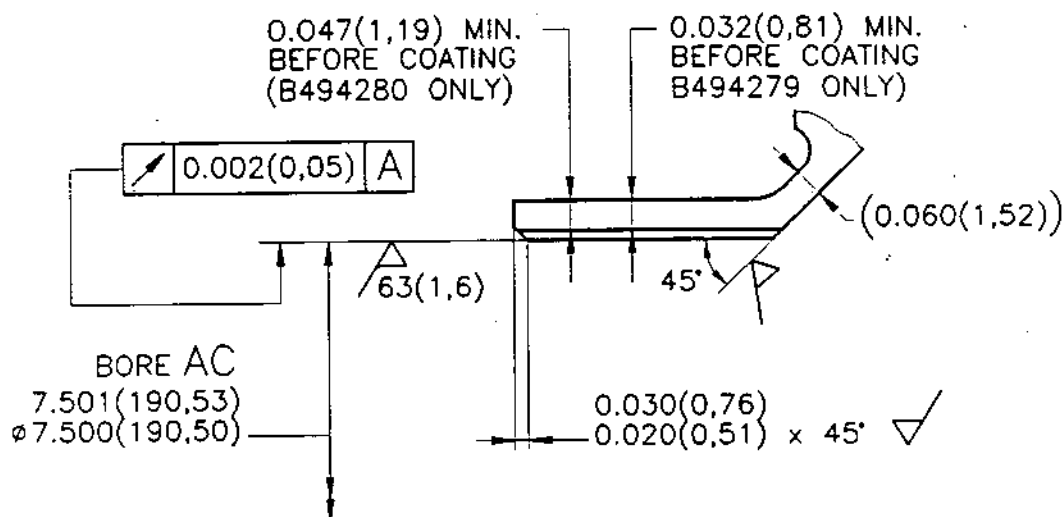
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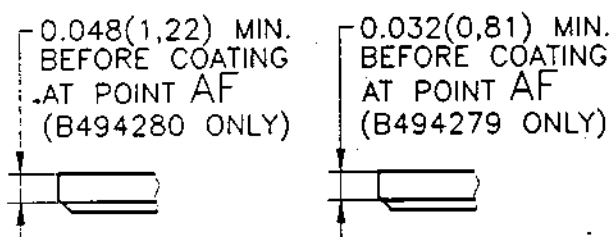
OLYMPUS 593

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OVERHAUL

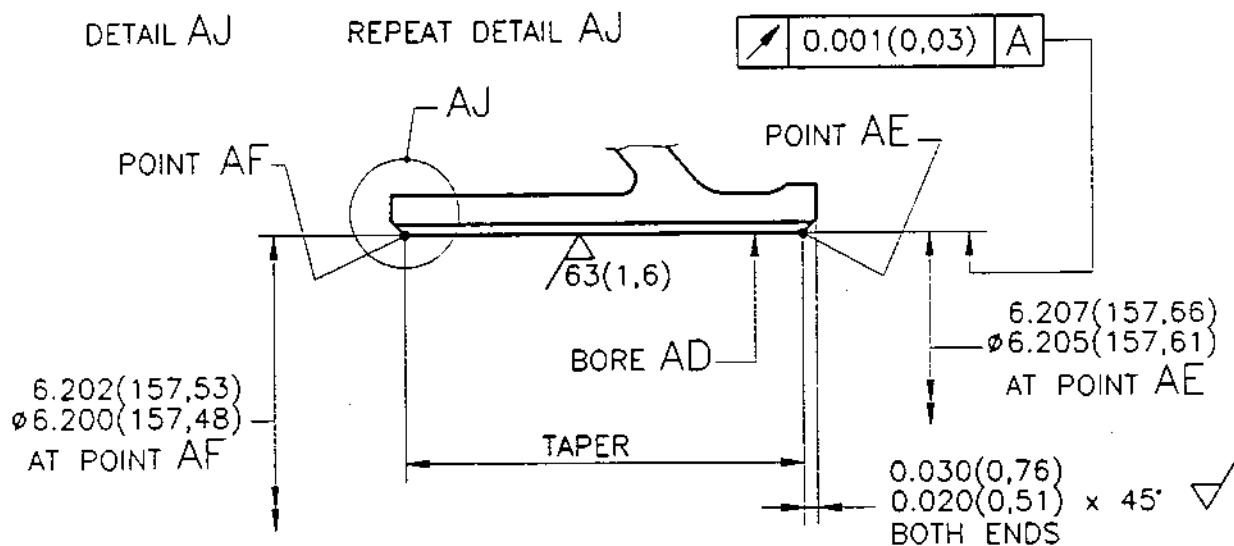


DETAIL AA



DETAIL AJ

REPEAT DETAIL AJ



DETAIL AB
FIG. 402

REPAIR

72-32-00

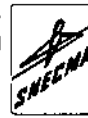
Repair No. 21

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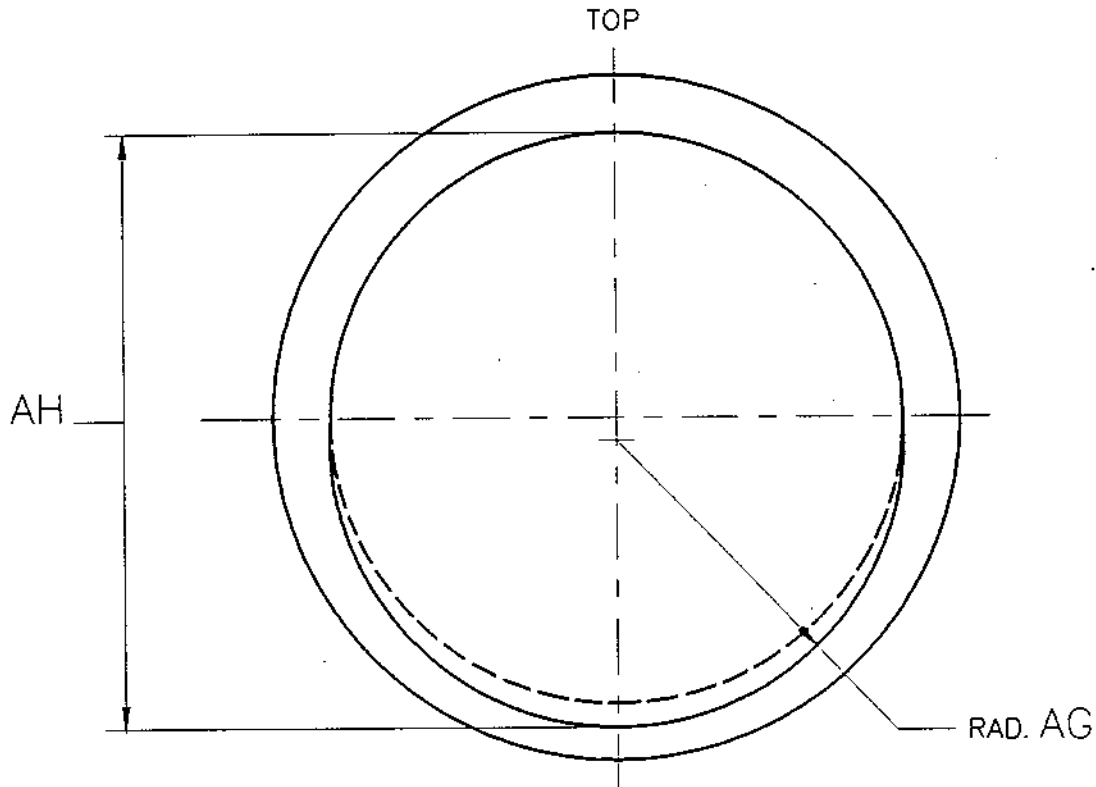
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OVERHAUL



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DIAGRAMMATIC SECTION THROUGH
BORES AC AND AD

FIG.403

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**OLYMPUS 593**

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OVERHAUL



TABLE.1 (APPLICABLE TO B494279 ONLY)

	BEFORE COATING (REF.ONLY)	
	RAD.AG	DIMN.AH
BORE AC	3.765(95,63)	7.538(191,46)
	3.763(95,58)	7.536(191,41)
BORE AD	3.115(79,12)	6.238(158,44)
	3.113(79,07)	6.236(158,39)

TABLE.2 (APPLICABLE TO B494280 ONLY)

	BEFORE COATING (REF.ONLY)	
	RAD.AG	DIMN.AH
BORE AC	3.775(95,88)	7.558(191,97)
	3.773(95,83)	7.556(191,92)
BORE AD	3.125(79,37)	6.258(158,95)
	3.123(79,32)	6.256(158,90)

TABLE.3 (APPLICABLE TO ALL PART NUMBERS)

	AFTER COATING	
	RAD.AG	DIMN.AH
BORE AC	3.750(95,25)	7.508(190,70)
	3.748(95,20)	7.506(190,65)
BORE AD	3.100(78,74)	6.208(157,68)
	3.098(78,69)	6.206(157,63)

FOR TAPERED BORE AD RAD.AG IS CYLINDRICAL
AND DIMN.AH IS MEASURED FROM POINT AF.

FIG.404

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OVERHAUL



HOUSING, ASSEMBLY OF, LABYRINTH OUTER

REMOVAL AND REPLACEMENT OF ABRADABLE COATINGS

REPAIR NO. B514666

1. EFFECTIVITY

IPC	Fig./Item	Part No.
72-32-00	1 350D	B494281 B494432

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

Temporary re-protection of components between operations should be carried out in accordance with TSD 594 OP.340.

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- 1) Strip to remove existing aluminium paint.
NOTE: Applicable to SB.0L.593-72-8284-219 Standard only.

Refer Overhaul Manual
Chapter 72-09-00 Cleaning,
Process F.

- 2) Strip to remove existing combustion sprayed seal coatings.

Refer Overhaul Manual
Chapter 72-09-25 Repair,
using Para.L. Process A
and Process K.

REPAIR

72-32-00

Repair No. 22

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OVERHAUL



3) Locally swab etch seal bore locations to ensure complete removal of combustion sprayed coatings.

Refer Overhaul Manual
Chapter 72-09-14 Repair,
using Para.1.L. Solution E.

4) Crack detect.

Refer Overhaul Manual
Chapter 72-32-00
Inspection/Check.

5) Locally dry abrasive blast seal bore locations.

Refer TSD 594 OP.704 Para.6,
using OMat 1/238.

6) Combustion flame spray seal bores AA, AB and AC with bond coat 0.003/0.005 (0,08/0,13) thick.

Refer Overhaul Manual
Chapter 72-09-06 Repair
and TSD 594 OP.704 using
Nickel/Aluminium (80/20)
wire (OMat 3/90) or Nickel/
Aluminium (95/5) composite
powder (OMat 3/188).
Refer fig.402.

7) Combustion flame spray an abradable coating 0.035 (0,89) minimum thickness over the bond coating.

Refer Overhaul Manual
Chapter 72-09-06 Repair
and TSD 594 OP.704 Appendix 1
Process 019/020 using Nickel/
Graphite (75/25) powder
(OMat 3/91).

8) Identify TOP position of the Labyrinth and locate to TOP position of holding fixture and secure. Set true on a centre lathe to concentric clocking register on fixture.

Refer Para.7. TOOLS,
Item 1.
Refer fig.401 for location
of TOP marking.

9) Finish turn abradable coated bore AA producing Dia.AF to dimensions given.

Refer Para 7. TOOLS,
Item 2.
Refer Figs.401 to 404.

10) Finish turn abradable coated bore AB producing Dia.AF to dimensions given.

Refer Para.7. TOOLS,
Item 2.
Refer Figs.401 to 404.

11) Finish turn abradable coated bore AC producing Dia.AF to dimensions given.

Refer Para.7. TOOLS,
Item 2.
Refer Figs.401 to 404.

REPAIR

72-32-00

Repair No. 22

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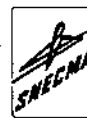
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OVERHAUL



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- | | | |
|-----|---|--|
| 12) | Finish turn front face of bores removing surplus spray to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Figs.401 and 402. |
| 13) | Finish turn front chamfer of bores AA, AB and AC to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Fig.402. |
| 14) | Remove from fixture. Visually and dimensionally inspect previous operations. | Refer figs.401 to 404. |
| 15) | Identify TOP position of the Labyrinth and locate to TOP position of holding fixture and secure. Set true on a centre lathe to offset clocking register on fixture. | Refer Para.7. TOOLS, Item 1.
Refer fig.401 for location of TOP marking. |
| 16) | Finish turn offset in bore AA producing Rad.AE to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Figs.401 to 404. |
| 17) | Finish turn offset in bore AB producing Rad.AE to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Figs.401 to 404. |
| 18) | Finish turn offset in bore AC producing Rad.AE to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Figs.401 to 404. |
| 19) | Finish turn front chamfer of bores AA, AB and AC over offset Rad.AE to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer Figs.402 and 403. |
| 20) | Remove from fixture. Visually and dimensionally inspect previous operations. | Refer figs.401 to 404. |
| 21) | Remove all sharp edges and any surplus spray. | Use standard hand tools. |
| 22) | Apply aluminium enamel all over except joint faces AG, areas AH and surfaces enclosed by AJ.
NOTE: Applicable to SB.OL.593-72-8284-219 Standard only. | Refer Overhaul Manual Chapter 72-09-04 Repair.
Refer Fig.401. |

REPAIR

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**OLYMPUS 593**

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OVERHAUL



- 23) Mark Repair Instruction number RI B514666 or R22 adjacent to normal 'assy of' number using the electro-chemical marking or vibro-percussion engraving techniques. Refer Overhaul Manual Chapter 72-09-00 Repair. Refer fig.401 for identity marking location.

5. MATERIAL

COMPONENT	MATERIAL	RR CODE
HOUSING, ASSY OF, LABYRINTH, OUTER	JETHETE MSRR 6503	EAK

6. DATA

NONE.

7. TOOLS

TOOL NUMBER	DESCRIPTION	ITEM
S3S 15788000	HOLDING FIXTURE	1
N/A	WIMET TIPPED TOOL	2

8. REPLACEMENT PARTS

PART NUMBER	DESCRIPTION	QUANTITY	ITEM
NONE.			

REPAIR

72-32-00

Repair No. 22

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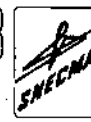
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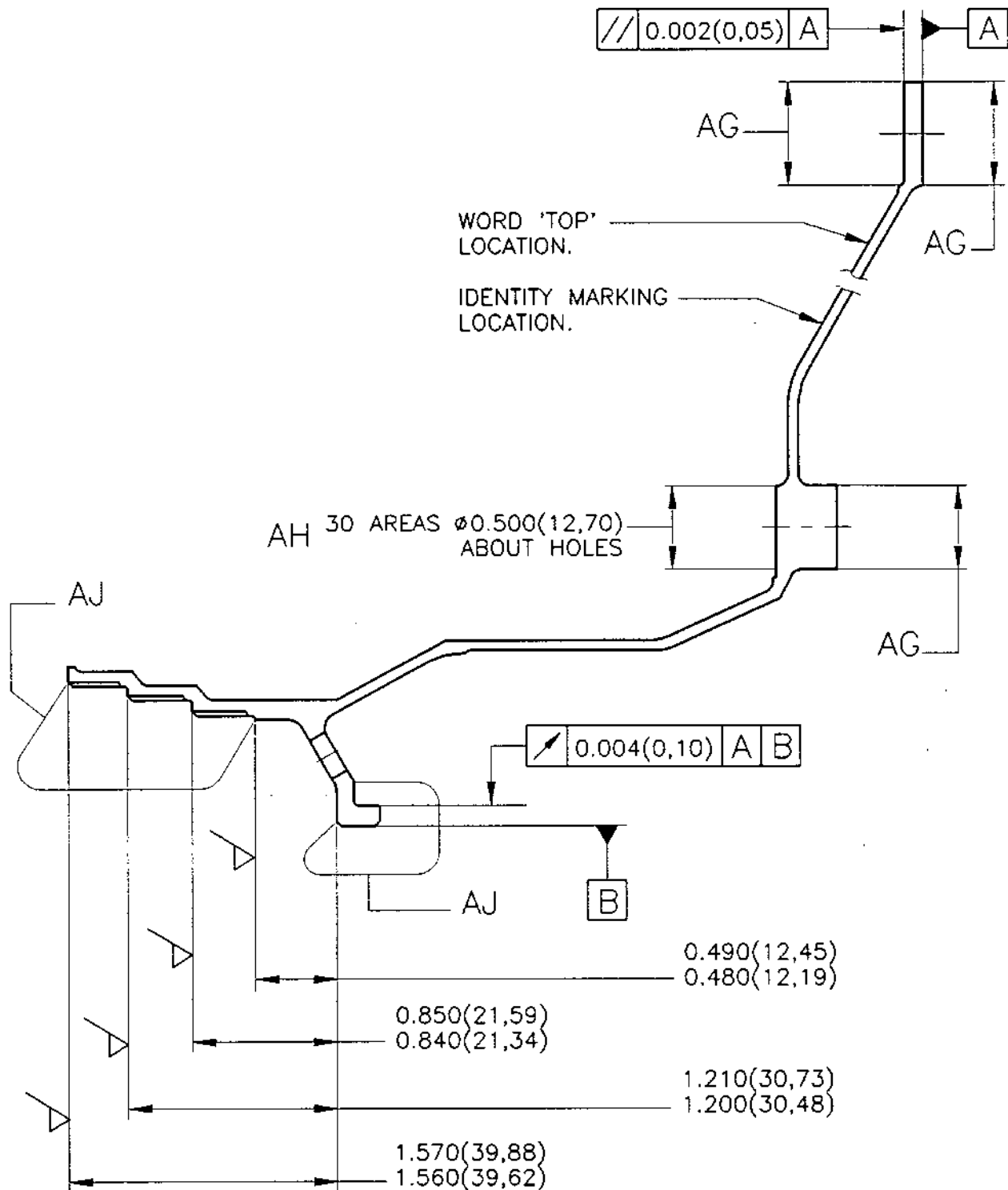


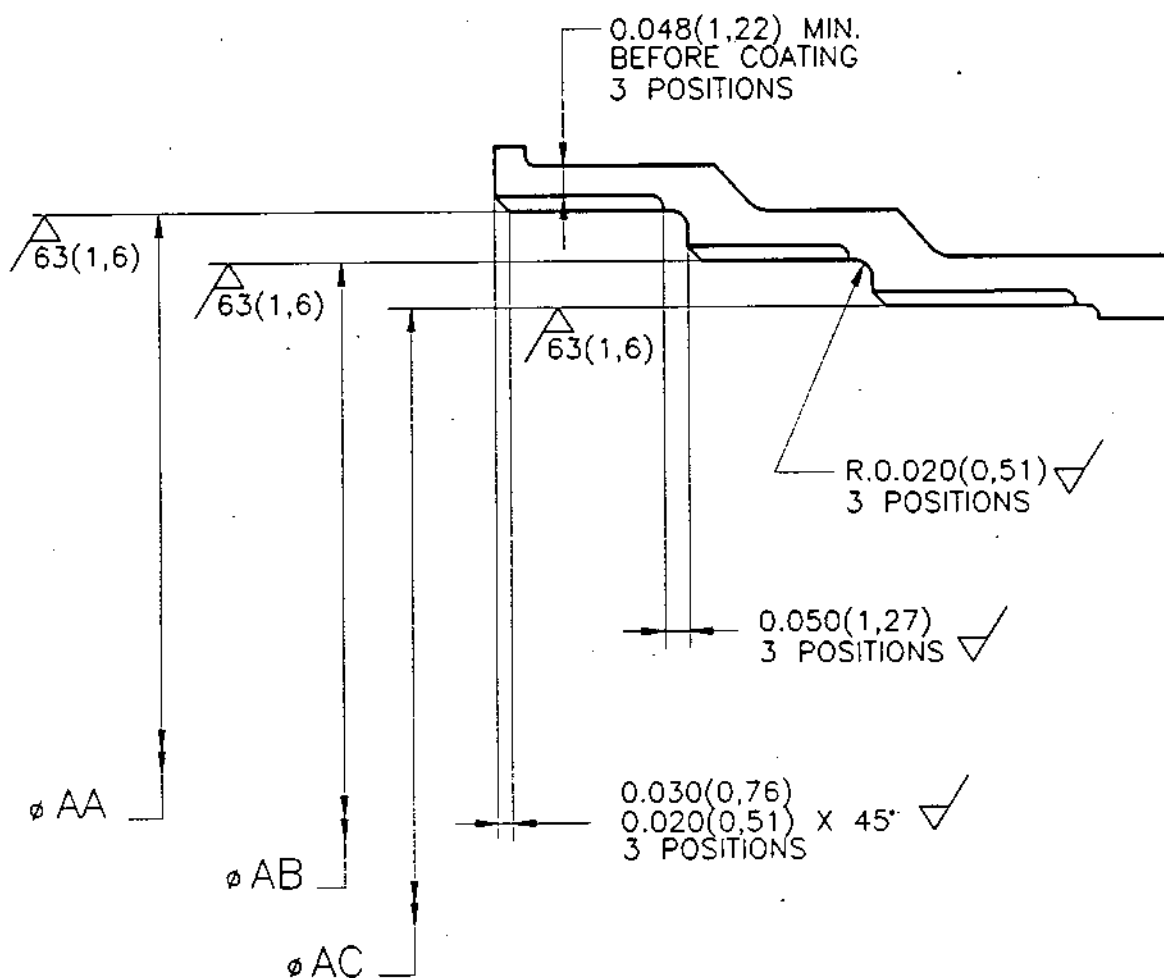
FIG.401



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OVERHAUL



SECTION SHOWING EXTENT OF COATING.

FIG.402



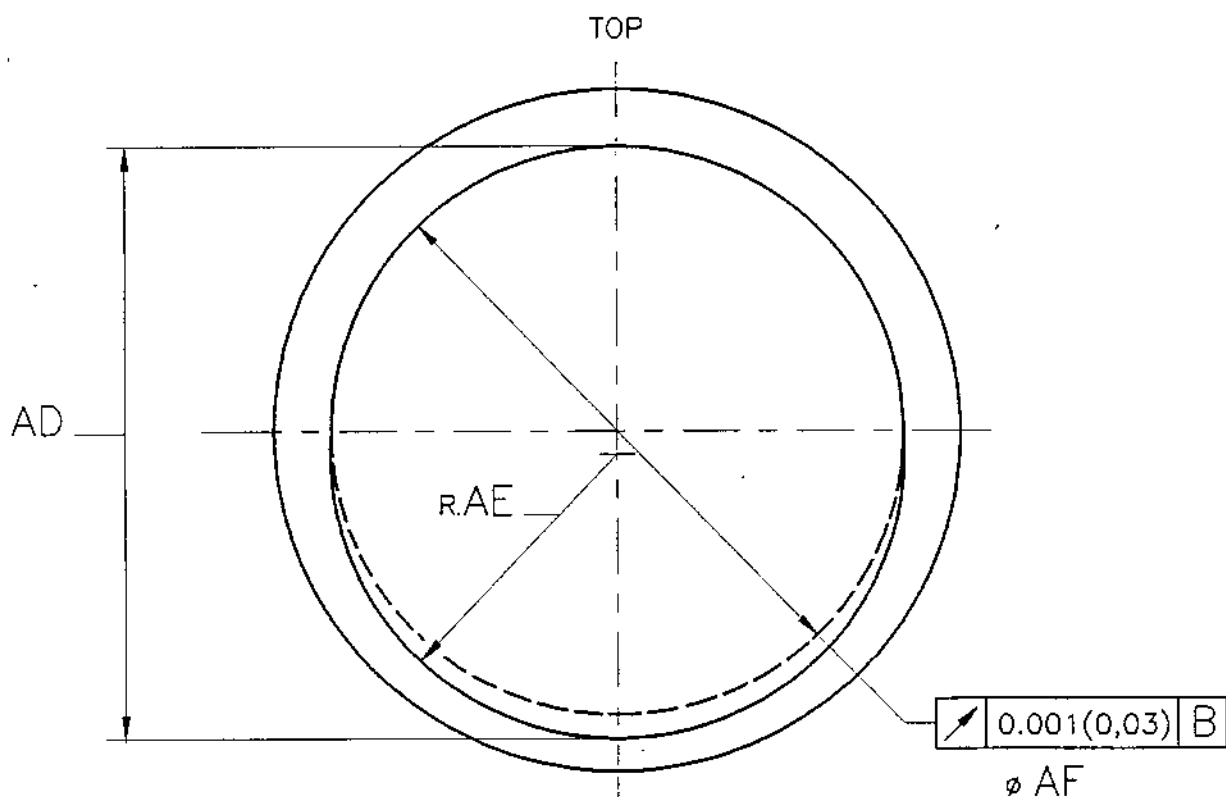
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OVERHAUL



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DIAGRAMMATIC SECTION THROUGH
BORES AA,AB AND AC.

FIG.403

REPAIR

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Repair No: 22

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**OLYMPUS 593**

MK. 610-14-28

OVERHAUL



	BEFORE COATING (REF. ONLY)		
	DIMN. AD	R. AE	ø AF
BORE AA	9.858(250,40)	4.926(125,12)	9.852(250,24)
	9.855(250,32)	4.924(125,07)	9.850(250,19)
BORE AB	9.678(245,82)	4.836(122,83)	9.672(245,67)
	9.675(245,75)	4.834(122,78)	9.670(245,62)
BORE AC	9.498(241,25)	4.746(120,55)	9.492(241,10)
	9.495(241,17)	4.744(120,50)	9.490(241,05)

	AFTER COATING		
	DIMN. AD	R. AE	ø AF
BORE AA	9.808(249,12)	4.901(124,49)	9.802(248,97)
	9.805(249,05)	4.899(124,43)	9.800(248,92)
BORE AB	9.628(244,55)	4.811(122,20)	9.622(244,40)
	9.625(244,48)	4.809(122,15)	9.620(244,35)
BORE AC	9.448(239,98)	4.721(119,91)	9.442(239,83)
	9.445(239,90)	4.719(119,86)	9.440(239,78)

FIG.404

REPAIR

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Repair No. 22

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HOUSING, LABYRINTH, INNER (HP).

REMOVAL AND REPLACEMENT OF ABRADABLE COATINGS

REPAIR NO. B514667

1. EFFECTIVITY

IPC	Fig./Item	Part No.
72-32-00	2 60B	B494276 B494277

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

Temporary re-protection of components between operations should be carried out in accordance with TSD 594 OP.340.

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- 1) Strip to remove existing combustion sprayed seal coatings.
- 2) Locally swab etch seal bore locations to ensure complete removal of combustion sprayed coatings.

Refer Overhaul Manual
Chapter 72-09-25 Repair,
using Para.L. Process A
and Process K.

Refer Overhaul Manual
Chapter 72-09-14 Repair,
using Para.1.L Solution E.

REPAIR

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Repair No. 23

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MK.610-14-28
OVERHAUL



- | | | |
|-----|--|---|
| 3) | Crack detect. | Refer Overhaul Manual
Chapter 72-32-00
Inspection/Check. |
| 4) | Locally dry abrasive blast
seal bore locations. | Refer TSD 594 OP.704 Para.6,
using OMat 1/238. |
| 5) | Combustion flame spray seal
bores AC and AD with bond
coat 0.003/0.005 (0,08/0,13)
thick. | Refer Overhaul Manual
Chapter 72-09-06 Repair
and TSD 594 OP.704 using
Nickel/Aluminium (80/20)
wire (OMat 3/90) or Nickel/
Aluminium (95/5) composite
powder (OMat 3/188).
Refer fig.402. |
| 6) | Combustion flame spray an
abradable coating 0.035
(0,89) minimum thickness
over the bond coating. | Refer Overhaul Manual
Chapter 72-09-06 Repair
and TSD 594 OP.704 Appendix 1
Process 019/020 using Nickel/
Graphite (75/25) powder
(OMat 3/91). |
| 7) | Identify the TOP position of
the Labyrinth and locate to
TOP position of holding fixture
and secure. Set true on a
centre lathe to concentric
clocking register on fixture. | Refer Para.7. TOOLS,
Item 1 or 2.
Refer fig.401 for location
of TOP marking. |
| 8) | Finish turn abradable coated
bore AC to dimensions given. | Refer Para.7. TOOLS,
Item 3.
Refer Figs.401 and 402. |
| 9) | Finish turn to remove surplus
spray from end faces of bore
AC and produce front end
chamfer to dimensions given. | Refer Para.7. TOOLS,
Item 3.
Refer Figs.401 and 402. |
| 10) | Finish turn abradable coated
bore AD producing taper to
dimensions given. | Refer Para.7. TOOLS,
Item 3.
Refer Figs.401 and 402. |
| 11) | Finish turn to remove surplus
spray from end faces of bore
AD and produce chamfers to
dimensions given. | Refer Para.7. TOOLS,
Item 3.
Refer Figs.401 and 402. |



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OVERHAUL



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- 12) Remove from fixture. Visually and dimensionally inspect previous operations. Refer figs.401 and 402.
- 13) Identify the TOP position of the Labyrinth and locate to TOP position of holding fixture and secure. Set true on a centre lathe to offset clocking register on fixture. Refer Para.7. TOOLS, Item 1 or 2. Refer fig.401 for location of TOP marking.
- 14) Finish turn offset in bore AC producing Rad.AG, Dim.AH and chamfer to front face, to dimensions given. Refer Para.7. TOOLS, Item 3. Refer Figs.401 to 404.
- 15) Finish turn cylindrical offset in tapered bore AD producing Rad.AG and Dim.AH measured at Point AF and chamfer both ends, to dimensions given. Refer Para.7. TOOLS, Item 3. Refer Figs.401 to 404.
- 16) Remove from fixture. Visually and dimensionally inspect previous operations. Refer figs.401 to 404.
- 17) Remove all sharp edges and any surplus spray. Use standard hand tools.
- 18) Mark Repair Instruction number RI B514667 or R23 adjacent to normal 'assy of' number using the electro-chemical marking or vibro-percussion engraving techniques. Refer Overhaul Manual Chapter 72-09-00 Repair. Refer fig.401 for identity marking location.

5. MATERIAL

COMPONENT	MATERIAL	RR CODE
HOUSING, LABYRINTH, INNER (HP).	JETHETE MSRR 6503	EAK

6. DATA

NONE.

REPAIR

72-32-00

Repair No. 23

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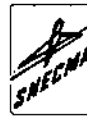
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OVERHAUL



7. TOOLS

TOOL NUMBER	DESCRIPTION	ITEM
S3S 12424000	HOLDING FIXTURE	1
S3S 15552000	HOLDING FIXTURE	2
N/A	WIMET TIPPED TOOL	3

8. REPLACEMENT PARTS

PART NUMBER	DESCRIPTION	QUANTITY	ITEM
NONE.			

REPAIR

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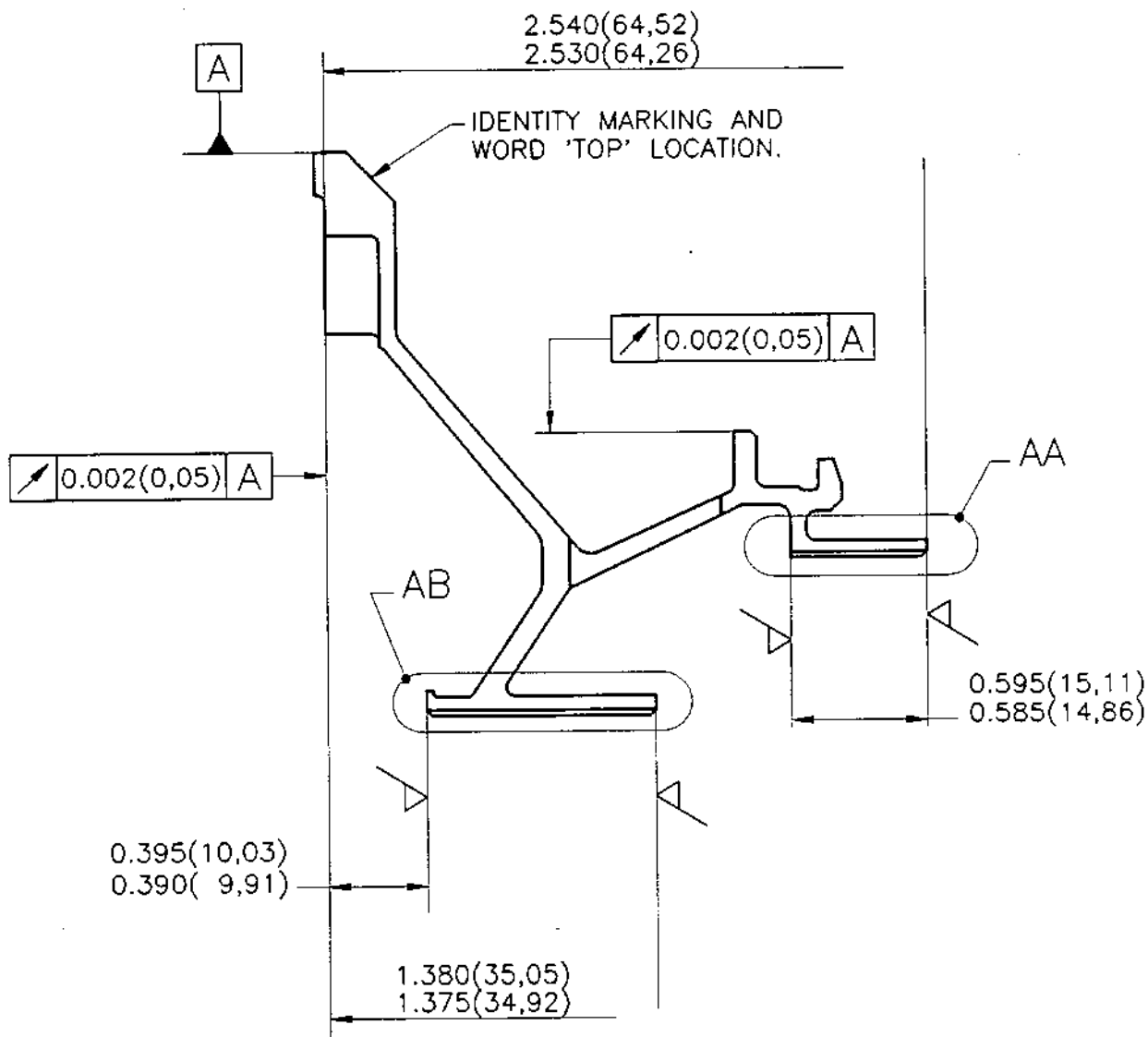


FIG.401

REPAIR

72-32-00

Repair No. 23

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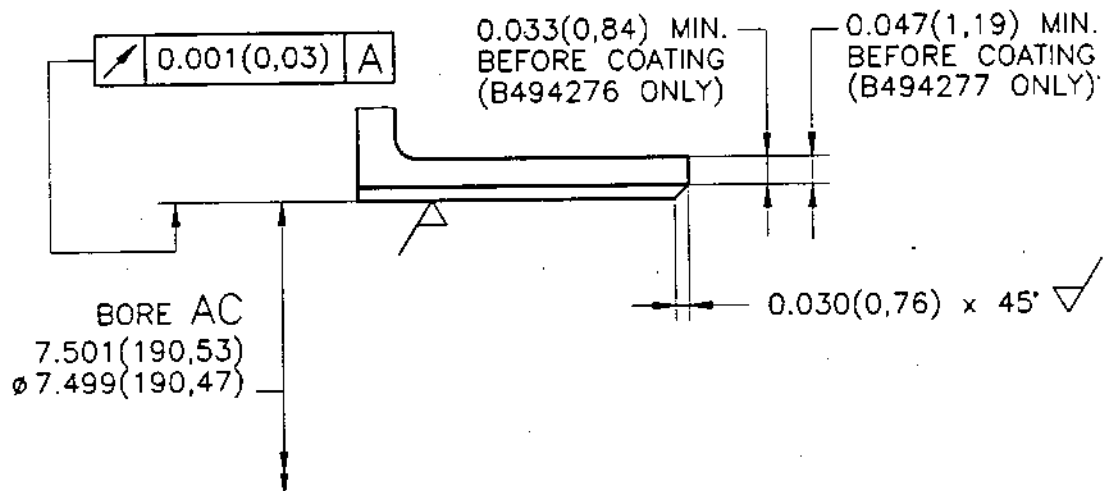
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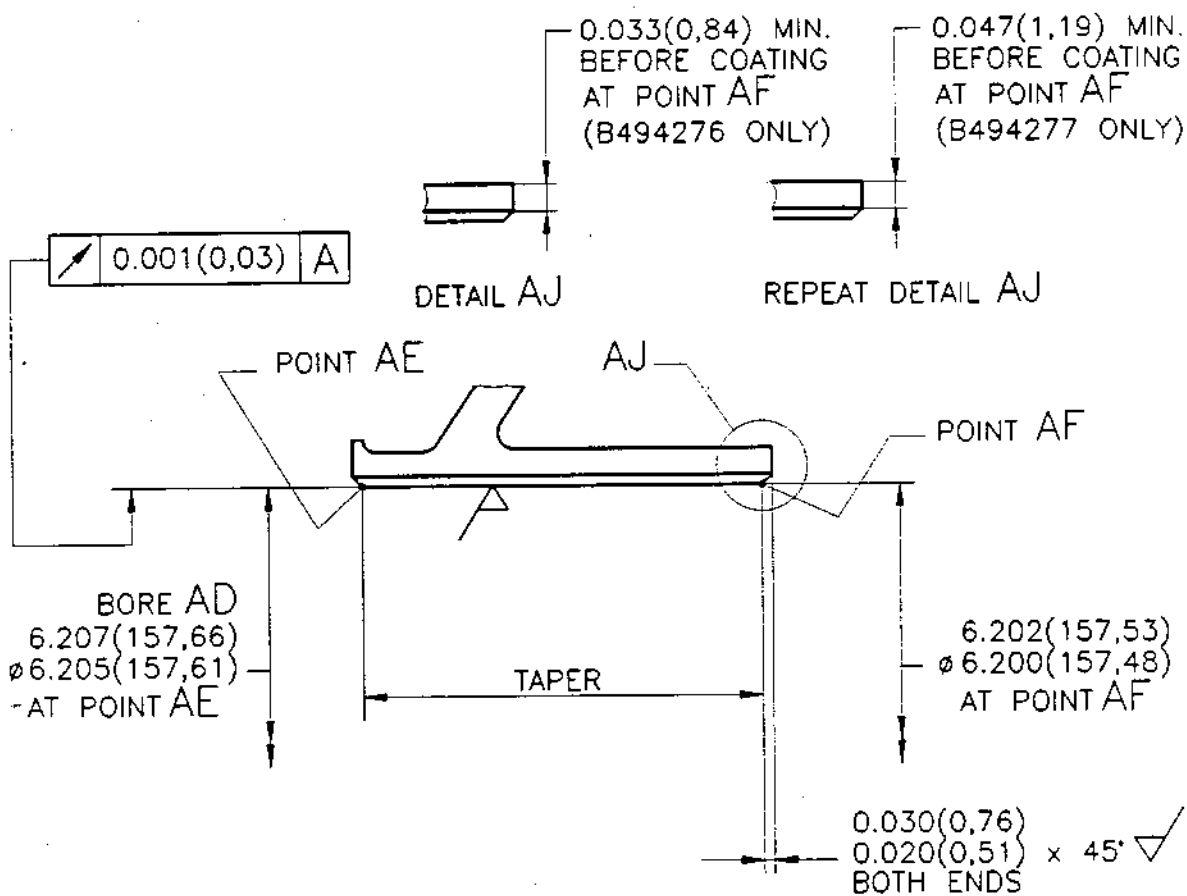
OLYMPUS 593

MK.610-14-28

OVERHAUL



DETAIL AA



DETAIL AB
FIG.402

REPAIR

72-32-00

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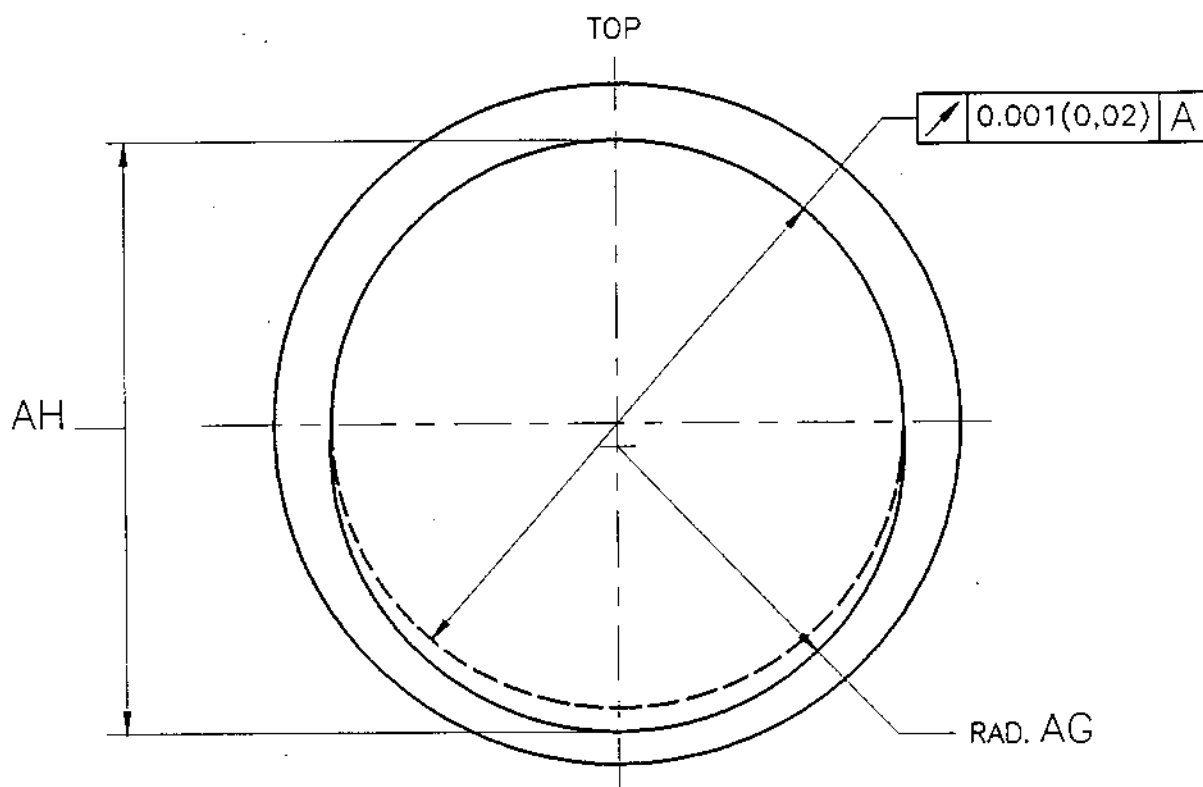
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DIAGRAMMATIC SECTION THROUGH
BORES AC AND AD
FIG.403

REPAIR

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TABLE.1 (APPLICABLE TO B494276 ONLY)

	BEFORE COATING (REF.ONLY)	
	RAD.AG	DIMN.AH
BORE AC	3.765(95,63) 3.763(95,58)	7.538(191,47) 7.536(191,41)
BORE AD	3.115(79,12) 3.113(79,07)	6.238(158,45) 6.236(158,39)

TABLE.2 (APPLICABLE TO B494277 ONLY)

	BEFORE COATING (REF.ONLY)	
	RAD.AG	DIMN.AH
BORE AC	3.775(95,89) 3.772(95,81)	7.559(192,00) 7.556(191,92)
BORE AD	3.125(79,38) 3.122(79,30)	6.259(158,98) 6.256(158,90)

TABLE.3 (APPLICABLE TO ALL PART NUMBERS)

	AFTER COATING	
	RAD.AG	DIMN.AH
BORE AC	3.750(95,25) 3.748(95,20)	7.508(190,70) 7.506(190,65)
BORE AD	3.100(78,74) 3.098(78,69)	6.208(157,68) 6.206(157,63)

FOR TAPERED BORE AD RAD.AG IS CYLINDRICAL
AND DIMN.AH IS MEASURED FROM POINT AF.

FIG.404

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RING, ASSEMBLY OF, SEAL STATIC HOUSING

REMOVAL AND REPLACEMENT OF ABRADABLE COATINGS

REPAIR NO. B514668

1. EFFECTIVITY

IPC	Fig./Item	Part No.
72-32-00	5 40B	B494282 B494283 B507217 B507218
	40C	B500629 B500630

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

Temporary re-protection of components between operations should be carried out in accordance with TSD 594 OP.340.

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)
Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- 1) Strip to remove existing combustion sprayed seal coatings.

Refer Overhaul Manual
Chapter 72-09-25 Repair,
using Para.L. Process A
and Process K.

REPAIR

72-32-00

Repair No. 24

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OVERHAUL



- | | |
|---|---|
| 2) Locally swab etch seal bore locations to ensure complete removal of combustion sprayed coatings. | Refer Overhaul Manual Chapter 72-09-14 Repair, using Para.1.L Solution E. |
| 3) Crack detect. | Refer Overhaul Manual Chapter 72-32-00 Inspection/Check. |
| 4) Locally dry abrasive blast seal bore locations. | Refer TSD 594 OP.704 Para.6, using OMat 1/238. |
| 5) Combustion flame spray seal bores AD and AE with bond coat 0.003/0.005 (0,08/0,13) thick. | Refer Overhaul Manual Chapter 72-09-06 Repair and TSD 594 OP.704 using Nickel/Aluminium (80/20) wire (OMat 3/90) or Nickel/Aluminium (95/5) composite powder (OMat 3/188). Refer fig.403. |
| 6) Combustion flame spray an abradable coating 0.030 (0,76) minimum thickness over the bond coating. | Refer Overhaul Manual Chapter 72-09-06 Repair and TSD 594 OP.704 Appendix 1 Process 019/020 using Nickel/Graphite (75/25) powder (OMat 3/91). |
| 7) Identify the offset positions of the legs of the Labyrinth and locate to holding fixture and secure. Set true on a centre lathe to clocking register on fixture. | Refer Para.7. TOOLS, Item 1.
Refer fig.401. |
| 8) Finish turn abradable coated bore AD to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer figs.401 to 403. |
| 9) Finish turn to remove surplus spray from end face of bore AD and produce rear end chamfer to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer figs.401 to 403. |
| 10) Finish turn abradable coated bore AE to dimensions given. | Refer Para.7. TOOLS, Item 2.
Refer figs.401 to 403. |

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- 11) Finish turn to remove surplus spray from end faces of bore AE and produce chamfers to dimensions given. Refer Para.7. TOOLS, Item 2. Refer figs.401 to 403.
- 12) Remove from fixture. Visually and dimensionally inspect previous operations. Refer figs.401 to 403.
- 13) Remove all sharp edges and any surplus spray. Use standard hand tools.
- 14) Visually inspect to ensure passageways are clear through the six radial legs. Use clean, dry, compressed air if required. Refer fig.401.
- 15) Mark Repair Instruction number RI B514668 or R24 adjacent to normal 'assy of' number using the electro-chemical marking or vibro-percussion engraving techniques. Refer Overhaul Manual Chapter 72-09-00 Repair. Refer fig.401 for identity marking location.

5. MATERIAL

COMPONENT	MATERIAL	RR CODE
RING, ASSEMBLY OF, SEAL STATIC HOUSING	JETHETE MSRR 6503	EAK

6. DATA

NONE.

7. TOOLS

TOOL NUMBER	DESCRIPTION	ITEM
S3S 12354000	HOLDING FIXTURE	1
N/A	WIMET TIPPED TOOL	2

8. REPLACEMENT PARTS

PART NUMBER	DESCRIPTION	QUANTITY	ITEM
NONE.			

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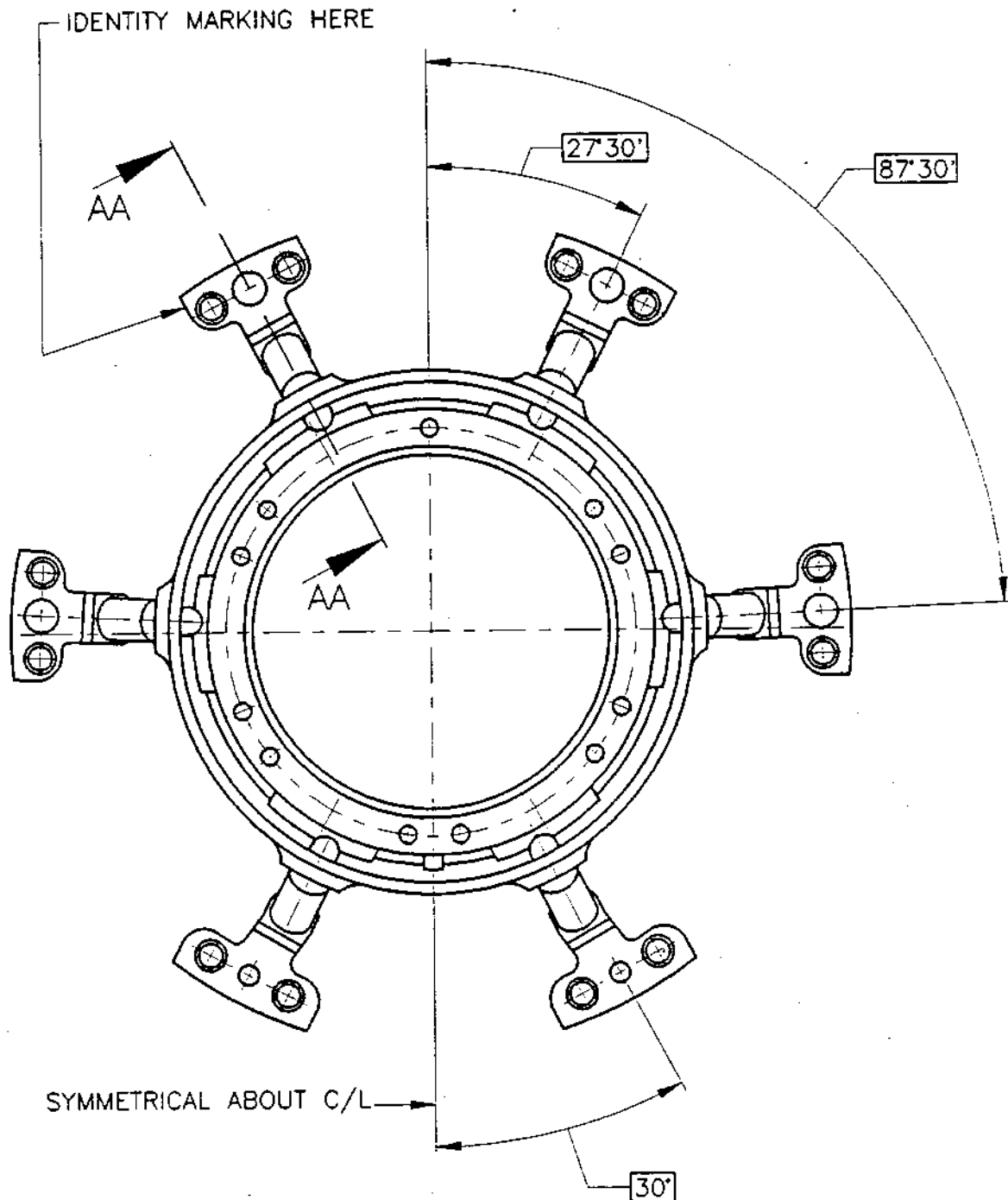
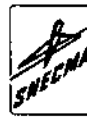
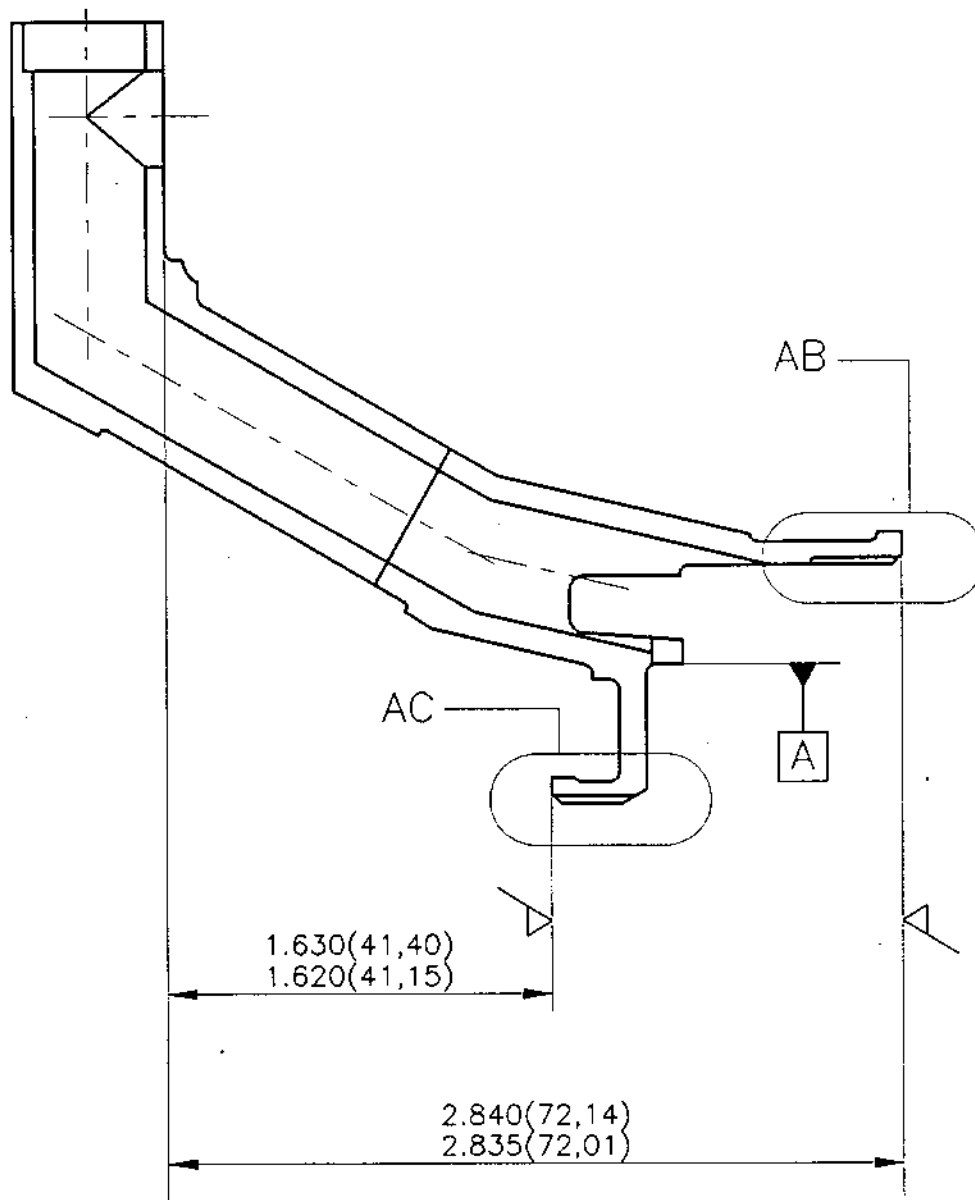


FIG.401

REPAIR
72-32-00
Repair No. 24
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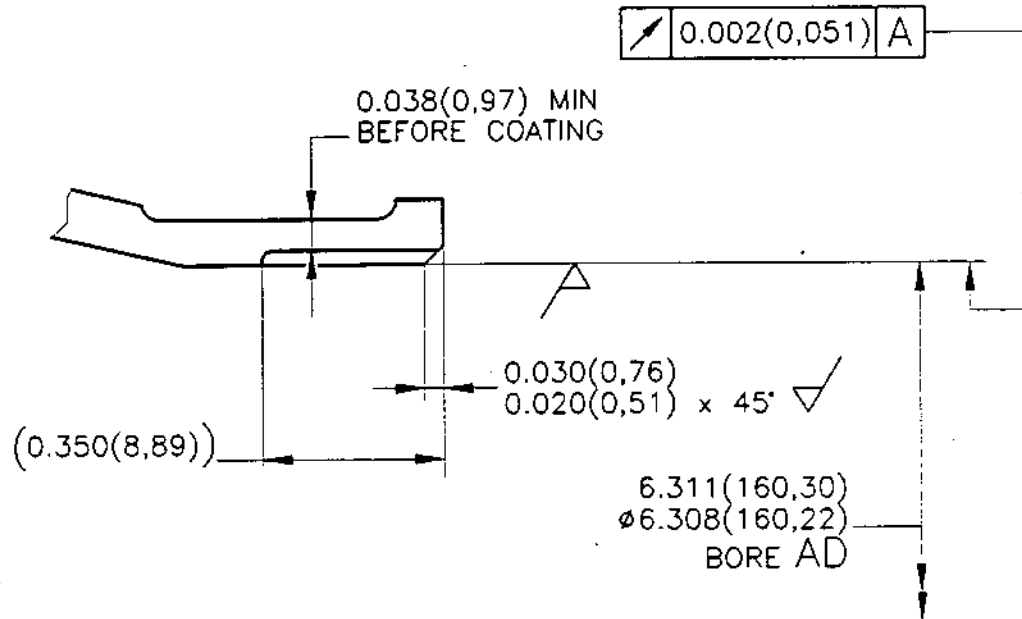
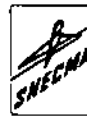
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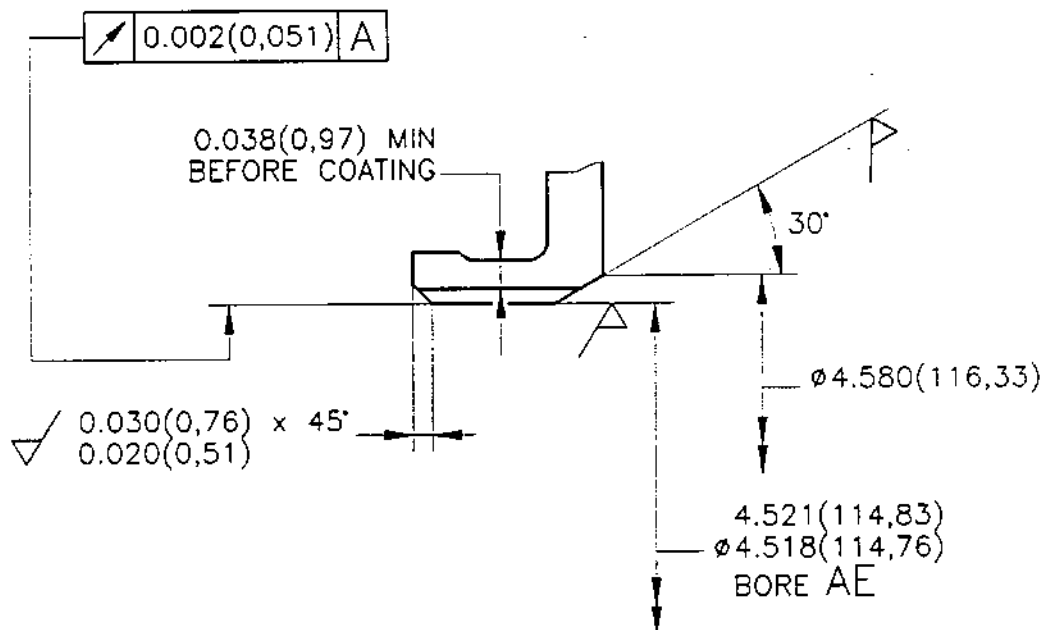
SECTION AA
FIG.402



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OVERHAUL



DETAIL AB

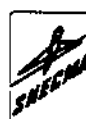


DETAIL AC
FIG.403

REPAIR
72-32-00
Repair No. 24
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OVERHAUL



BEARING, LP COMPRESSOR THRUST

REMOVAL OF COATING PICK-UP BY DRESSING

REPAIR NO. B514799

1. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-32-00	1 190A	FB218877
	190B	FB219733
	190C	FB219799

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

Temporary re-protection of components between operations should be carried out in accordance with TSD 594 OP 340.

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 20 (0,5) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- | | | |
|----|--|--|
| 1) | Dis-assemble bearing. | Refer Overhaul Manual
Chapter 72-32-00
Dis-Assembly. |
| 2) | Identify locations of coating pick-up to area AA. | Refer Fig.401. |
| 3) | Carefully hand dress outer track to remove coating pick-up. Ensure surface finish is maintained. | Refer Overhaul Manual
Chapter 72-09-22 Repair. |

REPAIR

72-32-00

Repair No. 25

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- 4) Clean. Refer Overhaul Manual Chapter 72-32-00 Cleaning.
- 5) Visually inspect and crack detect. Refer Overhaul Manual Chapter 72-32-00 Inspection/Check.
- 6) Re-assemble bearing. Refer Overhaul Manual Chapter 72-32-00 Sub-Assembly.
- 7) Mark Repair Instruction number RI B514799 or R25 adjacent to the normal 'assy of' number. Use the vibro-percussion engraving technique. Refer Overhaul Manual Chapter 72-09-00 Repair. Refer Fig.401 for identity marking location.
NOTE: Use 0.079(2,0) max. high characters. Ensure raised edges are removed (surface finish to be maintained).
- 8) Clean bearing assembly. Refer Overhaul Manual Chapter 72-32-00 Cleaning.

5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
BEARING, LP COMPRESSOR THRUST	BSEM 613 OR BSEM 832 OR MSRR 6015	---

6. DATA

NONE.

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE.		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			



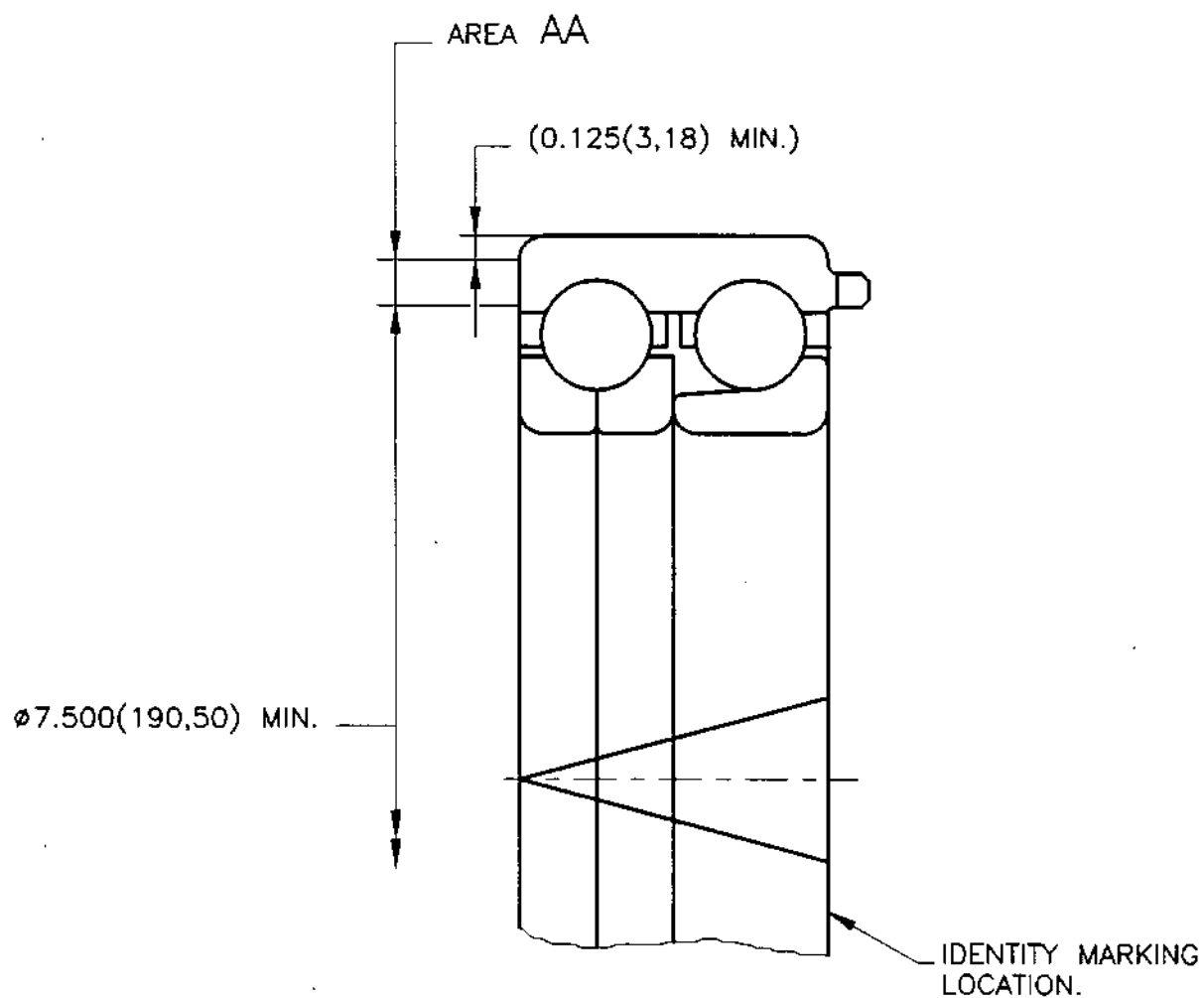
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BEARING, LP COMPRESSOR THRUST
FIG.401

REPAIR

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**OLYMPUS 593**

MK.610-14-28

OVERHAUL

CASE, ASSEMBLY, INTERMEDIATE, OUTERREMOVAL OF IMPACT DAMAGE BY BLENDINGREPAIR NO. B5147841. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-32-00	6 /100B	B928254
	6 /100C	B928256
		B928257
		B928258
		B928259
		B928264

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

Sharp bottomed indents greater than 0.010(0,25) in depth but less than 0.015(0,38) are acceptable for blending. Maximum final depth of depression after blending must not exceed 0.020(0,51). Refer fig.402.

Sharp bottomed indents occurring within the confines of Rokide Z coating should be blended in accordance with this instruction. Re-application of Rokide Z should be carried out in accordance with Overhaul Manual, Chapter 72-32-00, Repair No.18.

Repair of damage by blending is limited to vane aerofoil surfaces and adjacent inner case surface only. Blending must not encroach within 0.10(2,5) of vane or casing flange welds. Refer fig.401.

3. GENERALUNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

REPAIR

72-32-00

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OVERHAUL



4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- 1) Using hand tools only (no power tools permitted), carefully blend to remove all sharp bottomed impacts 0.010 to 0.015 (0,25 to 0,38) deep. Remove the minimum amount of material necessary. Maximum depth of blending 0.020 (0,51). Polish to restore surface finish.

Refer figs.401 and 402
Refer para.6. DATA.

CAUTION: If during metal removal, blending or polishing, the material exhibits discolouration due to local overheating, the component must be referred to the local controlling laboratory for assessment by etching and metallurgical examination.

- 2) Locally crack detect repaired areas.

Refer Overhaul Manual
Chapter 72-32-00
Inspection/Check

- 3) Mark Repair Instruction number RI B514784 or R26 adjacent to existing 'assy of' no. using the vibro-percussion engraving technique.

Refer Overhaul Manual
Chapter 72-09-00 Repair

5. MATERIAL

COMPONENT

MATERIAL

RR CODE

CASE, ASSEMBLY OF,
INTERMEDIATE, OUTER

TITANIUM
MSRR 8605

TBC

6. DATA

The definition of the term HAND TOOLS ONLY is deemed to imply that the following may be used:-

GUN - USHIO AIR TOOL COMPANY Ltd.

TYPE MSG-3BSN 65000 R.P.M (6 BAR AIR PRESSURE).

WHEEL - MASTER ABRASIVE

TYPE A120 HFX.

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NOTE: Load/pressure applied when using the above equipment should not be sufficiently great so as to produce smoking and/or an unpleasant odour from the adhesive agent in the abrasive wheel.

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE	--	--

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE	--	--	--

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REPAIR

72-32-00

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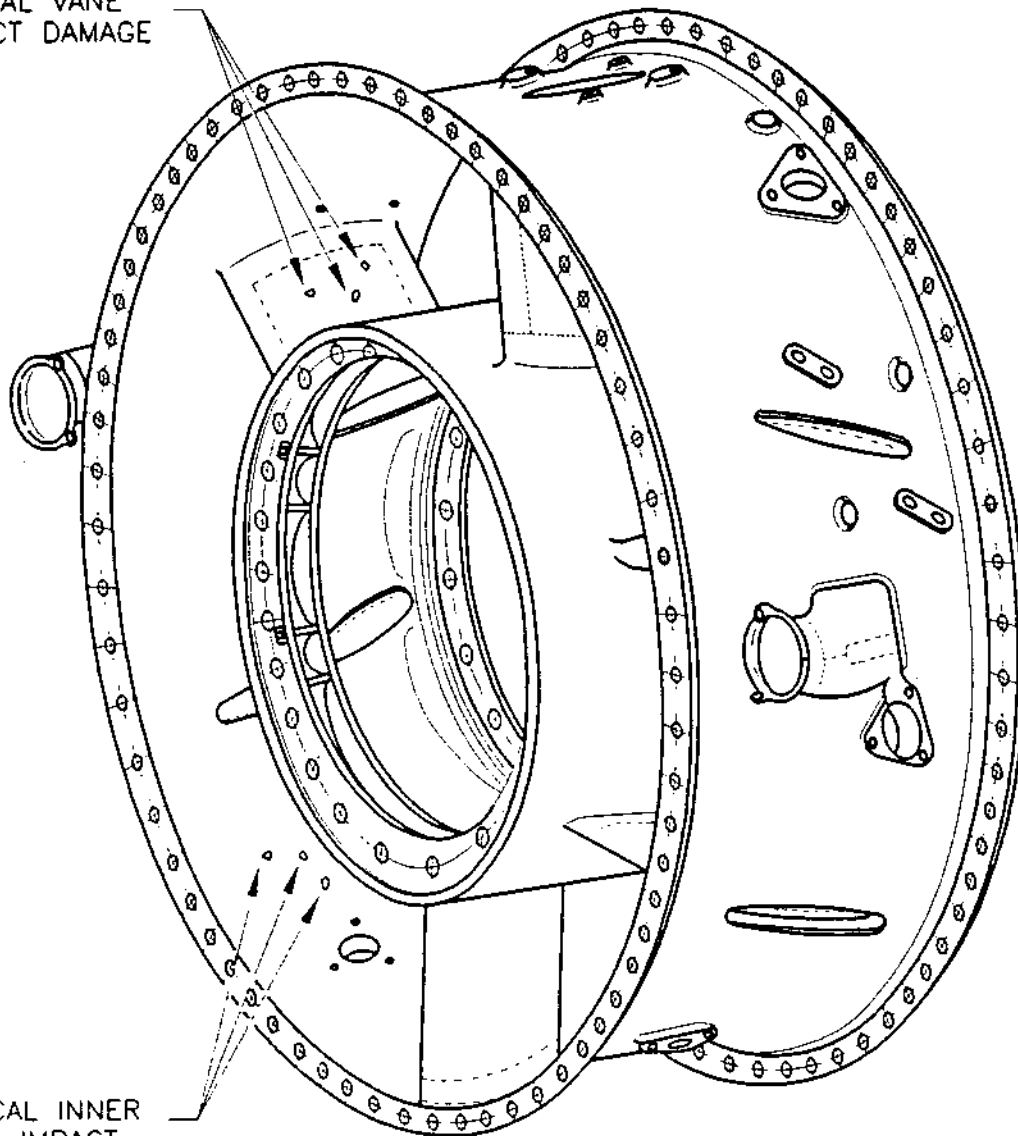
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TYPICAL VANE
IMPACT DAMAGE

TYPICAL INNER
CASE IMPACT
DAMAGE



GENERAL VIEW OF CASE, ASSEMBLY, INTERMEDIATE OUTER
FIG.401

REPAIR

72-32-00

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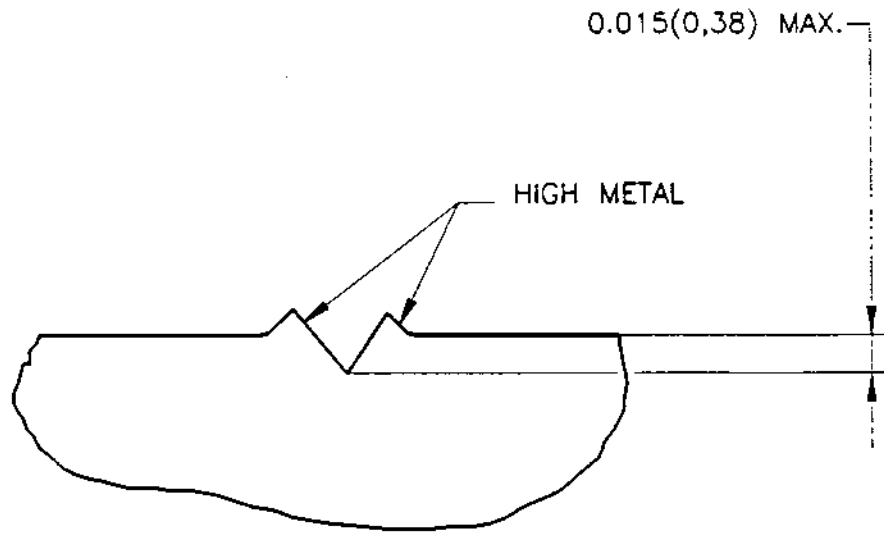
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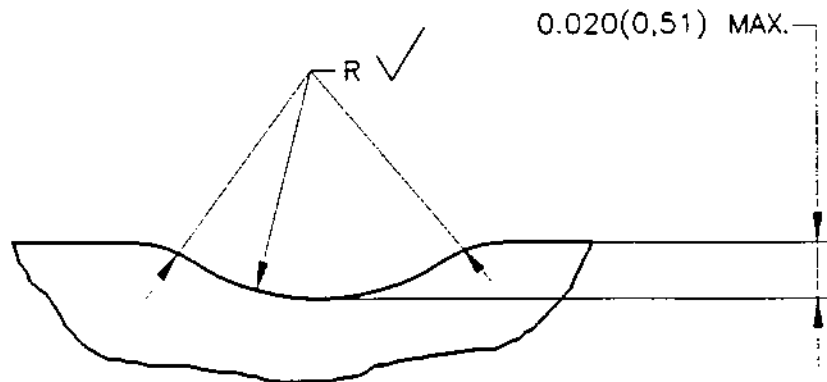
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TYPICAL SECTION THROUGH SHARP BOTTOMED IMPACT DAMAGE



TYPICAL SECTION THROUGH SHARP BOTTOMED IMPACT
DAMAGE AFTER BLENDING AND POLISHING.

BLENDING DETAIL
FIG 402

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Repair No. 26
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SNECMA

HOUSING, AND THRUST RING ASSEMBLY,
LP COMPRESSOR THRUST BEARING

RESTORATION OF WASHER, THRUST REAR ABUTMENT
FACE BY APPLICATION OF PLASMA SPRAYED COATING

REPAIR NO. B515007

1. EFFECTIVITY

IPC	Fig./Item	Part No.
72-32-00	1 /270	B468887 B923917 B923919 B926967

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

The Thrust Washer repaired by this instruction forms part of a matched set. For details of dis-assembly, cleaning, inspection and re-assembly, refer to the relevant section in the Overhaul Manual, Chapter 72-32-00.

This repair may be embodied any number of times provided that stated dimensions are maintained (refer fig.402, 403 and 405).

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.010 to 0.020 (0,25 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 63 (1,6) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- 1) Visually inspect for previous embodiment of this Repair Instruction.

Refer fig.405 for identity location.

REPAIR

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Note: For first repair to Pre-Mod. SB.0L.593-72-28 assemblies proceed to operation 4.

- | | | |
|--|---|---|
| 2) | Mask off all areas except face AC and strip existing plasma sprayed coating. | Refer Overhaul Manual
Chapter 72-09-25
Process D or F.
Refer fig.401 and 402. |
| 3) | Locally etch face AC to ensure coating has been completely removed. | Refer Overhaul Manual
Chapter 72-09-14 Repair
Solution E.
Refer fig.401 and 402. |
| <p>NB. Operations 4 to 6 are applicable to first Repair of Pre-Mod. SB.0L.593-72-28 assemblies only.</p> | | |
| 4) | Set Thrust Washer true to datum A. | Refer fig.401 and 402. |
| 5) | Machine grind defective rear abutment face AC to remove fretting. Remove 0.004(0,10) minimum material to ensure that a coating minimum thickness of 0.003(0,08) will be achieved. Maintain minimum section at dimension AD. | Refer fig.401 and 402. |
| 6) | Heat treat at 1500 ± 50 C for 1 hour in air or oil. Air cool. | |
| 7) | Dimensionally inspect repair area. Record actual Thrust washer thickness AD. | Refer fig.402. |
| 8) | Locally crack detect repair area. | Refer Overhaul Manual
Chapter 72-32-00
Inspection/Check |
| 9) | Dimensionally inspect mating housing drop dimension AE and record. | Refer fig.404. |
| 10) | Assemble Thrust Washer to mating housing. | Refer Repair Limitations. |
| 11) | Dimensionally inspect drop dimension AF and record. | Refer fig.404. |

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- 12) Dis-assemble Thrust Washer from Housing. Refer Repair Limitations.
- 13) Using the dimensions previously recorded, calculate the required Thrust Washer thickness AD to achieve a final drop dimension AF of 2.371/2.372 (60,22/60,25). Record required dimension.
- Note: Dimension AD may require further adjustment by machine grinding face AG to achieve engine build tolerances (No.2 main bearing in position). This operation is performed at the Engine Sub-Assembly stage. Refer Overhaul Manual Chapter 72-32-00 Sub-Assembly Refer fig.405.
- 14) Plasma spray face AC. Refer TSD 594 OP.704 Process 026 using OMat 3/114. Refer fig.401 and 402.
- 15) Set Thrust Washer true to datum A. Refer fig.401 and 402.
- 16) Machine grind repair area to achieve the finished Thrust Washer thickness AD calculated and recorded at operation 13. Refer TSD 594 OP.704. Refer fig.401 and 405.
- 17) Remove overspray from sides of 4 off slots and outer edge of holes in face AC (as required). Refer fig.401 to 403.
- 18) Visually inspect repair area. Refer TSD594 OP.704.
- 19) Locally crack detect repair area. Refer Overhaul Manual Chapter 72-32-00 Inspection/Check
- 20) Dimensionally inspect. Refer fig.401, 403 and 405.
- 21) Mark Repair Instruction number RI B515007 or R27 and coating identity symbol adjacent to the component part number using the vibro-percussion engraving technique. Refer Overhaul Manual Chapter 72-09-00 Repair Refer fig.405 for identity marking location.

Coating identity symbol

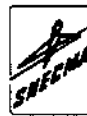




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5. MATERIAL

COMPONENT	MATERIAL	RR CODE
WASHER, THRUST	C.M.S. S106	---

6. DATA

NONE.

7. TOOLS

TOOL NUMBER	DESCRIPTION	ITEM
NONE.		

8. REPLACEMENT PARTS

PART NUMBER	DESCRIPTION	QUANTITY	ITEM
NONE.			



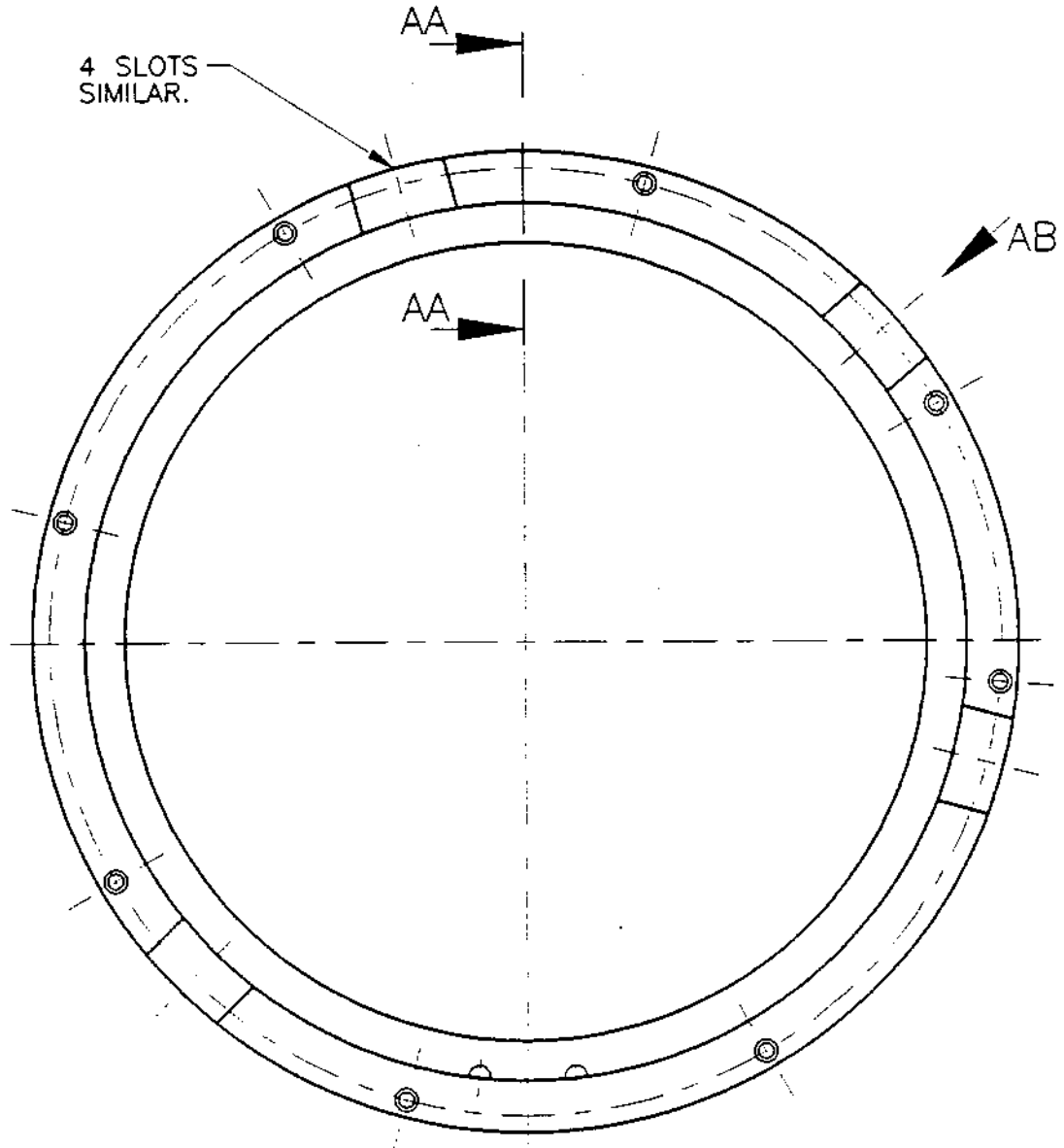
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TYPICAL VIEW ON WASHER, THRUST - REAR ABUTMENT FACE
FIG.401

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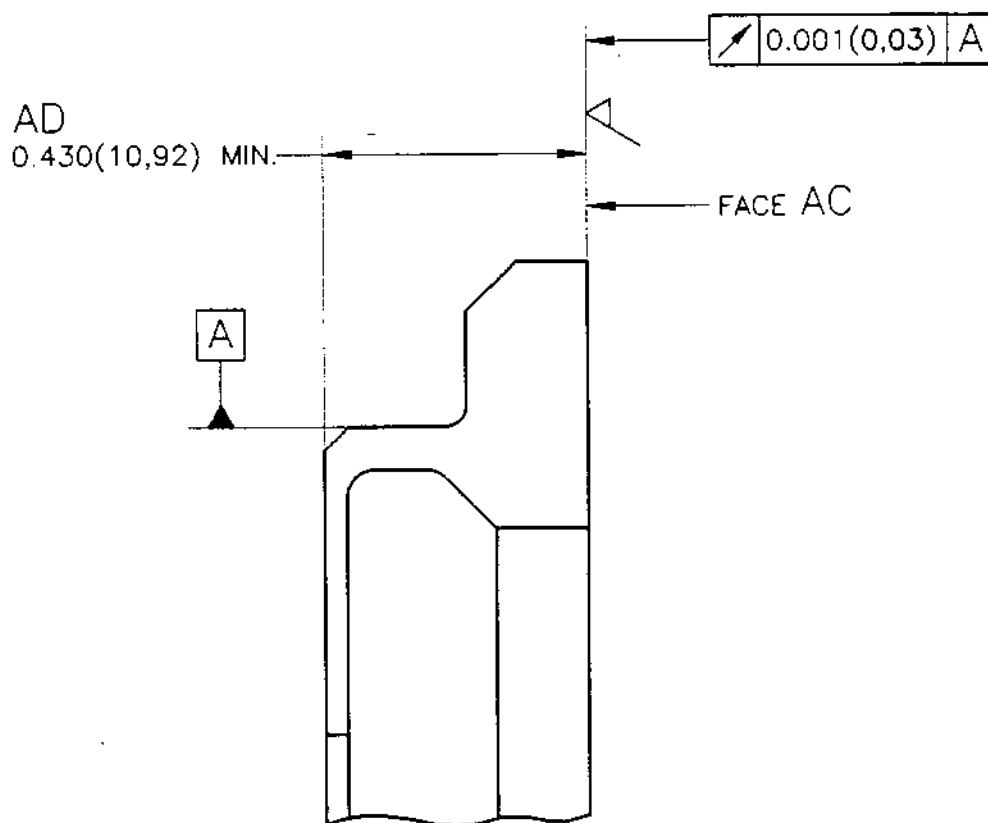
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SECTION AA
PRE-MACHINING DIMENSIONS
FIG.402

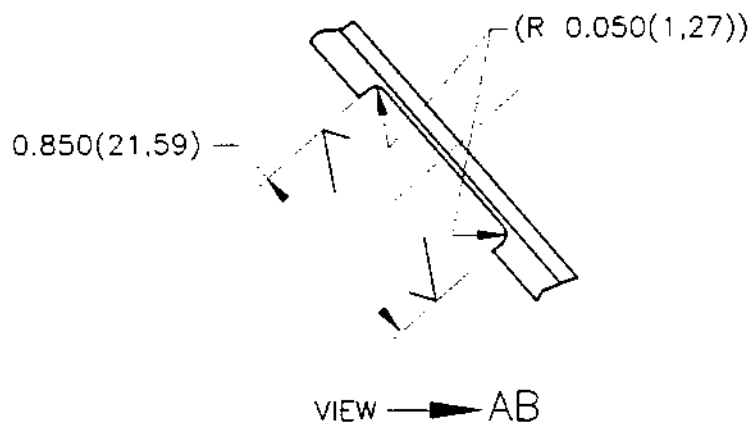


FIG.403

REPAIR

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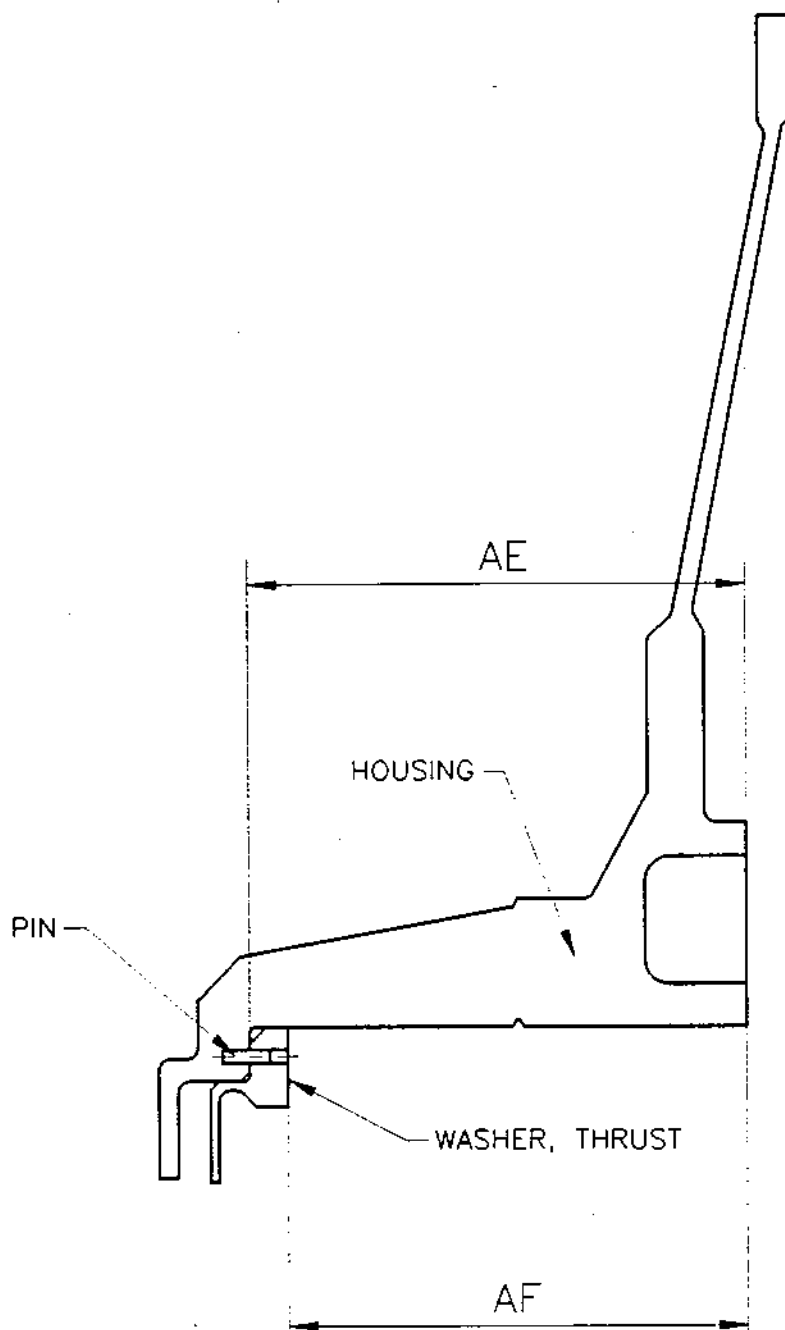


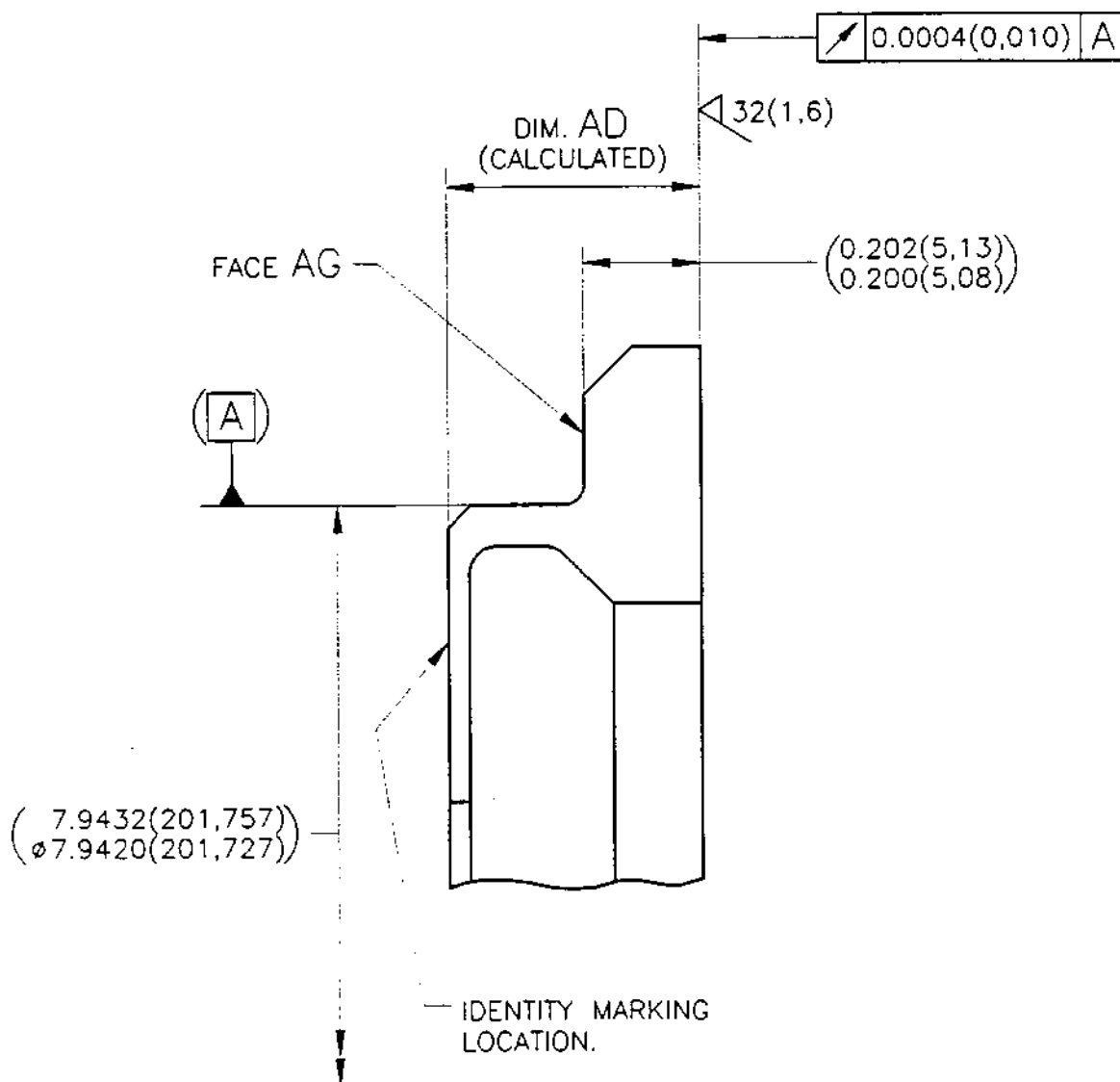
FIG. 404



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REPEAT SECTION AA

FINISH MACHINING DIMENSIONS
FIG.405

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**OLYMPUS 593**MK.610-14-28
OVERHAUL

TUBE ASSEMBLY, VENT
REPAIR OF DAMAGED AND/OR FRETTED AREAS

REPAIR B.4974681. EFFECTIVITY

<u>IPC</u>	<u>FIG/ITEM</u>	<u>PART NO.</u>
72-32-00	4/440A	B474926

2. REPAIR LIMITATIONS

Refer to Overhaul Manual 72-09-30 Repair.

3. GENERAL

Refer to Overhaul Manual 72-09-30 Repair.

4. REPAIR PROCEDUREREPAIR PROCEDURESUPPLEMENTARY INFORMATION

(1) Repair

Refer to Overhaul Manual
72-09-30 Repair(2) Mark SAL B497468 or R28
adjacent normal assy.
number using the electro-
chemical marking technique.Refer to Overhaul Manual
72-09-00 Repair5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
B474926	T55	-

6. DATAPRESSURE TEST REQUIREMENTS:

<u>PART NUMBER</u>	<u>STANDARD PRESSURE TEST REQUIREMENT</u>	<u>COMMON PRESSURE TEST REQUIREMENT</u>
B474926	110 PSI FOR 15 SECONDS	USE 240 PSI FOR 15 SECONDS

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7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
B427739	FERRULE	A/R	1
B474927	FERRULE	A/R	2
AS16450	RIVET	A/R	3
1206274	ANCHOR NUT	A/R	4
B445307	TUBE JOINT	A/R	5

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Repair No.	Title	Scheme No.
1	Stage 1 and Stage 2 Stator Vane Inner Fixing Ring Assemblies Repaired by Fitting Replacement Labyrinth Ring	SAL.B.488616-7
2	Blending and Polishing Damaged Stator Vanes with Control on Number of Blended Vanes per Stage	SAL.B.930289-96
3	Stage 1 and 2 Stator Vane Inner Abutment Faces with Flame Plating	SAL.B.935540-1
4	Stage 1 and 2 Stator Vane Inner Abutment Faces with Flame Plating	SAL.B.510617-8
5	Case, Assembly of, Compressor, HP, Front. Repair of impact damage by blending and/or welding	SAL.B.514749-50
6	Case, Compressor HP, Rear. Replacement of damaged Rokide coating.	SAL.B.499477
7	Case, Compressor, HP, Rear. Cracked rear flange bolt hole locations repaired by welding.	SAL.B.516914

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HP COMPRESSOR CASE AND VANES - REPAIR
STAGE 1 AND STAGE 2 STATOR VANE INNER FIXING RING ASSEMBLIES
REPAIRED BY FITTING REPLACEMENT LABYRINTH RING

Applicable to:

Ring Assemblies: Stage 1 B.922544
B.922960
Stage 2 B.922546
B.922961

Authority:

Modification No. OL.8384C

1. Introduction

- A. This Repair describes the procedure for fitting a standard replacement labyrinth ring to the stage 1 and stage 2 stator vane inner fixing ring assemblies in order to maintain the standard labyrinth ring/fin clearances.
- B. Refer to Chapter 72-09-00, Repair for all standard practices and tolerancing applicable to this repair procedure.
- C. Dimensions are shown thus on illustrations and in Table 401: INCHES (MILLIMETRES).

2. Summary of Operations

A. Remove the Defective Labyrinth Ring.

- (1) Remove the nuts, bolts and retaining plates from the assembly; retain these items for the reassembly procedure.
- (2) Carefully remove the defective labyrinth ring; use the extractor (item 1). Discard the labyrinth ring.
- (3) Inspect the bore B of the stator fixing ring against the appropriate dimensions (Ref.Fig.401 and Table 401).
- (4) Crack test the stator fixing ring by the fluorescent-penetrant process specified for this component in 72-33-01, Inspection/Check.

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B. Fit Replacement Labyrinth Ring.

NOTE: Use the correct location tool (Ref. paragraph 3, A and B).

- (1) Select the correct labyrinth ring for the stage 1 or stage 2 stator fixing ring assembly (Ref. Table 401).
- (2) Locate the relevant stage 1 or 2 stator fixing ring assembly to its corresponding location tool.

NOTE: Exercise care when fitting stage 2 stator fixing ring assembly as one group of the dowel holes are pitched closer together than the other 3 groups.

- (3) Heat the stator fixing ring to 170 deg C (plus/minus 10 deg C).
- (4) Assemble the new labyrinth ring to the stator fixing ring.

NOTE: Maintain the setting dimension C (Ref.Fig.401 and Table 401).

- (5) Allow the assembly to cool.
- (6) Fit the retaining plates, nuts and bolts. The correct procedure, including torque-loading, is described in 72-33-01, Sub-Assembly.
- (7) Inspect the assembly for correct fitting of the labyrinth ring.

C. Identify repair (Ref. Table 401). Mark the appropriate repair scheme number close to the standard number on the assembly.

STAGE	REPAIR SCHEME NO.	DIAMETER B (REF.FIG.401)	ASSEMBLE WITH LABY- RINTH RING	DIMENSION C (REF.FIG.401)
1	SAL B.488616	17.667 (448,742) 17.665 (448,691)	B.429484	0.249 (6,325) 0.248 (6,299)
2	SAL B.488617	19.072 (484,429) 19.070 (484,378)	B.429490	0.279 (7,087) 0.278 (7,061)

Table 401

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3. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Extractor	1	S3S12985000	1
Location Tool	1	S3S12986000	2
Location Tool	1	S3S12987000	3

A. SAL B.488616. Use item 3.

B. SAL B.488617. Use item 2.

4. Replacement Parts

<u>Description</u>	<u>Quantity</u>	<u>Part No.</u>
Labyrinth Ring	1 per assy	B.429484
Labyrinth Ring	1 per assy	B.429490

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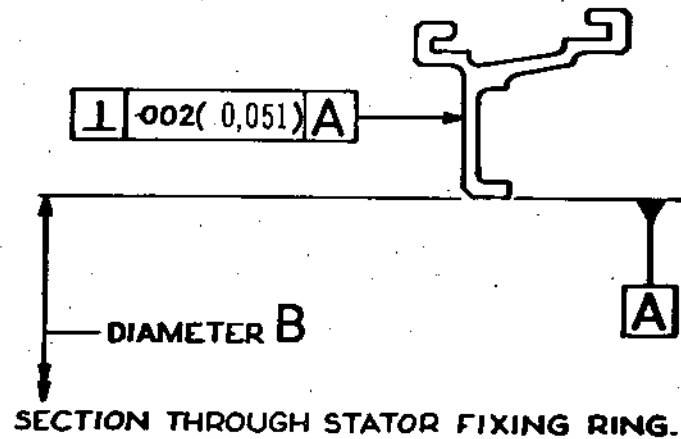
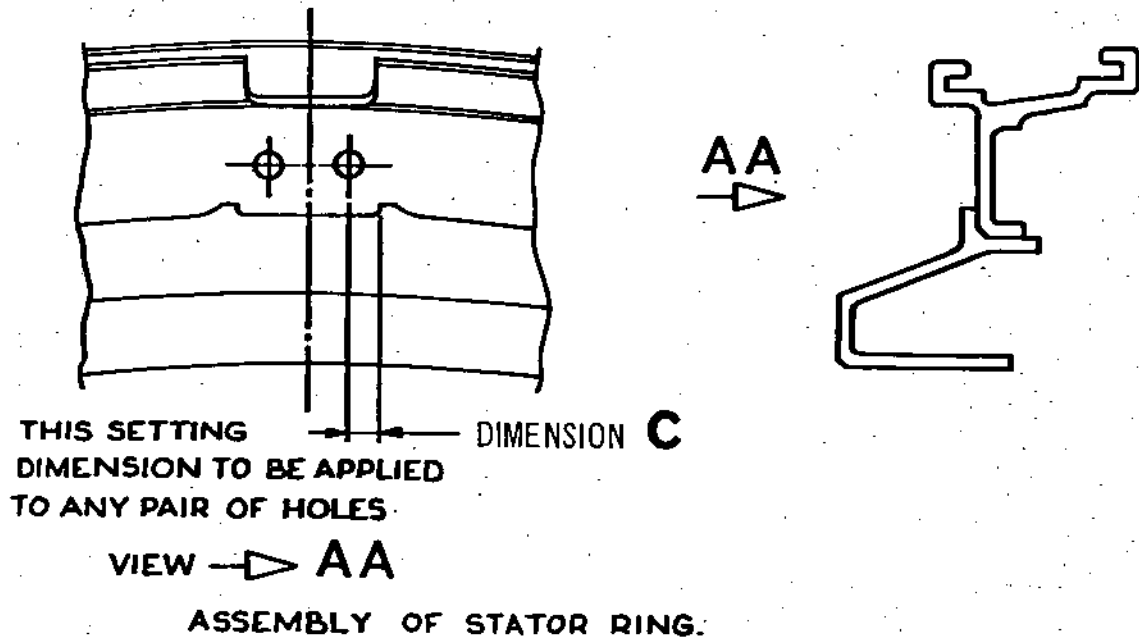
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Stator Vane Inner Fixing Ring/Labyrinth Ring Assembly
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HP COMPRESSOR CASE AND VANES - REPAIR
BLENDING AND POLISHING DAMAGED STATOR
VANES WITH CONTROL ON NUMBER OF
BLENDED VANES PER STAGE

(SCHEME NO. B.930289 - 96 APPLICABLE TO ALL STAGES)

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Stage</u>	<u>Part numbers up to and including Mod. No.</u>
72-33-01	01 250, 260, 270, 280	1	OL.8031
	01 460, 470, 480, 490	2	OL.8031
	02 80, 90, 100	3	OL.8031
	02 170, 180, 190	4	OL.8031
	02 220, 230, 240	5	OL.8031
	03 30, 40, 50	6	OL.8031
	03 110, 120, 130 (E.G.V.)		OL.8031

2. Authority

Modification No. OL.8462C

3. Introduction

A. The text and Fig.401 of this Repair defines the blending procedure (SAL B.930289) applicable to all HP compressor stator vanes and must be read in conjunction with the specific data for each stage of vanes given on Fig.402 to 404.

B. Refer to 72-09-00 Repair for all standard practices applicable to this repair procedure.

C. Dimensions are shown thus: INCHES (MILLIMETRES).

NOTE: Blended vanes must be reassembled, spaced evenly around the stage.

4. Instructions

A. General.

- (1) Test vanes for cracks, before and after blending, by the fluorescent dye process specified for the vanes in 72-33-01 Inspection/Check; reject cracked vanes.

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- (2) Vanes with dents which deform the opposite surface of the vane are not acceptable for blending; reject vanes with this form of damage.
- (3) A blend in one zone can run out into the adjacent zone even if it infringes the blend limit for that zone, except at zone X.

B. Procedure.

- (1) Crack test vanes to determine full extent of damage. Refer to the fluorescent dye process specified for the vanes in 72-33-01 Inspection/Check.
- (2) Dress to remove damage.

CAUTION: IF MECHANICAL BLENDING METHODS ARE USED, ENSURE THAT VANES ARE NOT OVERHEATED.

- (a) Polish acceptable surface dents (Ref. para.4.(2)) to remove burrs.
- (b) Blend torn, rough or scored edges to a depth 20 per cent greater than the depth of damage, provided that specified limits are not exceeded.
- (c) If adjacent blends interfere, remove material from between them to produce a coupled blend.
- (d) Profile edge blends smoothly into the aerofoil shape (Ref.Fig.401).
- (e) Polish blends and defective areas.
- (f) Remove only the minimum amount of material consistent with specified requirements and dimensions.
- (g) In zone X, blending is permitted only as defined in (i) and (ii).
 - (i) Blend light nicking of the edges.
 - (ii) Polish out light surface scratches.
- (h) For opposing blends the chordal width must not be reduced by more than the maximum permissible blend depth.

TN6620

British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

TEMPORARY REVISION No. 72-517

Insert in 72-33-01 Repair 2 before Page 403

REASON FOR ISSUE:

To discontinue on British Airways engines only, the post dressing procedures on H.P. Compressor stator vanes stages 1, 2, 3, 4, 5 and 6 as quoted in the Rolls-Royce repair procedure No.2. (MRA73).

ACTION

Delete paragraphs B(5) Etch the vanes B(7) Vapour blasting and passivation. This deletion does not apply to the E.G.V. stage of vanes.

NOTE: Only applicable to British Airways engines.



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SEE TR

- (j) Blending and polishing marks must be only in a radial direction, from root to tip.
- (k) Blend and polish to a surface finish of 32 MICROINCHES (0,8 MICROMETRES).
- (3) Clean vanes by the process specified for the vanes in 72-33-01 Cleaning.
- (4) Vapour degrease the vanes.
- CAUTION: OBSERVE THE RESTRICTION ON THE PERIOD OF IMMERSION FOR TITANIUM COMPONENTS (REF. 72-09-00 CLEANING) FOR STAGE 1 AND 2 VANES.
- (5) Etch the vanes (Ref.72-09-14 Repair).
- (a) Use Solution A for stage 1 and 2 vanes.
- (b) Use Solution B for stage 3, 4, 5, 6 and exit guide vanes.
- (c) Mask the vane roots and other areas not to be etched, with I.C.I., Stopping-off Red Lacquer F230-2006.
- (d) Etch the vanes for the minimum time required to achieve the desired surface for inspection, up to a maximum period of 20 seconds after the onset of gassing.
- (e) Remove the masking lacquer from vanes by swabbing with trichloroethane to the approved specification (Ref.72-09-00 Cleaning).
- (6) Repeat the test for cracks.
- (7) Vapour blast all the blended vanes and passivate only stages 3, 4, 5, 6 and exit guide vanes (Ref.72-09-13 Repair).
- (a) Apply masking tape to the vane roots and other areas which are not to be blasted.
- (b) Vapour blast to the Parameters for Procedure A and Special Details for Blades and Vanes specified in the vapour blasting procedure.
- (c) Remove masking tape from the vanes.

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- (d) Passivate stage 3, 4, 5, 6 and exit guide vanes for a minimum period of two hours.

5. Assessment of Amount of Blending per Vane (All Stages)

- A. Vanes may be blended in several positions provided that the total extent of blending is not more than the equivalent of two blends to the maximum in zone Z.
- B. Depth of blending is controlled by zones.
- C. The maximum permissible number of blended vanes per stage, when blended to maximum limits, is identified as L on the illustrations.
- D. Where vanes are not blended to the permissible maximum, this number (Ref. para. (C)) may be increased, provided that the aggregate of the blending does not exceed L.
- E. Permissible blending is controlled by depths e.g. stage 1 vane.
- (1) 0.120 in. (3,05 mm) depth x two blends = 0.240 in. (6,10 mm) total = maximum blended vane.
- (2) This maximum may be obtained as defined in (a), (b) or (c), or by any combination of depths the total of which does not exceed 0.240 in. (6,10 mm).
- (a) 0.060 in. (1,52 mm) depth x four blends.
- (b) 0.040 in. (0,102 mm) depth x six blends.
- (c) 0.030 in. (0,76 mm) depth x eight blends.
- F. One coupled blend = two blends.
- G. Corner radius blend = half blend (depth assessed as $\text{RADIUS} \div 2$).

6. Assessment of Blending Equivalent of L Number of Blended Vanes per Stage

- A. Example for stage 1 vane.
- (1) L = seven vanes x 0.240 in. (6,10 mm) = 1.680 in. (42,68 mm) aggregate depth.

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(2) This aggregate may be obtained as defined in (a) or (b), or any aggregate of blended vanes which does not exceed 1.680 in. (42,68 mm).

(a) 0.168 in. (4,27 mm) depth x ten vanes.

(b) 0.112 in. (2,84 mm) depth x fifteen vanes.

7. Identify Repair (Ref. Table 401)

A. Mark the repair scheme number, appropriate to the stage of vanes, close to the standard part number on the vanes (Ref.72-09-00 Repair).

NOTE: Do not mark the number of this scheme SAL B.930289 on the vanes.

HP STATOR STAGE	REPAIR SCHEME NUMBER
1	SAL B.930290
2	SAL B.930291
3	SAL B.930292
4	SAL B.930293
5	SAL B.930294
6	SAL B.930295
(E.G.V.)	SAL B.930296

Table 401

8. Special Tools, Fixtures and Equipment

A. Not Required.

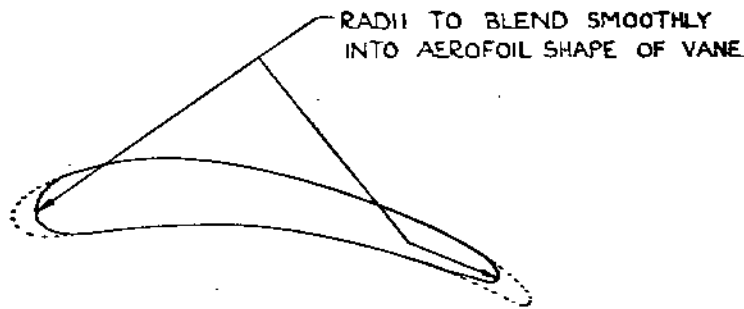
9. Replacement Parts

A. Not Required.



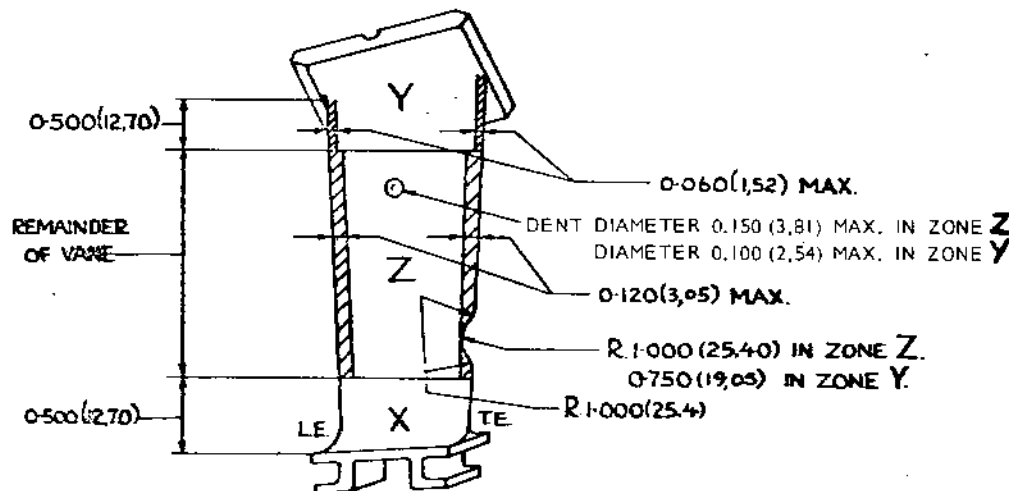
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DEFECTS IN ZONE Y (STAGES 1 AND 2) ADJACENT TO VANE PLATFORM MUST BLEND SMOOTHLY INTO FILLET RADIUS.

Figure 401



THIS SCHEME MUST BE READ IN CONJUNCTION WITH SAL B.930289 (REF.PARA.3.A.).

L - MAXIMUM NUMBER OF VANES BLENDED TO
MAXIMUM = 7 FOR STAGE 1.
8 FOR STAGE 2.

AT LEAST 0.100 (2,54) MUST EXIT BETWEEN ADJACENT DENTS.

LIGHT EDGE NICKING IN ZONE X TO BE BLENDED PROVIDED THE DEPTH OF BLEND DOES NOT EXCEED 0.010 (0,25) MAX.

BLEND RADII TO BE AS FOR ZONE Z.

MARK APPROPRIATE SCHEME NUMBER CLOSE TO STANDARD PART
NUMBER: STAGE 1 SAL B.930290
STAGE 2 SAL B.930291

Stage 1 and 2 HP Compressor Vanes - Blending Data
Figure 402

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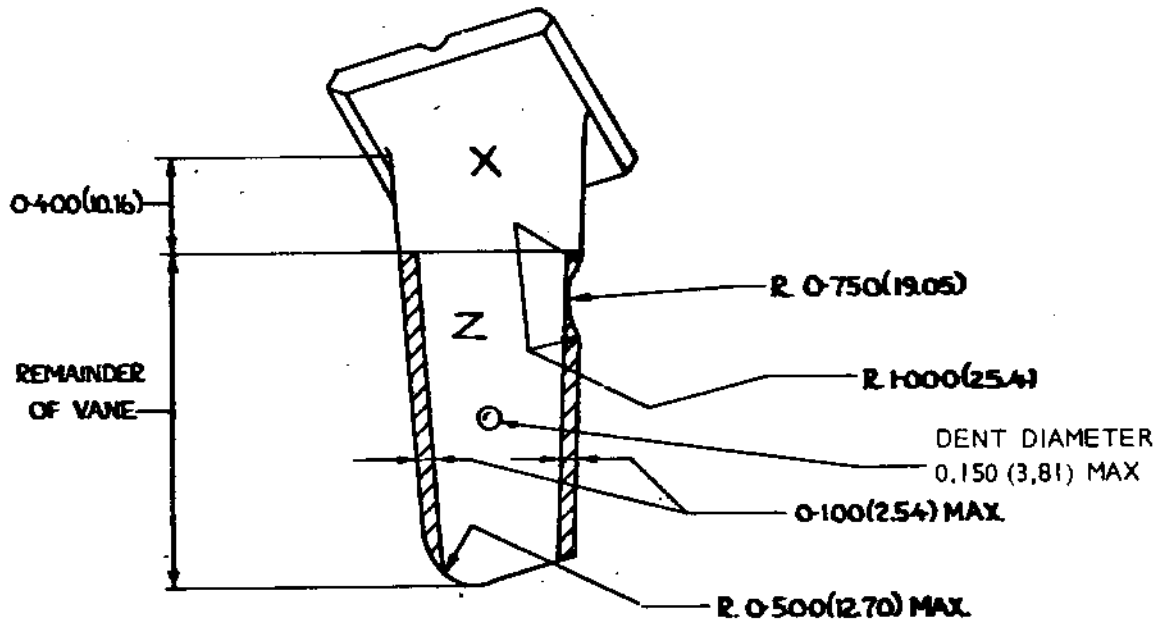
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THIS SCHEME MUST BE READ IN CONJUNCTION WITH
SAL. B.930289 (REF. PARA.3, A).

L - MAXIMUM NUMBER OF VANES BLENDED TO MAXIMUM =
8 FOR STAGE 3
7 FOR STAGE 4

AT LEAST 0.100 (2,54) MUST EXIST BETWEEN ADJACENT DENTS.

LIGHT EDGE NICKING IN ZONE X TO BE BLENDED PROVIDED
THE DEPTH OF BLEND DOES NOT EXCEED 0.010 (0,25) MAX.

BLEND RADII TO BE AS FOR ZONE Z.

MARK APPROPRIATE SCHEME NUMBER CLOSE TO STANDARD PART
NUMBER:

STAGE 3	SAL.B.930292
STAGE 4	SAL B.930293

Stage 3 and 4 HP Compressor Vanes - Blending Data
Figure 403

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ENGINE OVERHAUL MANUAL

TEMPORARY REVISION No.72-501

Insert in chapter 72-33-01 REPAIR Adjacent page 408

REASON FOR ISSUE:

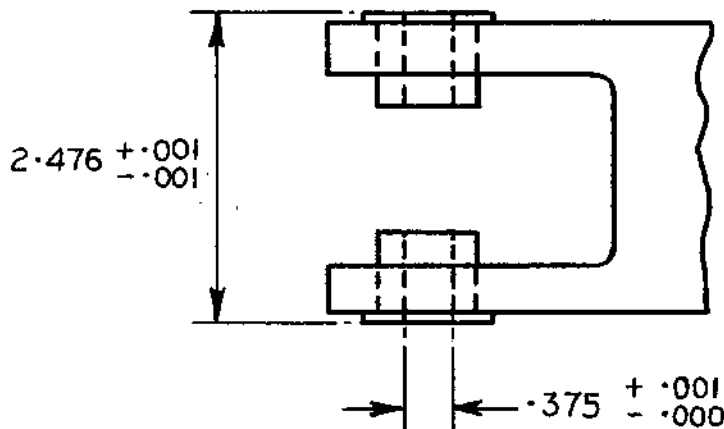
Engine Air Starter Duct Bracket worn bushes - Repair Scheme added (EI.321-20).

REPAIR

Add the following topic:-

Engine Air Starter Duct Bracket P/No. B484866 - worn bushes

1. Obtain new flanged bush P/No. B484865 (PM.1)
2. Remove U/S bushes
3. Shrink fit new bushes in position
4. Line ream internal diameter of bushes to $0.375 \begin{smallmatrix} +.001 \\ -.000 \end{smallmatrix}$ inches
5. Machine flange of bush so that distance between flanges is $2.476 \begin{smallmatrix} +.001 \\ -.001 \end{smallmatrix}$ inches.



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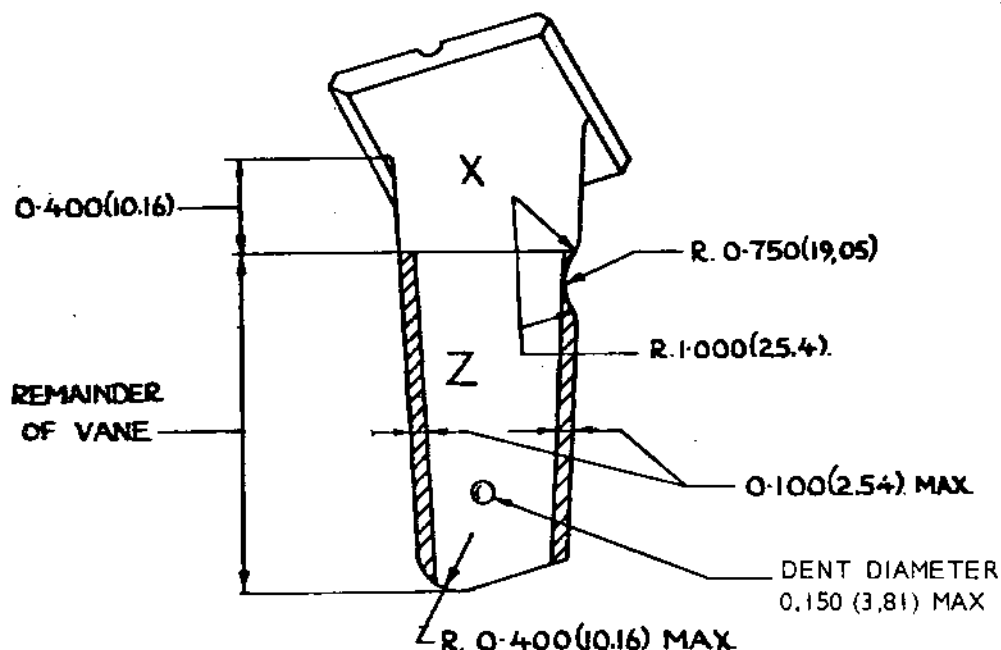
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THIS SCHEME MUST BE READ IN CONJUNCTION WITH
SAL. B.930289 (REF. PARA.3, A).

L - MAXIMUM NUMBER OF VANES BLENDED TO MAXIMUM =
10 FOR STAGES 5 AND 6
14 FOR E.G.V.

AT LEAST 0.100 (2,54) MUST EXIST BETWEEN ADJACENT DENTS.

LIGHT EDGE NICKING IN ZONE X TO BE BLENDED PROVIDED
THE DEPTH OF BLEND DOES NOT EXCEED 0.010 (0,25) MAX.

BLEND RADII TO BE AS FOR ZONE Z.

MARK APPROPRIATE SCHEME NUMBER CLOSE TO STANDARD PART
NUMBER:

STAGE 5	SAL B.930294
STAGE 6	SAL B.930295
E.G.V.	SAL B.930296

Stages 5, 6 and E.G.V. HP Compressor Vanes - Blending Data
Figure 404

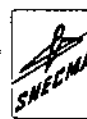
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HP COMPRESSOR VANES STAGES 1 AND 2
RESTORATION OF INNER ABUTMENT FACES BY THE
APPLICATION OF DETONATION FLAME DEPOSITION

MODIFICATION NO. OL.8823C1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>	
72-33-01		Stage 1	
	1/250B	B.918715,	B.918719
	250C	B.930546	
	260A	B.918380,	B.918384
	260B	B.918713,	B.918717
	260C	B.930542	
	270B	B.918714,	B.918718
	270C	B.930544	
	280B	B.918716,	B.918720
	280C	B.930548	
		Stage 2	
	1/460B	B.918722,	B.918726
	460C	B.930552	
	470A	B.918388,	B.918392
	470B	B.918721,	B.918725
	470C	B.930550	
	480B	B.918724,	B.918728
	480C	B.930554	
	490B	B.918723,	B.918727
	490C	B.930556	

2. Introduction

A. General

- (1) This repair describes the procedure to restore the inner abutment faces by removing the existing flame plating, machining back the abutment faces, and applying a thicker coating.
- (2) Dimensions are shown thus, INCHES (MILLIMETRES), in tables and illustrations.
- (3) Refer to Chapter 72-09-00, Repair, for all standard practices applicable to this repair.
- (4) Remove sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.

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- (5) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (6) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (7) Surface texture is to be 125 micro-inches (3,2 micrometres).
- (8) All tools referred to by item number in procedural steps are detailed in para.4.
- (9) Protect the component against corrosion after each operation, and place in a container for protection against damage during transit between operations.

3. Instructions

A. Remove Flame Deposition Coating

- (1) Remove the flame deposition coating from the inner abutment faces (Ref.Fig.401), following the procedure detailed in 72-09-25, Repair, using process F.
- (2) Inspect the inner abutment faces to ensure complete removal of flame deposition coating.

B. Inspect

- (1) Inspect to determine the amount of metal to be removed to produce dimension AF (Ref.Fig.403).

NOTE: Inspection fixtures Ref. tool items 1 and 2 may be used for this inspection. They were designed for use with SB.0L.593-72-8453-252, in which 0.002/0.001 in. (0,025/0,051 mm) is removed. In this repair, up to 0.009 in. (0,23 mm) is removed (measured from the original unplated abutment face), therefore allowance must be made for this when using the AFTER MACHINING gauge readings stamped on the fixture. Note that the concave side is 0.002 in. (0,051 mm) higher than the convex side.

C. Grind Inner Abutment Face (Convex Side)

- (1) Locate the vane to its relevant fixture (Ref.Table 401 and Fig.402).

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VANE STAGE	FIXTURE
1	Tool item 3
2	Tool item 4

Grinding Fixtures - Vane Convex Side
Table 401

- (2) Locate the vane/fixture assy. to a grinding machine and grind the inner abutment face, convex side, to remove the required amount of metal from face AC (Ref.Fig.403) to produce dimension AF.
- (3) Remove the vane/fixture assy. from the machine, and the vane from the fixture.
- (4) Remove all burrs produced during grinding of inner abutment face.
- (5) Inspect the vanes for the satisfactory completion of the grinding operation.

D. Grind Inner Abutment Face (Concave Side)

- (1) Locate the vane to its relevant fixture (Ref.Table 402 and Fig.402).

VANE STAGE	FIXTURE
1	Tool item 5
2	Tool item 6

Grinding Fixtures - Vane Concave Side
Table 402

- (2) Locate the vane/fixture assy. to a grinding machine and grind the inner abutment face, concave side, to achieve dimension AG (Ref.Fig.403).

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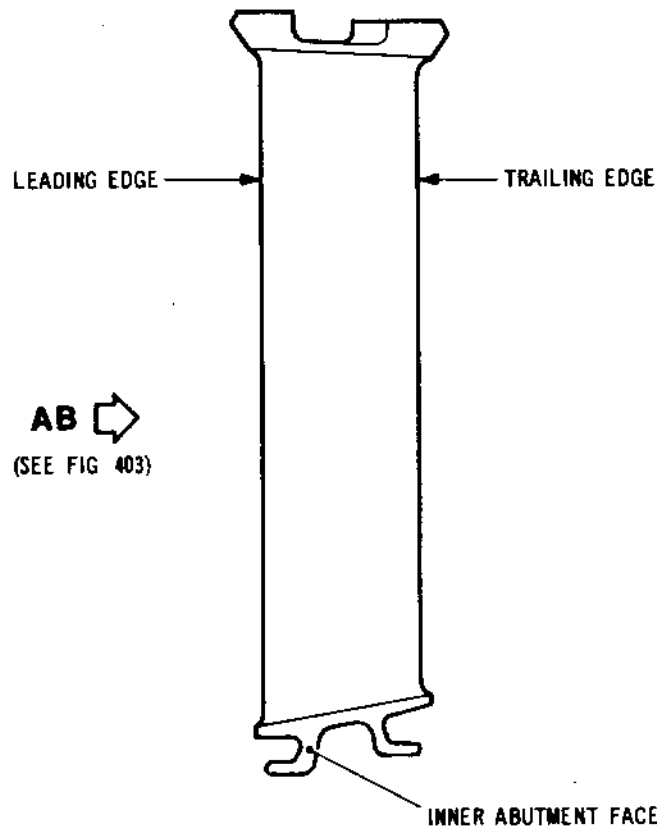


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VIEW ON CONVEX SIDE OF VANE

HP Compressor Vane
Figure 401

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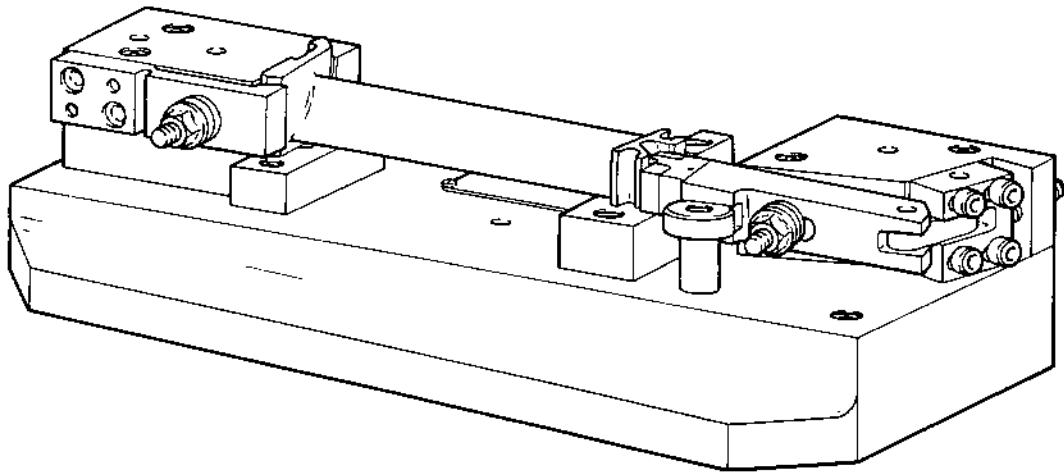
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Typical Fixture for Grinding Inner Abutment Face
Figure 402

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- (3) Remove the vane/fixture assy. from the machine, and the vane from the fixture.
- (4) Remove all burrs produced during grinding of inner abutment face.
- (5) Inspect the vanes for the satisfactory completion of the grinding operation.

E. Inspect

- (1) Check all dimensions shown on Fig.403 and 404.
- (2) Ensure that no evidence of wear remains.
- (3) Test the vane for cracks using the fluorescent dye penetrant process specified for this component in 72-33-01 Inspection/Check.

F. Detonation Flame Spray

- (1) Detonation flame spray the inner abutment faces AC and AD (Ref.Fig.403) using LWIN 40, 0.008/0.010 in. (0,20/0,25 mm) thick, following the procedure detailed in 72-09-26. No flame deposition at AM, and overspray only permissible where shown (Ref.Fig.404).

NOTE: The inner abutment faces will not be machined after spraying.

- (2) Inspect to ensure complete coverage of coating to the correct thickness, using inspection fixtures Ref. tool items 1 and 2.

G. Produce Radii

- (1) Using standard hand tools produce radii AR as shown on Fig.404.

CR 35954/00A



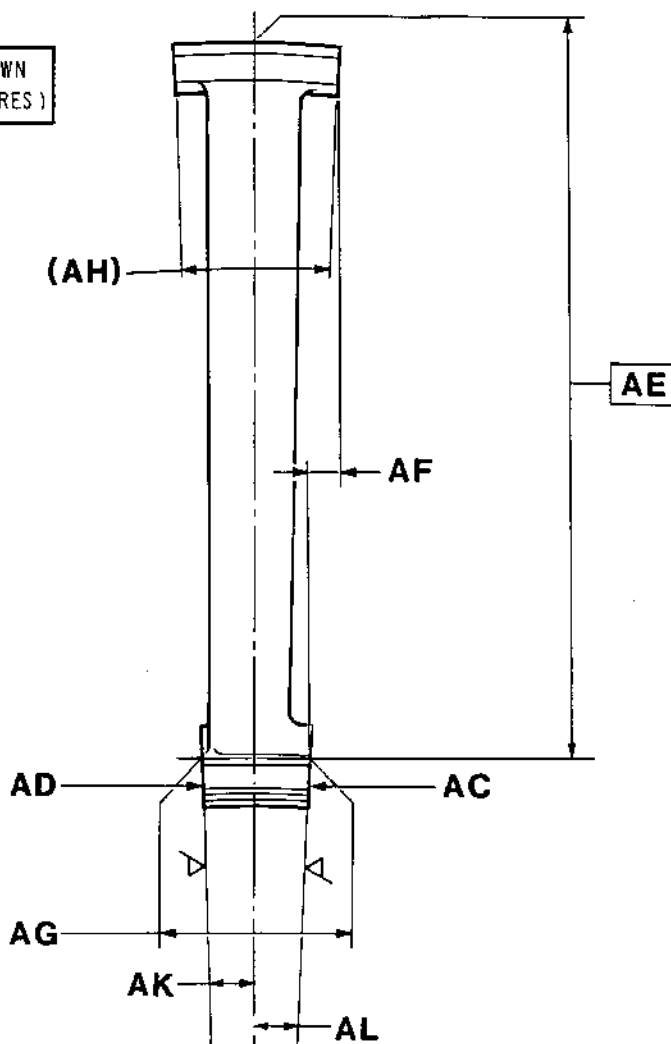
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MK.610-14-28

OVERHAUL



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



VIEW IN DIRECTION OF ARROW AB
(SEE FIG 401)

SCHEME NUMBER	VANE STAGE	DIMENSION			ANGLES ± 0 DEGREES 5 MINUTES	
		AE	AF	AG	(AH)	AK AND AL
B 935540	1	6.660 (169,16)	0.321 (8,15) 0.309 (7,85)	0.909 (23,09) 0.905 (22,99)	5 DEGREES 17 MINUTES 28 SECONDS	2 DEGREES 38 MINUTES 50 SECONDS
B 935541	2	5.715 (145,16)	0.243 (6,17) 0.233 (5,92)	0.845 (21,46) 0.841 (21,36)	4 DEGREES 36 MINUTES 38 SECONDS	2 DEGREES 18 MINUTES 27 SECONDS

Machining Dimensions
Figure 403

REPAIR

72-33-01

Repair No.3

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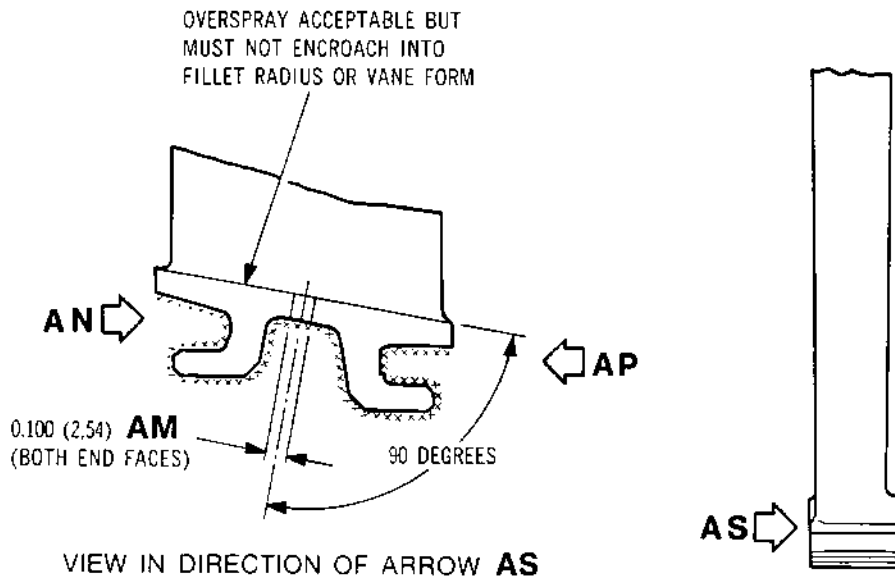
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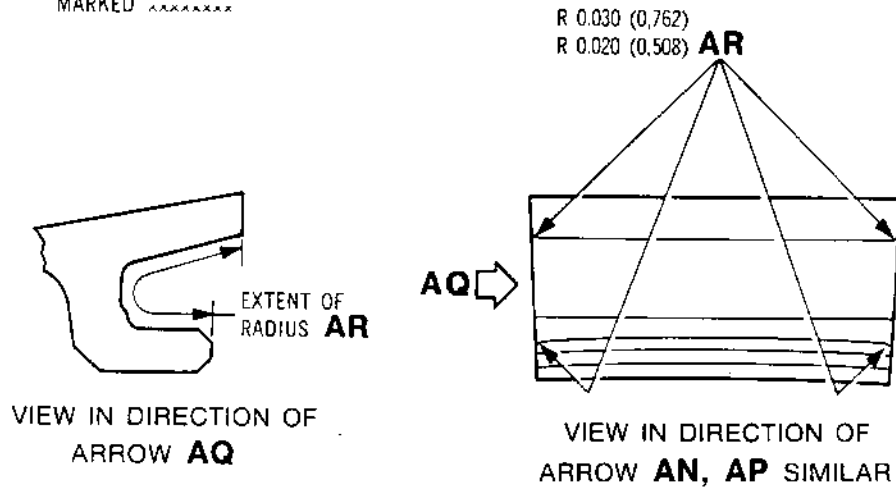


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CR 35956 '00B



NO OVERSPRAY WHERE
MARKED xxxxxxx



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Spraying and Radiusing
Figure 404

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H. Inspect and Identify

- (1) Test the vanes for cracks using the fluorescent dye penetrant process specified for this component in 72-33-01 Inspection/Check.
- (2) Using the vibro-percussion engraving technique, Ref.72-09-00 Repair, mark SAL.B.935540-1 or R3 adjacent to the existing part number.
- (3) Finally inspect the vane to ensure that the repair has been carried out satisfactorily, and that the vane is in a serviceable condition.

4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item No.</u>
Inspection Fixture	1	S3S 15753000	1 *
Inspection Fixture	1	S3S 15754000	2 *
Grinding Fixture	1	S3S 15775000	3
Grinding Fixture	1	S3S 15774000	4
Grinding Fixture	1	S3S 15751000	5
Grinding Fixture	1	S3S 15752000	6

* Refer to NOTE in para. 3B.

NOTE: The above tools are also used on Service Bulletin OL.593-72-8453-252.

5. Replacement parts

None.

REPAIR

72-33-01Repair No.3
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HP COMPRESSOR VANES STAGES 1 AND 2
RESTORATION OF INNER ABUTMENT FACES BY THE
APPLICATION OF DETONATION FLAME DEPOSITION

MODIFICATION NO. 0L.8921C1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>	
72-33-01		Stage 1	
	1/250B	B.918715,	B.918719
	250C	B.930546	
	260A	B.918380,	B.918384
	260B	B.918713,	B.918717
	260C	B.930542	
	270B	B.918714,	B.918718
	270C	B.930544	
	280B	B.918716,	B.918720
	280C	B.930548	
		Stage 2	
	1/460B	B.918722,	B.918726
	460C	B.930552	
	470A	B.918388,	B.918392
	470B	B.918721,	B.918725
	470C	B.930550	
	480B	B.918724,	B.918728
	480C	B.930554	
	490B	B.918723,	B.918727
	490C	B.930556	

2. Introduction

A. General

- (1) This repair describes the procedure to restore the inner abutment faces by removing the existing flame plating, machining back the abutment faces, and applying a thicker coating.
- (2) Dimensions are shown thus, INCHES (MILLIMETRES), in tables and illustrations.
- (3) Refer to Chapter 72-09-00, Repair, for all standard practices applicable to this repair.
- (4) Remove sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.

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72-33-01
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- (5) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (6) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (7) Surface texture is to be 63 micro-inches (1,6 micrometres) unless otherwise stated.
- (8) All tools referred to by item number in procedural steps are detailed in para.4.
- (9) Protect the component against corrosion after each operation, and place in a container for protection against damage during transit between operations.

B. Repair Limitations

- (1) This repair is only to be used when scheme B935540-1 (72-33-01 Repair No.3) will not restore worn or damaged vanes.

3. Instructions

A. Remove Flame Deposition Coating

- (1) Remove the flame deposition coating from the inner abutment faces (Ref.Fig.401), following the procedure detailed in 72-09-25, Repair, using process F.
- (2) Inspect the inner abutment faces to ensure complete removal of flame deposition coating.

B. Inspect

- (1) Inspect to determine the amount of metal to be removed to produce dimension AF (Ref.Fig.403).

C. Grind Inner Abutment Face (Convex Side)

- (1) Locate the vane to its relevant fixture (Ref.Table 401 and Fig.402).

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VANE STAGE	FIXTURE
1	Tool item 1
2	Tool item 2

Grinding Fixtures - Vane Convex Side
Table 401

- (2) Locate the vane/fixture assy. to a grinding machine and grind the inner abutment face, convex side, to remove the required amount of metal from face AC (Ref.Fig.403) to produce dimension AF.
- (3) Remove the vane/fixture assy. from the machine, and the vane from the fixture.
- (4) Remove all burrs produced during grinding of inner abutment face.
- (5) Inspect the vanes for the satisfactory completion of the grinding operation.

D. Grind Inner Abutment Face (Concave Side)

- (1) Locate the vane to its relevant fixture (Ref.Table 402 and Fig.402).

VANE STAGE	FIXTURE
1	Tool item 3
2	Tool item 4

Grinding Fixtures - Vane Concave Side
Table 402

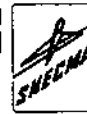
- (2) Locate the vane/fixture assy. to a grinding machine and grind the inner abutment face, concave side, to achieve dimension AG (Ref.Fig.403).

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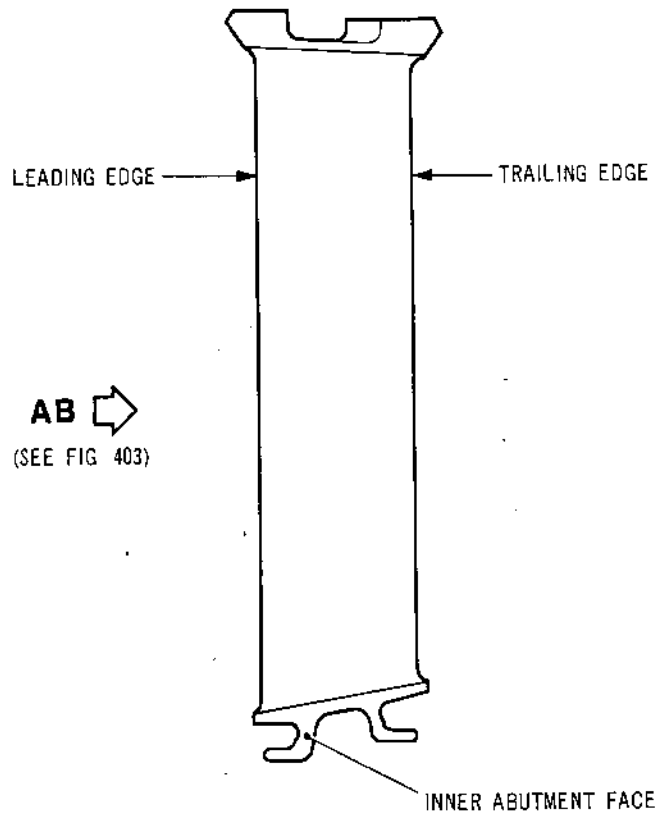


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VIEW ON CONVEX SIDE OF VANE

HP Compressor Vane
Figure 401

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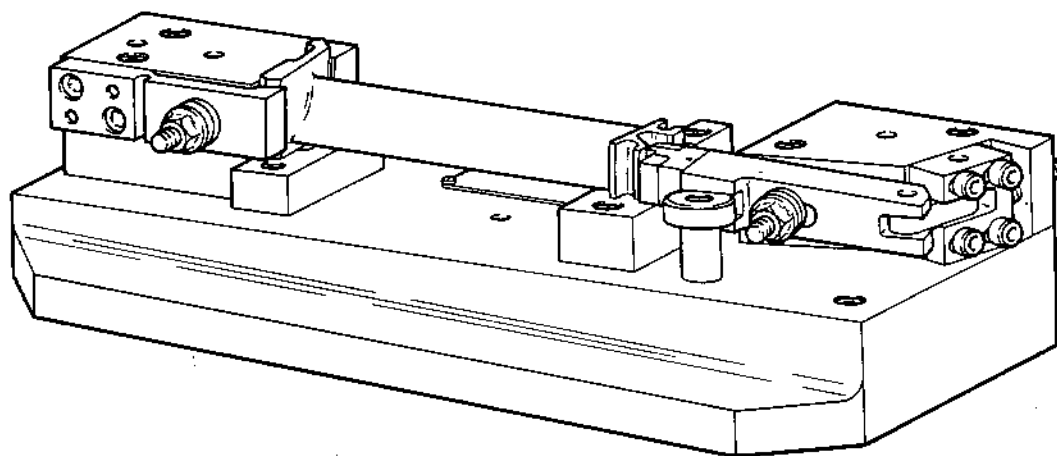
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Typical Fixture for Grinding Inner Abutment Face
Figure 402

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- (3) Remove the vane/fixture assy. from the machine, and the vane from the fixture.
- (4) Remove all burrs produced during grinding of inner abutment face.
- (5) Inspect the vanes for the satisfactory completion of the grinding operation.

E. Inspect

- (1) Check all dimensions shown on Fig.403 and 404.
- (2) Ensure that no evidence of wear remains.
- (3) Test the vane for cracks using the fluorescent dye penetrant process specified for this component in 72-33-01 Inspection/Check.

F. Detonation Flame Spray

- (1) Detonation flame spray the inner abutment faces AC and AD (Ref.Fig.403) using LWIN-40, 0.015/0.013 in. (0,38/0,33 mm) thick, following the procedure detailed in 72-09-26. No flame deposition at AM, and overspray only permissible where shown (Ref.Fig.404).

NOTE: The inner abutment faces will not be machined after spraying.

- (2) Inspect to ensure complete coverage of coating to the correct thickness.

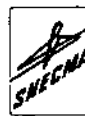
G. Produce Radii

- (1) Using standard hand tools produce radii AR as shown on Fig.404.



OLYMPUS 593

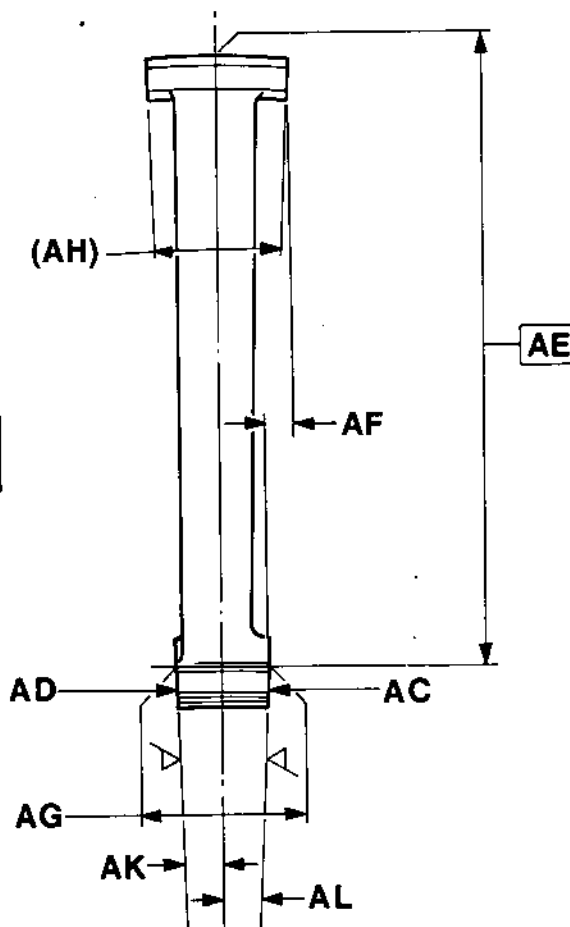
MK.610-14-28
OVERHAUL



CR 36244/00A

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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



VIEW IN DIRECTION OF ARROW **AB**
(SEE FIG 401)

SCHEME NUMBER	VANE STAGE	DIMENSION			ANGLES ± 0 DEGREES 5 MINUTES	
		AE	AF	AG	AH	AK AND AL
B 510617	1	6.660 (169,16)	0.326 (8,28)	0.899 (22,83)	5 DEGREES	2 DEGREES
			0.314 (7,98)	0.895 (22,73)	17 MINUTES 28 SECONDS	38 MINUTES 50 SECONDS
B 510618	2	5.715 (145,16)	0.248 (6,30)	0.835 (21,21)	4 DEGREES	2 DEGREES
			0.238 (6,05)	0.831 (21,11)	36 MINUTES 38 SECONDS	18 MINUTES 27 SECONDS

Machining Dimensions
Figure 403

REPAIR
72-33-01
Repair No.4
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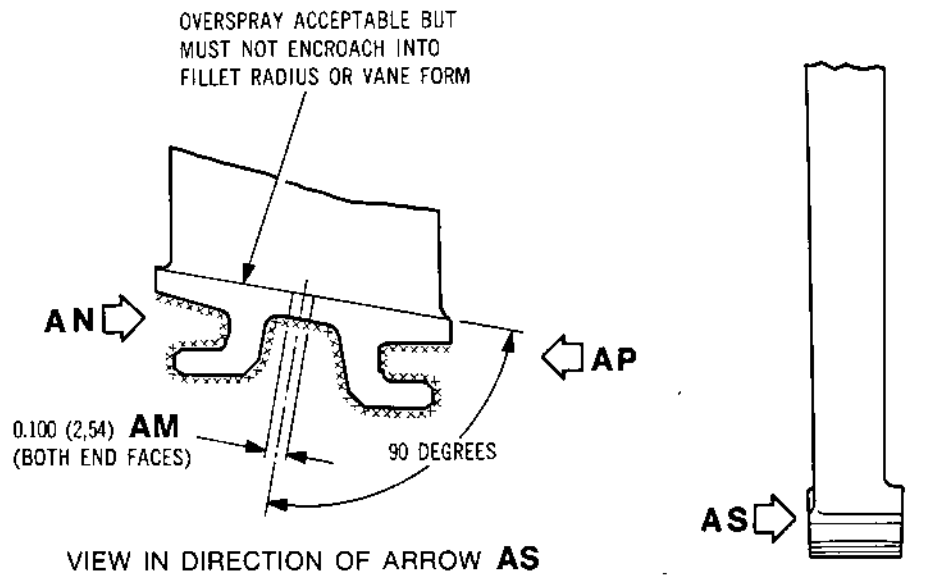


OLYMPUS 593

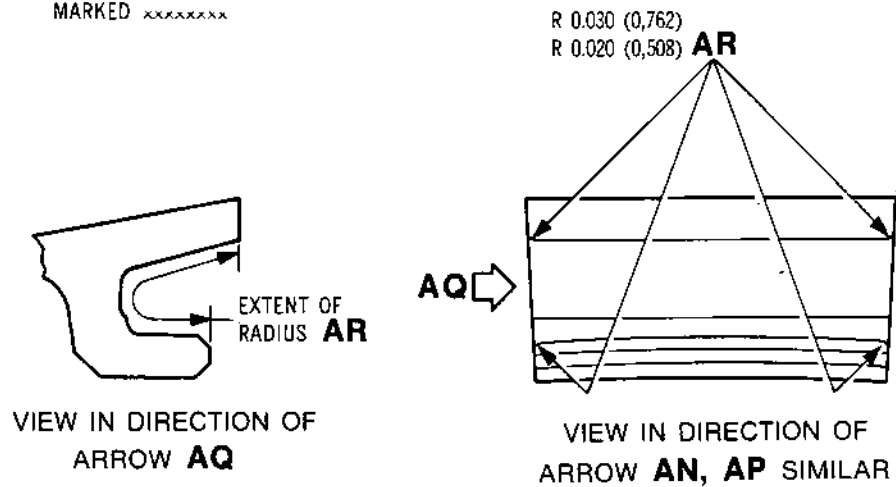
MK.610-14-28
OVERHAUL



CR 35956/00B



NO OVERSPRAY WHERE
MARKED xxxxxxxx



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Spraying and Radiusing
Figure 404

REPAIR
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H. Inspect and Identify

- (1) Test the vanes for cracks using the fluorescent dye penetrant process specified for this component in 72-33-01 Inspection/Check.
- (2) Using the vibro-percussion engraving technique, Ref.72-09-00 Repair, mark SAL.8.510617-8 or R4 adjacent to the existing part number.
- (3) Finally inspect the vane to ensure that the repair has been carried out satisfactorily, and that the vane is in a serviceable condition.

4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item No.</u>
Grinding Fixture	1	S3S 15775000	1
Grinding Fixture	1	S3S 15774000	2
Grinding Fixture	1	S3S 15751000	3
Grinding Fixture	1	S3S 15752000	4

NOTE: The above tools are also used on Service Bulletin 0L.593-72-8453-252.

5. Replacement parts

None.



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MK.610-14-28
OVERHAUL



CASE, ASSEMBLY OF, COMPRESSOR, HP, FRONT

REPAIR OF IMPACT DAMAGE BY BLENDING AND/OR WELDING

REPAIR NO. B514749-50

1. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-33-01	5 440A	B925702
		B925703
	5 440B	B919734
		B925023
		B925024
		B925032
		B925033
		B925036
		B925704
		B925705
		B925707
		B925708
B925710		

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

Smooth bottomed impact damage up to 0.030(0,76) deep is acceptable following blending and polishing to remove sharp edges/raised material.

Sharp bottomed indents greater than 0.010(0,25) in depth but less than 0.030(0,76) are acceptable following blending provided that the final depth of blend does not exceed 0.035(0,89).

Sharp bottomed impact damage and/or impacts in excess of 0.030(0,76) deep must be welded.

Repair of damage by blending is limited to blade rotor paths only and must not encroach within 0.100(2,50) from the vane dovetail slots.

Repair of damage by welding is limited to blade rotor paths only and must not encroach within 0.250(6,40) of the vane dovetail slots.

REPAIR

72-33-01

Repair No. 5

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Blending is not permissible radially in line with external inserts or dowel holes, except where welding is employed to restore the profile.

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)

Dimensions in Inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerance on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

Surface texture to be 125 (3,2) Microinches (Micrometres)

Welding symbols to ISO2553 (JES139)

3rd Angle Projection

4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

A. BLENDING

- 1) Blend and polish smooth bottomed impacts up to 0.030(0,76) deep to remove sharp edges/high metal. Refer fig.403 and 404
- 2) Smoothly blend out sharp bottomed impacts up to 0.030(0,76) deep. Remove the minimum amount of material necessary to facilitate the repair. Refer fig.403 and 405
- 3) Locally crack detect repaired areas. Refer TSD 594 OP 210
- 4) Mark Repair Instruction number RI B514749 or R.5A on component adjacent to normal 'assy.of' no. using the vibro-percussion engraving technique. Refer Overhaul Manual Chapter 72-09-00 Repair. Refer fig.401 for identity marking location.

B. WELDING

- 1) Remove and discard wire thread inserts. Refer Overhaul Manual Chapter 72-09-00 Repair.
- 2) Prepare impacts for welding. Refer TSD 594 OP.409
- 3) Puddle weld prepared locations. Refer TSD 594 OP.409 Use filler wire OMAT 3/54.

REPAIR

72-33-01

Repair No. 5

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- 4) Locally crack detect repaired areas. Refer TSD 594 OP.210
- 5) Radiographically inspect welded areas for defects. Refer TSD 594 OP.409
- 6) Heat treat component at 650°C ± 5°C for 1 hour in vacuum. Cool in argon.
- 7) Locally dress repaired locations to restore original profile. Thinning of parent material not permissible. Refer fig.401.
- 8) Dimensionally inspect. Refer fig.401 and 402.
- 9) Crack detect. Refer Overhaul Manual Chapter 72-33-01 Inspection/Check
- 10) Vapour blast repaired areas. Ensure dovetail features are adequately masked. Refer Overhaul Manual Chapter 72-09-13 Repair Procedure B.
- 11) Assemble wire thread inserts. Insert to be installed 1 to 1.5 turns below surface. Refer Overhaul Manual Chapter 72-09-00 Repair.
- 12) Mark Repair Instruction number RI B514750 or R.5B on component adjacent to normal 'assy.of' no. using the vibro-percussion engraving technique. Refer Overhaul Manual Chapter 72-09-00 Repair. Refer fig.401 for identity marking location.

5. MATERIAL

COMPONENT

CASE, ASSEMBLY OF,
COMPRESSOR, HP, FRONT

MATERIAL

JETHETE M152
MSRR 6544

BSEM 792

RR CODE

EEP

6. DATA

NONE.

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7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE.		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
AGS3707	INSERT, SCREW THREAD.	43	1

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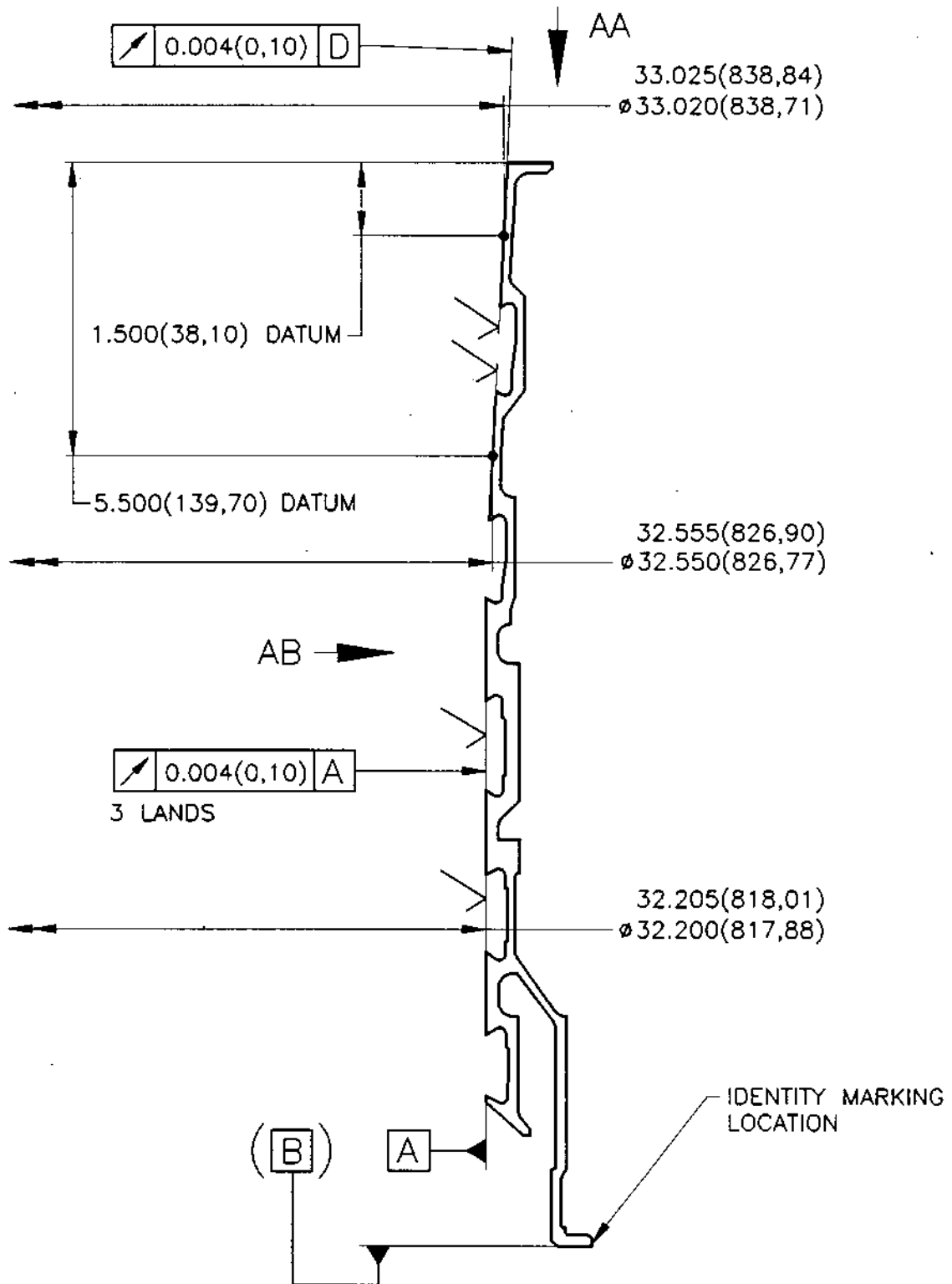
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TYPICAL SECTION THROUGH CASE, ASSEMBLY OF, COMPRESSOR, HP, FRONT
FIG.401

REPAIR

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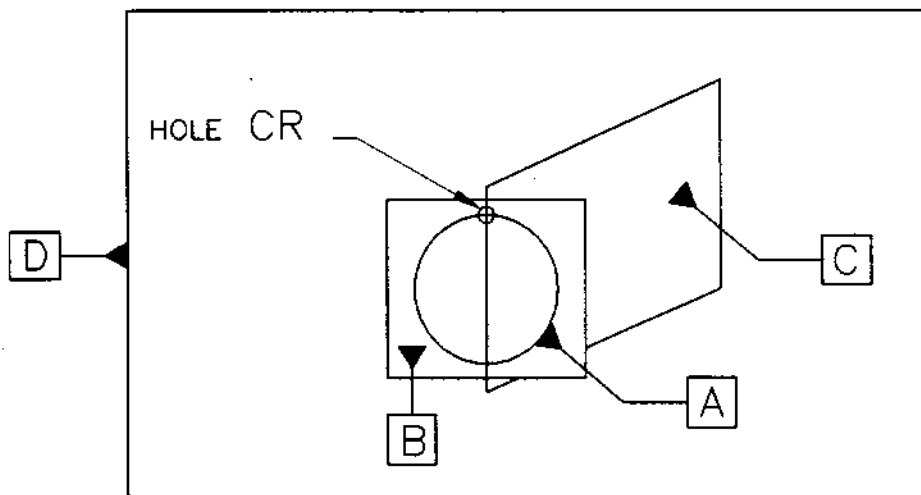
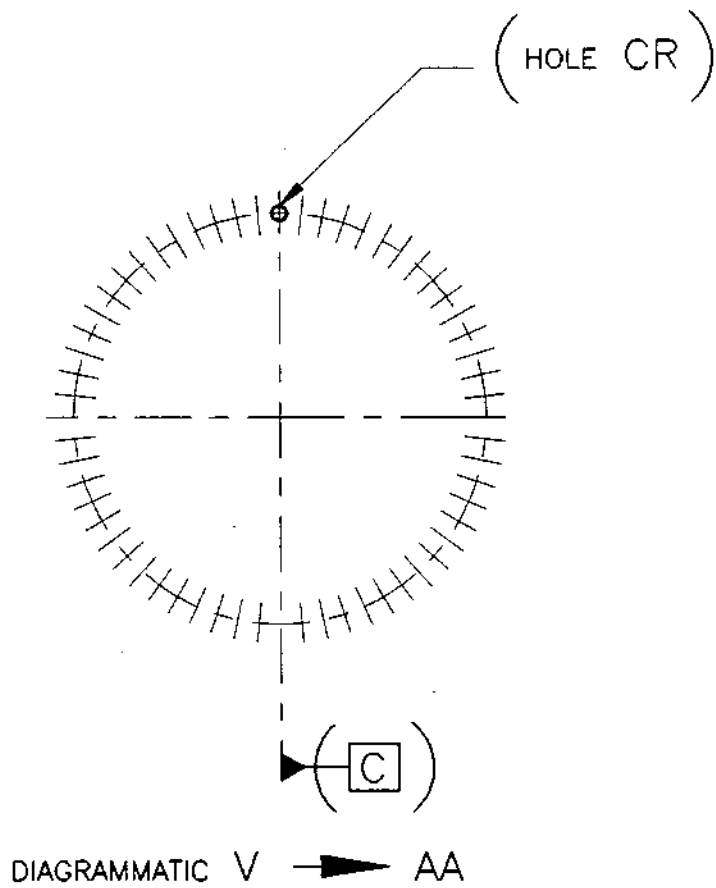


FIG.402



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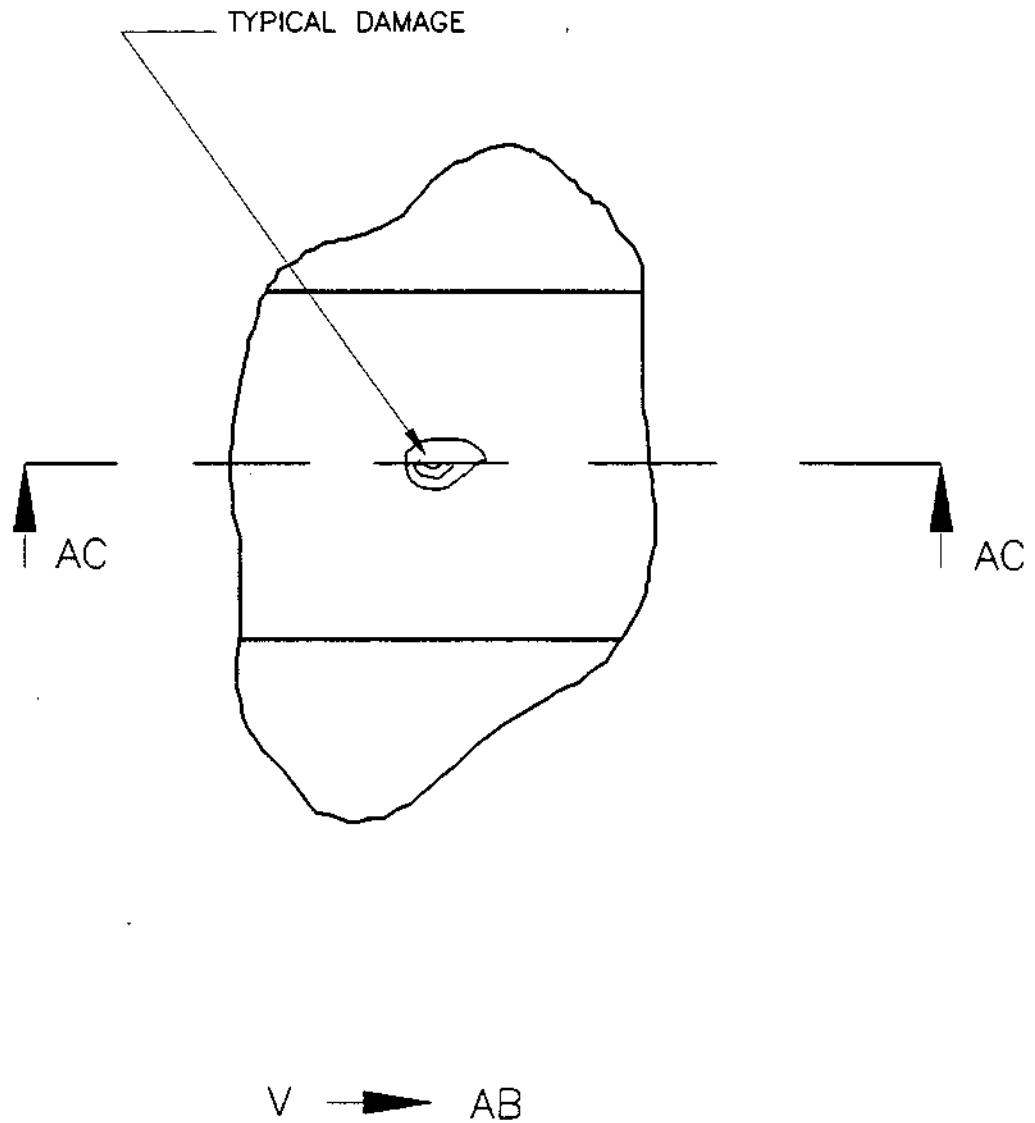
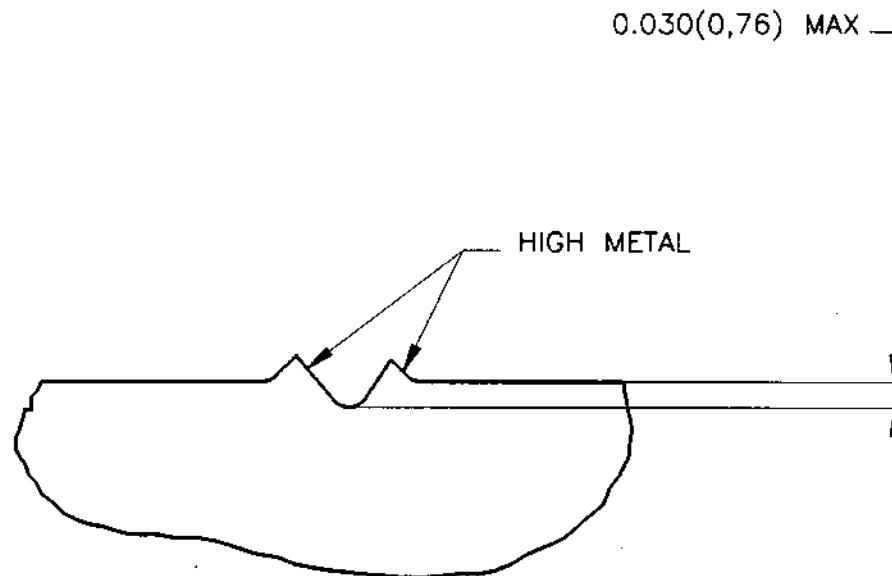


FIG.403

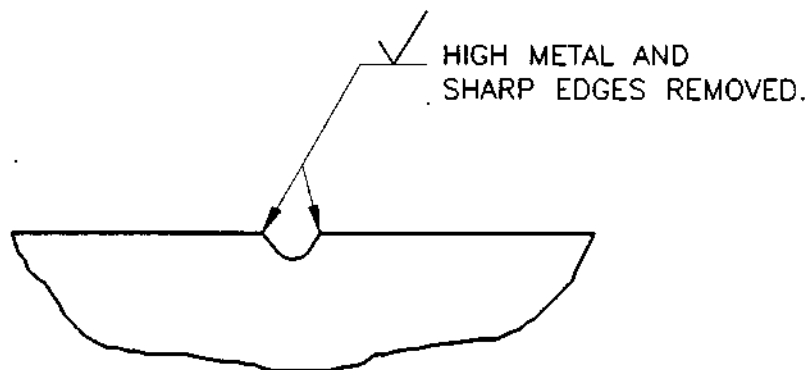
REPAIR
72-33-01
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SECTION AC
SHOWING TYPICAL SMOOTH BOTTOMED IMPACT DAMAGE

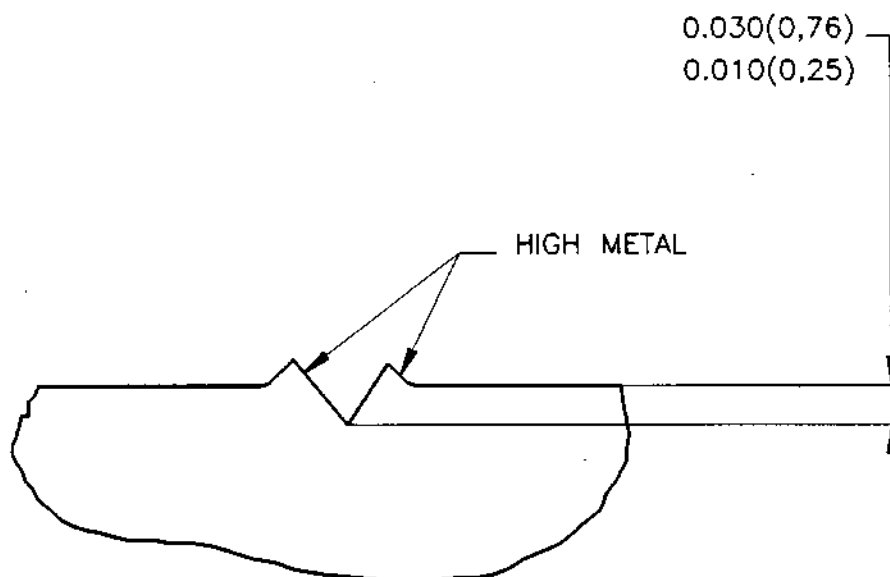


REPEAT SECTION AC
SHOWING TYPICAL SMOOTH BOTTOMED IMPACT
DAMAGE AFTER BLENDING AND POLISHING.

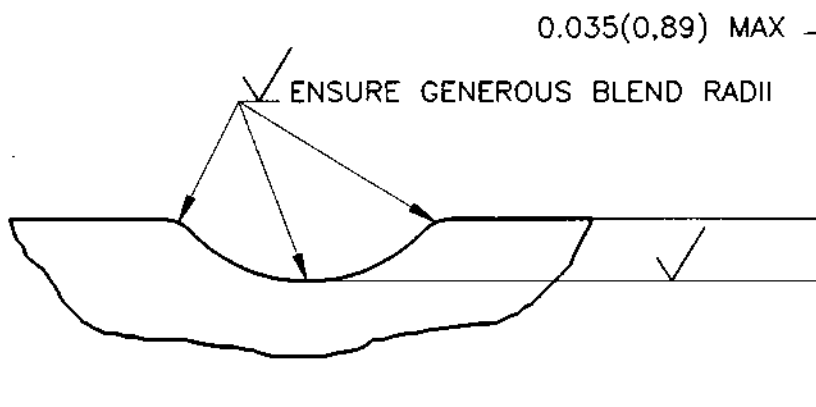
FIG 404



OLYMPUS 593
MK.610-14-28
OVERHAUL



REPEAT SECTION AC
SHOWING TYPICAL SHARP BOTTEMED IMPACT DAMAGE



REPEAT SECTION AC
SHOWING TYPICAL SHARP BOTTEMED IMPACT
DAMAGE AFTER BLENDING AND POLISHING.

FIG 405



OLYMPUS 593



MK.610-14-28 *sneema*
OVERHAUL

CASE, COMPRESSOR HP, REAR

REPLACEMENT OF DAMAGED ROKIDE COATING

REPAIR NO. B499477

1. EFFECTIVITY

<u>IPC</u>	<u>Fig.Item</u>	<u>Part No.</u>
72-33-01	08 120B	B.934473 B.934474 B.934475 B.934476 B.934477

2. REPAIR LIMITATIONS

None.

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practices & tolerance interpretation to ISO1101 (JES160)

Dimensions in inches (Millimetres)

Tolerances on machined dimensions plus/minus 0.010 (0,25)

Tolerances on angles plus/minus 2 degrees

Break sharp edges 0.004 to 0.020 (0,1 to 0,5)

Surface texture interpretation to ISO1302 (JES137)

3rd Angle Projection

4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- 1) Set casing running true, constrain if necessary to remove any ovality.

Check that diameters 32.755/32.750 (831,98/831,850) and 32.690/32.685 (830,33/830,20) are running true.
Refer to Fig.401 Detail A.

- 2) Machine to remove Rokide coating and also the nickel bond by opening up the 32.200/32.205 (817,88/818,01) dia. bore.

Refer to Fig.401 Details A and C.
Note: Minimum wall section 0.100 (2,54).



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MK.610-14-28 *sneema*
OVERHAUL

REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- | | |
|---|---|
| 3) Locally etch machined areas. | Refer to TSD594 Op.214. |
| 4) Locally crack detect. | Refer to TSD594 Op.201. |
| 5) Prepare surface for Metco coating. | Refer to TSD594 Op.704 and Fig.401 Detail B. |
| 6) Plasma spray a bond coat using MSRR9507/109, 0.003/0.005 (0,07/0,13) thick and a top coat using MSRR9507/108 sufficient to achieve final machining requirements.
<u>ALTERNATIVELY</u>
Plasma spray a bond coat using MSRR9507/14 0.003/0.005 (0,07/0,13) thick and a top coat using Metco 201B/201B-NS sufficient to achieve final machining requirements. | Refer to TSD594 Op.704 and Fig.401 Detail B. |
| 7) Set casing running true, constrain if necessary to remove any ovality. | Check that diameters 32.755/32.750 (831,98/831,850) and 32.690/32.685 (830,33/830,20) are running true.
Refer to Fig.401 Detail A. |
| 8) Finish machine to produce final dimensions. | Refer to Fig.401 Detail C. |
| 9) Inspect coating for cracking and adhesion. | Refer to TSD594 Op.201. |

REPAIR

72-33-01

Repair No.6

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MK.610-14-28 *sneema*
OVERHAUL

REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

- 10) Mark Repair Instruction number RI B499477 or R.6 adjacent the normal part number. Use the vibro-percussion engraving technique. Also mark the coating identification as follows:

- ◆ KA NICHROME MSRR9507/109
- ◆ ZR ROKIDE MSRR9507/108
- ◆ HC METCO MSRR9507/14
- ◆ ZR METCO 201B/201B-NS

- 11) Finally Inspect.

5. MATERIAL

<u>COMPONENT</u>	<u>MATERIAL</u>	<u>RR CODE</u>
CASE, COMPRESSOR, HP	BSEM 631	EGX

6. DATA

NONE.

7. TOOLS

<u>TOOL NUMBER</u>	<u>DESCRIPTION</u>	<u>ITEM</u>
NONE.		

8. REPLACEMENT PARTS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>ITEM</u>
NONE.			

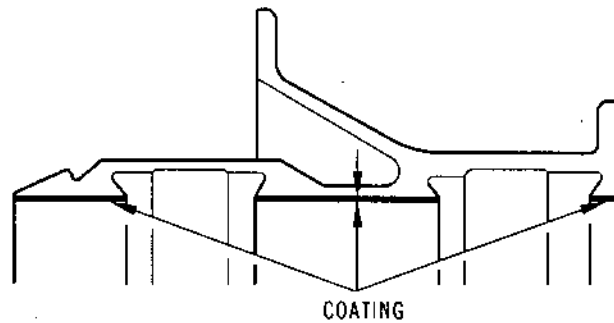
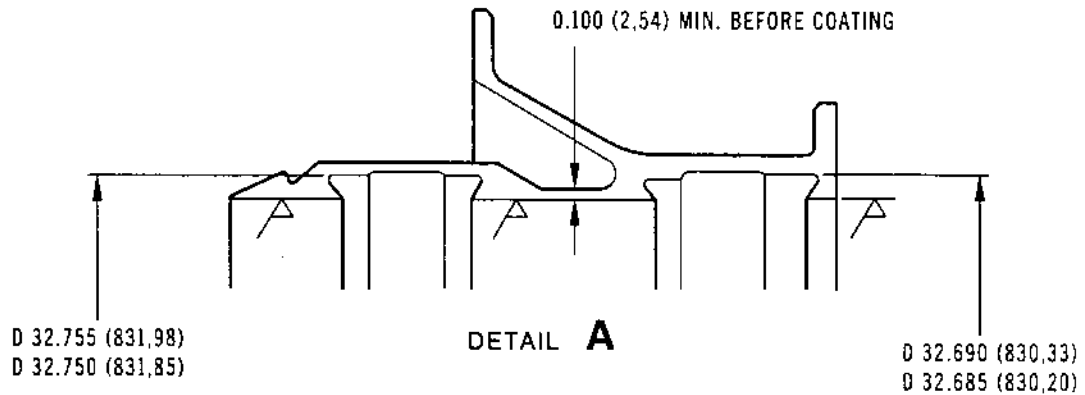


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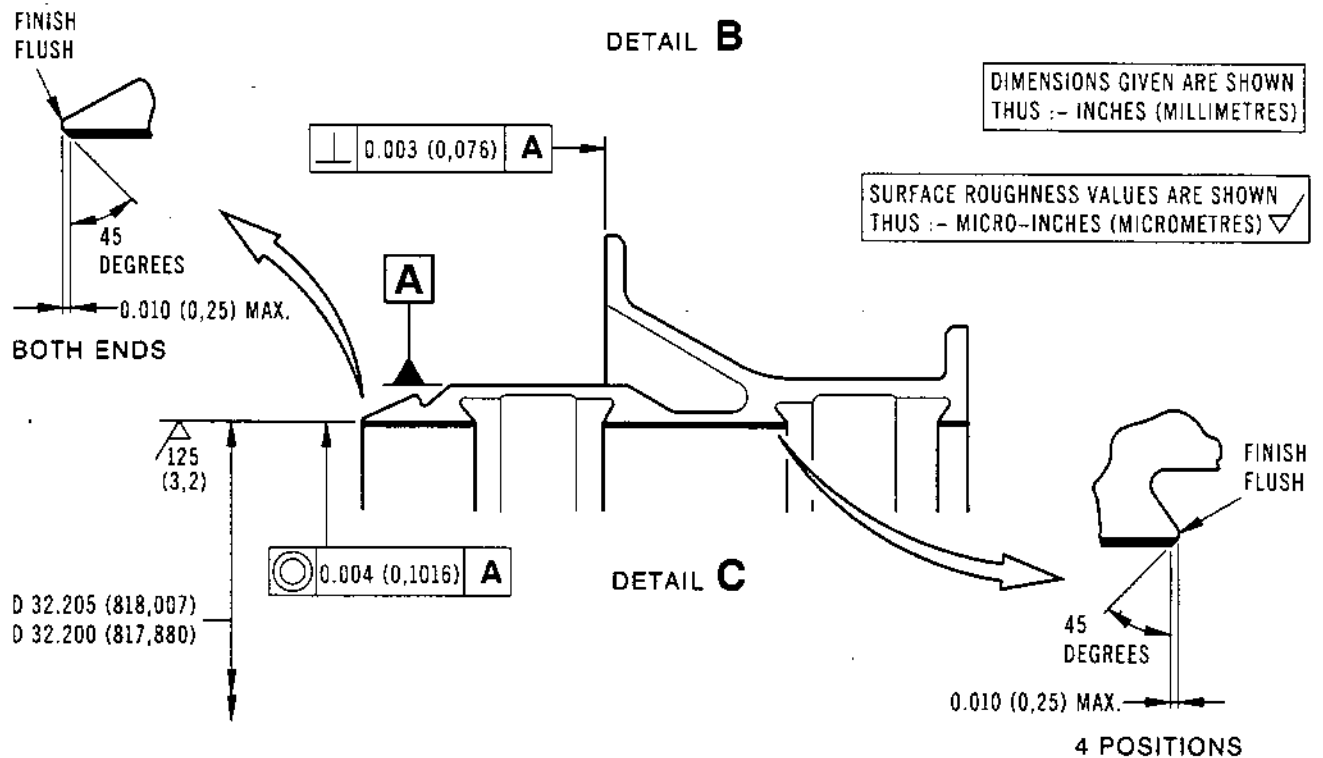


MK.610-14-28 *sneema*
OVERHAUL

CR 36457/00A



DETAIL B



Machining and Spraying Details
Figure 401

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OVERHAUL

CASE, COMPRESSOR, HP, REAR

CRACKED REAR FLANGE BOLT HOLE LOCATIONS
REPAIRED BY WELDING.

B516914

1. EFFECTIVITY

<u>IPC</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-33-01	8A/120C	B936648
		B936637
		B936638
		B936639
		B936640
		B936641
		B936642
		B933829
		B936643
		B936644
		B936645
		B936646
		B936647
	8A/120D	B515586
	(MOD.72-8987)	B515587
		B515588
		B515589
		B515590
		B515591
		B515592
		B515593
		B515594
		B515595
		B515596
		B515597
		B515598

2. REPAIR LIMITATIONS

Compliance with all aspects of this repair process should be achieved without deviation. Where a need to deviate is considered necessary, reference should be made to the Repair Authority for agreement.

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OVERHAUL

3. GENERAL

UNLESS OTHERWISE SPECIFIED

Drawing practice & tolerance interpretation to ISO1101 (JES160)
Dimensions in Inches (Millimetres)
Tolerances on machined dimensions plus/minus 0.010 (0,25)
Tolerance on angles plus/minus 2 degrees
Break sharp edges 0.004 to 0.020 (0,1 to 0,5)
Surface texture interpretation to ISO1302 (JES137)
Surface texture to be 125 (3,2) Microinches (Micrometres)
Welding symbols to ISO2553 (JES139)
3rd Angle Projection

4. REPAIR PROCEDURE

SUPPLEMENTARY INFORMATION

FOR POST MOD.72-8987 COMPONENTS ONLY.

- | | | |
|----|---|---|
| 1) | Locally hand dress to remove existing corrosion resistant coating from damaged bolt location hole(s). | Use abrasive cloth
OMat 5/70 or OMat 5/71. |
|----|---|---|

FOR ALL COMPONENTS.

- | | | |
|----|---|---|
| 2) | Locally dye penetrant inspect damaged location(s) to confirm length of cracking. | Refer TSD 594 OP.213 |
| 3) | Vee groove cracks in preparation for welding. | Use hand tools only. |
| 4) | Locally degrease dressed location(s). | Refer TSD 594 OP.101 |
| 5) | Inert gas arc weld dressed location(s), ensuring full penetration using minimum heat input to avoid excessive distortion. | Refer TSD 594 OP.409
Use filler wire OMat 3/54 |
| 6) | Locally dye penetrant inspect repair area. | Refer TSD 594 OP.213 |
| 7) | Locally heat treat repaired area(s) to $5850C \pm 50C$ for 1 hour. | Refer TSD 594 OP.409,
para.4C. |

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- 8) Dress weld beads flush to surface and re-produce contours. Parent material not to be impaired. Refer fig.401. Use hand tools only.
- 9) Dimensionally inspect. Refer figs.401, 402 and 403.
- 10) If required, load component to machine and set true to datums. On standard hole centres, ream repaired bolt location hole and chamfer to dimensions given. Refer figs.401, 402 and 403.
- 11) Dye penetrant inspect component. Refer TSD 594 OP.213
FOR POST MOD.72-8987 COMPONENTS ONLY.
- 12) Re-coat repaired bolt location holes with corrosion resistant coating where marked XX. Minimum thickness of coating to be applied by hand brush on/wipe off technique. Refer TSD 594 OP.349 para.C. Use OMat 7/167. Refer fig.403.
Holes not to be burnished.
- NOTE
Front and rear faces of flange to be free from coating, except for a residual witness, which is permissible.
- 13) Stove coating. At 345°C to 355°C for 1 hour. Load component when oven temperature is no greater than 85°C max.
- FOR ALL COMPONENTS.
- 14) Mark Repair Instruction number RI B516914 or R7 on component, adjacent to normal 'assembly of' number, using the vibro-percussion engraving technique. Refer Overhaul Manual Chapter 72-09-00 Repair. Refer fig.401.

5. MATERIALCOMPONENTCASE, COMPRESSOR,
HP, REARMATERIALFV535
MSRR6519RR CODE

EBH



OLYMPUS 593



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sneema

6. DATA

NONE.

7. TOOLS

TOOL NUMBER

DESCRIPTION

ITEM

NONE.

8. REPLACEMENT PARTS

PART NUMBER

DESCRIPTION

QUANTITY

ITEM

NONE.

REPAIR

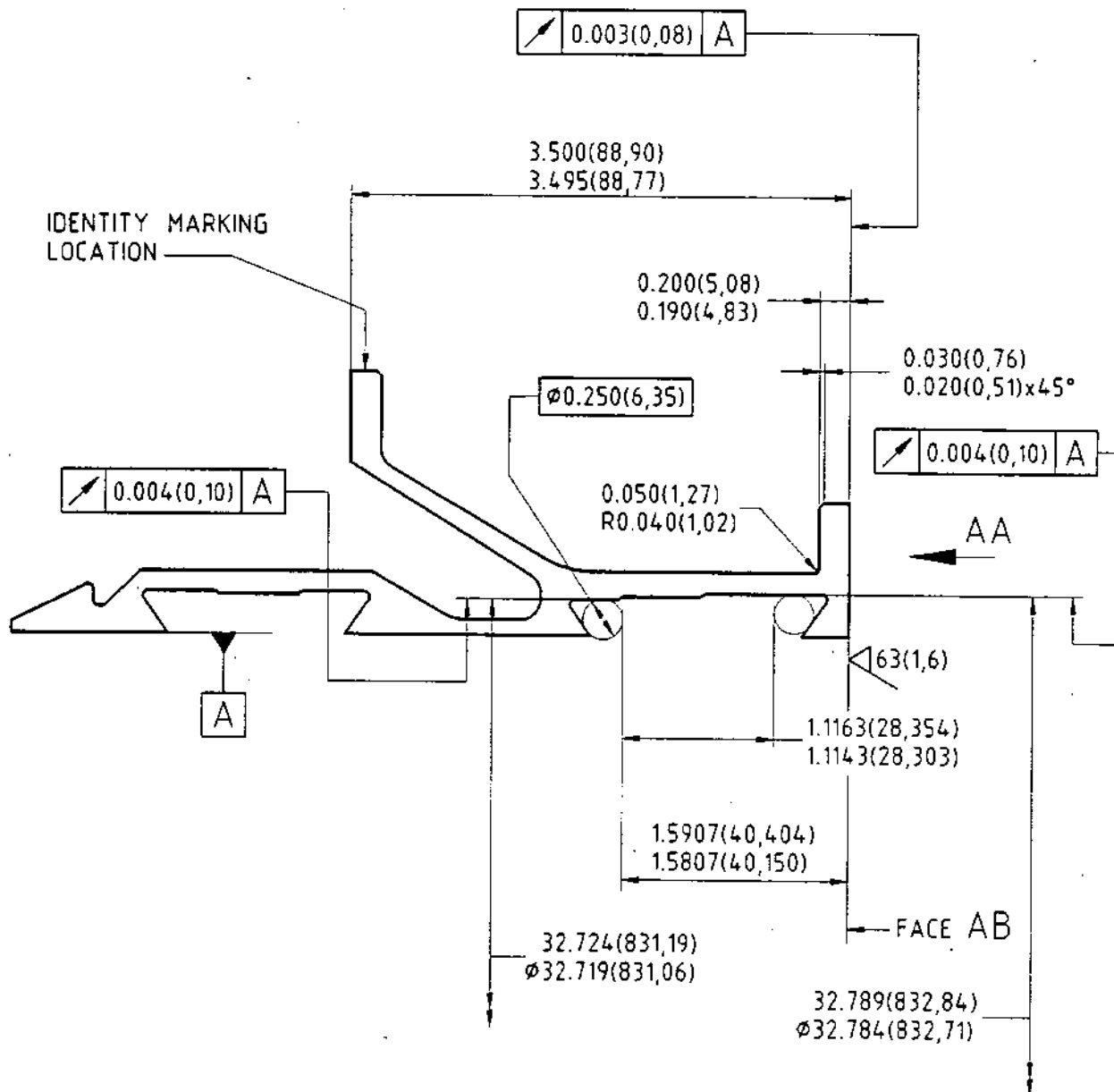
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NOTE:- ALL DIMENSIONS ARE FOR
REFERENCE PURPOSES ONLY.

TYPICAL SECTION THROUGH CASING
FIG.401.

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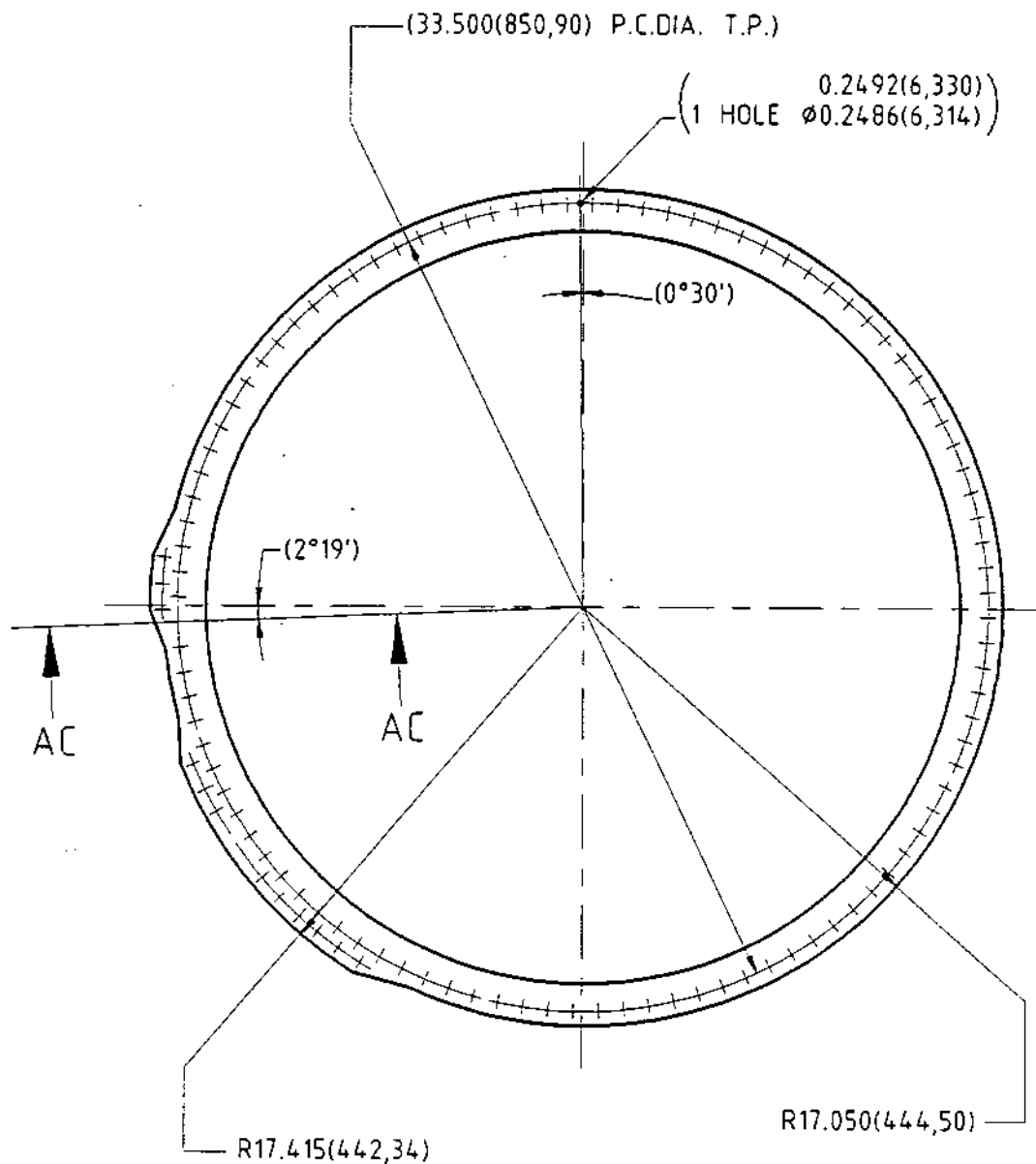
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DIAGRAMMATIC V —▶ AA
FIG.402.

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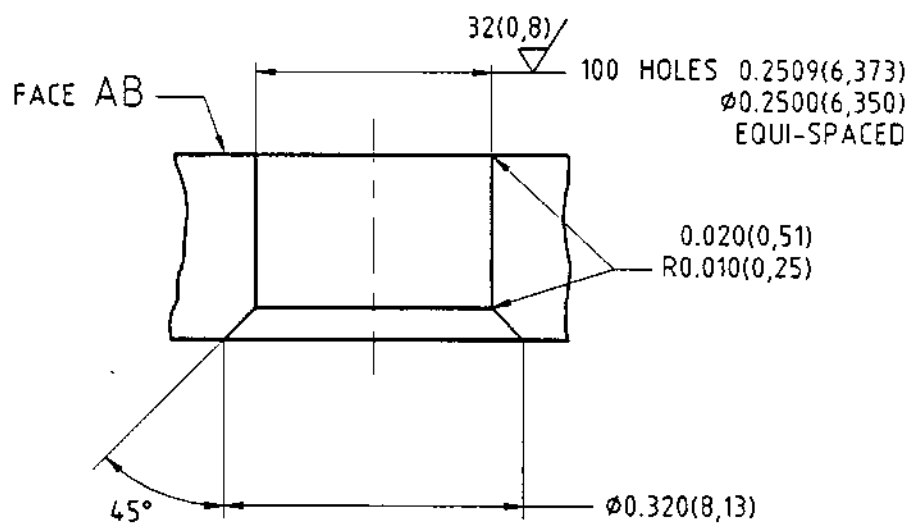
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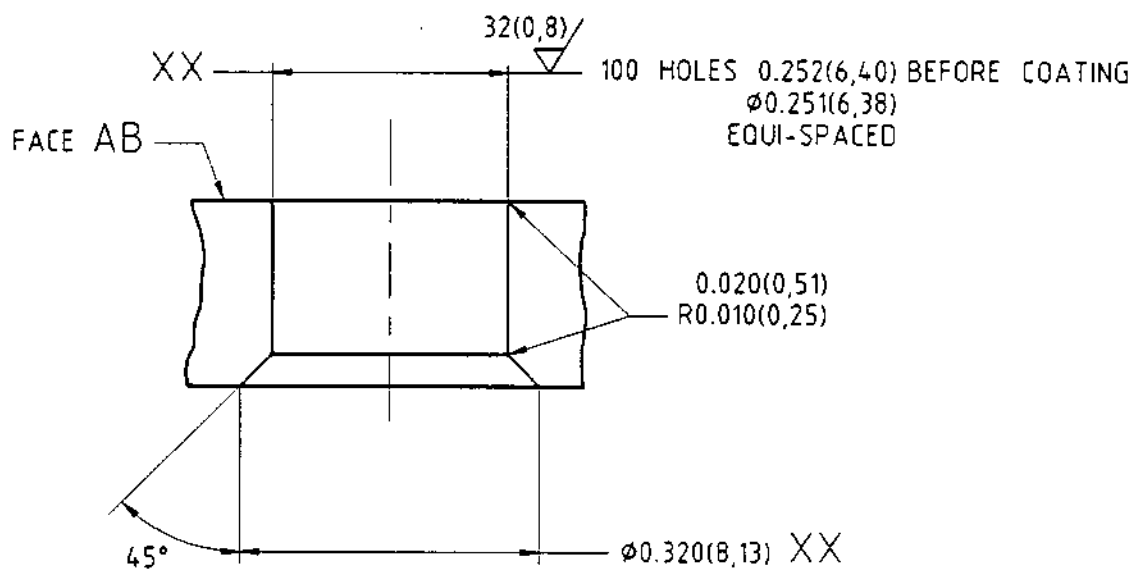
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PRE-MOD OLY 72-8987 STANDARD.



POST-MOD OLY 72-8987 STANDARD.

SECTION AC
FIG.403.

British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

TEMPORARY REVISION No. 72-526

Insert in 72-33-01 at rear of repair section in RST No. order

REASON FOR ISSUE:

To introduce a repair to cover the restoration of Rokide Z coating on the H.P. (rear) compressor casing. (MRA 92).

ACTION

BEOL REPAIR: RST 4012. Casing compressor H.P. (rear) - Restore Rokide 'Z' coating.

PROCEDURE

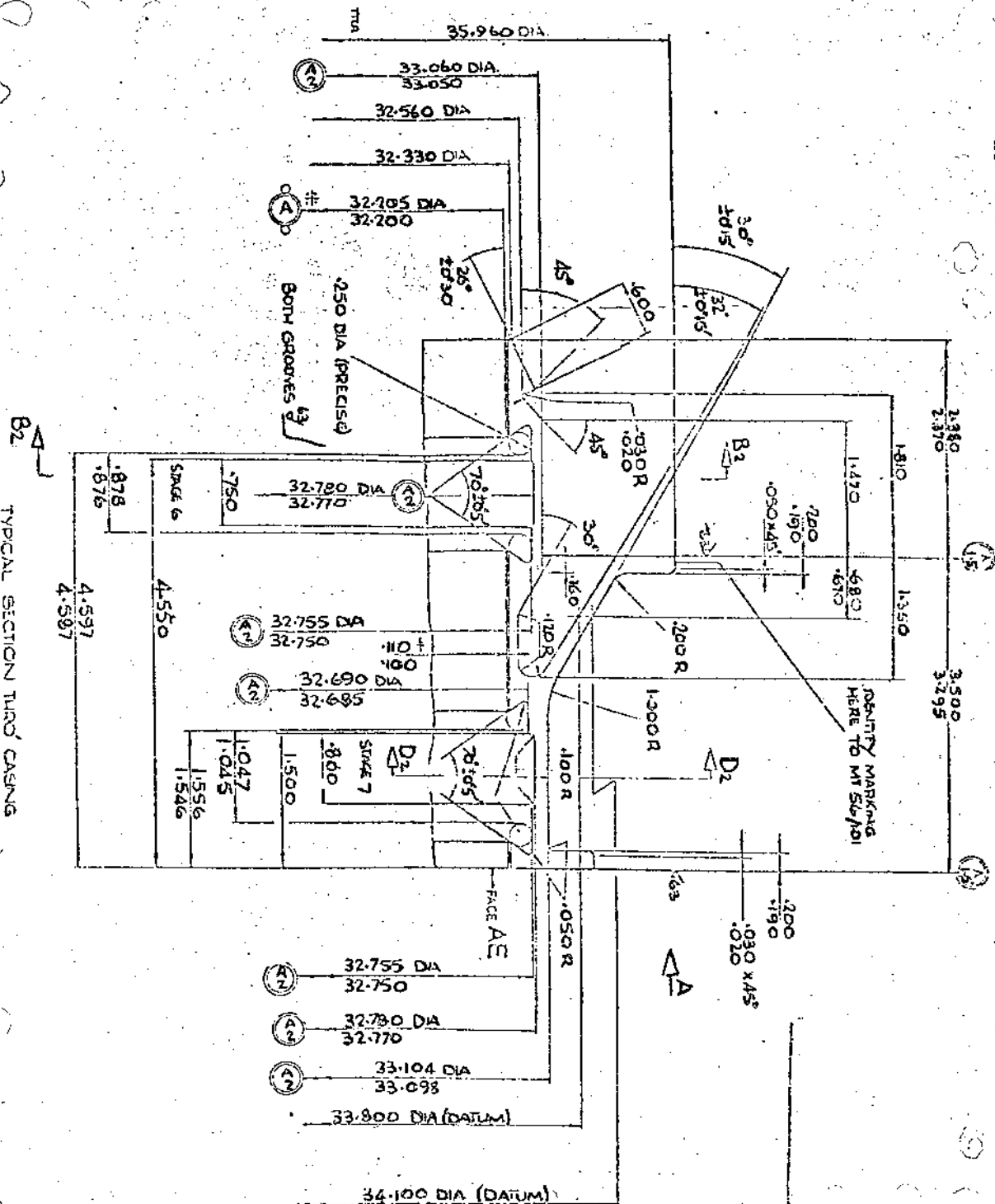
1. Set casing running true. Constrain, if necessary, to remove any ovality.
Check that Dia's. 32.755/32.750 and 32.690/32.685 are running true.
2. Machine to remove Rokide coating and also, the Nickel bond, by opening up the 32.205/32.200 dia. bore. Observe the min. wall (.100/.110).
3. Prepare surface for Metco coating per T.S.D. 594 Op. 704.
4. Plasma spray a bond coat using Metco 43C or Metco 43C-NS, to MS.RR 9507/109, 0.003-0.005 thick, per T.S.D. 594 Op. 704.
5. Plasma spray, using Metco 201B OK Metco 201B-NS, in accordance with T.S.D. 594 Op. 704, sufficient for final machining.
6. Machine to produce final dimensions. See Fig.1.
7. Inspect coating for cracking and adhesion per T.S.D. 594 Op. 704.
8. Final Inspect.
9. Vibro engrave RST 4012 adjacent to P/No.

N.B. The foregoing information is in accordance with OLY/SEDP/259 and D01-T7005.

1 May 1981

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72-33-01
TR Page 1 of 2
RST 4012

TEMPORARY REVISION No. 72-526



British airways
CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

Temporary Revision No. 72-537

Insert in 72-33-01 at rear of repair section in RST No. order

REASON FOR ISSUE:

To introduce a repair for a cracked bracket on the front H.P.
compressor case external fittings. (MRA 107)

ACTION

B.E.O.L. REPAIR

RST 4021 FRONT H.P. COMPRESSOR
CASE EXTERNAL FITTINGS - ARGON ARC
WELD CRACKED BRACKET.

PROCEDURE:-

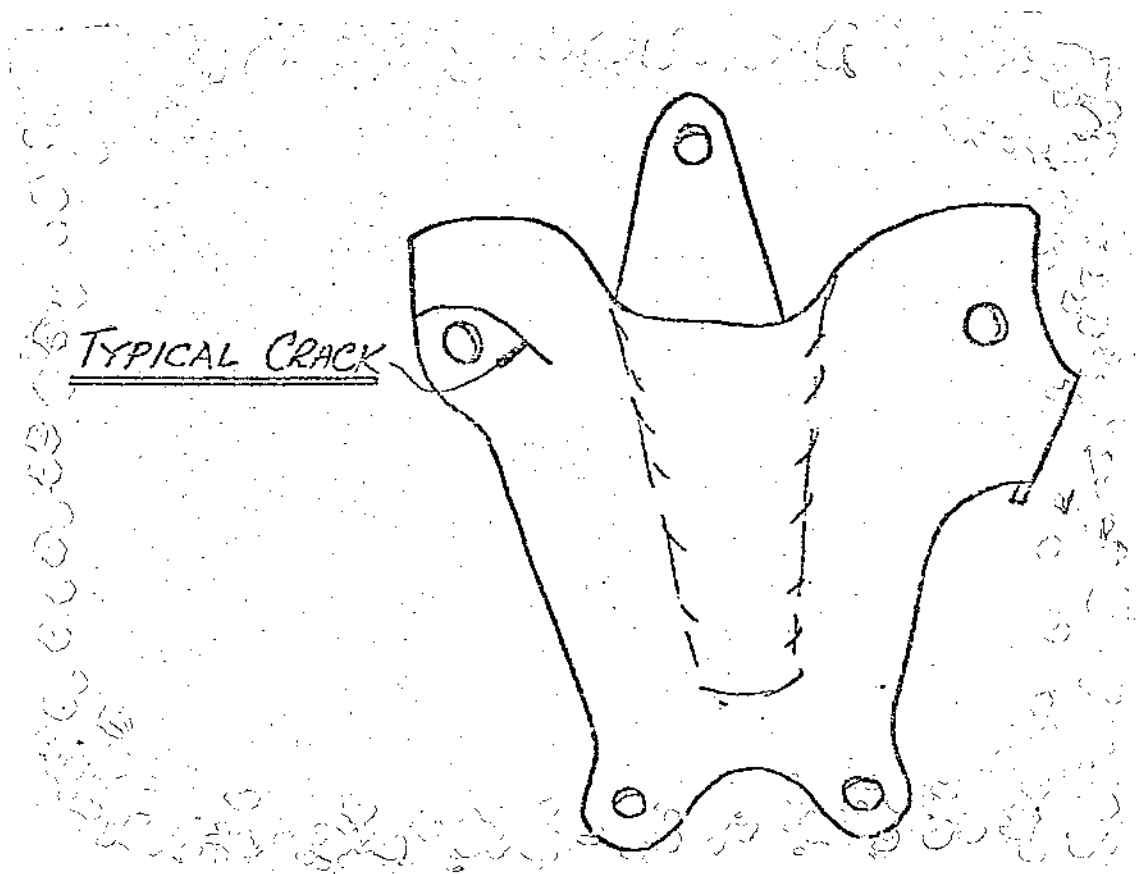
1. Clean and prepare cracked area for welding in accordance with T.S.D. 594/Op. 407.
2. Argon Arc weld, using filler rod MSRR 9500/2 as per T.S.D. 594/Op. 407.
3. Crack detect as per standard practices manual 70-20-10.
4. Hand dress back to original contours.
5. Visually Inspect.
6. Vibro engrave RST 4021 adjacent to part number.

1 May 1981

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RST 4021
TR. Page 1 of 2

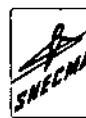
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CONCORDE

TR.NO. 72-537 (cont'd)





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HP COMPRESSOR ROTOR - REPAIR

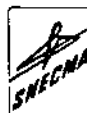
TABLE OF CONTENTS

Repair No.	Title	Scheme No.
1	Rotor Shaft Front Labyrinth Fins Repaired by Roll Forming	SAL.B.478086-9
2	Labyrinth Ring Fins Repaired by Roll Forming	SAL.B.478094
3	Drive Shaft Labyrinth Fins Repaired by Roll Forming	SAL.B.478095-7
4	Rotor Shaft Front Interstage Labyrinth Fins Repaired by Roll Forming	SAL.B.488586
5	Stage 2-3 Spacer Labyrinth Fins Repaired by Roll Forming	SAL.B.488595
6	Blending and Polishing Damaged Blades with Control on Number of Blended Blades per Stage	SAL.B.930281-8
7	HP Compressor Rotor Shaft Front Repaired by Restoring the No.6 Labyrinth Fins by Plasma Welding	SAL.B.476079
8	HP Compressor Rotor Shaft Front Repaired by Restoring the No.7 Labyrinth Fins by Plasma Welding	SAL.B.476136
9	HP Compressor Rotor Shaft Front Repaired by Restoring the No.8 Labyrinth Fins by Plasma Welding	SAL B.488618
10	2nd Stage HP Compressor Rotor Disk Repaired by Restoring Bolt Holes	B.495681
11	3rd Stage HP Compressor Rotor Disk Repaired by Restoring Bolt Holes	B.495682
12	CANCELLED	
13	HP Compressor Rotor Blades Stages 4-7 Repaired by Cold Coining	B.495644-7

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15	HP Compressor Rotor Disks Stages 2 and 3 Repaired by Blending to Remove Light Impact and Other Damage	SAL.B.497539
16	HP Compressor Rotor Disks Stages 4 to 7 Repaired by Blending to Remove Light Impact and Other Damage	SAL.B.497540
17	HP Compressor Drive Shaft Bearing Location Restored by Plasma Spraying with Metco 450	SAL.B.476039
18	HP compressor Rotor - Stage 2 to 3 Spacer Ring Repaired by Blending Damage Caused by Bolt Heads	SAL.B.499476
19	HP Compressor Rotor Shaft Front Repaired by Removal of Score Marks in Bore by Machining	SAL.B.499494
20	HP Compressor Rotor - Stage 2 to 3 Spacer Ring - Labyrinth Seal Repaired by Plasma Welding	SAL.B.935523
21	HP Compressor Rotor Shaft Front - Repair - No.1 to 2 Interstage Labyrinth Fins Restored by Plasma Welding	SAL.B.935526
22	HP Compressor Drive Shaft - Air Transfer Tube Location with Tribomet Coating	SAL.B.506054
23	HP Compressor Drive Shaft - Labyrinths 13, 14 and 15 Restored by TIG Welding	SAL.B.488639-41

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24	HP Compressor Rotor Disk Stage 2 - Removal of Corrosion by Blending and Machining	SAL.B.511542
25	HP Compressor Rotor Disk Stage 3 - Removal of Corrosion by Blending and Machining	SAL.B.511719
26	HP Compressor Rotor Disk Stage 7 - Repair of Minor Damage by Blending	SAL.B.512154
27	HP Rotor Shaft Front Labyrinths 6, 7 and 8 Restored by TIG Welding	SAL.B.508136-8
28	HP Rotor Shaft Front Bearing Location Restored by Tungsten Carbide Coating	SAL.B.512713
29	HP Compressor Rotor - Stage 2 to 3 Spacer Ring - Neutralisation and Removal of Corrosion	SAL.B.512919
30	HP Compressor Rotor - Stage 2 to 3 Spacer Ring - Removal of Corrosion on Rear Flange by Machining	SAL.B.512824
31	HP Compressor - Stages 3-4, 4-5, 5-6 and 6-7 Spacer Rings - Removal of Scoring on Retaining Bolt Locating Diameter	SAL.B.513459
32	Air Transfer Tube - Restoration of Bell-End Bore by Plasma Spray	SAL.B.513509
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34	HP Compressor - Stage 4-5 Spacer Ring - Restoration of Front and Rear Location Diameters by Plasma Spray	SAL.B.513847-48
35	HP Compressor Rotor - Stage 4 to 5 Spacer Ring - Removal of Corrosion by Blending	SAL.B.512616
36	HP Compressor Rotor - Stage 6 to 7 Spacer Ring - Removal of Corrosion by Blending	SAL.B.512617

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Repair No.	Title	Scheme No.
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38	Shaft - Rotor, Front, (H.P.C.) Stages 1-2 Interstage Labyrinth Fins Rebuilt by Mechanised T.I.G. ("Dabber") Welding and Remachined	SAL B.513351
39	Ring Spacer Stage 6-7 (H.P.C.) Provision for Restoration of Front and Rear Outer Location Diameters by Plasma Spraying	SAL B.513857-58
40	Ring Spacer Stage 6-7 (H.P.C.) Provision for Restoration of the Rear Inner Location Diameter by Plasma Spraying	SAL B.513859
41	Ring Spacer Stage 2-3. Restoration of front spigot location by plasma spray	SAL.B.514498
42	Ring Spacer Stage 2-3. Removal of corrosion from rear flange bolt holes by machining and polishing	SAL.B.514517
43	Labyrinth No.12. Restoration of worn labyrinth fins by mechanised T.I.G. welding	SAL.B.514548
44	HP Comp. Drive Shaft. Removal of corrosion and/or scoring from front flange bolt holes by blending and polishing	SAL.B.514987
45	To be issued	SAL.B.515133
46	Disk, Compressor HP Stage 1. Provision for local touch-up or re-application of anti-fret coating	SAL.B.514428
47	Blade, Compressor HP Stage 1. Provision for local touch-up or re-application of anti-fret coating	SAL.B.514429

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Repair No.	Title	Scheme No.
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49	Disk, Compressor Rotor, HP Stage 2. Provision for the restoration of front and/or rear location diameters by plasma spraying	SAL.B.515436-7
50	Blade, Compressor, HP Stages 1-3. Provision for blade aerofoil tip dressing to remove burrs and/or high metal	SAL.B.515216-18
51	Disk, Compressor Rotor, HP Stage 1. Removal of light impact and other damage from the broached root form by blending	SAL.B.515937
52	Spacer Ring, Stage 5-6 (HPC). Removal of light corrosion from inner surfaces and bolt holes by blending	SAL.B.516402A-B
53	Spacer Ring, Stage 6-7 (HPC). Removal of light corrosion from inner surfaces by polishing	SAL.B.516413
54	Spacer Ring, Stage 3-4 (HPC). Provision for the restoration of the front and rear location diameters by plasma spraying	SAL.B.516405A-B
55	Labyrinth, No.12. Removal of light corrosion from inner surfaces by polishing.	SAL.B.516644
56	Shaft, Drive Compressor HP - The blending of damage on the bolt locating diameter.	SAL.B.517751
57	Shaft, Drive, Compressor HP - Remove fretting/corrosion from No.4 bearing inner race abutment shoulder.	SAL.B.517804

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Repair No.

Title

Scheme No.

58

Ring, Spacer, Stage 3-4 (H.P.C) -
Remove corrosion from bore by
hand dressing.

SAL.B.517809

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HP COMPRESSOR ROTOR - REPAIR ROTOR SHAFT FRONT LABYRINTH FINS
REPAIRED BY ROLL FORMING

MODIFICATIONS NO. OL.8325C, OL.8423C, OL.8807C

Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-33-02	1 260A	B.922639 B.922640 B.922905 B.922906 B.922907 B.922908
	260B	B.927125 B.927126 B.927129 B.927130 B.927131 B.927132

1. Introduction

- A. This Repair describes the procedure for restoring defective labyrinth fins on the HP compressor rotor shaft front, in order to maintain the standard fin/housing clearances of labyrinth No.6, No.7 and No.8. The diameter of each fin is first increased by roll forming then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the roll forming technique applicable to this repair procedure.
- C. Dimensions are shown thus in Tables and on illustrations: INCHES (MILLIMETRES).

2. Repair Limitations

- A. Fins which have previously been repaired by welding must not be repaired by roll forming.
- B. The first repair to each HP compressor rotor shaft front must be carried out in accordance with paragraph 3. The second repair to No.8 labyrinth is to be carried out in accordance with paragraph 3 if possible. Subsequent repairs must be carried out in accordance with paragraphs 3 and 4.
- C. Verify that there is adequate material at each defective location to permit machining to the dimensions before roll forming (Ref.para.3 and 4).

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3. Summary of Operations

- A. Secure the shaft flange to the centre-lathe faceplate and set true on datum diameter B (Ref.Fig.401).
- B. Clean up defective fins; remove only the minimum amount of material to achieve the specified dimensions (Ref.Table 401 and Fig.402). A localised "witness", not exceeding 0.003 in. (0,076 mm) in depth, is acceptable on each fin.
- C. Carefully remove any burrs.
- D. Apply the roll forming technique to increase the diameter of defective fins to the specified dimensions (Ref.Table 402 and Fig.403 and 404). Helix angle required on rolling tool is 1 deg. 30 min.
- E. Remove any folds by careful blending (Ref.Fig.405).
- F. Crack test the rotor shaft with fluorescent-penetrant.
- G. Finish machine the fins (Ref.Fig.401); a maximum of 1.000 in. (25,4 mm) of the circumference which has not cleaned up is acceptable on each fin.
- H. Polish fins to remove sharp edges.
- J. Chemically etch the rotor shaft using solution A and etching technique, (Ref.72-09-14 Repair) and repeat the test for cracks (Ref.para.F).
- K. Vapour blast the rotor shaft using grit mesh 280/500.
- L. Identify repair (Ref.Table 401). Mark the appropriate repair scheme number close to the standard part number on the rotor shaft. For the second repair, mark /2 against the existing repair scheme number.

4. Amended dimensions for repeated rolling of No.6, No.7 and No.8 Labyrinth fins

- A. Machining dimensions before roll forming (Ref.Fig.402) may be reduced by 0.008 in. (0,20 mm) maximum, if necessary.



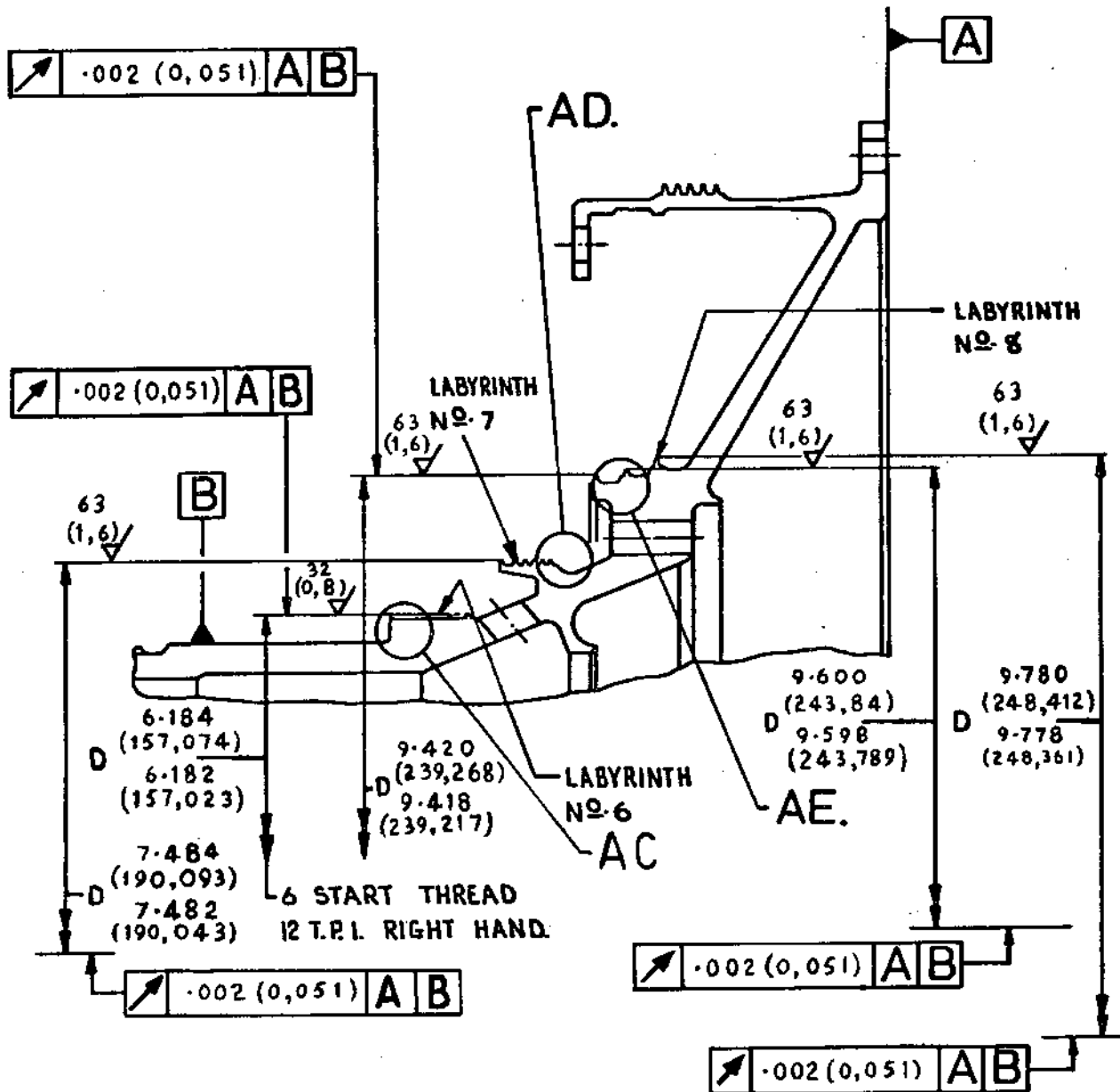
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Standard Dimensions
Figure 401

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MINIMUM MACHINED RADII (REF. FIG. 402)						
REPAIR SCHEME NO	LABY- RINTH NO	A	B	C	D	E
SAL. B. 478086	6	3.086 (78,384)	-	-	-	-
SAL. B. 478087	7	-	3.734 (94,844)	-	-	-
1ST REPAIR SAL B. 478088	8	-	-	4.883 (124,028)	4.793 (126,742)	4.703 (119,456)
2ND REPAIR SAL B. 478089	8	-	-	4.874 (123,800)	4.784 (121,514)	4.694 (119,228)

Machining Dimensions Before Roll Forming
Table 401.

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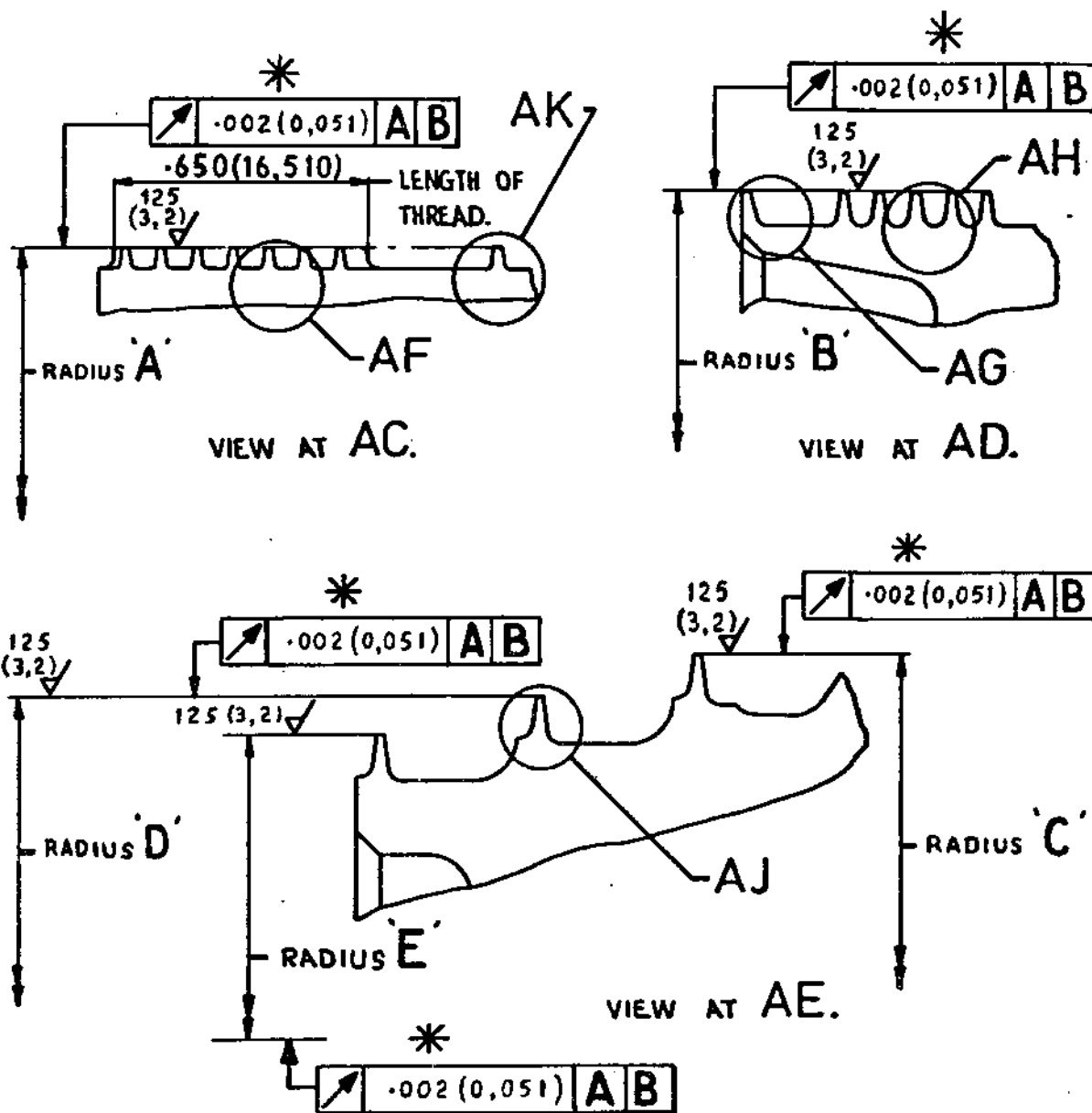


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* $\cdot 003(0,076)$ LOCAL WITNESS IS IN ADDITION TO THESE TOLERANCES.

Machining Dimensions Before Roll Forming
Figure 402

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MAXIMUM ROLLED RADII (REF.FIG.403 AND 404)						
REPAIR SCHEME NO	LABY- RINTH NO	F	G	H	J	K
SAL. B.478086	6	3.095 (78,613)	-	-	-	-
SAL. B.478087	7	-	3.745 (95,123)	-	-	-
1ST REPAIR SAL B.478088	8	-	-	4.893 (124,282)	4.803 (121,996)	4.713 (119,710)
2ND REPAIR SAL B.478089	8	-	-	4.893 (124,282)	4.803 (121,996)	4.713 (119,710)

Roll Forming Dimensions
Table 402

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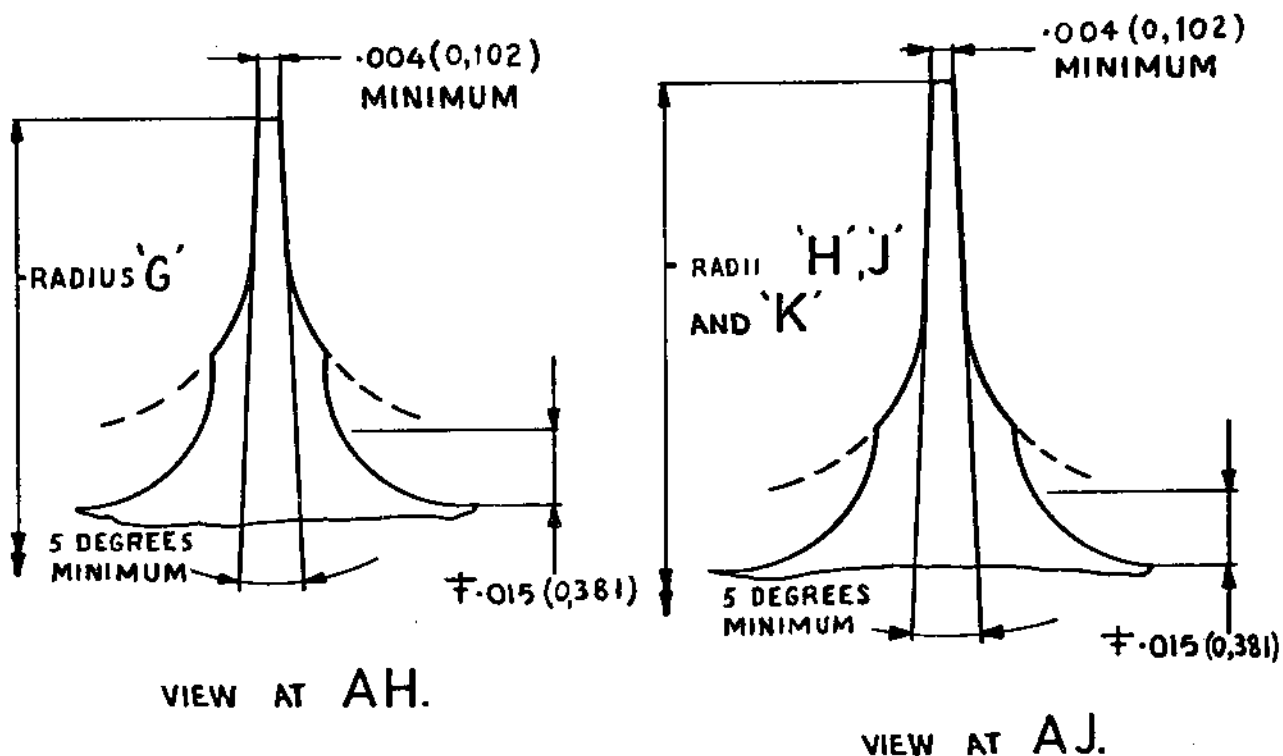
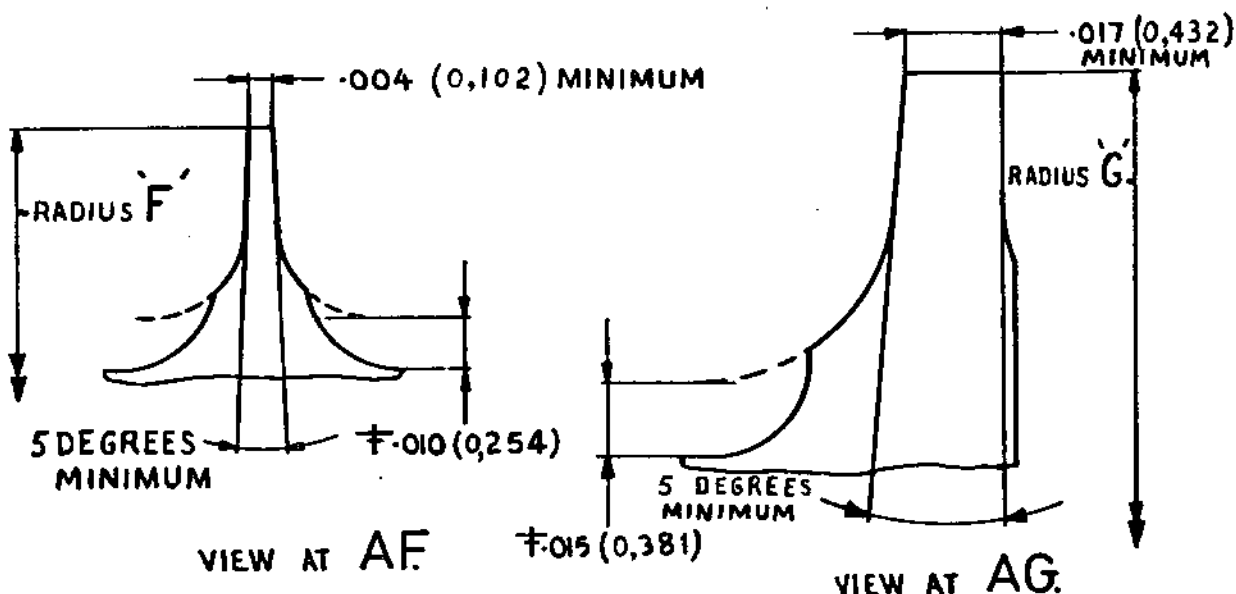
OLYMPUS 593

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± ROLLING TOOL NOT TO
ENCROACH WITHIN DIMENSION
SHOWN.

VIEW AT AJ.
APPLICABLE TO ALL THREE FINS.

Roll Forming Dimensions
Figure 403

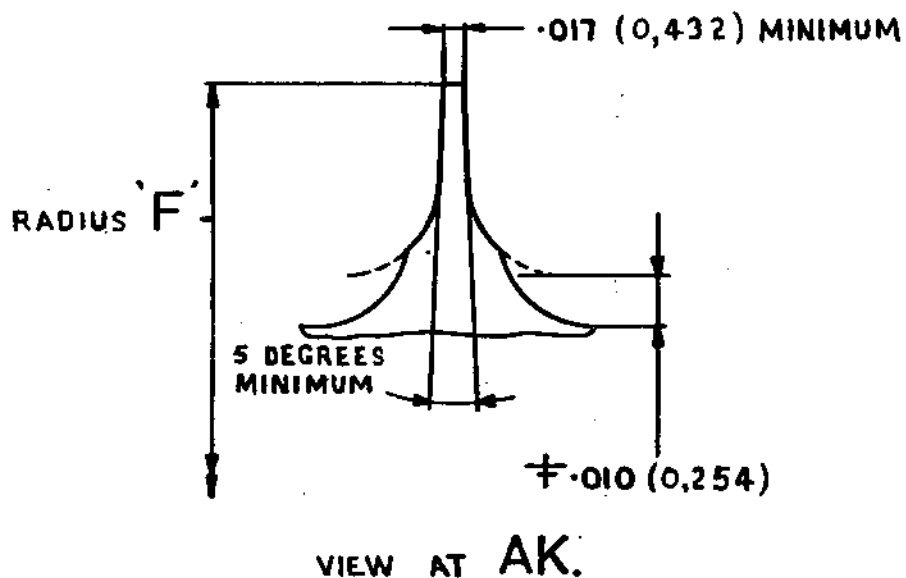
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TN6377

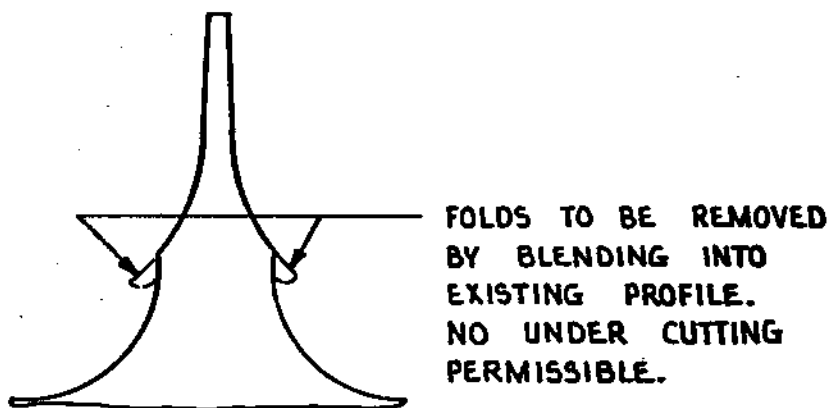


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OVERHAUL



Roll Forming Dimensions
Figure 404



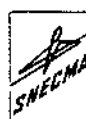
Fold Blending Detail
Figure 405

REPAIR
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Repair No.1
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MK.610-14-28

OVERHAUL



- B. Roll forming radii (Ref.Fig.403, 404) may be reduced by 0.008 in. (0,20 mm) maximum, if necessary.
- C. Standard dimensions (Ref.Fig.401) may be reduced, if necessary, as follows:

LABYRINTH NO.	STANDARD MINIMUM DIA.	REDUCED MINIMUM DIA.
6	6.182 (157,023)	6.168 (156,667)
7	7.482 (190,043)	7.462 (189,535)
8	9.418 (239,217)	9.395 (238,633)
	9.598 (243,789)	9.573 (243,154)
	9.778 (248,361)	9.754 (247,752)

Table 403

5. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Tool Holder	1	S3S.12358000	1
Rolling Tool	1	S3S.12363000	2
Roller	2	S3S.12379000	3
Roller	2	S3S.12381000	4
Roller	2	S3S.12382000	5
Shims	4	S3S.12375-78000	6

A. SAL.B.478086. Use items 1, 2, 5 and 6.

B. SAL.B.478087. Use items 1, 2, 3, 4 and 6.

C. SAL.B.478088-9. Use items 1, 2, 4 and 6.

6. Replacement Parts

A. Not required.

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HP COMPRESSOR ROTOR - REPAIR
LABYRINTH RING FINS REPAIRED BY ROLL FORMING

MODIFICATION NO. OL.8371C, OL.8807CEffectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-33-02	3 300c	B.929466 B.929467 B.933207 B.933206

1. Introduction

- A. This Repair describes the procedure for restoring defective fins on the HP compressor rotor labyrinth ring, in order to maintain the standard fin/housing clearances of labyrinth No.12. The diameter of each fin is first increased by roll forming then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the roll forming technique applicable to this repair procedure.
- C. Dimensions are shown thus in Tables and on illustrations: INCHES (MILLIMETRES).

2. Repair Limitations

- A. Fins which have previously been repaired by welding must not be repaired by roll forming.
- B. The first repair to each HP compressor labyrinth ring must be carried out in accordance with paragraph 3. Subsequent repairs must be carried out in accordance with paragraphs 3 and 4.
- C. Verify that there is adequate material at each defective location to permit machining to the dimensions before roll forming (Ref.para.3 and 4).

3. Summary of Operations

- A. Locate the labyrinth ring in fixture (Item 6) and set true in centre-lathe on datum diameter A and face D (Ref. Fig.401).

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72-33-02

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- B. Clean up defective fins; remove only the minimum amount of material to achieve the specified dimensions (Ref. Table 402 and Fig.402). A localised "witness", not exceeding 0.003 in. (0,076 mm) depth, is acceptable on each fin.
- C. Carefully remove any burrs.
- D. Apply the roll forming technique to increase the diameter of defective fins to the specified dimensions (Ref. Table 403 and Fig.403).

NOTE: Station 1. Fins are no longer used.
Station 2 to 6 inclusive: Increase in fin diameter depends on the dimensional change between pre and post rolling dimensions from face D to the rear of the fin, Ref.Fig.403. Dimensions in column \oplus apply when pre-rolling axial dimension (face D to fin face) is at maximum (maximum axial movement obtainable). Dimensions in column \mp apply when pre-rolling axial dimension is at minimum, (minimum axial movement obtainable).
Stage 7 only: As this fin is repaired by direct rolling, and not by axial displacement, only one pre-rolling radius is required.

- E. Remove any folds by careful blending (Ref.Fig.404).
- F. Crack test the labyrinth ring with fluorescent-penetrant.
- G. Refit the labyrinth ring to fixture (Item 6), set true in lathe and finish machine the fins (Ref. Table 401 and Fig.401); a maximum of 1.000 in. (25,4 mm) of the circumference which has not cleaned up is acceptable on each fin.
- H. Polish fins to remove sharp edges.
- J. Chemically etch the ring using solution 'C' (reference 72-09-14). An immersion time of 2 minutes is required, then repeat the crack detection test reference para.F.
- K. Vapour blast the ring using grit mesh 320/400.
- L. Identify repair. Mark the repair scheme number SAL B.478094 close to the standard part number on the labyrinth ring. For the second repair, mark /2 against the existing repair scheme number.

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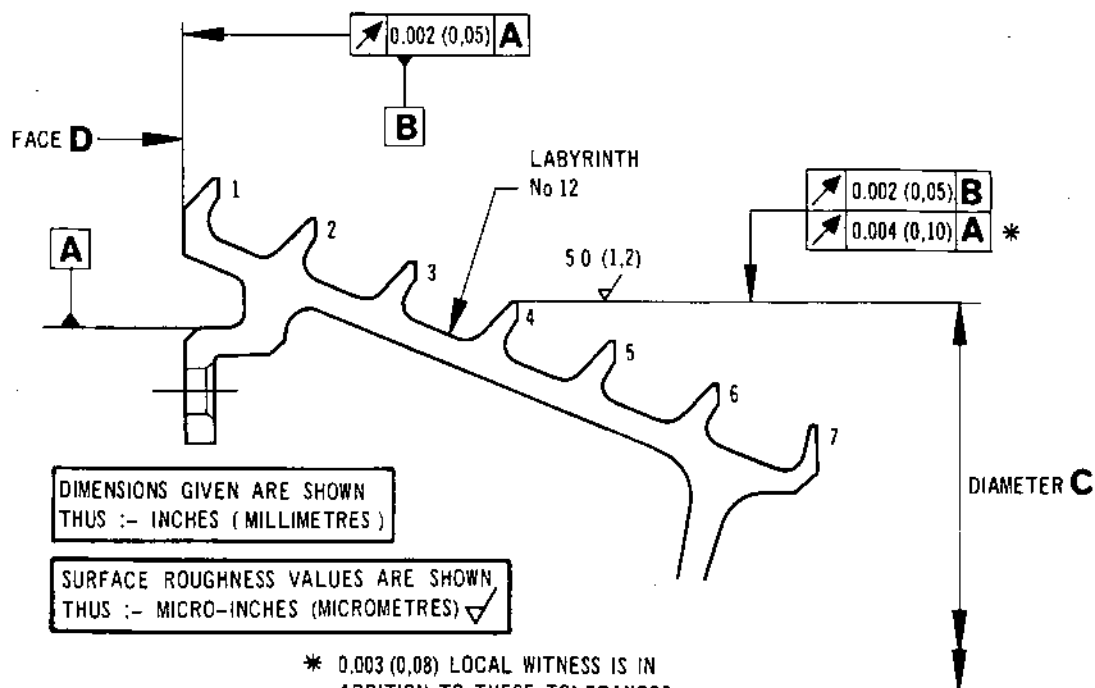


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CR 35512/00A



Standard Dimensions
Figure 401

STATION	DIAMETER C	(REF.FIG.401)
2	22.250-22.245 in.	(565,15-565,02 mm)
3	21.820-21.815 in.	(554,22-554,10 mm)
4	21.380-21.375 in.	(543,05-542,92 mm)
5	20.934-20.929 in.	(531,72-531,59 mm)
6	20.485-20.480 in.	(520,31-520,19 mm)
7	20.037-20.032 in.	(508,93-508,81 mm)

Standard Dimensions
Table 401

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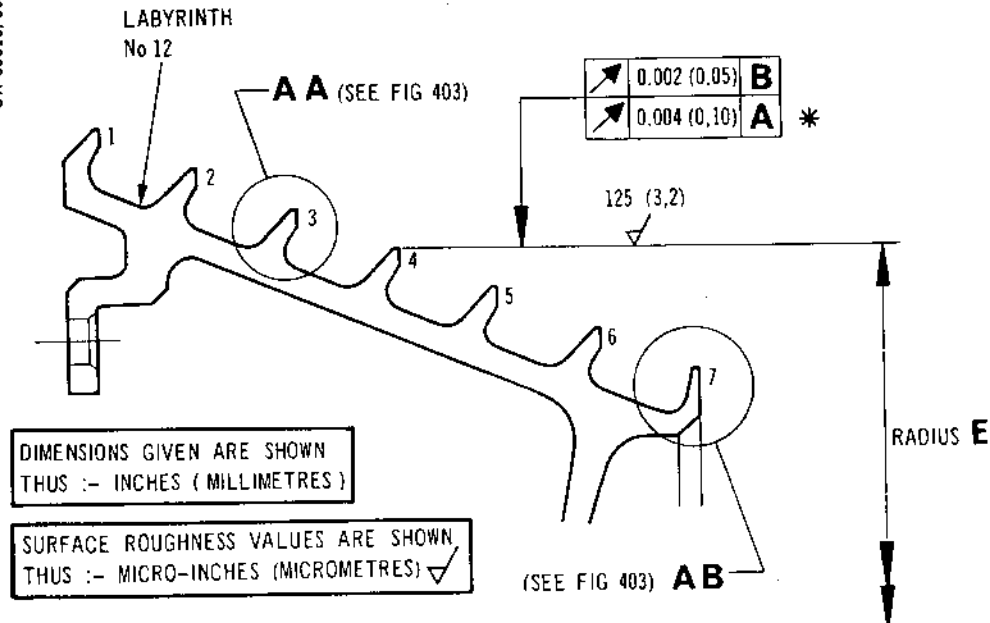


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CR 35513/00A



* 0.003 (0,08) LOCAL WITNESS IS IN
ADDITION TO THESE TOLERANCES

Machining Dimensions Before Roll Forming
Figure 402

STATION	⊕ RADIUS E	± (REF.FIG.402)
2	11.116 in. (282,34 mm)	11.120 in. (282,44 mm)
3	10.901 in. (276,88 mm)	10.905 in. (276,98 mm)
4	10.681 in. (271,29 mm)	10.685 in. (271,39 mm)
5	10.458 in. (265,63 mm)	10.462 in. (265,73 mm)
6	10.233 in. (259,91 mm)	10.237 in. (260,01 mm)
7	10.010 in. (254,25 mm)	10.019 in. (254,48 mm)

Machining Dimensions Before Roll Forming
Table 402

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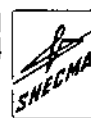
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STATION	RADIUS G (MAXIMUM)	DIMENSION F (MINIMUM)
(REF.FIG.403)		
2	-	0.650 in. (16,51 mm)
3	-	1.160 in. (29,46 mm)
4	-	1.670 in. (42,41 mm)
5	-	2.180 in. (55,37 mm)
6	-	2.690 in. (68,32 mm)
7	10.019 in. (254,48 mm)	Not Applicable

Roll Forming Dimensions
Table 403

4. Amended Dimensions for Repeated Rolling of No.12 Labyrinth Fins

- A. Machining dimensions before roll forming (Ref.Fig.402 and Table 402) may be reduced by 0.0025 in. (0,064 mm) maximum, if necessary.
- B. Roll forming radius G (Ref.Fig.403 and Table 403) may be reduced by 0.0025 in. (0,064mm) maximum, if necessary.
- C. Standard dimensions (Ref.Fig.401 and Table 401) may be reduced, if necessary, as follows:

STATION	STANDARD MINIMUM DIA.	REDUCED MINIMUM DIA.
2	22.245 (565,02)	22.240 (564,90)
3	21.815 (554,10)	21.810 (553,97)
4	21.375 (542,92)	21.370 (542,80)
5	20.929 (531,59)	20.924 (531,47)
6	20.480 (520,19)	20.475 (520,07)
7	20.032 (508,81)	20.027 (508,69)

Table 404

Any two stations may be 0.010 in. (0,254 mm) less than the dimensions given in Table 404.

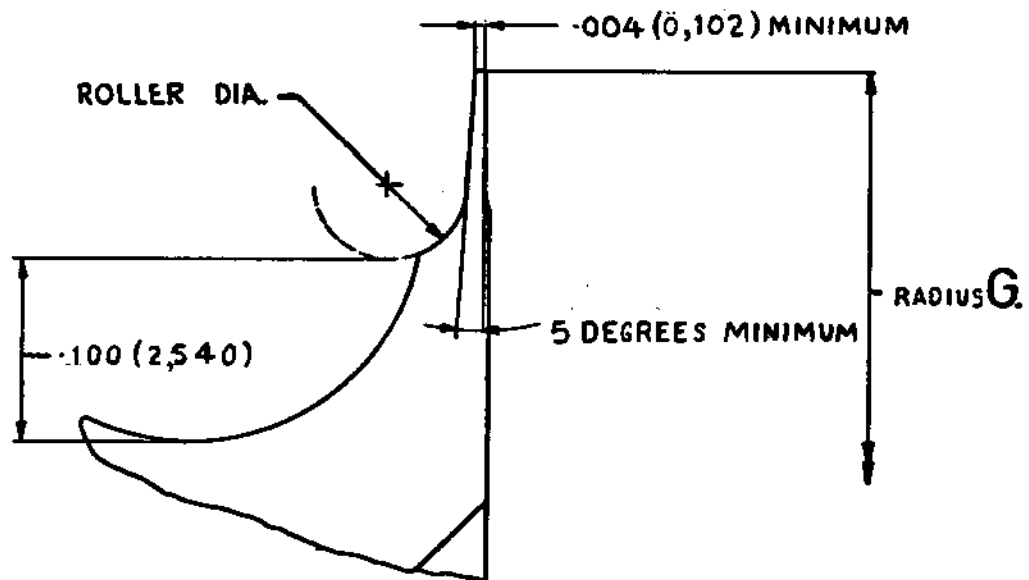
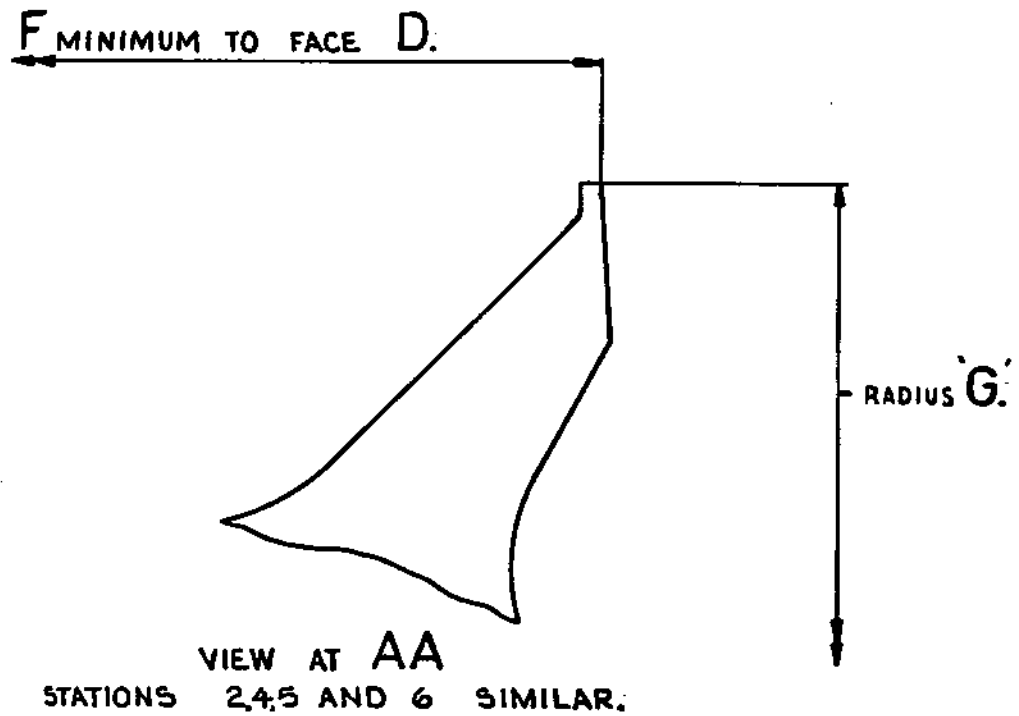
REPAIR
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Repair No.2
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OVERHAUL



VIEW AT **AB** (APPLICABLE ONLY TO STATION 7).

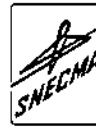
Roll Forming Dimensions
Figure 403

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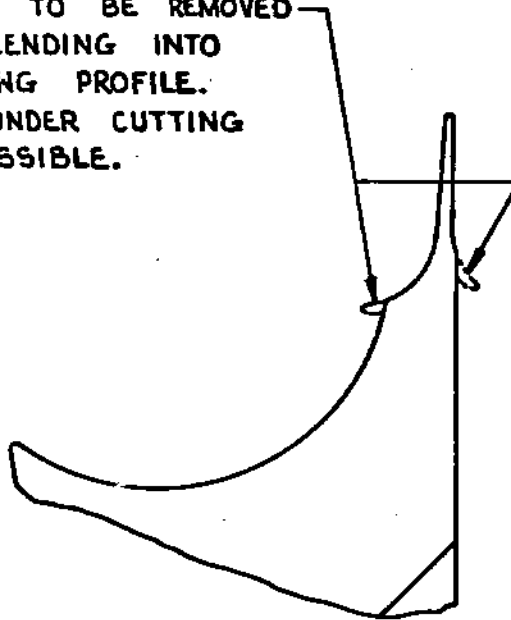
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FOLDS TO BE REMOVED
BY BLENDING INTO
EXISTING PROFILE.
NO UNDER CUTTING
PERMISSIBLE.



Fold Blending Detail
Figure 404

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5. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>	<u>Fins</u>
Tool Holder	1	S3S.12358000	1	7 only
Rolling Tool	1	S3S.12363000	2	2-6 inclusive
Rolling Tool	1	S3S.15585000	3	7 only
Roller	2	S3S.12381000	4	2-6 inclusive
Shims	4	S3S.12375-78000	5	2-6 inclusive
Fixture	1	S3S.12368000	6	2-7 inclusive

6. Replacement Parts

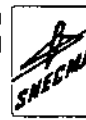
A. Not required.



OLYMPUS 593

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OVERHAUL



HP COMPRESSOR ROTOR - REPAIR
DRIVE SHAFT LABYRINTH FINS
REPAIRED BY ROLL FORMING

Applicable to:

Drive Shafts B.925461, B.925462,
B935451, B935452, B935454, B935455,
B935457, B935458

Authority:

Modification No.0L.8362C

1. Introduction

- A. This Repair describes the procedure for restoring defective labyrinth fins on the hp compressor drive shaft, in order to maintain the standard fin/housing clearances of labyrinth No.13, No.14 and No.15. The diameter of each fin is first increased by roll forming then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the roll forming technique applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

2. Repair Limitations

- A. This Repair may be applied once only.
- B. Fins which have previously been repaired by welding must not be restored by roll forming.
- C. Verify that there is adequate material at each defective location to permit machining to the dimensions before roll forming (Ref.para.3.B).

3. Summary of Operations

- A. Secure the shaft flange to the centre-lathe faceplate; use a running centre at the small end. Set the shaft true on datum diameters A and B (Ref.Fig.401).
- B. Clean up defective fins; remove only the minimum amount of material to achieve the specified dimensions (Ref. Fig.402). A localised "witness", not exceeding 0.003 in. (0,076 mm) is acceptable on each fin.
- C. Carefully remove any burrs.

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OVERHAUL



- D. Apply the roll forming technique to increase the diameter of defective fins to the roll forming dimensions (Ref. Fig.403).
- E. Remove any folds by careful blending (Ref.Fig.403).
- F. Crack test the shaft with fluorescent-penetrant.
- G. Finish machine the fins (Ref.Fig.401); a maximum of 1.000 in. (25,4 mm) of the circumference which has not cleaned up is acceptable on each fin.
- H. Polish the fins to remove sharp edges.
- J. Chemically etch the shaft using solution C and etching technique, (Ref.72-09-14 Repair) and repeat the test for cracks (Ref.para.F).
- K. Vapour blast the rotor shaft; use grit mesh 320/400.
- L. Identify repair (Ref.Table 401). Mark the appropriate repair scheme numbers close to the standard part number on the rotor shaft.

REPAIR SCHEME NO.	LABYRINTH NO. (REF.FIG.401)
SAL B.478095	13
SAL B.478096	14
SAL B.478097	15

Repair Scheme Numbers
Table 401

4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Tool Holder	1	S3S.12358000	1
Rolling Tool	1	S3S.12363000	2
Roller	2	S3S.12380000	3
Shims	4	S3S.12375-78000	4

5. Replacement Parts

- A. Not required.

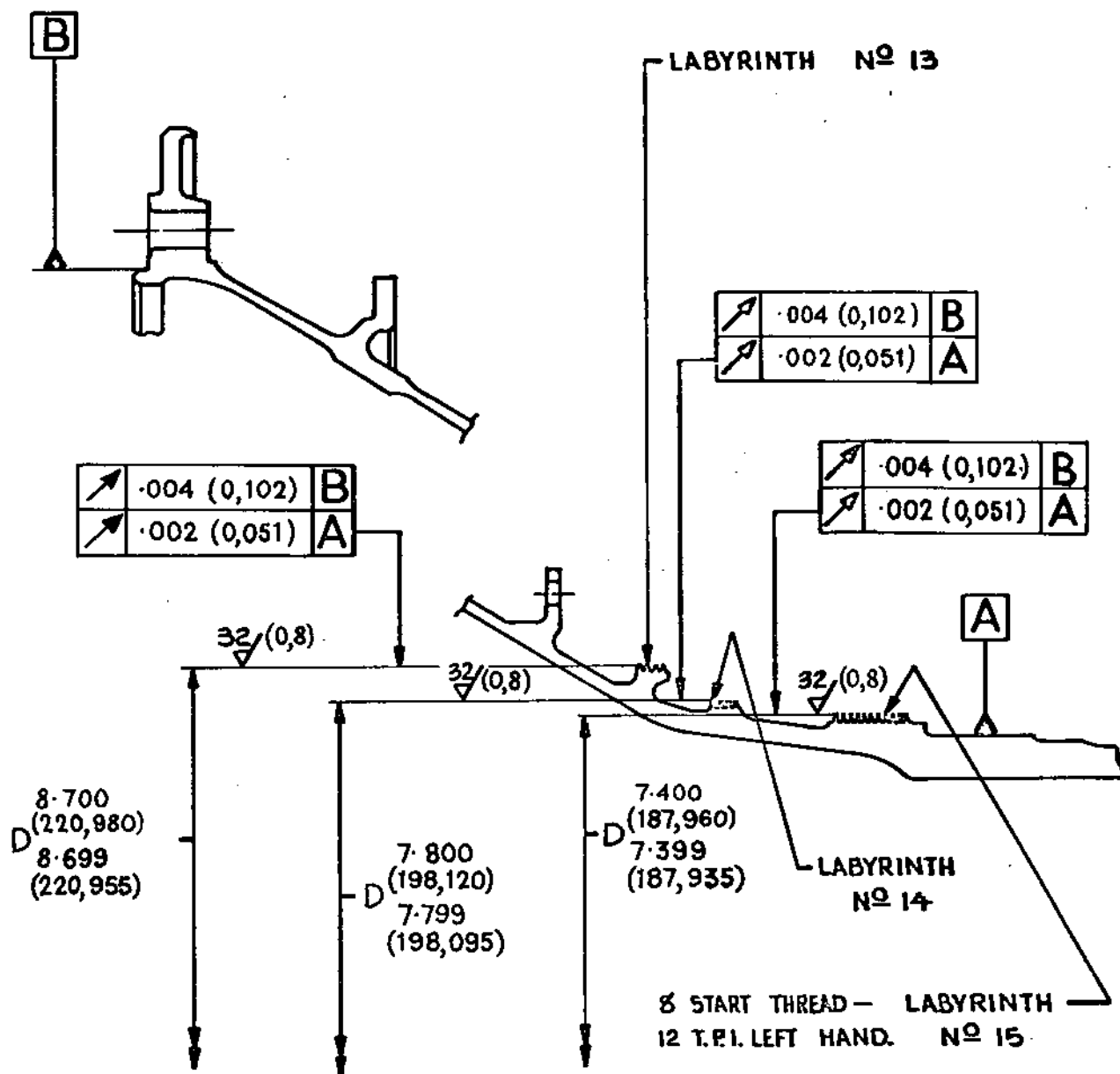
REPAIR
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Repair No.3
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MK. 610-14-28
OVERHAUL



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Standard Dimensions
Figure 401

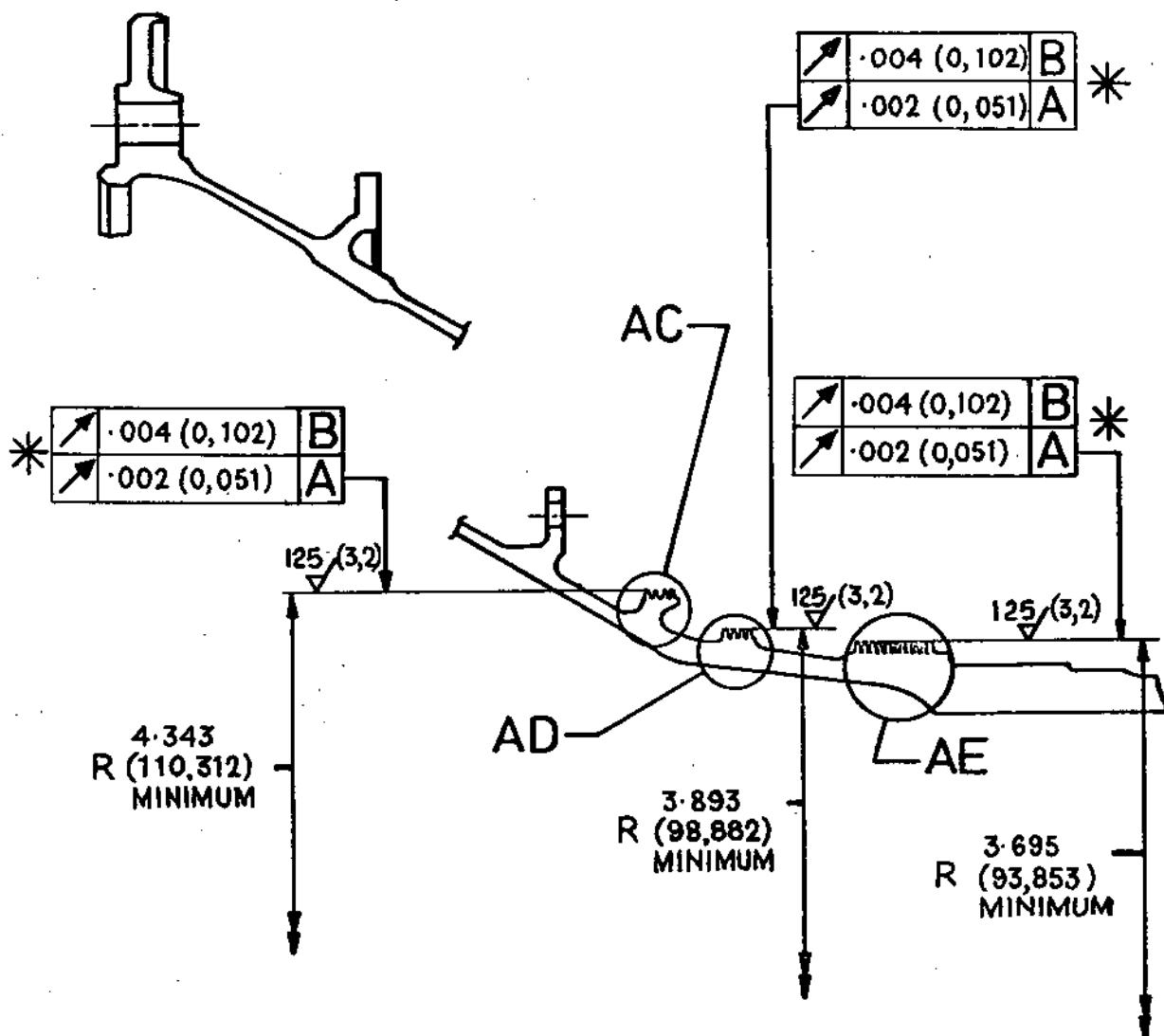
REPAIR
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* $.003 (0,076)$ LOCAL WITNESS IS IN ADDITION TO THESE TOLERANCES.

Dimensions Before Roll Forming
Figure 402

REPAIR
72-33-02

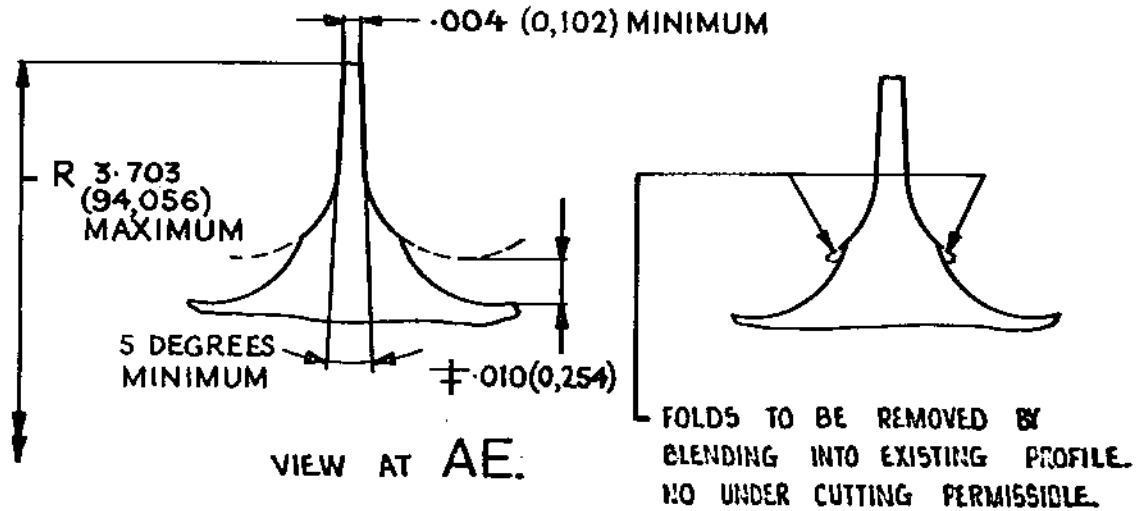
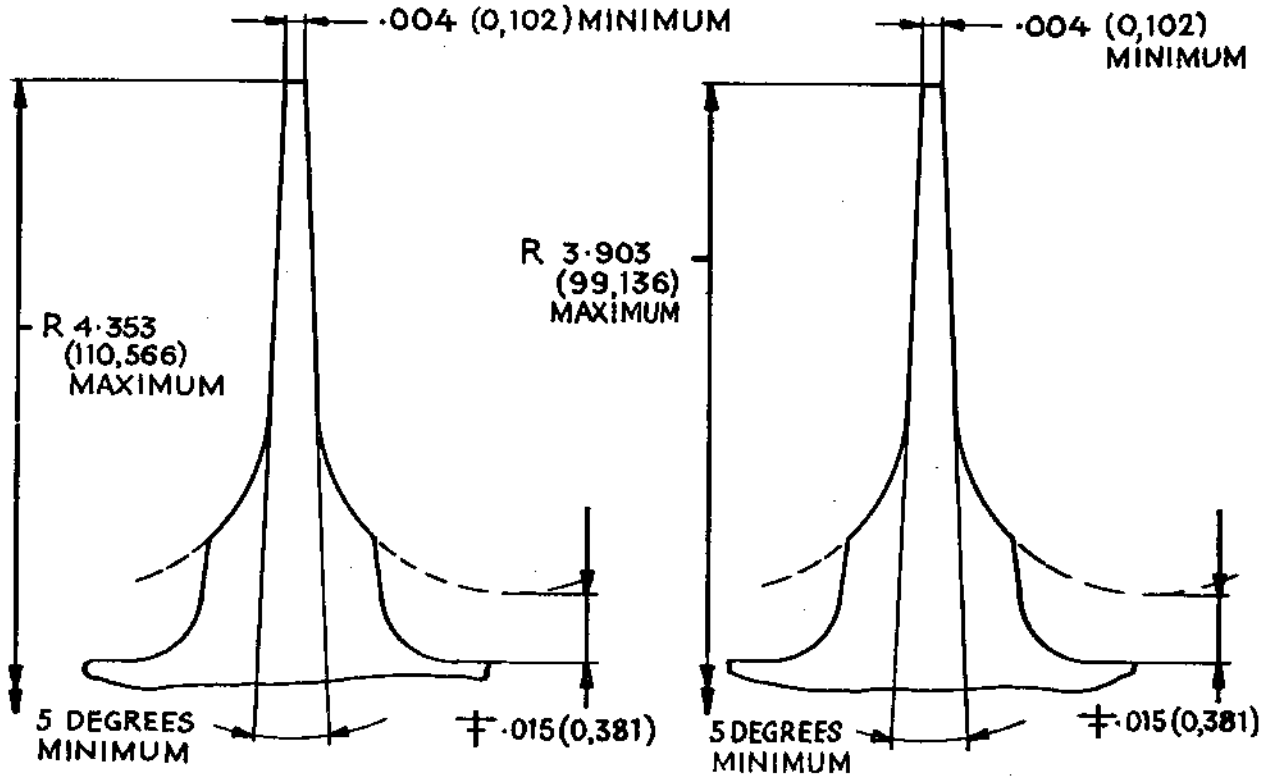
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OVERHAUL



ROLLING TOOL NOT TO ENCROACH WITHIN DIMENSION SHOWN.

Roll Forming Dimensions and
Fold Blending Details
Figure 403



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OVERHAUL



HP COMPRESSOR ROTOR - REPAIR ROTOR SHAFT FRONT INTERSTAGE
LABYRINTH FINS REPAIRED BY ROLL FORMING

MODIFICATION NO. OL.8388C

Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-33-02	1 260B	B.927125 B.927126 B.927129 B.927130 B.927131 B.927132 B.930066 B.930067 B.930068 B.930069 B.930070 B.930071 B.930072 B.930073 B.930074 B.930075 B.930076 B.930077

1. Introduction

- A. This Repair describes the procedure for restoring defective interstage labyrinth fins on the HP compressor rotor shaft front, in order to maintain the standard fin/housing clearances. The diameter of each fin is first increased by roll forming then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the roll forming technique applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

2. Repair Limitations

- A. This Repair may be applied once only.
- B. Fins which have previously been repaired by welding must not be restored by roll forming.
- C. Verify that there is adequate material at each defective location to permit machining to the dimensions before roll forming (Ref.para.3.B).

3. Summary of Operations

- A. Secure the shaft to the centre-lathe face plate on datum face A and set true on datum diameter B (Ref.Fig.401).

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TN46307

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- B. Clean up defective fins; remove only the minimum amount of material to achieve the specified dimensions (Ref. Fig.402). A localised "witness", not exceeding 0.003 in. (0,076 mm) is acceptable on each fin.
- C. Carefully remove any burrs.
- D. Apply the roll forming technique to increase the diameter of defective fins to the roll forming dimensions (Ref. Fig.403).
- E. Remove any folds by careful blending (Ref.Fig.403).
- F. Crack test the shaft by the process specified for this component in 72-33-02, Inspection/Check.
- G. Finish machine the fins (Ref.Fig.401); a maximum of 1.000 in. (25,4 mm) of the circumference which has not cleaned up is acceptable on each fin.
- H. Polish the fins to remove sharp edges.
- J. Chemically etch the shaft using solution A and etching technique, (Ref.72-09-14 Repair) and repeat the test for cracks (para.F).
- K. Vapour blast the rotor shaft; use alumina, garnet or quartz grit mesh 320/400.
- L. Identify repair. Mark the repair scheme number SAL B.488586 close to the standard part number on the rotor shaft.

4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Tool Holder	1	S3S12358000	1
Rolling Tool	1	S3S12363000	2
Roller	2	S3S12381000	3
Shims	4	S3S12375-78000	4

5. Replacement Parts

- A. Not required.

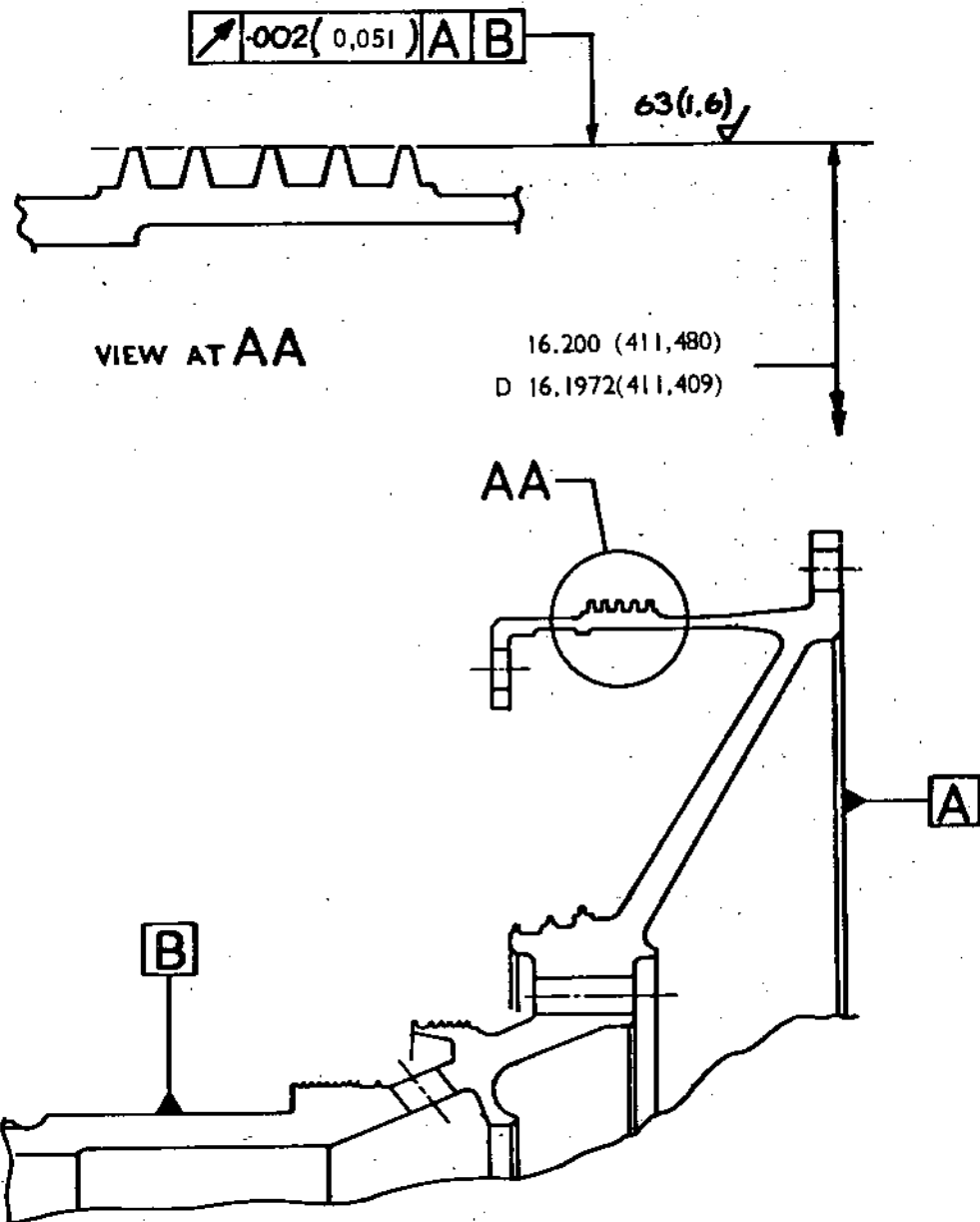
TN46308

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GEOMETRIC TOLERANCES APPLY IN THE RESTRAINED STATE.

Standard Dimensions
Figure 401

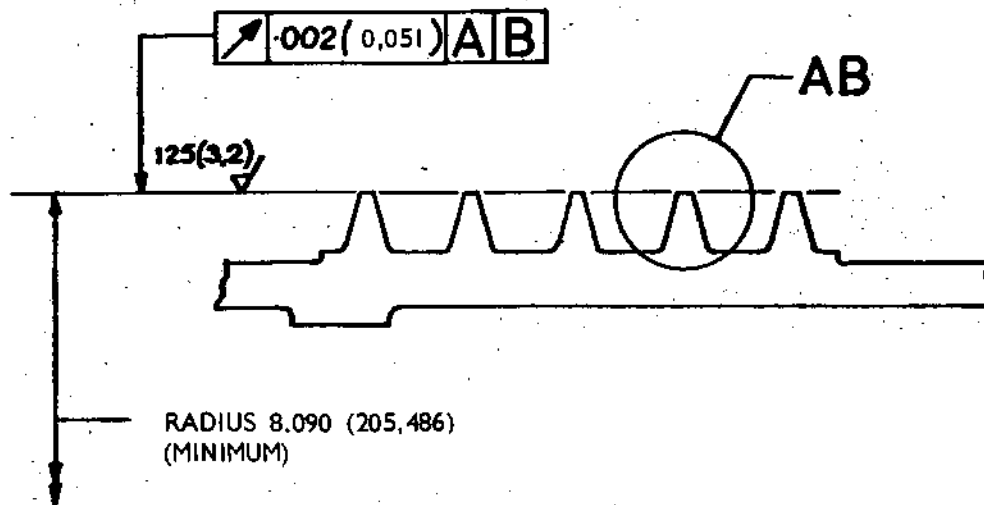
REPAIR
72-33-02

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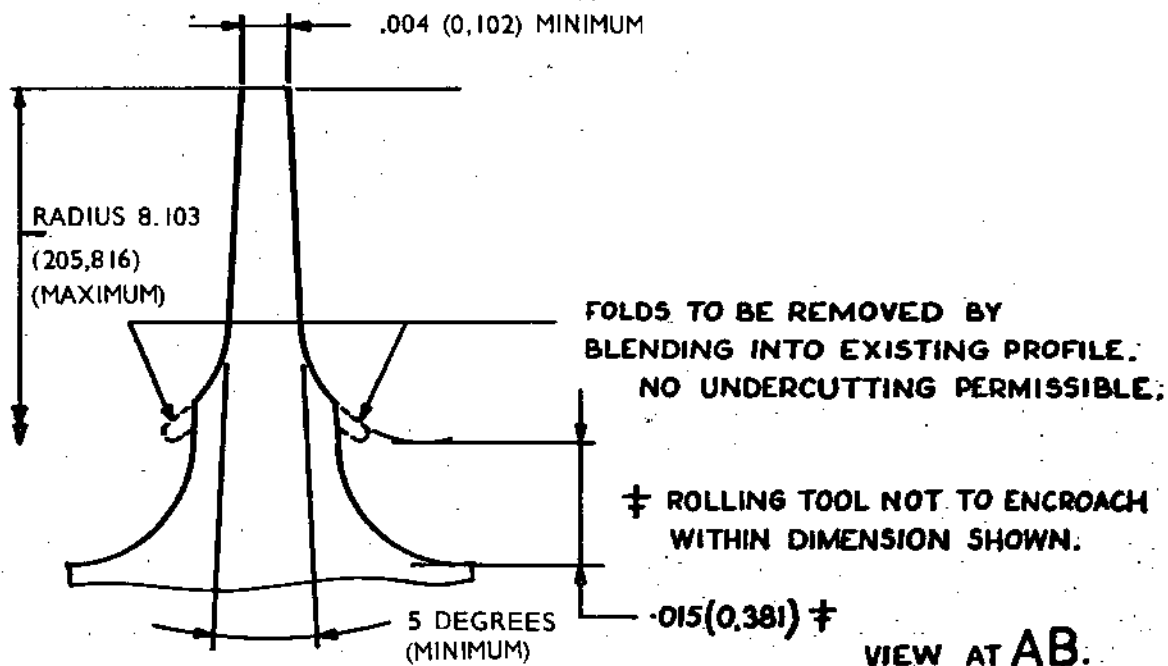
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SECTION THROUGH INTERSTAGE
LABYRINTH.

Dimensions Before Roll Forming
Figure 402



Roll Forming Dimensions
Figure 403

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Repair No. 4
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11N22468



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HP COMPRESSOR ROTOR - REPAIR
STAGE 2-3 SPACER RING LABYRINTH FINS REPAIRED BY ROLL FORMING

Applicable to: Spacer Rings B.922835, B.922836

Authority: Modification No. OL.8399C

1. Introduction

- A. This Repair describes the procedure for restoring defective labyrinth fins on the hp compressor rotor stage 2-3 spacer ring in order to maintain the standard fin/housing clearances. The diameter of each fin is first increased by roll forming then machined to standard dimensions.
- B. Refer to Chapter 72-09-00, Repair for all standard practices, tolerancing and the roll forming technique applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

2. Repair Limitations

- A. This Repair may be applied once only.
- B. Fins which have previously been repaired by welding must not be restored by roll forming.
- C. Verify that there is adequate material at each defective location to permit machining to the dimensions before roll forming (Ref.para.3.C).

3. Summary of Operations

- A. Strip the aluminium enamel from the component.
- B. Locate the spacer ring in fixture (Item 5) and set true on datum face A and datum diameter B (Ref.Fig.401).

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- C. Clean up defective fins; remove only the minimum amount of material to achieve the specified dimensions (Ref. Fig.402). A localised "witness", not exceeding 0.003 in. (0,076 mm) is acceptable on each fin.
- D. Carefully remove any burrs.
- E. Apply the roll forming technique to increase the diameter of defective fins to the roll forming dimensions (Ref.Fig.403).
- F. Remove any folds by careful blending (Ref.Fig.403).
- G. Crack test the spacer by the process specified for this component in 72-33-02, Inspection/Check.
- H. Finish machine the fins (Ref.Fig.401); a maximum of 1.000 in. (25,4 mm) of the circumference which has not cleaned up is acceptable on each fin.
- J. Polish the fins.to remove sharp edges.
- K. Repeat the test for cracks (Ref. para.G).
- L. Apply high-heat resisting aluminium enamel all over the spacer ring except spigot diameters AB and AC, faces AD and areas 0.650 in. (16,510 mm) in diameter around holes on faces AE.
- M. Identify repair. Mark the repair scheme number SAL B.488595 close to the standard part number on the spacer ring.

4. Special Tools, Fixtures and Equipment

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item</u>
Tool Holder	1	S3S12358000	1
Rolling Tool	1	S3S12363000	2
Roller	2	S3S12381000	3
Shims	4	S3S12375-78000	4
Fixture	1	S3S12421000	5

5. Replacement Parts

- A. Not Required.



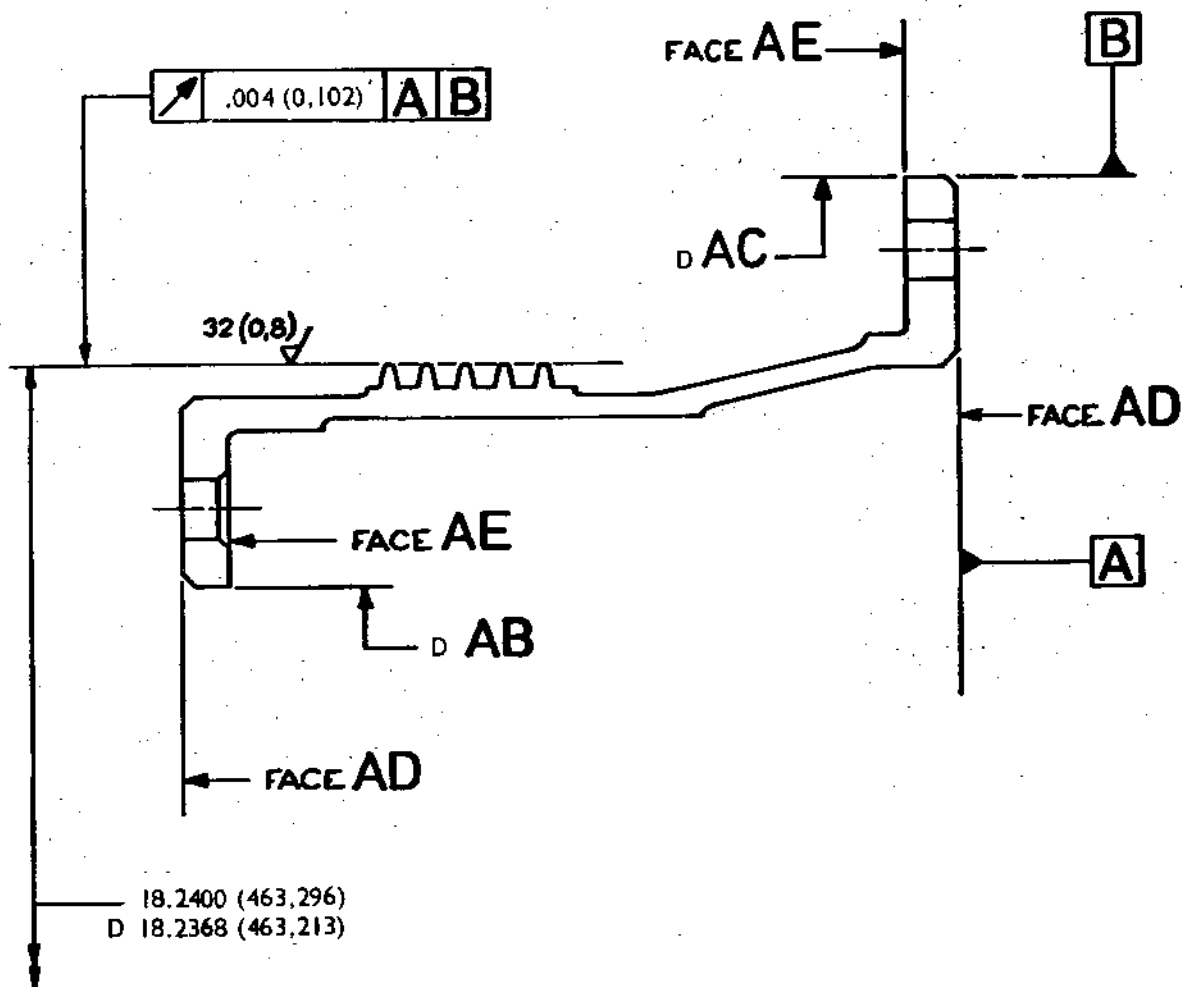
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GEOMETRIC TOLERANCES AND DIMENSIONS APPLY
IN THE RESTRAINED STATE.

Standard Dimensions
Figure 401

REPAIR

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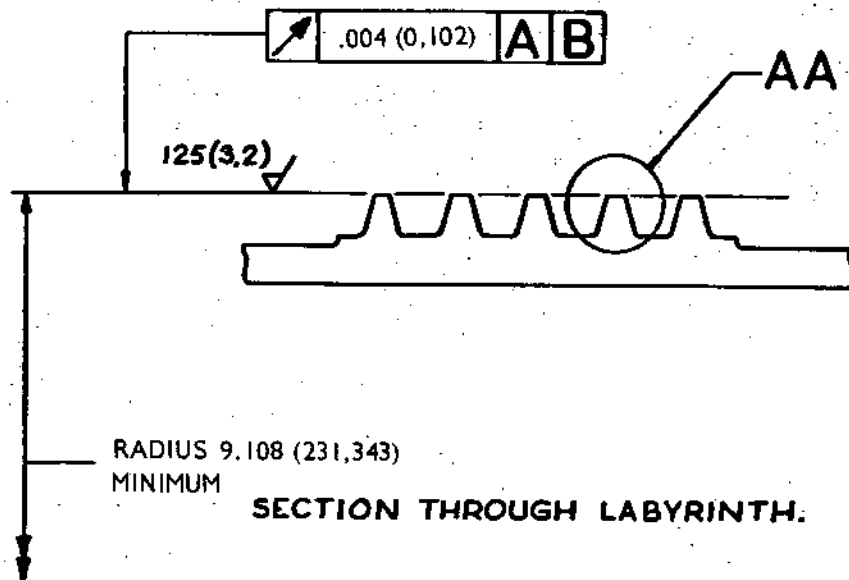
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TN31618



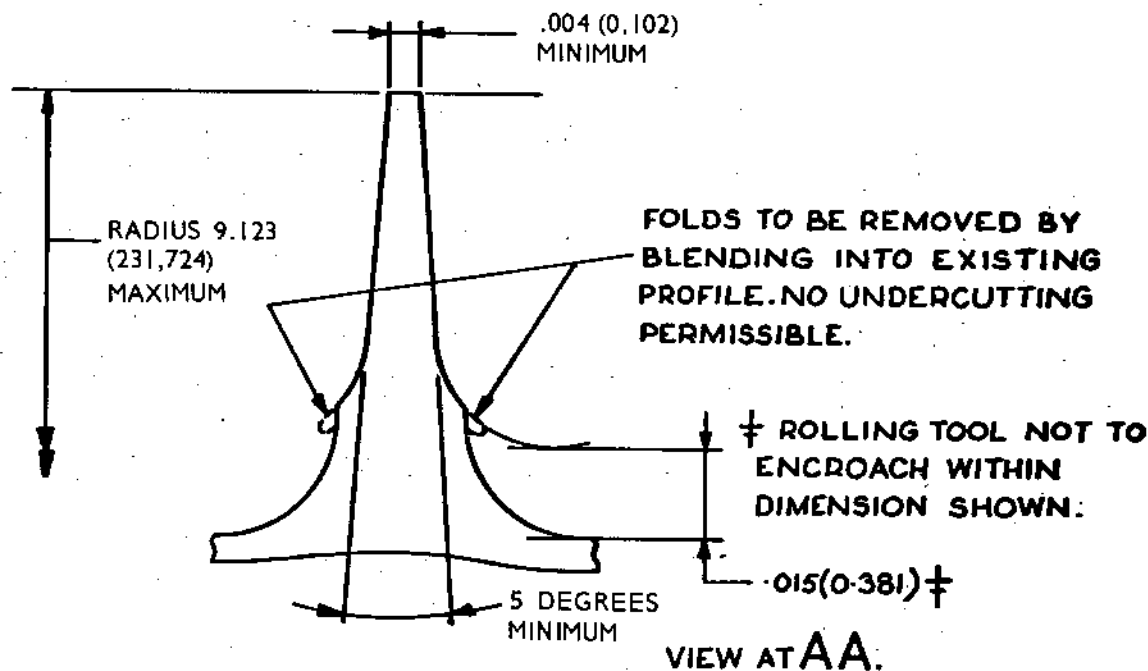
OLYMPUS 593

MK.610-14-28
OVERHAUL



SECTION THROUGH LABYRINTH.

Dimensions Before Roll Forming
Figure 402



Roll Forming Dimensions
Figure 403

TN31619

REPAIR
72-33-02

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OVERHAUL

sneema

HP COMPRESSOR ROTOR - REPAIR
BLENDING AND POLISHING DAMAGED BLADES WITH
CONTROL ON NUMBER OF BLENDED BLADES PER STAGE
(SCHEME NO. B.930281 - 8 APPLICABLE TO ALL STAGES)

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Stage</u>	<u>Part Numbers up to and including Mod. No.</u>
72-33-02	01 210	1	OL.8563
	01 280	2	OL.9006
	01 340	3	OL.9006
	02 10	4	OL.8031 AND B.932816 B.932820 B.932821 B.932822
	02 60	5	OL.8265 AND B.932817 B.932825 B.932826
	02 110	6	OL.8265 AND B.932818 B.932829 B.932830 B.932831
	03 360	7	OL.8031 AND B.932819 B.932834 B.932835

2. Authority Modification No. OL.8462C and OL.8814C.3. Introduction

- A. The text and Fig.401 of this Repair defines the blending procedure (SAL B.930281) applicable to all HP compressor rotor blades and must read in conjunction with the specific data for each stage of blades given on Fig.401 to 404.
- B. Refer to 72-09-00 Repair for all standard practices applicable to this repair procedure.
- C. Dimensions are shown thus: INCHES (MILLIMETRES).

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4. Instructions

A. General.

- (1) Test blades for cracks, before and after blending, by the fluorescent dye process specified for the blades in 72-33-02 Inspection/Check; reject cracked blades.
- (2) Blades with dents which deform the opposite surface of the blade are not acceptable for blending; reject blades with this form of damage.
- (3) A blend in zone Z must not run out into zone X.

B. Procedure.

- (1) Crack test blades to determine full extent of damage. Refer to the fluorescent dye process specified for the blades in 72-33-02 Inspection/Check.
- (2) Dress to remove damage.

CAUTION: IF MECHANICAL BLENDING METHODS ARE USED, ENSURE THAT BLADES ARE NOT OVERHEATED.

- (a) Polish acceptable surface dents (Ref. para.4.(2)) to remove burrs.
- (b) Blend torn, rough or scored edges to a depth 20 per cent greater than the depth of damage, provided that specified limits are not exceeded.
- (c) If adjacent blends interfere, remove material from between them to produce a coupled blend.
- (d) Profile edge blends smoothly into the aerofoil shape (Ref.Fig.401).
- (e) Polish blends and defective areas.
- (f) Remove only the minimum amount of material consistent with the specified requirements and dimensions.

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British airways

CONCORDE

OLYMPUS 593 OVERHAUL MANUAL

TEMPORARY REVISION No. 72-516

Insert in 72-33-02 Repair 6 before page 403

REASON FOR ISSUE:

To discontinue on British Airways engines only, the post dressing procedures on H.P. compressor blades as quoted in the Rolls-Royce repair procedure No.6. (MRA 72).

ACTION

Delete paragraphs B(5) Etch the blades B(7) Glass bead peening and B(8) Vapour blasting and passivation.

NOTE: Only applicable to British Airways engines.



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- (g) In zone X, blending is permitted only as defined in (i) and (ii).
 - (i) Blend light nicking of the edges.
 - (ii) Polish out light surface scratches; 0.002 in. (0,050 mm) maximum permissible depth.
- (h) For opposing blends the chordal width must not be reduced by more than dimension A.
- (j) When blending within dimension D of blade tip, blend out towards the tip.
- (k) Blending and polishing marks must be only in a radial direction, from root to tip.
- (l) Blend and polish to a surface finish of 32 MICROINCHES (0,8 MICROMETRES).
- (3) Clean blades by the process specified for the blades in 72-33-02 Cleaning.
- (4) Vapour degrease the vanes.

CAUTION: OBSERVE THE RESTRICTION ON THE PERIOD OF IMMERSION FOR TITANIUM COMPONENTS (REF.72-09-00 CLEANING) FOR STAGE 1, 2 AND 3 BLADES.
- (5) Etch the blades (Ref.72-09-14 Repair).
 - (a) Use Solution A for Stages 1, 2 & 3 blades, either by Immersion or by Swab etch.
 - (b) For Immersion etching proceed as follows:
 - (i) Mask the blade roots and other areas not to be etched, with approved Acid Resistant Lacquer (I.C.I.F230-2006).
 - (ii) Etch the blades for the minimum time to achieve the desired surface for inspection, up to a maximum time of 20 seconds after the onset of gassing.
 - (iii) Remove the Lacquer by vapour degreasing (Ref.72-09-00 Cleaning).

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- (c) For Swab etching, apply the etch to the repaired area only. Do not allow the etch solution to come into contact with blade roots. Swab etch for a minimum time of 30 seconds.
- (d) Use Solution B for Stages 4, 5, 6 & 7 blades, either by Immersion or by Swab etch.
- (e) For Immersion etching proceed as follows:
 - (i) Mask the blade roots and other areas not to be etched, with approved Acid Resistant Lacquer (I.C.I.F230-2006).
 - (ii) Etch the blades for the minimum time to achieve the desired surface for inspection, up to a maximum time of 60 seconds.
 - (iii) Remove the Lacquer by vapour degreasing (Ref.72-09-00 Cleaning).
- (f) For Swab etching, apply the etch to the repaired area only. Do not allow the etch solution to come into contact with blade roots. Swab etch for a minimum time of 30 seconds.
- (g) Remove the masking lacquer from blades by vapour degreasing to the approved specification (Ref.72-09-00 Cleaning).
- (6) Repeat the test for cracks.
- (7) Glass bead peen stage 1, 2 and 3 blades (Ref. 72-09-15 Repair).
 - (a) Apply masking tape to the blade roots and other areas which are not to be peened.
 - (b) Peen to the Parameters for Procedure A specified in the glass bead peening procedure, for a period of three to five seconds per sq. in. (645 sq. mm) of blade surface.
 - (c) Remove the masking tape from the blades.

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(8) Vapour blast and passivate stage 4, 5, 6 and 7 blades (Ref.72-09-13 Repair).

- (a) Apply masking tape to the blade roots and other areas which are not to be blasted.
- (b) Vapour blast to the Parameters for Procedure A and Special Details for Blades and Vanes specified in the vapour blasting procedure.
- (c) Remove masking tape from the blades.
- (d) Passivate stage 4, 5, 6 and 7 blades for a minimum period of two hours.

5. Assessment of Amount of Blending per Blade (All Stages)

- A. Blades may be blended in several positions provided that the total extent of blending is not more than the equivalent of two blends to the maximum in zone Z.
- B. Depth of blending is controlled by zones.
- C. The maximum permissible number of blended blades per stage, when blended to maximum limits, is identified as L on the illustrations.

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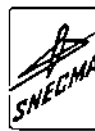
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- D. Where blades are not blended to the permissible maximum, this number (Ref. para.C.) may be increased, provided that the aggregate of the blending does not exceed L.
- E. Permissible blending is controlled by depths e.g. stage 1 blade.
- (1) 0.150 in. (3,81 mm) depth x two blends = 0.300 in. (7,62 mm) total = maximum blended blade.
 - (2) This maximum may be obtained as defined in (a) and (b), or by any combination of depths the total of which does not exceed 0.300 in. (7,62 mm).
 - (a) 0.100 in. (2,54 mm) depth x three blends.
 - (b) 0.075 in. (1,90 mm) depth x four blends.
- F. One coupled blend = two blends.
- G. Dimension D blend = one blend.
- H. Dimension E blend = half blend depth assessed as
RADIUS \div 2.

6. Assessment of Blending Equivalent to L Number of Blended Blades per Stage

A. Example for stage 1 blade.

- (1) L = three blades x 0.300 in. (7,62 mm) depth = 0.900 in. (22,86 mm) aggregate depth.
- (2) This aggregate may be obtained as defined in (a) and (b), or by any aggregate of blended blades which does not exceed 0.900 in. (22,86 mm).
 - (a) 0.180 in. (4,57 mm) depth x five blades.
 - (b) 0.150 in. (3,81 mm) depth x six blades.



7. HP Compressor Blades Stage 2 Only

NOTE: This para. only applies to the HP compressor rotor stage 2 blades that have been blended.

A. Frequency Check Blended Blades.

- (1) Check the frequency number marked on the base of each blade.
- (2) If the frequency number is above 2060 Hz, proceed to para.8.
- (3) If the frequency number is between 2040 and 2060 Hz then the blade must be re-frequency checked as detailed in SB.72-8777-302 para.2.C. If the frequency is above 2040 Hz, line through the old number and re-number with the new frequency. If the frequency is below 2040 Hz, reject the blade.

8. Identify Repair (Ref. Table 401)

- A. Mark the repair scheme number, appropriate to the stage of blades, close to the standard part number on the blades (Ref.72-09-00 Repair).

NOTE: Do not mark the number of this scheme SAL B.930281 on blades.

HP ROTOR STAGE	REPAIR SCHEME NUMBER
1	SAL B.930282
2	SAL B.930283
3	SAL B.930284
4	SAL B.930285
5	SAL B.930286
6	SAL B.930287
7	SAL B.930288

Table 401

9. Special Tools, Fixtures and Equipment

- A. Not required.

10. Replacement Parts

- A. Not required.



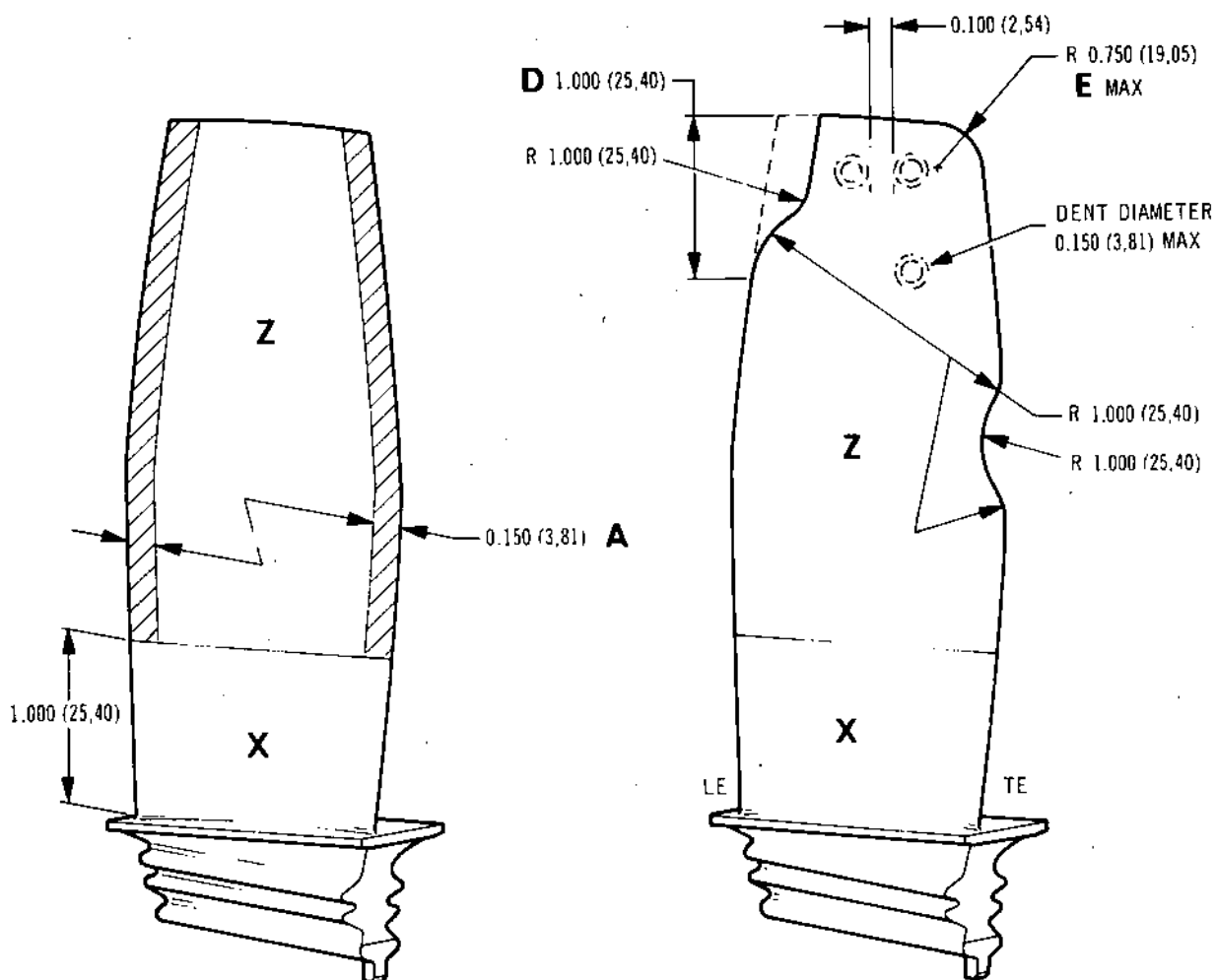
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RADI TO BLEND SMOOTHLY INTO AEROFOIL SHAPE
BLENDING INSTRUCTIONS APPLICABLE TO ALL STAGES



THIS SCHEME MUST BE READ IN CONJUNCTION WITH SAL B 930281 (REF.PARA.3.A.).

IN ZONE **X** EDGE BLENDS 0.010 (0,25) DEEP MAX. PERMITTED WITH BLEND RADI AS FOR ZONE **Z**.

DIMENSIONS **D** AND **E** CAN BE APPLIED TO EITHER LEADING OR TRAILING EDGES.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 3

MARK SAL B 930282 CLOSE TO STANDARD PART NUMBER.

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Stage 1 HP Compressor Blades - Blending Data
Figure 401

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TN28615

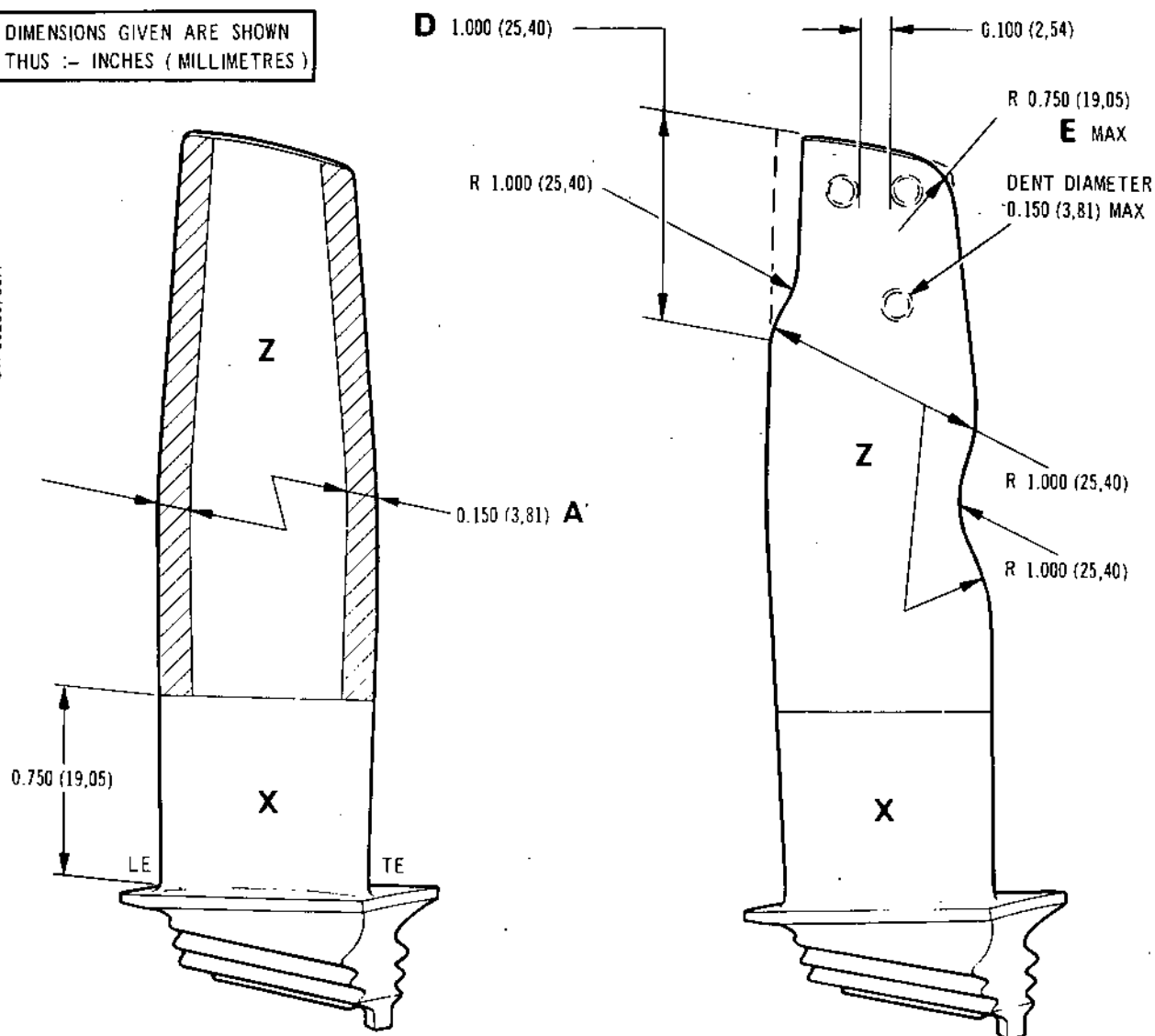


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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

CR 35280/00A



THIS SCHEME MUST BE READ IN CONJUNCTION WITH SAL
B.930281 (REF. PARA.3.A.)

IN ZONE X, EDGE BLENDS 0.010 (0.25) DEEP MAX.,
PERMITTED WITH BLEND RADII AS FOR ZONE Z.

DIMENSIONS D AND E CAN BE APPLIED TO EITHER LEADING
OR TRAILING EDGES.

L - MAXIMUM NUMBER OF BLADES BLENDED TO MAXIMUM = 5.

MARK SAL B.930283 CLOSE TO STANDARD PART NUMBER.

Stage 2 HP Compressor Blades - Blending Data
Figure 402

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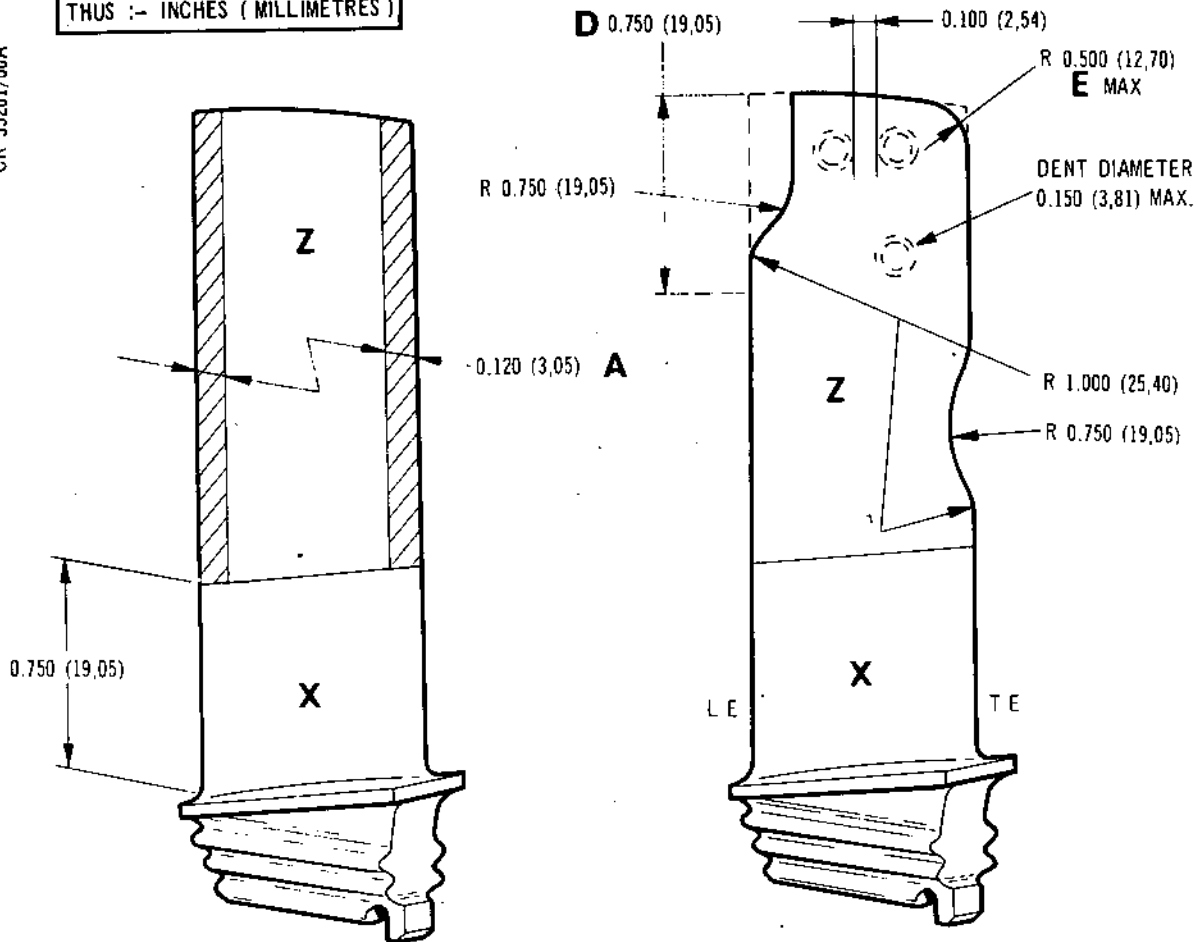
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MK.610-14-28
OVERHAUL



CR 35281/00A

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



THIS SCHEME MUST BE READ IN CONJUNCTION WITH SAL
B.930281 (REF. PARA. 3.A.).

IN ZONE **X** EDGE BLENDS 0.010 (0,25) DEEP MAX..
PERMITTED WITH BLEND RADII AS FOR ZONE **Z**

DIMENSIONS **D** AND **E** CAN BE APPLIED TO EITHER LEADING
OR TRAILING EDGES.

L - MAXIMUM NUMBER OF BLADES BLENDED TO
MAXIMUM = 5 FOR STAGE 3
7 FOR STAGE 4.

MARK APPROPRIATE SCHEME NUMBER CLOSE TO STANDARD
PART NUMBER. STAGE 3 SAL B.930284
STAGE 4 SAL B.930285.

Stage 3 and 4 HP Compressor Blades - Blending Data
Figure 403

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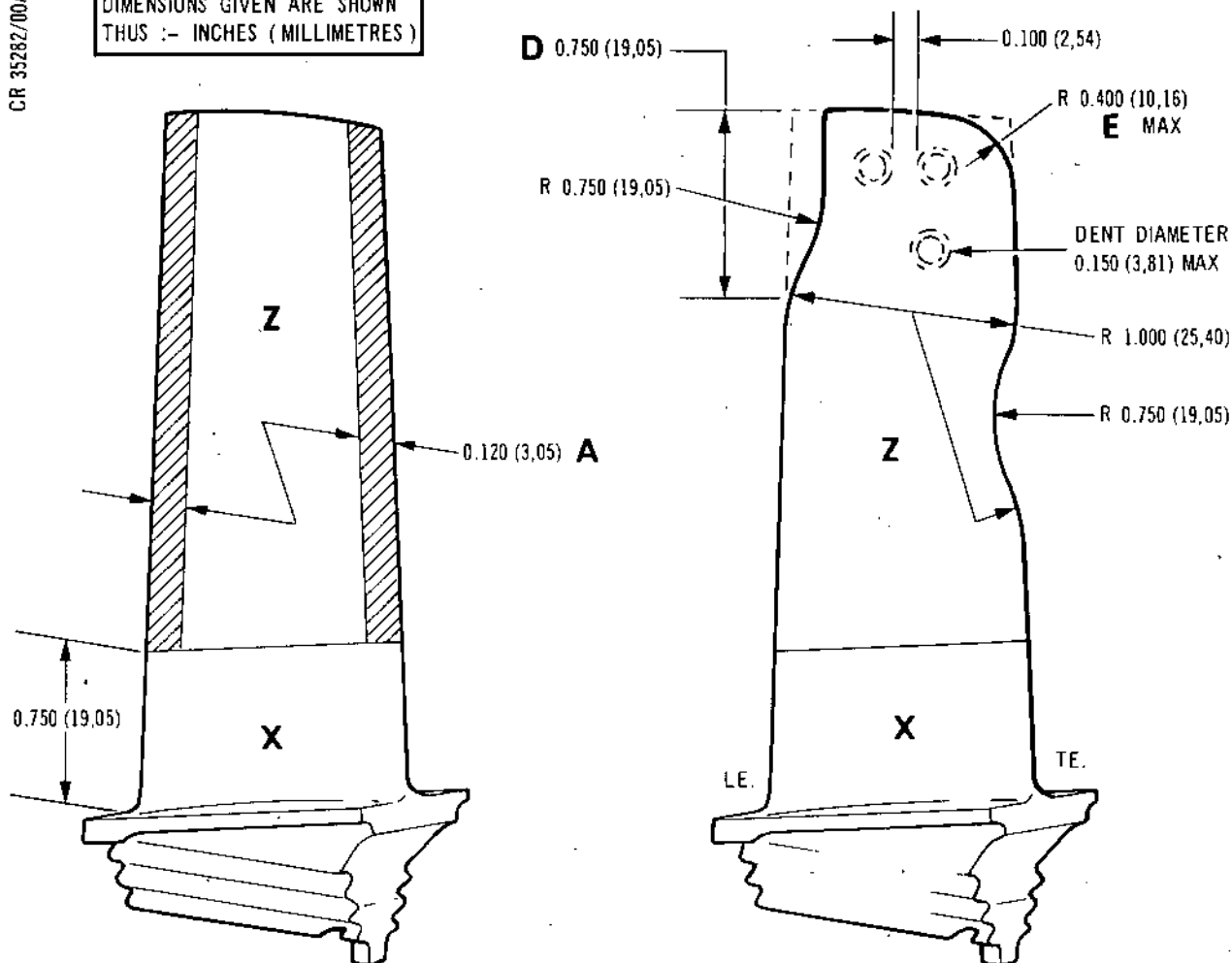


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MK. 610-14-28
OVERHAUL



CR 35282/00A

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



THIS SCHEME MUST BE READ IN CONJUNCTION WITH
SAL B.930281 (REF. PARA. 3.A.).

IN ZONE **X**, EDGE BLENDS 0.010 (0,25) DEEP MAX..
PERMITTED WITH BLEND RADII AS FOR ZONE **Z**

DIMENSIONS **D** AND **E** CAN BE APPLIED TO EITHER LEADING
OR TRAILING EDGES.

L - MAXIMUM NUMBER OF BLADES BLENDED TO
MAXIMUM = 8 FOR STAGE 5.
8 FOR STAGE 6.
10 FOR STAGE 7.

MARK APPROPRIATE SCHEME NUMBER CLOSE TO STANDARD
PART NUMBER: STAGE 5 SAL B.930286.
STAGE 6 SAL B.930287.
STAGE 7 SAL B.930288.

Stage 5, 6 and 7 HP Compressor Blades - Blending Data
Figure 404

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HP COMPRESSOR ROTOR SHAFT FRONT - REPAIR NO.6 LABYRINTH
FINS RESTORED BY PLASMA WELDING
MODIFICATION NO.OL.8427(C)

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-33-02	1 260	B.927125, B.927126, B.927129, B.927130, B.927131, B.927132.

CAUTION: THIS PROCEDURE CONTAINS OPERATIONS WHICH ARE SUBJECT TO COMPONENT MANUFACTURING TECHNIQUE (CMT) CONTROL. THESE OPERATIONS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE MANUFACTURER.

2. Introduction

A. General.

- (1) This repair describes the procedure for restoring the worn No.6 labyrinth fins on the HP compressor rotor shaft front, to maintain the labyrinth fin/housing clearance. The rotor shaft front finned area is reduced in diameter by machining, the diameter restored using the plasma welding technique, then the welded area machined to produce new fins.
- (2) Refer to Chapter 72-09-00 Repair, for all standard practices applicable to this repair procedure.
- (3) Dimensions in Tables and on illustrations are shown thus: INCHES (MILLIMETRES).
- (4) The operations that are subjected to Component Manufacturing Technique Control are indicated CMT.
- (5) A test piece shall be produced and subjected to metallurgical examination; test pieces are required initially, and upon any change of airline operator, sub-contractor, machine or welding equipment. CMT

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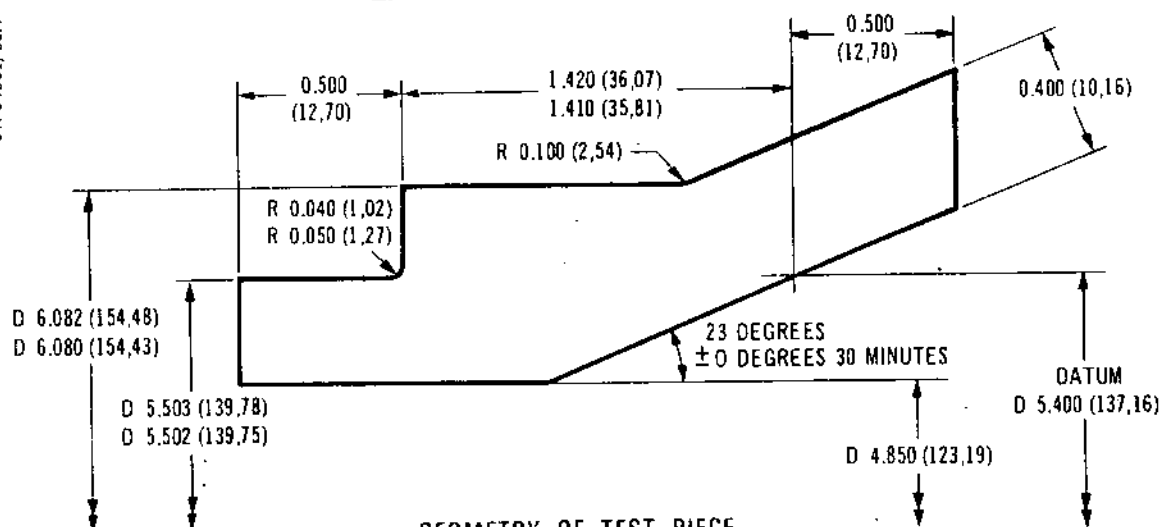


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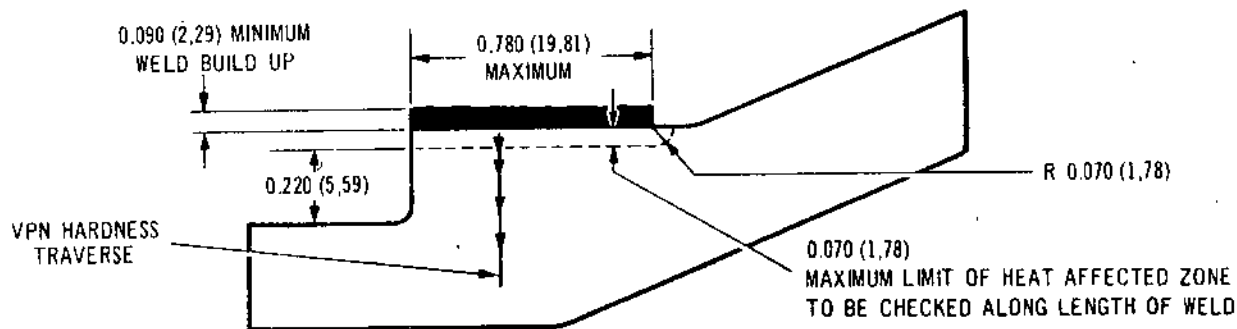
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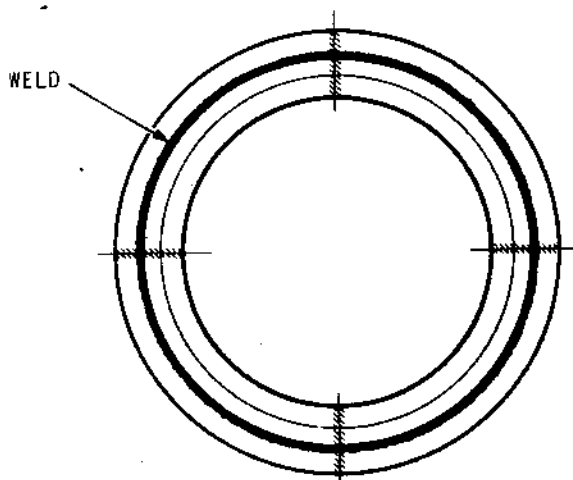


GEOMETRY OF TEST PIECE



MICRO-SECTION OF TEST PIECE

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



DIAGRAMMATIC VIEW SHOWING POSITIONS OF MICRO-SECTIONS

Geometry of Test Piece
Figure 401

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Salvage of No.6 labyrinth fins HP rotor shaft front

Material	Titanium MSRR 8634
Preparation	Machined surface
Weld Geometry	Circumferential
Filler Wire	MSRR 9500/70 26 swg (0.018 in. (0,460 mm) diameter)
Feed Rate	46 in. (1168,400 mm) per minute
Machine	Union carbide 100 amp with fine wire feed
Upslope Current	Nil
Welding Current	36-40 amps
Downslope Current	Maximum that can be set on machine
Plasma Type	Argon 0.35 cu ft/h at 30 psi (0,175 l/min at 210 kPa)
Shield Type	Argon 15 cu ft/h at 30 psi (8 l/min at 210 kPa)
Backing Type	Nil
Trailing Type	Argon 20 cu ft/h at 30 psi (10 l/min at 210 kPa)
Weld Speed	5 in./min (127,00 mm/min) on Roturn variable control turntable
Nozzle	No.2 orifice dia. 0.052 in. (1,321 mm)
Electrode	3/32 in. (2,3813 mm) dia. thoriated tungsten
Stand Off	0.200/0.250 in. (5,10/6,350 mm)
Angle of Gun	90° to weld surface
Polarity	Electrode negative

Welding Data
Table 401

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3. Test Piece

A. Produce Test Piece.

- (1) Produce a suitable test piece (Ref.Fig.401), using conventional machining methods, in material specification MSRR 8634 (in the fully heat treated condition). The geometry of the test piece must conform to the standard part, with the addition of the weld build diameter to provide a datum for the heat affected zone. CMT
- (2) It is permissible to use an unserviceable standard part as the test piece. In this case no heat treatment is required. CMT

B. Plasma Weld Test Piece (Ref.Fig.401).

- (1) Build up the representative No.6 labyrinth diameter in layers to a minimum depth of 0.090 in. (2,286 mm) using the plasma welding technique. Refer to Table 401 and Chapter 72-09-12, Repair, for Plasma weld procedure. Three layers of weld deposit should be sufficient to produce the No.6 labyrinth. During this operation, carry out the following: CMT
 - (a) Fifteen minutes must elapse between the deposit of each weld layer. CMT
 - (b) Clean each weld deposit using a rotary stainless steel brush. CMT
 - (c) Remove weld bead irregularities, cavities, etc. at the completion of each weld deposit using a non-abrasive cutter. CMT

C. Metallurgical Examination of the Test Piece.

NOTE: The following examination must be carried out by the controlling laboratory.

- (1) Produce four suitable micro-sections at 90° from the test piece weld surface. CMT

TN22691

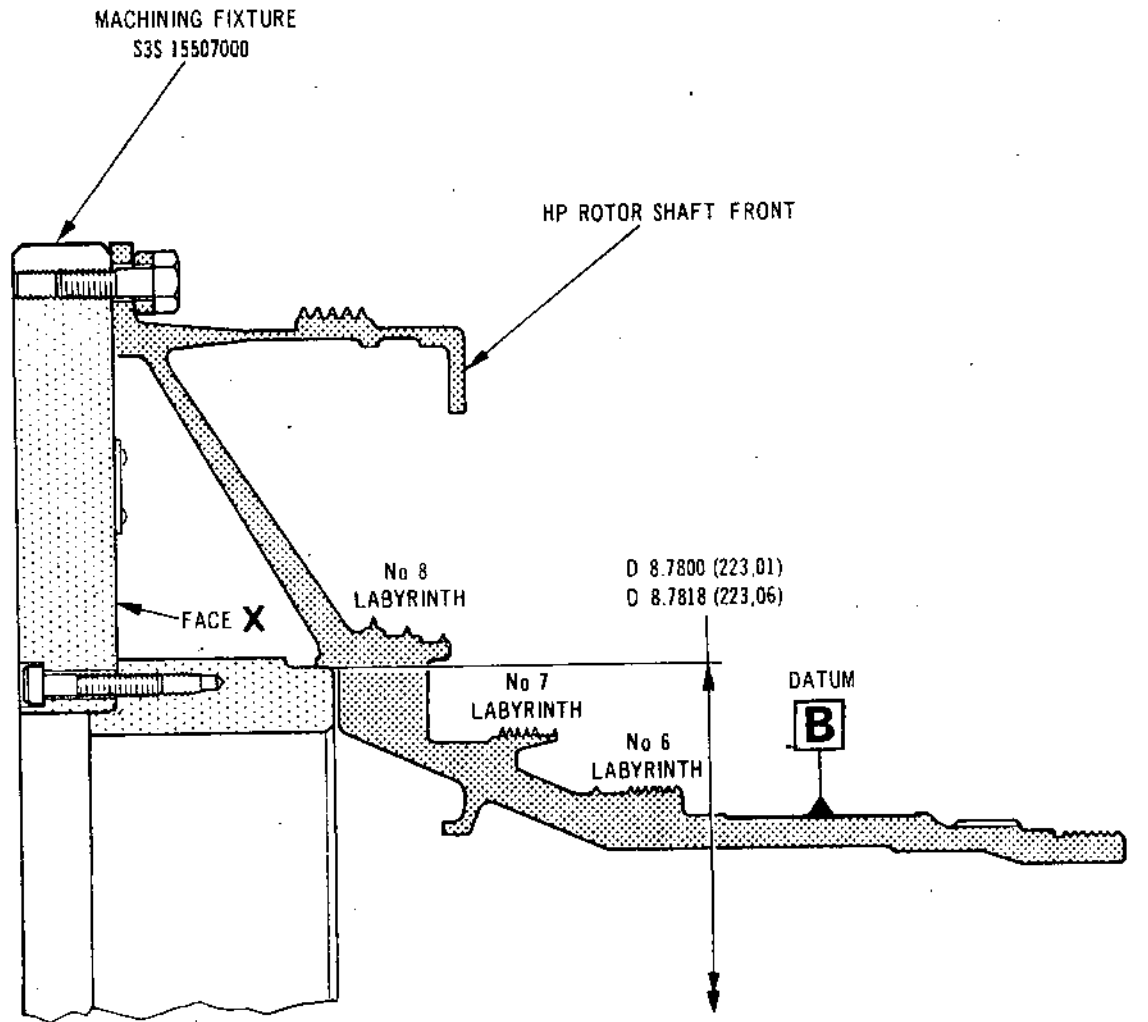


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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

TN11641

Machining Fixture Detail
Figure 402

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- (2) Subject the micro-sections to a VPN hardness check using a 5 kg load and a 2/3rds objective at 0.020 in. (0,508 mm) increments, traversed across the micro-sections. Check that the heat affected zone is limited to the area shown; (Ref.Fig.401). CMT

4. Instructions

A. Machine No.6 Labyrinth Fins.

NOTE: During the initial (pre-welding) turning operations of the rotor shaft front, conventional machining methods apply; (Ref.Fig.403) for machining dimensions.

- (1) Locate the component in the fixture; ref. tool item 1 (Fig.402). CMT
- (2) Locate and secure the component/fixture assembly to centre lathe and set true to datum B. CMT
- (3) Turn to remove defective No.6 labyrinth fin to produce the dimensions shown in Fig.403, using the form tool; ref. tool item 2. CMT
- (4) Remove all burrs from the machined area using conventional hand tools, then remove the component/fixture assembly from the lathe and the component from the fixture. CMT

B. Build up the Labyrinth Fin Area.

- (1) Build up the No.6 labyrinth fin location to a minimum depth of 0.090 in. (2,2860 mm) using the plasma welding technique, sufficient to produce the labyrinth fins, to the dimension shown at Fig.403. Refer to Table 401 and Chapter 72-09-12, Repair, for the Plasma welding procedure. Three layers of weld deposit should be sufficient to produce the No.6 labyrinth. During this operation, carry out the following: CMT
- (a) Fifteen minutes must elapse between the deposit of each weld layer. CMT

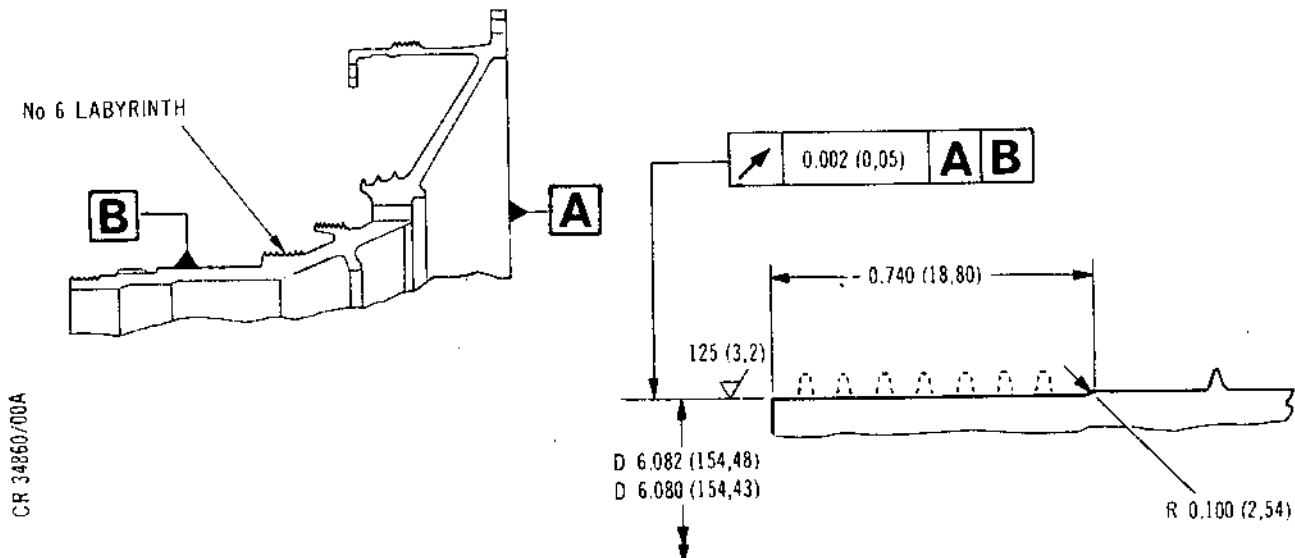
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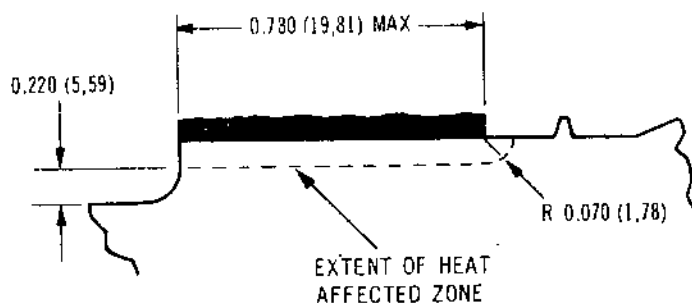
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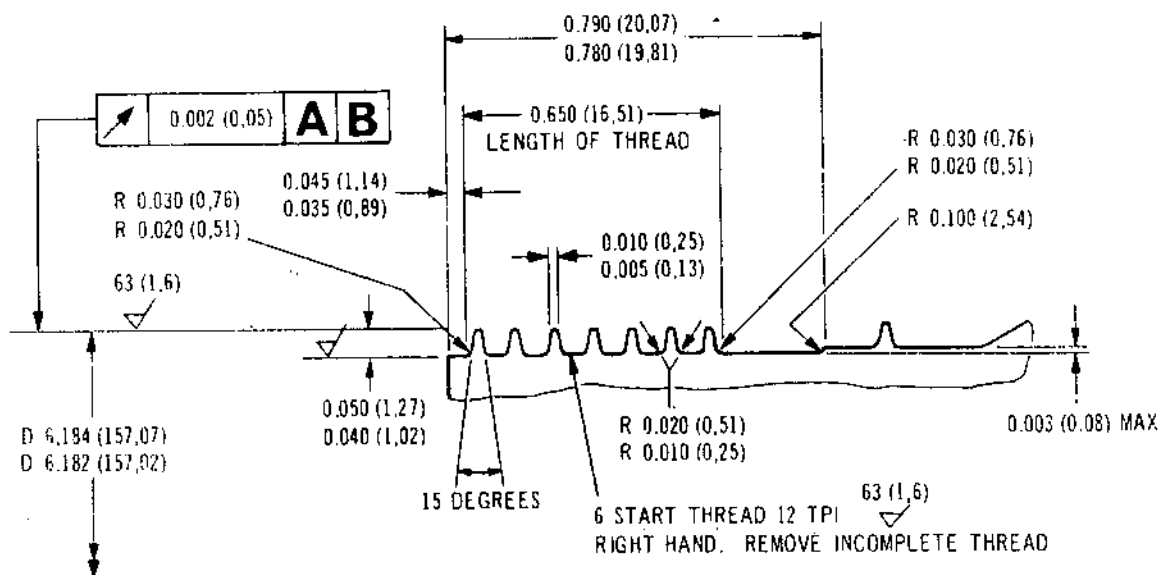


PRE-WELDING MACHINING DETAILS



WELD DETAILS

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



FINAL MACHINING DETAILS

Labyrinth Machining Dimensions
Figure 403



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- (b) Clean each weld deposit using a rotary stainless steel brush. CMT
- (c) Remove weld bead irregularities, cavities, etc. at the completion of each weld deposit using a non-abrasive cutter. CMT

C. Inspect.

- (1) Crack detect the plasma weld and the surrounding area, using the fluorescent dye penetrant technique F2A specified for this component in Chapter 72-33-02, Inspection/Check. CMT
- (2) Visually inspect the weld and ensure that all parameters have been achieved.

D. Finish Turn the No.6 Labyrinth Fin.

- (1) Locate and secure the component in the fixture, ref. tool item 1 (Fig.402). CMT
- (2) Locate and secure the component/fixture assembly to a suitable centre lathe and set true to datum B. CMT
- (3) Finish turn to remove the surplus weld from the front face of the No.6 labyrinth and blend with existing face. Finish turn the labyrinth fin outside diameter and the adjacent recess diameter forming the corner radius (Fig.403). CMT

Machining data:

CUTTING TOOL TYPE ISO K20
COOLANT SOLUBLE OIL
SPEEDS 57 RPM
FEED 0.004 IN. (0,102 MM) PER REV AND MANUAL
MAXIMUM DEPTH OF CUT 0.002 IN. (0,051 MM) CMT

- (4) Finish turn rear recess producing corner radius and run-out using form tool ref. tool item 2, do not exceed maximum permissible step; Ref.Fig.403, for machining dimensions. Use feeds and speeds etc. as in para.(3).

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- (5) Finish turn 6 start 12 TPI right-hand thread to depth, using form tool; ref. tool item 3 (Fig.403).

CMT

Machining data:

CUTTING TOOL TYPE ISO K20
COOLANT TYPE SOLUBLE OIL
SPEED 7½ RPM
FEED 0.004 IN. (0,102 MM) PER REV AND
MANUAL
MAXIMUM DEPTH OF FINAL CUT 0.002 IN. (0,051 MM)

CMT

- (6) Remove all burrs and incomplete threads using conventional hand tools. Remove the fixture from the lathe and the rotor shaft front from the fixture.

- (7) Inspect the machined area to ensure that the labyrinth fin dimensions have been achieved.

5. Chemically Etch the No.6 Labyrinth Fin Area

WARNING: OBSERVE THE WARNINGS GIVEN IN CHAPTER 72-09-14, REPAIR.

- A. Mask off the rotor shaft front using "I.C.I. Stopping Off Red Lacquer" to specification F.230/2006. Ensure that only the No.6 labyrinth fin area is exposed to the etching solution.

CMT

- B. Using the etching technique specified in Chapter 72-09-14, Repair, solution A, immerse the shaft in the etching solution for sufficient time to achieve the desired surface up to a maximum period of 20 seconds after the onset of gassing.

CMT

- C. Wash and remove the protective lacquer by swabbing with trichloroethane.

CMT

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6. Crack Detect the Labyrinth Area

- A. Crack detect the labyrinth area using the fluorescent dye penetrant technique F2A as specified in Chapter 72-33-02, Inspection/Check. CMT

7. Vapour Blast the Labyrinth Area

- A. Mask off the rotor shaft front with a suitable waterproof masking tape; ensure that only the repair area of the labyrinth is exposed. CMT
- B. Vapour blast the labyrinth finned area using the technique specified in Chapter 72-09-13, Repair, procedure B. Remove masking tape at the completion of vapour blasting. CMT

8. Identify Repair

- A. Using the electro-chemical marking technique, Ref. Chapter 72-09-00, Repair, mark on SAL B.476079 or R7 close to the existing part number.

9. Special Tools, Fixtures and Equipment

- A. The following tools, fixtures and equipment are required to complete this repair:

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item No.</u>
Fixture	1	S3S.15507000	1
Form tool	1	S3S.15508000	2
Form tool	1	S3S.15510000	3

10. Finally Inspect

- A. Finally inspect the rotor shaft front to ensure the repair has been carried out satisfactorily and that the rotor shaft front is in a serviceable condition.
- B. Place the rotor shaft front in a suitable container and store as required.

TN15813



OLYMPUS 593
MK.610-14-28
OVERHAUL



HP COMPRESSOR ROTOR SHAFT FRONT - REPAIR NO.7
LABYRINTH FINS RESTORED BY PLASMA WELDING

MODIFICATION NO. OL.8463C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-33-02	1 260	B.927125, B.927126, B.927129, B.927130, B.927131, B.927132

CAUTION: THIS PROCEDURE CONTAINS OPERATIONS WHICH ARE SUBJECT TO COMPONENT MANUFACTURING TECHNIQUE (CMT) CONTROL. THESE OPERATIONS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE MANUFACTURER.

2. Introduction

A. General.

- (1) This repair describes the procedure for restoring the worn No.7 labyrinth fins on the HP compressor rotor shaft front, to maintain the labyrinth fin/housing clearance. The rotor shaft front finned area is reduced in diameter by machining, the diameter restored using the plasma welding technique, then the welded area machined to produce new fins.
- (2) Refer to Chapter 72-09-00 Repair, for all standard practices applicable to this repair procedure.
- (3) Dimensions in Tables and on illustrations are shown thus: INCHES (MILLIMETRES).
- (4) The operations that are subjected to Component Manufacturing Technique Control are indicated CMT.
- (5) A test piece shall be produced and subjected to metallurgical examination; test pieces are required initially, and upon any change of airline operator, sub-contractor, machine or welding equipment.

CMT

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OVERHAUL

Salvage of No.7 labyrinth fins HP rotor shaft front

Material	Titanium MSRR 8634
Preparation	Machined surface
Weld Geometry	Circumferential
Filler Wire Type	MSRR 9500/70 26 swg 0.018 in. (0,460 mm) diameter
Feed Rate	48.00 in. (1219,200 mm) per minute
Machine	Union Carbide 100 amp with fine wire feed
Upslope Current	Nil
Welding Current	Refer to Fig.402 (welding amperage and layered runs)
Downslope	Maximum that can be set on machine
Plasma Type	Argon 0.35 cu ft/h at 30 psi (0,175 l/min at 210 kPa)
Shield Type	Argon 15 cu ft/h at 30 psi (8 l/min at 210 kPa)
Backing Type	Argon 22 cu ft/h at 30 psi (11 l/min at 210 kPa)
Trailing Type	Argon 22 cu ft/h at 30 psi (11 l/min at 210 kPa)
Weld Speed	5 in./min (127,00 mm/min) on Roturn variable control turntable.
Nozzle	No.2 orifice diameter 0.052 in. (1,321 mm)
Electrode	3/32 in. (2,3813 mm) dia. thoriated tungsten
Stand off	0.200/0.250 in. (5,10/6,350 mm)
Angle of gun	Vertical
Polarity	Electrode negative

Welding Data
Table 401

FN39424

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3. Test Piece

A. Produce Test Piece.

- (1) Produce a suitable test piece (Ref.Fig.401), using conventional machining methods, in material specification MSRR 8634 (in the fully heat treated condition). The geometry of the test piece must conform to the standard part, with the addition of the weld build diameter to provide a datum for the heat affected zone. CMT
- (2) It is permissible to use an unserviceable standard part as the test piece. In this case no heat treatment is required. CMT

B. Plasma Weld Test Piece (Ref.Fig.401).

- (1) Build up the representative No.7 labyrinth diameter to a minimum depth of 0.120 in. (3,048 mm), using the plasma weld technique. Refer to Table 401, Fig.402 and Chapter 72-09-12, Repair, for the Plasma welding procedure. Three layers of weld deposit should be sufficient to produce the No.7 labyrinth. During this operation, carry out the following: CMT
 - (a) The turntable is to be tilted upwards at an angle of 20° to 25° to provide access for the torch and filler wire attachment. CMT
 - (b) Fifteen minutes must elapse between the deposit of each weld layer. CMT
 - (c) Clean each weld deposit using a rotary stainless steel brush. CMT
 - (d) Remove weld bead irregularities, cavities, etc., at the completion of each weld deposit using a non-abrasive cutter. CMT

C. Metallurgical Examination of the Test Piece.

NOTE: The following examination must be carried out by the controlling laboratory.

- (1) Produce four suitable micro-sections at 90° from the test piece weld surface. CMT

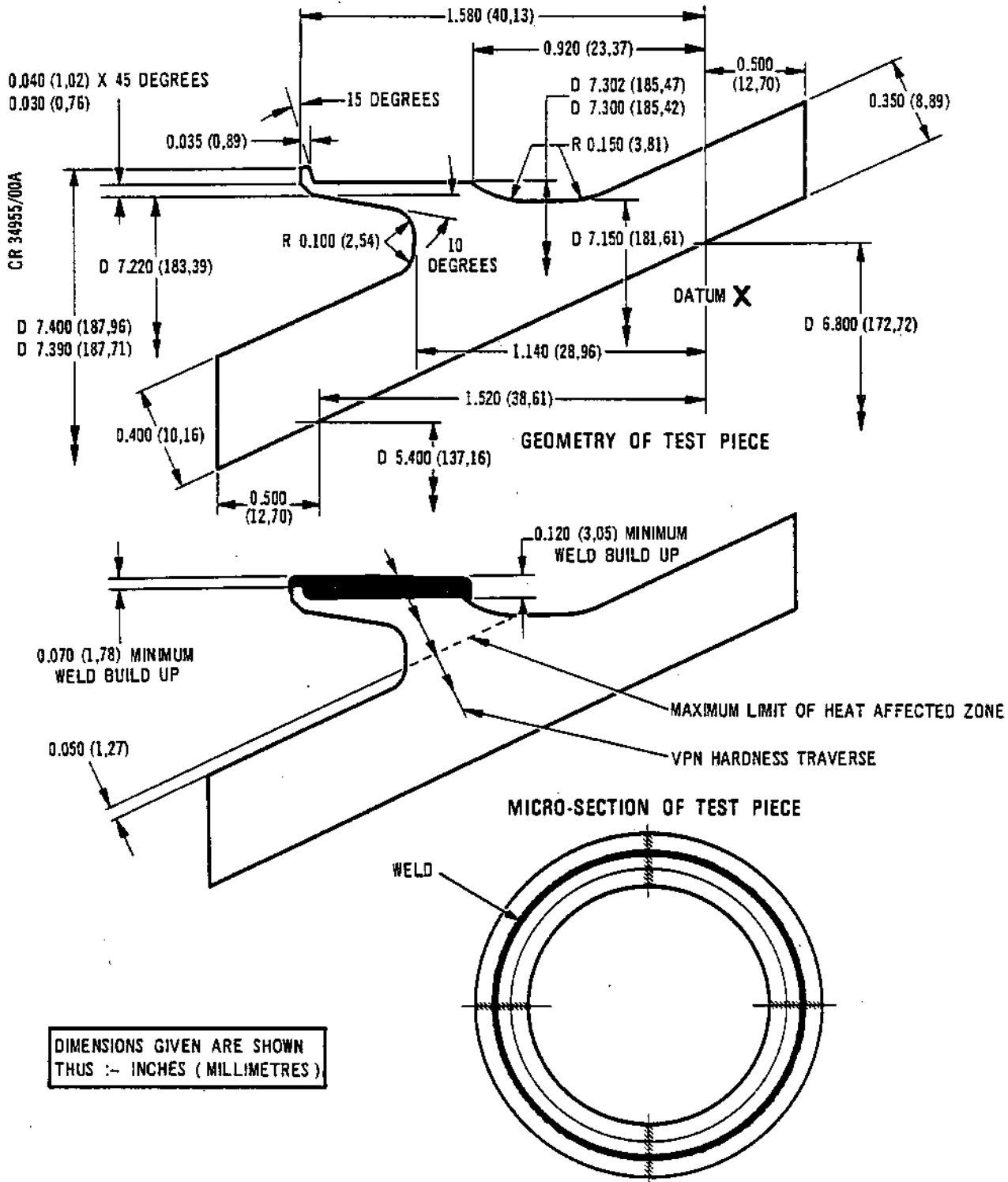
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OLYMPUS 593

MK.610-14-28
OVERHAUL



DIAGRAMMATIC VIEW SHOWING POSITIONS OF MICRO-SECTIONS

Geometry of Test Piece
Figure 401

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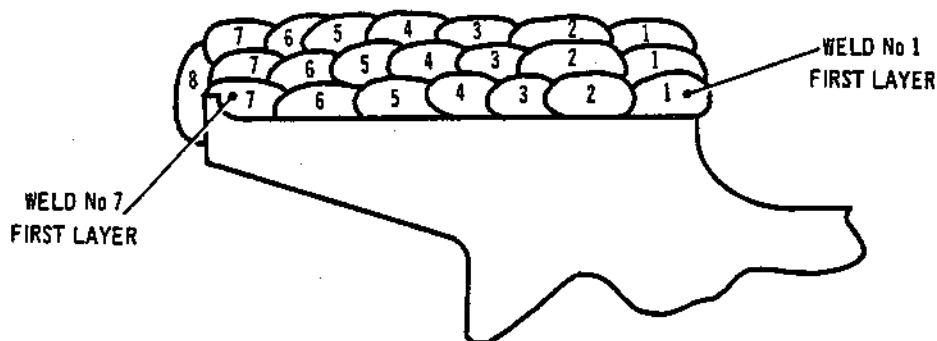


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MK.610-14-28
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FIRST LAYER	WELD No	1	2	3	4	5	6	7	
	CURRENT AMPS	40	40	40	38	34	28	26	
SECOND LAYER	WELD No	1	2	3	4	5	6	7	
	CURRENT AMPS	40	40	40	38	34	32	28	
THIRD LAYER	WELD No	1	2	3	4	5	6	7	8
	CURRENT	40	40	40	40	38	36	34	30

Welding Amperage and Layered Runs
Figure 402

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- (2) Subject the micro-sections to a VPN hardness check using a 5 kg load and a 2/3rds objective at 0.020 in. (0,508 mm) increments, traversed across the micro-section. Check that the heat affected zone is limited to the area shown, (Ref.Fig.401).

CMT

4. Instructions

A. Machine No.7 Labyrinth Fins.

NOTE: During the initial (pre-welding) turning operations of the rotor shaft front, conventional machining methods apply; ref.Fig.404 for machining dimensions.

- (1) Locate the component in the fixture; ref. tool item 1 (Fig.403). CMT
- (2) Locate and secure the component/fixture assembly to a centre lathe and set true to datum B. CMT
- (3) Turn to remove the tip of the first fin to produce 7.400/7.390 in. (187,96/187,71 mm) diameter. Turn to remove the rear fins to produce 7.302/7.300 in. (185,47/185,42 mm) diameter and blend with the base radius of the first fin as shown in Fig.404. CMT
- (4) Remove all burrs from the machined area using conventional hand tools, then remove the component/fixture assembly from the lathe and the component from the fixture. CMT

B. Build-up the Labyrinth Fin Area.

- (1) Build-up the No.7 labyrinth fin location to a minimum depth of 0.120 in. (3,05 mm), using the plasma weld technique, sufficient to produce the labyrinth fins to the dimensions shown at Fig.404. Refer to Table 401, Fig.402 and Chapter 72-09-12, Repair, for the Plasma welding procedure. Three layers of weld deposit should be sufficient to produce the No.7 labyrinth. During this operation, carry out the following: CMT
- (a) The turntable is to be tilted upwards at an angle of 20° to 25° to enable access for the torch and filler wire attachment. CMT

TN39427

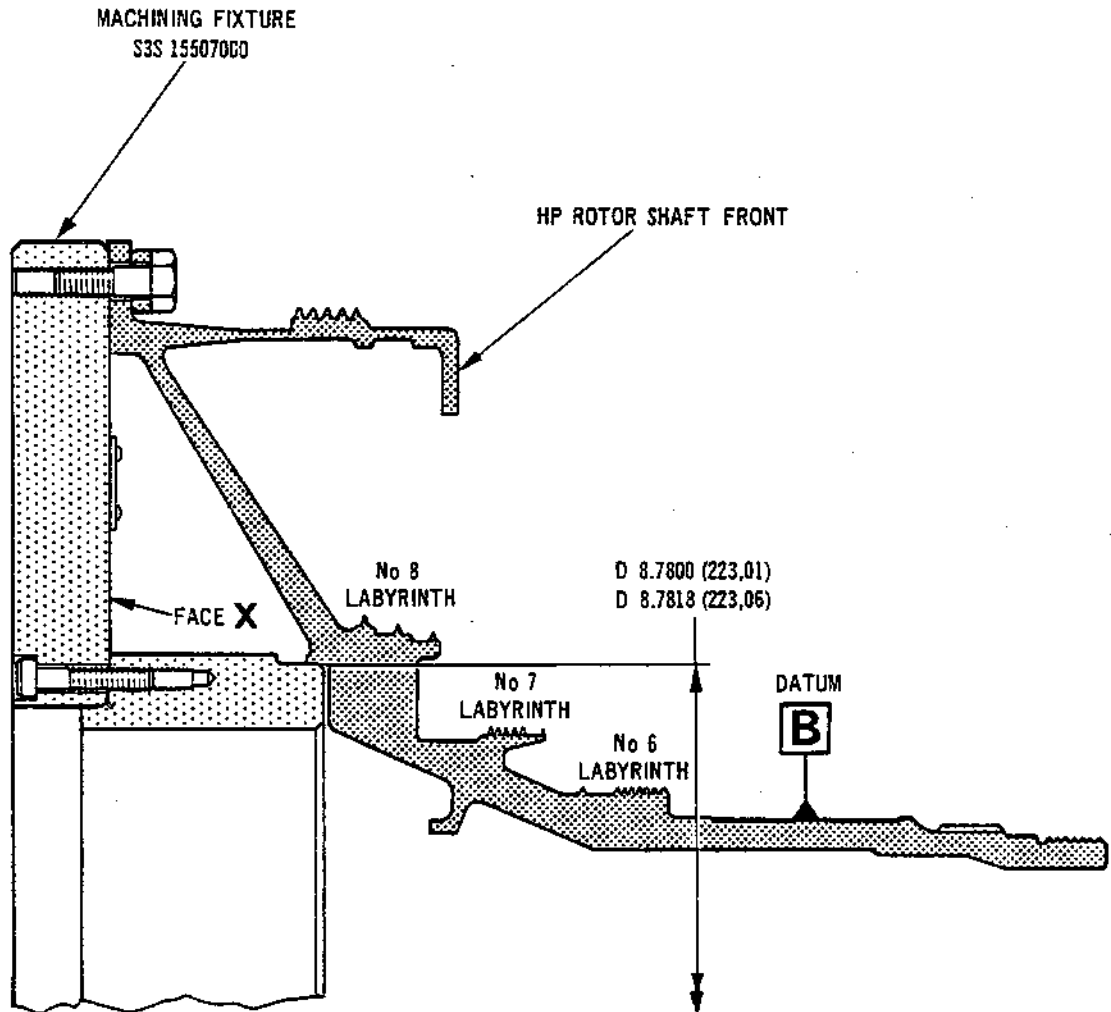


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MK.610-14-28
OVERHAUL



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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

TN39429

Machining Fixture Detail
Figure 403

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- (b) Fifteen minutes must elapse between the deposit of each weld layer. CMT
- (c) Clean each weld deposit using a rotary stainless steel brush. CMT
- (d) Remove weld bead irregularities, cavities, etc. at the completion of each weld deposit using a non-abrasive cutter. CMT

C. Inspect.

- (1) Crack detect the plasma weld and the surrounding area, using the fluorescent dye penetrant technique F2A specified for this component in Chapter 72-33-02, Inspection/Check. CMT
- (2) Visually inspect the weld and ensure that all parameters have been achieved.

D. Finish Turn the No.7 Labyrinth Fin.

- (1) Locate and secure the component in the fixture, ref. tool item 1 (Fig.403). CMT
- (2) Locate and secure the component/fixture, to a suitable centre lathe and set true to datum B. CMT
- (3) Finish turn the outside diameter of the labyrinth. Finish turn to remove the surplus weld from the front face of the labyrinth and blend with the existing face. Finish turn the chamfer in the bore and produce radius behind the labyrinth diameter, 0.150 in. (3,81 mm) and turn adjacent dia. out square (Ref.Fig.404) for machining dimensions. CMT

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TN41043



OLYMPUS 593
MK.610-14-28
OVERHAUL



Machining data:

CUTTING TOOL TYPE	ISO K20
COOLANT	SOLUBLE OIL
SPEED	57 RPM
FEED	0.004 IN. (0,102 MM) PER REV AND MANUAL
MAXIMUM DEPTH OF CUT	0.002 IN. (0,051 MM)

CMT

- (4) Finish turn to form the rear labyrinth fins to depth and width, using form tools ref. tools item 2, 3 and setting gauge item 4; refer to Fig.404 for machining dimensions.

CMT

Machining data:

CUTTING TOOL TYPE	ISO K20
COOLANT TYPE	SOLUBLE OIL
SPEED	7½ RPM
FEED	0.004 IN. (0,102 MM) PER REV AND MANUAL
MAXIMUM DEPTH OF FINAL CUT	0.002 IN. (0,051 MM)

CMT

- (5) Remove all burrs from the machined area using conventional hand tools. Remove the component/fixture from the lathe and the component from the fixture.
- (6) Inspect the machined area to ensure that the labyrinth fin dimensions have been achieved.

5. Chemically Etch the No.7 Labyrinth Fin Area

WARNING: OBSERVE THE WARNINGS GIVEN IN CHAPTER 72-09-14, REPAIR.

- A. Mask off the rotor shaft front using "I.C.I. Stopping Off Red Lacquer" to specification F230/2006. Ensure that only the No.7 labyrinth fin area is exposed to the etching solution.

CMT

- B. Using the etching technique specified in Chapter 72-09-14, Repair, Solution A, immerse the shaft in the etching solution for sufficient time to achieve the desired surface, up to a maximum period of 20 seconds after the onset of gassing.

CMT

FN39767

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- C. Wash and remove the protective lacquer by swabbing with trichloroethane.

CMT

6. Crack Detect the Labyrinth Area

- A. Crack detect the labyrinth area using the fluorescent dye penetrant technique F2A as specified in Chapter 72-33-02, Inspection/Check.

CMT

7. Vapour Blast the Labyrinth Area

- A. Mask off the rotor shaft front with a suitable waterproof masking tape; ensure that only the repair area of the labyrinth is exposed.

CMT

- B. Vapour blast the labyrinth finned area using the technique specified in Chapter 72-09-13, Repair, procedure B. Remove masking tape at the completion of vapour blasting.

CMT

8. Identify Repair

- A. Using the electro-chemical marking technique, Ref. Chapter 72-09-00, Repair, mark on SAL B.476136 or R8 close to the existing part number.

9. Special Tools, Fixtures and Equipment

- A. The following tools, fixtures and equipment are required to complete this repair.

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item No.</u>
Fixture	1	S3S.15507000	1
Form tool	1	S3S.15511000	2
Form tool	1	S3S.15509000	3
Setting gauge	1	S3S.15512000	4

10. Finally Inspect

- A. Finally inspect the rotor shaft front to ensure the repair has been carried out satisfactorily and that the rotor shaft front is in a serviceable condition.
- B. Place the rotor shaft front in a suitable container and store as required.

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OVERHAUL



HP COMPRESSOR ROTOR SHAFT FRONT - REPAIR NO.8 LABYRINTH
FINS RESTORED BY PLASMA WELDING
MODIFICATION NO. OL.8464C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-33-02	1 260	B.927125, B.927126, B.927129, B.927130, B.927131, B.927132

CAUTION: THIS PROCEDURE CONTAINS OPERATIONS WHICH ARE
SUBJECT TO COMPONENT MANUFACTURING TECHNIQUE
(CMT) CONTROL. THESE OPERATIONS SHALL NOT BE
VARIED WITHOUT REFERENCE TO THE MANUFACTURER.

2. Introduction

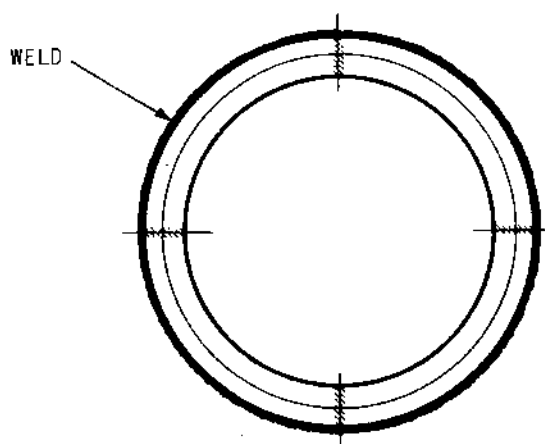
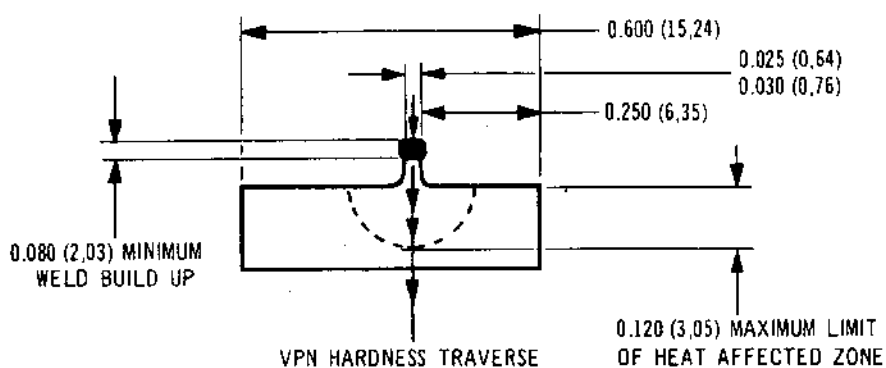
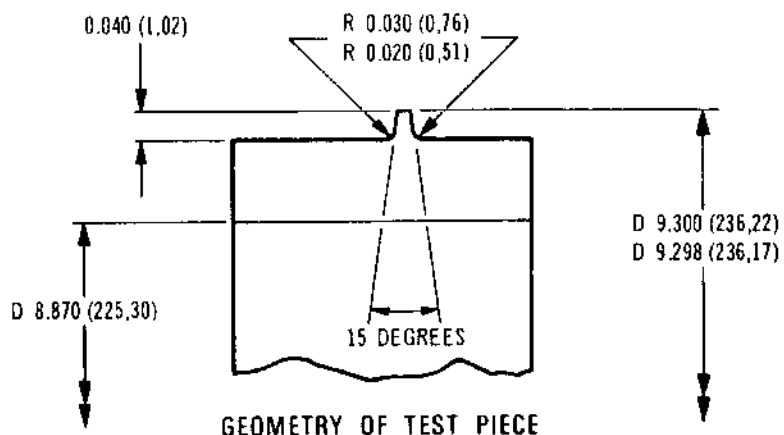
A. General.

- (1) This repair describes the procedure for restoring the worn No.8 labyrinth fins on the HP compressor rotor shaft front, to maintain the labyrinth fin/housing clearance. The rotor shaft front finned area is reduced in diameter by machining, the diameter restored using the plasma welding technique, then the welded area machined to produce new fins.
- (2) Refer to Chapter 72-09-00 Repair, for all standard practices applicable to this repair procedure.
- (3) Dimensions in tables and on illustrations are shown thus: INCHES (MILLIMETRES).
- (4) The operations that are subjected to Component Manufacturing Technique Control are indicated CMT.
- (5) A test piece shall be produced and subjected to metallurgical examination; test pieces are required initially, and upon any change of airline operator, sub-contractor, machine or welding equipment.

CMT



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MK. 610-14-28
OVERHAUL



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

DIAGRAMMATIC VIEW SHOWING POSITIONS OF MICRO-SECTIONS

Geometry of Test Piece
Figure 401

TN40992

**OLYMPUS 593**

MK.610-14-28

OVERHAUL

Salvage of No.8 Labyrinth Fins HP Rotor Shaft Front

Material	Titanium MSRR 8634
Preparation	Machined surface
Weld Geometry	Circumferential
Filler Wire	MSRR 9500/70 26 swg (0.018 in. (0,460 mm diameter))
Feed Rate	48 in. (1219,20 mm) per minute
Machine	Union carbide 100 amp with fine wire feed
Upslope Current	Nil
Welding Current	1st run - 34 amps no wire. Remaining welds 36-40 amps
Downslope Current	Maximum that can be set on machine
Plasma Type	Argon 0.35 cu.ft./h at 30 psi (0,175 l/min at 210 kPa)
Shield Type	Argon 15 cu.ft./h at 30 psi (8 l/min at 210 kPa)
Backing Type	Nil
Trailing Type	Argon 15 cu.ft./h at 30 psi (8 l/min at 210 kPa)
Weld Speed	5 in./min (127,00 mm/min) on Return variable control turntable
Nozzle	No.2 orifice dia. 0.052 in. (1,321 mm)
Electrode	3/32 in. (2,3812 mm) dia. thoriated tungsten
Stand Off	0.200/0.250 in. (5,10/6,350 mm)
Angle of Gun	Vertical
Polarity	Electrode negative

Welding Data
Table 401

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3. Test Piece

A. Produce Test Piece.

- (1) Produce a suitable test piece, (Ref.Fig.401), using conventional machining methods in material specification MSRR 8634 (in the fully heat treated condition). The geometry of the test piece must conform to the standard part, with the addition of the weld build diameter to provide a datum for the heat affected zone. CMT
- (2) It is permissible to use an unserviceable standard part as the test piece. In this case, no heat treatment is required. CMT

B. Plasma Weld Test Piece (Ref.Fig.401).

- (1) Build up the representative No.8 labyrinth diameter to a minimum depth of 0.080 in. (2,032 mm) using the plasma welding technique. Refer to Table 401 and Chapter 72-09-12, Repair, for Plasma Weld procedure. Four weld deposits should be sufficient to produce No.8 labyrinth. During this operation carry out the following: CMT
 - (a) When an unserviceable standard part is used as a test piece, the turntable is to be positioned at 35° to the vertical torch to allow for maximum access to the rear fin; (Ref.Fig.404). CMT
 - (b) Fifteen minutes must elapse between each weld deposit. CMT
 - (c) Clean each weld deposit using a rotary stainless steel brush. CMT
 - (d) Remove weld bead irregularities, surface cavities, etc., at the completion of each deposit, using a non-abrasive cutter. CMT

TN40994

REPAIR
72-33-02

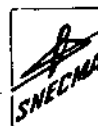
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OVERHAUL



C. Metallurgical Examination of the Test Piece.

NOTE: The following examination must be carried out by the controlling laboratory.

- (1) Produce four suitable micro-sections at 90 deg from the test piece weld surface. CMT
- (2) Subject the micro-sections to a VPN hardness check using a 5 kg load and a 2/3rds objective at 0.020 in. (0,508 mm) increments, traversed across the micro-sections. Check that the heat affected zone is limited to the area shown; (Ref.Fig.401). CMT

4. Instructions

A. Machine No.8 Labyrinth Fins.

NOTE: During the initial (pre-welding) turning operations of the rotor shaft front, conventional machining methods apply; (Ref.Fig.403) for machining dimensions.

- (1) Locate the component in the fixture; ref. tool item.1 (Fig.402). CMT
- (2) Locate and secure the component/fixture assembly to a centre lathe and set true to datum B. CMT
- (3) Turn to remove the defective No.8 labyrinth fins to produce the dimensions shown in Fig.403, using the form tool, ref. tool item 2. CMT
- (4) Remove all burrs from the machined area using conventional hand tools, then remove the component/fixture assembly from the lathe and the component from the fixture. CMT

B. Build up the Labyrinth Fin Area.

- (1) Build up the No.8 labyrinth fin tops to a minimum depth of 0.080 in. (2,032 mm) using the plasma welding technique sufficient to produce the outside

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72-33-02

Repair No.9

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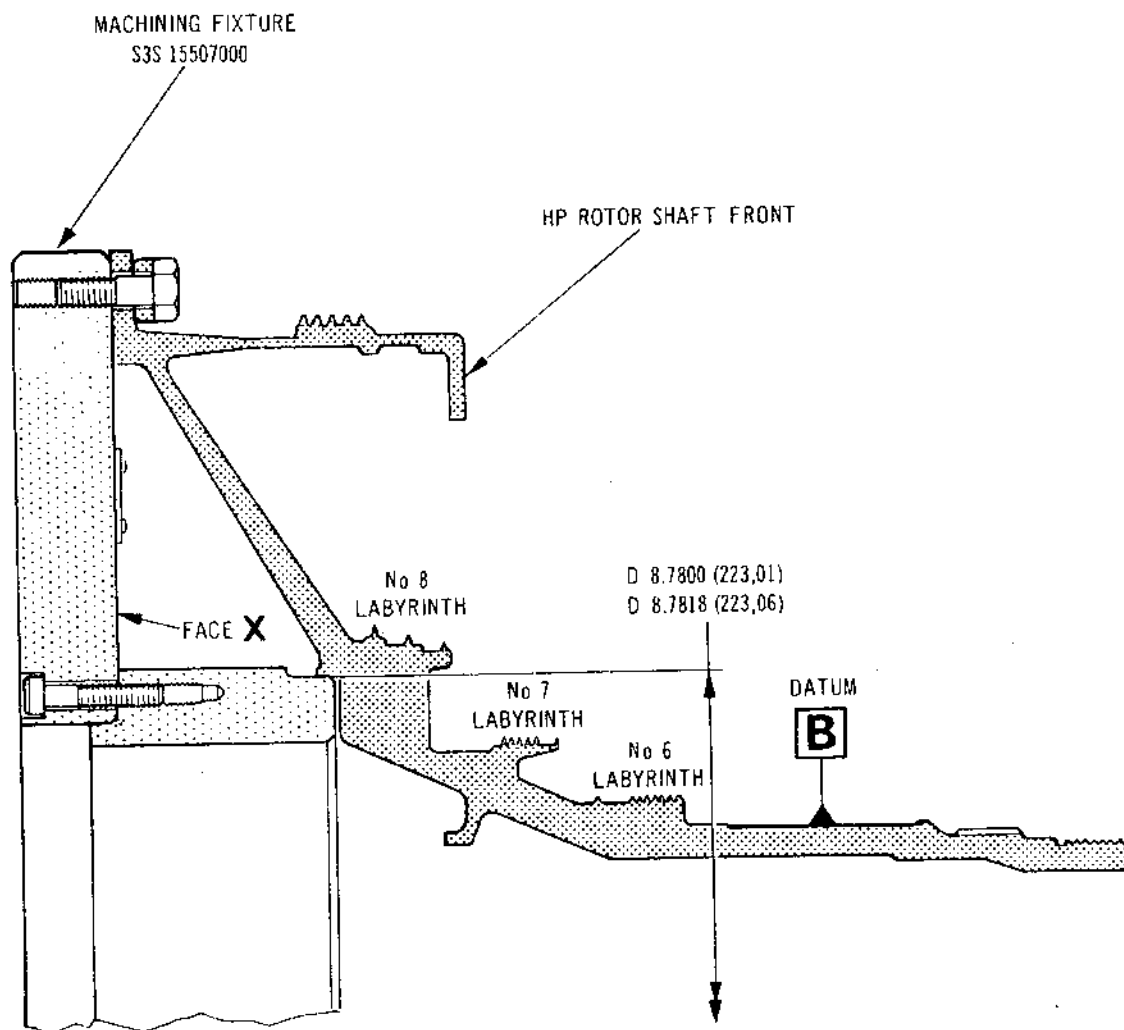
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OLYMPUS 593

MK.610-14-28
OVERHAUL



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

IN40996

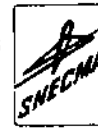
Machining Fixture Detail
Figure 402

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diameter dimensions of the fins shown on Fig.403. Refer to Table 401 and Chapter 72-09-12, Repair, for Plasma Welding procedure. Four weld deposits on each fin should be sufficient to produce the No.8 labyrinth. During this operation, carry out the following:

CMT

- (a) The turntable is to be positioned at 35 deg to the vertical torch, to allow for maximum access to the back fin; (Ref.Fig.404). CMT
- (b) Fifteen minutes must elapse between each weld deposit. CMT
- (c) Clean each weld deposit using a rotary stainless steel brush. CMT
- (d) Remove weld bead irregularities, cavities etc., at the completion of each weld deposit, using a non-abrasive cutter. CMT

C. Inspect.

- (1) Crack detect the plasma weld and the surrounding area, using the fluorescent dye penetrant technique F2A specified for this component in Chapter 72-33-02, Inspection/Check. CMT
- (2) Visually inspect the weld and ensure that all parameters have been achieved.

D. Finish Turn the No.8 Labyrinth Fins.

- (1) Locate and secure the component in the fixture, ref. tool item 1 (Fig.402). CMT
- (2) Locate and secure the component/fixture assembly to a suitable centre lathe and set true to datum B. CMT
- (3) Finish turn the outside diameter of the labyrinth fins (Fig.403). CMT

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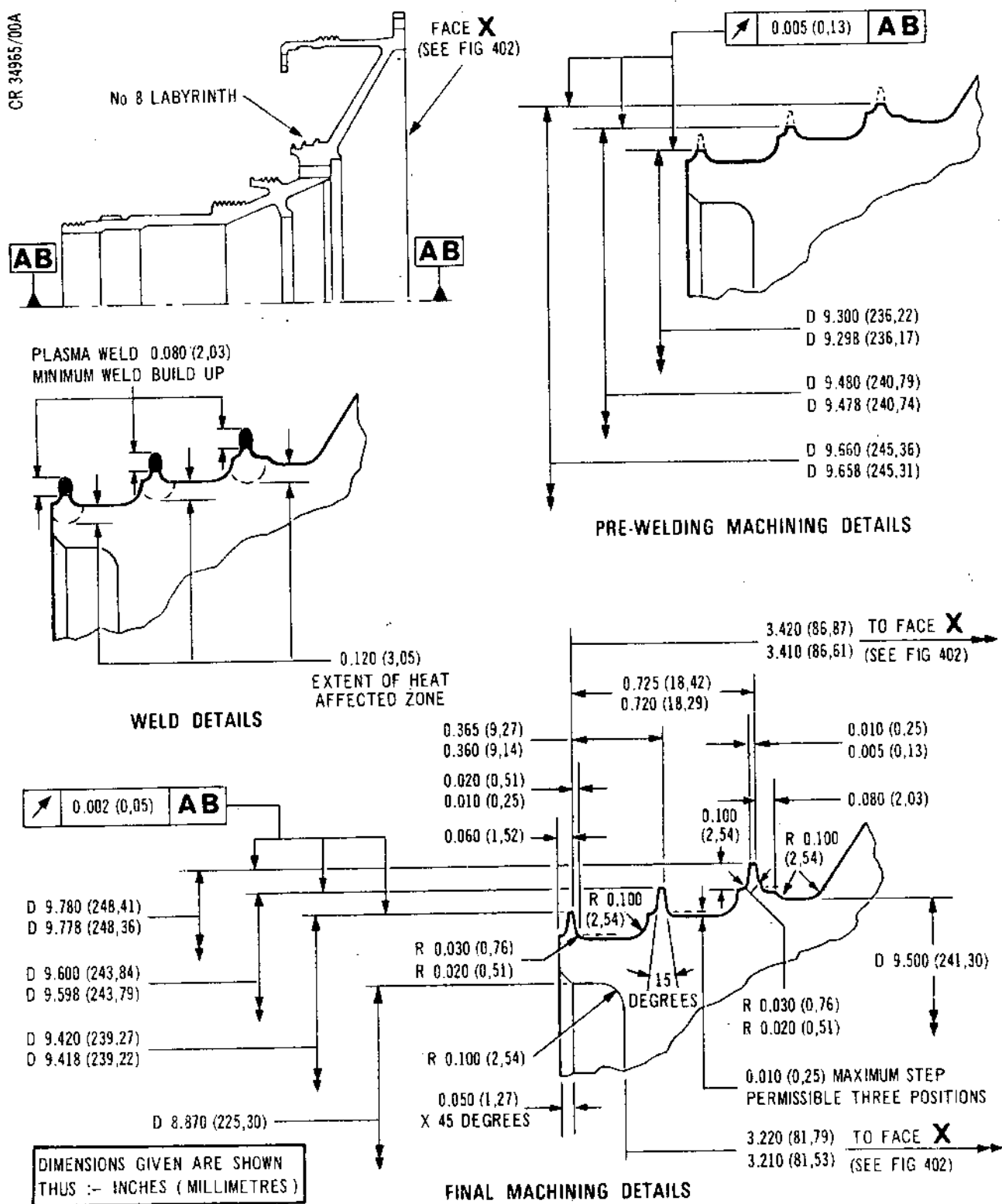
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OLYMPUS 593

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Labyrinth Machining Dimensions
Figure 403

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TN6087



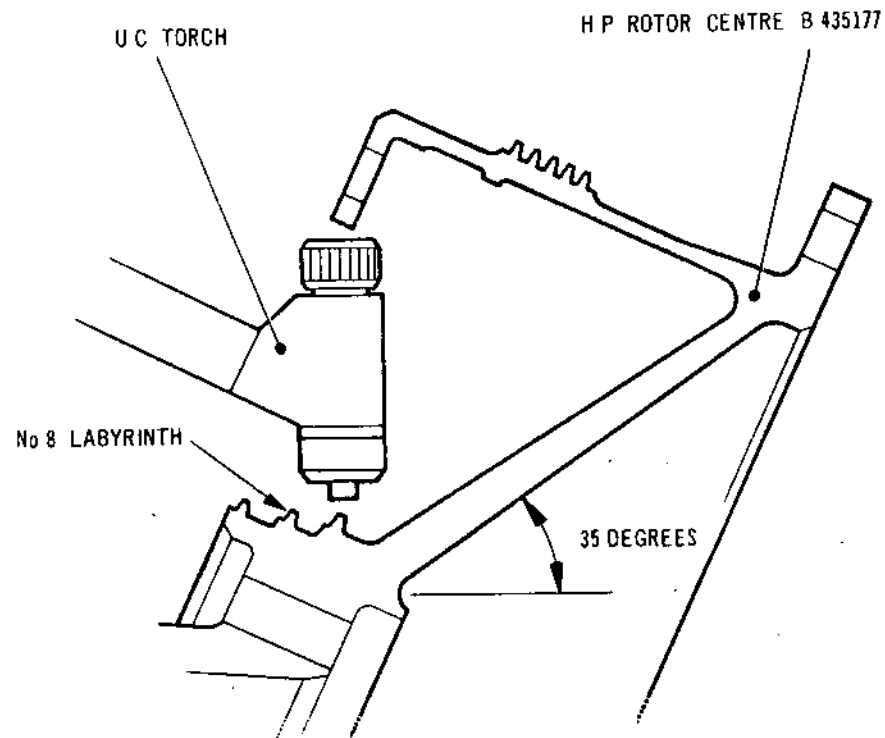
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CR 34956/00A



Welding Rear Fin
Figure 404

TN43441

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OVERHAUL



- (4) Finish turn the labyrinth fins to width, using form tool; ref. tool item 2 and Fig.403.

CMT

Machining data:

CUTTING TOOL TYPE	ISO K20
COOLANT TYPE	SOLUBLE OIL
SPEEDS	57 AND 15 RPM
FEED	0.004 IN. (0,102 MM)
	PER REV AND MANUAL
MAXIMUM DEPTH OF CUT	.002 IN. (0,051 MM)

CMT

- (5) Remove all burrs and any surplus weld, using conventional hand tools. Remove the fixture from the lathe and the rotor shaft front from the fixture.
- (6) Inspect the machined area to ensure that the labyrinth fin dimensions have been achieved; (Ref. Fig.403).

5. Chemically Etch the No.8 Labyrinth Fin Area

WARNING: OBSERVE THE WARNINGS GIVEN IN CHAPTER 72-09-14, REPAIR.

- A. Mask off the rotor shaft front using "I.C.I. Stopping Off Red Lacquer" to specification F.230/2006. Ensure that only the No.8 labyrinth fin area is exposed to the etching solution.

CMT

- B. Using the etching technique specified in Chapter 72-09-14, Repair, solution A, immerse the shaft in the etching solution for sufficient time to achieve the desired surface up to a maximum period of 20 seconds after the onset of gassing.

CMT

- C. Wash and remove the protective lacquer by swabbing with trichloroethane.

CMT

INS151



OLYMPUS 593
MK.610-14-28
OVERHAUL



6. Crack Detect the Labyrinth Area

- A. Crack detect the labyrinth area using the fluorescent dye penetrant technique F2A as specified in Chapter 72-33-02, Inspection/Check. CMT

7. Vapour Blast the Labyrinth Area

- A. Mask off the rotor shaft front with a suitable waterproof masking tape; ensure that only the repair area of the labyrinth is exposed. CMT
- B. Vapour blast the labyrinth finned area using the technique specified in Chapter 72-09-13, Repair, procedure B. Remove masking tape at the completion of vapour blasting. CMT

8. Identify Repair

- A. Using the electro-chemical marking technique, ref. Chapter 72-09-00, Repair, mark on SAL B.488618 or R9 close to the existing part number.

9. Special Tools, Fixtures and Equipment

- A. The following tools, fixtures and equipment are required to complete this repair:

<u>Description</u>	<u>Quantity</u>	<u>Tool No.</u>	<u>Item No.</u>
Fixture	1	S3S.15507000	1
Form tool	1	S3S.15547000	2

10. Finally Inspect

- A. Finally inspect the rotor shaft front to ensure the repair has been carried out satisfactorily and that the rotor shaft front is in a serviceable condition.
- B. Place the rotor shaft front in a suitable container and store as required.

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TN39782

**OLYMPUS 593**MK.610-14-28
OVERHAUL

ROTOR COMPRESSOR HP DISK 2ND STAGE - REPAIR
RESTORATION OF BOLT-HOLES
MODIFICATION OL.8664C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-33-02	1	300A/B/C
		B.904643, B.916375, B.919889, B.919946, B.929380, B.929382, B.930695, B.930696

CAUTION: THIS PROCEDURE CONTAINS OPERATIONS WHICH ARE SUBJECT TO COMPONENT MANUFACTURING TECHNIQUES (CMT) CONTROL. THESE OPERATIONS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE MANUFACTURER. CMT. CERTIFICATE No. 128/B.495681.

2. Introduction

A. General.

- (1) This repair describes the procedure for the restoration of the bolt-holes by reaming to remove damage marks.
- (2) Dimensions are shown thus, INCHES (MILLIMETRES) in tables and illustrations.
- (3) Refer to Chapter 72-09-00 Repair for all standard practices applicable to this repair procedure.
- (4) Remove all sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.
- (5) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (6) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (7) Protect the component against corrosion after each operation, and place in a container for protection against damage during transit between operations (Ref.72-09-20 Repair).

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3. Instructions

A. Machine Holes to Remove Damage.

- (1) Visually inspect the disk and identify the holes that require repair.
- (2) Locate the disk onto a suitable jig boring machine and true up to datum B (Ref.Fig.401).
- (3) Ream the damaged holes (identified at A.(1)) 0.3998/0.4008 in. (10,155/10,18 mm) diameter using reamer, Ref. Tool Item 1, (Ref.Fig.401), at a Speed of 370 rpm (11m/min) and a feed rate of 0.028in/per (0,07mm/per). Use GP Soluble Oil 30:1 diluted coolant. CMT
- (4) Chamfer the reamed holes 0.020/0.030 in. (0,51/0,76 mm) at an angle of 45 degrees, (Ref.Fig.401).
- (5) Remove the disk from the jig borer and remove sharp corners 0.010/0.020 in. (0,25/0,51 mm) (Ref.Fig.401).
- (6) Visually inspect for removal of damage and ensure that all machining parameters have been achieved.

B. Crack Detect.

- (1) Crack test the disk using the magnetic particle crack detection technique specified for this component in Chapter 72-33-02 Inspection/Check. CMT

C. Identify.

Mark salvage B.495681 or R10 close to the existing part number, using the vibro-percussion engraving technique as specified in Chapter 72-09-00 Repair.



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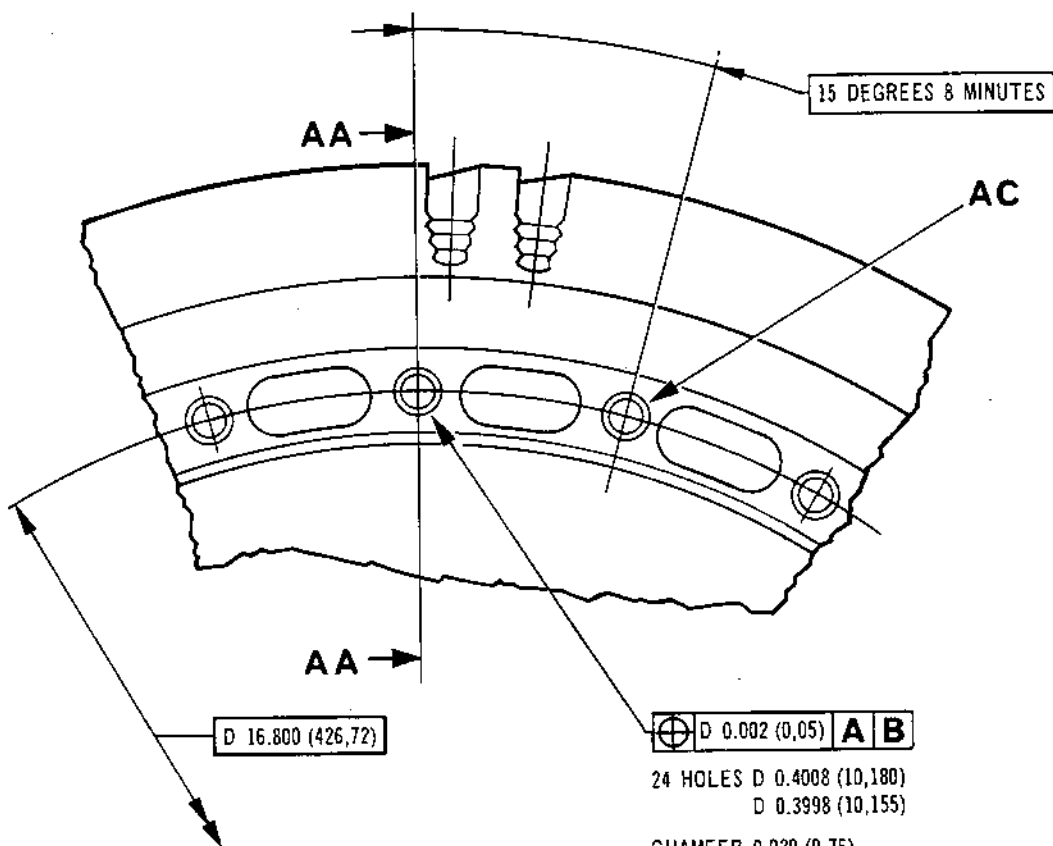
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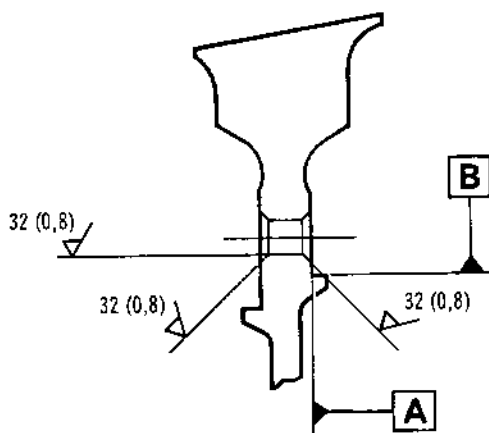
⊕ D 0.002 (0,05) A B

24 HOLES D 0.4008 (10,180)
D 0.3998 (10,155)

CHAMFER 0.030 (0,76)
0.020 (0,51) X 45 DEGREES

REMOVE SHARP CORNERS 0.010 (0,25) TO 0.020 (0,51)

16 HOLES SPACED AS FOR 24 HOLES EQUI-SPACED
8 HOLES EQUI-SPACED MARKED **AC**



SECTION AA

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

Machining Details
Figure 401

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TN30584



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D. Finally Inspect.

- (1) Finally inspect the disk to ensure the repair has been carried out satisfactorily and that the disk is in a serviceable condition.
- (2) Generally clean the disk to remove grease and foreign bodies, then place in a protective container and store as required.

4. Tools, Fixtures and Equipment

<u>Description</u>	<u>Qty.</u>	<u>Tool No.</u>	<u>Item No.</u>
Reamer	1	S3S15772000	1

TN31049

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**OLYMPUS 593**MK.610-14-28
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sneema

ROTOR COMPRESSOR HP DISK 3RD STAGE - REPAIR
RESTORATION OF BOLT-HOLES
MODIFICATION OL.8664C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>
72-33-02	1 350A/B/C	B.922857, B.922858, B.925081, B.925082, B.929392
	1 350D	B.509596, B.509597, B.512730 B.512731, B.512732, B.512733 B.512734, B.512735, B.512736 B.512737
	1 350E	B.512568, B.512571, B.512746 B.512747, B.512748, B.512749 B.512750, B.512751, B.512752 B.512753
	1 350F	B.517003, B.517004, B.517005 B.517006, B.517007, B.517008 B.517009, B.517010, B.517011 B.517012

CAUTION: THIS PROCEDURE CONTAINS OPERATIONS WHICH ARE
SUBJECT TO COMPONENT MANUFACTURING TECHNIQUES
(CMT) CONTROL. THESE OPERATIONS SHALL NOT BE
VARIED WITHOUT REFERENCE TO THE MANUFACTURER.
CMT. CERTIFICATE No. 129/B.495682.

2. Introduction

A. General.

- (1) This repair describes the procedure for the restoration of the bolt-holes by reaming to remove damage marks.
- (2) Dimensions are shown thus, INCHES (MILLIMETRES) in tables and illustrations.
- (3) Refer to Chapter 72-09-00 Repair for all standard practices applicable to this repair procedure.
- (4) Remove all sharp edges 0.004 to 0.020 in. (0,10 to 0,51 mm) unless otherwise stated.

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- (5) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm) unless otherwise stated.
- (6) Tolerances on all angles are plus/minus 2 degrees unless otherwise stated.
- (7) Protect the component against corrosion after each operation, and place in a container for protection against damage during transit between operations (Ref.72-09-20 Repair).

3. Instructions

A. Machine Holes to Remove Damage.

- (1) Visually inspect the disk and identify the holes that require repair.
- (2) Locate the disk onto a suitable jig boring machine and true up to datum B (Ref.Fig.401).
- (3) Ream the damaged holes (identified at A.(1)) 0.3998/0.4008 in. (10,155/10,18 mm) diameter using reamer, Ref. Tool Item 1, (Ref.Fig.401), at a Speed of 370 rpm (11m/min) and a feed rate of 0.028 in/rev (0,07mm/rev). Use G.P. Soluble Oil 30:1 diluted coolant. CMT
- (4) Chamfer the reamed holes 0.020/0.030 in. (0,51/0,76 mm) at an angle of 45 degrees, (Ref.Fig.401).
- (5) Remove the disk from the jig borer and remove sharp corners 0.010/0.020 in. (0,25/0,51 mm) (Ref.Fig.401).
- (6) Visually inspect for removal of damage and ensure that all machining parameters have been achieved.

B. Crack Detect.

- (1) Crack test the disk using the magnetic particle crack detection technique specified for this component in Chapter 72-33-02 Inspection/Check. CMT

C. Identify.

Mark salvage B.495682 or R11 close to the existing part number, using the vibro-percussion engraving technique as specified in Chapter 72-09-00 Repair.

REPAIR

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Repair No.11

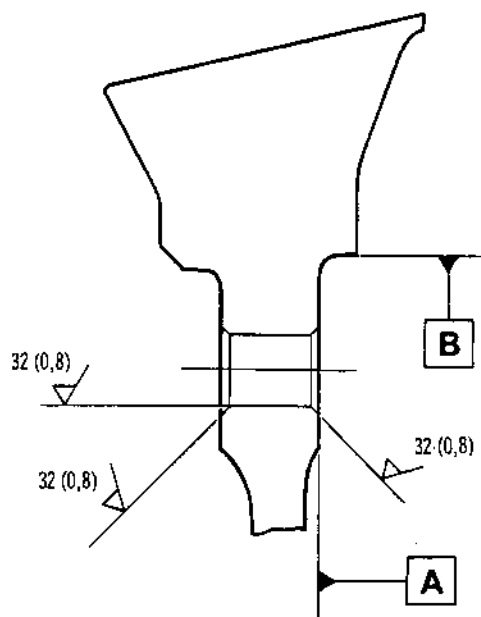
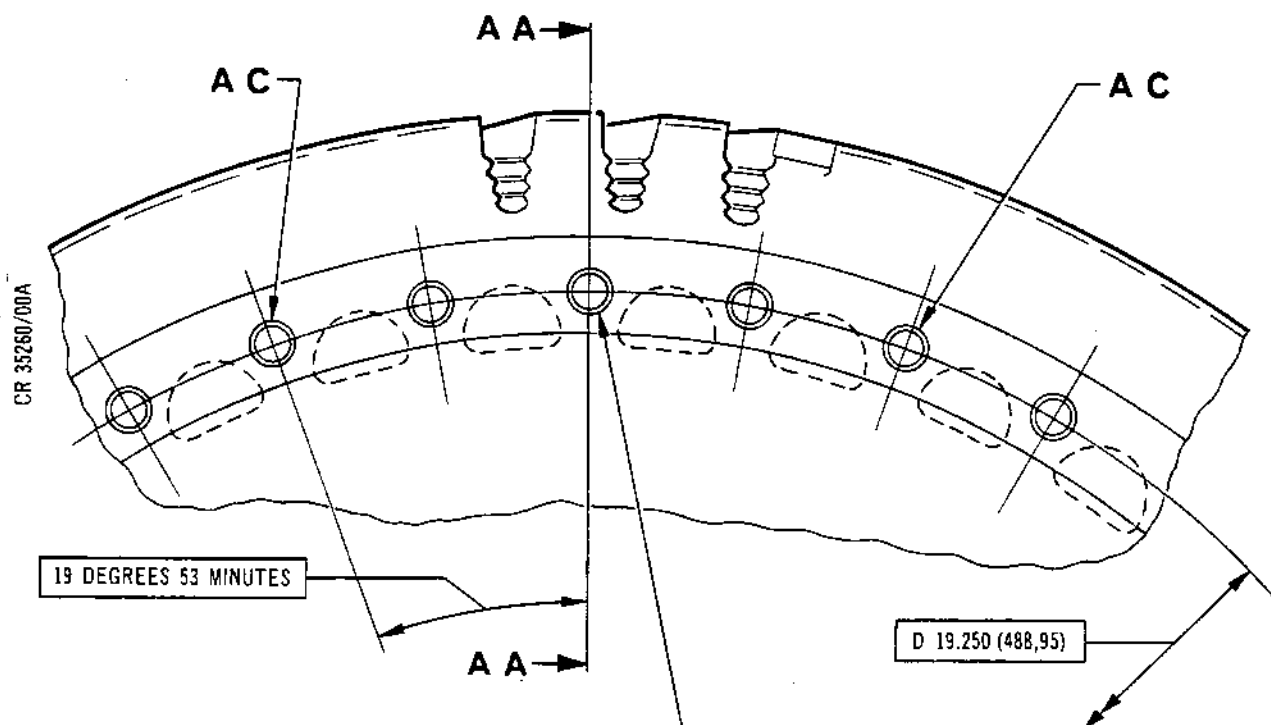
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SECTION A A

⊕ D 0.002 (0,05) **A B**

36 HOLES D 0.4008 (10,180)
D 0.3998 (10,155)

CHAMFER 0.030 (0,76)
0.020 (0,51) X 45 DEGREES

REMOVE SHARP CORNERS
0.010 (0,25) TO 0.020 (0,51)

27 HOLES SPACED AS FOR 36 EQUI-SPACED
9 HOLES EQUI-SPACED MARKED **A C**

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

Machining Details
Figure 401

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D. Finally Inspect.

- (1) Finally inspect the disk to ensure the repair has been carried out satisfactorily and that the disk is in a serviceable condition.
- (2) Generally clean the disk to remove grease and foreign bodies, then place in a protective container and store as required.

4. Tools, Fixtures and Equipment

<u>Description</u>	<u>Qty.</u>	<u>Tool No.</u>	<u>Item No.</u>
Reamer	1	S3S15772000	1

TN40772

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HP COMPRESSOR ROTOR DRIVE SHAFT - REPAIR
NO.12 LABYRINTH FINS RESTORED BY PLASMA WELDING

MODIFICATION OL.8681(C) AND 8688(C)

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THIS REPAIR HAS BEEN CANCELLED

REPAIR
72-33-02
Repair No.12
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HP COMPRESSOR ROTOR - REPAIR OF ROTOR BLADES
(STAGES 4 TO 7) BY COLD COINING AND MACHINING

MODIFICATION NO. OL.8641C

1. Effectivity

<u>I.P.C.</u>	<u>Fig./Item</u>	<u>Part No.</u>	<u>Stage</u>
72-33-02	2 10A/B	B.918245 B.918246)	4
		B.918242 B.927361)	
		B.932816 B.932820)	
		B.932821 B.932822)	
	2 60A/B/C	B.914739 B.927540)	5
		B.927541 B.927547)	
		B.932817 B.932825)	
		B.932826)	
	2 110A/B	B.923126 B.923129)	6
		B.927340 B.927543)	
		B.932818 B.932829)	
		B.932830 B.932831)	
	3 360A/B	B.248021 B.914738)	7
		B.918046 B.932819)	
		B.932834 B.932835)	

2. Introduction

A. General.

- (1) This repair describes the procedure to be followed in order to restore to a serviceable condition HP compressor rotor blades (stages 4 to 7) that have been rendered unserviceable through wear occasioned by excessive tip-rub in service.
- (2) The defective blade is restored to an acceptable condition by cold coining the blade tip to produce an extension that is then machined to the required overall dimension.

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- (3) Refer to Chapter 72-09-00 Repair, for all Standard Practices applicable to this repair procedure.
- (4) Dimensions in tables and on illustrations are shown thus: INCHES (MILLIMETRES).
- (5) Remove all sharp edges 0.004 to 0.020 in. (0,102 to 0,508 mm), unless otherwise stated.
- (6) Tolerances on machined dimensions are plus/minus 0.010 in. (0,25 mm), unless otherwise stated.
- (7) This repair covers stages 4 to 7 rotor blades in the HP compressor; each stage has its own salvage number and repair scheme number suffix as follows:

<u>Stage</u>	<u>Salvage No.</u>	<u>Repair Scheme No.</u>
4	B.495644	R.13A
5	B.495645	R.13B
6	B.495646	R.13C
7	B.495647	R.13D

- (8) Unless a statement is made to the contrary, the steps of procedure detailed in paragraph 3 are applicable to all stages of blades covered by this repair.
- (9) All tools referred to by item number in procedural steps are detailed in paragraph 4.
- (10) Ensure that the blades are suitably protected, to avoid corrosion and damage, upon completion of this repair.

B. Repair Limitations.

- (1) Each blade may be restored to a serviceable condition once only by the method detailed in this repair.

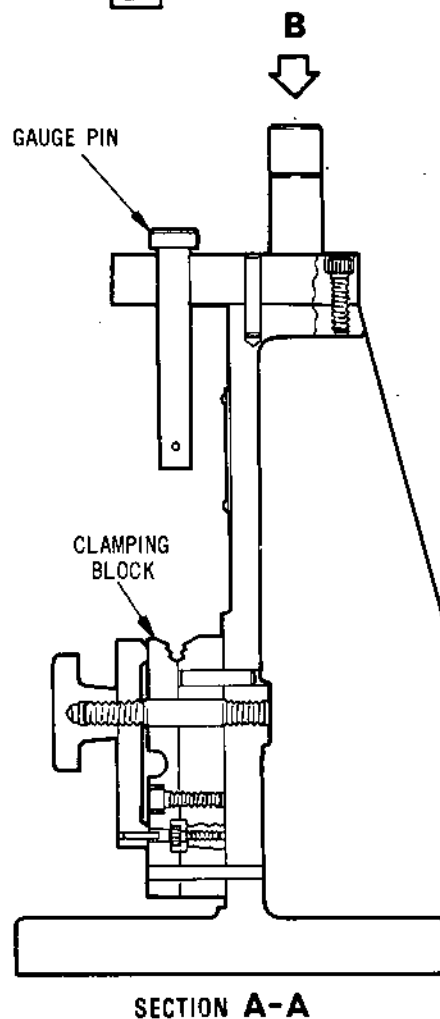
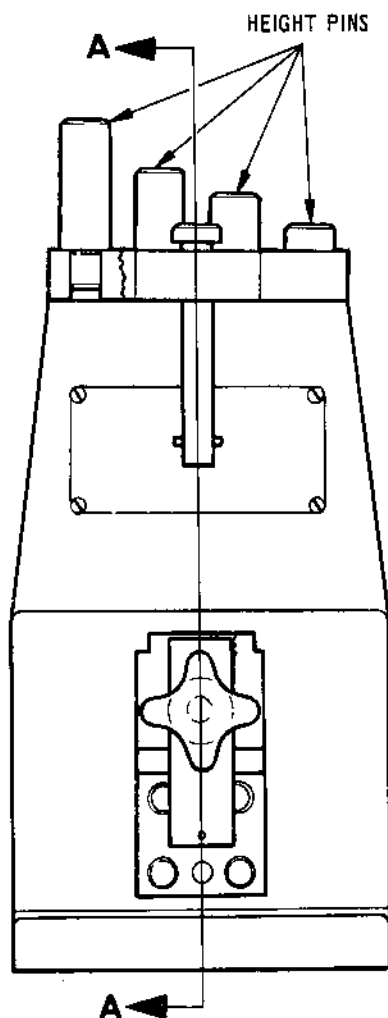
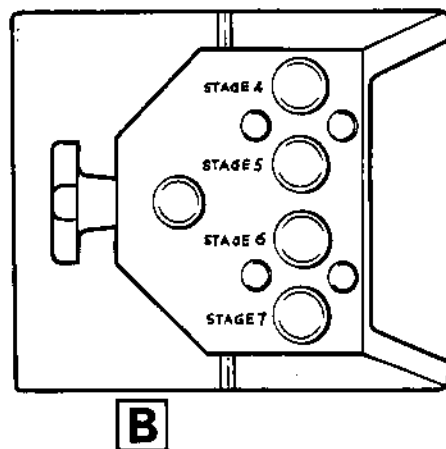
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Inspection Fixture, S3S.15771000
Figure 401



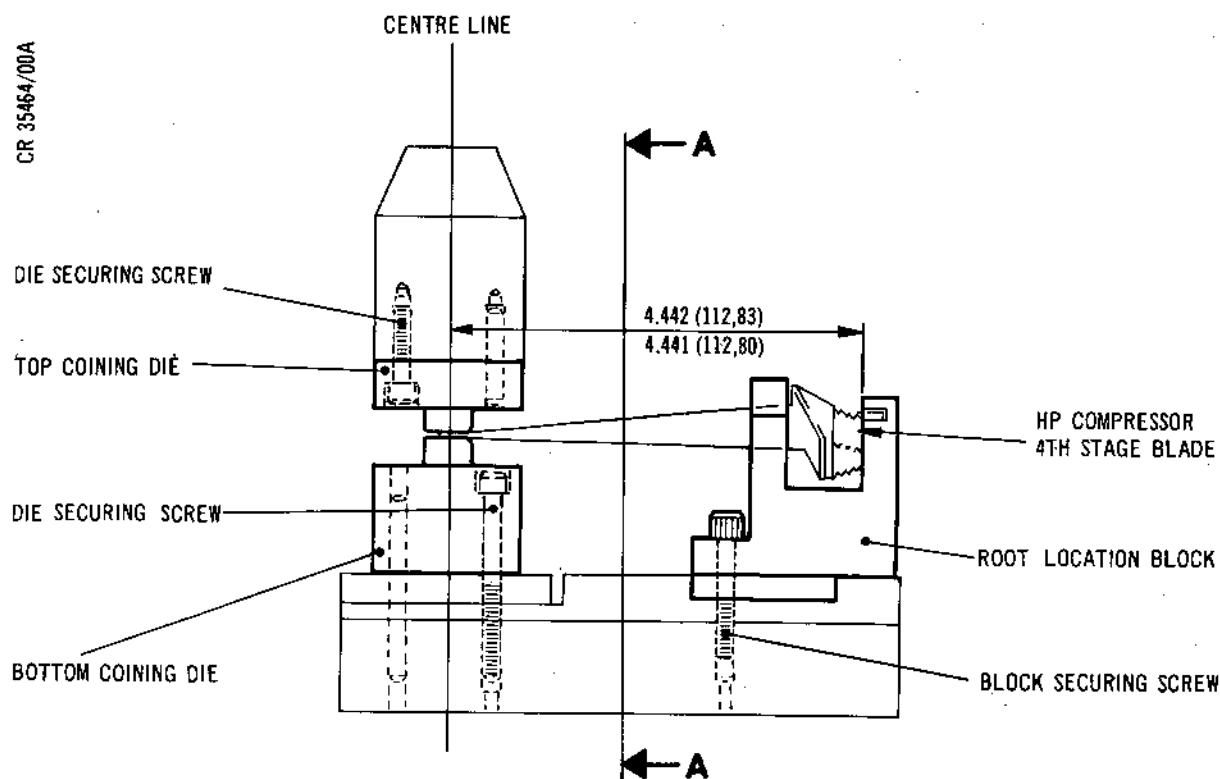
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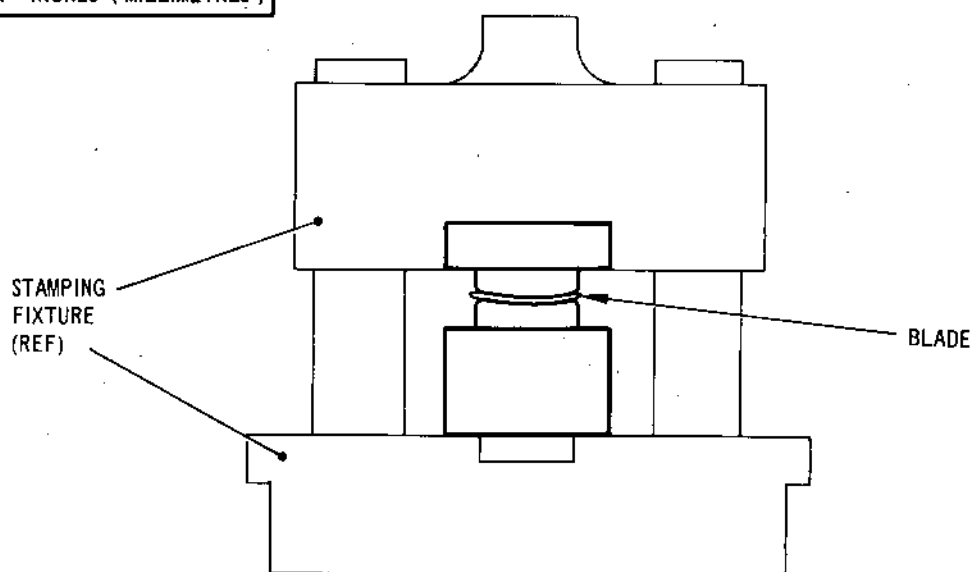
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CR 35464/00A



DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



SECTION A-A

(TYPICAL OF FIXTURES FOR ALL STAGES OF BLADES)

HP Compressor Rotor Blades (Stage 4) - Coining Dies, S3S.15707000
Figure 402

IN39503

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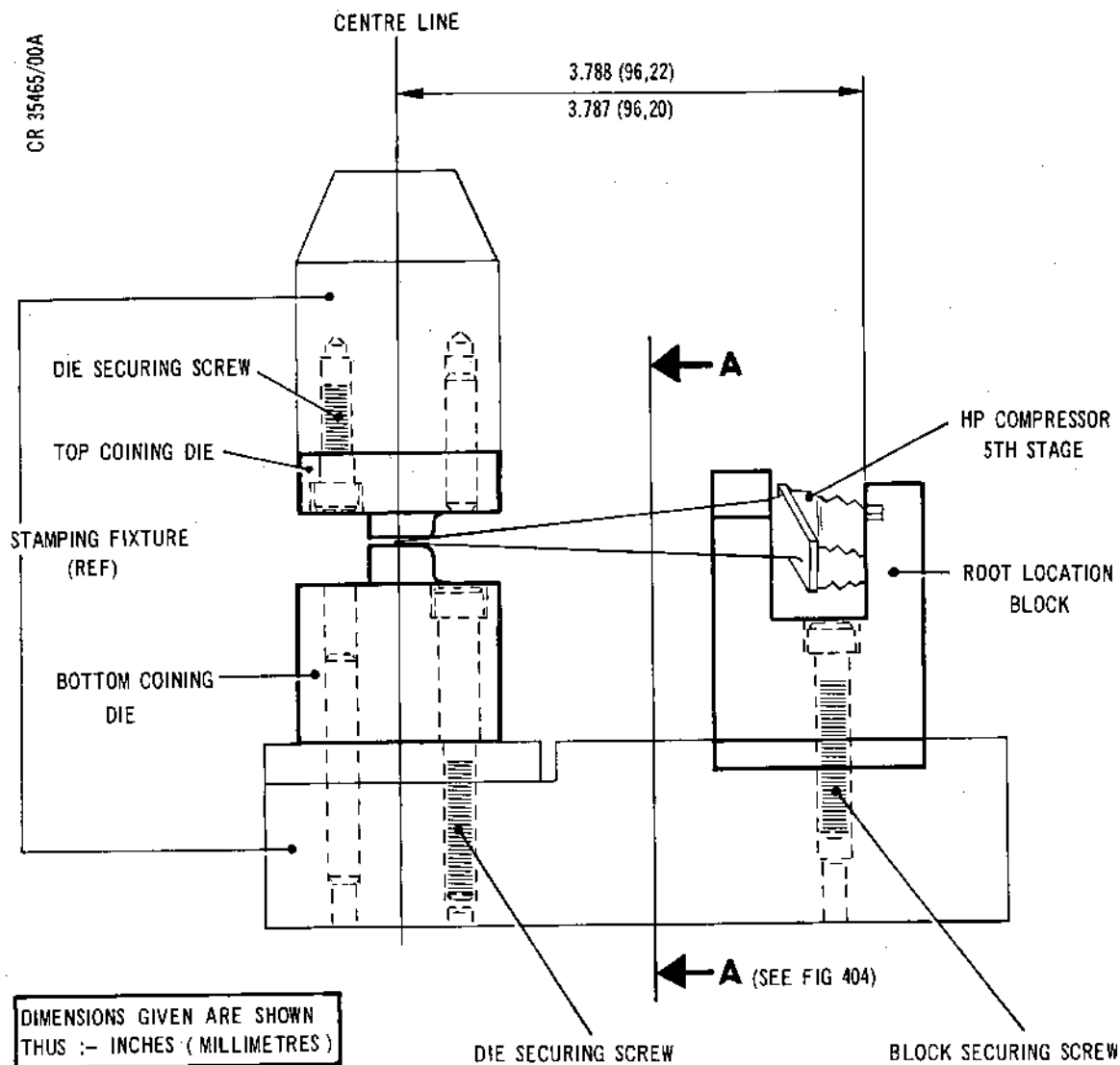
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TN15944

HP Compressor Rotor Blades (Stage 5) - Coining Dies, S3S.15709000
Figure 403

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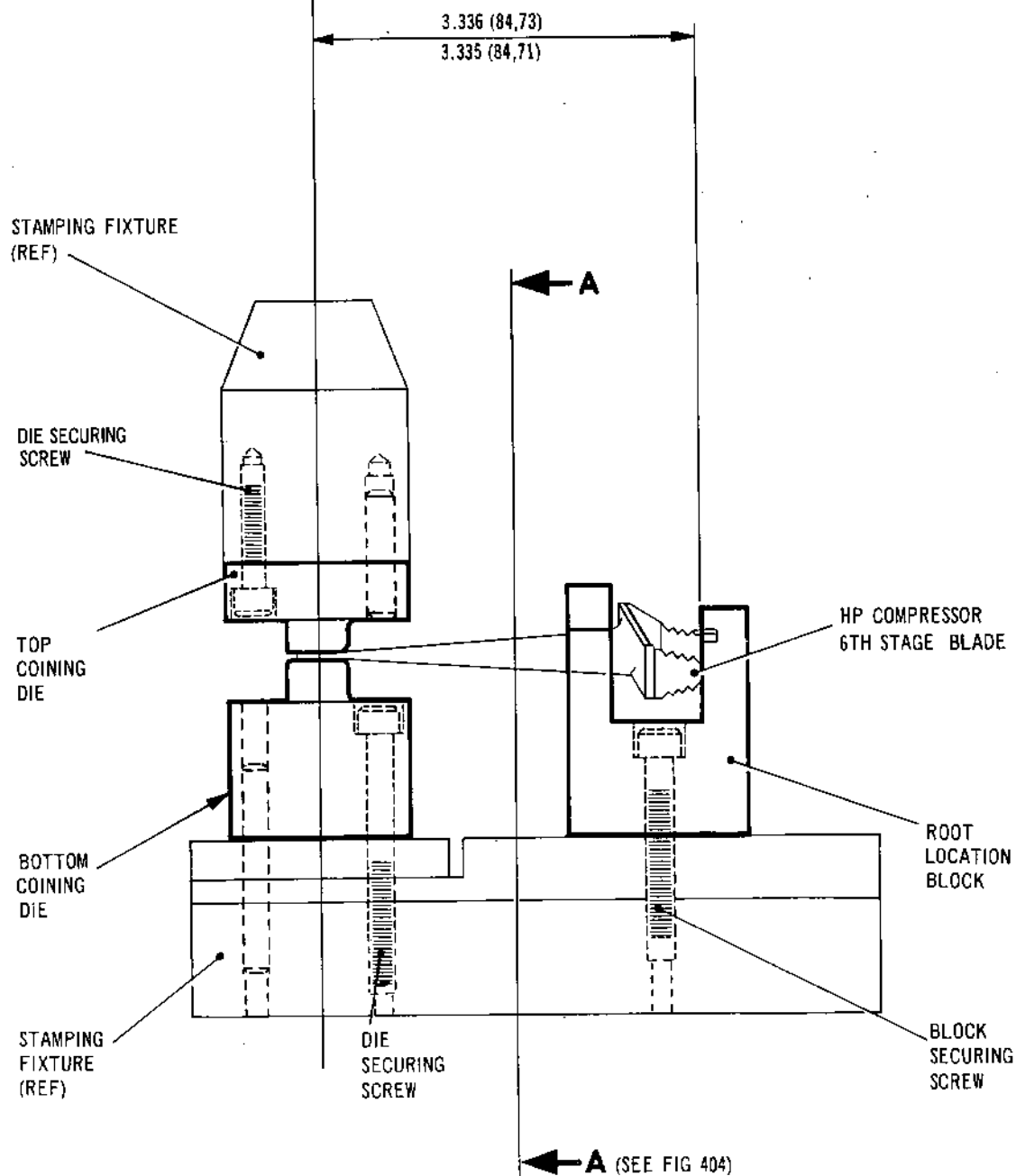
OLYMPUS 593
MK. 610-14-28
OVERHAUL



CR 35466/00A

CENTRE LINE

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)



TN15945

HP Compressor Rotor Blades (Stage 6) - Coining Dies, S3S.15711000
Figure 404

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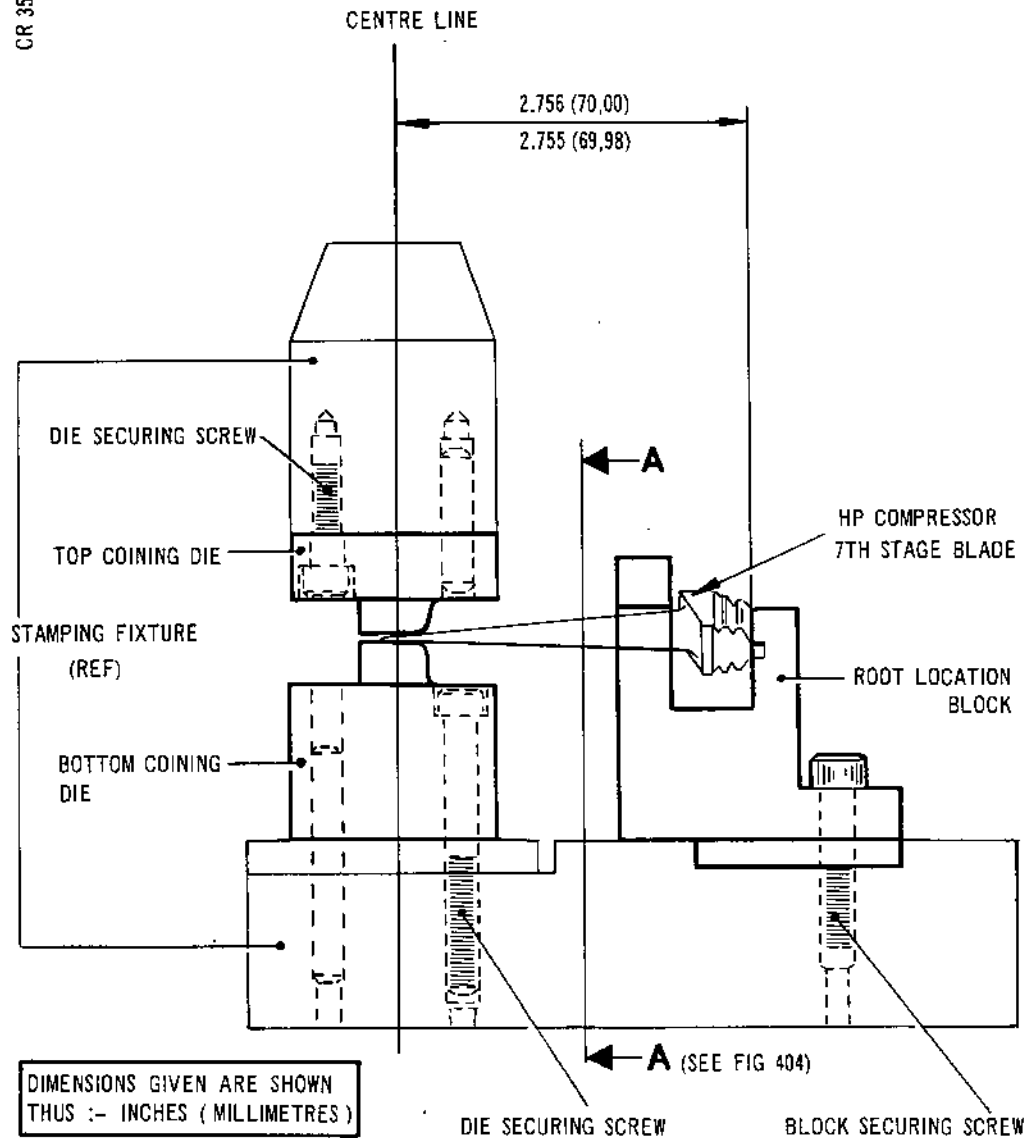


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MK.610-14-28
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CR 35467/00A

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TN12534

HP Compressor Rotor Blades (Stage 7) - Coining Dies, S3S.15713000
Figure 405

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SALVAGE NO.	STAGE	BLADE PART NUMBER
B.495644	4	(B.918242 (B.918245 (B.918246 (B.927361
B.495645	5	(B.927540 (B.927541 (B.927547
B.495646	6	(B.923126 (B.923129 (B.927340 (B.927543
B.495647	7	(B.248021 (B.914738 (B.918046

Salvage Number, Stage and Part Number Identification
Table 401

3. Instructions

A. Check the HP Compressor Rotor Blade.

- (1) Check the blade part number to ascertain which salvage is applicable (Ref. Table 401).
- (2) Check the overall length of blade, from blade datum to tip, to determine blade acceptability for repair.
 - (a) Install blade in fixture (Ref.Fig.401 and para.4. Item 9) and clamp in position in the lowest fir-tree serration.
 - (b) Place fixture/blade and a dial indicator gauge on surface table.
 - (c) Set fixture gauge pin to abut blade tip.

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- (d) Zero the dial indicator gauge on head of appropriate height pin.

NOTE: This zero reading equates to the minimum height of a serviceable blade.

- (e) Take comparative reading on head of gauge pin.
- (f) Remove blade from fixture, and reject any blade that does not conform to the minimum height requirements.

B. Cold-coin the HP Compressor Rotor Blade.

- (1) Select coining dies for the stage of blade being repaired (Ref. para. 4. Item 1, 3, 5 or 7).
- (2) Assemble the top (convex) and bottom (concave) dies in a suitable stamping fixture; secure dies in position (Ref. Fig. 402, 403, 404 and 405).
- (3) Assemble stamping fixture/coining dies in a hydraulic press; secure fixture to press.
- (4) Secure root location block in position on stamping fixture (Ref. Fig. 402, 403, 404 and 405).
- (5) Set blade tip on bottom die, convex face down, and support blade root in location block; ensure bottom of root abuts location block (Ref. Fig. 402, 403, 404 and 405).

NOTE: The root location block supports the blade in the correct position relative to the die.

- (6) Cold-coin the blade tip to produce the required extension (Ref. Fig. 407); apply 40 tons force (approx.) for 10 seconds (max.).
- (7) Remove blade from die and check that sufficient elongation, within the quoted limits (Ref. Fig. 407), has been achieved to permit machining to final dimensions (Ref. Fig. 408); use inspection fixture and dial indicator gauge (Ref. para. 3.A.(2)). Re-coin blade tip if required.
- (8) Remove coining dies and stamping fixture from hydraulic press.

REPAIR

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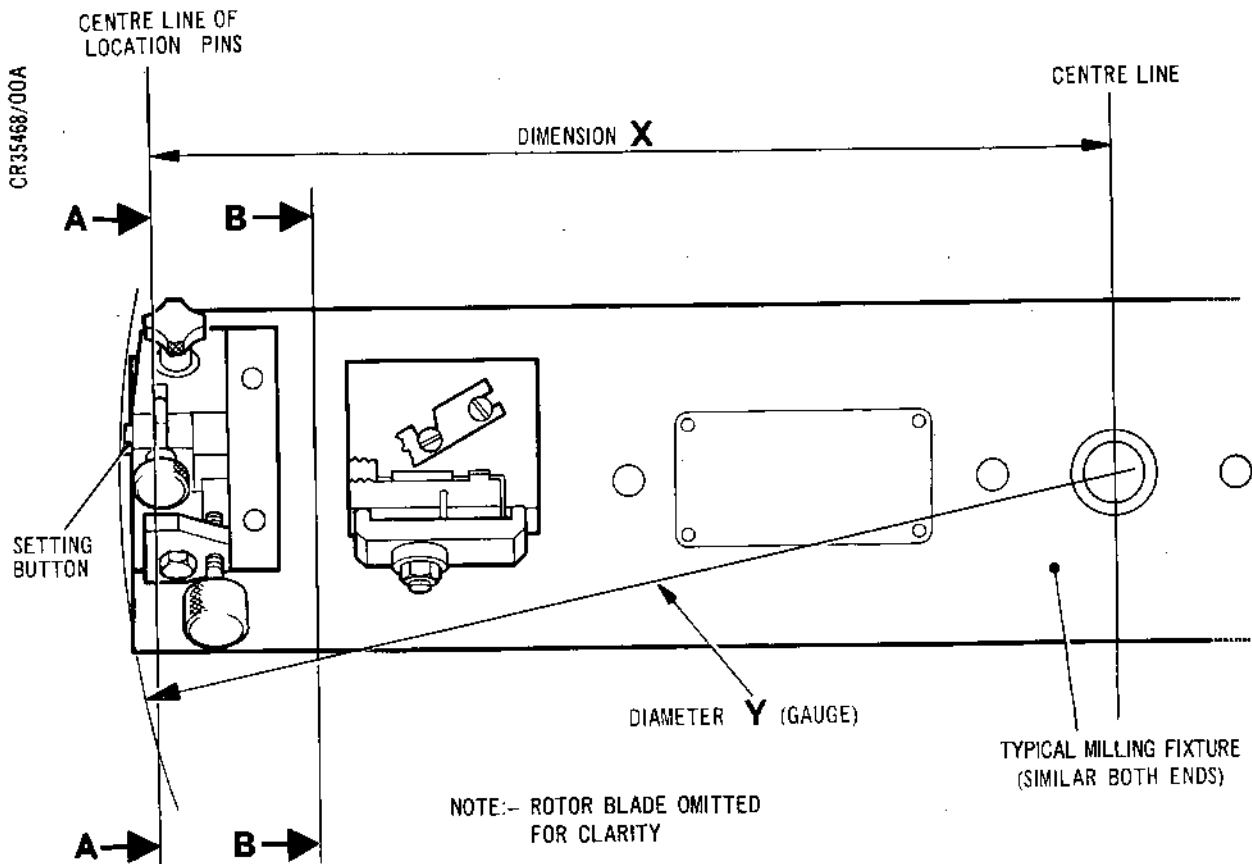
Repair No. 13

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	DIMENSION X	DIAMETER Y
STAGE 4	15.5105 (393,966)	32.0360 (813,714) 32.0280 (813,511)
STAGE 5	15.5512 (395,000)	32.0281 (813,514) 32.0200 (813,308)
STAGE 6	15.5906 (396,000)	32.0240 (813,410) 32.0160 (813,206)
STAGE 7	15.5906 (396,000)	32.0040 (812,902) 31.9960 (812,698)

DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

TN12537

HP Compressor Rotor Blades - Typical Milling Fixture
Figure 406 (Sheet 1 of 2)

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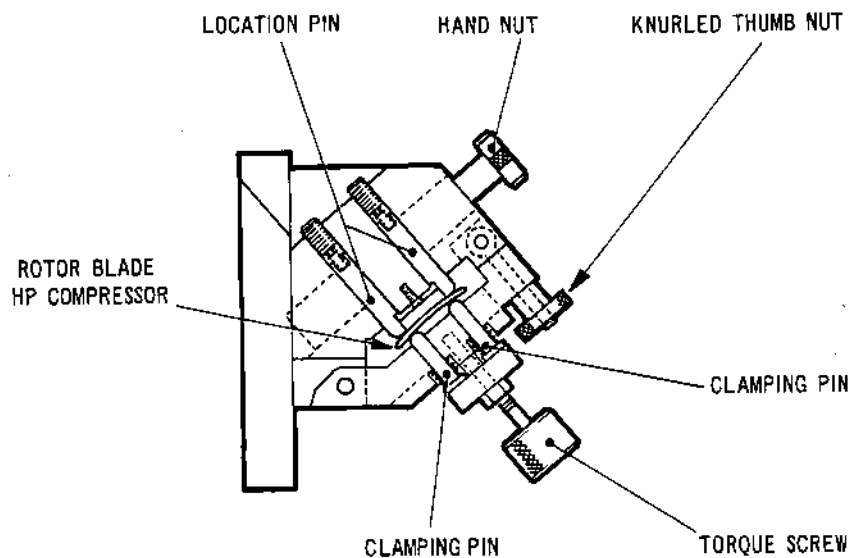
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MK. 610-14-28

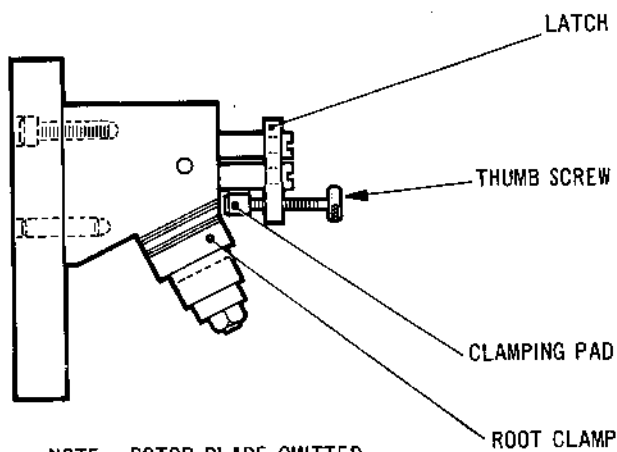
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SECTION A-A



NOTE:- ROTOR BLADE OMITTED
FOR CLARITY

SECTION B-B

HP Compressor Rotor Blades - Typical Milling Fixture
Figure 406 (Sheet 2 of 2)

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C. Inspect the HP Compressor Rotor Blade.

- (1) Visually inspect the blade for excessive 'stepping' or indentations resulting from the coining operation; lightly polish the blade, at leading edge and on convex side only, to blend out coining marks.

NOTE: Refer to the controlling laboratory for details of blade untwisting checks if required.

- (2) Test the blade for cracks; use the fluorescent dye penetrant process F2A (Ref.72-09-00 Inspection/Check).

D. Machine the HP Compressor Rotor Blade.

- (1) Install two previously coined blades from the same stage in appropriate milling fixture (Ref.para.4, Item 2, 4, 6, or 8 and Fig.406).
- (2) Install the milling fixture/blades on suitable milling machine.
- (3) Machine the blade tips to produce the required dimensions and surface finish (Ref.Fig.408).
- (4) Remove milling fixture/blades from milling machine and remove blades from fixture.
- (5) Remove burrs from blade tip and blend leading and trailing edges at blade tip to remove any excess material; use conventional hand tools.

E. Etch the HP Compressor Rotor Blade Tip.

WARNING: ETCHING SOLUTIONS ARE CORROSIVE. OPERATORS MUST WEAR COMPLETE BODY PROTECTIVE CLOTHING AND FACE MASKS AND MUST COMPLY WITH THE SAFETY PRECAUTIONS DETAILED IN CHAPTER 72-09-14 REPAIR.

- (1) Mask the blade root and that part of the blade aerofoil not being etched; use I.C.I. Stopping-off Red Lacquer F230-2006.

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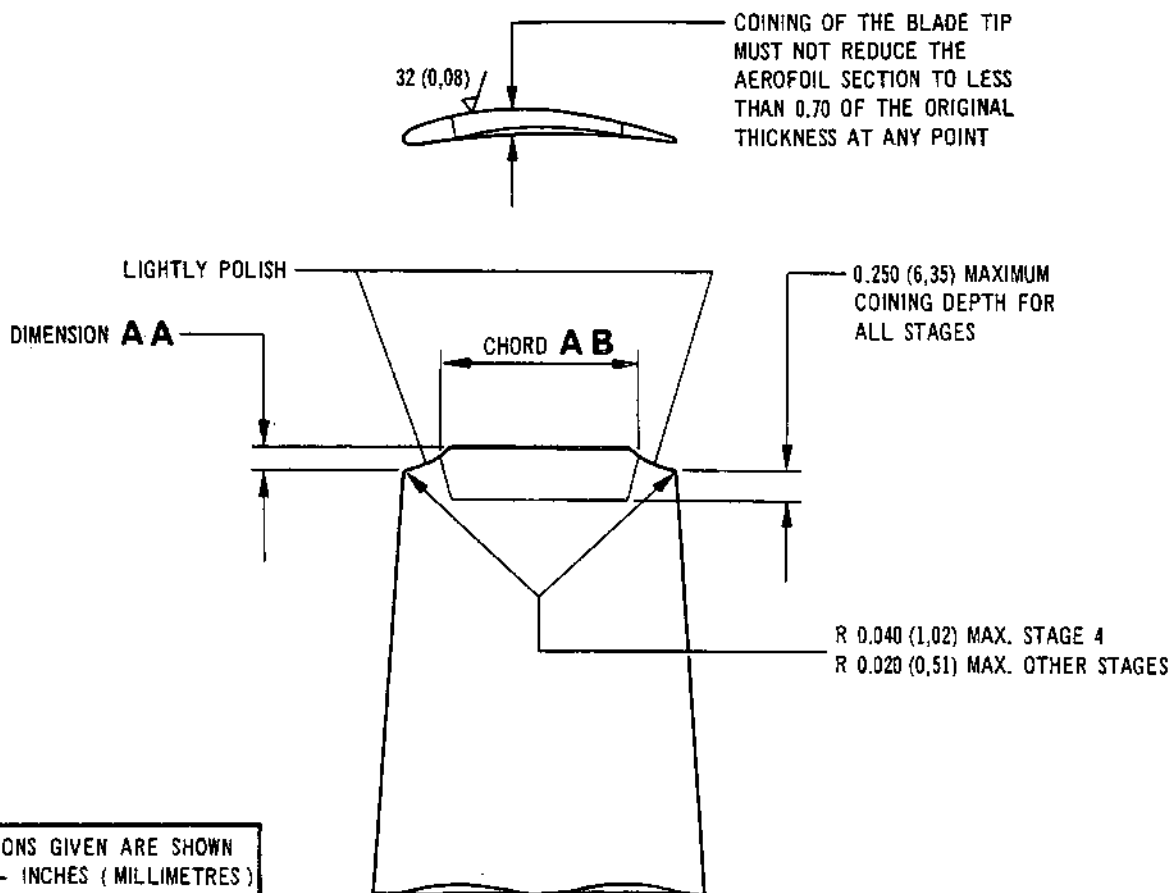
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DIMENSIONS GIVEN ARE SHOWN
THUS :- INCHES (MILLIMETRES)

SURFACE ROUGHNESS VALUES ARE SHOWN
THUS :- MICRO-INCHES (MICROMETRES) ✓

STAGE	MAX. EXTENSION DIMENSION AA	COINING WIDTH DIM AB MIN.
4	0.050 (1,27)	0.92 (23,37)
5	0.045 (1,14)	0.90 (22,86)
6	0.045 (1,14)	0.92 (23,37)
7	0.045 (1,14)	0.72 (18,29)

HP Compressor Rotor Blades (Stages 4 to 7) - Coining Dimensions
Figure 407

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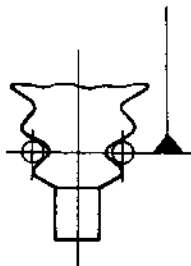
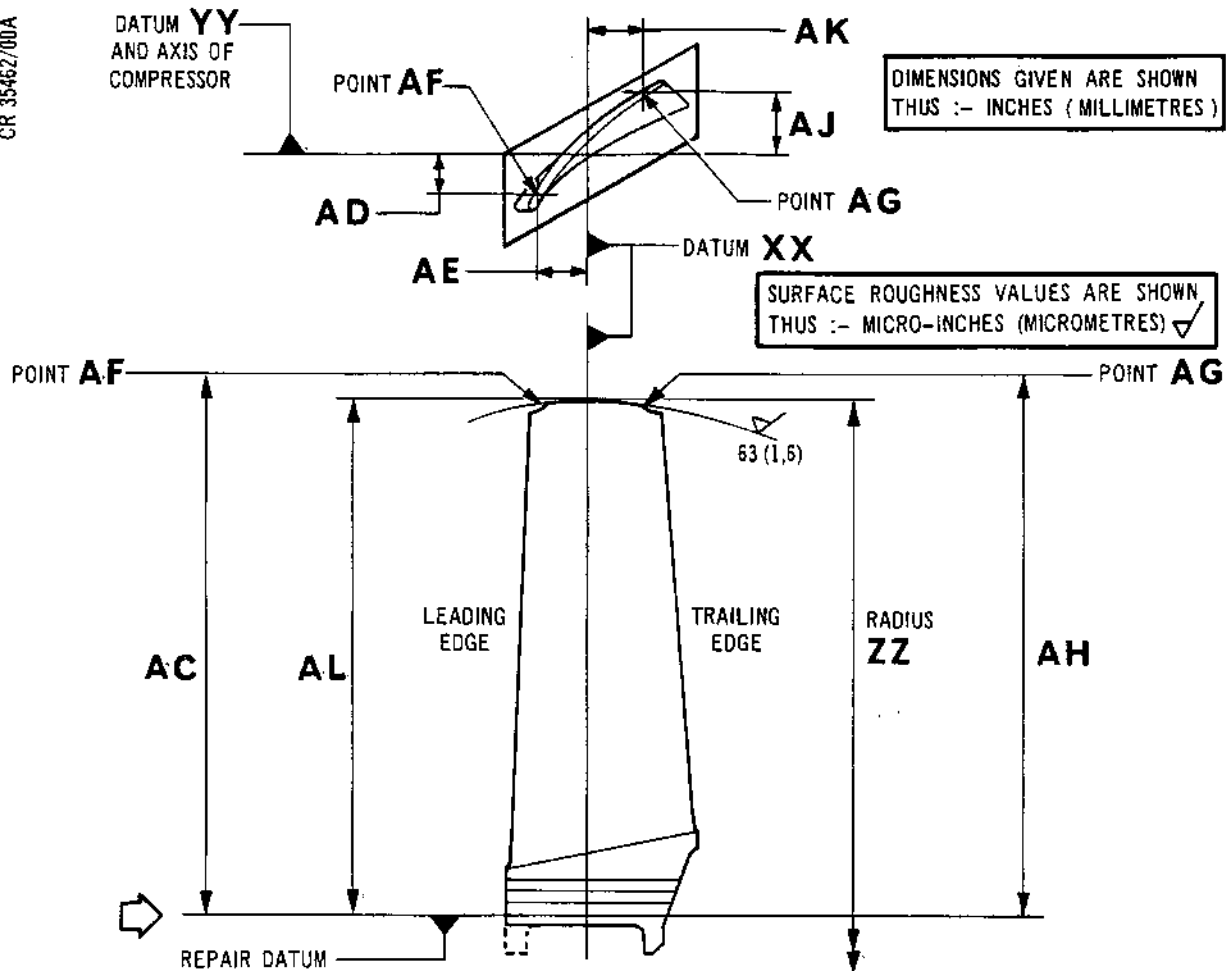


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CR 35462/00A



VIEW IN DIRECTION
OF ARROW

NOTE:-
FOR THE PURPOSES OF THIS
SCHEME THE BLADE REPAIR
DATUM IS LOCATED IN LOWEST
FIR TREE SERRATION FOR
ALL BLADES

LOCATION	STAGE 4 SAL. B 495644	STAGE 5 SAL. B 495645	STAGE 6 SAL. B 495646	STAGE 7 SAL. B 495647
AC	4.5535 (115,659) 4.5485 (115,532)	3.8995 (99,047) 3.8945 (98,920)	3.4475 (87,567) 3.4425 (87,440)	2.8595 (72,631) 2.8545 (72,504)
AD	0.330 (8,38)	0.360 (9,14)	0.370 (9,40)	0.230 (5,84)
AE	0.380 (9,65)	0.320 (8,13)	0.330 (8,38)	0.270 (6,86)
AH	4.5485 (115,532) 4.5435 (115,405)	3.8985 (99,022) 3.8935 (98,895)	3.4475 (87,567) 3.4425 (87,440)	2.8575 (72,581) 2.8525 (72,454)
AJ	0.520 (13,21)	0.400 (10,16)	0.400 (10,16)	0.340 (8,64)
AK	0.460 (11,68)	0.460 (11,68)	0.480 (12,19)	0.330 (8,38)
AL	4.5575 (115,761) 4.5525 (115,634)	3.9035 (99,149) 3.8985 (99,022)	3.4515 (87,668) 3.4465 (87,541)	2.8615 (72,682) 2.8565 (72,555)
ZZ	16.016 (406,81)	16.012 (406,71)	16.010 (406,65)	16.000 (406,40)

HP Compressor Rotor Blades (Stages 4 to 7) - Machining Dimensions
Figure 408

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OVERHAUL



sneema

- (2) Etch the previously coined and machined area of the blade tip (Ref.72-09-14 Repair) for a period of 30 seconds from onset of gassing; use solution 'D' detailed in referenced procedure.
- (3) Remove masking lacquer from blade by vapour degreasing to the approved specification (Ref.72-09-00 Cleaning).

F. Inspect the HP Compressor Rotor Blade.

- (1) Test the blade for cracks; use the fluorescent dye penetrant process F2A (Ref.72-09-00 Inspection/Check).

G. Vapour Blast the Aerofoil Section of the HP Compressor Rotor Blade.

- (1) Apply approved masking tape to the blade root and other areas of the blade aerofoil which are not to be vapour blasted.
- (2) Vapour blast the blade (Ref.72-09-13 Repair); use procedure 'A' detailed in referenced procedure.
- (3) Remove masking tape from the blade.
- (4) Passivate the blade for a minimum period of two hours (Ref.72-09-13 Repair).

H. Identify Repair.

- (1) Mark the repair scheme number (Ref. para.2.A.(7) close to the standard part number on the repaired blade; use the vibro-percussion engraving method (Ref. 72-09-00 Repair).
- (2) Re-part number (Ref.72-09-00 Repair) repaired pre-modification OL.8576 standard blades (Ref. Table 402). Use the vibro-percussion engraving method.



OLYMPUS 593
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SALVAGE NO.	STAGE	OLD PART NUMBER	NEW PART NUMBER
B.495644	4	(B.918242	B.932822
		(B.918245	B.932821
		(B.918246	B.932820
		(B.927361	B.932816
B.495645	5	(B.927540	B.932825
		(B.927541	B.932817
		(B.927547	B.932826
B.495646	6	(B.923126	B.932818
		(B.923129	B.932829
		(B.927340	B.932830
		(B.927543	B.932831
B.495647	7	(B.248021	B.932835
		(B.914738	B.932819
		(B.918046	B.932834

New Part Numbers for Repaired Pre modification OL.8576 Blades
Table 402

J. Inspect the HP Compressor Rotor Blade.

- (1) Carry out a final visual inspection and dimensional check of the blade to ensure satisfactory completion of repair and suitability for service; use the inspection fixture (Ref.para.4 Item 9 and Fig.401).
- (2) Endorse inspection records to ensure that blades to the standard of this repair scheme are not assembled in sets with standard blades to pre-modification OL.8576.

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REPAIR

72-33-02

Repair No.13

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